



125TH ANNIVERSARY CASE STUDY COMPILATION

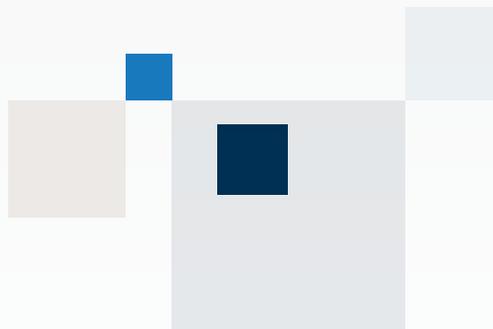


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ASTM Standard Use & Effectiveness Case Study Contest

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Please identify the designation and title of the standard

A1 - Standard Specification for Carbon Steel Tee Rails

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

A group of scientists and engineers, led by Charles Dudley, formed what would later become ASTM in 1898 to address the frequent rail breaks affecting the fast-growing railroad industry. The group developed a standard for the steel used to fabricate rails. The founding of ASTM occurred during the industrial revolution to address quality issues resulting from the hastened implementation of new technologies and the lack of focus on quality. The Bessemer steelmaking process allowed the first mass production of steel which was immediately utilized in structures and as rail. The American made rails suffered quality shortfalls to the point that more expensive British rails were preferred to avoid these issues. In order to address quality and production issues, the American Society for Testing Materials (ASTM) was formed in 1902 with one of the first specifications (A1) regarding steel railroad rail. This specification, along with rail accessories, now falls under the ASTM International and subcommittee A01.01.

Identify the interest groups that participated in the development and/or revision to the standard?

Railroads, rail manufacturers, design engineers, and regulatory agencies

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

The A1 standard establishes rail manufacturing methods, alloying requirements, internal condition of the steel including solidification, final microstructure, and ultrasonic testing, mechanical properties, dimensional requirements, etc.

After the standard was published, has it impacted health and safety? If yes, please explain.

Improvement in rail performance or a reduction in rail breaks related directly to a reduction in derailments and accidents due to utilization and adherence to the developed standard A1 along with other quality focused efforts and technological developments

How do consumers and the public benefit from this standard? (If applicable)

Utilization of the A1 standard relates to ensuring minimum performance standards for rail. Rail that is reliable ensures trains move safely to their destinations which ensures the timely movements of goods to market maintaining a constant supply of goods at a reasonable transportation cost. Additionally, passengers also move by rail and ensuring safe passage for the trains over the rail directly relates to the safety of the passengers and railroad workers.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

No

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

No

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

SDGs 1 and 2 are addressed through the economical transportation of agricultural products across the developed world lowering costs and improving availability of food to the world markets.

SDGs 7, 13, and 15 are addressed through extreme efficiency of moving goods via rail in comparison to over the road trucking. This efficiency directly reduces emissions and impact on the environment.

Please provide any additional information not provided above.

NA

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Committee: A01.01

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Please identify the designation and title of the standard

A53/A53M-20 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

In terms of standard developing organizations this standard filled a need for steel product "...intended for mechanical and pressure applications and...acceptable for ordinary uses in steam, water, gas and air lines."¹ The specification was originally approved in 1915 and published in July of 1918. It is one of the older standards in A01. Knowledge of the exact need is not currently known.

1-A53 Scope

Identify the interest groups that participated in the development and/or revision to the standard?

SAE - Society of Automotive Engineers founded in 1905, ASME - American Society of Mechanical Engineers founded in 1880, and ABS - American Bureau of Shipping founded in 1862 had vested interests in developing the standard.

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

- 1 - Luminaire arms for street lighting structures.
- 2 – Fire sprinkler pipe
- 3 - Pressure vessel applications (steam, water, gas and air), i.e. furnaces, boilers, etc.

After the standard was published, has it impacted health and safety? If yes, please explain.

- 1 - The product has been used in residences and medical facilities for water and gas applications as it is approved by UBC Uniform Building Code and ICBO international Conference of Building Officials.
- 2 - The product is found in commercial development as fire sprinkler pipe as it is approved by the National Fire Protection Association.

How do consumers and the public benefit from this standard? (If applicable)

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

Aside from the previously mentioned acceptances, A53 is an approved product for the AWS Building Code and the AWS Bridge Welding Code. Type S seamless was used in the first nuclear powered submarine, the Nautilus.

I have chaired A01.09 for eleven years and received over two hundred different inquiries regarding the forty-five standards under A01.09 jurisdiction. Forty-eight of the inquiries directly or indirectly involved A53. I attribute the inquiries not to ambiguity but frequent use and applications including fifteen of offshore nature.

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

Please provide any additional information not provided above.

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Committee: A01.09

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Please identify the designation and title of the standard

ASTM A668 Standard Specification for Steel Forgings, Carbon and Alloy, for General Industrial Use

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

This standard was created by the merger and subsequent withdrawal of three former ASTM Standards: A 235 (Specification for Carbon Steel Forgings for General Industrial Use), A237 (Specification for Alloy Steel Forgings for General Industrial Use) and A 243 (Specification for Carbon and Alloy Steel Ring and Disk Forgings). These three standards date back to at least the 1940s but in 1975 they were merged into the new specification A668. A668 retains some of the alloy recommendations from these earlier documents. Due to the age of A668, none of the committee members who were originally involved in its creation are still active in the committee and records pertaining to the motivation for merging the three specifications noted above are not available. However, it is clear from a review of the earliest ASTM documents and other historical literature surrounding the development of the steel and forging industry that base line minimum requirements were needed within industry. Since the development of the former three specifications and later A668, numerous additional specifications for forgings for specific applications, such as pressure vessels and gears, have been created, but where such highly loaded and specialized components are not used, A668 provides assurance of a minimum level of performance.

Identify the interest groups that participated in the development and/or revision to the standard?

Today the users of ASTM A668 represent a wide range of industries. State departments of transportation use it as a guide for the creation of forged gears and other structures used on movable and drawbridges. Forgings for all sorts of manufacturing machinery such as crankshafts, propulsion shafts for ships, and components for power generation machinery are made to the requirements of this specification. A wide range of components used on mining machinery are produced to its requirements. Notably, it is also widely referenced by the shipbuilding industry and the language of the specification can be found in the documents of other standards organizations such as the American Bureau of Shipping (ABS) as well as specifications which govern the production of parts for the defense sector. Because of its wide use, it is regularly revised and updated. These updates are generally initiated by the producer community but are reviewed and approved by the user community represented on committee A01 as well as those from other industry organizations

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

Generally, purchasers of forgings will detail a specific grade and class callout from A668 on their purchase orders or internal specifications. Occasionally, the language of the specification will be adopted within these documents. Likewise, other standards organizations such as ABS will specifically call out grade/class and or specific heat treat requirements from A668 within their documents.

After the standard was published, has it impacted health and safety? If yes, please explain.

Because of its wide use for components used to build bridges and ships, it has become integral to the transportation infrastructure. Designers of bridges and ship-board machinery rely on the property requirements detailed in this specification when they design components for these applications.

How do consumers and the public benefit from this standard? (If applicable)

The best example of public benefit from A668 is its use by designers of bridges, specifically those used in coastal areas where shipping traffic must pass under bridges. Many of these bridges are of the drawbridge or pivoting type. The movement of these structures are actuated by large gears, shafts and linkages made to the requirements of ASTM A668. Such structures not only must pivot but also effectively carry heavy traffic loads. While few users in this capacity are aware of the mechanisms associated with these bridges, they are dependent on these components for safe operation of these structures.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

Because it is used in such a wide variety of sectors, there is no specific industry to provide this type of supporting information. And if available would not likely be provided to the members of A01.06.

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

It is a recognized standard within the American Bureau of Shipping which provides regulatory oversight for marine shipping.

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

Number 11. Sustainable Cities and Communities.

These forgings can be used in supporting infrastructure such as a shaft to power a hydroelectric station that would provide electricity to a community without the use of fossil fuels.

Please provide any additional information not provided above.

Contact Name: Patrick Nowak

Committee: ASTM A01, Subcommittee A01.06 Steel Forgings and Billets

Email Address: pnowak@scotforge.com

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Please identify the designation and title of the standard

ASTM A653/A653M Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

The roots of A653/A653M go back many decades, even to the time galvanized steel sheets were largely produced only as cut lengths of sheet hand-dipped individually into molten zinc. Control of coating weight was rudimentary, and the zinc coating was as thick as 1.25 oz/ft² (0.0037") on each surface. Because of the zinc thickness and chemistry, it was sometimes not very adherent, limiting it to end uses that involved only mild forming. Such thick coatings were also more than were needed for most applications, making zinc cost an appreciable portion of the selling price, especially so the thinner sheet.

In the 1930s the sheet galvanizing process began migrating to the continuous method with its higher production rates and improved zinc wiping methods. At the higher processing speeds used it was, and still is, very difficult to successfully apply 1.25 ounces of zinc on each surface of thin sheet. At about the same time, the industry learned that a small amount of aluminum in the zinc bath markedly improved zinc adhesion and made zinc wiping slightly easier. Manufacturers saw an opportunity, so began producing coated sheet with lower coating weights, which reduced production costs, resulted in a much more formable coating, yet provided adequate corrosion protection for the many markets that did not need, nor want to pay for, thick coatings. Even as late as 1950 some producers marketed galvanized sheet with terms such as "Tight Coated Stock", which had an adherent "tight" coating to reduce the likelihood of flaking during severe forming. However, no industry-wide specification governed the coating weights each producer was offering. Many producers, though, would produce special coating weights at the request of customers.

During the early 1950s the most common of the thinner coatings being offered was labeled "1.25 Commercial", which aimed at minimum 0.90 oz/ft², split between both sides. Governance of this and other coating designations was controlled through industry AISI committees. It took until 1964 for these coatings to be formally standardized in ASTM specification A525 General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process. Coating Class "1.25 Commercial" became Coating Designation "G90", with a specified minimum weight of 0.90 oz/ft², total both sides. The coating class known as "Light Commercial" became Coating Designation "G60". Coating Class "2.50" (equivalent to the original 1.25 per side coating) became Coating Designation "G210".

Specification A525 was a General Requirements document that contained, amongst other requirements such as dimensional tolerances, the minimum limits for all galvanize coating designations. Other specifications were written for specific galvanized sheet products, although referred to A525 for coating weight. These included A446 for Structural Quality, A526 for Commercial Quality, A527 for Lockforming Quality, A528 for Drawing Quality, and A642 for Drawing Quality, Special Killed. These specifications governed the galvanized sheet industry at a time when all steel sheet was produced via ingot casting, with which non-metallic inclusions were a concern re formability of the steel substrate. A527 specified that rimmed steel was to be used, as it was free of non-metallic inclusions, so withstood lockforming without the risk of fracturing. Also, in 1962 a stand-alone document, A463, was created by A05.11 for Aluminum-Coated steel sheet.

The above specifications served the galvanized sheet industry well until the early to mid 1980s when other hot-dip products coated with zinc-alloys came into the marketplace. Specification A792 for 55% Aluminum-Zinc Alloy-Coated was approved in 1984 and A875 for Zinc-5% Aluminum Alloy-Coated was approved in 1987. These were similar documents to A526 but were not covered by A525, so each had to contain all the dimensional tables within them. It was also becoming increasingly difficult to maintain consistency and harmony amongst all these similar documents when a change was made to any one of them. Another factor was the existing specifications described their products only in terms of chemical composition, identical in some cases for two or more qualities. The Quality Designations did not reflect the availability of new steels, which were the result of then emerging technologies such as continuous casting, vacuum degassing, and steel ladle treatments. Ingot casting of steel for coated sheet was rapidly being phased out.

Committee A05 decided circa 1986 that the existing quality descriptors of the products in its specifications did not provide producers and users with all the information needed to select and manufacture the appropriate steel for an application. A Task Group was formed to revamp all the hot-dip coated sheet specifications to reflect the steels that were available and put the common requirements of the product specifications into one general document for ease of maintenance and harmony. Each product specifications was written to contain only information specific to that product, and to reference the general document for requirements common to all. This arrangement proved extremely valuable in later years when thickness tolerances for coated sheet were tightened, as only one specification had to be revised instead of seven or eight.

Identify the interest groups that participated in the development and/or revision to the standard?

The publication of A653/A653M was the culmination of cooperation amongst galvanized sheet users and producers, zinc producers, and general interest members of A05. The 1986 Task Group was headed by Bernard Jennings. Members included Herb Koch, Ralph Leonard, Don Mongeon, Ralph Vogler, Gary Dallin, Doug Edwards, Richard Lynch, Jack Mahaney, and many others in subsequent years, as the job of completely updating all A05.11 hot-dip product specifications took until late 1993 to complete. Compared to the way ASTM documents are revised today, the entire process was quite slow as it was done via phone calls, photocopying, post office mail, and in-person meetings additional to the normal twice per year committee week meeting.

It was a massive project. Many ballots were issued with many negatives needing resolution. Early on it was decided that the A525 would not serve as a suitable identifier of a revised General Requirements document since it was too “imbedded” in the minds of both producers and users as just hot-dip galvanized sheet, and was also sometimes used (improperly) to order commercial quality galvanized sheet.

The project also brought about a change in product terminology by replacing the word “quality” from grade descriptors with the word “steel”, e.g., “commercial quality” became “commercial steel”. The term “quality” did not provide the user with all the information needed to select the appropriate steel for an application, as an example, the change to “steel” came with the capability for users to restrict the steels applied to any order, e.g., restricting the application of ultra-low carbon steels on an application through the selection of an appropriate “type” designator.

In 1993, two of the first documents on which agreement was reached were a new Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process, and a new Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process, covering all the hot-dip zinc-coated, zinc alloy-coated, and even aluminum-coated steel sheet product specifications.

Interestingly, both the zinc-coated and general requirements document were formally approved in the same month in 1994 and could have received adjacent specification numbers. Fortunately, Task Group member Jack Mahaney realized this could be confusing to galvanized sheet producers, and particularly so to purchasers. The general requirements document received the specification number A924, the then next available number at the time in 1994. Permission was granted by ASTM to use A653 (a then abandoned and available number from circa 1971) for the galvanized sheet specification, thus avoiding any possible confusion with A924.

The issuing of these new documents then required each producer and user to begin a revamping of their purchasing, order entry, production control, invoicing, and quality control systems to be updated as soon as possible. The was a massive project across the industry but fortunately was completed in a much shorter time frame than it took to create A653/A653M and A924/A924M.

Today, A653/A653M is one of the most broadly used product specifications in Committee A05 and one of the most frequently updated documents under the jurisdiction of Subcommittee A05.11. Since its inception it has undergone at least one revision almost every year. This is primarily because it covers a product that has seen a tripling of production in the world since the early 1990s, involving many changes and improvements in steel grades, and zinc coatings. Committee A05 has been very diligent in ensuring that A653/A653M has kept abreast of the strong growth in the demand for galvanized steel sheet.

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

One way to describe the utility of A653/A653M is that it is “one stop shopping” for almost the entire galvanized sheet market. Users can order zinc-coated sheet with steel substrates that range from being very hard and dent resistant for building siding, to very soft and formable for producing deep drawn shock towers for automobile suspension systems. The product can be ordered as coated structural steel having guaranteed mechanical properties such as minimum yield strength and ultimate tensile strength for construction applications. Coating weights anywhere from as thin as G30 [Z120] to as thick as G360 [Z1100] are available, and as indicated by these coating designations, the specification can be used by both the inch-pound and SI worlds. By using appropriate surface treatment processes on zinc coating lines A653/A653M product can be made with a very smooth surface suitable for processing through painting lines to make prepainted coils for roll-forming into building panels for the demanding architectural cladding market. These are just a few of the hundreds of industrial uses of A653/A653M galvanized sheet, all to minimize and slow the corrosion of steel that our society depends on.

One specific example is the construction industry, which consumes approximately 20 percent of galvanized sheet production. One segment of that industry is cold formed steel framing. One of the governing documents for this product is AISI Standard S220-20 North American Standard for Cold-Formed Steel Nonstructural Framing. It mandates the use of A653/A653M and also complies with the 2018 International Building Code.

Since 2008 A653/A653M has been purchased and downloaded over 2400 times, driven by its required use by other industrial codes and specifications. This does not include copies of A653/A653M available in purchases of the Annual book of ASTM Standards Volume 6.01.

After the standard was published, has it impacted health and safety? If yes, please explain.

Since galvanized sheet was first made, its trademark appearance was visible zinc crystals (spangles). Spangles are the result of residual lead content in the zinc affecting its freezing kinetics as a liquid film on steel to produce large crystals. A bulk lead content of more than about 0.03% in zinc will cause spangles to form. Studies have shown that lead, which is not soluble in solid zinc, can concentrate in the surface of a spangle to a level of more than 2.5%, which is about 20 times higher than its weight percent in the liquid zinc. Galvanized sheet is used for such products as grain bins, which of course come in contact with grain used for food products. Reducing lead to a very low residual level in galvanized sheet coatings forestalls any potential issues for this end use, as it is known that lead buildup in the human body causes serious health problems such as hearing loss, kidney damage, reduced IQ, and slow growth.

The U.S.A. Consumer Protection Safety Act restricts lead in coatings to 0.009% (90 ppm). In 2015, Committee A05 approved a ballot to limit the lead in the zinc used for A654/A653M products to 90 ppm. The coatings on A653/A653M sheet now contain less than 50 ppm lead. Coatings produced with such low lead zinc have no visible spangle, and additionally make it much smoother and more easily used for products demanding a high-quality surface finish.

How do consumers and the public benefit from this standard? (If applicable)

Zinc coatings on steel can reduce the corrosion rate of steel in the atmosphere from between 10 to 100 times depending on the severity of the climate. A653/A653M regulates the minimum limits of each coating weight designation. Knowing the specifics of the application allows an estimated corrosion rate to be determined, thus the consumer can easily calculate the required coating weight (thickness) that will allow the rust-free design life of the application to be achieved. The consumer can be assured that product certified as conforming to A653/A653M will have the coating weight that was ordered.

Consumers and the public are familiar with the many uses of galvanized sheet covered by A653/A653M that are visible in our communities, such as house eaves troughs, grain bins seen on farms, roofs on low slope roofs, and heating and ventilating ducts. In addition to automotive bodies, what is not generally apparent is the many end uses protecting and lengthening the life of our unseen infrastructure. These include electrical cable trays for industrial plants, utilities, and commercial services; cable cores covered with galvanized armor; electrical enclosure boxes; HVAC enclosures; fractional HP motor cases; framing and racks for solar panels; and tunnel ventilation systems. These are just a few of the myriad products made with galvanized sheet complying with A653/A653M.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

The World Corrosion Organization Report of 2014 states that the annual cost of corrosion is \$2.2 trillion worldwide, which is over 3.3 % of the world's GDP. As mentioned above, a zinc coating on steel slows its corrosion rate by 10 to 100 times. Galvanized steel compliant with A653/A653M assures users that the products they make have the required coating quality and thickness needed to meet design life and contribute to reducing the high cost of corrosion.

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

One example, mentioned above, is AISI Standard S220-20 North American Standard for Cold-Formed Steel Nonstructural Framing. It mandates the use of A653/A653M and also complies with the 2018 International Building Code.

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

A 653/A653M addresses goal 3.9.3 of this UN document in that its low lead zinc coating does not contribute to unintentional lead poisoning, as was a possibility prior to the 2015 restriction on the amount of lead in the zinc used for producing continuous hot-dip galvanizing.

Please provide any additional information not provided above.

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Please identify the designation and title of the standard

ASTM B831 Standard Test Method for Shear Testing of Thin Aluminum Alloy Products and the APPENDIX X1. AN ADVANCED METHOD OF DETERMINING SHEAR STRESS-SHEAR STRAIN BEHAVIOR USING DIGITAL IMAGE CORRELATION (DIC) AND A MODIFIED SPECIMEN DESIGN

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

The original ASTM B831 Standard Test Method for Shear Testing of Thin Aluminum Alloy Products was developed for single shear testing of thin wrought and cast aluminum alloy products to determine ultimate shear strengths only. The original standard reports that the loading conditions developed in the test method are not ideal and do not strictly satisfy the definitions of pure shear.

Recognizing that shear is also an important strain path in metal forming operations and that testing in shear avoids the premature fracture associated with uniaxial tensile testing, developing a test method capable of placing a sample in pure shear is most advantageous. The key benefit of having pure shear over traditional tensile testing is that it allows one to measure material behavior to large strains. However, shear strain is difficult to measure using traditional extensometry techniques. In this new ASTM B831 Standard, a two-dimensional digital image correlation (DIC) system was introduced using a digital camera to measure shear strain development within the shear zone during the test, as DIC measures full-field strain tensors in which shear strain is a natural product. When measuring shear stress-shear strain curves at large strains, the existing specimen may not maintain a simple shear status and tends to have end rotation of the shear zone. Thus, a modified specimen was developed that ensures the shear zone always stays in simple shear and prevents end rotation of the shear zone. The nature of the narrow shear zone in the modified specimen is particularly effective when applied to small contained volumes of interest such as aluminum spot welds since it enables, for the first time, direct determination of their shear stress-shear strain behavior and enables development of constitutive models of material behaviour.

Dr. Jidong Kang, a Research Scientist at CanmetMATERIALS, Natural Resources Canada initiated the development of the Appendix to the standard in 2014.

Identify the interest groups that participated in the development and/or revision to the standard?

Researchers from McMaster University, General Motors R&D Center, Constellium, Alcoa (now Arconic) Technology Center, Kaiser Aluminum, NIST, and University of Waterloo participated in the development and/or commented on revision of the Appendix.

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

Mechanical properties of a material are fundamentally required in order to design and manufacture goods. Tensile and shear strength data are published in numerous sources by industry associations, companies, academic institutions and laboratories. The data enables design engineers to design components and systems that meet the strength and durability requirements of a myriad of structural applications in vehicles and buildings, for instance. Material performance in shear is particularly important since it most closely represents the fundamental response of a material to deformation. Accurate measurement of the shear behaviour of a material is critical to effective modelling of structural performance of a component. As such, the novel sample geometry and application of digital image correlation technology described in the Appendix of this new edition of the standard offer considerable advancement in the predictability of the performance of a part or assembly under deformation and fracture, including in events such as crash, where safety is critical and predictability essential. The new Appendix describes a method that will enhance the ability to design parts and assemblies that are lighter yet meet performance requirements with greater certainty.

An interesting application of the new shear testing is for the direct measurement of shear stress-shear strain behavior of spot welds. Using spot welding on aluminum will allow more aluminum components to be used. It will also allow automotive manufacturers to avoid expensive upgrades to plants and equipment, since the machinery needed is very similar to that being used now for spot welding steel components. Not only will this new shear testing help future car fleets to be more energy efficient, but automotive manufacturers will save on costs and improve competitiveness.

Speaking about the importance of the new shear test to GM's use of spot welding of aluminum components, Dr. David Sigler, Technical Fellow of GM (retired) said, "(This) is key to helping expand usage of aluminum since we now know how to generate spot welds efficiently; data on mechanical property of the welds is key to the design of efficient vehicle structures." "GM teams are now able to access and leverage the data, which have been added to its corporate database. This also supports the deployment of resistance spot welding of aluminum as the mainstream joining solution on all vehicles for aluminum-aluminum joints, and one application in production and others under consideration for aluminum-steel joints", added by Dr. Blair Carlson, Technical Fellow and Lab Group Manager of the Lightweight Systems Manufacturing Research Group at GM Global R&D Center.

Since the publication of this Appendix, Constellium and Kaiser Aluminum have used the technique for their aluminum crash management system development, General Motors Canada, SAPA and University of Waterloo have used the Appendix for developing a new aluminum extrusion for front rail applications.

After the standard was published, has it impacted health and safety? If yes, please explain.

Based on the accurate measurement of the shear strength of the weld nugget and heat affected zone in the aluminum resistance spot weld, a new formula was developed by CanmetMATERIALS and GM that accurately calculated and predicted the minimum weld nugget size required to avoid interfacial fracture for aluminum resistance spot welds, replacing an empirical formula that had been used for 50+ years, this significantly improves the vehicle safety.

How do consumers and the public benefit from this standard? (If applicable)

Aluminum producers, automotive manufacturers and aerospace companies are increasingly using this standard. This revision is expected to be used to directly determine shear stress-shear strain behavior of thin wrought and cast aluminum alloy and spot welds that will find many industrial applications:

- Materials testing facilities and laboratories (material property determination)
- Academic institutions (training and material property determination)
- Design engineers, computational modellers and metallurgists use material performance data in the prediction of component and system structural performance
- Industry associations such as ASM International and the Aluminum Association report materials performance data

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

The measured shear stress-shear strain curves provided vehicle designers for the first time quantitative data of resistance spot welds for CAE modeling and pre-validation of design changes before putting any part into production. This supported the success of the novel resistance spot welding technique development at GM thus eliminating significant capital investment in retooling (as a comparison, another major automaker had to retool their assembly lines to replace spot welders with riveting machines at a 500-million-dollar cost).

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

Many aluminum makers, automotive companies, universities and governmental labs are using this standard. For example, in addition to the extensive application to aluminum resistance spot welds by GM, Constellium and Kaiser Aluminum have used the technique for their aluminum crash management system development, General Motors Canada, SAPA and University of Waterloo have used the Appendix for developing a new aluminum extrusion for front rail applications.

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

In enabling structural lightweighting in automotive transportation, this standard supports improved energy efficiency in transportation. For internal combustion vehicles, this means reduced fuel consumption (and therefore, reduced emissions) and for zero emission vehicles, this means increased range. Lightweighting can also reduce the total material needs for a vehicle.

As such, this standard contributes to two SDGs:

7.3 Affordable and Clean Energy – By 2030, double the global rate of improvement in energy efficiency:

12.2 Responsible Consumption and Production – Sustainable Management and Efficient Use of Natural Resources: reduce material footprint, domestic material consumption intensity

Please provide any additional information not provided above.

CanmetMATERIALS' work on this standard, and structural lightweighting, is funded by the Government of Canada, through the Office of Energy Research & Development's Energy Innovation Program.

By contributing to energy efficiency, reduced emissions, and ZEV range extension via structural lightweighting, work on this standard aligns with the Canada's goal of net zero emissions by 2050 and the 2035 target of 100% light duty vehicle sales to be ZEV.

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Please identify the designation and title of the standard

ASTM C595/C595M – Standard Specification for Blended Hydraulic Cements

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

Portland cement, the binding ingredient in concrete, is responsible for approximately 8% of global CO₂ emissions. Society relies on concrete for its strength, durability, resiliency, recyclability, contribution to energy efficiency, and role in economic development. Therefore, the need for solutions to reduce the CO₂ footprint of cement and concrete is urgent.

Cement and concrete industry associations, such as the Portland Cement Association (PCA) and the Global Cement and Concrete Association (GCCA), have developed roadmaps to reach net-zero CO₂ emissions by 2050 across the concrete value chain. Numerous cement and concrete manufacturers have made commitments to reach these targets.

Reaching net-zero CO₂ across the concrete value chain by mid-century will require numerous solutions. ASTM has been and plans to continue to be at the forefront of developing standards for the use of products and technologies that result in lower CO₂ in cement and concrete while maintaining the performance and dependability of concrete on which society relies.

Blended cements are a solution that can reduce CO₂ emissions while resulting in equal or better concrete performance. Blended cements are covered by ASTM C595/C595M. Conventional portland cements are covered by ASTM C150/C150M.

In 2012, ASTM committee C01 approved a change to ASTM C595/C595M to allow the use of up to 15% limestone in blended cements. Cement with up to 15% limestone is known as Portland-Limestone Cement (PLC) and is standardized as Type IL. In 2017, the committee made further changes to allow the use of these PLCs in sulfate-rich environments, which was a critical change to allow these cements to be used in all part of the US. ASTM C595 has performance requirements so that cement manufacturers can demonstrate equal or better performance to conventional ASTM C150/C150M cements, while achieving a CO₂ reduction.

The 15% limestone content in PLCs compares to the 5% allowed in ASTM C150/C150M, and results in approximately 10% CO₂ reduction for the same performance. Further reductions are possible by blending pozzolans and slag with up to 15% limestone. These cements are standardized in ASTM C595/C595M as Type IT cement.

In the 10 years since PLCs were originally published in ASTM C595, PLC's have been adopted widely in specifications and building codes. In many parts of the US, PLCs have completely replaced conventional ASTM C150/C150M cements, with further momentum across the US to reach this milestone in the next few years. Given the conservative nature of the concrete and construction industry, which is attributable in part to the life-safety considerations and expected long-life of concrete, the short length of this conversion to lower-carbon cements is remarkable and unprecedented.

Identify the interest groups that participated in the development and/or revision to the standard?

ASTM C01 members participating in the standardization of PLC included cement manufacturers, concrete manufacturers, specifiers, consulting engineers, laboratories, regulatory agencies, industry associations, and university researchers. Committee C01 maintains liaison with the Committee on Materials and Pavements (COMP) at the American Association of State Transportation Organization (AASHTO), which writes standards used by state departments of transportation. This ensured that all changes in ASTM C595 were also made concurrently in the corresponding AASHTO standard. The committee benefited by reports and presentations from academic researchers and manufacturers that pioneered the use of PLC.

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

Nearly all cement sold in the US is covered by an ASTM standard. As the popularity of low carbon cements increases, specifiers and end users are continuing to migrate to ASTM C595 cements. In some parts of the US, PLC's have completely replaced conventional ASTM C150/C150M cements.

After the standard was published, has it impacted health and safety? If yes, please explain.

ASTM C595 results in a reduction of approximately 10% reduction in CO2 emissions. In addition, PLC reduces acidification potential and eutrophication potential. PLCs are made in the same plants with their well-established safety processes as conventional ASTM C150/C150M cements.

How do consumers and the public benefit from this standard? (If applicable)

PLC results in an approximately 10% reduction in CO2 emissions, as well as reductions in acidification potential and eutrophication potential. PLC can be readily substituted into concrete with no change in performance. The public can continue to rely on concrete's strength, durability, resiliency, recyclability, contribution to energy efficiency, and role in economic development.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

The Portland Cement Association Environmental Product Declarations (EPDs):

https://www.cement.org/docs/default-source/default-document-library/pca_epds_2021_rev01312022.pdf?sfvrsn=d26ffbf_2

The shift to PLC was recently detailed by Engineering News Record.

<https://www.enr.com/articles/53850-producers-shift-to-make-more-lower-carbon-portland-limestone-cement>

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

Portland Limestone Cement standardized in ASTM C595/C595M is incorporated into the following:

- ASTM standards for ready mix concrete, precast concrete, pipe, block and numerous other cement-based products.
- American Concrete Institute (ACI) building codes
- International Building Code (IBC), which is used by most state and local building codes
- 44 of 50 state Department of Transportation (some states use AASHTO M240, which is harmonized with ASTM C595), with additional states considering adoption
- America Institute of Architects (AIA) MasterSpec
- US Military / US Army Corps of Engineers
- Federal Aviation Administration

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

PLC contributes to the following UN SDG:

- 1) Industry, Innovation, and Infrastructure (Goal 9)
- 2) Sustainable Cities and Communities (Goal 11)
- 3) Responsible Consumption and Production (Goal 12)
- 4) Climate Action (Goal 13)
- 5) Life Below Water (Goal 14)
- 6) Life on Land (Goal 15)

Please provide any additional information not provided above.

ASTM C01 is continuing to ballot additional changes and new standards that will enable manufacturers to incorporate lower carbon cements.

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Please identify the designation and title of the standard

C1920-21 Standard Practice for Cleaning of Vitrified Clay Sanitary Sewer Pipelines

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

Before the publication of C1920, there were no ASTM standards for cleaning sanitary sewer pipelines. The only sanitary sewer cleaning information available was found in the general literature from tooling manufacturers, industry trade associations, and governmental agencies. There was a good deal of variation between the processes recommended by these groups.

Some of the processes recommended didn't require cleaning the entire circumference of the pipeline. Some were based on how quickly a length of pipe could be cleaned, not on how clean a given length of pipe was at the end of the process. The primary guidance for cleaning methods came from entities selling equipment.

Systematic maintenance and rehabilitation programs are essential elements in the efficient, effective management of a wastewater collection system. A planned, intentional maintenance program helps to ensure a longer life for an installed pipeline while maintaining capacity.

Preventing sewer overflows is a national enforcement priority for the EPA. The EPA's compliance goal is to eliminate sanitary sewer overflows (SSOs) from municipal collection systems while ensuring that wastewater is being conveyed to treatment plants in accordance with the requirements of the Clean Water Act.

Development of this standard was initiated by Kent Carlson. As the former Operations Manager for the City of Los Angeles, CA with more than 30 years of experience in cleaning and maintaining 6,700 miles of sanitary sewers, he was uniquely positioned to understand the need for a standard and the elements that should be included.

Identify the interest groups that participated in the development and/or revision to the standard?

The following groups provided guidance or participated in the development of the standard:

- U.S. EPA
- Various cleaning equipment manufacturers
- Cleaning contractors
- Other maintenance professionals
- California Water Boards
- Vitrified Clay Pipe (VCP) manufacturers
- National Clay Pipe Institute (NCPI)

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

Federal requirements for the operation and maintenance of collection systems are not new and presently exist within the U.S. EPA's National Pollutant Discharge Elimination System (NPDES) regulations. Per the U.S. Government's Code of Federal Regulations (CFR), all NPDES permits must contain two standard conditions addressing operation and maintenance.

A. Proper Operation and Maintenance Requirements at 40 CFR 122.41(e) require proper operation and maintenance of permitted wastewater systems and related facilities to achieve compliance with permit conditions.

B. Duty to Mitigate at 40 CFR 122.41(d) requires the permittee to take all reasonable steps to minimize or prevent any discharge in violation of the permit that has a reasonable likelihood of adversely affecting human health or the environment

Given these requirements and the lack of a national standard, municipalities were left to define what was "proper" and "reasonable" themselves. As a result, many municipalities have embraced the new ASTM standard in part because it is a common national standard and in part, because it establishes a new benchmark for how clean a sewer must be.

After the standard was published, has it impacted health and safety? If yes, please explain.

Yes. Because several cities are now aware of the new standard, the benchmark for a clean pipe is changing. The long-term impact of this shift will be reduced SSOs.

The Center for Disease Control (CDC) has issued new sewer guidelines as part of wastewater surveillance for COVID-19. ASTM C1920 incorporates the CDC guidelines for handling human waste.

The new standard was developed in accordance with current OSHA requirements.

Reducing SSOs also contributes to the long term physical and economic health of the community.

How do consumers and the public benefit from this standard? (If applicable)

The benefits realized by the public from the utilization of C1920 is multi-dimensional.

SSO Reduction – Eliminating or at least reducing the release of raw sewage is in the interest of public health and environmental protection of all our waterways.

Elimination of Obstructions – Roots are the most common obstruction found in sewer pipelines. Roots are eradicated in a line that is cleaned regularly, maintaining the designed capacity of a pipeline. A fully functioning infrastructure is important to the livability of a community.

Fiscal Responsibility – Responsible maintenance of a physical asset ensures the longevity of the asset while reducing the expense of repair or replacement. A community's sewer system infrastructure is one of its most valuable assets. This infrastructure is a long-lived capital asset; managing and caring for it limits the depreciation value.

In other words, the new standard is good for the health of the community, municipal budgets and the environment.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

The standard was developed after ten years of aggressive cleaning tests (including the development of new tooling) conducted in the City of Los Angeles between 2007 and 2017.

In 2007 the state of California created a new database that tracked SSOs throughout the state (ciwqs.waterboards.ca.gov). That database provided the tracking and benchmarking needed to conduct the first-ever long-term testing and experimentation on the cleaning and maintenance of sewer pipelines. The database was also used to evaluate the impact of the standard operating procedures that are the basis for ASTM C1920.

The methodology documented in the new standard resulted in a significant reduction in spills in the City of Los Angeles test. The reduced spill rate was maintained over several years, with an anomaly in 2013/2014, when half of the annual precipitation fell in a single storm over the course of three days (Feb. 28 – March 2). By 2017 the spill rate in the City of Los Angeles had been reduced by 70%.

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

Less than a year after the standard was adopted, The United States Greenbook Construction Standards incorporated it into their standard by referencing C1920.

Various international trade groups are now exploring adoption. It is also being used as a training protocol for several municipalities.

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

This standard addresses several of the UN's 17 Sustainable Development Goals (SDGs).

SDG #3: Good Health and Well-Being & SDG #6 Clean Water and Sanitation

Good sanitation is one of the most important things a government can provide to ensure the health and well-being of all residents. This standard provides directions for cleaning VCP pipelines to eliminate Sanitary Sewer Overflows and maintain sanitary sewer capacity.

SDG #11 Sustainable Cities and Communities & SDG#12 Responsible Consumption and Production

VCP has a demonstrated service life of over 200 years in the U.S. and Europe. The new standard outlines maintenance procedures that ensure municipalities continue to enjoy this longevity.

Please provide any additional information not provided above.

This standard is also written as a possible guide for cleaning of other pipe materials. The acceptance of this standard and the rapid adoption of it is likely to spur the development of cleaning standards for all types of sewer pipe materials.

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Please identify the designation and title of the standard

C840 – 20 Standard Specification for Application and Finishing of Gypsum Board

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

As the most common interior finish material in North America, the standard gives guidance on how, and the conditions under which, these products are likely to result in the most acceptable manner of interior appearance for the building owner and occupants. Gypsum board serves an aesthetic function in the finished wall or ceiling, but it also provides fire resistance and acoustical performance for these assemblies as well. This standard helps to give guidance as to how best to achieve this performance.

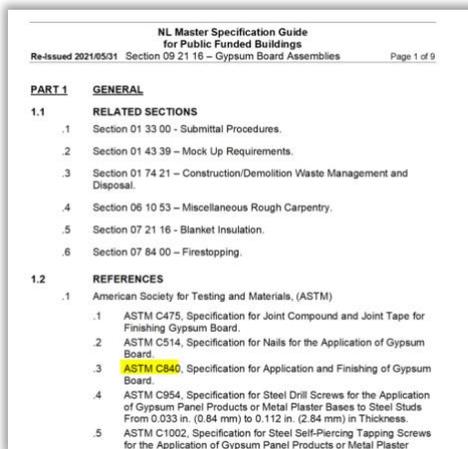
The standard developed by the gypsum industry and adopted as a standard in 1979 is continuously under review and being updated as product uses, and improvements, are made which then are reflected in the installation methods.

Identify the interest groups that participated in the development and/or revision to the standard?

We have gypsum board manufacturers, industry associations, code consultants, engineering firms, architectural firms, other component manufacturers – steel industry, wood industry, screw manufacturers, other fastener manufacturers, joint tape, joint compound, corner bead, etc. and the contractors who install the products every day who participate and actively comment on the changes and identify the need for changes in this standard.

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

This standard is referenced in Construction Documents, i.e. any construction specification in North America that has a section on gypsum assemblies will reference the standard.



It is referenced in the International Building Code as the basis for the installation of gypsum panel products.

MATERIAL	STANDARD
Gypsum board and gypsum panel products	GA 216; ASTM C840
Gypsum sheathing and gypsum panel products	ASTM C1280
Gypsum veneer base	ASTM C844
Interior lathing and furring	ASTM C841
Steel framing for gypsum board and gypsum panel products	ASTM C754; C1007

It is referenced in the National Building Code of Canada for numerous sections.

ASTM	C840-18b	Standard Specification for Application and Finishing of Gypsum Board	3.1.6.6.(2) Table 5.9.1.1. 9.29.5.1.(3) A-9.29.5.1.(3)
ASTM	C920-18	Standard Specification for Elastomeric Joint Sealants	Table 5.9.1.1. 9.27.4.2.(2)
ASTM	C954-18	Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness	9.24.1.4.(1)
ASTM	C991-16	Standard Specification for Flexible Fibrous Glass Insulation for Metal Buildings	Table 5.9.1.1.
ASTM	C1002-07	Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs	Table 5.9.1.1. 9.24.1.4.(1) 9.29.5.7.(1)
ASTM	C1055-03	Standard Guide for Heated System Surface Conditions that Produce Contact Burn Injuries	A-6.5.1.1.(3)

National Building Code of Canada 2020 Volume 1

Division B 1-5

NFPA standards reference it. NFPA 5000-2019 [Section No. 2.3.11]

It also gets referenced in other publications from different organizations:

- Drywall Finishing Council Publications and Resources
- Gypsum Association Publications
- Association of Walls and Ceilings
- American and Canadian Wood Council
- Steel stud industry documents.
- Government documents relating to construction.
- Articles about installing and finishing gypsum board.

Basically, anything which references gypsum board installation then cites this standard as the go-to on how the product gets installed and finished.

After the standard was published, has it impacted health and safety? If yes, please explain.

There are basic minimum requirements for storage, handling and fastening of gypsum boards specified in this standard. Full sheets of gypsum board are heavy and if not properly stored or handled, then injury may result, and has, unfortunately, occurred. Toppling gypsum panels can be a problem on the job site and we recommend:

26.3 Gypsum board shall be neatly stacked flat, not on its end or edge, to prevent toppling, sagging or damage to the ends, edges, and surfaces.

Also, fastening is important because we don't want the boards to become loose and fall off on occupants.

C840 also covers the recommendations for PPE when handling and finishing these products. To prevent particles from getting into airway passage, into eyes, etc.

The standard specifies storage and environmental conditions to ensure that risk for mold growth is minimized both during the transportation and handling stage through to the installation stage of these products.

How do consumers and the public benefit from this standard? (If applicable)

Beyond the safety and health aspects discussed above, this standard sets the expectations of the final appearance for the owner. The [EPA](#) says that, "Americans, on average, spend approximately 90 percent of their time indoors" and so the expectation that gypsum board finished areas are acceptable is important.

It allows architects, owners and contractors to set an expectation of installation and final appearance.

24.6 Levels of Finish:

NOTE 13—The required level or extent of finishing of gypsum wall-board joints, fastener heads, and overall surface can vary with the location in a structure and the intended type of decoration. This section describes various levels of finishing, that is, number of applications of joint compound, sanding or other finishing techniques; the recommendations of manufacturers may vary from what is specified herein and as such are not part of these specifications. The relationship of levels of finishing with location and intended decoration is described in [Appendix X7](#). See [Appendix X11](#) for information on using [jobsite mock-ups](#) to determine acceptance of the finish within the building.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

Yes, there are a number of articles which cite the benefits of gypsum boards. Gypsum board is inherently fire-resistant which is an added layer of passive fire protection to any building. It is a sound barrier, and it is low-cost and simple to install.

[Gypsum Board - an overview | ScienceDirect Topics](#)

[Gypsum Board - Types, Uses, Advantages & Disadvantages - Civil Engineering Portal - Biggest Civil Engineering Information Sharing Website \(engineeringcivil.com\)](#)

[What Are the Advantages and Disadvantages of Gypsum Board? \(alldryus.com\)](#)

[Interior Gypsum Board \(nih.gov\)](#)

“Advantages of Gypsum Board:

- Gypsum is also used in plaster to provide a smooth, crack-free surface. Gypsum boards give a smooth, continuous surface to which you can apply paint directly.
- Gypsum has the property of balancing the building’s indoor temperature and humidity. Gypsum is a low-emission building material that provides excellent thermal and acoustic insulation.
- The use of gypsum goods within the budget boosts the creativity of architects. It offers a wide range of attractive design options.
- The gypsum products are simple to install and do not necessitate the use of trained staff. The installation is simple, clean, and quick.
- A wide range of gypsum products is available to meet a variety of practical and aesthetic needs.”

CHARACTERISTICS OF GYPSUM BOARD SYSTEMS

Variety Of Systems Available:

- Area Separation Walls
- Shaft Walls
- Cavity Walls
- Solid Walls

Code Acceptance:

- Meets BOCA, ICBO, and SBCCI Code requirements for shaft walls, area separation walls, fire walls, party walls, and townhouse separation walls

Fire-Resistance:

- Fire-resistance ratings up to four hours
- Fire-resistive as tested in accordance with ASTM E 119 or CAN/ULC-S101-M
- Third-party inspected and labeled
- Acceptable for use in noncombustible construction



Sound Attenuation:

- High degree of sound isolation
- STC ratings up to 64 when tested in accordance with ASTM E 90



Public Acceptance:

- Universally accepted in apartments, condominiums, townhomes, and commercial structures
- Environmentally friendly and easy to recycle (Contact the Gypsum Association for alternative disposal methods for waste gypsum board.)

Physical Properties:

- Gypsum board is manufactured in accordance with ASTM standards
- Complies with all ASTM standards for technical properties such as flexural strength, nail pull, edge hardness, etc.

MONEY-SAVING FEATURES OF GYPSUM BOARD

Economical, Faster, And More Efficient Installation:

- Inexpensive and readily available materials
- Permit design flexibility
- Dry construction techniques - not wet like masonry’s mortar
- No cold weather delays to wait for mortar to dry and attendant work stoppage during the “curing” time, thus ending costly construction problems
- Free technical assistance from manufacturers and trade association
- Large size panels install quickly to reduce construction time
- Easily accepts wide variety of decorative finishes



Weigh Less Than Masonry Units:

- Easier to handle than concrete blocks
- Less extensive structural requirements than masonry, thus reducing material and construction costs for footings
- Shaftwall and stairwell designs ease high rise construction
- Scaffolding requirements minimized
- Temporary bracing and support systems eliminated
- Easily installed on light-weight steel or wood framing

OTHER ADVANTAGES OVER MASONRY

Quality Assurance:

- All gypsum board manufacturers participate in a third-party in-plant inspection and labeling program, such as Underwriters Laboratories, Factory Mutual, Omega Point Laboratories, ITS (formerly Warnock Hersey), etc.
- Each fire-rated system published by the Gypsum Association is supported by industry fire tests
- Adaptable to meet a large variety of commercial construction needs: fire walls, fire separation walls, fire partitions, shaft enclosures, etc.
- Fewer trades required
- Installed quickly and easily by professional installer
- Installed one floor at a time to coincide with construction schedules
- Thinner wall profiles allow more usable space than masonry blocks



GYPSUM

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

Please see section, “**How is this standard commonly used by industry**”.

We see it referenced in literature by other accessory product manufacturers in other regions.

[Microsoft Word - GenieClip RST 3-Part Spec Guide UK.docx \(pliteq.com.au\)](#)

In accreditation scope for organizations outside of North America.

[Scope with Header - PCB Single site rev 4- NAC 020.pdf \(moiat.gov.ae\)](#)

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

Goal 9, Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation. Gypsum board is relatively inexpensive to replace and if damaged, it can be replaced and repaired without complete dismantling of an assembly. In addition, the products are always being innovated to be lighter for installers and mold and moisture resistant which helps to contribute to durability.

Goal 11, Make cities and human settlements inclusive, safe, resilient, and sustainable. Gypsum board is inherently fire resistant which improves safety of habitat. If damaged, the products are easy to replace and repair. The industry is continually looking at opportunity to reduce energy usage and water consumption in the manufacturing process and increasing recycling usage in the product.

Please provide any additional information not provided above.

Contact Name: Pamela Shinkoda

Committee: C11

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ASTM Standard Use & Effectiveness Case Study Contest

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Please identify the designation and title of the standard

ASTM C270 - Standard Specification for Mortar for Unit Masonry

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

Masonry has been around for literally millennia. Masonry is a tradecraft that combines artistry and structural requirements. So, a balanced specification is required. Mortar uses local materials, so an adaptable specification is also required. Hardened properties of the mortar must be balanced with the plastic properties so it is durable yet can be installed properly

Identify the interest groups that participated in the development and/or revision to the standard?

Masons, structural engineers, architects, material engineers, building owners, general contractors

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

ASTM C270 is the “go to” specification for mortar for masonry. The specification allows either a performance approach or a proportion approach for designing mortar. Designers rely on ASTM C270 to easily specify mortar that will be durable and provide the necessary properties for a project.

After the standard was published, has it impacted health and safety? If yes, please explain.

ASTM C270 has improved the durability and consistency of mortar. It has improved the safety and reliability of homes and other buildings from around the world. New ingredients have been included in the specification to address sustainability and embodied carbon of mortar.

How do consumers and the public benefit from this standard? (If applicable)

The public is benefited by increased reliability of homes and other buildings. Consumers are assured of a long-lasting structure.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

The building code TMS 402 – “Building Code Requirements for Masonry Structures” requires mortar to meet ASTM C270.

The model masonry specification – TMS 602 – “Specification for Masonry Structures” requires mortar to meet ASTM C270/C270M.

A review of several building codes around the country require mortar to meet ASTM C270. In fact, a masonry building code that does NOT reference ASTM C270 was not found in the United States

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

1. No poverty – reliable mortar can be used around the world, providing affordable housing in various communities.

3. Good health and wellbeing – good mortar sturdies homes and reduces insect intrusions into homes.

7. Affordable and clean energy – the mass of masonry reduces loads on heating and cooling systems.

12. Responsible consumption and production – specification C270 has been updated to allow a wide variety of cementitious materials, reducing the carbon footprint of building materials.

Masonry is a durable building system, reducing the requirements for quick replacements.

Please provide any additional information not provided above.

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Committee: C12

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Please identify the designation and title of the standard

ASTM C90 – Standard Specification for Loadbearing Concrete Masonry Units

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

Masonry construction has been around since antiquity. Manufactured concrete masonry units (CMU) started to gain popularity in the late 1800s – early 1900's. The first versions were made on machines that produced a single unit at a time and was hand operated.

As the concrete masonry industry started to move from individuals with portable machines to more automated factories, it was apparent there was a need to standardize the properties of these units in an effort to ensure good performance of concrete masonry walls. This led the industry trade association (National Concrete Masonry Association) of the time to initiate development of this standard, first published in 1931.

Identify the interest groups that participated in the development and/or revision to the standard?

Unfortunately, details of the individuals who developed this standard have been lost to time. It is certainly that a consortium of producers through the National Concrete Masonry Association were participants, but others, including mason contractors, designers and academics were likely also involved.

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

ASTM C90 is the primary standard specification for concrete masonry units in the United States. Generally, when concrete masonry is used on a building project, the units are required to comply with this standard. It is referenced in many other standards and building codes, and used throughout project specifications. It is also used in other countries looking to establish a minimum quality standard for concrete masonry units. This standard is also referenced by building codes to ensure masonry assemblies constructed using concrete masonry units will perform sufficiently to ensure a minimum life safety under typical and catastrophic loading.

As an example, contact for this submission presented at ASTM's invitation to standards developers in Rwanda, including comparison of ASTM C90 their existing standards and suggesting ways to align such standards.

After the standard was published, has it impacted health and safety? If yes, please explain.

ASTM C90 ensures a minimum level of performance for concrete masonry units used in construction. The provisions of ASTM C90 ensure that concrete masonry construction is safe, structurally sound, provides occupants with safety and security, and maintains superior levels of performance.

How do consumers and the public benefit from this standard? (If applicable)

Concrete masonry construction designed properly and using CMU that meet ASTM C90 can last for centuries. The use of resilient construction provides the public with long-lasting, safe and secure buildings.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

Testing of concrete masonry assemblies has been used to establish to performance of these systems under loads. The units used in these assemblies have been fabricated to meet the provisions in ASTM C 90. The standard is thus used to ensure a minimum quality of units are used and that masonry assemblies have a predictable load deformational performance.

A few references are shown below:

<p>Allen et al, 2000. Allen, R., Borchelt, J. G., Klingner, R. E. and Zobel, R., "Proposed Provisions for Design of Anchorage to Masonry," <i>TMS Journal</i>, Vol. 18, No. 2, pp. 35-59, The Masonry Society, Longmont, CO, 2000</p>	<p>Tubbs et al, 2000. Tubbs, J. B., Pollock, D. G. and McLean, D. I., "Testing of Anchor Bolts in Concrete Block Masonry," <i>TMS Journal</i>, Vol. 18, No. 2, pp. 75-88, The Masonry Society, Longmont, CO, 2000.</p>
<p>Brown and Whitlock, 1983. Brown, R.H. and Whitlock, A.R., "Strength of Anchor Bolts in Concrete Masonry," <i>Journal of the Structural Division</i>, Vol. 109, No. 6, pp. 1362-1374, American Society of Civil Engineers, New York, NY, 1983.</p>	<p>Brown and Melander, 1999. Brown, R. and Melander, J. "Flexural Bond Strength of Unreinforced Grouted Masonry Using PCL and MC Mortars", Proceedings of the Eighth North American Masonry Conference, Austin, TX, June, 1999, The Masonry Society, Longmont, CO.</p>
<p>Dickey, 1982. Dickey, W.L., "Joint Reinforcement and Masonry," <i>Proceedings</i>, 2nd North American Masonry Conference, College Park, MD, Aug. 1982, The Masonry Society, Longmont, CO, pp. 15-1 through 15-15.</p>	<p>Chrysler 2010. Chrysler, J., "Reinforced Concrete Masonry Construction Inspector's Handbook", 7th Edition, Masonry Institute of America and International Code Council, Torrance, CA, 2010.</p>
<p>Priestley and Bridgeman , 1974. Priestley, M.J.N., and Bridgeman, D.O., "Seismic Resistance of Brick Masonry Walls," <i>Bulletin</i>, New Zealand National Society for Earthquake Engineering (Wellington), Vol. 7, No. 4, Dec. 1974, pp. 167-187.</p>	<p>Gulkan et al, 1979. Gulkan, P., Mayes, R.L., and Clough, R.W., "Shaking Table Study of Single-Story Masonry Houses Volumes 1 and 2," <i>Report No. UCB/EERC-79/23 and 24</i>, Earthquake Engineering Research Center, University of California, Berkeley, CA, Sept. 1979.</p>
<p>Rad and Mueller, 1998. Rad, F. N, Winnen, J., M., and Mueller, W. H., "An Experimental Study on the Strength of Grouted Anchors in Masonry Walls," Report submitted to the Masonry & Ceramic Tile Institute of Oregon, Portland State University, Portland, OR, 1998.</p>	<p>Hamid et al, 1979. Hamid, A., Drysdale, R., and Heidebrecht, A. "Shear Strength of Concrete Masonry Joints," <i>Journal of Structural Engineering</i>, ASCE Vol. 105, ST7, American Society of Civil Engineers, Reston, Virginia, pp. 1227-1240, 1979.</p>
<p>Klingner et al, 2010. Klingner, R. E., P. Benson Shing, W. Mark McGinley , David I. McLean, Hussein Okail , and Seongwoo Jo, "Seismic Performance Tests of Masonry and Masonry Veneer," <i>Journal of ASTM International</i>, Vol. 7, No. 3, ASTM International, West Conshohocken, PA Januarv 2010.</p>	<p>Minaie et al (2009). Minaie, Ehsan; Hamid, Ahmad; and Moon, Franklin, Summary of the Research on Behavior of Fully Grouted Reinforced Concrete and Clay Masonry Shear Walls, SN2902b, Portland Cement Association, Skokie, Illinois, USA, 2009, 8 pages. NCMA 2008.</p>

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

Note – these use concrete masonry as ways to support these goals. Concrete masonry construction is not possible without using units that meet C90.

1. **No poverty** – concrete masonry construction provides affordable, accessible construction for all types of communities.
3. **Good health and wellbeing** – concrete masonry construction provides safety, is inherently low emitting (no VOCs), and provides superior occupant comfort related.
9. **Industry, innovation and infrastructure** – concrete masonry construction is inherently resilient and provides safety to communities and individuals. This is also a very durable product that with proper maintenance can last for centuries
11. **Sustainable Cities and Communities** – same comments as #9
12. **Responsible consumption and production** – C90 sets the bar for properties of concrete masonry units. This includes a list of allowable constituent materials for CMU, which ensures that the materials used are safe and compatible with other concrete ingredients.

Please provide any additional information not provided above.

Contact Name: Nick Lang, Chair Subcommittee C15.03

Committee: C15

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CALL FOR PARTICIPATION!

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Please identify the designation and title of the standard

ASTM C216 – Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale)

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

Historically, clay brick was typically manufactured locally near the building site, and thus tended to vary significantly, thus standardization of physical properties and characteristics was needed. This was accomplished by Specification C21 for building brick in 1920, which was later replaced by Specification C62 – Standard Specification for Building Brick (Solid Masonry Units Made from Clay or Shale) in 1927. After an initial standard for clay brick was developed and in use, the industry found that physical properties and characteristics alone were not sufficient for structures where the brick would be exposed and serve as a finished surface. Specification C216, first published in 1948, built upon the foundation of C62 and added appearance requirements such as dimensional tolerances and chippage, etc., creating the Types FBX, FBS, and FBA that we use today.

Identify the interest groups that participated in the development and/or revision to the standard?

Masons, structural engineers, architects, material engineers, building owners, general contractors

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

ASTM C216 is the most commonly referenced clay masonry material standard and is considered the “default” brick in project specifications. It is also the most commonly used standard for clay masonry in the Building codes. In the ASTM community, C216 is used as a baseline to define clay masonry unit performance and it is updated on a regular basis. Updates to other clay unit standards often include language to match or coordinate them with the current language in C216.

After the standard was published, has it impacted health and safety? If yes, please explain.

No. The changes in C216 from C62 were primarily aesthetic.

How do consumers and the public benefit from this standard? (If applicable)

Consistent dimensional tolerances allow designers to select the brick Type that is best suited to a given project, which results in more satisfied owners/consumers when their expectations for the appearance of the project are met. Consistent dimensional tolerances also benefit masons and contractors by providing increased constructability.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

The masonry code and specification TMS 402/602 - Building Code Requirements and Specification for Masonry Structures includes C216 as one of the nine clay masonry units covered by the code.

C216 is also a standard that is referenced directly by the model codes adopted throughout the United States: The International Building Code (IBC) and the International Residential Code (IRC)

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

3. Good Health and Well-Being. Clay masonry is inert and does not off-gas VOCs.

7. Affordable and Clean Energy. Masonry construction has high thermal mass, which reduces interior temperature swings and the thermal loads on building HVAC systems.

9. Industry, Innovation, and Infrastructure. Clay brick has historically been a key component in the construction of the country's infrastructure—sewers, tunnels, etc. that are still in use today. Clay deposits capable of becoming durable brick are widely available.

11. Sustainable Cities and Communities. Clay brick and other masonry products are highly resilient, able to resist impacts from wind-borne debris, serve as components to storm shelters, and are naturally fire resistant and long lasting. The ability of masonry buildings to be adapted and repurposed has led to rejuvenation of many downtown areas that had been previously ignored for years.

12. Responsible Consumption and Production. Clay brick can be salvaged and re-used in other construction applications. It can also be crushed and used in paving and landscape applications. Based on brick's historic use, mass masonry buildings constructed of clay brick are commonly incorporated into adaptive reuse projects where the original building is repurposed for new usage instead of building from scratch.

Please provide any additional information not provided above.

Contact Name: Cortney Fried

Committee: C15.02

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Please identify the designation and title of the standard

ASTM E96-2021 "Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials"

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

Materials in the building enclosure can suffer from moisture accumulation and subsequent biological growth and material decay. One important material property for these building materials is the water vapor permeability, or perm value, which provides designers information needed to design appropriate building enclosure assemblies that are durable and resilient, with decreased risk for moisture accumulation, material decay, and biological growth.

ASTM E96 is the standard test method to determine this important material property. The publication record for the E96 standard dates back to 1990, with 12 revisions since that time. The task group remains active in revising and improving upon the standard.

Identify the interest groups that participated in the development and/or revision to the standard?

ASTM E96 is primarily used by building enclosure designers, material producers, and code officials for specifying and classifying building materials. The current revision committee consists of Charly Petty, Michael Joyce, Diane Lawson, and Manfred Kehrer.

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

ASTM E96 is referenced in almost 100 specification standards within ASTM. Examples are listed at the end of this document. The standard is used by designers, material producers, and code officials for specifying and classifying building materials.

After the standard was published, has it impacted health and safety? If yes, please explain.

Moisture accumulation in and on the building enclosure can result in biological growth, which can be detrimental to indoor air quality and human health. This standard helps designers to select appropriate materials to reduce the risk for moisture accumulation.

How do consumers and the public benefit from this standard? (If applicable)

Moisture accumulation in and on the building enclosure can result in biological growth, which can be detrimental to indoor air quality and human health. This standard helps designers to select appropriate materials to reduce the risk for moisture accumulation.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

See above

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

ASTM E96 is referenced by the International Building Code (IBC), International Residential Code (IRC), International Energy Conservation Code (IECC), ASHRAE 90.1, and others.

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

Goal #3, Human Health

Goal #9, Resilient Infrastructure

Please provide any additional information not provided above.

--

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Committee: C16.33

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ASTM Standards that reference ASTM E96:

Designation	Committee
B0479-19	B07.03
C0011-18B	C11.91
C0171-20	C09.22
C0209-20	C16.32
C0534_C0534M-20A	C16.22
C0552-22	C16.20
C0578-22	C16.22
C0591-21	C16.22
C0647-19	C16.33
C0665-17	C16.23
C0727-19	C16.21
C0755-20	C16.33
C0887-20	C12.06
C0928_C0928M-20A	C09.43
C1029-20	C16.22
C1126-19	C16.22
C1136-21	C16.33
C1224-15R20	C16.21
C1258-21A	C16.33
C1278_C1278M-17	C11.01
C1289-22	C16.22
C1290-16R21	C16.23
C1313_C1313M-13R19	C16.21
C1321-15R20	C16.21
C1396_C1396M-17	C11.01
C1423-21	C16.40
C1427-21	C16.22
C1482-17	C16.22
C1483_C1483M-17	C16.21
C1594-11R17	C16.22
C1668-20	C16.21
C1692-18	C15.10
C1696-20	C16.40
C1713-17	C12.03

C1775-22	C16.40
C1809-20	C16.40
C1902-22A	C16.20
C1916-21	C16.40
D1653-13R21	D01.23
D1970_D1970M-21	D08.02
D2103-15	D20.19
D2626_D2626M-04R20	D08.04
D2643_D2643M-21	D35.06
D2673-14R22	D20.19
D2842-19	D20.22
D3105-17	D08.01
D3468_D3468M-99R20	D08.09
D3833_D3833M-96R19	D10.14
D4000-20	D20.15
D4068-17R22	D20.24
D4397-16	D20.19
D4551-22	D20.24
D4635-16	D20.19
D4649-20	D10.25
D4708-19	D01.23
D4819-13R21E01	D20.22
D5047-17	D20.19
D5456-21E01	D07.02
D5886-95R18	D35.10
D6134_D6134M-07R19E01	D08.18
D6153-15	D04.32
D6380_D6380M-03R18	D08.02
D6434-12R18	D35.10
D6455-11R18	D35.10
D6523-00R14E01	D35.03
D6630_D6630M-16R22	D08.20
D6694_D6694M-15	D08.09
D6826-05R14E01	D18.25
D7008-08R22	D35.06
D7106_D7106M-05R15E01	D35.10
D7230-06R21	D33.02
D7407-07R20	D35.10
D7425_D7425M-13R19	D08.06
D7709-12R17	F02.10
D8065_D8065M-16	D20.19
D8257_D8257M-22	D08.02
E0154_E0154M-08AR19	E06.21
E0398-20	F02.10
E0631-15	E06.94
E1549_E1549M-13R16	E21.05
E1677-19	E06.41
E1745-17	E06.21
E1993_E1993M-98R20	E06.21
E2321-03R19	E06.58
E2556_E2556M-10R16	E06.55
E2570_E2570M-07R19	E06.58

E3069-19A	E06.24
E3127-22	E06.41
F0602-09R15	F04.11
F0624-09R15E01	F04.11
F1249-20	F02.10
F2407-20	F23.40
F2733-21	F23.80
F2902-16E01	F04.11
F3010-18	F06.40
F3299-18	F02.10
F3319-20	F25.02
F3510-21	F04.42
G0021-15R21E01	G03.04

ASTM Standard Use & Effectiveness Case Study Contest

CALL FOR PARTICIPATION!

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Please identify the designation and title of the standard

ASTM C373, Standard Test Methods for Determination of Water Absorption and Associated Properties by Vacuum Method for Pressed Ceramic Tiles and Glass Tiles and Boil Method for Extruded Ceramic Tiles and Non-tile Fired Ceramic Whiteware Products.

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

Prior to development of the C373 "vacuum" method, methods used internationally for evaluation of water absorption varied and produced inconsistent results. While the water absorption criteria for porcelain tiles have been well-defined for several decades, mislabeling tiles frequently occurred due to these inconsistencies. This resulted in some non-porcelain tiles made overseas being miscategorized (sometimes intentionally) as porcelain, even though the North American ceramic tile specification ANSI A137.1 requires porcelain tiles to have a water absorption of less than 0.5% when tested per ASTM C373. Simply stated, this meant that some tiles classified as porcelain overseas would not meet the strict and demanding criteria used in North America, resulting in a large amount of tile being sold that was marked as porcelain but was in fact not.

In addition, the "boil" method that was contained in ASTM C373 prior to development of the vacuum method required a lengthy test time of nearly 30 hours. In many cases, it took more time for a tile to be evaluated for water absorption than to be manufactured. Manufacturers needed a reliable method that could be conducted in a shorter timeframe.

Taking all of this into account, ASTM Committee C21 on Ceramic Whitewares and Related Products initiated development of a consistent test method for determining water absorption. C21's efforts were organized by Mr. Ryan Marino (Tile Council of North America), who primarily researched the vacuum method with the collaboration of various testing facilities worldwide.

Identify the interest groups that participated in the development and/or revision to the standard?

Currently, the C21 Committee contains a variety of different stakeholders, many of whom participated in the standardization of the ASTM C373 vacuum method. The ceramic tile industry and ceramic whiteware industries were represented by many different manufacturers, distributors, and consultants. Significant participation came from various industry stakeholders including safety and forensic consultants and other hard surface flooring professionals.

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

ASTM C373 is used to identify water absorption of ceramic tiles and non-tile ceramic whiteware products. It is included in all tile industry specifications (ANSI A137.1, A137.2, and A137.3). It is also utilized by a critical certification program known as the Porcelain Tile Certification Agency, or PTCA. This certification ensures that tiles are “true porcelain” per ANSI criteria.

After the standard was published, has it impacted health and safety? If yes, please explain.

Porcelain tile is denser and has a lower water absorption than other types of ceramic tile. When non-porcelain tiles are unknowingly substituted, freeze/thaw and expansion failures can result from unexpected moisture expansion. This can cause potentially dangerous cracking, which is especially relevant in today’s market with the emergence of tile pedestal systems. In addition to freeze/thaw concerns, unintended use of non-porcelain tile when porcelain tile is specified can cause greater than anticipated moisture-related expansion, possibly leading to tiles popping off of the floor or wall due to the resulting compression. Finally, unglazed products miscategorized as “porcelain” are more susceptible to staining.

How do consumers and the public benefit from this standard? (If applicable)

The PTCA certification program, which utilizes ASTM C373, benefits all consumers purchasing porcelain tiles and, indirectly, everyone involved in the supply chain. Program participants are able to independently and reliably confirm to customers that what they are producing or selling is truly porcelain, and are able to differentiate their products from falsely labeled porcelain products. This prevents the potential for a consumer to purchase a non-porcelain product that has been labeled as porcelain.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

In general, the nearly two-thirds of tile produced and consumed in the United States is porcelain (with domestic production of tile being over four-fifths porcelain, and over half of imported products being porcelain). Use of C373 as the driving force behind the PTCA certification program is substantial in ensuring that tile being sold as porcelain is properly labeled. PTCA, which was co-founded by the Ceramic Tile Distributors Association (CTDA), helps to raise awareness of the importance of water absorption among distributors, which in turn impacts consumers.

Sources: U.S. Census Bureau, Tile Council of North America.

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.

Ceramic tile imported into the United States is tariffed, or subject to duty, per the Harmonized Tariff Schedule (HTS) maintained by the United States International Trade Commission (USITC). This schedule provides the applicable tariff rates and statistical categories for all products imported into the United States. Whether a tile is porcelain or non-porcelain is relevant under the tariff schedule, which classifies tiles based on their water absorption using the ASTM C373 standard. The HS heading for ceramic tile is "6907," with porcelain classified under the subheading "6907.21." If tiles are not categorized correctly, U.S. Customs and Border Patrol can issue fines and potentially hold importers criminally liable for making false declarations. The risk of such presumably reduces the amount of mislabeled tile from entering the market.

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

While addressing the 17 Sustainable Development Goals was not a direct objective of the major revision to ASTM C373, product quality and correct classification are an integral component to fair trade. Thus, these important updates to ASTM C373 foster an important contribution toward goals 9, 11, and 12 in that they facilitate industry innovation, better specification of sustainable and resilient construction products, and sustained consumer access to responsibly manufactured goods.

Please provide any additional information not provided above.

It is abundantly clear that the practice of selling non-porcelain tiles as porcelain was a significant problem in the United States marketplace prior to the development of the ASTM C373 vacuum method. Confusion was spurred by inconsistencies among lab results and different methods being used to evaluate water absorption internationally. The vacuum method's standardization addressed the issue by providing a way for manufacturers and distributors to confirm their products are genuine porcelain, while also providing a highly repeatable and reproducible test method. Further, because of the C21 efforts to develop the new method, ASTM C373 has increasingly garnered worldwide attention, which has led to expanded conversations worldwide toward adopting the same vacuum procedure for evaluating water absorption and tile specifications. This has led to harmonization of how products are tested internationally.

It is also worth noting that the vacuum method takes roughly 1 hour to complete, a fraction of the boil method's time. Boiling, which was commonly used before the vacuum method was standardized, requires a 5-hour boil and a 24-hour water soak.

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Please identify the designation and title of the standard

ASTM C-920 Standard Specification for Elastomeric Joint Sealants

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

This standard Specification was created to fill the urgent need to replace and eventually improve Specification TT-S-00230A developed by the National Bureau of Standards (1967) succeeded by TT-S-00230C 1970 for "SEALING COMPOUND: Elastomeric Type, single Component)For Caulking, Sealing, and Glazing in Buildings and Other Structures".

The C-920 standard was put in place (published 1979 by Subcommittee C24.32 on Chemically Cured Compounds) to set minimum performance standards for sealants that increasingly were used as weather seals in Curtain Wall construction.

Identify the interest groups that participated in the development and/or revision to the standard?

C24.32 committee members who had input to the standard was composed of mainly Leading Sealant Manufacturers and Building Construction Architects who understood the issues of underperforming sealants and their contribution to building damage due to failed sealant joints and water infiltration.

Currently, revision of this standard falls under Committee C24 subcommittee 24.10 Specifications, Guides and Practices. C-920 revisions have had the same type of participants as the original standard, ie.. sealant producers, architectural firms and representatives of general interest

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

A very large volume of sealants are now sold in North America that comply with meeting this specification. In fact, very few new products (for designed weather seal joints) are introduced into the construction sealant Market which do not meet this standard, unless they have another specific purpose or application which where the C-920 Specification is not directly useful.

ASTM C-920 is extremely useful as it classifies sealants into movement capabilities which are closely tied

To joint movement design. For instance in C-920, there are 5 classes of sealants which must pass a very rigorous C-719 tests to meet that class. Class 100/50 is the highest movement class designated by the Specification. Sealants which meet this specification, help the Architect with selecting a sealant that

Performs in the highest moving weather seal joints; whereas if the performance of a sealant is NOT known to meet this specification and is chosen/selected (for a building joint designed to take such movements) there certainly will be joint failure, and water infiltration which can cause loss of building life, and immense costs to repair. There are other classes, such as Class 50 (another high movement class) Class 35, Class 25 and Class 12 ½. Selecting sealants which with the proper movement class (same or higher) for the intended joint movement design is critical to the sealant life/joint life on the building structure. In 1986 Specification C-920 had only two Movement classes, Class 25 and Class 12 ½. Since then three additional higher movement classes have been added. Generally sealants meeting the higher classes, have less chance of joint failure due to excess joint movement.

Also the C-920 weight loss limit requirement after Heat Aging per ASTM Test Method C1246 (7% maximum) in combination with the movement classes noted above, prevent sealant failure due to loss of solvent or mass, that may effectively stiffen the sealant over time, leading to cohesive failures, adhesion failures or loss of function in the construction joint. Generally this prevents low cost, low performing sealants to be improperly used which may fail early after sealant application.

Also, C-920 specification requires a minimum of 5 lbs. peel strength and Maximum 25% cohesive loss when testing sealants according to ASTM C-794. This assures the user of the sealant and design specifier a minimum of performance with regards to adhesion.

The combination of meeting all three above often present difficulties in developing new sealants with other performance targets, which demonstrates the importance of the C-920 Specification

After the standard was published, has it impacted health and safety? If yes, please explain.

Building Health affects the general population. Water infiltration due to sealant failure can eventually cause corrosion of steel supports, reinforced concrete etc which impact the useful life of a building.

Eventually, damaged steel and concrete can deteriorate to the level where the building structure becomes unsafe, threatening the safety of building occupants.

Other effects of water infiltration are build up of mold which often causes negative impacts to human health, and also being a contributing factor to what is known as "Sick Building syndrome". Reducing the likelihood of water infiltration in buildings by using sealants which comply to ASTM C-920, along with other factors such as proper joint design and proper sealant installation has helped in the effort to reduce health effects and lower safety risks associated with water damage. However, this is difficult to quantify.

How do consumers and the public benefit from this standard? (If applicable)

Consumers benefit by the general adoption of ASTM C-920 by Sealant manufacturers for most of their products where applicable. Although consumers are most likely not aware of these standards, the likelihood is that they will have benefited is high either by working in buildings using these sealants (also

In conjunction with good joint detail and design principles) or (less likely) by purchasing a sealant for home use (if they were aware of the benefit of the C-920 classification etc.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

At this time, it is hard to find actual compiled data on this, although it would be difficult to find a new building specification which does specify ASTM C-920 for sealant joints.

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

ASTM C-920 is broadly used throughout North America & South America, and for cities in developing countries which have no Domestic standards. ISO 11600, developed after C-920 (with international contributors) is a somewhat comparable standard which classifies sealants for use, and addresses sealant movement class, adhesion, flow, change of sealant mass, resistance to compression etc with different test methods.

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identity which one(s) and describe how?)

#11 Sustainable cities and Communities. Buildings globally are often built with poor design and components as it relates to the building envelope, whereby water intrusion prematurely degrades building structures and wastes the energy and raw material inputs to create the building structure.

Buildings which do not meet the intended design life, through improper use and selection of materials such as building sealants are uneconomic, put the user populations at risk, and wastefully drain resources whether energy or natural that could be applied to other uses. Though the progressive evolution of Specifications such as ASTM C-920, there will be positive impacts on sustainable buildings.

Please provide any additional information not provided above.

Committee C24 and Subcommittee C24.10 continue to work on improving the Specification of C-920.

Long term, it is the goal to further classify sealants with a specification that includes some testing or additional classification, where the sealant is exposed to simultaneous movement and artificial weathering to better approximate sealant application life and durability, as it recognized that the current specification is not an assurance of long term durability in outdoor applications.

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Committee: C24

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Please identify the designation and title of the standard

ASTM C1227 Standard Specification for Precast Concrete Septic Tanks

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

Before ASTM C1227, there was no standard for a septic tank. The common thought was that it was acceptable for residential sewage to go to a holding structure (concrete, metal, brick, block, etc.) and allow the liquids to seep into the surrounding ground. In many cases, the outlet was a field tile or a drain that flowed to a creek.

Gary Munkelt was an integral part of Standards development at the time of creating C1227. Norm Gavin and Frank Schaub brought this opportunity to the Committee.

Identify the interest groups that participated in the development and/or revision to the standard?

Septic tank manufacturers
The National Precast Concrete Association
State Departments of Health
IAPMO
Product and material suppliers

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

The most significant use of the Standard is for the construction of precast concrete septic tanks. It is specified by many states as the required minimum construction for private onsite wastewater treatment systems. The performance requirements are used to prove structural integrity and watertightness.

After the standard was published, has it impacted health and safety? If yes, please explain.

The committee is not aware of a study relating to the health and safety of this standard, but when a septic tank is manufactured in compliance with C1227, the system of residential sewage treatment functions better. The system designer can plan for the best conveyance and treatment of the sewage and the anaerobic function will work better at breaking down solids for better treatment.

How do consumers and the public benefit from this standard? (If applicable)

The most significant benefit that the consumer receives from the Standard is a minimum baseline for quality. In the absence of a Standard, a contractor can install the most cost-effective system. These products may not function as well, and they may not last long. This standards provides the minimum material requirements for a septic tank, the minimum equipment for it to function, and the minimum level of performance for assurance of quality construction.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

ASTM C1227 has been adopted by the National Precast Concrete Association for incorporation in the plant certification quality control guidance manual. They have also developed and published a Best Practices Manual for Precast On-site Wastewater Tanks.

Additionally, ASTM C1227 has been codified into private sewage regulations by many State Departments of Health around the United States. Producers of precast concrete tanks are required to comply with ASTM in the manufacture of the products they sell.

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

The publication of this Standard addresses goal number 6, clean water and sanitation.

Please provide any additional information not provided above.

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Committee: C27, Precast Concrete

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Please identify the designation and title of the standard

ASTM D2700-22 "Standard Test Method for Motor Octane Number of Spark-Ignition Engine Fuel"

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

Back in early 1900's after the gasoline powered automobile started to dominate the market and before the development of the octane methods, automobile engines were plagued by a phenomenon called knock. There was a lot of disagreement within the community as to the cause of this annoying and sometimes destructive sound. One theory was that the sound was coming from pre-ignition. The competing theory was that the sound was coming from detonation or more precisely the explosion of the end gases within the cylinder once the pressure and temperature reach the point of auto ignition. Work done by Thomas Midgely and TA Boyd of General Motors in the early 1900's proved that the knock was due detonation and not preignition as others had proposed. During the 1920's, the Co-operative Fuel Research Committee (CFR) expanded their activities to address the issue of knock.

Identify the interest groups that participated in the development and/or revision to the standard?

The CFR committee, comprised of fuel producers and engine manufactures, decided that a standardized method using a standardized engine was needed to address the problem of knock. The first engine was built in 1929 by the Waukesha Motor Company and by 1933 a tentative method was developed. The method was adopted in 1939 as D357 titled "Method of Test for Knock Characteristics of Motor Fuels Below 100 Octane Number by the Motor Method", Eventually three other methods were developed. D614 "Method of Test for Knock Characteristics of Aviation Fuels by the Aviation Method" adopted in 1941, D1948 "Method of Test for Knock Characteristics of Motor Fuels Above 100 Octane Number by the Motor Method" adopted in 1964, and D2723 "Method of Test for Characteristics of Motor Fuels Using the Compressive Ratio (CR) Technique for Motor Ratings" adopted in 1968. All four of these methods were combined into a single method which we now know as ASTM D2700.

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

The most common application of this method in industry is the buying and selling of gasoline. Just about every batch of gasoline of the more than 148 trillion gallons of gasoline sold in the United States annually is tested against this standard.

When deciding on which gasoline to use to fill their vehicle tanks, consumers use the posted results from this method to select the proper grade of fuel required by their automobile. The fuel octane is posted on the fuel dispenser, $(R+M)/2$, where the "M" is the octane numbers determined by this method and the "R" is the octane determined by a companion method ASTM D2699 Standard Test Method for Research Octane Number of Spark-Ignition Engine Fuel". The average of these two values is called the antiknock index.

Refiners rely on the results from this method to optimize fuel production. Each blend stream used in the production of gasoline has an octane value associated with the product and the accurate knowledge of that octane allows the refiner to produce a gasoline that meets the requirements of consumer vehicles in the most cost-effective manner.

When designing an engine, the engineers developing the engine need to know the octane values of the fuels that are in the marketplace to design an engine that can run reliably and perform satisfactorily on the available fuel.

Government and state agencies use the results from this method to ensure the consumer is getting the product advertised. Several states have laboratories with this method in operation so they can routinely test the fuel obtained from retail dispensers to make sure the fuel is compliant with the posted octane rating.

After the standard was published, has it impacted health and safety? If yes, please explain.

Indirectly, this method has had a positive impact on the public's health and safety. For an engine to run at peak efficiency, the fuel used must meet the minimum performance requirements of that engine, and octane is one of the major performance parameters. When an engine is running at peak efficiency, it produces lower emissions reducing the impact of emissions on human health, it uses less fuel which results in lower greenhouse gas emissions per mile traveled which is better for the environment, and it reduces the probability of an unintended engine failure which could jeopardize the safety of the vehicle occupants.

How do consumers and the public benefit from this standard? (If applicable)

As stated previously, the vehicle designers develop an engine based upon a certain octane appetite and require that a certain octane grade be used in the vehicle to ensure proper performance. The consumer uses the information generated by this method to select the correct grade of fuel for their vehicle, and several states provide oversight to verify that the products being offered are indeed of the proper octane. The consumer benefits from the fact the fuel they purchase is truly fit for purpose and will function properly in their automobile.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

According to a 2015 article written by David Seiver of Valero Energy Corporation as published by Digital Refining in October 2015. A “conservative working average value” for Octane in the US is \$1.20 per barrel or 2.8 cents per gallon. On a 200,000-barrel shipment of gasoline, being off by 0.2 tenths of an octane can result in a loss of upwards of \$47,000 dollars. The accuracy and precision of this method is extremely important to the refiners, blenders, and importers to ensure they are paying the right price for the proper product.

According to Kelley Blue book, “the average new car in America sold for \$48,182 in July.” Not only are new car prices setting records, used car prices are at an all-time high, so protecting one’s investment is extremely important. Using a fuel with an improper octane value can lead to engine damage which will not only results in costly repairs, but also has the potential to devalue the vehicle. This method ensures that the fuel producers can make fuel that meets the minimum performance requirements of the engine, thereby protecting the consumers vehicle.

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

The method is cited in 16 CFR § 306.5 (a)(1) for “Automotive fuel rating”. The regulation requires that the automotive fuel octane rating must be determined any time the product is transferred.

The Method also appears in several international fuel specifications including Mexico’s NOM-016, Canada’s CGSB-3.5-2016. Additionally, the Energy Institutes IP236 and the EU’s method EN ISO 5163 are methods that are comparable to the ASTM D2700.

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identity which one(s) and describe how?)

It could be argued that this method is going to be necessary for accomplishing goal 7 “Affordable and Clean Energy”. The method will be directly useful in meeting target 7.2 of substantially increasing the share of renewable energy in the global mix. A necessary step in qualifying a fuel as a replacement or incremental addition to the transportation fuel section will be to undergo qualification by the octane method to ensure it is fit for use in the vehicle’s powerplant.

Please provide any additional information not provided above.

ASTM D2700 played an important role in the successful outcome of World War II. The US had learned during the first world war that airplanes would be a key element in any future battles and aviation fuel quality and supply was one of the key elements to air superiority. Industry, the Bureau of Mines, the National Institute of Standards, the CFR Committee and others worked together to pull off one of the more important technological achievements of the war effort. The method was key to helping refine the new processes that were developed to produce the “fighting grade” 100 octane fuel demanded by the fighter aircraft. In 1941, a series of tests were conducted to evaluate the merits of the different blend stocks and determine the most efficient way to produce them. The improvement in the fuel uncovered a deficit in the D2700 methodology. It was realized that a supercharged version of the method was needed to better quantify the antiknock performance of the fuel in the aircraft flying at altitude. This ultimately developed in the ASTM Method D909 “Standard Test Method for Supercharge Rating of Spark-Ignition Aviation Gasoline”

All four of the engine-based tests methods under subcommittee D02.01 jurisdiction should be up for consideration, but we settled on D2700 since it was the original method. All the methods are ingrained in the history of our nation, from the role they played in World War II, through the growth of automobile ownership and even now as we transition into the future of fuels and deserve a place of honor within ASTM.

ASTM D2699 - “Standard Test Method for Research Octane Number of Spark-Ignition Engine Fuel”.

ASTM D2700 - “Standard Test Method for Motor Octane Number of Spark-Ignition Engine Fuel”

ASTM D613 - “Standard Test Method for Cetane Number of Diesel Fuel Oil”

ASTM D909 - “Standard Test Method for Supercharge Rating of Spark-Ignition Aviation Gasoline”

The octane engines are almost 100 years old and the ASTM methods that use them are almost as old.

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Approved submittals must be sent to kkoperna@astm.org and mlynyak@astm.org by **September 23, 2022**.

Please identify the designation and title of the standard

ASTM D6751-20a : Standard Specification for Biodiesel Fuel Blend Stock (B100) for Middle Distillate Fuels

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

During the mid-1980s and into the 1990s, the United States and other countries throughout the world became increasingly aware of the need for cleaner burning transportation fuels to help mitigate greenhouse gas emissions/climate change as well as reduce global dependence on fossil fuels. The first commercial production of biodiesel in the United States occurred in 1991 and biodiesel volumes increased over the next few years enough that it was soon realized product quality would be absolutely critical to biodiesel's success going forward. This meant there was a very real need to develop a robust fit-for-purpose specification for biodiesel that would need to be internationally accepted/recognized by those entities associated with the energy and fuels sector. ASTM International was designated as the best, and most obvious, Standard Development Organization to begin the monumental task of developing a new and critical fuel specification for adopting biodiesel on a global scale. To officially begin this process, a Biodiesel Task Force, led by the biodiesel industry, was developed in ASTM Committee D02, Subcommittee E, Section E.02 on Diesel Fuel.

After rigorous vetting with a variety of fuel industry stakeholders such as Original Equipment Manufacturers (OEMs), biodiesel producers, and many others such as state-level regulators and numerous iterations of the proposed product specification, ASTM PS121-99 was approved to provide initial guidance on minimum requirements for an acceptable and consistent biodiesel product (this was the last Provisional Standard approved by ASTM). After more technical debate, the first full specification for biodiesel was approved as ASTM D6751-02. More than 50 changes have been made since then, with 26 new designations due to research and "real-world" insights from all sectors involved on a "day-to-day" basis with the energy and fuels industries. These changes have helped ensure biodiesel fuel quality meets all OEM and customer requirements and needs – leading to the current version of D6751-20a.

Identify the interest groups that participated in the development and/or revision to the standard?

Interest group participation was extremely wide ranging – OEMs, government officials, including state regulators eager to have a consensus-derived standard to adopt into their fuel quality regulations, fuel producers (both petroleum refiners and biodiesel producers), researchers, and a broad range of representatives all providing guidance on test methods and needed parameters and specification limits.

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

D6751 has been adopted as the state standard for biodiesel in almost every US state as well as the US EPA in their governance associated with the RFS. To qualify as an alternate fuel for inclusion in the RFS, biodiesel must first meet the D6751 specification. In addition, there are 30 countries that adopt, reference in regulation, cite as a Normative Reference or otherwise use as a basis for their National Standards for biodiesel making D6751 a true international standard! Producers use this specification for minimum product quality production and fuel purchasers have referenced this specification in their sales agreements. OEMs specify D6751 as minimum for use in their equipment and regulators sample and test biodiesel in commerce to ensure fuels meet these specification limits. In effect, D6751 controls biodiesel properties from production lots to the fueling ports of the end user. D6751 also is the “backbone” of the current voluntary nationally-accepted biodiesel quality program, BQ-9000, directed at producers, marketers, and laboratories responsible for fuel quality from production through end-use.

After the standard was published, has it impacted health and safety? If yes, please explain.

Yes. By establishing a consensus driven fit-for-purpose biodiesel specification, biodiesel became the first commercially available Advanced Biofuel (designated by the EPA in the RFS) in the United States. Biodiesel generates less greenhouse gas emissions and less particulate matter, lower CO, and unburned hydrocarbons than conventional petroleum-derived diesel fuel. Published data supports that the use of biodiesel specifically decreases cancer risk, fewer premature deaths, reduced asthma attacks and fewer lost workdays¹. In terms of safety, biodiesel in its pure form (B100) causes less biological damage to the environment than petroleum diesel if spilled or released and is safer than diesel fuel as it is less combustible (i.e., higher flash point), making it safer to handle, store, and transport.

How do consumers and the public benefit from this standard? (If applicable)

In short, consumers benefit from this specification as it provides an internationally-recognized standard ensuring quality assurance in the fuels used for transportation and/or home heating oil fuels will perform as expected when biodiesel is used. The public benefit is vast – biodiesel use greatly impacts the need for better environmental justice in areas where the product is used in diesel engines and heating oil systems.

¹ *Assessment of Health Benefits from Using Biodiesel as a Transportation Fuel and Residential Heating Oil, Trinity Consultants, 2022.*

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

The amount of material available to support this section with respect to biodiesel's use in society is too lengthy to cover in this space; however two of the most notable aspects associated with biodiesel are as follows:

Social Justice Health/Economic Benefits of D6751 B100 Biodiesel in Markets Hardest to Decarbonize – A study of 15 high-risk air quality communities coast-to-coast:

Researchers have found that switching to 100% biodiesel in 28 transportation and home heating oil sectors studied would provide immediate community health improvements that include the following:¹

- More than 456,000 fewer/reduced asthma cases per year
- More than 141,000 fewer sick days per year
- Cancer cases reduced by nearly 9,500 (over a 70-year timeframe)
- The prevention of more than 910 premature deaths per year
- A total of \$7.7 billion in avoided health costs annually
- A 45% reduction in cancer risk when legacy heavy-duty trucks use B100, and an 86% reduced risk when biodiesel is used for home heating oil.

Toxicity – Derived from vegetable oils, D6751 biodiesel is naturally non-toxic. The acute oral LD50 (lethal dose) of biodiesel is more than 17.4 g/Kg. By comparison table salt (NaCl) has an LD50 of 3.0g/Kg meaning table salt is almost six times more toxic than biodiesel. In an aquatic environment, biodiesel has been proven to be 15 times less toxic to common species of fish than diesel fuel. In both soil and water, biodiesel degraded at a rate four times faster than regular diesel fuel, with nearly 80% of the carbon in the fuel being readily converted by soil and water borne organisms in as little as 28 days.²

² Peterson, Charles and Moller, Gregory. "Biodegradability, BOD4, COD and Toxicity of Biodiesel Fuels", University of Idaho Biodiesel Education Program.

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

As noted above, D6751 has been adopted as the state standard for biodiesel in almost every state as well as the US EPA. In the RFS, to obtain payments for RINs (Renewable Identification Numbers), the original biodiesel fuel must meet D6751. In addition, there are 30 countries that adopt, reference in regulation, cite as a Normative Reference or otherwise use as a basis for their National Standards for biodiesel making D6751 truly international!

The following states have adopted D6751 as their biodiesel quality specification:

AK, AZ, AR, CA, CO, CT, DE, FL, GA, ID, IL, IN, IA, KS, KY, LA, ME, MA, MI, MN, MS, MO, MT, NV, NJ, NM, NY, NC, ND, OH (Summit County), OK, OR, PA, RI, SC, SD, TN, TX, UT, VT, VA, WA, WV, WI, WY

EPA Regulations under CFR Part 1090.95 incorporates D6751 by Reference.

Countries referencing D6751: New Zealand, Croatia, Sri Lanka, Uruguay, Ecuador, Tanzania, Saudi Arabia, Indonesia, Jamaica, Egypt, Columbia, Malaysia, Ethiopia, Israel, El Salvador, Honduras, Nicaragua, UK, India, UAE, Vietnam, Rwanda, Mozambique, Philippines, Zimbabwe.

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

Goal 7: Affordable and Clean Energy – Ensure access to affordable, reliable, sustainable and modern energy for all

Biodiesel is a proven renewable and sustainable alternate fuel with respect to petroleum with many positive attributes relating to energy, environment, and economics. It has been proven to reduce greenhouse gas emissions by an average of 74%, reduce hydrocarbon emissions by 67% and return 3.5 units of renewable energy versus a unit of fossil energy when compared to petroleum-based fuels. Because biodiesel can be produced from a wide variety of feedstocks (i.e., fats, oils, and waste greases) it is able to more readily adapt to market conditions and provide a cost-effective and reliable energy source.

Goal 11: Sustainable Cities and Communities – Make cities and human settlements inclusive, safe, resilient and sustainable

Biodiesel is typically used in diesel-based motor transport, but also has applications as an alternate fuel for petroleum-derived fuels used in home heating oil applications, rail, and marine as well as a replacement for heavier petroleum fuels (i.e., No. 4 and 6) or natural gas for electricity production. In many areas of the world, significantly large populations are in close proximity to these transport and end-use modes and the use of biodiesel has been demonstrated to provide “real-world” tangible benefits for energy and environmental sustainability.

Goal 12: Responsible Consumption and Production – Ensure sustainable consumption and production patterns

As stated above, biodiesel is currently produced from a wide range of fats, oils, and waste greases that, in general, do not compete with conventional food resources and have demonstrated flexibility in their ability as readily-available feedstocks for sustainable fuel production.

Please provide any additional information not provided above.

The success of D6751 has definitely enhanced the acceptance of biodiesel in blends of 5 to 20% (and higher) by volume in a number of energy-based sectors. D975 (Standard Specification for Diesel Fuel) allows up to 5% by volume of biodiesel which has been a more than a suitable replacement to restore lubricity lost when the nation transformed to ULSD. In addition, D396 (Standard Specification for Fuel Oils) and D7467 (Standard Specification for Diesel Fuel Oil, Biodiesel Blend (B6 to B20)) were both able to be undertaken and accepted due to having an internationally accepted standard for biodiesel as a blend stock. These standards have proven extremely valuable to the transport and energy delivery sectors as a vast majority of OEMs now approve and support their engines for biodiesel blends of up to 20% by volume.

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CALL FOR PARTICIPATION!

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Please identify the designation and title of the standard

D7566 – 21: Standard Specification for Aviation Turbine Fuel Containing Synthesized Hydrocarbons

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

In the mid-2000's, the commercial aviation industry and the military were facing challenges regarding both the environmental impact and supply security of petroleum-derived jet fuels. While it appeared that jet fuel produced from renewable sources was the solution to both these challenges, there were concerns with ensuring the safety, performance, and quality of these new "alternative jet fuels", and with obtaining airworthiness authority approval to use the new fuels.

The development of ASTM standard D7566 addressed both issues by introducing new structural provisions into the aviation jet fuel specifications such as the use of annexes to define more stringent criteria for each new fuel, and the inclusion of a provision to allow re-designation as the D1655 (Specification for Aviation Turbine Fuels) jet fuel currently approved for use on virtually all commercial jet engine aircraft. This specification therefore effectively opened the door for production and use of renewable jet fuels by the existing fleet of aircraft by establishing the concept of a "drop-in" jet fuel that requires no further evaluation or approval beyond ASTM.

Identify the interest groups that participated in the development and/or revision to the standard?

The stakeholders involved in developing this specification, and in the revisions incorporating seven new annexes for drop-in synthetic jet fuels which can be produced from renewable feedstocks, included the aircraft and engine manufacturers, synthetic jet fuel producers, existing jet fuel producers (petroleum companies), regulatory authorities such as the US Federal Aviation Administration (FAA) and the European Aviation Safety Agency (EASA), and numerous other representatives from all elements of the aviation fuel supply chain.

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

ASTM standard D7566 is used by drop-in synthetic jet fuel producers to produce jet fuel, it is used by engine and aircraft manufacturers to certify their products with the airworthiness authorities, and it is used by prospective synthetic jet fuel producers to determine if their candidate fuel is viable for use on aircraft. Because it is an internationally recognized and accepted standard, it is also referenced by foreign standards development organizations in their jet fuel specifications.

After the standard was published, has it impacted health and safety? If yes, please explain.

The issuance of D7566 promoted the introduction and use of environmentally friendly Sustainable Aviation Fuels (SAF) thereby mitigating the climate impact of air travel. Synthetic fuels are typically free of sulphur, oxygen and aromatics, which combined with their high energy content, burn cleaner in aircraft engines. Reports indicate that combustion of fuels meeting ASTM D7566 have reduced soot emissions due to their reduced aromatic content. Soot, depending on the particulate size, can pose tremendous harms to public health. At airports, the reduced level of soot emitted during ground operations is a major health and safety improvement when compared to conventional, petroleum derived fuels. Amongst other benefits, a reduction in soot is also believed to lead to a reduction of ice crystals and shortened durations of contrails (a trail of condensed water from an aircraft or rocket at high altitude, seen as a white streak against the sky) and therefore has a strong potential for climate benefit compared to standard kerosene. Contrails are believed to heighten the effect of global warming and so their reduction is a positive benefit for the global society.

How do consumers and the public benefit from this standard? (If applicable)

The issuance of ASTM D7566 enables consumers and the public to mitigate their environmental impact while traveling, yet still be assured of the level of aviation safety expected in today's world. There is great public interest in contributing to the mitigation of global warming and climate change, and the ASTM aviation fuels subcommittee (D02.J) has responded to this interest and provided a means to address the challenge.

Synthetic blending components (SBCs) produced to ASTM D7566 have reduced greenhouse gas (GHG) emissions of up to 80% when compared to fossil jet fuel. When these SBCs are blended with jet fuel to produce SAF, they provide a direct replacement (drop-in) for current jet fuels with greatly reduced greenhouse gas emissions. This environmental benefit is realized without additional investment or cost increases in the aircraft equipment or fueling infrastructure due to the drop-in nature of fuels specified to D7566 (SAF).

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

Aircraft operation with a SAF produced to ASTM D7566 will reduce net carbon emissions from that aircraft¹. As an example, "a large-cabin modern business jet on a 1,000 nautical-mile mission might burn enough fuel to produce approximately 22,787 pounds of CO₂. If such a flight were to use SAF (HEFA-SPK pathway) at a blend of 30% SAF to 70% conventional Jet-A fuel, the same mission would result in a net reduction of CO₂ emissions of approximately 4,100 pounds (18%) on a lifecycle basis"². Use of SAF produced to ASTM D7566 will also enable airlines to avoid economic penalties imposed by the International Civil Aviation Organization's (ICAO) Carbon Offset and Reduction Scheme for International Aviation (CORSIA). Several of the annex materials specified in ASTM D7566 have been pre-approved by ICAO as CORSIA-eligible fuels with default carbon emissions reduction values.

¹ PARTNER Project 28 Report, version 1.2, *Life Cycle Greenhouse Gas Emissions from Alternative Jet Fuels*, Stratton et al, June 2010

² <https://caafi.org/resources/faq.html>, "What sort of actual emissions reductions can be expected from using SAF?"

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

As stated above, several of the annex materials specified in ASTM D7566 have been pre-approved by ICAO as CORSIA-eligible fuels with default carbon emissions reduction values. ICAO document “CORSIA Default Life Cycle Emissions Values for CORSIA Eligible Fuels”, dated March 2021, provides default carbon emissions reduction values for four SAFs specified in D7566. In addition, the certification bases for virtually all turbine engine powered aircraft indirectly adopt the D7566 fuel specification as an operating limitation via that specification’s provision to allow re-designation as conventional D1655 fuel.

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

Yes, the issuance of ASTM D7566 directly applies to Goal 7; “Ensure access to affordable, reliable, sustainable and modern energy for all”. As discussed above, this ASTM specification has effectively opened the door to the production and use of lower carbon intensity jet fuels, which is a stated goal of the commercial aviation industry. The Air Transport Action Group (ATAG) has established a goal for global civil aviation operations to achieve net-zero carbon emissions by 2050, and the International Air Transport Association (IATA) has committed its airline members across the globe to carbon emissions at 50% of the 2005 levels by 2050.

ASTM standard D7566 is now the internationally recognized specification for SAF jet fuels. It is a dynamic document that can accommodate new biomass feedstocks and conversion technologies as they emerge. The specification incorporates each new conversion pathway in separate annexes after a rigorous evaluation process. Currently, the synthetic blend component (SBC) specified in each of the annexes must be blended with conventional jet fuel before it can be used in an aircraft. However, efforts are currently underway in the ASTM aviation fuel subcommittee to develop criteria to allow these renewable SBCs to be used without blending with conventional jet fuel, further enhancing the environmental benefit through the use of 100% SAF (or unblended SAF). These changes, and others being devised by the subcommittee, aim to enhance the utility of D7566 as a global vehicle for environmental change that will enable commercial aviation to meet its emission goals well into the future.

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Please identify the designation and title of the standard

D6373- Standard Specification for Performance-Graded Asphalt Binder

D8239- Standard Specification for Performance-Graded Asphalt Binder Using the Multiple Stress Creep and Recovery (MSCR) Test

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

These specifications are used in contractual arrangements between buyers and sellers of asphalt to define the asphalt product being purchased. There are equivalents of these two standards, AASHTO M 320 and M 332, that are also widely specified throughout the United States. For many years, differences have existed between the AASHTO versions of the standards and the ASTM versions of the standards. The divergence of these asphalt specifications creates a burden for owners and specifiers, and also creates logistical problems for asphalt producers. Producers must meet varying technical requirements for customers depending upon whether the AASHTO or ASTM version of the standard is specified.

The Task Force on Asphalt Standards Harmonization (TFASH) was formed in January 2019 to examine differences between the AASHTO and ASTM versions of asphalt-related standards that are published by both organizations. The group evaluates technical issues that exists in the standards and works to develop consistent requirements that meet the collective needs of asphalt producers, specifiers, and owners. TFASH consists of members of both ASTM Committee D04 and AASHTO Committee on Materials and pavements (COMP). The harmonization of ASTM D6373/AASHTO M 320 and ASTM

ASTM D8239 / M 332 was the very first set of standards that TFASH decided to tackle. Harmonization of these standards took a great deal of coordination and effort.

In order to ensure that both the interests of AASHTO membership and ASTM membership were met, TFASH evaluated technical issues that existed in the standards and worked to develop recommended revisions that would create consistency in the requirements for the AASHTO and ASTM versions of the standards. Input from both AASHTO and ASTM members was equally considered. Recommended revisions were sent to AASHTO COMP Subcommittee 2b and ASTM Subcommittees D04.40 for considering after 100% consensus was reached amongst all Task Force members.

The recommended revisions were balloted in both AASHTO and ASTM and were successfully published by both organizations in 2022.

Identify the interest groups that participated in the development and/or revision to the standard?

ASTM Committee D04.40, Asphalt Specifications

AASHTO Committee on Materials and Pavements, Subcommittee 2b, Liquid Asphalt

Task Force on Asphalt Standards Harmonization (TFASH)

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

The performance graded (PG) asphalt binder grading system is used to characterize asphalt binders used in asphalt pavements. The system correlates the PG grade of the asphalt binder to the climactic conditions under which it will be used and aging properties of the asphalt. The PG system involves a series of tests and specifies that an asphalt binder must pass the tests limits at specific temperatures.

These standards are the most used grading specifications for asphalt binder, utilized by federal, state, and local agencies in specifying the purchase and design of asphalt pavements.

The United States has approximately 3,600 asphalt production sites and produces over 400 million tons of asphalt mixture each year. Approximately 94% percent of roads in the United States are surfaced with asphalt. (Reference: [NAPA and Industry Fast Facts](#)). These asphalt binder specifications are the most commonly-specified for asphalt binder in the United States.

After the standard was published, has it impacted health and safety? If yes, please explain.

The harmonization of the specification will lead to a reduction in disputes over acceptance of binders. This in turn will lead to economic and time savings in completing projects without delays caused by retesting and interpretation of the binder specifications by AASHTO and ASTM versions of the specification. Safety has been improved by not requiring changes in production procedures to meet the specifications.

How do consumers and the public benefit from this standard? (If applicable)

Roads and highways in the United States are typically built using tax-payer dollars. Publicly funded highway programs make up about 65% of the asphalt pavement market, with residential and non-residential construction making up the remaining 35% (Reference: [NAPA and Industry Fast Facts](#)). Harmonization of these standards relieves the burden on project owners in understanding and evaluating products for purchase. Likewise, it reduces the logistical issues for producers that are associated with developing products that meet multiple criteria. This has a direct impact on ensuring that tax-payer dollars for asphalt purchase are well-spent. This harmonization effort has the following impact on the public:

1. Ensures high-performing, durable, and long-lasting asphalt pavements;
2. Provides a means to determine compliance an asphalt binder used in roadway construction;
3. Promote consistency and uniformity in asphalt binder used in public roadways;
4. Uses scientifically sound testing methodologies;
5. Provides for the optimization of available natural resources and manufacturing technology in order to accommodate various local and regional conditions.
6. Ensures effective communication between buyers and sellers of asphalt binders to ensure best interests of the taxpayer are met;
7. Promote fairness, equity, and practicality in binder selection and usage;

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

The United States has approximately 3,600 asphalt production sites and produces over 400 million tons of asphalt mixture each year. Approximately 94% percent of the U.S.'s 2.8 million miles of roads surfaced with asphalt. In addition, 80% of 3,330 runways in the U.S. national airport system are surfaced with asphalt. In 2014, the total spending on highway improvements at all levels of government in the U.S. was \$105 billion. (Reference: [NAPA and Industry Fast Facts](#)).

On November 15, 2021, President Joe Biden signed a \$1.2 trillion Infrastructure Investment and Jobs Act (IIJA) of 2021. The bill dedicates \$360 billion for roads and bridges. Reference: <https://www.fhwa.dot.gov/bipartisan-infrastructure-law/funding.cfm>. This harmonization effort is completed at a critical time where the investment in asphalt infrastructure, and therefore production, will increase substantially.

Roads and highways are the backbone of our economy and are essential to the U.S.'s continued economic success, allowing U.S. motorists to travel 3.2 trillion miles annually. 87% of the \$16.8 trillion worth of commodities shipped within the country each year are carried on U.S. highways. (Reference: [Build Back Better with Asphalt](#)). Safe and durable pavements play a key role in U.S. economic growth and recovery.

Harmonization of the asphalt specifications used in the industry leads to better efficiency in asphalt production and less disputes between project owners and producers, which leads to better efficiency in spending and use of resources, including several billion taxpayer dollars.

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

These standards are used widely throughout the United States, Canada, and by regulatory bodies in other countries to specify the performance grade of asphalt binders for purchasing. Agencies including the Federal Highway Administration (FHWA) and all 50 states, most Canadian provinces, counties, and municipalities specify the use of one or both versions of these standards. Additional information on United States usage can be found [here](#). Additional information on Canadian usage can be found [here](#).

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

3. Good Health and Well-Being- Safe, durable and reliable pavements allows for access and transportation plays a critical role in ensuring access to medical care, education, as well as goods and services.

8. Decent Work and Economic Growth- Highway infrastructure is a key catalyst for increasing economic growth. Our pavement networks link goods and services, bringing together people from cities, towns, and rural communities to provide opportunities for all.

9. Industry, Innovation, and Infrastructure- This harmonization effort ensures pavements that are high-performing, long-lasting, and durable.

12. Responsible Consumption and Production- This harmonization effort simplifies asphalt production and purchasing.

Please provide any additional information not provided above.

TFASH is currently working on several other harmonization efforts in order to ensure better consistency and agreement between AASHTO and ASTM. Some of the efforts TFASH is currently working on include harmonization of:

- ASTM D6997 and AASHTO T 59, Standard Test Method for Distillation of Emulsified Asphalt
- ASTM D6648 and AASHTO T 313, Standard Test Method for Determining the Flexural Creep Stiffness of Asphalt Binder Using the Bending Beam Rheometer (BBR)
- ASTM D7175 and AASHTO T 315, Standard Test Method for Determining the Rheological Properties of Asphalt Binder Using a Dynamic Shear Rheometer
- ASTM D6925 and AASHTO T 312, Standard Test Method for Preparation and Determination of the Relative Density of Asphalt Mix Specimens by Means of the Superpave Gyrotory Compactor
- ASTM D139 and AASHTO T 50, Standard Test Method for Float Test for Bituminous Materials
- ASTM D2872 and AASHTO T 240, Standard Test Method for Effect of Heat and Air on a Moving Film of Asphalt Binder (Rolling Thin-Film Oven Test)
- ASTM D8237 and AASHTO T 321, Standard Test Method for Determining Fatigue Failure of Asphalt-Aggregate Mixtures with the Four-Point Beam Fatigue Device

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Approved submittals must be sent to kkoperna@astm.org and mlynyak@astm.org by **September 23, 2022**.

Please identify the designation and title of the standard

ASTM D8159: Standard Test Method for Automated Extraction of Asphalt Binder from Asphalt Mixtures

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

Traditionally, the manual extraction standard D2172 was used for specifying how a paving mixture is extracted with trichloroethylene, normal Propyl Bromide, or methylene chloride. This method took a long time and was producing large quantities of hazardous waste. Even though the procedure was vital for calculating asphalt content, it was being phased out by agencies due to the solvent waste and exposure concerns. D8159 introduced a new method of performing the extraction procedure in a self-contained apparatus that has the capacity to recycle the solvent and reduce solvent exposure.

The original manufacturer of the automated equipment required for extraction, InfraTest Pruftechnik GmbH initiated the creation of the standard by giving a presentation about the new technology at a 2016 ASTM Committee Week in Tampa FL.

Identify the interest groups that participated in the development and/or revision to the standard?

The development of this standard was spearheaded by manufacturers of the automated equipment: InfraTest Pruftechnik and Controls Group, as well as a user, Walbec Group. Louisiana State University took the lead on development of an interlaboratory study (ILS) that ensured that the results of the new test procedure were comparable to those from the manual extraction method.

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

The standard D8159 is used by university researchers to characterize various asphalt mixtures containing additives, recycled asphalt pavement, and recycled asphalt shingles. In turn, they provide guidance to Departments of Transportation (DOTs) and contractors in the industry about new and more effective uses of materials and additives for the industry. In addition, the use of automated extraction system cut the test time and staff training time in half of the manual method. This time-savings is very helpful for asphalt contractors and understaffed DOT's who are now able to spread out their resources more proficiently and test more material at a time.

After the standard was published, has it impacted health and safety? If yes, please explain.

The standard has quickly become a popular industry staple as labs replaced antiquated manual extraction equipment that utilized large amounts of hazardous solvents and posed consistent exposure risk to laboratory staff. The automated extraction method as outlined in D8159 provides a closed solvent-based extraction process that recycles the solvent, hence producing much less hazmat waste and minimizing staff exposure to the hazardous materials to almost zero % during the entire extraction process. The chemicals used in the extraction process are known carcinogens that can cause several side effects due to exposure, including unconsciousness, liver damage, kidney damage, and death if exposed in high amounts. They are also known to accumulate in breast tissue, and the fetus of nursing newborns of women that are exposed to them. In addition, substances are also known environmental hazards that can enter our ecosystem and impact fish and wildlife if non properly disposed of. The general population can be exposed to these hazardous chemicals by inhaling contaminated air as well as eating contaminated food and water.

How do consumers and the public benefit from this standard? (If applicable)

The standard is enabling contractors to increase the percentage of Recycled Asphalt Materials (RAP) in their mix since the automated extraction process makes characterizing the RAP faster and more accurate. The public benefits from having higher quality roads and municipalities are recycling waste materials and saving tax money in the process.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

Since the standard was first approved in 2018, there are now 17 laboratories accredited by the American Association of State Highway and Transportation Officials (AASHTO) for D8159. There are still 167 laboratories accredited to perform the manual extraction procedure, but it is expected that acceptance and adoption of the new automated procedure will continue to grow. Source:

<http://aashtoresource.org/aap/accreditation-directory>

The Agency for Toxic Substances and Disease Registry indicates that one of these substances, trichloroethylene is the most frequently reported organic compound in groundwater, with between 9 and 34 percent of drinking water sources containing some trichloroethylene. Source:

<https://www.epa.gov/sites/default/files/2016-09/documents/trichloroethylene.pdf>

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

Several State Departments of Transportation (DOTs, for example Wisconsin DOT and Illinois DOT have already adopted this standard and are mandating it for all DOT districts and have all the state contractors on board to implement the standard and adopt the new technology in their laboratories.

The standard is steadfastly getting adopted by DOT's around the country. It is also currently used by the Federal Highway Administration laboratories as well as laboratories maintained by Florida DOT, Georgia DOT, Idaho DOT (D1/D5/D2), Illinois DOT (D1,D2, D3,D4), Indiana DOT, Iowa DOT, Kansas DOT, Louisiana DOT @ LTRC, Montana DOT, Oklahoma DOT, Texas DOT, Wisconsin DOT (all districts).

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

3- Good Health and Well-Being: This standard reduces workers' exposure to harmful chemicals

12- Responsible Consumption and Production: This standard reuses hazardous solvents and therefore reduces consumption and production needs. In addition, it allows for testing of recycled pavement materials to be done faster and more economically, providing a less-resistive path to their use.

14- Life Below Water- This standard reduces the production of hazardous waste created through the testing process. The production of less waste reduces the change of improper disposal which can create environmental hazards for our waterways, seas, and oceans.

15- Life on Land- This standard reduces the production of hazardous waste created through the testing process. The production of less waste reduces the change of improper disposal which can create environmental hazards for our forests, wildlife, and ecosystems.

Please provide any additional information not provided above.

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ASTM International has developed specifications for roof shingles starting with ASTM D 225-86 Asphalt Shingles (Organic Felt) Surfaced with Mineral Granules (withdrawn), which later evolved into ASTM D3462-87 (Asphalt Shingles Made from Glass Felt and Surfaced with Mineral Granules). ASTM also developed test methods including ASTM D228/D228M-21 Standard Test Methods for Sampling, Testing, and Analysis of Asphalt Roll Roofing, Cap Sheets, and Shingles Used in Roofing and Waterproofing; ASTM D3161, Standard Test Method for Wind-Resistance of Asphalt Shingles (Fan-Induced Method); and ASTM D7158, Standard Test Method for Wind-Resistance of Asphalt Shingles (Uplift Force/Uplift Resistance Method), among others.

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

ASTM D3462 was developed by the industry: manufacturers and installers, working together to develop a standard that improved the performance and appearance of asphalt shingles including a drive to make a product that would have uniform and safe installation procedures. Together, we developed a standard which must be met if a manufacturer is to certify that their products will perform properly, a standard that ushered in new manufacturing processes and further improved the product performance, and made asphalt shingles more affordable with additional advantages that are outlined below.

Identify the interest groups that participated in the development and/or revision to the standard?

International Code Council (ICC), National Research Council of Canada (NRC), National Institute of Standards and Technology (NIST), and numerous state and county building departments, Factory Mutual International (FM), Underwriters Laboratories (UL), National Roofing Contractors Association (NRCA) and affiliated bodies, Asphalt Roofing Manufacturers Association (ARMA), numerous other building product associations, producers of building products, Architects (AIA), the American Society of Civil Engineers (ASCE), and designers.

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

ASTM D3462 provides a guideline for the manufacture and for the performance of shingles. This standard, as well as those leading up to its development, have been updated repeatedly to address new science, new materials, and new challenges as they unfold. Standards and testing are now addressing improved resistance to wind damage, hail damage, resistance to wildfires, and the newest threat from global warming by tackling solar reflectance for roofing.

After the standard was published, has it impacted health and safety? If yes, please explain.

The advent of Asphalt Shingles has provided low-cost protection for most North American homes against storms, high winds, hail, wildfires, and other weather events. The ASTM D3462 Standard set the bar for a product that is strong, yet flexible, easy to install, and provides ease of mind to most property owners. Designers and engineers now know what will be used to protect the building, while insurers can confidently provide low-cost protection to the owner.

Early production of asphalt shingles used what was called “organic felt” made of rags and paper (ASTM D225). ASTM D3462 ushered in the use of fiberglass felts which provided superior fire protection and reduced costs and prices. Fiberglass also replaced the use of asbestos in shingles.

This standard also saw the introduction of modified sealants that greatly improved the shingles resistance to high winds and t blow-off from the roof.

How do consumers and the public benefit from this standard? (If applicable)

Because of the extensive use of these standards by manufacturers, builders, government officials, and purchasers, the public at large can feel at ease knowing that the roof above them has been manufactured, evaluated, and approved for use by multiple stakeholders.

Looking ahead, there is a baseline for asphalt shingles to be used as recycled materials. According to a 2007 study conducted for the United States Environmental Protection Agency (EPA), approximately 11 million short tons (10.0 Mt) of asphalt shingle waste is generated each year in the United States. ([this AI article](#)) Utilizing manufactured scrap that follows ASTM D3462 has been a good starting point and framework for recycling asphalt shingles in production or for use in road paving.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

The American roofing industry occupies an essential role in the construction, repair, and maintenance of every standing structure in the United States. As such, it provides and supports employment, incomes, and economic activity across the U.S. economy. As an example, in 2018, the roofing industry supported employment for 972,869 Americans who earned wages and salaries averaging \$57,777 and totaling \$56.2 billion. Furthermore, roofing manufacturers have developed and produced a number of innovative roofing materials and products that help conserve energy and water and help reduce greenhouse gases and other dangerous pollutants.

Additional resource: Shapiro, Robert with Aneja, Siddhartha (2020). "The Impact of the Roofing Industry on the American Economy."

https://www.sonecon.com/docs/studies/The_Impact_of_the_US_Roofing_Industry_on_the_American_Economy-Robert_Shapiro-Siddhartha_Aneja-July_7_2020.pdf

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

ASTM D3462 is referenced in the International Building Code and the International Residential Code, which are primarily used as model building codes throughout the United States. These codes are also adopted internationally in 19 Caribbean countries, Columbia, Honduras, Mexico, Eastern Europe (Georgia), the Middle East and North Africa, and Africa. Additionally, ASTM D3462 is referenced by the Florida Building Code and nearly every other state building code in use today.

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

As shown in Maslow's Pyramid of Needs, we must have food, water, air, and *shelter* to survive. Asphalt roofing has shown it has the robustness of being the primary building component that provides the necessary shelter while also addressing many needs found in the **SDGS**, in particular, Number 11 dealing with cities, safety, disaster risk reduction, fighting urban heat island effect, used for collecting solar energy, and collecting rainwater to mitigate flooding. Asphalt shingle roofing is also recyclable, reusable, and repurposed into roads, dust control, and clean fill at construction projects.

Please provide any additional information not provided above.

Most people are familiar with traditional steep-slope roofs because that is what we commonly see on homes. The ASTM D3462 Standard provides guidelines for manufacturers to produce steep-slope roofing products, which are relatively low maintenance, affordable compared with other options, safe to transport and install, long lasting, and have a familiar, classic, and aesthetically pleasing look that compliments a variety of structures. ASTM D3462 includes product specifications for design, production, and performance, which must be met if a manufacturer is to certify that their products meet the standard.

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Committee: D08

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Please identify the designation and title of the standard

D5147 - Standard Test Methods for Sampling and Testing Modified Bituminous Sheet Material

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

Modified-bitumen sheet membranes were introduced in the North American roofing market in the 1980s. This type of roofing materials was different than any other product that was covered by an ASTM standard at that time. In order to ensure proper and objective evaluation of these new products, Committee D08 worked on the development of a new set of test methods that apply specifically to modified-bitumen sheet materials. D5147 was originally published in 1991.

Identify the interest groups that participated in the development and/or revision to the standard?

As with most standards under the jurisdiction of Committee D08, the development of D5147 involved various stakeholders of the roofing industry: manufacturers, testing laboratories, roofers associations, roof consultants, government agencies, and more. These groups are still involved in the maintenance and evolution of the standard.

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

D5147 is a cornerstone standard for testing and evaluation of a wide variety of modified-bitumen products. It is cited in more than 20 ASTM standards, from Committees D08, D35 and E06, as well as standards and guidelines from several organizations in the United States and other countries.

After the standard was published, has it impacted health and safety? If yes, please explain.

Roofing assemblies are vital in the protection of people living in buildings and materials found in buildings. The appropriate testing of modified-bitumen products ensures that these products are compliant with their respective specifications and comply with applicable building codes and regulations.

When adequately designed and tested, roofing assemblies provide protection against water infiltration, uplift due to wind events, energy efficiency and thermal comfort. A well-designed roof ensures that building materials are protected from incidental leaks that could lessen their performance or even be degraded.

How do consumers and the public benefit from this standard? (If applicable)

The benefits to consumers are directly linked to the item above. Performance provided by modified-bitumen sheet materials is ensured by adequate testing, conformity assessment by specifications referencing D5147, and building code requiring these materials to meet their respective specifications.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

Manufacturers use D5147 for routine quality control testing of the hundreds of millions of square feet of modified-bitumen sheet materials produced each year in North America.

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

D5147 is the basis of testing in several ASTM specifications for modified-bitumen sheets (D6162, D6163, D6164, D6222, D6223, and D7530 to only name a few). These specifications have been adopted in model building codes in the United States. D5147 is also the basis of testing of the Canadian national standard for modified-bitumen sheets (CSA A123.23) which is referenced by the National Building Code of Canada.

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

As mentioned in previous items, D5147 indirectly provides elements supporting UN SDG number 3 (Good Health and Well-Being). It also contributes to UN SDG number 11 to promote sustainable cities and communities through the quality of the built environment.

Please provide any additional information not provided above.

Even if D5147 is more than 30 years old, it is still being actively maintained by Committee D08 stakeholders. Evolution in technology for testing equipment and devices brought D5147 to its current state and there is an active work item for addition of a precision statement to the load strain test method that is part of the standard.

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Please identify the designation and title of the standard

D6083/D6083M-21

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

Scientists and Chemists, working in the roofing industry, saw value in reflective coatings to achieve energy savings, and reduce peak energy demand. Originally approved in 1997, D6083 provided a valuable peer tested and reviewed standard for liquid applied acrylic roof coatings. Before the existence of this standard, outlaw contractors would use house paint or any low-cost white coating they could acquire to paint a roof, leading to disastrous results and failures. Clearly, developing this standard, and the efforts to refine and improve it, has brought tremendous value to the roof coatings industry.

Identify the interest groups that participated in the development and/or revision to the standard?

(RCMA) Roof Coatings Manufacturers Association, (NRCA) National Roofing Contractors Association, (CRRC) Cool Roof Rating Council, (US EPA) Energy Star, Architects, Consultants, Specifiers, Property Managers, Building Owners, Coating Manufacturers, and raw material suppliers.

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

This standard has been adopted by many regulatory bodies. Specifically, this standard is in the International Building Code. Furthermore, it is accepted by the Florida Building Code, Miami Dade County Product Control Division, Factory Mutual (FM Global), Underwriters Laboratories, and ICC-ES. This is the standard that all ATL's (Accredited Test Laboratories) follow to test acrylic coatings.

After the standard was published, has it impacted health and safety? If yes, please explain.

Coatings that meet this standard remain in service for many years providing protection, and energy savings for the roof and the building occupants. Furthermore, products that meet this standard provide protection in the form of roof life extension, prevention of water intrusion, and energy savings.

As a result of the utilization of this standard, being able to extend the life of an existing roof has greatly affected the reduction of total roof removal and replacement on an exponential scale, thereby reducing landfill waste. As a result of this standard, the reduced need for total roof replacement has had a major positive environmental impact.

This standard has enabled the roofing industry to impact our environment by increasing roof sustainability.

How do consumers and the public benefit from this standard? (If applicable)

For those who are not familiar with roof coatings technology, this standard provides them a great place to start their journey to understand how to choose a quality roof coating. Choosing a quality roof coating is the key first step in providing a long-term sustainable layer of protection and energy saving solution for any residential or commercial property.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

There is an impressive amount of data, case studies and a white paper or two available from the (RCMA), (NRCA), (CRRC), (Energy Star) and the ACA (American Coatings Association). The amount of information available online about this technology space is massive. Simply use your favorite search engine and search for phrases like cool roof, acrylic roof coating, sustainable roof coating and similar terms to find many articles and papers on the topic.

Some useful links to start your journey:

- <https://coolroofs.org/resources/general-information>
- <https://www.roofcoatings.org/benefits/>
- <https://www.paint.org/about/industry/sustainability/cool-roofs/>

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IBC, FBC, Miami-Dade, FM Global, UL, ICC-ES, California Title 24, US Green Building Council
Internationally we can cite the following examples; there are many more than we can share here:

- ECBC (Energy Conservation Building Code of India)
- ECRC (European Cool Roof Council)
- China implementing cool roof standards working with BEEC (Building Energy Efficiency Consortium)
- SANEDI (South African Energy Development Institute)

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

This standard affects 3 of the 17 sustainable development goals:

#7 Affordable and Clean Energy; Reflective coatings reduce peak energy demand, water based, and environmentally friendly.

#11 Sustainable Cities and Communities; Reflective coatings reduce landfill use.

#13 Climate Action; Reflective coatings lower demand for air conditioning, energy consumption, low or no VOC water based environmentally friendly solutions to our environment

Please provide any additional information not provided above.

These reflective, protective coatings and assemblies can be applied over existing BUR, Modified Bitumen, single ply TPO, PVC, EPDM, Hypalon, Metal Roofing panels, and Polyurethane foam roofs to indefinitely extend the building's roof life cycle. Besides all the technical benefits already mentioned, roof coatings are often not disruptive to the building occupants. Many roof coating installs can be done while building occupants remain in the facility and can continue with their work or other activities. In many cases, roof coatings are a maintenance product and not a capital expense. Consequently, tax deductions in those situations are mostly same year and not amortized over time; becoming an immediate savings.

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ASTM D4169 Standard Practice for Performance Testing of Shipping Containers and Systems

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

In the mid to late 1900's there was no public transport packaging test method to simulate a packaged product logistical journey. Each shipper had its own criteria for a successful package. A few companies such as GE and Kodak had their own specifications and the National Safe Transit Committee had procedure 1 and 1A developed around 1948 for package screening tests. In 1962 Fred Ostrem from General American Research Development wanted to develop a transportation performance test standard. Fred compiled an array of reports including transportation data from vehicles that had damage during transit of electrical systems for the Distance Early Warning System (DEW) project during the Cold War with the Soviet Union.

In 1971 began development of a general packaging performance test by ISO. In 1973, D10 decided to develop a test as other organizations did not have any interest. The D10 committee decided to take this proposed test further and have specific values for testing. The development of the standard was initiated by Dunc Godshall, Fred Ostrem, Bob Fielder, Marv Decker, Joe Hubbard, Sergey Guins, Dennis Young, Al McKinlay and Chester Gaynes. The task of developing the standard was immense and contentious as representatives from all industries wanted to be included.

In 1977 Forest Products Laboratory (FPL) sponsored a research project to assess available data (a lot from Fred Ostrem and Dunc Godshall's research) describing the carrier environment. In 1979, the FPL issued General Technical Report FPL 22 which is the basis for the original test intensities used in ASTM D4169.

The ASTM D4169 D10 Committee decided to publish this in 1979 as a proposal instead of standard because it was innovative and new for the time. Companies such as GE, magazine articles, and an article written by Godshall are published to explain the concepts, structure, and how it could be useful to users.

Identify the interest groups that participated in the development and/or revision to the standard?

The interested groups that participated in the development and revisions of D4169 standard are wide from government entities such as the General American Research Development (GARD), Forest Products Laboratory, US Military/Department of Defense, transport carriers, commercial industries, academia, independent laboratory facilities, and industry experts.

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

This standard is commonly used to simulate what a package will experience during transit from shipment to customer receipt. It is comprised of a variety of static and dynamic tests along with various environmental conditions a package may experience during transit. The testing varieties are now called schedules that each company or individual can use to predict whether a package will survive the transportation and logistical system selected.

There are 18 Distribution Cycles test schedules that cover a majority of transit modes in the supply chain world; the user selects the cycle(s) that reflect their transportation methods. Since there were numerous entities that use this standard, with different acceptance criteria, three assurance levels (I, II, and III) were created to satisfy the entities needs.

ASTM D4169 has been used to support all types of packaging development either by using individual test schedules or Distribution Cycles to ensure a package or unitized package system is adequate for shipment. The standard is also used as part of the regulatory validation process for pharmaceutical and medical device products.

After the standard was published, has it impacted health and safety? If yes, please explain.

After ASTM D4169 was published, the public has a documented source with the transportation environment known and aids and supports preventing damage to packaged product unitized, in pallet loads or exterior packages, or as individual packages. By possessing the knowledge of package handling both manually and mechanically, the users of ASTM D4169 have prevented package and product damages that could expose humans and the environment to unwanted outcomes that could lead to physical injury and up to death.

By prescribing specific test methods and environmental conditions within ASTM D4169, users are more informed of potential shipping-caused outcomes, reducing personnel/personal injuries, overall improved health by ensuring humans are not directly exposed to health hazards, and reduced product damage.

How do consumers and the public benefit from this standard? (If applicable)

Consumers and the public benefit from this standard by not having damaged product arrive from the multiple static and dynamic stresses shipping a product. The ASTM D4169 test was developed to ensure packaged product from multiple industry types can be challenged to hazards specific to their logistical/supply chain systems and have a pass or fail outcome. Before ASTM D4169 was published, public data related to the shipment of products was lacking. The standard is continuously reviewed with currently available data from North America and the International community to assure the test practice stay relevant.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

Not specifically, as this test is used and recognized worldwide. Most users utilizing ASTM D4169 keep their results internally and proprietary unless requested by governmental agencies, clients, customers, and similar.

The D4169 standard is an FDA-recognized consensus standard (the latest revision in 2022 is recognition number 14-576). The D4169 standard is also written into the ISO 11607-1 Packaging for terminally sterilized medical devices —Part 1:Requirements for materials, sterile barrier systems and packaging systems as a “performance testing” standard for use to “demonstrate conformity” with the document requirements with medical devices.

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

Since ASTM D4169 was published in 1981, it has gained traction as a standard primarily used in the United States of America to an international recognized and accepted standard. It is used widely in Europe and Asia and expect growth in Africa and South America.

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

Yes, ASTM D4169 targets the UN’s sustainable goal #12 Responsible Consumption and Production by reducing the quantity of damage to products for human behaviors (reducing waste of goods) and can reduce the use of packaging materials used for shipping product.

Please provide any additional information not provided above.

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Approved submittals must be sent to kkoperna@astm.org and mlynyak@astm.org by **September 23, 2022**.

Please identify the designation and title of the standard

ASTM D7504 Trace Impurities in Monocyclic Aromatic Hydrocarbons by Gas Chromatography and Effective Carbon Number

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

Monocyclic aromatic hydrocarbons, including benzene, ethylbenzene, mixed xylenes, o-xylene, p-xylene, styrene, and toluene, are bulk raw organic chemicals mainly used as chemical intermediates and solvents. For example, the major application of p-xylene is the production of purified terephthalic acid (PTA), which is used to produce polyester fibers, resins, and films, etc. Styrene is used in a broad range of polymer derivatives, ranging from commodity polymers to engineering plastics and synthetic rubber. The world annual production and trade of aromatics is tremendous. It is reported that the world capacity of benzene, p-xylene, and styrene produced in 2021 is approximately 73.0, 68.1, and 39.2 Million Metric Tons, respectively.

Standards for monocyclic aromatic hydrocarbons have played important roles in aromatic hydrocarbon production. Measuring the type and amount of organic impurities in these aromatics by gas chromatography (GC) is required for determining whether the product meets specifications and for use as an internal quality control tool. Traditional GC methods for aromatic hydrocarbons analysis in ASTM D16 committee are either internal standard calibration or external standard calibration techniques. These methods require standard preparation, instrument calibration and sample preparation procedures, which are time-consuming and significantly contribute to analysis variability. In addition, monocyclic aromatics endanger human health and environment. Therefore, a highly efficient and environmental friendly method for monocyclic aromatic hydrocarbons is required by aromatic industry.

In 2007, a proposal was made by Mr. Wang Chuan from SINOPEC for developing a new GC method with effective carbon number for toluene, mixed-xylenes and p-xylene. It was approved by D16 committee. This method employs effective carbon number correction factors which are obtained by theoretical calculation, with no need of standard calibration and sample preparation. On account of its significant advantages in terms of efficiency and HSE, D7504 has been revised several times since its first publication in 2009 and now includes 7 aromatic chemicals.

Compared with the traditional GC methods developed by D16 committee for aromatics analysis, D7504 has the following advantages:

1. Eliminates time required to prepare and calibrate the GC.
2. Significantly reduces long term lab variability.
3. Eliminates the primary source of Reproducibility between labs.
4. Significantly reduces calibration problems.
5. Allows one GC with one set of conditions to analyze seven different materials, including benzene, toluene, ethylbenzene, p-xylene, o-xylene, styrene and mixed xylenes. This is a significant cost benefit to industry labs, especially to some small labs.

Since the implement of D7504, 9 test methods in D16 committee were withdrawn with the replacement of D7504, and 15 aromatics specifications reference D7504.

Identify the interest groups that participated in the development and/or revision to the standard?

1. SINOPEC
2. Stuart Smith (retired)
3. BP America Inc.(now INEOS)
4. SECCO (a Joint-Venture company in China)
5. BASF-YPC (a Joint-Venture company in China)
6. SGS (Shanghai)

Note:

1-3: refers to the groups participating in the development and revision of D7504

4-6: refers to the some of the groups participating in the ILS for obtaining the precision statements of the method.

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

1) ASTM standards have high reputation in petrochemical industry in the world. The aromatic hydrocarbons (AH) PTP program is organized twice annually by ASTM. In 2022, 45 labs participated in the ASTM D16's PTP program. Twenty two labs are producers. Twenty six labs are outside the United States. Nineteen labs are contract labs. This PTP program indicates the broad usage of D7504 in industry and in the world. Detailed results were:

Mixed xylenes

- D2360 N= 6 Average = 96.60 mass % \pm 0.82 mass %.
- D5917 N= 1 96.17 mass %.
- D6563 N= 4 Average = 96.36 mass % \pm 0.34 mass %.
- D7504 N= 20 Average = 96.15 mass % \pm 0.14 mass %.

P-xylene

- D3798 N = 1 99.810 mass %.
- D5917 N = 6 Average = 99.800 \pm 0.011 mass %.
- D7504 N = 13 Average = 99.791 \pm 0.014 mass %.

Benzene

- D4492 N = 16 Average = 99.959 mass % \pm 0.003 mass %.
- D5713 N = 6 Average = 99.859 mass % \pm 0.007 mass %.
- D7360 N = 1 Average = 99.961 mass %.
- D7504 N = 17 Average = 99.958 mass % \pm 0.003 mass %.

The above data also indicate that the improved precision with D7504 and the consistent results with D7504 and other GC methods.

2) Several large Joint-Venture petrochemical companies (SECCO, BASF-YPC and Ningbo ZRCC Lyondell Chemical Co., Ltd.) in China have utilized D7504 for final product quality control and intermediate product control.

After the standard was published, has it impacted health and safety? If yes, please explain.

Monocyclic aromatic hydrocarbons (including benzene, ethylbenzene, mixed xylenes, o-xylene, p-xylene, styrene and toluene) are highly flammable and harmful to health. For example benzene poses several serious health hazards: cause cancer, genetic defects, cause irritant to skin and eyes, cause anemia, and irreversible injury to blood-forming tissues of the bone marrow through repeated exposure, etc.

The implement of D7504 has obvious positive impact on health and safety of the staffs in aromatics industry and testing labs, since the method requires neither standard preparation calibration nor sample preparation process, it significantly reduces peoples' contact with aromatic species, and reduces the risk of lab fire hazards.

How do consumers and the public benefit from this standard? (If applicable)

Not applicable.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

D7504 has made economic impacts on aromatic hydrocarbon industry.

In the past, there were more than 10 GC test methods in D16 committee for testing the impurities in monocyclic aromatic hydrocarbons, and the GC columns and operating conditions were various among these methods. D7504 allows one GC with one set of conditions to analyze 7 different materials, making the routine test process more convenient and helping labs reduce the labor costs and instrument costs.

On the other hand, D7504 requires no standard calibration and sample preparation, leading to the great reduction of solvent consumption and waste treatment costs.

Since the implement of D7504, 9 test methods (D2360, D3797, D4492, D5060, D5135, D5917, D6563, D3760, and D7057) in D16 committee were withdrawn with the replacement of D7504. And in ASTM D16 committee alone, 15 out of 16 specifications for aromatics reference D7504, indicating D7504 is extensively utilized for aromatic products. The specifications include D841, D843, D2359, D2827, D3193, D4734, D5136, D5211, D5471, D5606, D5871, D6367, D7124, D7185, and D7951, respectively.

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

- 1) Based on the 2022 AH PTP program, more than half of the participating labs are outside of the United States, indicating the broad international use of D7504. These participating labs are from the following countries: Israel, Singapore, Netherland, Canada, Spain, South Africa, Korea, Philippines, Malaysia, India.
- 2) According to a limited survey, the following information was obtained:
 - o Intertek and SGS are two world leading testing and inspection companies. All of Intertek labs have applied D7504 testing aromatic hydrocarbons. SGS (Shanghai) has adopted D7504 for benzene and toluene analysis.
 - o Several large Joint-Venture petrochemical companies in China are using D7504, including : SECCO, BASF-YPC and Ningbo ZRCC Lyondell Chemical Co., Ltd.
 - o Several China Customs (Ninbo, Guangzhou and Taicang) have adopted D7504 for benzene and toluene import and export inspection.

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identity which one(s) and describe how?)

Yes. D7504 addresses goal 12: ensure sustainable consumption and production patterns. Compared with the traditional GC methods mentioned above for aromatics analysis, D7504 requires no standard calibration and sample preparation, significantly reduce the consumption and waste treatment of the toxic chemicals in labs.

Take styrene test as an example, D7504 requires only 2 mL specimen, while D5135 using internal standard calibration needs 100 mL specimen. If a lab runs 2 samples a day with D5135, it will consume 73 L styrene per year. That will be a massive consumption globally. On the contrary, D7504 can save the consumption of solvent by about 50 times.

Please provide any additional information not provided above.

D7504 has been listed as the one of the 5 key documents in D16 committee for years.

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Please identify the designation and title of the standard

D698 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³))

and

D1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³))

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

Placement of earthen material is an essential part of building the infrastructure that underpins all of society. Geotechnical Engineering is a subdiscipline of Civil Engineering and is responsible for construction with earthen materials through a process called compaction. Proper compaction creates a material that meets specific design criteria and assures adequate performance.

Compaction conditions can be selected to prevent excessive settlement of roadways, air strips, bridge abutments or building foundations. They can also be used to control the permeability of earthen dams, pond structures, and landfill soil liners to prevent excessive fluid transport.

These standards were originally developed for placement of earthen materials for Dams and Roadways in a manner that provided mechanical behavior that was adequate for long term impoundment of water and reliable foundations of road surfaces. The standard compaction test was developed to measure the relationship between the amount of water mixed with the soil and the resulting mechanical characteristics (stiffness, strength, and permeability). The resulting compaction curve provides the relationship between the dry density versus the amount of water. It is used to set limits on the water content during field compaction to achieve the necessary material behavior. The technology was developed by O. J. Porter from the California Division of Highways in 1929. It was then adopted and advanced by Ralph Proctor of the Los Angeles Department of Water and Power around 1933. The method then became D698 in 1942.

During WWII, the US Army Corps of Engineers developed methods to compact soils in the field to much higher densities. This was in response to the need to accommodate the heavy equipment, such as tanks and aircraft. In the late 1940's and early 1950's the 40,000 mile interstate highway system was constructed. In response to the needs of the military and to accommodate the loads from much heavier vehicles on the new highway system, a new soil compaction method was developed and approved in 1958. D1557 applies 4 ½ times more energy to the material and is believed to achieve the maximum possible dry density. The development of this new procedure has been credited to Dad Middlebrooks, Jim Porter, and Arthur Casagrande.

Identify the interest groups that participated in the development and/or revision to the standard?

Federal Highway Association, Army Corps of Engineers, Bureau of Reclamation, Bureau of Waterworks and Supplies in Los Angeles, California.

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

These test methods are used to measure the relationship between the compacted dry density vs placement water content of site-specific material that will be used for construction of dams, foundations for buildings, roads, highways, railways, embankments, waste landfills, retaining structures, etc. Once the relationship has been established, the engineer sets limits on the water content to be used during placement and sets limits for the acceptable field dry density. The contractor uses this information, along with field tests, to adjust the water content of the material during placement. After placement, the field engineer measures the water content and dry density and verifies these against acceptance criteria that have been set based on the compaction test results.

After the standard was published, has it impacted health and safety? If yes, please explain.

These standards have been essential to efficient and safe construction with earthen materials around the world. The standards are routinely used to establish construction control limits for massive dams that retain lakes and reservoirs, foundations for town roads and highspeed highways, airport runways, and foundations for buildings. Virtually every large-scale structure that involves the placement of fill is engineered using these standards. They are essential to the integrity of dams, the flatness of traveled surfaces, and the stability of countless large buildings. The success of these standards is one of the reasons why we feel so safe in a building, crossing a bridge or living downstream from a dam!

How do consumers and the public benefit from this standard? (If applicable)

These standards are one of the fundamental underpinnings of a large part of the build infrastructure. They are an essential tool of the geotechnical engineer. More importantly, they protect the public from a host of hazards associated with foundation failures. Ironically, these standards are buried within regulations, building codes, and contract documents and hence are never really appreciated by the public. If earthen materials were placed at random water contents, we would have massive numbers of performance failures, including uneven roads, limits on vehicle sizes, failures of water retainment structures, etc.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

This is too hard for me to pull together reasonable numbers but the positive impacts of these standards on society as a whole is enormous. In the US alone the annual new construction value is around 1.5 trillion dollars. A significant portion of this construction involves building on compacted materials. These standards also have impact on transportation efficiency, water storage and distribution, building safety, etc.

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

These standards are in building codes, specifications, and construction manuals around the world, are referenced in countless textbooks, and are incorporated into standards produced by other organizations. Within the United States, we know the AASHTO Resource proficiency program had approximately 1360 laboratories participate in the last compaction proficiency test program. Of these 1360 participants, 125 were international, representing more than 20 countries. It is difficult to provide factual information about the “reach” of these standards because there is no official reporting mechanism, and it is common for large companies to specify the standards for their international work even if the standard is not commonly used in the particular country. ASTM’s Global Department does some tracking. According to their report on D1557, 4 countries have adopted the standard, 10 consult the standard, 7 provide a normative reference, 4 have it referenced in regulations, 6 use it as the basis for the national standard. The standards are referenced by International Code Council and National Institute of Building Sciences. The standards have also been translated into Russian and Spanish by ASTM and are available on the website.

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

These standards are essential to several of the UN's Sustainable Development Goals in the sense that proper building of dams and foundations provides the underpinning for the built environment. Transportation of resources and goods is only possible at the world scale with proper roads, highways, runways, and bridges. This contributes to hunger (2), health (3), industrial development (9) and life on land (15). Dams and other water containment/conveyance systems will be necessary in the future for hunger (2) and health (3), clean water (6), and life on land (15).

Please provide any additional information not provided above.

These standards are important tools used in the civil engineering profession. Civil engineers are dedicated to the safe development of the infrastructure that provides the home for society. The cornerstone of everything we build is a solid foundation. These standards provide a means for both the design of foundations as well as the specifications for quality control and evaluation of the placed material.

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Please identify the designation and title of the standard

D5334-22 "Determination of Thermal Conductivity of Soil and Soft Rock by the Needle Probe Method"

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

Countries around the world look to reduce their dependence on fossil fuels, and imported oil to reduce their carbon footprint. Alternative sources of power generation in the forms hydro, solar and wind projects have become huge entries into the Construction and Energy industries.

Hydro energy production has been around for quite some time but is limited to where sufficient water resources are present. Wind and solar developments are much more flexible with their locations and are being developed world-wide. Electrical energy is a direct result of these sites and means of moving the energy so it can be accessed is normally accomplished through subsurface cables.

While placing electrical transfer cables below ground surface is an efficient means to transfer the generated electricity, it also produces a significant problem in the form of heat generation. The transmission of power and its thermal implications are critical in reducing and dissipating what is referred as the Joule Effect. The Joule Effect is the production of heat by mechanical work such as electrical current. Without regulating transient heat, damage to cables, energy transfer equipment, and the surrounding environment can take place. This can result in costly repairs, inefficient operation, and may include complete facility shutdowns. D5334 "Determination of Thermal Conductivity of Soil and Soft Rock by the Needle Probe Method" was established to determine the surrounding soil and aggregate ability to dissipate heat, generated by the cabling installed at these facilities.

Identify the interest groups that participated in the development and/or revision to the standard?

The interest groups that were instrumental in the development of the standard included contractors that were involved in the construction of wind and solar electrical facilities. Civil engineers who are responsible for the site design, layout and soils and aggregates used on site. Structural engineers and architects that design the generating facilities and generators. And the electrical design engineers, tasked with the challenge of sizing and selecting the transfer cables to be used to transfer the generated electricity off-site. The wind and solar industry have grown to provide 13% of the United States total power supply, 10% of the world's energy, and this trend is expected to continue. New data center construction is also a source where the D5334 standard is utilized.

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

To establish the thermal behaviors of soils, including Clays, Silts, Sands, Gravels, or any mixture thereof, D5334 is specified. A needle probe is inserted into a soil test specimen and a current is applied to the heating element housed within the probe over a short period of time. The temperature fluctuation from heating to cooling, measured in milliseconds, is recorded. With this information, the test will provide the thermal conductivity reported in $Wm^{-1} K^{-1}$. The value is unique to the specific soil density and water content. The denser the soil, the greater its capacity to dissipate heat. The dryer the soil, the capacity to dissipate heat is reduced. Because of this phenomena, standard practice for the testing agency is to develop what is referred to as a "Dry Out Curve." This is a graphical representation of the thermal resistance of the soil, at a specific density, versus varying water contents. The presence of air, within the soil medium, negatively impacts the abilities of the power transfer cabling and wires to perform as planned. The presence of water will positively impact a median's thermal nature. The capacity of the soil to dissipate heat is at it lowers with zero percent water. It's ability to dissipate heat is at its highest when in a saturated state. The resulting data allows for the correct sizing and type of power transfer cables to be implemented. It also allows for soils with marginal thermal capacities to be avoided or replaced.

After the standard was published, has it impacted health and safety? If yes, please explain.

Aside from the obvious subgrade benefits regarding stability and construction, the health and safety benefits achieved from D5334, in terms of power transfer, cannot be understated. The heat aspects of any power medium to and from its source is of immediate proximity concern to both structural, mechanical, electrical, and personal safety. Damage to structures and equipment has been documented when the densification of the soil has been neglected or even ignored and in the absence of thermal parameters. These types of failures are both time consuming, involve serious litigation, and are fiscally costly. The danger to technicians and other project personnel is present in the transfer of power from one source to another which makes the accuracy of these tests of fundamental importance. D5334 has been instrumental in facilitating the development of alternative energy sources to fossil fuel and a benefit in helping mitigate climate change.

How do consumers and the public benefit from this standard? (If applicable)

With the advent of wind and solar projects come the development of clean energy. Clean energy contributes to the reduction of the carbon footprint that is impacting global climate change. The global reliance on imported energy sources has been problematic for decades. Air pollution and contamination to water sources has become a concern to the health, wellbeing, and quality of living standards. D5334 is one factor that contributes to the solution of what has been an issue for generations. The costs saved with proper cable insulation are substantial.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

It is difficult to provide relevant data produced by the standard as to the economic and other impacts. Clearly as more and more solar and wind farm installations go on-line, our reliance on fossil fuels is reduced. Global expansion of this and other alternative energy sources continue to become reality with the intent to develop and utilize cleaner forms of energy. ASTM D5334, which is required for almost all energy production projects, provides data to the designers and engineers that allow these facilities to operate efficiently, safely, and reliably.

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

The reference to D5334 is written into almost every project specification involving the construction and operation of wind and solar energy production facilities as well as the proliferation of new data centers. It is common in project specifications throughout projects within the United States and is becoming more popular internationally.

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

The D5334 standard certainly is in line with many of the 17 UN's Sustainable Development Goals.

1. **No Poverty** Clean and efficient power production will impact every country on earth with financial, climate, and employment opportunities.
3. **Good Health and Well Being** The production and development of clean and abundant energy will provide a healthy environment and by responsibly using natural resources will promote security.
4. **Clean Water and Sanitation.** Efficient power transfer will lead to better and less expensive water consumption as well as the removal of waste generation.

The D5334 standard certainly is in line with many of the 17 UN's Sustainable Development Goals cont.

7. Affordable and Clean Energy. The goal is the development of clean energy transfer. By utilizing natural resources, sun and wind, production costs are expected to decrease

8. Work and Economic Growth. Employment opportunities and revenue generation will be positively affected.

13 Climate Action The development and ability to transmit clean energy is at the core of climate action.

15 Life on Land – D5334 will certainly be influential to improve our standard of living with the continued production of clean energy. D5334 facilitates the production and design of the facilities needed to reach this goal

Please provide any additional information not provided above.

The D5334 standard is a critical component in the design and construction of our cleanest energy sources as well as the increasing global demand for data facilities. The operation and economical design of the facilities rely on accurate performance of surrounding soils and aggregates. D5334 is one of the tools used by designers and engineers to assure these requirements are met.

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Please identify the designation and title of the standard

ASTM D1193 Standard Specification for Reagent Water. Also known as Federal Test Method 7916

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

This specification describes the required characteristics of reagent waters. Four types of waters have been specified, with three additional grades that can be applied to the four types. The grade specifications specifically address contaminants of microbiological origin. Historically, reagent water types I, II, III, and IV have been linked to specific processes for their production. These types of waters may be produced with alternate technologies as long as the appropriate constituent specifications are met. The electrical conductivity and resistance, pH, silica, sodium, chlorides, TOC, endotoxins, and microbiological contamination shall be tested to meet the requirements prescribed. The standard was originally approved in 1951.

Identify the interest groups that participated in the development and/or revision to the standard?

A Google search for ASTM D1193 conducted on 7/22/2022 returned 41,300 hits. A search for ASTM Type I water returned 25,200,000 hits. This large number of hits illustrates the importance of this standard. Besides being referenced by almost every ASTM D19 test method, the specification is referenced by Standard methods for the Examination of Water and Wastewater, The USEPA, the FDA, and numerous other ASTM committees. A quick on the related content tab in ASTM Compass related content tab reveals the extent that this specification is referenced by other ASTM committees.

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

The standard is used by laboratories to define the quality of water that must be used to conduct various chemical tests. Thus, the standard is referenced in methods as a required specification to meet. In addition, the reagents are prepared in water that must meet the specifications of this standard. The reagents cross multiple industries, including medical, environmental, ores and minerals, consumer goods testing, electroplating, and this list goes on. Again, search ASTM Compass for related content.

After the standard was published, has it impacted health and safety? If yes, please explain.

This standard has impacted health and safety for over 70 years. ASTM was a leader in the development of test methods for the analysis of water and these test methods rely on specifying how water is purified in the laboratory. In addition, the specification formed the basis of other specifications that are used in other industries, such as health care. Almost all laboratories and laboratory reagent suppliers purify their water according to ASTM D1193 specifications.

How do consumers and the public benefit from this standard? (If applicable)

Consumers, in this case laboratories, benefit from the standard by having a well-defined baseline that tells them, and their reagent water supplier, what water must be purified to in order to obtain reliable laboratory results. Similarly, the standard defines the specification that water must meet for all reagent suppliers that manufacture and sell reagents and standards used in testing. This relates to public health both indirectly, and directly. Indirectly, the standard is important because reagent water and reagents prepared in reagent water are used in almost all laboratory tests conducted such as the analysis of steel and concrete, to the direct analysis of drinking water and air. Additionally, commercial suppliers of water use the standard to demonstrate their product meets certain specifications.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

Unfortunately, this topic is so broad and the standard is so well established and used it is difficult to describe the economic impact. The sheer volume of hits on Google and the huge number of other ASTM standards that reference D1193 should attest to its importance.

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

As mentioned previously, the standard or simply reference such as "Type I water" are used extensively in ASTM methods, in US EPA methods, in FDA methods, and referenced in the reagent water section of Standard Methods for the Analysis of Water and Wastewater. It has broad international use based on the fact that the test methods that reference it are used routinely all over the world.

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

6 clean water and sanitation. Besides the standard being used by companies that manufacture drinking water to be distributed or produced at home with RO or other commercially available water purification devices, the specification defines requirements that must be met for water used in the analyses that verify that water is safe to drink.

Please provide any additional information not provided above.

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Committee: D19

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ASTM Standard Use & Effectiveness Case Study Contest

CALL FOR PARTICIPATION!

As ASTM International prepares to celebrate its 125th Anniversary in 2023, we want to recognize the tremendous work of our volunteer members by recognizing ASTM standards that are broadly used and proven effective by industry.

The contest will be based on written submissions reviewed and selected by a collection of ASTM Board Members. Multiple submissions from a variety of industry segments will be selected. The winning submissions will be featured as part of our 125th anniversary celebration including recognition by the ASTM President, on social media channels, and at anniversary celebration event. As an additional incentive for participation, ASTM International will deposit \$1,250 into each of the winning committees' funds to be used as desired.

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Please identify the designation and title of the standard

ASTM D3863

Standard Test Method for Retention Characteristics of 0.40 to 0.45- μ m Membrane Filters Used in Routine Filtration Procedures for the Evaluation of Microbiological Water Quality

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

This standard was developed in 1987 as up to this point, there were no methods approved to test for the retention characteristics of microbiology membranes. This test was needed to show that membranes are manufactured correctly and have the capacity to retain/grow the microorganisms tested in any type of liquid sample.

Identify the interest groups that participated in the development and/or revision to the standard?

This standard currently lives in D19 however, this is the go to method for microbiology testing of any liquid. Therefore, this standard is applicable beyond water. (Beverages, Oil/Gas, etc)

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

This standard is used by all membrane manufacturers to quality membranes used for microbiology testing. This standard and ISO 7704 are the only 2 methods for this purpose.

When a company is evaluating a new membrane manufacturer, they will use this standard (in NA) to verify the vendor.

After the standard was published, has it impacted health and safety? If yes, please explain.

This standard ensures that the membranes used in QC microbiology testing are effective therefore giving trust that any microorganism recovered from the filterable liquid is accurate. This is then used to determine if there are any human pathogenic microorganisms which then lead to boil water alerts, beverage product recalls, sufficient petroleum grading (don't want microorganisms in jet fuel).

How do consumers and the public benefit from this standard? (If applicable)

This will help make sure that microbiology membranes are capable of retaining/growing microorganisms therefore ensuring accurate test results.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

This standard is adopted in North America and other countries that follow US EPA methods. Other countries especially in EU follow ISO 7704.

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

Of the sustainable development goals, this standard meets:

3 – Good Health and Well Being

6 – Clean Water and Sanitation

12 – Responsible Consumption and Production

13 – Climate Action

14 – Life Below Water

15 – Life on Land

For all of these sustainable development goals mentioned above, the standard is critical for each of them as microbiology is tested in so many different areas/markets and having this standard ensures clean drinking water, sustained waste water treatment (and other water treatments), testing of ocean/lakes/ ponds for human pathogens, testing of beverages to ensure there are no spoilage microorganisms, etc.

Please provide any additional information not provided above.

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Committee: D19

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Please identify the designation and title of the standard

ASTM D1056-20
Standard Specification for Flexible Cellular Materials—Sponge or Expanded Rubber

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

ASTM D 1056 was originally issued in 1949 because of a need to specify and classify newly developed cellular materials manufactured out of synthetic rubber. In World War I, Germany developed synthetic rubber because supply lines of natural rubber from Asia into Germany were closed off. In World War II the United States developed synthetic rubber for similar reasons (supplies of natural rubber from Asia cut off by Japan). Rubber was critically important for military vehicles, automotive and numerous other consumer and war effort uses. Development work was based in Akron, OH and was a collaborative effort between various existing rubber competitors / manufactures. In the early years of WW II, US allies went so far as to barter US cotton reserves to acquire remaining allied natural rubber reserves. Solid (hard) and cellular rubber products were part of that development work. In 1949 the first ASTM standard was drafted and issued to address the need to classify and specify these new materials into various grades and firmnesses. ASTM D 1056 was written shortly after WWII and has been a major industry standard ever since. ASTM D 1056 was originally based in committee D11 (Rubber & Rubber-like Materials) but was moved into D20 (Plastics) in the late 1990's so all cellular materials (plastics & elastomers / rigid and flexible) could be in one subcommittee. Subcommittee D20.22 on Cellular Materials - Plastics and Elastomers.

¹ This specification is under the jurisdiction of ASTM Committee D-11 on Rubber and Rubber-Like Materials. A list of committee members may be found in the ASTM Yearbook. This standard is the direct responsibility of Subcommittee D-11.33 on Flexible Cellular Materials. Current edition effective Dec. 18, 1968. Originally issued 1949. Replaces D 1056 - 67 T. D 1055 and D 1056 replaced D 798.

Footnote in 1968 revision

Identify the interest groups that participated in the development and/or revision to the standard?

Cellular rubber manufacturers who were members of ASTM D11 wrote the first draft and issued this standard in 1949. See reasons why in question 1 above.

ASTM D1056 has been continuously updated and improved to keep up with new developments in the industry and make it more user friendly.

There was a major revision in 1985 that substantially changed the classification nomenclature of the types, classes and grades of open and closed cell rubber.

¹ This specification is under the jurisdiction of ASTM Committee D20 on Plastics and is the direct responsibility of Subcommittee D20.22 on Cellular Materials - Plastics and Elastomers.

This standard has been approved for use by agencies of the Department of Defense to replace Methods 12001, 12005, 12011, 12021, 12031, 12041, 12151, and 12411 of Federal Test Method Standard No. 601.

This standard has been approved for use by agencies of the Department of Defense to replace MIL-STD-670 and MIL-STD-C 3133, which were discontinued in 1986.

Current edition approved Oct. 1, 2020. Published November 2020. Originally approved in 1949. Last previous edition approved in 2014 as D1056 - 14. DOI: 10.1520/D1056-20.

² This version supersedes all prior versions of this specification.

XI. CROSS REFERENCE TABLES

XI.1 See Tables XI.1-XI.3.

TABLE XI.1 Cross Reference to Previous Versions of Specification D1056

NOTE 1—*Example:* Grade 1A1C1F1 denotes soft sponge rubber containing natural, reclaimed, synthetic or blends of these rubbers with a compression deflection value of 2 to 5 psi (13.8 to 34.5 kPa), having no specific solvent or oil resistance and requiring in addition to the basic tests, a weather resistance test run in accordance with Test Method D1171, Ozone Chamber Exposure, Method A, and a low-temperature test at -40°F (-40°C).

D1056-68	D1056-73	D1056-77	D1056-85 to -20
RE 41 BF1	RE 41 BF1	RE 41 B2F1	2A1 B2F1
SBE 43 BCF2	RE 43 BCE2F2	RE 43 B2C1E2F2	2B3 B2C1F2
SCE 42	RE 42 E1	RE 42 E1	2C2
SBO 12 BF1	SBO 12 BF1	SBO 12 B1F1	1B2 B1F1
SCO 13 CF2	SCO 13 CF2	SCO 13 C2F2	1C3 C2F2
RE 45	RE45	RE 45	2A5
SBE 41	RE 41 E1	RE 41 E1	2B1
SCE 43	RE 43 E1	RE 43 E1	2C3
RE 43 B	RE 43 B	RE 43 B	2A3 B3
N/A	N/A	N/A	1A0

After the standard was published, has it impacted health and safety? If yes, please explain.

ASTM D1056 classifies and provides requirements for closed cell foams that are used for impact / shock absorption in headgear (North American football, ice hockey, lacrosse etc) & athletic mats (wrestling & gymnastics). D1056 firmness grades can be correlated to Gmax and HIC (head impact criteria) performance (ASTM Committee F08 – Sports equipment & facilities).

D1056 closed cell foam firmness grades are currently used for worker health and safety in the form of anti-fatigue mats.

Closed cell foams are also tested and certified to UL requirements for use in Coast Guard approved flotation vests and cushions for personal and work lifesaving flotation devices.

Covid 19 / Medical: Cellular material with an added biocide (fungus resistance) are used in medical face masks for comfort (nose bridge). These foams are durable and completely closed cell blocking any air transfer through the comfort foam and also acts as a moisture barrier (sweat).

How do consumers and the public benefit from this standard? (If applicable)

Consistent and clear requirements are provided by D1056 to classify cellular materials (both open and closed cell). These foams are used for head protection (headgear (ASTM F08.53), mats (F08.12) and personal flotation devices (UL 1977 & US Coast Guard).

In addition, the robust suffix callout system in ASTM D 1056 can be used to specify flame performance flame requirements for aerospace (Suffix M: FAR 25.853 12 second vertical burn) and mass transit applications (Suffix M: ASTM D162, Suffix Z: ASTM D662 smoke, & Suffix Z: Toxicity / Boeing BSS 7239 & Bombardier SMP 800 C).

The suffix system in D1056 was used as a model for D3575 and D3574 to classify numerous test methods in an organized / structured and familiar / harmonized manner.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

ASTM D1056 is a global industry standard and is the lead specification for flexible cellular materials – sponge (open cell) or expanded (closed cell) rubber. Numerous OEM, government and industry standards are based off of ASTM D 1056. Following is a list of standards that are essentially identical or are extremely similar to ASTM D 1056. Some of these standards (example: SAR J18) are obsolete because the standards writing bodies defer to and acknowledge D1056 as the global lead and that it is continuously reviewed and revised.

- SAE J18 (Obsolete – replacement = ASTM D1056)
- Government: MIL STD 670 B / MIL C 3133C (Obsolete – replacement = ASTM D1056)
- Stellantis / Fiat / FCA Chrysler MSZ-75 (Obsolete – replacement = ASTM D1056)
- Toyota TSK 1501 G (essentially identical to D1056 with minor changes)
- ISO 6916 (essentially identical to D1056 with minor changes / not routinely reviewed or updated)
- MIL R 6130 C (obsolete and replaced by ASTM D 6576 / many similarities / based of D1056 test methods)
- Ford WSK M2D 419 A (similar firmness grades to D1056)

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identity which one(s) and describe how?)

Goal 12: Ensure sustainable consumption and production patterns

2 examples of long-term usage of a consumer product vs short term disposable / lesser performance option.

- 1) Wrestling mats manufactured from cellular rubber are durable, maintain shock absorption performance (Gmax & HIC) for a 30-year expected life span. Lightweight, lower cost non-elastomeric mats have been introduced into the athletics mat industry that are less durable and have an expected life span of only 7 years. ASTM D 1056 can be used to specify polymer, firmness and density to ensure that the 30-year higher performance mats be used instead of an essentially disposable mat that will end up in a landfill.
- 2) Anti-fatigue Mats: More durable, high performance shock absorption closed cell synthetic rubber foams can be specified using the ASTM D1056 callout system (Suffix D, Suffix W, Suffix Z etc.) for longer life, extended use anti fatigue mats vs, lower durability, lower density mats that have a much shorter usable life span and are discarded.

Please provide any additional information not provided above.

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Committee: ASTM D 20.22

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Approved submittals must be sent to kkoperna@astm.org and mlynyak@astm.org by **September 23, 2022**.

Please identify the designation and title of the standard

ASTM D4000 -Standard Classification System for Specifying Plastic Materials

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

This standard provides a classification system for tabulating the properties of unfilled, filled, and reinforced plastic materials suitable for processing into parts and was developed to provide Government and Industries a way to provide a single call-out for a specific type of thermoplastic material that best suited their needs. A line call-out assembled using this classification system becomes a "specification". The line call-out refers to the standard used and contains the broad and specific type of plastic, together with the appropriate identifiers followed by any special suffix requirements. The purpose of this classification system is to provide a method of adequately identifying plastic materials to give industry a system that can be used universally for plastic materials. It further provides a means for specifying these materials using a simple line call-out designation. Plastic materials are classified based on their broad generic family. For example: PA = polyamide (nylon), EMA = ethylene-methacrylic acid, and EVA = ethylene-vinyl acetate. It provides a recognizable call-out that could act as a stand-alone Material Specification.

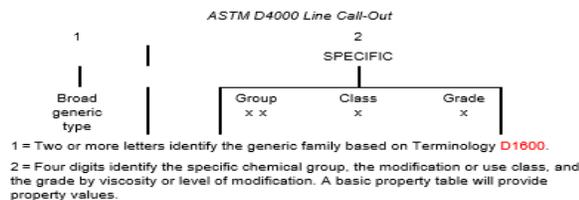


Figure 1: Example of a D4000 Line Call-Out

ASTM D4000 is the single and only foundation for the generation of 33 ASTM Thermoplastic Plastics Material Specification standards¹⁾, providing an effective system for adequately identifying and specifying plastic materials by using a simple line call-out. Even though these 33 Classification documents are self-sustaining, the link to D4000 is needed to ensure that all classification documents follow the same recognizable format.

Example Material Specification standards referencing D4000 include:

ASTM D5205 - Standard Classification System And Basis For Specification For Polyetherimide (PEI) Materials

ASTM D5575 - Standard Classification System For Copolymers Of Vinylidene Fluoride (VDF) With Other Fluorinated Monomers

ASTM D6778 - Standard Classification System And Basis For Specification For Polyoxymethylene Molding And Extrusion Materials (POM)

The method of creating material standards using the Classification D4000 is so important that Committee D20 created a standalone standard that is a template aid in the writing of material standards in the D4000 format; ASTM D5740 Standard Guide for Writing Material Standards in the Classification Format. It is important to note that this style of line call out symbol coding has been utilized into other standardization bodies, including SAE and ISO material designation standards.

1) <https://webstore.ansi.org/Search/Find?cp=3&st=Standard%20Classification%20System&v=5&f1=Standard&f2=2>

Identify the interest groups that participated in the development and/or revision to the standard?

This work was initiated partly at the request and through participation of the U.S. military so that all their tests would be standardized, and they could rely on a specification to replace the MIL specs in use at that time. It has since been revised by a countless number of plastic material suppliers, building product producers, the appliance industry and aerospace. The automotive industry became very active in the 1980's to adapt D4000 to new methods required for this industry to become more global. It truly was revolutionary and changed the way thermoplastic polymers were used and traded.

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

The various Standard Specifications, for example polyolefin or polyamide materials, based on the initial D4000 are used widely for trade amongst the various stake holders, producing and using these materials. D4000 became a foundation for standardizing Material Datasheets which are used as information for comparing materials. Total value of plastic shipments utilizing D4000 call-outs approaches \$400B.

An example of an older call-out under ASTM D4000 CTA0000 G33 D53380 would indicate the product is a cellulose triacetate with 33 +/- 2% glass, and the properties of 105 MPa tensile strength, 5000 MPa flex modulus, 50 J/M Izod impact and 155C minimum heat deflection temperature. This call-out can be used directly on a drawing to specify the product and there would be no need to write an internal material standard within the company.

As the plastic industry evolves and as more and more recycled materials are used today, the ASTM D4000 system can also be used for the approval of these materials, to ensure that product specifications are met and to guarantee the quality of the recycled materials. The ASTM D4000 system also offers a direct comparison of the main properties of virgin and recycled materials.

An ISO thermoplastic material designation can be converted into a material specification to meet certain product specifications, for example by reference to ASTM D20 polymer and plastics material classification standards. Linking the ASTM D4000 Classification system and the ISO Designation system results in an easy and effective way for selecting materials and meeting certain specifications by referencing to ASTM Material Classification standards.

In summary, the ASTM D4000 system is a universal method to adequately designate and specify thermoplastic materials and is widely used throughout the plastics value chain, for example as an alternative to the OEM Approved Material Source List.

After the standard was published, has it impacted health and safety? If yes, please explain.

Yes. Table 3, which contains the portion of the line call outs for requirements that are needed that supersede or supplement the property table or cell table requirements. These test methods and requirements required by the material specifications continued to expand. For example, Section F in Table 3 includes Flammability which now has 19 different test methods. It includes FMVSS302 for automotive interior burn requirements as well as fire ratings for builders and vertical burn and ignition required by aerospace. One section for UL ratings had to be moved to the appendix to make room for a series of new methods within the last 20 years.

The standard also references Transmission haze, which provides requirements for film build-up on windshields and headlights. It also provides cold impact tests using specific speeds required by automotive for vehicle crash requirements for interior and exterior plastic parts.

How do consumers and the public benefit from this standard? (If applicable)

The standard provides for minimum property requirements and their repeatability. Once the standard and call-out are used on a drawing, the performance of parts will maintain their integrity from year to year with little to no testing. This provides peace of mind to the consumer as performance will stay consistent.

When there are catastrophes resulting in material shortages, this system provides the guideline to other potential sources so production can continue, preventing shortages and cost increases. ASTM D4000 system can also be used for the approval of recycled materials, to ensure that specifications are met and to guarantee the quality of the recycled materials. As discussed above, combining the ASTM D4000 system and the ISO Designation system simplifies the transition from virgin material to recycled material worldwide.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

The European Commission's standardization request, M/584 - 2022-08-30, concerns the development/revision of 45 standards on plastics recycling. A partnership between ASTM, CEN and ISO is exploring how to maximize benefits of linking the ASTM D4000 designation system and the ISO designation system, and what systems should be developed to encourage the use of recycled materials.

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

ASTM D4000 is used in many countries around the world, of which the heaviest users are the U.S, Canada, Mexico, South America, and China. It is recognized in Europe but to a lesser extent as DIN and ISO standards are more commonly referenced. Yet neither organization has a call-out system like D4000 which can be used as a stand-alone Material Standard. Hence, converting an ISO designation system into a specification by referencing to ASTM's D4000 call-out line system is an effective way to ensure the quality of manufactured products, further highlighting the foundational and critical importance of D4000 to a broad range of industries.

To further showcase the importance of D4000, in the 1980s, the Society of Automotive Engineering (SAE) tried to develop a better system when the Automotive Industry demanded the use of some ISO test methods. But after 6-8 years, the idea was abandoned, and ASTM Committee D20 took control and allowed the industry to establish this goal without the need to abandon the D4000 system. The effort increased the involvement of material suppliers to ASTM to make sure that their products would be included.

ASTM D4000 is not adopted into any regulations because it is a standard that references outward towards the existing regulations. D4000 adopts test methods based on regulations so that the system can still be used no matter how regulations change.

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

D4000 can affect the following areas:

9) Industry, Innovation and Infrastructure: The standard allows for new plastic materials and fillers that can improve performance and decrease cost. The standard is used extensively in the housing/building/infrastructure market so can be adapted to different areas based on logistics and building codes.

12) Ensure sustainable consumption and production patterns: This standard can be used for plastics that are made from sustainable materials (such as castor oil for nylon 11 for instance). It also has a reinforcement table that allows the use of natural fiber fillers like cotton, wood, hemp and flax fibers or powders.

Please provide any additional information not provided above.

There are 33 Classification System Documents in ASTM Book of Standard volumes 8.01 to 8.03 that uses D4000 as its reference document for classifications. These documents would not have existed without the introduction of D4000. Even now when these documents are self-sustaining, the link to D4000 is needed for special test requirements and to ensure that all classification documents follow the same recognizable format.

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Please identify the designation and title of the standard

A portfolio of standards that is helping to grow the new "BioPlastics" industry. Bioplastics covers biobased (using renewable plant-biomass carbon instead of petro-fossil carbon) and biodegradable-compostable plastics (responsible end-of-life for plastics by designing for biodegradability-compostability). The key standards are:

1. [D6866-22](#) Standard Test Methods for Determining the Biobased Content of Solid, Liquid, and Gaseous Samples Using Radiocarbon Analysis
2. [D6400-21](#) Standard Specification for Labeling of Plastics Designed to be Aerobically Composted in Municipal or Industrial Facilities
3. [D6868-21](#) Standard Specification for Labeling of End Items that Incorporate Plastics and Polymers as Coatings or Additives with Paper and Other Substrates Designed to be Aerobically Composted in Municipal or Industrial Facilities

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

D6866 radiocarbon analysis standard allows industry, regulators, and Government to experimentally determine the percent biobased carbon present in a product or fuel. There is increasing attention in the USA and worldwide to move away from using fossil carbon resources to plant-biomass carbon resources. The USDA "Biopreferred" program mandated by the U.S. Congress in the Farm Bill authorizes the procurement of biobased products by the Federal Government. ASTM D6866 standard is required to be used to report the percent biobased content of product for federal procurement and labelling a product with the USDA Biopreferred logo showing biobased content.

D6400 and D6868 are companion specification standards for compostable plastics and paper coatings respectively -- re-designing plastic polymers for biodegradability in industrial composting for an environmentally responsible managed end-of-life. Compostable plastics are next generation polymer materials for packaging, disposable products, and hybrids with paper. At its end of life, it can be safely and efficaciously treated along with food, paper, and biodegradable organic wastes in industrial composting.

There has been much confusion and misleading claims about biodegradability and compostability in the marketplace. The ASTM standard specifications grounded in strong science and consensus driven provided much needed clarity and credibility for acceptance by the marketplace, and the regulatory bodies in States like California, Washington State, Minnesota, Rhode Island, Connecticut, and others.

Identify the interest groups that participated in the development and/or revision to the standard?

A broad group of stakeholders participated in the development of the standards. Industry represented by the compostable plastic resin manufacturers, major brand owners, State government organizations, Federal government (USDA, EPA), testing laboratories and academe were active in the development of the standards

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

D6866 radiocarbon analysis test standard is the only accepted standard for determining and reporting biobased content of products. The USDA Biopreferred program for federal procurement as well as using the USDA logo mandates biobased content reporting only by using D6866. U.S. EPA requires using D6866 for reporting on biobased content in fuels.

D6400 & D6868 these compostability specification standards are used exclusively by the industry for making claims of biodegradability under industrial composting conditions. It is also the basis of certifications issued by US and European organizations. Stakeholders and brands demand that compostable products offered to them meet ASTM D6400 for plastics and D6868 for coatings on paper. Industrial composters also require certification that the compostable products are certified to D6400 for plastics and D6868 for coatings.

After the standard was published, has it impacted health and safety? If yes, please explain.

D6400 and D6868 require strict eco and phyto toxicity tests to be conducted as part of the specification standard. In these standards regulated metals should be 50% below that prescribed by the EPA.

Thus, health and safety provisions are part of the specification standard requirements.

How do consumers and the public benefit from this standard? (If applicable)

Consumers and the public benefit from the use of safe biobased, biodegradable-compostable plastics. It is an enabling technology to divert food, paper, and biodegradable organic wastes from landfills to industrial composting. Fifty percent + of biodegradable organic wastes go to landfills or open dumps leading to methane generation which has a 25X GWP (global warming potential) impact. Recovery of 1.84 million tons of MSW biodegradable organic wastes through composting results in 1.74 million tons of carbon dioxide equivalents of GHG emissions reductions. ASTM D6400 and D6868 provide the basis to ensure that the compostable plastics are safely and completely biodegradable in industrial composting leaving no persistent or toxic breakdown products.

D6866 standard for measuring biobased content is required to account for carbon footprint reductions and driving the bioeconomy.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

USDA BioPreferred Program Catalog identifies biobased products that qualify for mandatory federal purchasing, are certified through the voluntary labelling initiative or both. An economic impact analysis of the U.S. biobased products industry reports:

\$470B value added to the U.S. economy; 4.6 million American jobs through direct, indirect, and induced contributions, \$162B in direct sales, and \$309B in spillover sales.

<https://www.biopreferred.gov>

While no numbers are available, the States of California, Washington State, Minnesota, Massachusetts, and several others require the use of compostable packaging and products for food waste diversion to industrial composting. ASTM D6400 for compostable plastics and ASTM D6868 for coatings and modifiers to paper are the designated specification standards that must be met.

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

President Biden signed a new Executive Order on September 12th, 2022, to advance innovation for a sustainable, safe, and secure American **bioeconomy** and promote the purchase of **biobased products**. Federal law and Federal Acquisition Regulation directs all federal agencies purchase biobased products in categories identified by the U.S. Department of Agriculture (USDA). The USDA has also a voluntary labelling initiative for biobased products. **ASTM D6866** is the primary standard used for the determination of biobased carbon content of biobased products.

www.biopreferred.gov).

The State of California requires products labelled “compostable” to meet ASTM D6400 specification standard. Washington State requires third party certification of compostable plastics using D6400 or D6868 standards. Other States have similar requirements for sale and use of compostable plastics.

To address the plastics waste crisis, The U.S. Plastics Pact and the Ellen MacArthur Foundation Global Plastics Pact state the following:

- 100% of plastic packaging will be reusable, recyclable, or **compostable** by 2025
- By 2025, undertake ambitious actions to effectively recycle or **compost** 50% of plastics packaging
 - **ASTM D6400 and D6868** specification standards must be strictly met for claims of compostability!
- By 2025, the average recycled content or responsibly sourced **biobased** content in plastic packaging will be 30%.
 - **ASTM D6866** test method is the accepted standard to measure and report biobased content.

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

D6866, D6400, & D6868 are closely interrelated standards and address SDG 13 – Climate Action

Switching from a fossil carbon plastic to biobased plastics offers the value proposition of a reduced carbon footprint. This drive towards a responsibly sourced bioeconomy is served by ASTM D6866 test method for experimentally determining biobased carbon content.

ASTM D6400 & D6868 specification standards provide the framework to document that newly designed compostable polymers are not persistent and biodegrade completely in industrial composting systems. They become the enabling technology to help divert food, paper, and biodegradable organic waste from landfills to composting, thereby reducing GHG emissions impact.

ASTM D6400 & D6868 also address SDG goal 14 Life Below Water, specifically as it relates to microplastics pollution of the oceans. The biodegradable-compostable polymers will not persist, accumulate in ocean environment, and not form microplastics like today's carbon-carbon backbone polyolefin polymers.

All these standards support SDG 12 on responsible consumption and production as well as SDG 15 on life on land.

Please provide any additional information not provided above.

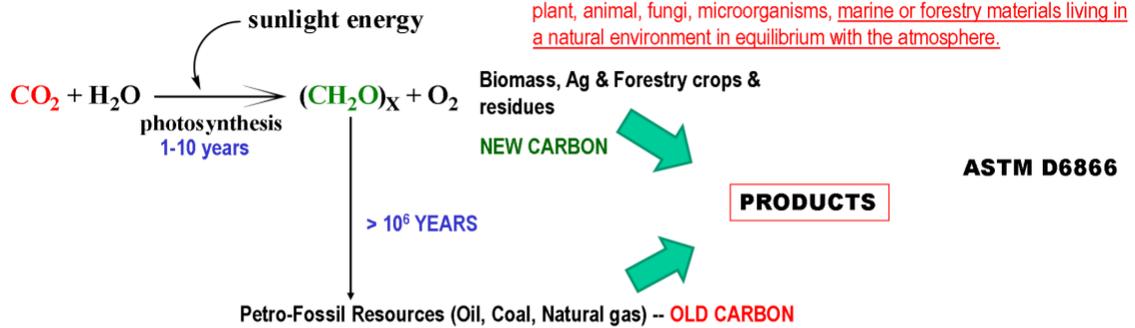
The @EnvSciTech article summarizes necessary requirements for assessing and reporting plastic biodegradation <https://pubs.acs.org/doi/10.1021/acs.est.9b04513>. It explains the use and application of the ASTM standards cited in this document. It has 10,000+ downloads and continuing since publication in August 2019 in American Chemical Society (ACS) Environmental Science & Technology Journal.

The article Law & Narayan "Reducing environmental plastic pollution by designing polymer materials for managed end-of-life" Nature Reviews (Materials), Vol 7, 104-116, 2022.

<https://www.nature.com/articles/s41578-021-00382-0> references all the standards cited in this document. Nature Reviews (Materials) is a peer reviewed high impact journal (impact factor=70).

Understanding the Value Proposition for biobased vs petro/fossil carbon

Biological Carbon Cycle – the material carbon footprint

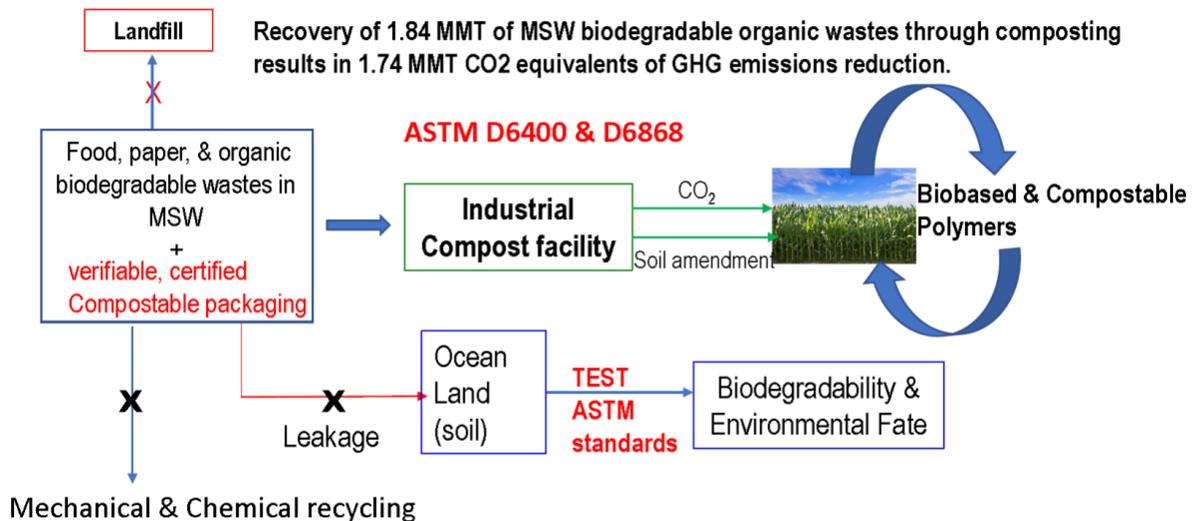


biobased –containing organic carbon of renewable origin like agricultural, plant, animal, fungi, microorganisms, marine or forestry materials living in a natural environment in equilibrium with the atmosphere.

- Removes CO₂ from the environment and incorporates it into a polymer molecule via plant-biomass photosynthesis in a short time scale of one (agricultural crops, algae) to 10 years (short rotation wood and tree plantations) in harmony with Nature’s biological carbon cycle
- Petro/fossil resources are formed from plant biomass over millions of years and so cannot be credited with any CO₂ removal from the environment even over a 100 year time scale (the time period used in measuring global warming potential, GWP100)

1. Ramani Narayan, *Carbon footprint of bioplastics using biocarbon content analysis and life cycle assessment*, MRS (Materials Research Society) Bulletin, Vol 36 Issue 09, pg. 716 – 721, 2011
2. Ramani Narayan, *Biobased & Biodegradable Polymer Materials: Rationale, Drivers, and Technology Exemplars*; ACS (an American Chemical Society publication) Symposium Ser. 1114, Chapter 2, pg 13-31, 2012

50% + of organic **biodegradable** wastes goes to landfills or dumps leads to methane generation – 25X GWP



Managing plastic wastes through industrial composting (Biological/Organic Recycling)

Contact Name: Ramani Narayan

Univ. Distinguished Professor, Michigan State University

Fellow ASTM International & Fellow National Academy of Inventors (NAI)

Committee: D20/ D20.96 on Environmentally Degradable & Biobased Products

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Final submissions must be approved by Executive Committees (limit 3 per committee) prior to submittal.

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Please identify the designation and title of the standard

ASTM D5755, Standard Test Method for Microvacuum Sampling and Indirect Analysis of Dust by Transmission Electron Microscopy for Asbestos Structure Number Surface Loading.

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

It is a long and storied tale that starts in the early 1980's with USEPA and other regulators looking for help to understand and develop analytical methods/practices for studying asbestos in settled dust in the environment. The late Michael Beard, Chair of ASTM D22.07 and manager with USEPA, answered the call by forming a task group within the ASTM sub-committee that studied the collection, sample preparation, analysis, and interpretation, of these results well before the initial 1993 terrorist bombing of the World Trade Center parking garage. This test case, and dozens more, led to years of perfecting the method into a series of ASTM consensus standards (D5755, D6480, D5756, D7390) that were essential tools for investigators after the 2001 WTC tragedy and upon start of the clean-up and remediation. Robust interlaboratory studies conducted by ASTM ILS and others continue to fortify the utility and efficacy of these tools. The genius of D5755 centers around the nuances of particulate collection for those potential asbestos particles that might be re-entrained into the air with minimal disturbance. Other related ASTM methods collect particles representing historical deposition. These are now considered international standards and are used routinely by industrial hygienists, remediation contractors, property engineers, insurance companies, and environmental and occupational health and safety professionals.

Identify the interest groups that participated in the development and/or revision to the standard?

They included USEPA, ATSDR, NIBS, and related building engineering professionals. In addition, USGS and NIOSH officials and scientists added to the development and field studies. Finally, several key laboratory professionals were engaged at a high level. This and related ASTM asbestos in surface dust standards are maintained by the sub-committee using a balance of laboratory, field engineer, and regulatory involvement.

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

The standard is used as a significant tool for environmental investigations. Here's a few examples... (1) Catastrophic Disturbance of Built Environments such as fire, building collapse/damage, explosions, demolition. Investigators want to know if asbestos was used in building construction and in building materials – and was it released during such an incident (ex. ConEd steam pipe explosion in Grammercy Park NYC) and have those hazards settled out onto surfaces. Qualitative and quantitative data will help stakeholders determine and craft remediation and clean-up steps, insurance companies trace back sources of liability, and safety professional understand the level of worker protection needed. (2) What gradients of asbestos hazard may or not be established to determine airborne settling patterns and clean-up procedures. (3) Establishment of clearance criteria when compared to ambient or controlled environment surfaces (D7391). (4) Mining/Quarry or disturbance of geologic source minerals and settling out of hazards over communities.

After the standard was published, has it impacted health and safety? If yes, please explain.

It has impacted occupational health and safety dramatically – as a tool for investigators to understand hazard/risk and to apply standards towards remediation. While most occupational health standards rely on asbestos in air concentrations – it is common for passive airborne samples to be minimal or absent of asbestos – yet surfaces to have abundant concentrations. Careful study in developing factors to predict re-entrainment and airborne concentrations continues. USEPA helped develop clearance criteria for Lower Manhattan post 9/11 for cleanup efforts – leading stakeholders (insurance companies, building owners, building engineers, etc.) towards consensus thresholds for asbestos in settled dust.

How do consumers and the public benefit from this standard? (If applicable)

Consumers: The standard has been applied to test fabrics and furniture to establish/determine if these and other products have been exposed to asbestos in manufacturing and installation or after an asbestos release event. It has been applied by well-known museums in cleaning rare objects (art, historical documents, etc.) exposed to asbestos. The public benefits by knowing that asbestos in surfaces in major US cities have been measured periodically and that continued studies indicate ambient levels diminish over time. Further, schools have used this tool to understand if AHERA protocols may have been successful in removing and controlling asbestos in school buildings.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

Final November 2005, WORLD TRADE CENTER INDOOR DUST TEST AND CLEAN PROGRAM PLAN. Here the ASTM D5755 Standard is not just recommended, but required for use in determining contamination and in establishing remediation clearance levels. "EPA will implement this effort utilizing the \$7 million in FEMA funding that has been earmarked for this program." Use of the standard was supported by insurance industry and real estate interests. It was a small portion of the billions spent reclaiming and rebuilding Lower Manhattan. Yet, an invaluable tool! The economic and health toll is well publicized – see also American College of Occupational Medicine's (ACOM) and American Industrial Hygiene Association (AIHA) 2021 presentation and article on the 20th Anniversary of 9/11; "A Tale of Two Cities – 20th Anniversary of the 9/11 Terrorist Attack on the World Trade Center and Pentagon – The Untold Story, Bernard L. Fontaine, Jr., CIH, CSP, FAIHA, James Detwiler, CIH, John R. Kominsky, CIH, CSP, CHM, Joy Erdman, CIH, CSP, FAIHA, Iris Udasin, M.D., and Frank Ehrenfeld III.

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

USEPA has by default accepted the standard and its use during the aforementioned WTC disaster and years long clean-up efforts. The standard has been involved in litigation in the US and also accepted as a recognized consensus standard by investigators. The use of the standard in the US is extensive – and, it is used more and more internationally.

I was asked to represent ASTM Global Ambassador Program in 2019 in Australia and New Zealand and to run a series of four-hour workshops for academics, government officials, engineers, regulators, accreditation bodies, and consultants – the most popular and in-demand subject pertained to this subject and this standard! There is pressure to develop a new ASTM eLearning series based upon this and related standards. D22 has approved its development.

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

GOAL 1: No Poverty, NA
GOAL 2: Zero Hunger, NA
GOAL 3: Good Health and Well-being, Yes, see above.
GOAL 4: Quality Education, NA
GOAL 5: Gender Equality, NA
GOAL 6: Clean Water and Sanitation, NA
GOAL 7: Affordable and Clean Energy, NA
GOAL 8: Decent Work and Economic Growth, NA
GOAL 9: Industry, Innovation and Infrastructure, Yes, helps secure environmentally sound conditions for workers.
GOAL 10: Reduced Inequality, NA
GOAL 11: Sustainable Cities and Communities, Yes, promotes built environment health and safety.
GOAL 12: Responsible Consumption and Production, NA
GOAL 13: Climate Action, NA
GOAL 14: Life Below Water, NA
GOAL 15: Life on Land, NA
GOAL 16: Peace and Justice Strong Institutions, NA
GOAL 17: Partnerships to achieve the Goal, NA

Please provide any additional information not provided above.

ASTM publications have whole chapters dedicated to this standard and subject of asbestos in settled dust including:

Asbestos Control and Management 3rd Edition: Oberta Editor.

STP 1342 1997

STO 1642 2021

Several non-ASTM publications. Ex: Millette and Hays, 1994

Dozens and dozens of peer reviewed publications in the literature.

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Committee: ASTM D22.07

Email Address: frankehrenfeld@iatl.com

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Please identify the designation and title of the standard

D7391 Standard Test Method for Categorization and Quantification of Airborne Fungal Structures in an Inertial Impaction Sample by Optical Microscopy.

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

In the world of fungal sampling and analysis for indoor air applications, traditionally there was little to no consensus. Every person collecting samples had their own collection technique. Laboratories each had their own ideas how to count particles by microscopy, how much of the slide to read, and what magnification to use. It was not possible to compare samples from lab to lab. Consultants and Health and Safety professionals, building owners even lawyers had no statistics regarding accuracy and reproducibility. Many decisions regarding risk assessment, remediation, legal cases, insurance claims were being made on data of unknown quality. In 2005, D22.08 was established by a strong group of stakeholders; laboratories, consultants, building scientists, academics to try to establish consensus in the analysis, sampling, and assessment for fungal concerns. In the 17 years since, the subcommittee developed and published methods, practices and guides that are considered to be the gold standards today. The first standard method to be developed was D7391 Standard Test Method for Categorization and Quantification of Airborne Fungal Structures in an Inertial Impaction Sample by Optical Microscopy spearheaded by about 10 prominent laboratories it took several years to complete. It is groundbreaking in that finally, all labs are analyzing on a level playing field. In addition, a few years later, the statistical data for the methods was finalized through robust interlaboratory studies conducted under the watchful eye of ASTM ILS.

These are now considered international standards and are used routinely by industrial hygienists, remediation contractors, property engineers, insurance companies, and environmental and occupational health and safety professionals.

Identify the interest groups that participated in the development and/or revision to the standard?

A large contingent of laboratories, consultants, academics, and cognizant authorities representing AIHA, EIA, IAQA from throughout the Us and internationally as well. The subcommittee has over 100 members including about 6 different countries that continue to review and maintain all our standards and work items.

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

This standard is used to analyze the most common type fungal sample collected, an air sample slangily called "spore trap" . This type of air sample is used for risk assessment, exposure evaluation, to identify extent of contamination and post remediation to determine effectiveness, thoroughness, and completion of project. The stakes are high, to find and remove mold from a home or building. Reproducible data and consistently analyzed data is essential to quality decisions

After the standard was published, has it impacted health and safety? If yes, please explain.

It has impacted the quality of health and safety of decisions significantly and improved the ability of the user to compare data as a tool for investigators to understand hazard/risk and to apply standards towards remediation. Further it sets the bar for all laboratories to achieve data quality goals.

How do consumers and the public benefit from this standard? (If applicable)

For the consumer and the public, this and all the subcommittee standards create a confidence around the data and the decisions made based on the data. The Consumer benefits from consistent, comparable results, with less ambiguity and uncertainty as possible. Insurance and legal claims are stronger, more successful when based on ASTM standards.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

There are no regulations governing Indoor air quality concerns, in particular fungal exposures, or even the assessment practices. USEPA and WHO provide guidance but not much regarding sampling and analysis. For that reason, the methods, practices and guides have become the de facto international standards and are used routinely by industrial hygienists, remediation contractors, property engineers, insurance companies, and environmental and occupational health and safety professionals.

Further AIHA EMLAB accreditation has recently adopted this method as a part of their assessment and proficiency program. It is being cited in legal cases and laboratories and consultants cite it in the reports.

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

GOAL 1: No Poverty, NA
GOAL 2: Zero Hunger, NA
GOAL 3: Good Health and Well-being, supports Indoor air quality and exposure concerns.
GOAL 4: Quality Education, supports good indoor air quality that makes for more productive school environment
GOAL 5: Gender Equality, NA
GOAL 6: Clean Water and Sanitation, NA
GOAL 7: Affordable and Clean Energy, NA
GOAL 8: Decent Work and Economic Growth, NA
GOAL 9: Industry, Innovation and Infrastructure, promotes productive work environments.
GOAL 10: Reduced Inequality, NA
GOAL 11: Sustainable Cities and Communities, , promotes healthy built environment
GOAL 12: Responsible Consumption and Production, NA
GOAL 13: Climate Action, NA
GOAL 14: Life Below Water, NA
GOAL 15: Life on Land, NA
GOAL 16: Peace and Justice Strong Institutions, NA
GOAL 17: Partnerships to achieve the Goal, NA

Please provide any additional information not provided above.

Contact Name Lisa Rogers

Committee: ASTM D22.08

Email Address: Irogers@mycometer.com

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Please identify the designation and title of the standard

E2356 – 18, Standard Practice for Comprehensive Building Asbestos Surveys

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

From the late 1970's through the early 1990's the US Environmental Protection Agency (EPA) published rules and guidance on asbestos management. As part of these rules, asbestos surveys (or as inspections, EPA) were required for public and private schools (K-12, known as "AHERA," 40 CFR Part 763, Sub. E) and prior to the renovation and demolition of buildings and structures (asbestos NESHAP, 40 CFR Part 61, Sub. M). As the regulated community began to understand and implement these EPA rules, there remained many questions; from how a survey was to be conducted and what the data would yield once gathered. The school rules, known as AHERA, did provide much guidance including basic requirements for simple risk analysis. But outside of schools, the needs were very widespread. Many property managers with worker safety needs and to meet risk management goals desired some methodology that was very comprehensive, but this was not forthcoming from the EPA. Similarly in the asbestos NESHAP regulations (pre-demolition and renovation), the rules require a "thorough inspection," but there is no guidance at all as to what that might be. The E-2356 standard practice provided a great service to industry by describing three types of asbestos surveys: Baseline Survey (very comprehensive to solve complex needs), Project Design Survey (to address needs prior to asbestos removal) and the Pre-construction Survey (designed to meet asbestos NESHAP requirements).

Identify the interest groups that participated in the development and/or revision to the standard?

They have included USEPA representatives, State/Local asbestos regulators, and related building engineering, industrial hygiene, and many environmental consulting industry professionals. As the standard practice was developed and revised other interested parties commented and contributed from academic, legal, and professional lobbyists representing specific interests.

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

Baseline Survey

This survey is the bulk of the standard practice. This survey provides a very comprehensive approach to building survey activities for those that have not attempted a facility-wide approach to data gathering and reduction to assess risk and management needs. This survey is of greatest use to building owner/manager that desires to have an overall program to provide for worker and building occupant safety and through data reduction and risk analysis to have better control of asbestos issues in their buildings and structures. It is also applicable to meet the requirements within the AHERA schools' asbestos management rule.

Project Design Survey

This portion of the standard practice is to serve the architectural and engineering community to determine the extent of asbestos containing materials (ACM) that will be involved in an asbestos removal projects and those that could be disturbed as part of construction activities. This is more focused approach that is of great service to those specific needs.

Pre-construction Survey

The asbestos NESHAP regulation applies to all demolitions and almost all renovation work in the US, including federal facilities. The regulation calls for a "thorough inspection" but never describes to the regulated community how that is to be performed. This has caused significant difficulty for those new to the asbestos consulting community (as certified asbestos Inspectors) and those State/Local regulators that must determine compliance at the local level. This survey has become especially useful across the US to set a standard for what information must be gathered and reported for asbestos NESHAP compliance. It has been approved by the EPA for that purpose.

After the standard was published, has it impacted health and safety? If yes, please explain.

Asbestos is a regulated carcinogen. It causes cancer (most often fatal) and other bodily harm to those exposed, especially occupationally. The purposes of asbestos surveys are to determine the presence of ACM/asbestos so that we can limit exposures to workers and building occupants. Once ACM is known or presumed to be present in a facility there are regulations to: communicate its presence, limit disturbance only to those trained and equipped to do so, manage work practices to protect those adjacent to work, significant worker protection requirements, and many other aspects designed to protect human health and the environment. Those that utilize E2356 in the manner in which it was designed (asbestos management) have likely saved many thousands from exposures and the potential for asbestos disease. With asbestos there is a long latency period between exposures and the onset of disease. So, we will never know quantitatively of the efficacy of this standard practice. But if procedures are followed and existing regulations are met by the owner/operator of facilities, we are highly likely saving thousands from future cancers and other health maladies.

How do consumers and the public benefit from this standard? (If applicable)

Those that own/manage buildings and structures that employ professionals that use this standard practice to help them develop a comprehensive management program are making great steps to reducing risks of asbestos exposures to the building occupants and the public that would enter and use services in these buildings/structures. In a similar fashion, those utilizing the Pre-construction Survey (prior to demolition and renovation) by determining the ACMs that must be removed by requirement prior to those regulated activities can significantly improve the potential health and safety to the public (fugitive dust) and consumers that would later occupy areas where asbestos was present. The E2356 standard practice provides a platform for the control of asbestos exposures. It is up to those that are in receipt of this data to meet regulatory requirements and standard industry practices to meet these goals, and many do.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

The comments here would be similar to that enumerated in the section above titled: **After the standard was published, has it impacted health and safety?**

With the latency of asbestos disease, it will be hard to ever quantify the true net effect of the impact of E2356. One must see this another way - it is a matter of prevention. This standard practice gives users a way to gather results to prevent exposures. In that we have met the overall goals of EPA and OSHA regulations and the guidance of other government bodies on this health matter including, NIOSH, CDC and ATSDR.

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

With the EPA asbestos NESHAP rules, there are no specified methods for how one meets the requirement of a “thorough inspection.” Since the early 1990’s when these rules became effective the regulated community has struggled with how to best meet these regulatory requirements. Of significant importance is the efforts of State/Local regulators to determine compliance with these rules. For years they have reviewed NESHAP asbestos survey reports that were hardly defensible in meeting NESHAP rules and missing critical information to assess the viability of a given asbestos Inspector’s work. In 2014, I was asked to speak to a group of state asbestos regulators from EPA Region 4. Several meeting participants were my training customers when I was on the staff of the The Environmental Institute in Marietta, Georgia. As a training agency we included discussion of ASTM standards as part of our training programs. The assembled group was interested in how they could leverage E2356 to assist them in getting their local regulated community in compliance with NESHAP inspection requirements. Participating in the meeting was a senior EPA official from Washington DC that was with the Clean Air Act office (NESHAP). He liked what he heard and asked me to write a letter to his office to ask them to evaluate the use of the E2356 Pre-Construction Standard for formal EPA adoption. From that effort we received a formal letter back from the EPA dated August 7, 2015, wherein the EPA approved E2356 for use as: “...EPA would expect an owner/operator to follow the steps described in Sections I through 5 and Section 8 in ASTM E2356-14 "Standard Practice for Comprehensive Building Asbestos Surveys." The document is included with this submission and can also be found on EPA’s Applicability Determination Index (ADI) as document A150001. This was seen by many as a major win for ASTM International, State/Local regulators that could benefit by this letter and the regulated community. In this we now had an approved methodology for asbestos NESHAP compliance. Further we have produced an online training module in conjunction with ASTM staff members: “ASTM E2356 Standard Practice for Comprehensive Building Asbestos Surveys -- eLearning Course” <https://www.astm.org/astm-tpt-502.html> . In this, interested parties can learn how the EPA letter applies to asbestos NESHAP compliance and what the required E2356 sections provide for them. The EPA letter has been posted numerous times on social media (as with LinkedIn) and has become known widespread in the asbestos control industry. The letter does not make E2356 mandatory, it merely gives regulators and the regulated community an option as to how the Pre-construction Survey can be a platform for EPA compliance. I know from first person experience that numerous state regulators have recommended E2356. We recently found that the state of Vermont includes this in their guidance to their regulated community. ASTM staff members have contacted them to offer further assistance in this matter. And would do the same for other states that might adopt this standard practice. It is likely that other state programs outside of our knowledge do as well. The standard practice is also recommended and/or used regularly as well by those in federal agencies such as the EPA, DOD, and DOE (and their subcontractors). In this we have industry penetration, knowledge, and an opportunity for training for one of committee D.22-07’s most well-known standard practices.

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

GOAL 1: No Poverty, NA
GOAL 2: Zero Hunger, NA
GOAL 3: Good Health and Well-being, Yes, see above.
GOAL 4: Quality Education, Yes, see above
GOAL 5: Gender Equality, NA
GOAL 6: Clean Water and Sanitation, NA
GOAL 7: Affordable and Clean Energy, NA
GOAL 8: Decent Work and Economic Growth, NA
GOAL 9: Industry, Innovation and Infrastructure, Yes, helps secure environmentally sound conditions for workers.
GOAL 10: Reduced Inequality, NA
GOAL 11: Sustainable Cities and Communities, Yes, promotes built environment health and safety.
GOAL 12: Responsible Consumption and Production, NA
GOAL 13: Climate Action, NA
GOAL 14: Life Below Water, NA
GOAL 15: Life on Land, NA
GOAL 16: Peace and Justice Strong Institutions, NA
GOAL 17: Partnerships to achieve the Goal, NA

9

Please provide any additional information not provided above.

The Oberta ASTM publications has whole chapters dedicated to this standard and subject of asbestos survey activity: Asbestos Control and Management 3rd Edition: Oberta Editor

It is also a referenced document in a variety of ASTM standards including: E1368, D7886, D7390

E2356 is part of asbestos training programs across the US

This standard practice has been part of conference presentations by me and others for many years.

Contact Name: Tom Laubenthal

Committee: ASTM D22.07

Email Address: tomlaub@att.net

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Please identify the designation and title of the standard

ASTM D8441/D8441M Standard Specification for an International Symbol for Identifying Consumer Products Containing Intoxicating Cannabinoids

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

The number of jurisdictions where cannabis and products containing cannabinoids are now regulated has grown rapidly in US states and around the world. While this market growth has benefited industry and consumers in some jurisdictions, the legal and regulatory ambiguity has created a landscape of risk in most jurisdictions. Indeed, the United States itself is a cautionary tale of the confusion this long-awaited shift in the zeitgeist toward cannabis has wrought. Some US states have legalized cannabis for all uses (medical and adult-use), while others have not made any movement toward legalization. It is important to note that cannabis containing more than 0.3% delta-9-THC (i.e., having a delta-9-THC concentration greater than that prescribed in the legal definition of 'hemp') is [federally prohibited by law and remains a scheduled substance](#).

The current global regulatory landscape for consumer products containing cannabinoids is so fragmented that each legal marketplace has developed unique requirements, resulting in a lack of harmonization of test methods, specifications, classifications, and other standards. One such example is a universal symbol used to identify consumer products containing intoxicating cannabinoids. There are currently 14 different ironically named "universal symbols." This lack of harmonization between marketplaces reduces understanding of the intended warning and consumer safety.

ASTM International Technical Committee D37 on Cannabis has developed *D8441/D8441M Standard Specification for an International Symbol for Identifying Consumer Products Containing Intoxicating Cannabinoids*, which defines specifications for a harmonized graphical symbol that can be used by authorities having jurisdiction as a means of identifying consumer products containing intoxicating cannabinoids, such as delta-9-THC and its stereoisomers.

This harmonized graphical symbol will help ensure consumer safety by providing (1) uniformity in identifying potential health and safety hazards associated with exposure to one or more substances that may cause mind-altering effects, and (2) visual clarity and consistency that improves recognition and comprehension by the end user.

Identify the interest groups that participated in the development and/or revision to the standard?

Doctors for Cannabis Regulation (dfcr.org)
HCD Research (hcdi.net)
TSOC LLC (thespockofcannabis.com/)
Kariki Pharma (karikipharma.com)
Health Canada (Canada.ca)
Advanced Vapor Devices (avdpro.com)
Dosecann (dosecann.com)
GMP Collective (gmpcollective.com)
Allay Consulting (allayconsulting.com)
Florida Department of Agriculture and Consumer Services (fdacs.gov)
N2 Packaging System (n2pack.com)
Control Point Consulting (controlpoint.consulting)
Lighthouse Worldwide Solutions (golighthouse.com/en)

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

ASTM 8441/8441M defines a harmonized universal symbol for identifying consumer products containing intoxicating cannabinoids.

This harmonized ASTM universal symbol, the *International Intoxicating Cannabinoid Product Symbol (IICPS)*, is intended to be used by authorities having jurisdiction to clearly distinguish between consumer products containing intoxicating cannabinoids from those that do not.

The IICPS is intended to identify all intoxicating cannabinoids, whether they are naturally derived, synthesized, or grown in a lab. Further, the IICPS is agnostic to the type of plant from which the material is sourced; therefore, whether the cannabinoid in a product comes from cannabis or hemp, the direct applicability of the IICPS to consumer-facing products remains the same.

ASTM D8441/8441M outlines the specifications for creating the IICPS and the means for its validation.

After the standard was published, has it impacted health and safety? If yes, please explain.

The IICPS was developed by a group of diverse industry representatives from around the world and its meaning and intended reaction by the consumer were validated through consumer neuroscience research.

The IICPS has been incorporated into the cannabinoid product symbols in Montana, Vermont, and New Jersey, and it is under consideration in New York, Massachusetts, and Alaska.

The D8441/8441M's adoption in [New Jersey impacts 1-3 million adult-use and medical-use consumers](#). With previous years finding [19% of Alaskan adults](#), [15% of Montanans](#), [10% of New Yorkers](#), [20% of Vermonters](#), and over [21% of adults in Massachusetts](#) using cannabis products, the IICPS is expected to protect the public health of tens of millions of Americans in just its first year of publication.

How do consumers and the public benefit from this standard? (If applicable)

Currently, jurisdictions that have legalized hemp or cannabis, for medical or adult use, have implemented differing requirements for labeling. These standards vary widely, and in the absence of federal standardization, the solutions that are best for one jurisdiction may not be suitable for another.

Nonetheless, there is one anchor point to ensure that consumers of all ages and backgrounds can correctly identify and exercise caution with consumer products containing cannabinoids: a universal symbol on packages. Such a symbol is critical for, among other reasons, preventing the accidental ingestion of cannabinoids by adults and children.

However, no one symbol has met with approval by more than one or two legalized markets, which is a serious issue of public safety now facing regulators, medical professionals, industry stakeholders, patients, consumers, and the general public.

ASTM 8441/8441M, which defines the International Intoxicating Cannabinoid Product Symbol (IICPS), fulfills the need for a universal standard to identify cannabis products.

The IICPS will help ensure consumer safety by providing (1) uniformity in identifying potential health and safety hazards associated with exposure to one or more substances that may cause mind-altering effects, and (2) visual clarity and consistency that improves recognition and comprehension by the end user.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

The accidental ingestion of cannabinoids by [children](#), pets, and adults is a [global concern](#). Products containing cannabinoids may have no differences in taste or smell than products that do not. Safety symbols already established by existing consensus standards are the ideal means by which to convey warnings and alerts. At both extremes of the human lifespan, childhood and older age, [symbols are better understood than text](#), as [reading comprehension](#) is not yet established or may be waning. The utility of [symbols](#) in controlling risky and [unsafe behaviors](#) and [improving public health and safety](#) has been well established in both academic and government literature.

[HCD Research \(HCD\)](#), a US-based consumer research house, conducted a survey among the American general population in support of the ASTM D37 symbol committee objectives in November 2021. To contribute to developing a universal symbol for non-intoxicating cannabis products, HCD Research administered a study to understand consumer perceptions of various types of symbol designs. HCD employed [Implicit Association Testing \(IAT\)](#) to probe respondents' unconscious perceptions of the symbols. Briefly, IAT methods reveal the strength of associations between descriptors and stimuli, or in the current research between symbols and emotion/perception words. These associations are based on reaction time when presented with a descriptor and a label combination simultaneously. In this type of go/no-go paradigm, a faster response implies a stronger association.

Specifically, HCD's study included a total US national sample of 216 adults with a demographic distribution reflecting the most recent national census. Of the total sample, 47% reported use of any kind of cannabis for any reason, while 53% were non-users. IAT results indicated that both cannabis user and non-user samples interpreted the IICPS to be cautionary - the IICPS was found to strongly associate with the terms "intoxicating" and "potent." Taken together, HCD Research's findings support that consumers, whether users or non-users of cannabis, perceive the IICPS as intended, specifically representing a warning of intoxication.

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

ASTM D8441/8441M is a newly published standard and is expected to have widespread use globally. It serves to provide the specifications for a harmonized graphical symbol, which can be used by authorities having jurisdiction as a means of identifying consumer products containing intoxicating cannabinoids, such as delta-9-THC and its stereoisomers.

Montana was the first U.S. state to adopt the International Intoxicating Cannabinoid Product Symbol (IICPS, the symbol defined by ASTM 8441/8441M) in late 2021. In early 2022, New Jersey and Vermont incorporated the IICPS design into their state symbols. Other states, including New York, Massachusetts, and Alaska, are currently considering adoption of the IICPS.

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

Goal 3: Good health and well-being: ASTM 8441/8441M creates a standard symbol that will ensure rapid identification of consumer products containing intoxicating cannabinoids, preventing potentially harmful inadvertent consumption of those products.

Goal 10: Reduced inequalities: ASTM 8441/8441M is designed to allow identification of consumer products containing intoxicating cannabinoids without relying on the use of written language. This reduces inequalities related to varying literacy levels in disadvantaged populations.

Goal 12: Responsible consumption and production: ASTM 8441/8441M ensures that manufacturers communicate critical information to consumers, who can then act responsibly to avoid adverse effects of cannabinoid use.

Please provide any additional information not provided above.

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Committee: D37 on Cannabis

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E1886-Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Storm Shutters Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials

E1996-Standard Specification for Performance of Exterior Windows, Glazed Curtain Walls, Doors and Stormbuilding failures in multiple hurricanes Shutters Impacted by Windborne Debris in Hurricanes

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

The breakage of glazing in building envelopes by impact from windborne debris in hurricanes caused multiple building failures. These standards were intended to mitigate this problem.

Development of these standards was initiated by Texas Tech wind laboratory under leadership of Professor Joe Minor.

Identify the interest groups that participated in the development and/or revision to the standard?

Principle participants were the glazing industry and the door and window manufacturers.

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

Both standards have been referenced in the model building codes since the year 2000, They apply in windborne debris areas defined in ASCE 7.

After the standard was published, has it impacted health and safety? If yes, please explain.

The standards are enforced widely throughout the gulf coast and the Atlantic Coast up to New England. They have been effective in multiple hurricanes and windstorm.

How do consumers and the public benefit from this standard? (If applicable)

Prevention of building collapses, building damages, and occupant safety.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

E1996 has been expanded and amended continuously since its adoption in 1997. Both E 1886 and E1996 have been referenced in ASCE 7 and in the IBC and IRC since 2000.

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

3. Good Health and Well Being. By preventing deaths and injuries due to building failures in hurricanes.
9. Industry, Innovation and Infrastructure. By leading to the development of innovative building envelope products.
11. Sustainable Cities and Communities. By leading to hurricane-safer cities.

Please provide any additional information not provided above.

Subsequent Developments of E1886 and E1996

- “Impact Protective Systems” substituted for “Storm Shutters” in both standards
- “Three identical specimens out of four” substituted for “Three identical specimens”
- Wind Zone 4, basic wind speed ≥ 140 mph, added to ASTM E1996 2003 edition in an attempt to coordinate with Miami/Dade requirements in the Florida High Velocity Hurricane Zone
- Miami/Dade participate in ASTM Task Group, but fail to adopt ASTM standard
- Disputes in South Florida lead to removal of Wind Zone 4 to a non-mandatory appendix X4
- Periodic editorial changes

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Please identify the designation and title of the standard

E2013-20: Standard Practice for Developing Functions, Constructing FAST Diagrams, and Performing Function Analysis During Value Engineering (VE) / Value Analysis (VA) Study.

E2013 Standard covers a logical structure for the function analysis of a project, product, or process. It provides a system to identify, define, and clearly communicate the purpose of a project, product, or process. This practice covers the relationship between functions that must be satisfied and the resources for a project, product, or process to accomplish those functions.

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

Value Engineering (Value Methodology) was developed in the 40's in US. US Congress passed a bill promoting the need for Value Methodology to serve the public. The Process helps to maximize funding to best serve stakeholders. However, absence of a standard on VE resulted in cost reduction rather than justifying spending to meet stakeholder needs. This includes not properly addressing Economics, Life Cycle Cost, Sustainability, and Community Resilience in arriving at a recommended solution. The differentiator of VE is the Function Analysis Techniques.

Muthiah Kas, PE, SE, CVS-Life, with the support of Alfred Benesch & Company (Benesch) and SAVE-International (formerly the Society of American Value Engineers) members, initiated the VE standards in ASTM in the 90's. This included standards E1699, E2013 and E2103.

Identify the interest groups that participated in the development and/or revision to the standard?

Muthiah Kasi, SAVE-International Certification Board Director, and Mary Ann Lewis, SAVE-International President, developed the E1699 standard. Later –Kasi with the technical support of Robert Chapman and Tony Huxley, ASTM E06.81 subcommittee members, developed the E2013 and E2103 standards. The basic concept of the Customer Function Model, as discussed in E2013 was developed by Thomas Snodgrass, and Ted Fowler. This diagramming technique is used for the understanding and analysis of functions of projects, products, or processes. Later Thomas Snodgrass and Muthiah Kasi expanded the Customer oriented concept to the building industry. Customer based Function Analysis was not recognized by the SAVE-International for a while. Muthiah Kasi with the resources from Alfred Benesch and Company developed the ASTM Standard E2013 for a customer/stakeholder-based approach to Value Methodology.

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

Customer Function Model, as defined in ASTM E2013 classifies the customer needs and desires into five categories and, with the distribution of resources, aids in verifying that the resources are allocated appropriately. Using the standard E2013, stakeholders like Departments of Transportation (DOT) engineers focused on balancing public safety, efficient operations, public convenience, sustainability with appropriate utilization of public resources in planning the projects.

Benesch led by Muthiah Kasi and Charles A. Bartlett applied the customer based VE standards in conducting Value Engineering (VE) studies. Clients include City of Chicago, DOTs in Michigan, Connecticut, Massachusetts, Wisconsin, Nebraska, Kansas, Wyoming, Florida, Georgia, and many other states. Since then, various Value Practitioners are applying this concept to Building and Transportation projects. Miles Value Engineering Foundation (MVF), part of SAVE-International and SAVE-International’s Certification Board have expressed support for the E2013 standards.

Allocation of the project cost is to balance the needs and desires of the stakeholders. Desired allocation is verified by staying within the range:

- Basic Functions 15-25%
- Enhance dependability Functions 25-35%
- Enhance Convenience Functions 20-30%
- Improve Acceptance Functions and 10-25%
- Attract stakeholder functions. 5-15%

Examples of application and results of the ASTM E2013 standard for VE are shown in the following discussions.

After the standard was published, has it impacted health and safety? If yes, please explain.

For the past ten years, major highway projects in the country have balanced the public improvements with safety during transportation. ASTM E2013 method of approach helped to address public safety during construction and also post construction. Some of the examples shown below details the results.

An example of the successful application of the E2013 standard is The Wisconsin Department of Transportation's (WisDOT) use of the Customer Function Model as outlined in E2013 resulting in the reduction of the cost of the project while maintaining the needed functions. Eliminating overbuilt project elements based on the needed functions and lowering the project's budget by \$108 million helped to make funds available for other highway projects to improve safety in the state of Wisconsin. Additionally, by not reconstructing 23 new bridges, disturbance to the travelling public for two year of construction was avoided. This helps to maintain existing safety by not reconstructing 23 bridges.

The proposed work included reconstruction of the existing road section, the addition of several miles of a third lane to carry peak traffic and 23 reconstructed bridges to accommodate the widened roadway. Using the ASTM Economic Standards, this study addressed the asset management requirements of Federal Highway Administration (FHWA). The study recommended an alternative where the existing two lanes of roadway could satisfy all the needed functions, 23 bridges in this corridor would be rehabilitated and the pavement reconstruction would be minimized. WisDOT accepted the Value Engineering recommendations, and the estimated construction cost was reduced from \$305 million to \$198 million. WisDOT's approved memo and was recognized by American Association of State Highway and Transportation Officials (AASHTO) (See Figure 1).



Figure 1: Recognition by AASHTO

How do consumers and the public benefit from this standard? (If applicable)

A VE study focusing on stakeholder needs, desires, and constraints (as defined in E2013) was conducted for the City of Chicago. A six-legged intersection encompassed in the Damen/Elston/Fullerton intersections in Chicago caused major congestion, delays, and accidents (Figure 2). The original solution was to separate the traffic by an underpass (Figure 3). This caused community disruption, major underground utility relocation and environmental impacts.



Figure 2: Existing intersection



Figure 3: As Given underpass

Using the ASTM standards, the VE study resulted in reconfiguring the intersections as shown in Figures 4 and 5).



Figure 4: At grade solution



Figure 5: At Grade Solution (As Built)

Public benefits included:

1. No separation of two sides of the road
2. No impact to public underground utilities
3. Reduced construction time
4. Optimized land utilization
5. Created new parcels for economic growth
6. Less maintenance and long-term care by not avoiding a new physical structure
7. Improved drainage
8. A layout that harmonizes with the nature of the neighborhood

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

A five-year VE program evaluating major roadway projects using ASTM standard E2013 from 2015 through 2020 resulted in economic benefits to the state of Connecticut and specifically its DOT. Following is the summary of the VE program:

- Number of VE Studies Performed = 9
- Number of Proposals = 51
- Number of Proposals Incorporated = 25
- Potential Savings Identified = \$ 88 Million
- Accepted Savings = \$ 35 Million
- Average Cost to DOT Per Study = \$ 85,000
- ROI (Based on Accepted Proposals) = 4100%

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

1. Muthiah Kasi is currently developing two chapters on defining and applying Customer Function Model, based on E2013 for the Miles Foundation's upcoming VE manual. This will be published in 2023.
 2. Indian Value Engineering Society (INVEST) established Muthiah Kasi Trophy for the best application of Customer Function Model based on the E2013 Standard.
 3. By using ASTM Standards, Benesch demonstrated its value in various large projects that have been recognized by ACEC, AASHTO, SEAIOI, NSBA and other organizations. (See Figure 1 above)
 4. Pennsylvania Department of Transportation (DOT) recognized the strength of the ASTM E2013 standard in awarding the contract to Benesch for the proposed rehabilitation of a complex 60-year-old viaduct in the City of Philadelphia.
- "The Benesch team plans to make cost effective decisions based on the principles of "right-sizing" and not just least initial cost by utilizing nationally recognized procedures such as the ASTM Cost Allocation Methodology; Function Analysis and their AASHTO award winning in-house generated

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

Goal#9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.

Foster Innovation: The I-74 Corridor improvement in Peoria, Illinois includes rebuilding a new bridge over a waterway (Flume). Instead of erecting a vertical pier or eliminating the pier with longer span, during VE Study and application of E2013, the team came up with an innovative arch pier concept.



Figure 6: Arch pier allows for pier construction without impacting the waterway below

Build Resilient Structure through Innovation.

A series of VE studies were conducted using ASTM standard E2013 to address public needs, sustainability, and economics for a bridge conveying I 94 over Telegraph Road in Michigan. The resulting bridge concept avoided the annual inspection of the ribs by pressurizing and adding a pressure gauge to detect leaks due to cracking of the welded connection (Figure 7). This innovation avoided the traditional two-week closure of lanes for annual inspection and avoided impact to 64,000 vehicles.



Figure 7: I-94 over Telegraph Road with pressure gauge

Hangers with 4% of the cost is more vulnerable to failure and the most likely element to be replaced in the future. Based on the VE study a recommendation was made to add two strands, each one carrying the load (Figure 8). This redundancy facilitates future replacement of each cable without any additional support. The VE approach showed the bridge's cost increased by 1% while avoiding annual inspection and future disruption to 64,000 Vehicles per day during hangers required replacement.



Figure 8: Redundant cable strands

Please provide any additional information not provided above.

Muthiah Kasi of E06.81 represented ASTM at the Workshop on Building and Construction Standards, held in New Delhi, India. One of the well-received messages in India is the ASTM balloting process assuring that Standards reflect current needs and trends.



Figure 9: Workshop in New Delhi, India

The demand by stakeholders today through social media requires officials to have a standard that addresses the stakeholders' needs, desires, and constraints of any type of improvement. This effort is further complicated by limited available resources. ASTM E2013 aids owners and public officials in balancing stakeholders' needs and desires with constraints and resources.

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ASTM E2813, Standard Practice for Building Enclosure Commissioning
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Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

ASTM E2813 was developed in response to a marketplace demand for higher performing buildings, in particular with regard to the growing influence of our built environment on energy use, sustainability and climate change. Development of this standard was initiated by Dan Lemieux in 2009 through the formation of a Task Group populated by like-minded professionals from across the real estate development, design, construction, legal and insurance industries and professions. Co-chaired by Martina Driscoll, support for this initiative and recognition of its potential influence on our built environment was provided by Thomas A. 'Tom' Schwartz, now retired and a past Chairman of the Board for ASTM International. The problems that this standard sought to address include:

- Persistent and on-going failure of building enclosure systems and assemblies to satisfy baseline performance requirements for heat, air and moisture transport and energy use in buildings;
- Misaligned expectations in the real estate development, design and construction communities about how architects are educated and trained in building science and the physics of building enclosure and wholebuilding performance;
- Rising incidence and cost of construction claims litigation associated with building enclosure performance;
- Lack of a concise, authoritative, technically sound, and enforceable standard to deliver improved building enclosure and whole-building performance through commissioning.

To address these concerns, ASTM E2813 first established the following performance attributes to be addressed by the standard, each of which would form the basis of an Owner's Project Requirements (OPR) as defined by and supported in the standard:

- Energy
- Environment
- Safety
- Security
- Durability
- Sustainability, and
- Operation

One of the more significant and complex challenges that ASTM E2813 next sought to address was the misalignment of expectations between owner, architect, and contractor regarding the education and training of design professionals in building science and the physics of building enclosure and whole building performance.

The developers of the standard addressed this concern through the establishment of minimum core competencies required of the BECx service provider under the standard – a first for ASTM and one that now requires a fundamental understanding of the following:

- Building and Materials Science
- Procurement and Project Delivery
- Contract Documents and Construction Administration
- Performance Test Standards and Methodology

Notable among this list is the requirement for the service provider to verifiably demonstrate a fundamental understanding of Building and Materials Science, including:

- Principles associated with heat transfer via conduction, convection, radiation and air infiltration/exfiltration
- Principles associated with moisture storage and transport via gravity, diffusion, convection, capillary action, absorbed flow and osmosis;
- Characteristics and behavior of enclosure-related materials, components, systems and assemblies when specified for a given application, geographic region, location, exposure or climate.
- Principles of structural loading and structural capacity of enclosure-related materials, components, systems and assemblies for specified loads, including: wind, earthquake, projectile, differential volume change, kinetic energy and differential pressure conditions.

Each of the core competencies outlined in ASTM E2813 are included in a wide variety of BECx training-based certificate programs and will form the basis of the first BECx Personnel Certification Program to be accredited under ISO 17024 by the International Standards Organization (ISO).

Springboard for the Advancement of Education and Training in Building Science

ASTM E2813 and the challenges it began to address through core competencies and how we educate and train design professionals in building science and the physics of building enclosure and whole building performance led directly to the development of the following workshops and symposia:

- ASTM/NIBS 1st Workshop on Building Science Education in North America, 2012, Toronto, Ontario, Canada
- ASTM/NIBS 2nd Workshop on Building Science Education in North America, 2014, Washington, DC
- ASTM E06/D08 1st Joint Symposium on Building Science and the Physics of Building Enclosure Performance, 2018, Washington, DC (STP 1617)
- ASTM E06/D08/C16 2nd Joint Symposium on Building Science and the Physics of Building Enclosure Performance, Seattle, Washington (STP 1635)

The purpose of these workshops and symposia was, in part, to raise awareness regarding the importance of building enclosure design and construction to whole building performance and to explore opportunities to reduce energy use in buildings and minimize the impact of our building environment on climate change. Today, this initiative has led directly to re-engagement by representatives of ASTM, NIBS, and the Society of Building Science Educators (SBSE) with the American Institute of Architects (AIA), National Council of Architecture Registration Boards (NCARB), National Architecture Accreditation Board (NAAB) and the American Collegiate Schools of Architecture (ACSA). The goal of this re-engagement will be to explore current accreditation and licensing requirements and opportunities to adjust and further refine those requirements to include

coursework in the fundamentals of building science at both the undergraduate and graduate level in architecture.

Basis for Continuing Education and Training Opportunities in BECx

ASTM E2813 and ASTM E2947, together with NIBS Guideline 3, ASHRAE Guideline 0 and ASHRAE Standard 202 continue to serve as the basis for a variety of different training-based certificate programs in Cx and BECx available throughout the U.S. Notable among these are the BECx Training-Based Certificate Modules currently under development by NIBS. Over the coming year, ASTM E2813 and ASTM E2947 will also serve as the basis for the new ISO 17024 accredited Personnel Certification program currently under development by the International Institute of Building Enclosure Consultants (IIBEC). Subject-matter experts representing AIA, ASHRAE, ASTM International, NIBS, Society of Building Science Educators and other professional organizations and stakeholders in real estate development and the A/E/C community have contributed to this effort. The successful candidate for CBECxP® certification will have achieved that distinction through pre-qualification (verified education and work experience) and examination and will be required to maintain that credential through mandatory continuing education requirements. At time of launch (2023), CBECxP® will be the first and only certification of its kind in the world to ensure that a qualified professional is engaged in and can effectively develop and enforce a BECx program as defined by

ASTM E2813 and required by contract and/or by building code.

Recognition and Adoption in Building Codes and Standards

Since its original publication in 2012, this standard served as the basis for the Memorandum of Understanding between ASTM International and the National Institute of Building Sciences (NIBS) to develop ASTM E2947-14, Standard Guide for Building Enclosure Commissioning as a replacement for NIBS Guideline 3, Exterior Enclosure Technical Requirements for the Commissioning Process. Today, both ASTM E2813 and E2947 are referenced directly in the following codes and standards:

- International Building Code (IBC) published by the International Code Council (ICC)
- GSA Facilities Standards for the Public Buildings Service (P100) published by the U.S. General Services Administration (GSA);
- U.S. Department of State Overseas Building Operations (DOS/OBO) 2019 Building Code published by the U.S. Department of State and included by adoption of the 2015 International Building Code
- U.S. Green Building Council (USGBC) LEED Web-Based Reference Guide and LEED v.4.1 requirements for Fundamental and Enhanced BECx in new construction;
- Whole Building Design Guide published and maintained online by the National Institute of Building Sciences (NIBS)

ASTM E2813 is currently under consideration as a reference standard to be included in the next version of the ICC International Energy Conservation Code (IECC) and ICC International Green Building Code (IgBC), with input from industry representatives and stakeholders that will continue to shape the language and reinforce the relevance of BECx in design and construction.

Identify the interest groups that participated in the development and/or revision to the standard?

Members of ASTM Committee E06 and D08 who, as authorized representatives or representatives through membership in allied organizations and as stakeholders in Commissioning (Cx) and BECx participated in the development and/or revision to the standard, including:

- American Architectural Manufacturers Association (AAMA)
- American Institute of Architects (AIA)
- American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE)
- International Institute of Building Enclosure Consultants (IIBEC, formerly RCI)
- National Institute of Building Sciences (NIBS)
- Society of Building Science Educators (SBSE)
- National Research Council Canada (NRCC)

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

ASTM E2813, together with the best practices outlined in ASTM E2947, have been adopted (at times verbatim) by both public and private developers and stakeholders in real estate here in the U.S. and, through stakeholders with built assets located beyond our borders, overseas and around the world. Their goal in adopting these standards is intended, in part, to help curb energy use in buildings through the establishment of baseline ('Fundamental') and benchmark ('Enhanced') requirements for BECx, beginning in the Pre-Design phase and extending through Design, Construction, and the Occupancy and Operations phases of the project delivery process.

In actual practice, the BECx process outlined in these standards have been most effective on projects where the consequences of failure in the building enclosure can be significant and costly. Examples include hospitals, museums, biomedical research laboratories and facilities associated with our national defense both here and abroad, where the effective management of climate-specific heat, air, and moisture transport across the exterior enclosure of a building is critical.

On projects where the consequences of failure may be less significant, though still a concern, the requirements established in ASTM E2813 and best practices described in ASTM E2947 are frequently adopted, in whole or in part, by an Owner and its design and construction team to further mitigate the risk for failures in the building envelope, loss of value in the asset, and the associated increase in risk for potential litigation.

After the standard was published, has it impacted health and safety? If yes, please explain.

Yes. On projects where it has been appropriately developed and successfully enforced, the BECx process has helped to deliver a cost-effective, fully integrated above and below-grade building enclosure that addresses each of the problems outlined previously in this submission. Health-related complications associated with microbial growth in building enclosure assemblies are one example of the positive impact that the BECx process has had in our built environment. Safety-related risks addressed by this standard also include the mitigation of moisture-related corrosion and deterioration in building enclosure components, systems and assemblies designed to resist both structural and environmental loads for the anticipated service life of the building.

How do consumers and the public benefit from this standard? (If applicable)

Consumers and, ultimately, the end-user of a building where the BECx process has been successfully applied will benefit directly through the effective management of:

- Air leakage
- Rainwater penetration resistance
- Moisture-related deterioration of components and materials
- UV degradation of components and materials
- Thermal efficiency
- Condensation potential
- Passive solar heat gain
- Acoustical separation
- Combustibility and reaction to fire

Each of these benefits speaks directly to the health, safety and welfare of the occupants/end-users of a building and, with regard to sustainability and climate change, reduced energy use in buildings and an enforceable process to address both operational and embodied carbon in buildings.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

While there are a variety of sources, case studies, and published data now available to support the safety, economic and environmental benefits of BECx, one of the more compelling and succinct was published by a researcher at Lawrence Berkeley National Laboratory (LBNL). According to Evan Mills, PhD, building enclosure commissioning, or BECx, should be viewed as “the single-most cost-effective strategy for reducing energy, costs, and greenhouse gas emissions in buildings today.”

Mills studied the benefits of BECx, noting that commissioning only costs about \$1.16/sf for new construction and \$0.30/sf for existing buildings on average, with a payback period of as little as 14 months. Savings associated with using BECx from both maintenance and energy savings average about 16% for existing buildings and 13% for new construction. The main benefit is that whole-building energy savings are guaranteed, thanks to the pivotal role of the enclosure in determining efficiency performance.

“Further enhancing the value of commissioning, its non-energy benefits surpass those of most other energy management practices,” including major first-cost savings through right-sizing of HVAC equipment, Mills has testified. “When accounting for these benefits, the net median commissioning project cost was reduced by 49% on average, while in many cases they exceeded the direct value of the energy savings.”

The advantages cited here nearly a decade ago hold true today. Until we strengthen the education and training requirements for design professionals in building science and the physics of building enclosure and whole building performance, BECx offers a cost-effective and enforceable process intended to bridge that gap.

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

See previous discussion

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

Goal 4: Quality Education: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

ASTM E2813 and the core competencies required therein have triggered the development of multiple continuing education and training opportunities in BECx. These programs are available to all and at every level of experience in the real estate design, development and construction communities, as well as to those who may be interested in a career change or change in direction in their work. The goal of these programs is to build a better workforce at every level of the project delivery process through continuing education and training in building science and the physics of building enclosure and whole building performance. The outcome will be higher performing buildings delivered by a more diversified and inclusive workforce armed with the knowledge they need to improve the performance and sustainability of our built environment and, for many, to slow the effects of climate change.

Goal 8: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all

ASTM E2813 and the continuing education and training programs BECx has triggered will continue to offer expanded opportunities for full and productive employment and decent work for all. This is particularly true in the construction sector, where job growth and diversification are often leading indicators of economic growth in both developed and underdeveloped countries. Opportunities to expand your knowledge and advance your career are fundamental to building a better workforce.

Goal 11: Sustainable Cities and Communities: Make cities and human settlements inclusive, safe, resilient and sustainable

As noted above, an appropriately developed and successfully applied and enforced BECx program will, by design, help to achieve more sustainable cities and communities by delivering energy-efficient, environmentally conscious, higher performing buildings. Functional and operational resilience of our built environment are embodied in the performance attributes published in ASTM E2813 for inclusion in the Owner's Project Requirements (OPR).

Goal 12: Responsible Consumption and Production: Ensure sustainable consumption and production patterns

ASTM E2813 and E2947 are included, by reference, in the current U.S. Green Building Council (USGBC) LEED Web-Based Reference Guide and LEED® v.4.1 requirements for Fundamental and Enhanced BECx in new construction. Material sourcing for building enclosure systems and assemblies that is sensitive to both the embodied and operational carbon footprint associated with those materials is fundamental to the mission of USGBC LEED®.

Goal 13: Climate Action: Take urgent action to combat climate change and its impacts

ASTM E2813 and E2947 were developed and published in a span of just 5 years to address an urgent need in: a) how we educate and train design and construction professionals in building science and the physics of building enclosure and whole building performance, and; b) how we can deliver higher performing buildings through an appropriately conceived and responsibly enforced BECx process.

Goal 17: Partnerships for the Goals: Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development

The development, publication and ongoing refinement of ASTM E2813 and E2947 through periodic balloting and the consensus process that is fundamental to the mission of ASTM is, by definition, an opportunity to strengthen the means and revitalize the Global Partnership for Sustainable Development. These standards and the continuing education and certification opportunities they have triggered are global in reach and speak directly to the need for a return to first-principles in sustainable design and the influence of our built environment on climate change.

Please provide any additional information not provided above.

The development and publication of ASTM E2813 and E2947 would not have been possible without the tireless commitment and voluntary contributions of professionals too numerous to list here but absolutely worthy of recognition. An extraordinary challenge involving stakeholders from across the real estate design, development and construction industries and professions, including practicing professionals, industry representatives, tenured professors, and department heads from colleges and universities across North America, the UK and EU. As 'living' documents, both ASTM E2813 and ASTM E2947 have continued to evolve under the leadership of Andrea DelGiudice and Matt Normandeau, the Task Group chairs currently responsible for maintaining those standards.

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Approved submittals must be sent to kkoperna@astm.org and mlynyak@astm.org by **September 23, 2022**.

Please identify the designation and title of the standard

ASTM E399 Standard Test Method for Linear-Elastic Plane-Strain Fracture Toughness of Metallic Materials

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

Throughout the late 19th and first half of the 20th century researchers and engineers realized, after many structural failures resulting in significant economic loss and in some cases loss of life, that cracks or crack-like defects degraded structural strength far below that based on material strength properties. These failures affected many different industries and types of structures including aircraft, ships, bridges, pressure vessels, jet engine turbines, etc. Several famous examples include the WWII Liberty Ships, some of which cracked in half while docked; the first commercial jet aircraft, the de Havilland Comet, two of which exploded mid-flight in 1954 killing all aboard; and pressure vessel structural failures which resulted in multiple deaths and high value destruction. Unfortunately, there were no standardized test methods available to characterize material with cracks that generated a result applicable to structural design. With the emergence of fracture mechanics as a rigorous engineering discipline after World War II (and applicable especially to metallic materials), fracture toughness was identified as a key material property. Intensive research ensued throughout the 1960's with a focus on measuring plane strain fracture toughness as a lower bound material property to be used as a design value. E399 was initiated in the late 1960's and standardized in the early 1970's. The development of E399 happened in parallel with new structural analysis methods to utilize fracture toughness as part of an emerging damage-tolerant design philosophy to account for the presence of a crack in a structure and thus anticipate and prevent failure. E399 was the first ASTM test method standardized to support the new design philosophy and was the foundation for other fracture mechanics-based test methods to follow including E561, E647, E740, E1221, E1457, E1820, E1921, E2472, E2760, E2818, E2899.

Identify the interest groups that participated in the development and/or revision to the standard?

E399 was developed by a diverse group of representatives from universities, national labs and industry including representatives of the steel, aluminum and titanium alloy producers and users, as well as the US Air Force, US Navy, and NASA. Each of these contributors was a key stakeholder, and all saw the potential that fracture toughness material property data could bring to their respective industries and associated applications. One major impetus for E399 development was failures of the wing pivot fitting of USAF F-111 aircraft. Failures of that critical component resulted in the loss of aircraft and led the USAF to move primarily from “safe-life” (stress-life fatigue-based) design and instead mandate “damage tolerance” design for all fracture-critical parts in future military aircraft. The FAA followed with a similar mandate for commercial aircraft and later jet engines. E399 was a key enabler for this new design methodology. Development was not strictly driven by the aerospace industry as parallel developments were taking place to use E399 to demonstrate structural integrity of safety-significant components in the nuclear power, naval ship building, oil and gas, transportation and other industries. E399 has been revised and refined continually over the past half century with contributions from diverse stakeholders to maintain the test method’s relevance.

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

There are multiple uses for data generated using E399. Material producers use E399 in the development and characterization of new metallic materials. Improvements in fracture toughness are highly valued as they can be used to produce safer, tougher, and lighter structures. Once a new material is developed, extensive E399 testing is performed to fully characterize the material and to develop statistically-derived minimum and mean or typical fracture toughness values. The minimum values are often used in material specifications and engineering designs issued by standards development organizations (SDOs) and individual companies. These material specifications and designs typically require E399 testing for lot acceptance ensuring guaranteed levels of fracture toughness and consistency in material or part quality. The minimum and mean fracture toughness values are also widely disseminated in reference books and databases and used by engineers and analyst for structural design in a wide array of industries (some of which are listed in question 2) to anticipate and prevent premature failure of fracture critical structure. One prominent reference is the Metallic Materials Properties Development Standardization (MMPDS) Handbook (maintained by the FAA; formerly MIL-HDBK-5), which contains fracture toughness results for many metallic materials from E399 testing. These minimum and mean toughness data can be used in industries that rely on damage tolerant concepts to assess in-service component performance and remaining service life. In these analyses, E399 is used to evaluate the effects of age-related degradation on fracture performance of service-aged materials. Then, if flaws are found through in-service inspection and testing, this information is used to determine whether the component has sufficient remaining integrity to perform its function over its intended life, or whether repair or replacement is necessary. The E399 test method and other fracture test methods have enabled multiple generations of new materials with improved and guaranteed levels of fracture toughness, thus enabling designers across numerous industries to design structure that is safer, lighter, longer lasting and higher performing than was possible with previous generations of materials.

After the standard was published, has it impacted health and safety? If yes, please explain.

Before fracture mechanics and fracture toughness were introduced into design, significant economic loss and, in several cases, loss of life from structural failures were common for a variety of metallic materials and in a variety of industries. For example, the loss of aircraft by structural failure was not uncommon in the early days of aviation and extending into the jet age as evidenced by the de Havilland Comet and USAF F-111 failures. Another change was to the ASME pressure vessel code which incorporated leak-before-break requirements (which needs a fracture toughness value). Thanks to improved design methodologies for fracture critical structure enabled by E399, and the other fracture mechanics-based test methods that followed, structural failures are exceedingly rare today.

How do consumers and the public benefit from this standard? (If applicable)

Because E399 is widely used and has remained relevant for over half a century, the benefits have been far reaching. The primary benefits are to safety – safer bridges, safer airplanes, safer ships – increased safety in essentially every industry where fracture mechanics is used as part of the design process. The E399 test method also enabled material producers to differentiate their products based on the new fracture toughness performance metric, thus spurring competition and innovation in the marketplace. The innovation benefits the public in a variety of ways, but an example from the aerospace market – a new material with higher fracture toughness enables lower weight airplane structure. That lower weight allows the aircraft to consume less fuel and generate fewer CO₂ emissions while carrying more cargo and passengers or flying longer distances. Another benefit of the damage-tolerance design methodology made possible by E399 and related standards is life extension of engineering structures. “Safe-life” structures have to be retired or replaced when their safe design life is reached. “Damage-tolerant” structures can be economically utilized for far longer with periodic inspections. One example of this is the Aircraft Structural Integrity Program (ASIP) which has allowed aircraft to be used well beyond their original design life. The benefit of life extension to the consumer is reduced cost while maintaining a high level of safety.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

Anecdotally, several of the more “infamous” fatal accidents such as the Comet resulted from failure of fracture-critical structural or jet engine components. More broadly, aircraft safety as measured by fatal accident rates for jet aircraft improved significantly after the introduction of damage-tolerance design enabled by E399 and other fracture mechanics-based test methods. The fatal accident rate of first-generation aircraft with “safe-life” designs was 3.0 per million flights. For second-generation aircraft, which contained a mix of “safe-life” and “damage-tolerant” designs, the fatal accident rate decreased to 0.9 per million flights. After damage-tolerant design was fully implemented, fatal accident rates decreased further to 0.3 per million flights for third-generation and 0.1 per million flights for fourth-generation aircraft [Ref: A Statistical Analysis of Commercial Aviation Accidents 1958-2021, Airbus]. Therefore, over this evolution in aircraft design aided in-part with adopting standard fracture toughness measurement methods, fatal accident rate exhibited a 30-fold decrease. While improvements in many areas (e.g., in-flight control, flight management systems) contributed to these improved failure rates, “damage-tolerance” designs enabled by E399 and other fracture-mechanics based test methods have significantly improved aircraft safety and made structural failures exceedingly rare relative to early aircraft.

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

The use of E399 for mechanical property lot acceptance testing is required by hundreds, if not thousands of material specifications and engineering designs issued by SDOs and individual companies: for example, Aerospace Material Specifications (AMS) issued by SAE, and AIMS and BMS specifications issued by Airbus and Boeing, respectively. In terms of testing volume, use of E399 for lot acceptance testing is second only to use of test method E8 (tensile testing). The damage-tolerance design methodology made possible by E399 and subsequent fracture mechanics-based test methods derived from E399 are required by several design certification standards including JSSG-2006 (formerly MIL-A-83444) issued by the Department of Defense for military aircraft; FAR Part 25.571 for design of commercial and transport aircraft having a maximum take-off gross weight over 12,500 lbs., and FAR Part 33 for certification of jet engines, both issued by the FAA. Virtually the same requirements are also present in the corresponding aircraft certification requirements from EASA (Europe), Canada, China, Brazil and all other countries that are part of the ICAO certification reciprocity agreements.

The Pressure Vessel and Boiler code issued by ASME is used for design and certification by the nuclear industry, and many other industries for the design of pressurized components and similarly includes requirements on fracture toughness testing for fracture critical structure. Fracture mechanics-based evaluations relying on E399-based toughness measurements are also required in 10 CFR Part 50.61, 10 CFR Part 50, Appendix G and ASME Section XI, Appendix G for demonstration that nuclear reactor pressure vessel integrity is adequate over its intended service life. Leak-before-break evaluations (29 CFR 1910, 1915, 1917, 1918, 1926) also rely on E399-based toughness measurements.

The Department of Defense has embraced fracture mechanics with programs like ASIP and Engine Structural Integrity Program (ENSIP) resulting in MIL-STD-1530 and MIL-HDBK- 1783, respectively. JSSG-2006 adopted ENSIP. These programs use the fracture mechanics standards which originated with E399.

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)? (If yes, please identify which one(s) and describe how?)

E399 and the fracture mechanics-based damage-tolerant design methodology that it enabled contribute to Sustainable Development Goals #3 Ensure healthy lives and promote well-being for all at all ages, and #9 Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation. E399 and damage-tolerant designs protect the health, safety, and well-being of all from catastrophic structural failures, which were much more common in the 1st half of the 20th century than after their introduction. They also contribute to air travel, in particular, being more inclusive and economically affordable by greatly improving structural resilience of newer aircraft compared to the first-generation aircraft; thereby extending the economical service life of all aircraft and reducing the number lost to accidents. E399 also guarantees the fracture toughness of many engineering materials while also fostering further innovation in structural materials and designs making structures safer, lighter and longer lasting. Additionally, energy production and transport (e.g., pipelines) have become safer and more efficient, and standards such as E399 have enabled longer nuclear power plant lives, thus contributing to more economic energy production. License extension of nuclear power plants is possible, in part, due to the technical basis provided by fracture mechanics evaluations that rely on E399-based fracture toughness measurements.

E399 contributes to many other Material Substitution programs which largely reduce the product life-cycle cost, improve safety and sustainability. An example is the on-going testing project which is planning to include E399 testing to support a military transport aircraft re-wing program including material substitution (7075 to 7249, safe-life to damage tolerance etc.).

Please provide any additional information not provided above.

Metal fatigue causes more failures than any other mechanism and it is estimated to be responsible for 80-90% of all mechanical failures (ref. Sachs, N. W., [Practical Plant Failure Analysis – A Guide to Understanding Machinery Deterioration and Improving Equipment Reliability](#), CRC Press, 2nd edition, 2020, pp. 81). The K_{Ic} fracture toughness parameter, whose standardized measurement is specified in E399, determines when instability (fracture) occurs for a crack slowly growing in a structure. In a sense, fracture toughness in a cracked component is analogous to ultimate material strength in an uncracked component. The adoption of a standardized test method to measure fracture toughness with the E399 test procedure has enabled development of design codes and methodologies that reduce failure rates and increase safety of widely used mechanical components. These methods would have been of limited utility without the E399 standard that dictates how the critical fracture toughness parameter is measured and thereby eliminates lab-to-lab variability/bias in the generation of this important mechanical property measurement.

Another area impacted by E399 was in space vehicle and missile design. An early example of flaw sensitivity problems in this arena was dramatically demonstrated by Polaris missile case failures. NASA (Glenn) built significant facilities in the 1960's to characterize fracture toughness under cryogenic conditions, to support cryogenic fuel use in liquid propellant rocket engines. In another example, The NASCRAC program was a direct result of work supporting the Space Shuttle Main Engine, and its systems.

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CALL FOR PARTICIPATION!

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Please identify the designation and title of the standard

E466 Standard Practice for Conducting Force Controlled Constant Amplitude Axial Fatigue Tests of Metallic Materials

E606 Standard Practice for Strain-Controlled Fatigue Testing

E399 Standard Test Method for Linear-Elastic Plane-Strain Fracture Toughness of Metallic Materials was published. ASTM Standard

E647 Standard Test Method for Measurement of Fatigue Crack Growth Rates

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

Of the 35+ standardization documents it maintains, ASTM International Committee E08 on Fatigue & Fracture is home to several standards that have become foundational and deeply ingrained into the design and safety of aircraft and aerospace vehicles, ground-based vehicles, nuclear reactors, oil pipelines, wind power, medical devices, as well as many other industries.

As a combination, the four ASTM standards, ASTM E466, E606, E399, and E647 are the quartet that provide the testing methodologies relevant to the critical understanding of material behavior under cyclic conditions and the determination of product safety in the many areas of our daily life. In more specific terms, "durability" refers to the number of cycles required to nucleate a crack in a material undergoing cyclic deformation or forces (i.e., fatigue). "Damage tolerance", on the other hand, refers to the concept that a material already has a crack somewhere, but the design of the structure is such that if the crack isn't yet of a critical size (fracture toughness), it can be tolerated and managed via non-destructive inspection and knowledge of the fatigue crack growth rate.

Identify the interest groups that participated in the development and/or revision to the standard?

As eluded to above, the foundation for these four universal standards was not performed strictly in an “aerospace vacuum”. Parallel research was being done in the nuclear power industry, naval ship building, ground vehicles, medical devices... if the product “moves”, fatigue must be a consideration! As history tells us, sometimes research has advanced more quickly due to necessity and need, and in the cases of ASTM E399 and ASTM E647, military and commercial safety requirements were a driving force that provided the funding for research necessary for the rapid development of such standards.

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

The concept of materials undergoing cyclic deformations and subject to fatigue is not a new phenomenon; rather, the first reference being that of Wilhelm Albert of Germany in 1829 in the study of mining cables. Fatigue was brought to light in the in 1848 in relation to railroad transportation by August Wöhler. Railroad wheels and axels were failing due to material behavior not previously considered in their design or use. As such, methods were developed to determine the fatigue life of these materials when cyclic forces were applied *via* cyclic rotation. For the aerospace industry, the concept of fatigue forces came into consideration during post WWII with the increased desire for air travel and the advent of jet propulsion. With a bit of irony during the 1951 Jimmy Stewart fictional movie “No Highway in the Sky”, his character unknowingly provided an ominous warning regarding dealing with flaws in aircraft structures. In 1952, the deHavilland Comet became the first jet-powered commercial aircraft. But it also became the first jet-powered commercial aircraft to suffer catastrophic in-flight failure due to a combination of cyclic deformations and stress-concentrations at sharp corners of passenger windows. This is the very reason that aircraft windows have rounded corners or are round or oval. Not only did the aerospace/aircraft industry, but many others as mentioned above, realize they needed to better understand material behavior and response under cyclic deformation and force, but testing methodology standards and durability assessment techniques needed to be developed that better represented the type of duty cycle histories being applied. Such duty cycle histories are unique and quite different for each industry and component e.g., railroad cars are different than aerospace vehicles, wind power, ground vehicles, etc. These efforts led to the development and publication of such as ASTM Standards E466 Standard Practice for Conducting Force Controlled Constant Amplitude Axial Fatigue Tests of Metallic Materials and E606 Standard Practice for Strain-Controlled Fatigue Testing in 1972 and 1977, respectively. These two standards are critical for the design of “safe life” structures and components: the guiding principle in crack initiation and design of aircraft, aerospace, automotive, medical devices, etc.. Safe life design means that the component or structure is designed in such a way that it will not fail in a predetermined number of cyclic repetitions. This would not be possible without standardized testing methodologies (i.e., E466 and E606) to understand a material’s response to specific applied stress (force) or strain (deformation) levels within a standard history or duty cycle.

After the standard was published, has it impacted health and safety? If yes, please explain.

At the same time as these two initiation-based standards were being developed, other issues within aerospace, aircraft, ground vehicle, railroad, etc. structural and engine designs, were being encountered. For example, in 1969, the United States Air Force's F-111 aircraft exhibited failures in components due to manufacturing flaws. One prime example occurred in the wing pivot fitting that had been manufactured from a D6AC steel forging. This forging had a manufacturing flaw that resulted in the failure of the component, leading to loss of aircraft. Because non-destructive inspection techniques at the time as well as to the present could not guarantee 100% "flaw-free" materials, the Department of Defense supported the development of ASTM test methodologies and standards that help to determine a material's fracture toughness and fatigue crack growth rate under cyclic conditions. In 1970, ASTM Standard E399 Standard Test Method for Linear-Elastic Plane-Strain Fracture Toughness of Metallic Materials was published. ASTM Standard E647 Standard Test Method for Measurement of Fatigue Crack Growth Rates was released in 1978. These two standards form the backbone for the principle of the Damage Tolerant Design Methodology for metallic as well as other materials and are based in the research of fracture mechanics going back as far as the 1920's as well as research into the fatigue of metals during the 1960's to today.

How do consumers and the public benefit from this standard? (If applicable)

Society is such today that all of us are dependent in some way on aircraft, ground vehicles, medical devices, power generation and transmission, etc. None of these would be as possible or safe without the knowledge and data that are generated per ASTM Standards E466, E606, E399, and E647. These standards are foundational and critical. In fact, very similar ASTM Standards and take-offs have also been developed for asphalts, concretes, polymers, elastomers, and even textiles are being tested employing these basic cyclic fatigue standards now days!

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

This is too hard for me to pull together reasonable numbers but the positive impacts of these standards on society as a whole is enormous. In the US alone the annual new construction value is around 1.5 trillion dollars. A significant portion of this construction involves building on compacted materials. These standards also have impact on transportation efficiency, water storage and distribution, building safety, etc.

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Please identify the designation and title of the standard

E1337 – 19

Standard Test Method for Determining Longitudinal Peak Braking Coefficient (PBC) of Paved Surfaces Using Standard Reference Test Tire.

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

ASTM E1337 was an existing standard that required revision due to the manufacturer stopping production of the 14" Standard Reference Test Tire (SRTT) that was cited in the standard. Since different tires respond differently to the same surface, a change in SRTT is very consequential.

Identify the interest groups that participated in the development and/or revision to the standard?

The tire manufacturer approached the E17 Committee before the tire became obsolete and suggested a 16" SRTT to replace the 14" SRTT. Subcommittee E17.21 formed a work group to investigate the variation in results between the soon-to-be obsolete tire and the suggested replacement tire.

There was extensive testing performed at both the Transportation Research Center (TRC) and Penn State's Larson Transportation Institute (LTI) facilities to collect data with both SRTTs. This testing was performed with the TRC ASTM E274 Locked Wheel Friction Tester. The data collected was analyzed and a correlation between the two tires was established. The correlation equations were included in the 2019 revision of the ASTM E1337 standard. All of this work was done on a volunteer basis.

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

The Peak Brake Coefficient (PBC) test is used to determine the peak coefficient of friction of various surfaces and is referred to by National Highway Traffic Safety Administration (NHTSA) standards to qualify test surfaces for brake tests, etc. The values represent the maximum coefficient of friction of the surface as measured by the tire being used.

After the standard was published, has it impacted health and safety? If yes, please explain.

The SRTT is used by the tire industry to quantify the PBC of the test surfaces used for Tire Traction Testing to determine the traction value for the tires as indicated by the Uniform Tire Quality Grading (UTQG). The data collected by the tire testing for the UTQG values are adjusted based on the response of the SRTT. This was previously being done with the use of the original 14" SRTT; however, is now being done with the replacement 16" SRTT. The continuity of the UTQG is achieved with the change of SRTT. The traction of a tire contributes to the ability of the vehicle operator to safely brake, steer, and maintain control of their vehicle.

How do consumers and the public benefit from this standard? (If applicable)

Consumers may use the UTQG rating to shop for tires and can select the tires with the highest traction value for increased safety.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

Subcommittee E17.21 doesn't have data to support the impact of the standards.

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

NHTSA refers to the E1337 standard in several of their test standards, especially brake standards such as Federal Motor Vehicle Safety Standards (FMVSS) 105, 121, 122, and 135. The test surfaces must have a minimum PBC value for the high coefficient surfaces, and a maximum value for the low coefficient surfaces in order qualify for this testing.

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

I believe the composition of the replacement 16" SRTT is more environmentally friendly than the original 14" tire. This would fall in either the industry, innovation and infrastructure or responsible consumption and production goals. If necessary, the supplier (Michelin Tire) could be contacted for more information.

Please provide any additional information not provided above.

Contact Name: Mike Bilbee

Committee: E17.21

Email Address: BilbeeM@trcpg.com

ASTM Standard Use & Effectiveness Case Study Contest

September 2022

E17 Vehicle Pavement Systems Submission

Please identify the designation and title of the standard

E3266 – Standard Guide for Friction-Limited Aircraft Braking Measurements and Reporting

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

This standard directly addresses the open safety NTSB recommendation A-16-24, which calls for industry collaboration “...to develop procedures that ensure that aircraft based braking ability results can be readily conveyed to and easily interpreted by arriving flight crews, airport operators, air traffic control personnel, and others...” This recommendation originated from a 2005 fatal aircraft accident in MDW airport and was republished after a 2015 runway excursion at LGA airport.

This standard provides the **world’s first** engineering standard for defining aircraft-based braking ability. In doing so, it has been specifically referenced in FAA and Transport Canada regulatory guidance as *the only* standard to be referenced in defining this new capability.

Identify the interest groups that participated in the development and/or revision to the standard?

The initiative for this project originated with as partnership between ASTM and the Society of Aircraft Performance and Operations Engineers (SAPOE). SAPOE acted as a subject matter expert Task Group to the E17.62 Aircraft Friction subcommittee and was comprised of members from Boeing, Airbus, NAVBLUE, the FAA, Alaska Airlines, Delta Air Lines, Southwest Airlines, American Airlines, Aviation Safety Technologies, and Four Winds Aerospace Safety Corp. Review and approval for the standard was provided by a wide range of industry stakeholders to include major airports, pavement testing manufacturers, and academics. The purpose of this collaboration for creation and review of this standard was to take the unique knowledge of large aircraft certification and present it to an audience with experience in pavement friction to achieve the widest possible industry “buy in” and acceptance.

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

Braking action reports are currently reported by flight crews, however, until recently, there has been no connection between the engineering definitions of aircraft performance and the flight crew reporting. E3266 is now being incorporated to close that large gap in risk management.

E3266 has now been incorporated into government regulatory guidance with the Canadian Advisory Circular [700-060 “Braking Action,”](#) as well as draft FAA advisory Circular 91-79B “Aircraft Landing Performance and Runway Excursion Mitigation.” The ASTM standard has fundamentally changed the way aircraft braking action reports are incorporated into the National Airspace System by introducing two new terms based on the ASTM guidance. The Aircraft Braking Action Report (ABAR) and Pilot Braking Action Report (PBAR) will both use E3266 concepts for reporting content, precision, accuracy, and quality assurance.

After the standard was published, has it impacted health and safety? If yes, please explain.

Aircraft have been operating on contaminated runways without a having a sensor to communicate the true condition of the pavement. This lack of information from the aircraft could result in runway excursions. Runway excursions related to unexpectedly poor friction have been a top safety priority for the past 20 years with the FAA, NTSB, EASA, and ICAO.

Since publication, the standard has enabled a process that will significantly reduce this risk. AC 700-060 from Transport Canada is now currently in effect and will greatly increase the confidence of braking action reporting for the winter of 2022-23.

The FAA guidance will be even broader, enabling new technologies in aircraft flight data sensing and analysis to be formally recognized and approved for air carrier operations.

How do consumers and the public benefit from this standard? (If applicable)

Airline passengers' safety is increased since the airline crew will all have the capability to have their aircraft sense and communicate when a runway has become too contaminated to allow a safe landing. In the 2005 MDW overrun, three aircraft landed before the accident aircraft and experienced poor braking. Since discriminating wheel braking forces from all the other decelerating forces of an aircraft can be quite difficult for pilots, this danger was not observed nor reported, resulting in a fatal accident.

New technology such as TCAS (Terminal Collision Avoidance), onboard weather radar, EGPWS (Enhanced Ground Proximity Warning Systems), and Cargo Fire Detection Systems, were all developed due to address dangers that were unseen by the flight crew that resulted in fatal accidents. ASTM E3266 will be the first to address the hidden danger of unexpectedly slippery runways and enables new Aircraft Braking Reporting technologies already

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

In the 2020 ICAO Safety Report, runway excursions were listed as one of the leading accident categories worldwide.

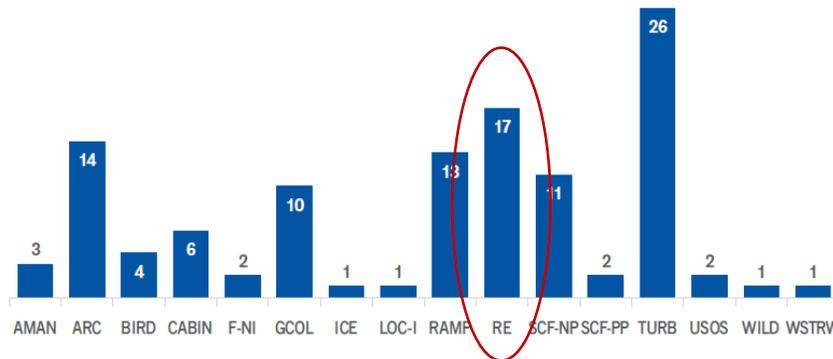


Chart 11. | Accidents overview by occurrence category

As of June 2022, the Flight Safety Foundation lists the total number of runway excursions as 548 with the majority being related to landings by passenger aircraft.

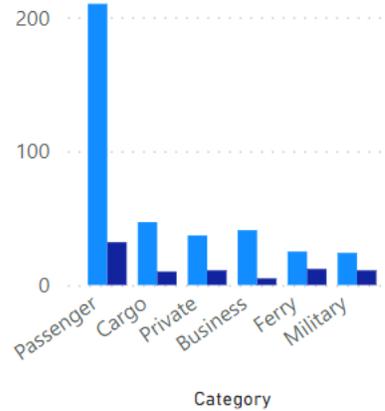
State of Occurrence

All

State of Occurrence	Count of State of Occurrence
USA	118
Brazil	29
Canada	28
Indonesia	28
Russia	21
D.R. Congo	16
India	16
Colombia	14
Mexico	14
Philippines	14
Venezuela	13
South Sudan	12
France	11
Nepal	9
Total	548

RE by Category

Phase Landing Takeoff



The Global Action Plan for the Prevention of Runway Excursions, as validated by CANSO, EASA, IATA, and ACI, lists several recommendations to aircraft operators that address technical solutions, training, and aircraft data solutions to mitigate runway excursion risks. These recommendations are addressed by E3266.

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

As previously stated, ASTM E3266 has been formally adopted by the Canadian Government in [AC 700-060](#), Braking Action Reports.

ASTM E3266 will be formally adopted by the FAA in AC 91-79B, Aircraft Landing Performance and Runway Excursion Mitigation. This AC was formally submitted in March 2022 and is undergoing formal review by AFS-800.

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?



BUILD RESILIENT INFRASTRUCTURE, PROMOTE INCLUSIVE AND SUSTAINABLE INDUSTRIALIZATION AND FOSTER INNOVATION

As referenced, the airline industry is still challenged to recoup catastrophic losses since the pandemic. Enabling a higher degree of Operational Risk Management will be critical to ensuring financial resilience especially as climate change produces more severe weather and harsher runway conditions. The ability to use aircraft data to enable braking action sensing brings with it the possibility for new flight crew alerting capabilities, new sensing technology, and enhanced communications capabilities such as the integration of Electronic Flight Bags.

17

Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development

Aviation has always involved a high degree of global partnerships. The technical working group and subsequent regulatory guidance involved a collaborative effort to include France, Canada, and the United States. Future implementation of ASTM guidance is expected to include ICAO participation as well as EASA regulatory acceptance.

The future of aviation is being defined by noise pollution, carbon footprints, and urban housing constraints. As the constraints for commercial lift become tighter, so too must the ability of aircraft operators to sense, measure, define, and manage risk. ASTM E3266 provides a world leading path towards all weather runway operations with clearly defined parameters and engineering methods that connect certification standards to operational observations.

To accommodate the truly global nature of aviation, these capabilities have and will continue to foster global partnerships and collaboration in technical development and safety analysis.

Please provide any additional information not provided above.

Further information about Safety Management Systems, Safety Assurance processes, human factors considerations, regulatory approval processes, and safety analysis initiatives can be found by addressing the contact person listed below.

Contact Name: Capt. John Gadzinski FRAeS

Committee: E17.62 Aircraft Friction

Email Address: John@FourWindsSafety.com

ASTM Standard Use & Effectiveness Case Study Contest

As ASTM International prepares to celebrate its 125th Anniversary in 2023, we want to recognize the tremendous work of our volunteer members by recognizing ASTM standards that are broadly used and proven effective by industry.

The contest will be based on written submissions reviewed and selected by a collection of ASTM Board Members. Multiple submissions from a variety of industry segments will be selected. The winning submissions will be featured as part of our 125th anniversary celebration, and include recognition by the ASTM President, on social media channels, and at our anniversary celebration event. As an additional incentive for participation, ASTM International will deposit \$1,250 into each of the winning committees' funds to be used as desired.

To participate, please notify your staff manager and complete the below form in its entirety (6 page maximum).

Final submissions must be approved by Executive Committees (limit 3 per committee) prior to submittal.

Approved submittals must be sent to kkoperna@astm.org and mlynyak@astm.org by **September 23, 2022**.

Please identify the designation and title of the standard

E1958 Standard Guide for Sensory Claim Substantiation

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

The 1946 Lanham Act required that advertisements be truthful, not misleading, and where possible, backed by scientific evidence. No consensus-based document specifying best scientific practices for product claims testing existed for decades after the Lanham Act. Without a consensus on best practices, businesses relied on prior legal case studies, television network requirements, and a Federal Judicial Center Manual for Complex Litigation, but the criteria were vague and/or inconsistent, allowing very different practices. Additionally, these source materials were written from a business and legal perspective, rather than a scientific one. In the early 1990s, the National Advertising Division (NAD) of the Councils of Better Business Bureaus, approached ASTM Committee E18 to develop scientific recommended practices for consumer product claims substantiation. In 1998, ASTM Committee E18 delivered a consensus document specifying best practices product testers must follow to support advertising claims for products.

Identify the interest groups that participated in the development and/or revision to the standard?

E1958 was developed by Committee E18 (Sensory Evaluation). This first-of-its-kind document is written from a scientific perspective by professionals in the field of product evaluation research. Scientists and statisticians from the consumer products industry, academia, and government are the core contributors to this living document, with ongoing input and requests from marketing, legal and business areas. The international community of sensory and consumer product testing professionals were and are also interested in the development of sound scientific practices needed for claims, given their regulatory and advertising requirements.

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

The Standard Guide for Sensory Claim Substantiation is used globally by the consumer goods industry to design, execute, and analyze sensory and consumer research to support product advertising claims. The best practices outlined in the document levels the playing field for advertisers and challengers. It also gives guidance to those mediating claims disputes. It provides best practice guidance for recruiting and testing representative consumers, testing with consumers and laboratory panels, developing questionnaires and instructions, selecting and handling products, fielding research and collecting data, analyzing data statistically, and developing and retaining scientific documentation. It is used for both the design of claims studies and the defense of sensory claims. In addition to consumer product companies, E1958 is an important resource for advertisers, advertising review boards, the legal community, and regulatory boards both nationally and internationally.

After the standard was published, has it impacted health and safety? If yes, please explain.

How do consumers and the public benefit from this standard? (If applicable)

When consumers see or hear an advertisement, whether it's on the internet, radio, or television, or anywhere else, U.S. federal law says that an ad must be truthful, not misleading, and, where appropriate, backed by scientific evidence. E1958 provides scientific guidance for robust development of data to support claims.

When claims are disputed in the US, and the NAD mediates, there is publicity about the claim dispute and final decision. The public can be reassured that there are constraints on what companies can say about their products, and know that there needs to be scientific support for advertising messages.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

E1958 supports the development of sound, scientifically robust, data for sensory claims substantiation. Truthful information on consumer product properties and performance help consumers purchase products every day.

The specific scientific guidelines on what is required in claims support product testing has reduced the number of claims companies make if their testing does not clearly meet these requirements. In addition, the NAD routinely cites E1958 principles in their case reviews, making their review and final disposition of cases more efficient.

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.

E1958 is used globally by corporations to design, execute, and analyze data to support product sensory and consumer claims. Following the 1998 publication of E1958, countries with developed markets and substantial advertising about product attributes, benefits, and performance, began to use the E1958 guidance. For example, Canada's 2014 guide to advertising, Germany's DIN 10977 document on advertising claims support draw heavily from E1958. ISO 20784 claims document (2021), keeps the E1958 core principles, and is complementary. ISO 20784 has expanded guidance on some topics (e.g., parity claims), and keeps the key principles of E1958 (e.g., classification of claims, stating the claim in advance of collecting data, test requirements for preference claims, etc.). The adoption of the core content by global product testing, advertising, and regulatory communities demonstrates the need for this document and the acceptance of the guidance globally. E1958 is a go-to document for the NAD of the Council of Better Business Bureaus for self-regulation by consumer product companies in the United States.

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

"Goal 16: Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels."

E1958 contributes to accountable institutions by providing science based best practices for supporting advertising claims. These guidelines help assure advertised product claims are truthful and appropriate.

Please provide any additional information not provided above.

E1958 is, and has been, a top selling ASTM E18 Standard Guide for decades. Purchasers come from a wide range of backgrounds, from sensory professionals in industry, the legal profession, state and federal regulatory agencies, sensory service providers, and consultancies. Having the E1958 Standard Guide for Sensory Claim Substantiation purchased and used by such a broad audience extends the reach of ASTM as an organization and highlights the value of standards.

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Committee: E18

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Please identify the designation and title of the standard

ASTM E3093-20 Standard Guide for Structured Small Group Product Evaluations

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

The development of this Standard was initiated by longtime ASTM member Christine Van Dongen. She and Lori Rothman, became co-chairs of the task group to develop the Standard Guide. This Guide addresses the issue of how to conduct a team review of sensory characteristics of products. While the focus of the Standard is on food products, the Guide also can be utilized for non-food products and includes both food and non-food examples.

Christine and I have worked in the food industry for many years, and have observed the negative impact of unstructured, unfocused and biased team evaluations. Thus, we decided to create a best practice document to minimize the incidence of such product evaluations.

Identify the interest groups that participated in the development and/or revision to the standard?

We had a wide variety of participants among the many members of ASTM E-18, who worked towards developing the Standard. ASTM members employed at companies of all sizes contributed to the content and shaped the final document via ballot revisions. The respective companies now have this Standard's guidance to make their small group evaluation results more scientifically robust and relevant to the decision that needs to be made.

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

Food and other consumer product companies use this Standard when they need to evaluate a product or products with a small group of people, either to make a decision about the product(s) or to develop shared knowledge regarding the product(s). Examples include:

- a company needs to evaluate the effects of changing raw materials due to cost or availability limits on a product's sensory properties
- a company needs an early indication of the effects of changing manufacturing equipment or location on the sensory attributes of a product
- a company needs to review products in response to consumer complaints or comments found on social media
- a company needs to select products among a larger set for further testing or future development

After the standard was published, has it impacted health and safety? If yes, please explain.

No

How do consumers and the public benefit from this standard? (If applicable)

Consumers benefit from this Standard in that product reviews can be conducted without bias, which will result in more robust discussions; this greater diversity of opinions will lead to the development of more consumer preferred products. Before the Standard was developed, those in power or with more product knowledge could have undue influence in decisions concerning the development of products. Since this Standard Guide was introduced, products are evaluated without bias, and no one individual has more influence on the outcome compared to the rest of the group. Therefore, responses from a diverse group of people contribute to the decision-making process. Small group evaluations previously had been unstructured and unfocused and did not leverage best practices in obtaining feedback from participants. This Standard employs the scientific method and brings objectivity to these activities.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

Following the publication of this Standard Guide, there was an immediate need to disseminate this information. In 2020, L. Rothman presented a webinar on Team Tastings at the national meeting of the Research Chefs Association (RCA), a community of Culinologists that blend Culinary Arts with Food Science, using the principles of this Standard Guide. In July 2021, The Institute of Food Technologists (IFT), a professional organization that supports Food Science and Technology, ran a workshop on team tasting at their national meeting, again using the principles of this Standard Guide. The Society for Sensory Professionals (SSP), in conjunction with ASTM International, will hold a workshop in November 2022 on how this Standard is currently being used. C. Van Dongen and L. Rothman will participate, with the latter sharing case studies that illustrate how she frequently uses the Standard with clients in her consulting practice. Lisa Beck and Stella Salisu, ASTM International E-18 members, are leading the workshop.

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

No

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

Goal 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.

Use of this Standard Guide promotes innovation by providing a process for capturing product feedback from a wide range of participants and making product decisions more efficient and robust.

Goal 12: Ensure sustainable consumption and production patterns

Encouraging sound Sensory Science at any level is a sustainable goal. This Standard addresses Goal 12 by improving Sensory practices, such as appropriate team tasting methods to ensure selection of products based on objective, pre-selected criteria rather than personal preferences and agendas.

Please provide any additional information not provided above.

This is a very practical Standard. In place of participants standing around a workspace, evaluating products with no structure or focus, this Guide provides a step-by-step process, which adds structure and focus to these evaluations. The author often uses this Guide with skits to show the differences between 'Before using the standard' and 'After using the standard' when conducting or participating in a team product evaluation. Below are a Before skit (skit 1) and After skit (skit 2), along with a training guide that incorporates all the aspects of the document. The items below will be presented at the November ASTM/SSP joint workshop.



Skit 1 for ASTM
SSP.docx



Skit 2 for ASTM
SSP.docx



Team Tasting
Training for SSP.pptx

Contact Name: Lori Rothman

Committee: E-18

Email Address: lorirothmanconsulting@gmail.com

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Please identify the designation and title of the standard

ASTM E2847 Standard Test Method for Calibration and Accuracy Verification of Wideband Infrared Thermometers

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

In November 2008, at the ASTM E20.02 Subcommittee meeting, there was a brainstorming of ideas for new standards for radiation thermometry. Dean Ripple of NIST spoke of the need for more accurate and informed measurements to be made with handheld infrared thermometers, first with use in the field, and second with calibration of these devices.

Indeed, this had been a problem for many years. A lot of work had been done to develop the optics with these systems and the electronics behind the measurements. What was lacking was an informed user community. There were a lot of errors made by users due to a lack of understanding and by improperly performed calibrations. First and foremost was a lack of understanding concerning emissivity, both by users in the field and also calibration laboratories. There were a number of other topics that were causing error in measurements as well.

For its roadmap, E20.02, led by subcommittee chair Frank Liebmann, prioritized two new standards to be developed. The first one was E2758 (Standard Guide for Selection and Use of Wideband, Low Temperature Infrared Thermometers) which was initially approved in 2010. It addressed the concerns of measurement error in the field. The second was E2847 (Standard Test Method for Calibration and Accuracy Verification of Wideband Infrared Thermometers) which was initially approved in 2012.

Identify the interest groups that participated in the development and/or revision to the standard?

Fluke Calibration (American Fork, Utah) with the old Raytek business in Santa Cruz, California

Significant feedback was provided by Peter Saunders of measurement Science Laboratory which is the national metrological institute of New Zealand

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

This standard is used by calibration laboratories and end users of infrared thermometers and thermal imagers for both calibration and accuracy verification of these instruments. This is a developed procedure that laboratories do not have to create on their own. This means they are able to provide an accurate temperature reading to their customers based on a published standard.

The developer of this standard used to receive many questions from customers about calibration of infrared thermometers. There was much doubt in many of these questions, and even when given an answer, many people in the calibration business still felt uneasy. 10 years after the release of this standard, the developer no longer receives this nature of question. Instead, he receives an occasional question on calibrating a specific model of IR thermometer or how to calculate an uncertainty.

The developer has also seen evidence of the impact of E2847 from laboratories. He has seen its use personally in a calibration laboratory in Chile. He has seen it referenced on a certificate of calibration from a laboratory in Colombia. And he has spoken with many laboratories in the United States who use this standard in their own calibration processes and are happy because it is 'all there', in other words, they are not having to guess on how to do a calibration.

After the standard was published, has it impacted health and safety? If yes, please explain.

Yes. Before COVID 19, there always were infrared thermometers used for fever detection. COVID 19 saw many more of these devices deployed to the community. This means that these devices measure temperatures that may have an impact on the spread of disease, and even life or death.

In addition, COVID 19 saw the deployment of elevated temperature systems (ETS) to detect fever by thermal imaging. These systems use a thermal imager which is calibrated in-situ by a thermal radiation source, when following the recommendations within IEC 80601-2-59:2017 and ISO/TR 13154. To properly do this type of in-situ calibration, the principles in E2847 must be followed.

How do consumers and the public benefit from this standard? (If applicable)

The public benefits from this standard because they can now have increased confidence in the measurements of infrared thermometers. This is more than a perceived sense of trust, since the improved calibrations increase safety due to better measurements of temperature.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

A list of selected citations:

Vitor F. Paes, Barbara A. Mueller, Pedro B. Costa, Rafael A. M. Ferreira, Matheus P. Porto, Calibration uncertainty of MEMS thermopile imagers for quantitative temperature measurement, *Infrared Physics & Technology*, Volume 120, 2022, 103978, ISSN 1350-4495, <https://doi.org/10.1016/j.infrared.2021.103978>.

Singh, R., Dureja, J.S. & Dogra, M. Performance evaluation of textured carbide tools under environment-friendly minimum quantity lubrication turning strategies. *J Braz. Soc. Mech. Sci. Eng.* 41, 87 (2019). <https://doi.org/10.1007/s40430-019-1586-1>

Sam Boles, Igor Pušnik, Dubhaltach Mac Lochlainn, David Fleming, Izabela Naydenova, Suzanne Martin, Development and characterisation of a bath-based vertical blackbody cavity calibration source for the range -30°C to 150°C, *Measurement*, Volume 106, 2017, Pages 121-127, ISSN 0263- 2241, <https://doi.org/10.1016/j.measurement.2017.03.023>.

B Lane, E Whitenton, V Madhavan and A Donmez, Uncertainty of temperature measurements by infrared thermography for metal cutting applications, *Metrologia* 50, 6, 2013, <https://doi.org/10.1088/0026-1394/50/6/637>.

Melda PATAN ALPER, Ahmet T. İNCE, Maria AIORDACHIOAIEI, Radyasyon (IR) Termometrelerin Kalibrasyonunda Ölçüm Belirsizliği Tahmini, *Porc. Ölçümbilim Sempozyumu ve Sergisi*, 2019.

Víctor Aranda, Silvia Medrano, Determinación De Emisividad Efectiva De Calibradores De Temperatura De Radiancia Por Método Indirecto, *Proc. Simposio de Metrología* 2016.

Eneko Setien, Rafael López-Martín, Loreto Valenzuela, Methodology for partial vacuum pressure and heat losses analysis of parabolic troughs receivers by infrared radiometry, *Infrared Physics & Technology*, Volume 98, 2019, Pages 341-353, ISSN 1350-4495, <https://doi.org/10.1016/j.infrared.2019.02.011>.

Matthew F. Schmidt, Frank Liebmann, Max Menenberg, Syed M. Rahman, Thomas A. Holz, Pete Bergstrom, Jeff Gust, Testing and performance standards for elevated skin temperature (EST) screening systems using infrared cameras, *Proceedings Volume 11741, Infrared Technology and Applications XLVII*; 1174117 (2021), <https://doi.org/10.1117/12.2589024>

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

ANAB, TR 2508, Technical Accreditation Requirements: Estimation of Uncertainty for Calibration of Wideband Infrared Thermometers

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

3. Good Health and Well-Being: This standard improves both food safety and human body temperature measurement accuracy. In addition to human body temperature screening already mentioned, infrared thermometers are used at variety of stages for processing a wide range of food products, including during packaging to help ensure food quality and safety. Grocery stores utilize portable infrared thermometers for checking refrigerated and frozen stored food as well as checking hot prepared food. During the 2012 Peanut Salmonella outbreak, infrared thermometers were installed at the exit of peanut roasters to ensure a high enough temperature was achieved for killing off bacteria.

7. Affordable and Clean Energy: This standard is used for instruments in the electrical generation and transmission markets for the measurement of electrical connections & terminations, bus-bars, transformers, sub-stations etc. In the photovoltaic solar panel industry, infrared thermometers are used in the fabrication process of the panels and to inspect the performance & function of panels installed in the field.

9. Industry, Innovation, and Infrastructure: As temperature is one of the most measured quantities in industry, it is also very often used in science. This standard provides a means to make more accurate temperature measurements which will result in less waste, higher quality, increased productivity, improved safety, and better understanding of our environment. In addition to an extremely broad range of products and materials which are manufactured in factories, infrared thermometers are also applied to winter roadway maintenance vehicles for optimizing de-icing and anti-icing operations and to related fixed-in-place 'RWIS' roadway information systems. Infrared thermometers are also utilized by atmospheric and ocean scientists for a better understanding of climate change and weather forecasting.

Please provide any additional information not provided above.

Contact Name: Frank Liebmann

Committee: E20 Temperature Measurement

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Please identify the designation and title of the standard

E11-22 Standard Specification for Woven Wire Test Sieve Cloth and Test Sieves

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

Originally published in 1925, E11 was created to define standard opening designations and tolerances for sieve cloth used for sizing particles. At the time, the arbitrary use of mesh count had been used to identify sieve designations and depending on the manufacturer, opening size was not consistent. By defining the nominal opening sizes and tolerances on the average opening and maximum opening, and the nominal wire diameter and range of permissible wire diameters, users were guaranteed that sieves purchased to a specific opening specification or U.S. Standard Sieve Series Number would have comparable openings. Accordingly, results from sieve analysis using E11 Test Sieves would be comparable.

Also at the time, there was no standard size or acceptance criteria for test sieve frames. The 1925 document defined what would become today's standard Test Sieve frame using the following characteristics; the diameter was defined at 8" and the acceptable heights of the test sieves were set at full height (2") and half high (1"). The new Specification discussed physical requirements for acceptable materials used and weave types for sieve cloth opening sizes. Further, even permissible variation on construction, acceptable methods of inspection, and acceptable marking of test sieves was discussed.

Identify the interest groups that participated in the development and/or revision to the standard?

The members of E29.01 Task Group for E11 are a balance of sieve manufacturers, weavers of industrial wire cloth, users of sieves (including representatives of the Unified Abrasive Manufacturers Association) and others with a general interest in particle measurement.

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

E11 is used both to establish purchasing designations and to establish tolerances, as the uniform size of sieved particles is often very critical.

The standard definition of a Test Sieve frame is very important so that Test Sieves from various manufacturers fit and work together.

After the standard was published, has it impacted health and safety? If yes, please explain.

E11 has impacted health and safety in numerous industries, including for example, pharmaceutical powders providing the proper dose of medicine, aggregate sands providing the proper concrete structures, and aviation metals stress relieved using properly sized shot peens.

How do consumers and the public benefit from this standard? (If applicable)

Consumers and the public benefit from this standard because it ensures that Test Sieves manufactured to comply with this standard will yield comparable sieving, resulting in consistency of final products.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

The DOT references E11 for road construction, and likely the FDA as well.

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)? (If yes, please identify which one(s) and describe how?)

Not Applicable.

Please provide any additional information not provided above.

The development of the current tolerances for the maximum standard deviation of the openings in sieve cloth was a significant effort. The statistical approach is based on a truncated normal Gaussian distribution curve with K-factors used to increase the acceptance confidence level. Various consultants in academia provided support and verification of the methodology used.

Contact Name: Richard Campbell

Committee: E29

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Please identify the designation and title of the standard

E1618: [Standard Test Method for Ignitable Liquid Residues in Extracts from Fire Debris Samples by Gas Chromatography-Mass Spectrometry](#)

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

Forensic science bridges the legal and scientific communities. As a result, the scientific evidence presented in court, and expert witnesses who testify to the science, must meet legal statutes which demonstrate the methods used have been thoroughly validated. One way forensic science meets these requirements is to use well-rounded and scientifically validated methods which have been developed using input from multiple stakeholders through a consensus process.

This standard addresses how laboratories analyze fire debris evidence for use in criminal and civil litigation cases. The standard was initiated by members of E30 to address concerns of the forensic fire debris analysis community of inadequate and often incorrect interpretation of analytical results by unaccredited laboratories. Widely accepted as the only recognized standard in fire debris analysis to be published by an SDO, it has become the standard for which all forensic laboratories performing fire debris analysis rely upon for classification and interpretation of ignitable liquid residues recovered from fire debris evidence and liquid samples.

Identify the interest groups that participated in the development and/or revision to the standard?

It was developed in 1997 and periodically revised with input from a broad audience within the forensic community to include numerous chemist practitioners performing forensic analysis of fire debris from the private sector, as well as local, state, and Federal forensic laboratories, law enforcement agencies and fire departments, insurance companies, the legal community, National Fire Protection Association, International Association of Arson Investigators, and the Organization of Scientific Area Committees (OSAC). The standard has had a significant impact for the fire investigation community by providing a method for classifying and interpreting ignitable liquid residues recovered from evidence collected at fire scenes and has, and will continue to, involve a comprehensive level of forensic community involvement and expertise to ensure it is meeting the most current industry standards of quality.

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

This test method is widely used by laboratories performing fire debris analysis, both within and outside the USA. This standard is used as a benchmark in courts for the appropriate analysis of ignitable liquid residues in fire debris cases. Laboratories use either E1618 or a slightly modified version with appropriate validation and verification which must be justifiable in a civil or criminal court.

After the standard was published, has it impacted health and safety? If yes, please explain.

This standard does not directly affect health or safety issues.

How do consumers and the public benefit from this standard? (If applicable)

This standard became the benchmark of quality and best practice for the analysis and interpretation of results in fire debris analysis for civil and criminal litigations. Fire investigators were provided additional evidence for use in a case investigation, in the form of credible and reliable data of the use of flammable and combustible liquids, or accelerants, used by perpetrators to commit arson.

This test method provides a consistent bar for which laboratories performing ignitable liquid analysis in a forensic setting must attain. It offers the basics of instrument performance criteria, quality assurance parameters, and data interpretation using methods designed to reduce interferences from complex samples. The consistency established by the standard helps the stakeholders such as juries, judges, officers of the court, criminal and civil just systems, and general members of the public, have better confidence in the results presented in court or used within the legal setting.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

The importance of the standard within the fire debris community is so ubiquitous that it is specifically mentioned in the proficiency testing instructions in the largest proficiency test provider for US forensic laboratories (Collaborative Testing Services). A copy of the summary of the results from the 2021 test is included below (instructions are at the end of the document)

https://cts-forensics.com/reports/21-5436_Web.pdf

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

Currently there is not a mandate for US laboratories to use E1618. However, future revisions to the standard will be adopted by OSAC for inclusion on their Registry. At that time, federal forensic laboratories will be required to adhere to the standard.

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

Peace, Justice, and Strong Institutions

All E30 standards are designed to test samples which could become involved in a criminal or civil litigation. Fire debris involves complex samples where analysts must determine if there is an ignitable liquid residue present amid heavily burned materials. This standard provides this guidance and is suitable for use with most extractions performed. Cases have a constitutional right to be reviewed or re-examined by another person or laboratory. In such instances, one of the main measures is if it can meet E1618 requirements for a positive identification or would it have met the version which was in use at the time of testing. When looking at data during a re-examination, E1618 is the consensus established best practice used to determine if appropriate testing and interpretation was performed.

Please provide any additional information not provided above.

Contact Name: Laura Hernandez

Committee: E30

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Please identify the designation and title of the standard

Designation: E2329-17 Standard Practice for Identification of Seized Drugs

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

Forensic scientists who offer expert witness testimony in court must meet legal standards in order for that testimony to be accepted. A key legal standard for this type of testimony is that there are scientific standards which attach to the practice that is the subject of the testimony. ASTM E2329-17 represents the most critical standard for the practice of seized drug analysis, wherein an expert assesses which analytical techniques to utilize and combine to create their analytical scheme, that provides reliable and scientifically supported identifications. In the absence of this standard, there would be no minimum criteria for the qualitative analysis of seized drugs. This standard was originally initiated at the Scientific Working Group for the Analysis of Seized Drugs (SWGDRUG) and then went through further refinement and development at the Organization for Scientific Area Committees (OSAC) for Forensic Science. The standard was developed to identify the minimum requirements to determine which combination of analytical techniques best satisfy the needs of the laboratory's jurisdiction.

Identify the interest groups that participated in the development and/or revision to the standard?

ASTM E30.01, Organization of Scientific Area Committees (OSAC) for Forensic Science.

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

This standard is the primary methodology used in qualitative analysis of seized drug evidence. The standard classifies techniques into three categories based on their maximum potential discriminating power and sets the minimum criteria for practitioners to employ during testing of seized drug evidence, in order to conduct sufficient testing that scientifically support their identifications.

In seized drug analysis, laboratories may have limited instrumentation capability and limited validated methods. This standard tells practitioners which combination of techniques (that operate with different principles) to utilize to provide reliable qualitative results. In addition, correct drug or chemical identifications depend on quality assurance measures applied during the analysis (e.g., analysis of two or more separate portions of test material, the use of reference materials, the use of positive and negative controls). This standard sets those requirements to ensure that the chosen analytical scheme demonstrates the identity of the drug present, while minimizing false positive and false negative identifications.

After the standard was published, has it impacted health and safety? If yes, please explain.

No

How do consumers and the public benefit from this standard? (If applicable)

This standard provides the minimum criteria to be used in the qualitative analysis of seized drug evidence, which aids in consistency in the practice of this discipline. It helps the practitioners determine which analytical techniques to combine in order to provide reliable and scientifically sound identifications. Such consistency of practice means that the consumers of forensic seized drug qualitative analysis – juries, judges, officers of the court, the criminal justice system and the public – can be confident in the results provided in criminal and civil litigation.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

No.

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

It has been posted to the OSAC Registry and has been formally implemented into the policies and procedures of sixty-nine (69) agencies. This represents just a small number of the groups that have adopted the standard. Additionally, hundreds of seized drug examiners all over the world have instituted this standard into their workflow.

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

No.

Please provide any additional information not provided above.

Contact Name: Ronald Kelly
Committee: E30.01 (Criminalistics)
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Please identify the designation and title of the standard

Designation: E3149 – 18 Standard Guide for Facial Image Comparison Feature List for Morphological Analysis

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

Forensic scientists who offer expert witness testimony in court must meet legal standards in order for that testimony to be accepted. A key legal standard for this type of testimony is that there are scientific standards which attach to the practice that is the subject of the testimony. ASTM E3149-18 represents the most critical standard for the practice of facial comparison analysis, wherein an expert assesses whether two images depict the same or different people, using the morphological analysis approach. In the absence of this standard, this type of expert witness testimony might be excluded. This standard was originally initiated at the Facial Identification Scientific Working Group (FISWG) and then went through further refinement and development at the Organization for Scientific Area Committees (OSAC) for Forensic Science. The standard was developed to identify all features of the face that should be compared when visible in the comparison and to standardize/provide consistency in the features that are being used by all practitioners in the Facial Identification discipline. It lists the main facial components (e.g., eyes, ears, nose, mouth), the component characteristics (e.g., lobe of the ear, nostrils of the nose), and the characteristic descriptors (e.g., symmetry of the lips, shape of the jawline).

Identify the interest groups that participated in the development and/or revision to the standard?

ASTM E30.12, Facial Identification Scientific Working Group (FISWG), Organization of Scientific Area Committees (OSAC) for Forensic Science, the International Association for Identification (IAI), and American Academy of Forensic Science (AAFS).

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

This standard is the primary methodology used in all levels of facial comparisons (assessment – image-to-image or image-to-person typically conducted in a high throughput environment, review – image-to-image often used in either investigative and operational leads or intelligence gathering applications, or examination – image(s)-to-image(s) often used in a forensic application). The multi-level list of facial features which aids the practitioner to conduct a step-by-step comparison with the degree of scrutiny that is appropriate to the level of comparison being conducted. In a facial assessment, the practitioners may have a time limit which allows them to only review some of the facial components only. In a facial review, the practitioner typically has more time than the assessment comparison and should be able to review all facial components, most of the component characteristics, and possibly some of the characteristic descriptors. In a facial examination, the practitioner should be able to review all facial components, all component characteristics, and all characteristic descriptors that are visible in the comparison.

After the standard was published, has it impacted health and safety? If yes, please explain.

No

How do consumers and the public benefit from this standard? (If applicable)

This standard provides a standard list of facial features to compare in a facial comparison which aids in consistency in the practice of this discipline. Like the friction ridge minutiae of ending ridges, bifurcations, and dots, it helps the practitioners to be able to compare the same features in the same way. Such consistency of practice means that the consumers of forensic facial comparison analysis – juries, judges, officers of the court, the criminal justice system and the public – can be confident in the results provided in criminal and civil litigation.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

No.

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

It has been posted to the OSAC Registry and while it has only been formally implemented into the policies and procedures of four (4) agencies, the number of individual practitioners around the world who use this as a reference is in the 100s.

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

No.

Please provide any additional information not provided above.

This standard is serving as the foundation for a series of standards that will address the topic of forensic facial comparison. While this standard describes the list of features used in a comparison, additional standards in provide practitioners with guidance on how to use these features to establish a foundation for the conclusions they reach, including guidance on how to mitigate issues related to such factors as image quality and subject aging.

Contact Name: Lora Sims

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Please identify the designation and title of the standard

E1053-20 Standard Practice to Assess Virucidal Activity of Chemicals Intended for Disinfection of Inanimate, Nonporous Environmental Surfaces

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

The method was published in 1985 to likely meet a need to standardize virucidal disinfection testing to allow a consistent measure of the efficacy of disinfectants, sterilants, etc. to inactivate dried viruses on hard, non-porous surfaces for the purposes of US EPA and FDA registration. The method may have also helped industry move away from using live animal models (e.g. chimpanzees for Hepatitis B virus claims, mice and chicks for other viruses). The EPA 1981 and 1986 product performance guidelines for viral testing did not identify a standardized method. Though EPA accepted the method earlier, it was formally incorporated into the EPA registration requirements in 810.2200 in 2012 and remains today. It has also been incorporated into Health Canada registration

Identify the interest groups that participated in the development and/or revision to the standard?

Though the history does not seem to have been recorded in 1985, we expect all members of the ASTM E35.15 committee participated. Today, we are working on an extensive revision of the method. Element, a contract laboratory, is leading the effort with significant input from the EPA Microbiology Laboratory, EPA registration staff from the Office of Pesticide Programs Antimicrobial Division Efficacy Branch and about 35 members of the E35.15 committee.

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

This standard is used throughout the world by regulatory authorities to support the registration of virucidal disinfection claims. The method has been adopted by US EPA: <https://www.epa.gov/test-guidelines-pesticides-and-toxic-substances/series-810-product-performance-test-guidelines>, Health Canada: <https://adicq.qc.ca/resources/Documents/2-%20Safety%20and%20Efficacy%20Requirements%20for%20Surface%20Disinfectant%20Drugs.pdf>, and Australia: https://www.tga.gov.au/sites/default/files/tga-instructions-disinfectant-testing_0.pdf, for example. Many other jurisdictions also accept E1053 to support viral disinfection claims. There are thousands of registered disinfectants in the US and most will contain viral label claims based on this method. A specific example is Lysol Disinfectant, EPA Registration No. 777-99, where all 36 viral claims on the label are supported by E1053 (https://www3.epa.gov/pesticides/chem_search/ppls/000777-00099-20220228.pdf).

After the standard was published, has it impacted health and safety? If yes, please explain.

The published standard immediately became the favored method by labs, registrants, and regulatory agencies as a standard method to measure product effectiveness against viruses. This method likely supports all the US virucidal disinfection claims on product labels today. It has most recently been used by EPA, Health Canada, and other countries to support the international response to the SARS-CoV-2 pandemic (<https://www.epa.gov/newsreleases/epas-list-approved-sars-cov-2-surface-disinfectant-products-passes-500>). The method has been used by Registrants to test and add claims to product labels so users can protect themselves from the virus. These products play a critical role in public health to interrupt transmission of viruses in residential, healthcare, and institutional settings. Today, the Monkeypox virus is being adapted to E1053 to assure efficacy/attain EPA label claims to respond to this emerging viral public health outbreak. This method is the foundation in North America and internationally to address emerging viruses as they appear and assess products for their ability to reduce transmission.

How do consumers and the public benefit from this standard? (If applicable)

This method supports viral claims on products the public uses. It provides confidence products have met the regulatory standard of effectiveness to make such claims. These products are recommended by CDC, WHO, etc. to respond to viral public health outbreaks (<https://www.cdc.gov/infectioncontrol/guidelines/disinfection/recommendations.html>). Viral Disinfectants tested by E1053 are instrumental in reducing nosocomial infections in healthcare institutions, cold and flu in schools, viral foodborne illness in restaurants and food manufacturing. The use of this method to test SARS-CoV-2 and variants has been vital to the world's response to the COVID pandemic and will be for future emerging pathogens (<https://www.epa.gov/coronavirus/disinfectant-use-and-coronavirus-covid-19>, <https://www.epa.gov/coronavirus/what-emerging-viral-pathogen-claim>). EPA maintains lists of products passing the E1053 requirement so users can easily find products to meet their needs (e.g., <https://www.epa.gov/coronavirus/about-list-n-disinfectants-coronavirus-covid-19-0>).

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

The EPA database found here allows access to all EPA registered products and their master labels: <https://ordspub.epa.gov/ords/pesticides>. Other EPA databases (NPIRS and Knowtify) can be accessed to view the titles of the studies. The labels list the viral claims supported by E1053 for each individual product. The EPA has registered over 900 Basic disinfectant registrations which are subregistered to provide the US with over 14,000 registered disinfectants in the US states. Most of these will have at least one viral claim and some will have many more like the example used above. The vast majority of these claims are supported by testing conducted in accordance with E1053. These products are used in a myriad of ways across the US and other countries to reduce viral disease transmission.

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.

This standard is used throughout the world by regulatory authorities to support the registration of virucidal disinfection claims. The method has been adopted by US EPA: <https://www.epa.gov/test-guidelines-pesticides-and-toxic-substances/series-810-product-performance-test-guidelines>, Health Canada: <https://adicq.qc.ca/resources/Documents/2-%20Safety%20and%20Efficacy%20Requirements%20for%20Surface%20Disinfectant%20Drugs.pdf>, and Australia: https://www.tga.gov.au/sites/default/files/tga-instructions-disinfectant-testing_0.pdf, for example. Many other jurisdictions also accept E1053 to support viral disinfection claims.

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

This method would have a direct impact on Goal 3 “Good health and Well-Being” and Goal #6 “Clean Water and Sanitation” for its role in measuring the efficacy of disinfectants that are then used to disinfectant surfaces to reduce transmission of viral disease between humans and animals. Though I am not sure which goal this may fall within (Goal #12 and 15), this method has been instrumental in helping to reduce the use of live animals for this testing by providing guidance on how to use transformed host cell lines to measure the virucidal endpoint.

Please provide any additional information not provided above.

It has been my great honor to work alongside the E35.15 scientists from academia, government, labs, law firms, trade associations, and producers to maintain and create standard antimicrobial methods for the past 32 years. I can think of no greater professional honor than to create and leave behind these standards for years to come.

Contact Name: Rhonda Jones, RM (AAM), CEO, Scientific & Regulatory Consultants, Inc.

Committee: ASTM E35.15

Email Address: Rjones@SRCconsultants.com

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Please identify the designation and title of the standard

ASTM E1173-15: Standard Method for Evaluation of Preoperative, Precatheterization, or Preinjection Skin Preparations

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

Prior to 1978, few standardized, systematic procedures existed for providing to the US Food and Drug Administration (FDA) reliable data from testing of candidate antiseptic formulations, and many were being marketed with little substantiation of efficacy. In that year, the FDA established a monograph for OTC topical antimicrobial products specifying criteria for approval to market surgical scrub antiseptics, healthcare handwash antiseptics (HCPHW), and preoperative antiseptics (FR 43:4. 06 Jan 78. Pp. 1210-1248). In an effort to provide methods for evaluating such products, membership of ASTM Subcommittee E35.15 undertook to create Standard Methods E1054 (neutralization of antimicrobial chemistries), E1115 (surgical scrub), E1174 (HCPHW), and E1173 for preoperative skin preparations to stand as frameworks for development of research study protocols that would provide scientifically reliable data for submission to the FDA. These methods subsequently were cited in the FDA's *Tentative Final Monograph for Health-Care Antiseptic Drug Products* (FR 59:116. 17 Jun 94. Pp. 31401-31452).

Identify the interest groups that participated in the development and/or revision to the standard?

Subcommittee E35.15 on Antimicrobial Agents comprises members from the pharmaceutical industry (producers of antimicrobial products), contract research laboratories (users of standard testing protocols), and others of "unaffiliated" status, all of whom are involved in creation of standards for testing in the realm of topical antimicrobials, disinfectants, and sanitizers. This group of mixed-interest participants originated E1173.

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

E1173 is used as the framework for protocols designed for testing putative preoperative and preinjection skin preparations for which the producer intends to seek approval from the FDA, and it is well-recognized by the agency in this role. All preoperative and preinjection chemistries currently in use have been tested according to its methodology. Health Canada also references E1173 in their 2009 Final Guidance for Human-Use Antiseptic Drugs for use in testing preoperative preparations. Lacking FDA approval, a product is found to be misbranded, and the producer is subject to federal prosecution. Hence, E1173 is fundamentally essential in the development and approval of chemistries that greatly reduce probabilities for postsurgical and post-injection infection.

After the standard was published, has it impacted health and safety? If yes, please explain.

As explained above, testing of antiseptic chemistries for actual efficacy in their intended use was poorly documented or not performed at all prior to the FDA awakening during the 1970s. This led to publication of requirements in 1978 and, subsequently, the Tentative Final Monograph in 1994 and the Final Monograph in 2017. Early on, provision by ASTM Subcommittee E35.15 of a standard method for testing the efficacy of chemistries intended for disinfecting the skin prior to surgery or injection assured that products actually served that purpose. Without question, this has resulted in reductions in rates of life-threatening postsurgical infections.

How do consumers and the public benefit from this standard? (If applicable)

Individuals who must undergo surgical procedures or even a simple transdermal injection or blood-draw have benefitted by reduced probability their medical care will result in the perhaps serious trauma of systemic infection.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

Only the generality acknowledged in healthcare that postsurgical infection rates have fallen considerably over the last decades.

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.

FDA cited the method first in the 1994 Tentative Final Monograph and, subsequently, in every iteration leading to the 2017 Final Monograph. As noted, Health Canada requires the method in their 2009 guidelines. Further, Japan employs protocols for testing preoperative preparations that are identical to those used by contract labs in the US.

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)? (If yes, please identify which one(s) and describe how?)

As explained above, implementation of E1173 plainly contributes to **Goal #3, Good Health and Well-Being.**

Please provide any additional information not provided above.

None to offer...

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Please identify the designation and title of the standard

E-1519 Standard Terminology Relating to Agricultural Tank Mix Adjuvants

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

This standard was initiated by E35.22 Sub-Committee from a request by the industry to Standardize Terminology in the growing use of Tank Mix Adjuvants for Pesticides. Initial interest was expressed by the Pesticide industry through the trade organization of CPDA (Chemical and Producers of Agro technology). The need identified was state and federal regulatory agencies were considering developing regulation of all products present in a tank mix of pest control agents. The industry needed a response to demonstrate to the agencies that better definition of function was needed for these products.

Identify the interest groups that participated in the development and/or revision to the standard?

Several key groups beyond ASTM participated in the development and subsequent revisions of the Standard. As described earlier CPDA was a driving force. Other trade organizations involved consisted of: Crop Life America (CLA), Biopesticide Industry Alliance (BPIA), Ag Retailers Association (ARA), German Regulatory body of CIPAC (DAPF) and many related companies. EPA and the State of Washington were also heavily involved

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

With the development of this Standard CPDA was able to initiate a Certification Program for Tank Mix Adjuvants. Seventeen (17) Standards were developed by CPDA to insure the Safety and Regulatory Compliance of Tank Mix Adjuvants. E-1519 was used as the backbone of the certification program by providing definition to the products in the market and identification of functional agents.

Furthermore, the States of Washington, California, Oregon, Tennessee and Arkansas now use this Standard to determine functional agent claims on labels of Tank Mix Adjuvants. If the functional agent claimed is not defined in E-1519 the label is not allowed.

After the standard was published, has it impacted health and safety? If yes, please explain.

The Standard has certainly impacted Health and Safety. Before the Standard many of the products sold in the Tank Mix Adjuvant market had incomplete or inadequate labeling. With the Standard the Adjuvant industry now relies on the Standard to insure proper labeling of hazards and safe handling of the products.

How do consumers and the public benefit from this standard? (If applicable)

The consumers (mainly farmers and applicators) have a reliable source of information on the safe effective use of adjuvants. Multiple adjuvants were eliminated from the market as users only would purchase Certified Adjuvants. With the advent of concerns regarding spray drift and spray drift damage the use of the Standard in the Certification process insures appropriate application and drift management.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

Attached is an example of the Certification standards as well as an article published in Agro Professional.



LabelingandPerformanceStandards.pdf



adjuvant standards article for Ag Professional.final.doc.pdf

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.

As previously stated above the States of Washington, Oregon, California, Tennessee and Arkansas currently use this standard in assessment of Tank Mix Adjuvants

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

The Standard addresses the following:

2. Zero Hunger – The use of the Standard in Tank Mix Adjuvants allows growers higher yielding crops

6. Clean Water – One of the biggest users of water and water run-off generators is the farmer. By using the Standard Tank Mix Adjuvants are controlled to allow for less water usage and better on target application resulting in less run-off.

14. Life below water – An aspect of the use of the Standard requires better clarification of the impact of the Tank Mix Adjuvant on aquatic life through required testing.

Please provide any additional information not provided above.

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Committee: E35.22

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Please identify the designation and title of the standard

E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

This standard was developed from a need to improve the overall safety of the construction of buildings. Construction failures leading to injury and death were too common in the 20th century, and the need for inspection during construction was gradually written into the building codes.

While the need for improved oversight and inspection was obvious, the qualifications required to perform those inspections wasn't understood, and there were little to no uniform standards for stakeholders to look to.

In 1967, a group of industry members approved the first version of ASTM E329 which provided standards for individuals and agencies involved with construction testing and inspection.

In 1984, congressional hearings were held to investigate the causes of a string of construction related structural failures throughout the United States, including the Kansas City Hyatt Regency tragedy which killed 114 people and injured 216 people in 1981. Their findings included the need for improved communication and mandatory construction inspection incorporated into the building codes.

Since its first publication, ASTM E329 has provided a standard for the industry to look to that establishes minimum qualifications for agencies and individuals involved with the important responsibility of construction inspection.

Identify the interest groups that participated in the development and/or revision to the standard?

ASTM E329 is maintained by a wide range of industry stakeholders. The most common include:

- Construction testing and Inspection companies
- Accreditation bodies
- Code officials and government agencies
- Contractors
- Construction material suppliers

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

Over the years, more and more construction stakeholders have looked to ASTM E329 as the standard for construction inspection. In short:

- Thousands of construction testing and inspection firms look to E329 as the standard to follow for providing these services.
- Accreditation bodies regularly use E329 as the standard for accrediting firms that provide construction inspection services.
- Currently the AASHTO Accreditation Program alone accredits over 1,100 testing and inspection laboratories nationwide for conformance to the ASTM E329 standard.
- Building officials, designers, owners, contractors all rely on accreditation to ASTM E329 as evidence a firm is competent and following accepted minimum standards for construction inspection and, in many cases, accreditation to E329 is a requirement in construction project specifications as well as incorporated into local building code requirements.
- A comprehensive list of other ASTM standard citations to this E329 are listed here.
 - [A627 Standard Test Methods for Tool-Resisting Steel Bars, Flats, and Shapes for Detention and Correctional Facilities](#) – Committee F33 on Detention and Correctional Facilities
 - [C1077 Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation](#) – Committee C09 on Concrete and Concrete Aggregates
 - [D3666 Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials](#) – Committee D04 on Road and Paving Materials
 - [D3740 Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction](#) – Committee D18 on Soil and Rock
 - [E543 Standard Specification for Agencies Performing Nondestructive Testing](#) – Committee E07 on Nondestructive Testing
 - [E699 Standard Specification for Agencies Involved in Testing, Quality Assurance, and Evaluating of Manufactured Building Components](#) – Committee E36
 - [E2353 Standard Test Methods for Performance of Glazing in Permanent Railing Systems, Guards, and Balustrades](#) – Committee E06 on Performance of Buildings
 - [E2833 Standard Practice for Certification Bodies that Certify Personnel Engaged in Inspection and Testing of Construction Activities and Materials Used in Construction, Including Special Inspection](#) – Committee E36

After the standard was published, has it impacted health and safety? If yes, please explain.

YES

Over the last 100 years, there are too many examples of injury and death that have been the direct cause of inadequate oversight and inspection during construction.

The introduction of ASTM E329 to the industry in 1967, and its continued maintenance and improvement, have provided the industry a standard which raises the bar for firms engaged in construction testing and inspection.

It is impossible to quantify the number of lives saved and injuries prevented since 1967, but the construction industry has been vastly improved by the standards that have been established in E329.

How do consumers and the public benefit from this standard? (If applicable)

In this case, **consumers** would include building officials, design professionals, contractors and building owners. They all benefit from this standard when they require firms performing construction testing and inspection to be accredited to E329. When they do, they can be assured that the firm performing this important part of the construction process has demonstrated that it is meeting standards that the industry has deemed necessary to perform such a critical role. **The public** benefits by having safer buildings that have been subjected to inspection by qualified firms and individuals.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

As stated earlier, it is difficult to quantify the impact improved inspection has had on the industry. However, considering that thousands of laboratories and inspection agencies, as well as tens of thousands of individuals have used E329 as a standard for improving competency and demonstrating qualifications, it is safe to say the industry as a whole has benefited and that there have been incalculable positive safety and economic impacts over the last 55 years.

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

YES

Throughout the country, building officials, and designers routinely require accreditation to ASTM E329 as part of approved construction documents and/or as part of local jurisdictional construction requirements for inspection agencies.

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)? (If yes, please identify which one(s) and describe how?)

YES

Sustainable Development Goal #9: Industry, Innovation, and Infrastructure: E329 is an important part of building sustainable, quality infrastructure by providing a standard for inspection and testing of the construction materials being used. Through proper testing and inspection, the ultimate quality and longevity of infrastructure is improved.

Sustainable Development Goal #11: Sustainable Cities and Communities: E329 provides a standard that helps the industry improve the overall sustainability and safety of structures in cities and communities, by improving the inspection process of during construction. In more and more jurisdictions, building officials are implementing and enforcing Chapter 17 of the International Building Code which mandates "Special Inspection" of key components of structures including the structural components as well as fire safety and building enclosure components.

Please provide any additional information not provided above.

For me personally, it has been an honor and a privilege to be a part of the committee that has maintained E329 for more than 15 years. Serving as both the E36.70 subcommittee chair, and the E36 main committee chair for most of that time, I have had the pleasure of working with many outstanding individuals who all work hard to keep such an important standard current, and continue raising the bar for our industry.

Participating in the evolution of E329 and seeing the positive impacts it has had on the construction industry has been a highlight of my career.

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Approved submittals must be sent to kkoperna@astm.org and mlynyak@astm.org by **September 23, 2022**.

Please identify the designation and title of the standard

Three related standards have been developed and validated together to address a spectrum of aerial drone sizes, capabilities, and use cases. Each standard contains five individual test methods to comprehensively evaluate drone capabilities and remote pilot proficiency at different flight altitudes and proximities to obstacles. They are being balloted sequentially in the following order to address increasingly complex environments:

1) ASTM WK58931 Standard Test Method for Evaluating Aerial Drone Maneuvering and Payload Functionality in OPEN Lanes and Scenarios: • Position Test • Traverse Test • Orbit Test • Inspect Test • Recon Test

2) ASTM WK58940 Standard Test Method for Evaluating Aerial Drone Maneuvering and Payload Functionality in OBSTRUCTED Lanes and Scenarios: • Perch Test • Wall Test • Ground Test • Alley Test • Post Test

3) ASTM WK58941 Standard Test Method for Evaluating Aerial Drone Maneuvering and Payload Functionality in CONFINED Lanes and Scenarios: • Perch Test • Wall Test • Ground Test • Alley Test • Post Test

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

Users of aerial drones weighing less than 25 kg (55 lbs) at takeoff, also known as small unmanned aircraft systems (sUAS) or remotely piloted aircraft systems (RPAS), need ways to measure whether a particular drone can perform specific missions in unstructured, complex, and often hazardous environments. These missions require various combinations of elemental capabilities. Each capability can be represented as a test method with an associated apparatus and procedure enabling repeatable and reproducible measures of performance with objective results. These test methods can be conducted individually or in operationally relevant sequences and combinations to evaluate drone capabilities and remote pilot proficiency. The results measure the reliability of the drone and remote pilot to perform essential mission tasks. A series of complementary test lanes enable users to evaluate a wide spectrum of intended missions.

The ASTM International Standards Committee on Homeland Security Applications (E54) specifies these standard tests to facilitate comparisons across different testing locations using drones of various sizes and capabilities within the designated weight class. These test methods are inexpensive, easy to fabricate, and simple to use so they can be replicated widely by organizations or individuals to measure their own drones and pilots. Resulting trial scores are comparable no matter where or when the testing occurs.

Identify the interest groups that participated in the development and/or revision to the standard?

<p>Federal Emergency Response and Public Safety Agencies</p> <ul style="list-style-type: none">• Department of Homeland Security (DHS)<ul style="list-style-type: none">• Science and Technology Directorate (S&T) sponsored test method development.• U.S. Secret Service (USSS) • U.S. Border Patrol (USBP)• Federal Emergency Management Agency (FEMA) – Urban Search and Rescue (US&R)• Department of Justice (DOJ)<ul style="list-style-type: none">• Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF)• U.S. Marshals Service (USMS)• Federal Bureau of Investigation (FBI)• Department of Defense (DOD)• U.S. Air Force Auxiliary, Civil Air Patrol (CAP) <p>State and Local Emergency Response and Public Safety Organizations</p> <ul style="list-style-type: none">• Texas Department of Public Safety• Colorado Department of Public Safety• Maryland State Police • Virginia State Police• New York Fire Department• Los Angeles Fire Department• Hundreds of local fire and police departments nationwide• International collaborators in Canada, Germany, Japan, Australia, Guam, Ireland, Columbia, etc. <p>User Community Associations</p> <ul style="list-style-type: none">• Airborne Public Safety Association (APSA)• Drone Responders Public Safety UAS Alliance (DR)• Public Safety Aviation Accreditation Commission (PSAAC)• Law Enforcement Drone Association (LEDA) <p>Academic Institutions</p> <ul style="list-style-type: none">• Embry-Riddle Worldwide University• Anderson University• Clemson University• Johns Hopkins University• University of Maryland• Mississippi State University• Several Community Colleges <p>Others</p> <ul style="list-style-type: none">• Federal Aviation Administration (FAA) Safety Team online course with certificate of completion.• Validation exercises hosted in Canada, Germany, Italy, Ireland, Japan, China, Australia, Guam, Columbia, and more.• Dozens of drone manufacturers participated in test method validation exercises.

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

<p>These standard tests support drone researchers, manufacturers, and other organizations in different ways. Researchers use these standard tests to understand mission requirements, encourage innovation, and demonstrate break-through capabilities. Manufacturers use these standard tests to evaluate design decisions, integrate emerging technologies, and harden systems. Various other organizations use these standard tests to guide purchasing, make deployment decisions, and measure remote pilot proficiency for credentialing. Examples include emergency response operations, critical infrastructure inspection, industrial and commercial applications, and even recreational pilots.</p> <p>The U.S. Air Force Auxiliary, Civil Air Patrol (CAP) conducts nationwide credentialing of remote pilots using these test methods. They have 52 “wings” of pilots with more than half currently using these test 7 methods as their quantitative measure of remote pilot proficiency. All CAP wings should be compliant by next year. Several Federal agencies with nationwide networks of remote pilots are also beginning to implement these tests for credentialing.</p> <p>The Departments of Public Safety in Texas and Colorado, and the State Police in Maryland and Virginia, use these test methods to conduct statewide credentialing of remote pilots. Licensed pilots across each state can more effectively provide mutual aid at large-scale disasters because the incident commanders now know and trust their certified level of proficiency.</p> <p>The Airborne Public Safety Association (APSA) has been hosting 3-day courses around the country to train and certify Proctors to fabricate and conduct these test methods. The Proctors can then certify remote pilots at their own organizations to a minimum level of proficiency defined by APSA. Each organization may also require a more rigorous threshold of proficiency to match their mission and air space complexities. APSA has certified more than 300 Proctors thus far and are conducting courses monthly. This nationwide network of regional Proctors, each with their own test methods set up for periodic use, is exactly the kind of infrastructure the FAA could leverage in any future regulations regarding implementing a minimum skills test for remote pilots.</p>

After the standard was published, has it impacted health and safety? If yes, please explain.

Flying remotely piloted drones in the national air space has associated risks for nearby manned aircraft and ground personnel. Drone pilots must have both knowledge and skill to fly safely. The Federal Aviation Administration (FAA) has implemented a mandatory knowledge examination for remote pilots to get a license. But there is no related skills test required currently. That's because there was no way to objectively measure remote pilot proficiency and scale such evaluations across the massive number of expected drone pilots nationwide. Now there is.

"When we started, there was no measurement science or standards infrastructure available to objectively evaluate drone capabilities or remote pilot proficiency, so we filled that void. After helping to guide purchases, these standard tests then support credentialing of remote pilots. Although these drone test methods are specifically designed to help emergency responders and public safety organizations maintain a safe operational standoff while performing extremely hazardous tasks, they similarly support a wide variety of commercial and industrial applications. All pilots flying in the national air space need to demonstrate they can maintain positive aircraft control while performing operational tasks in complex and often hazardous environments." said Adam Jacoff, Project Leader for Emergency Response Robots at the National Institute of Standards and Technology (NIST) and chair of the ASTM E54.09 Subcommittee on Response Robots.

The U.S military along with DHS and other federal, state, and local organizations will spend tens of millions of dollars a year on drones to assist in hazardous situations and will rely heavily on these test methods when making their purchases. To ensure the tests appropriately address hazardous real-world situations, the committee includes emergency responders to identify their needs and include them in the validation process.

One of those individuals is Capt. Tom Haus, a Los Angeles firefighter and member of a FEMA Urban Search and Rescue Task Force. He witnessed robots fail to traverse the rubble of the collapsed twin towers in New York after the 9/11 terrorist attacks. "They weren't effective because they didn't have the mobility to go where we needed to go," he said. Haus has worked with the committee since its inception. "It has been rewarding to push the envelope for robotic manufacturers to develop technologies that will help us locate victims quicker at less risk for rescuers," he said. He has also worked on other issues, including testing robots and drones that can deliver water deeper into structures without exposing firefighters to potential building collapse.

How do consumers and the public benefit from this standard? (If applicable)

For many years, robot manufacturers, researchers and emergency responders could not be confident that the machines would work as intended in dangerous situations because of the lack of rigorous, independent testing and uniform standards. For those responding to disasters and other dangerous situations, these were major concerns without clear answers as drones have come into wider use.

"The team's groundbreaking work represents a fundamentally new, creative approach to assessing robot performance to help emergency responders ensure that they have the capabilities they need," said Albert Wavering, the acting deputy director of NIST's Engineering Laboratory. "Their innovative efforts keep emergency responders and soldiers safe when addressing extremely hazardous public safety and national security threats."

Wavering said the test methods "provide the missing link for technological innovation" by allowing responders to specify and verify desired capabilities while giving robot makers the performance-based means to measure their progress toward meeting user needs. "Their work is saving lives," he said.

"I cannot overemphasize the significance of this effort," said Philip Mattson, director of the Office of Standards at the Department of Homeland Security and former Chair of the ASTM International Standards Committee on Homeland Security Applications (E54). "These test methods have helped guide the research and development of response robot technologies for ground and aerial systems and have been adopted and deployed globally."

Kevin Jurrens, acting chief of NIST's Intelligent Systems Division, said the standards "help purchasers make good decisions and know that the robots they buy have the capabilities they are looking for and will be appropriate for the emergency situations they face." The bottom-line result, he said, is that "the public benefits from having a more effective response to emergency situations."

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

The impacts from these drone tests will be huge because the drone market is huge and growing quickly. According to Market Reports World, "Global drone market size is estimated to be worth US \$7.7 billion in 2022 and is forecast to a readjusted size of US \$17.5 billion by 2028 with a compound annual growth rate (CAGR) of 14.7% during the forecast period 2022-2028.

The international use cases of these test methods apply well beyond supporting emergency response and public safety applications. These test methods also address critical infrastructure inspection tasks such as bridges, dams, levees, and cellphone towers; industrial plants and pipelines; agriculture; and many more.

However, the most important impacts will be from improvements in effectiveness and efficiency of lifesafety missions for both the emergency responders that use them and the victims they save.

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

As noted above, the myriad of Federal, state, and local adoptions of these test methods for credentialing remote pilots provide excellent use cases showing how these tests can scale to support eventual nationwide regulations for remote pilots operating in the national airspace. Emergency response and public safety organizations already use these test methods to document the outcomes of their training in their applications to the Federal Aviation Administration (FAA) for waivers to fly at night and beyond visual line of sight. The FAA has not yet mandated a practical pilot skills test for public safety, industrial, commercial, or recreational pilots. However other countries such as Canada are working toward that same need and may provide yet another example use case for the FAA to adopt.

Other standards organizations will certainly reference these tests. For example, the National Fire Protection Association Standard for Small Unmanned Aircraft Systems (sUAS) Used for Public Safety Operations (NFPA 2400) is the most applicable for firefighters. They already reference these test methods to evaluate their Job Performance Requirements (JPR). Similarly, organizations such as the Peace Officer's Standards and Training (POST) will likely do the same for public safety organizations in each state.

As mentioned previously, there has been extensive participation from other countries helping to validate these test methods. Validation exercises and competitions using these test methods have been hosted in Canada, Germany, Italy, Ireland, Japan, China, Australia, Guam, Columbia, and more.

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identity which one(s) and describe how?)

These standards do not directly support the UN Sustainable Development Goals

Please provide any additional information not provided above.

Some of the quotes included were from a Service to America Medal: Safety, Security, and International Affairs Category (2021 Finalist) project description discussing the development of these and other test methods. The awards are hosted by the Partnership for Public Service and the Samuel J. Heyman Foundation. <https://servicetoamericamedals.org/honorees/adamjacoff/>

Contact Name: Adam Jacoff, National Institute of Standards and Technology

Committee: E54 Committee on Homeland Security Applications

Email Address: Adam.Jacoff@nist.gov

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Please identify the designation and title of the standard

There are two relevant ASTM Standards:

- (1) ASTM E3141/E3141M-22A, *Test Method for Ballistic Resistant Shields for Law Enforcement*
- (2) ASTM E3347/E3347M, *Specification for Ballistic-Resistant Shields Used by Law Enforcement Officers*

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

The unfortunate reality of the law enforcement profession is that officers are routinely, and many times unexpectedly, placed in harm's way, so officer safety is a top priority for the law enforcement community. One way that officers mitigate the risk of duty-related injuries or death is by using protective equipment, including ballistic shields. Traditionally, the use of ballistic shields was limited to tactical team operations. However, with the increase in incidents requiring immediate intervention by officers, agencies have recognized the need for additional ballistic protection at multiple response levels, from the tactical operator all the way down to the routine patrol officer. In an incident where an armed suspect is actively attempting to wound or kill innocent victims, ballistic shields are critical protection for the first officers on scene.

Ballistic shields are complex protective technologies designed to stop either handgun or rifle rounds. These shields consist of the main shield body ballistic-resistant materials, a transparent ballistic-resistant viewport, fasteners, joints and seams, edging, appliques (intended to increase localized protection), and more features. Each of these must be tested to verify that the complete shield protects against bullets and also can withstand the environment conditions of use and storage. This standard and related test method (ASTM E3141/E3141M, *Test Method for Ballistic Resistant Shields for Law Enforcement*) were developed to verify that ballistic shields meet this purpose.

Until now, the standard typically used for assessment of protection afforded by ballistic shields was the National Institute of Justice (NIJ) Standard 0108.01, *Ballistic Resistance of Materials*, published in 1985. The NIJ standard was developed for materials used to fabricate protective products, not for complete products like shields. The NIJ standard requires only one test item, at least 12 inch by 12 inch, per ballistic test threat, with a maximum of 5 shots per test item. The test item is conditioned at ambient temperature and humidity. Additionally, the test threats required in the NIJ standard are not current threats facing law enforcement. Because there is no verification or certification program, manufacturers mix the requirements of NIJ Standard 0108.01 with requirements of NIJ Standard 0101.06, *Ballistic Resistance of Body Armor*. This has led to confusion and deception in the marketplace.

The new ASTM standards are designed for assessing the performance of a complete ballistic shields. The test method specifies detailed conditioning and testing procedures to assess all aspects of a ballistic shield and requires a minimum number of shots on each of these areas: the shield body, the viewport, fasteners, weak points, and appliques. The specification details additional testing requirements, performance levels and associated test threats, and performance requirements that shields of multiple sizes must meet.

Identify the interest groups that participated in the development and/or revision to the standard?

A diverse team of more than 40 stakeholders collaborated to develop both ASTM shield standards, including shield manufacturers; suppliers; federal, state, and local law enforcement end users; ballistic testing and certification experts; researchers; federal ballistic protection experts; and standards professionals.

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

These standards form the basis for a soon-to-be-established ASTM Verification Program, intended to build end user confidence through the use of the ASTM Verification Mark demonstrating product compliance. Because of the broad stakeholder support in developing these standards, it is expected that the verification program will be required by law enforcement purchasers, cooperative contracting programs (such as NASPO ValuePoint), and end users.

The ASTM Verification Program will result in:

- Independent, 3rd party evaluation of test reports to determine whether a ballistic shield meets ASTM Specification E3347/E3347M
- Use of the ASTM Verification Mark on verified products
- Verified product list published online
- Confidence in the continued performance of products (due to annual surveillance requirements)

After the standard was published, has it impacted health and safety? If yes, please explain.

These standards will impact the safety of law enforcement officers because they enable verification of products marketed and sold to law enforcement agencies.

How do consumers and the public benefit from this standard? (If applicable)

The public indirectly benefits from the standards. When an officer is using a verified ballistic protective product, that person has confidence in their personal safety, which decreases worry and increases their effectiveness and performance of duties.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

There are no data related to officers being saved by use of ballistic shields, so we are including an officer statement:

Patricia Knudson, an Officer with the Phoenix AZ Police Department Tactical Support Bureau and Vice Chair of E54.04, says, "Having gone through the unfortunate experience of being an officer who was shot in the line of duty, I understand, probably better than most, the importance of ballistic protection. Ballistic protection is not an option in the world of law enforcement; it is a necessity. It's about having the proper protective equipment available when needed and being confident that it will perform as expected. Many times, outside of a ballistic vest, the ballistic shield is the only thing separating an officer from an armed suspect. In those situations, the ballistic shield is a game changer, but only if that ballistic shield performs up to the acceptable standards of the law enforcement community."

Officer Knudson continues, "To use a ballistic shield, the officer needs to know it will perform as expected. If a ballistic shield is designed to protect an officer from a certain ballistic threat, then that is what it should do. The officer's life most likely is depending on that protection. So having a ballistic shield specifically tested to an acceptable standard and held to a level of accountability is critical for the officer to have the unquestionable confidence to deploy with that ballistic shield during a potentially life threatening situation."

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.

We are not aware of any regulatory adoption of the standards. However, it is anticipated that the National Institute of Justice (NIJ) will recognize the ASTM Verification Program as the basis for establishing an NIJ compliance testing program for shields.

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)? (If yes, please identify which one(s) and describe how?)

These standards do not directly support the UN Sustainable Development Goals.

Please provide any additional information not provided above.

N/A

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ASTM Standard Use & Effectiveness Case Study Contest

As ASTM International prepares to celebrate its 125th Anniversary in 2023, we want to recognize the tremendous work of our volunteer members by recognizing ASTM standards that are broadly used and proven effective by industry.

The contest will be based on written submissions reviewed and selected by a collection of ASTM Board Members. Multiple submissions from a variety of industry segments will be selected. The winning submissions will be featured as part of our 125th anniversary celebration, and include recognition by the ASTM President, on social media channels, and at our anniversary celebration event. As an additional incentive for participation, ASTM International will deposit \$1,250 into each of the winning committees' funds to be used as desired.

To participate, please notify your staff manager and complete the below form in its entirety (6 page maximum).

Final submissions must be approved by Executive Committees (limit 3 per committee) prior to submittal.

Approved submittals must be sent to kkoperna@astm.org and mlynyak@astm.org by **September 23, 2022**.

Please identify the designation and title of the standard

ASTM F3211-17 Standard Guide for Fatigue-to-Fracture (FtF) Methodology for Cardiovascular Medical Devices

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

ASTM F3211 was initiated and developed by members of the F04 subcommittee working group, which included experts across industry and academia. Prior to the publication of this standard, the dominate paradigm for fatigue testing of medical devices was a test-to-success methodology, where – although valuable information regarding device safety can be gleaned from this approach – it remained limited in its utility to assess iterative design changes quickly, for example, given the extensive number of cycles necessary. By introducing the fatigue-to-fracture approach as outlined in ASTM F3211, shortcomings of the previous approach were addressed, like the ability to empirically determine fatigue factors of safety in vitro, optimize fatigue durability during product development, and expeditiously arrive at fatigue performance data by utilizing hyperphysiological loading levels. Thus, this standard explicates a new paradigm involving testing to fracture that provides product development and testing laboratories a powerful tool to help continue in the advancement of creating safe medical devices for patients.

Identify the interest groups that participated in the development and/or revision to the standard?

The interest groups that participated in the development of ASTM F3211 include manufacturers (e.g., Boston Scientific, Cook Medical, W.L. Gore), government (e.g., US FDA), academia (e.g., Texas A&M Univ, Washington Univ), and general interest.

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

ASTM F3211 is used throughout the total product lifecycle. At its core, this standard helps ensure the cardiovascular medical device being assessed remains safe when exposed to a wide variety of clinical loads experienced throughout the patient's life. Serving as a one-stop compendium of information, ASTM F3211 carefully outlines key concepts like determining physiological loads, justifying sample sizes and test plans, monitoring and identification of fractures, and documenting test results. By exposing the device-under-test to hyperphysiological loads (that is, pulls, twists, bends, and pulses beyond which would be experienced clinically), the statistical analyses outlined in this standard allow the user to determine whether the device is safe for use throughout the patient's life.

After the standard was published, has it impacted health and safety? If yes, please explain.

Yes, this standard has impacted the health and safety of patients receiving cardiovascular medical devices. Specifically, ASTM F3211 provides an elegant methodology to assess the safety of permanent implants used for the treatment of cardiovascular disease (for example, aortic aneurysms). By exposing the device-under-test to hyperphysiological loading – rather than to physiological loading like the traditional test-to-success paradigm – safety results can be realized much more expeditiously. In fact, the fatigue-to-fracture methodology outlined in ASTM F3211 provides valuable safety data at rates of up to 1000 times faster than real-time clinical studies.

How do consumers and the public benefit from this standard? (If applicable)

The consumer and the public benefit from this standard in three primary ways. Firstly, speed! By providing another tool in the engineer's toolbelt, the design process can progress safely and expeditiously, particularly given the powerful statistical analysis options outlined in this standard that permit testing to draw conclusions from far fewer fatigue cycles compared to that of traditional testing and to clinical studies. Second, by embracing the fracture – and designing studies specifically to fracture – additional information can be gleaned that further support device safety. For example, fracture type, fracture location, and fracture geometry collectively provide valuable information to the safety of the design. Finally, the fatigue-to-fracture paradigm outlined in ASTM F3211 provides insights into device behavior that would not necessarily be apparent in clinical studies that typically focus on patient outcomes. Altogether, this standard paves the way for a paradigm shift for how designers and test engineers can assess the long-term safety of permanent implants.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

This standard has immense implications for assessing the structural fatigue durability of implantable medical devices (for example, endovascular prostheses). Ultimately, patients will benefit from manufacturers utilizing ASTM F3211 as innovation in implantable medical devices continues to progress. Usage of this standard, however, remains in its infancy, although evidence suggests that regulators domestically and abroad are beginning to appreciate its value. Coupled with the powerful predictive capabilities of computer-aided engineering (CAE), the fatigue-to-fracture paradigm is an exciting tool for the designer's and the testing laboratory's toolbelt.

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

ASTM F3211 is a recognized consensus standard by US FDA. The standard was officially recognized on September 17, 2018 under recognition number 3-154.

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

The Sustainable Development Goal, as outlined by the United Nations Department of Economic and Social Affairs, most closely addressed by ASTM F3211 is Goal 3 – Good Health and Well-Being. As a standard that supports safe design of endovascular medical devices, ASTM F3211 brings manufacturers, clinicians, and patients one step closer to tackling cardiovascular diseases (CVDs) worldwide. CVD is the leading cause of death globally, representing 32% of all deaths. As innovations in medical device design continue to improve, so too do the capabilities to test these designs. ASTM F3211 provides an exceptionally useful and important methodology for helping determine the overall safety of an implantable medical device designed to treat patients suffering from CVDs

Please provide any additional information not provided above.

While the existing standard has made a large impact in the design process, refinements to the standard are underway. One example refinement is to help clarify what information will likely provide utility for regulatory approval of small design changes to a device that is already approved and on the market. Therefore, in full alignment with the UN goal of Good Health and Well-Being, ASTM F3211 provides an exceptional approach to not only bring forth new and exciting technologies for patients suffering from CVDs, this standard also helps keep critical products on the market in order to continue treating CVD in support of good health and well-being across the globe.

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Please identify the designation and title of the standard

F1163 Standard Specification for Protective Headgear Used in Horse Sports and Horseback Riding

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

In the 1970s, the United States Pony Clubs' Board of Directors were concerned about an increasing number of youth members sustaining serious head injuries despite required use of existing helmets. Two members of the Board from Massachusetts, Augusta Giddings and Marjorie Kittredge (a founding member of the North American Riding for the Handicapped Association and judge for the sports of Dressage and Eventing), were charged with examining use and effectiveness of available riding helmets. In the mid-1970s, President Rufus Wesson, also a Director of the American Horse Shows Association (AHSA now USEF) and a founding member of the New York State Horse Council, personally visited manufacturers in both the U.S. and the U.K. He was hoping to influence them to modify their products to meet similar standards of the Snell Foundation, which was certifying helmets for other sports and activities. At the time, the only Snell-certified equestrian helmet was made in Mexico for racing. It was a modified motorcycle helmet, very heavy, and impractical for children and small women. It was never put into general production. The AHSA draft rule for its planned future use was in its rulebook for a couple of years, but never came into use and was removed.

In the U.S., Mario Plastino, president of Frank and Sons in New York, developed a helmet called the Pro '74 with a smaller profile and less weight than the Buco. It passed all Snell tests but the one for extreme heat. It featured a crushable liner and was ridiculed for looking different from the fashionable hunt caps of the day. Thoroughbred racing riders preferred the McHal Caliente, also made in Mexico. Angelo Plastino and his son Frank of International Riding Helmets were also working on improved helmets, as were several other manufacturers. The U.K. had its own standards.

Among the most influential voices in the U.S. in the late 1970s was Dr. Doris Bixby-Hammett, a pediatrician, Trail Distance Ride Physician, mother of a Pony Clubber, and a survivor of a severe equestrian-related concussion. She was a friend of a local North Carolina Master of Foxhounds who was killed in a riding accident. As a member of the American Academy of Pediatrics, she persuaded that organization to adopt a helmet use policy, which went into effect in 1991, three years after F1163-88 was completed. Her equestrian injury research and many publications were and still are cited in multiple studies internationally, and, as the founder of the American Medical Equestrian Association (later called the Equestrian Medical Safety Association, or EMSA), she was widely considered to be the conscience of equestrian safety in the U.S.

Identify the interest groups that participated in the development and/or revision to the standard?

A 1978 editorial in The Chronicle of the Horse by Clark Cassidy, board member of the U. S. Combined Training Association (now the U.S. Eventing Association) appeared after elite U.S. rider Caroline Treviranus was seriously injured at the Eventing World Championships in Kentucky. Her horse crashed through a stadium jumping fence, her unharnessed hunt cap flew off, and, as she fell, she was hit on the head by a loose jump pole, leaving her in a coma for several days. Cassidy's call for action resulted in a January 1979 meeting sponsored by the USPC and USCTA, the only US horse sports organizations at the time willing to do so. Forty people came together from all aspects of horse sports: competitors, event organizers, instructors, medical, legal, insurance, engineering, press, and manufacturing experts. Their work resulted in several manufacturers pledging to work on improved products, a gracious offer from the Snell Foundation for free comparison helmet testing of samples from various countries, and two press representatives promising to show only helmeted riders in their publications. As a result of this meeting, Dr. Bixby-Hammett and the meeting's organizer, Drusilla Malavase, were appointed co-chairs of the USPC Ad Hoc Committee for Equestrian Protective Headgear, with Margaret Taylor, Chair of the USPC Equestrian Trails Committee, and Dorothy Renfro, a Virginia riding instructor, as working members. This group received help from Wayne State University's Dr. Voit Hodgson who suggested using football's NOCSAE standard as a model. He also obtained permission from the U.S. Polo Foundation to share their new standard as needed, since Wayne State had recently developed a prototype helmet for their sport. The resulting draft was what became known as the USPC Standard.

Malavase forwarded sample equestrian helmets to a testing facility and maintained a list of those which passed the testing requirements. In 1983, the USPC adopted a new rule requiring its members to wear only helmets on the list. Other horse sports rules-making groups began to incorporate recommendations or requirements for the use of the listed helmets into their rules. Over the next few years, the committee kept track of these groups, which included 6 Breed Clubs, 3 Instructor Certification Groups, 13 Horse Sport groups, 3 Horse Industry and Welfare groups, 1 Insurance and Safety Advocate, 4 Youth Groups, and 5 National/International Organizations including the US, Canada, Australia, UK, and the Federation Equestre Internationale.

The USPC Standard was in effect as an interim standard from 1984 to 1988, when ASTM F1163 was completed. The original ASTM task group (F08.53.01 on Equestrian Protective Headgear) formation was requested by USPC when it became apparent to the Ad Hoc Committee that this project was too complex to be run by anything less than a professionally-recognized standards organization.

Malavase provided the list of original meeting participants and possible interest groups from the 1979 meeting in Washington DC, and most of them promptly joined ASTM International. Its first meeting was hosted at the downtown Philadelphia ASTM headquarters in August of 1984. Additional members included equestrian and human biokineticists, a Standardbred racing representative, many more engineers, a specialist in human factors, and a lawyer who represented sporting goods manufacturers and was well-versed in warning label development. Later in the process, the Safety Equipment Institute sent its Executive Director Tom Aughterton and President Patricia Gleason. Other members came from the U.S. Consumer Products Safety Commission as well as many manufacturers of other sport helmets, including several from other countries. From the start, three Canadians were essential to the standard's development, including Jocelyn Peddar from Biokinetics Inc. who wrote the first draft of F1163. Jim Newman, Biokinetics' president, and their testing technician Terry Smith were early major contributors of their practical knowledge, as well. P. David Halstead of NOCSAE, Randy Swart of the Bicycle Helmet Safety Institute and the late Dean Fisher of Bell Helmets were early and continuous sources of information and support.

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

The early 1990s saw U.S. and international sport horse organizations rewriting their competition rules to REQUIRE, not just to "recommend", the use of properly secured certified equestrian helmets in competitions. These changes didn't come without resistance, especially in the deeply traditional Hunter/Jumper and Dressage disciplines. As late as 2013, the U.S. Equestrian Federation Dressage Rulebook stated "If a rider is competing in both national and FEI (International) levels or tests, dress code for Training through Fourth Level requires protective headgear as defined in DR 120.5 and the General Rule 801. For tests above Fourth Level, riders over the age of 18 may wear a top hat, a bowler hat, a hunt cap, or protective headgear. Riders under age 18 competing in any FEI level or test must wear protective headgear." Dressage Rule 120.5 went on to state "At any time while mounted on the competition grounds, all riders under age 18, all riders while on horses competing in national level tests, all riders competing in Para-Equestrian tests, and all riders while on non-competing horses must wear protective headgear." "Protective headgear is defined as a riding helmet which meets or exceeds ASTM/SEI standards for equestrian use and carries the SEI TAG. The harness must be secured and properly fitted."

As happened in the Hunter/Jumper rules, then in some of the breed-specific divisions which include jumping, and Combined Driving (including marathon), certified helmets were required first for younger riders, then adults. The state 4H programs which required ASTM/SEI helmets for all seats and riding activities (including Western!) were following the lead of the U.S. Pony Clubs, the Girl and Boy Scouts and the USEF among others as part of their continuing emphasis on safety. USPC nationally adopted a concussion awareness program for instructors, parents and older members. These include "return to play" protocols for youth following a head impact and online access to training which is required for instructors, volunteers and recommended for parents.

The Riders4Helmets organization has hosted helmet safety summits and posted presentations on YouTube to reach a whole new audience for headgear information. In recent years the University of Kentucky instituted an annual summit on equestrian safety. Presenting there was Lola Chambless M.D. who was also a presenter in 2016 at the U.S. Hunter Jumper Association's annual meeting.

Currently the USEF (thanks to Joe Dotoli, of the National Hunter Jumper Board and Jacqueline Mars of Mars Equestrian) has sponsored and financed an equestrian STAR program at Virginia Tech to rate helmets for their relative safety and efficacy as had been done previously for football. The information developed is likely to influence changes in both materials and testing systems, including F1163.

How does this history connect to use of F1163 by the equestrian industry? By the requirement that certification by SEI requires annual quality audits for its member manufacturers, helmet buyers are assured that the products they are purchasing are checked annually for quality by an impartial monitor and are tested by internationally recognized facilities. Because F1163 is an ANSI approved national standard, manufacturers with certified products carrying the SEI label have automatic international credibility. F1163 is also unique among current equestrian headgear standards since its SEI certification is proof of a manufacturer's liability insurance coverage. Since the 1990s, potential new manufacturers have asked for and received guidance from members of F08.53 when they were in process of preparing for certification. Requesting information from then Co-Chair Malavase were representatives from Korea, Sweden, Germany, France, Australia, UK, Ireland, Taiwan and China as well as several potential U.S. Manufacturers.

On the rare occasions when manufacturers have been sued after a rider has received a head injury, members of F08.53, including SEI officers, have acted as consultants and expert witnesses.

After the standard was published, has it impacted health and safety? If yes, please explain.

According to a two-part article by Mollie Bailey of The Chronicle of the Horse in 2018, Dr. Chambless quoted a New York Times statement after they had published more than 60 articles about football and concussions over the previous 11 months. She asked the attending members of the U.S. Hunter Jumper Association's 2016 Annual Meeting "Of all the patients who are admitted to a hospital with a sports-related traumatic brain injury, how many do you think are equestrians?" The answer was 45% and that didn't include all of the concussions. In the past six years since that meeting, there have been multiple studies worldwide researching athletic head injuries. The USEF and USEA have shared the contents of their competition injury reports with carefully vetted researchers. Dr. Bixby-Hammett's multiple studies of the annual reports of the Consumer Products Safety Commission's National Electronic Injury Surveillance System (NEISS) coding of injury case admissions to trauma center emergency rooms are currently updated each year by researcher Mike Pilato, M.S.A.T.C a licensed athletic trainer who shares his work with F08.53 member Richard Timms M.D. and PhD in Public Health who was the CEO of Troxel Helmets during the years of development and continues on the committee along with Stephanie Bonin, PhD, a testing engineer, researcher, and the current chair of the equestrian head gear task group.

Any account about F1163 should include recognition of Jean Gulden of Spokane Washington. With the support of her state's 4H program she produced, directed, and distributed an educational video called "Every Time, Every Ride" which promoted the use of ASTM/SEI helmets for equestrians of all ages. The weekend before its original volunteer narrator Christopher Reeve was scheduled to do the voice-over, he was paralyzed in a fall at a Training Level combined training event in Virginia, and worldwide headlines appeared using the name Superman, his most famous role. He publicly credited his ASTM/SEI helmet with saving his life and allowing him time to advocate for equestrian safety. Stepping in on short notice was another celebrity horseman, William Shatner. The resulting video was placed on YouTube and 4H, and USPC made its viewing part of their educational requirements. Its use was promoted for parents as well as active riders.

F08.53 used F1163 as the matrix for another standard, F1446, since other sports began approaching us for guidance in developing helmet standards customized for their own disciplines. The first of these was Skateboarding F1492. Others include Paintball, Combative Sports, Short Track Speed Ice Skating, Ice Hockey, BMX Cycling, Pole Vaulting, Downhill Mountain Bike Racing, Off Road Motorcycle and ATV, Recreational Biking or Roller Skating, and Trick Roller Skating.

How do consumers and the public benefit from this standard? (If applicable)

Mail order and Internet consumers can compare ASTM/SEI Certified products to those without the independent testing, quality assurance audits and liability insurance guaranteed by SEI Certification.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

To quote *The Chronicle of the Horse* and their 2/26/ and 3/5/2018 articles about helmets:

“The general consensus is that only about 25 percent of horsemen wear helmets when riding, despite the fact that helmets reduce Traumatic Brain Injuries (TBI’s) by around 50 percent. What we can’t extrapolate is relative risk” said Dr. Chambless. “We don’t know in a scientific way what types of accidents are more prone to causing concussion or TBI -not to mention barn accidents. Part of the problem is that most concussions and TBI’s happen outside competition and not necessarily in a formalized practice with a trainer like NCAA and pro sports. Most happen in a barely witnessed way. “ Roy Burek, the late Director of Charles Owen helmets and past Co-Chair of our committee instituted data collection from the company’s accident replacement program, which required an extensive accident report form to be returned with the helmet. Typically, the company received three of these a day. The reports were forwarded to Malavase who had several years of accident reports on a database

started by Troxel Riding Helmets, an American company which sold over a million helmets while

under the direction of its original owners. She entered accident reports from a variety of sources, and the results were later analyzed by Dr. Timms. Malavase was also a member of the USEF Safety Committee chaired by Malcolm Hook, a previous chair of the U.S. Eventing’s Safety Committee who is familiar with eventing officiating as a Technical Delegate who fills and investigates injury reports at competitions.

Stewards at Hunter /Jumper competitions have similar requirements. The same article cited above quotes Hook. “We have seen an increase in concussions, but I think some of that is the result of better reporting as much as anything else,” said Hook. “In 2016 and I hope 2017 we are not seeing any unusual increases. In 2016 we had 219 concussions reported, and for the first three-quarters of 2017 we’re at 186, which is about the same as where we were last year. Sixty-five percent of head injuries at horse shows occurred in conjunction with a jumping effort, and 89 percent were injured while preparing for a class or competing. “He pointed out that in raw numbers the hunter/jumper world has five times as many concussions as eventing (yes, you read that right), but when accounting for the number of overall starters eventing has more head injuries per competitor.

Hunter/Jumper, Eventing and Dressage rank first, second and third respectively in the raw number of concussions of all the USEF breeds and disciplines.”

The USEF Learning Center has video by Dr. Chambless on its website.

usef.org/learning-center/videos/concussions-signs-symptoms-helmet-safety

The Centers for Disease Control and Prevention’s Heads Up program has information and resources for parents, coaches and providers about concussions and brain injuries, including free online concussion training and free, customizable handouts and posters.

cdc.gov/headsup/index.html

As for economic concerns as the result of equestrian-related injuries, head injuries often result in long-term disabilities which influence a rider’s ability to return to work.

The New England Journal of Medicine has reported that wearing helmets reduces head and brain injuries by 85%...more than the 50% estimate previously quoted. Of U.S. equestrian-related fatalities, 60% are from head trauma according to a variety of studies.

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

We stopped counting at 39 back in the late 1990’s.

International Use of F1163

The U.S. Equestrian Federation and the U. S. Olympic Committee both come under the competitive umbrella of the Federation Equestre Internationale (FEI).

FEI has a list of the applicable international testing standards for Protective Headgear.

ASTM 1163:2004a and any subsequent updates are on this list.

F1163 is recognized as a U.S. National Equestrian Helmet Standard by the American National Standards Institute (ANSI).

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

Number 3: Good Health and Wellbeing.

Certified Helmets prevent or mitigates the results of severe head injuries.

Number 5: Gender Equality.

Equestrian is a sport where international competitive riding disciplines are not divided by gender and athletes of any sexual orientation compete directly against each other without prejudice.

Para-Equestrian has been a welcome addition in fairness since riders are graded by a panel of experts to match each rider's physical or mental qualities to the appropriate competitive levels of ability. Certified helmet use is mandatory for riders and carriage drivers/and their passengers.

Please provide any additional information not provided above.

First U.S. city ordinance (Section 25-83) Helmets required for riding horses and other equine animals in Plantation Florida.

(b) After April 1, 1999, an equine animal rider who is under sixteen (16) years of age must wear a helmet that meets the American Society for Testing and Materials (ASTM) standards (or any other nationally recognized standard for equine helmets adopted by the police department through a Police Chief's Executive Order) which is properly fitted and fastened securely upon the rider's head by a strap, when riding in a public area. This requirement applies regardless of whether a rider is controlling the equine animal. As used within this subsection, the term "equine animal" means a horse, pony, mule, or donkey.

In 2009 the State of Florida passed "Nicole's Law" requiring children 16 years of age and under to wear a helmet when riding. Named for a 12-year-old who died after suffering brain injuries from a fall off a horse while not wearing a helmet.

Effective on January 29, 2001, the Canadian Province of Ontario enacted a law that requires approved helmets and proper footwear (or safety stirrups) for persons under the age of 18 in most situations except horse shows. Penalty for violation is a fine of up to \$5,000. "No owner or operator of a horse-riding establishment shall permit any rider under the age of 18 years to ride any horse unless the rider has and is correctly using the following equipment in the manner that it was designed to be used: 1. A helmet that meets current standards for equipment designed and manufactured for use while riding horses as established by the American Society of Testing and Materials (ASTM), the British Standards Institute (BSI) or the European Safety Standards. This law also applies to riders under 18 on a highway."

Effective January 5, 2000, New York State Vehicle and Traffic Law 1265 required riders under age 14 to wear a helmet meeting or exceeding ASTM F1163 (Safety Equipment Institute Certified). The law explains certification and requires permanent marking with the certifying body's registered mark, and requires the helmet to be fastened securely using the model's fitting guidelines. New York's General Business Law 396-DD requires horse providers for horse rental or training to provide protective helmets to beginning riders and those less than 14. The helmets must meet the same requirements as described in the Vehicle and Traffic Law above.

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Please identify the designation and title of the standard

ASTM F977 Standard Consumer Safety Specification for Infant Walkers

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

While infant walkers have been used for many years by parents and caregivers, far too often a child had been seriously injured or died when the walker with the baby on board fell down stairs. In the early 90's, infant walkers were responsible for more injuries annually than any other type of nursery product because their mobility made them prone to stair falls. At about 23,000 injuries per year, the injury rate for walkers was nearly triple that of the next most injurious nursery product. The significant number of injuries was so alarming that the CPSC considered granting a petition by consumer groups to ban the products. Instead, ASTM's subcommittee on Carriages, Strollers, Walkers and Stationary Activity Centers (F15.17) took on the challenge to revise the F977 standard to significantly reduce the risk of death and injury from stair falls. The revisions required that walkers must incorporate a gripping feature to stop the walker at the edge of a step, or be at least 36-inches in width to prevent them from fitting through common doorways.

Identify the interest groups that participated in the development and/or revision to the standard?

Infant walker manufacturers, the Juvenile Product Manufacturer's Association (JPMA), the U.S. Consumer Product Safety Commission (CPSC), testing laboratories, industry consultants, and multiple consumer groups.

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

Once the F977 standard was revised to require features that prevent stair fall incidents, and the revisions to the standard proved to be effective, the CPSC's compliance director wrote to walker manufacturers in 2005 urging them to ensure that they comply with, not only federal regulations, but also the ASTM standard. Failure to comply would be considered a "Substantial Product Hazard" and be subject to a recall. JPMA also made compliance with the ASTM standard to be an essential requirement of their Certification Program. Today, all manufacturers on infant walkers are required by law under Section 104 of the CPSIA to be complaint with the ASTM standard.

After the standard was published, has it impacted health and safety? If yes, please explain.

The reduction in injuries and fatalities associated with this product are nothing short of remarkable. The attached graph prepared by the CPSC demonstrates the steep drop in the rate of injury once the F977 standard was implemented. Since that time, improvements continue to be made to further bolster the safety of these products, and injuries have continued to decline. The most recent version of the standard, published in 2022, was incorporated by reference in the Code of Federal Regulations.

How do consumers and the public benefit from this standard? (If applicable)

Without question, consumers can depend on the fact that the infant walkers they purchase are safe under reasonable foreseeable use. The ASTM standard, which is now incorporated by reference in federal regulations, has helped to reduce the pain and suffering experienced by both babies and their caregivers by essentially eliminating a most serious safety hazard.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

The standard has had a substantial impact on the safety of our most vulnerable population – infants and babies. While the cost for compliance is minimal, the reduction in cost realized with reduced medical expenses, product liability lawsuits, and recalls is substantial. The standard has also saved the lives of many infants. Manufacturers have embraced the standard and no responsible company would ever bring to market an infant walker that did not comply with the standard.

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

The ASTM F977 standard is incorporated by reference under Section 104 of the Consumer Product Safety Improvement Act. Compliance is mandatory in the U.S. Based on a report provided by the Staff Manager, the standard is also relied upon internationally. Australia and New Zealand (MoU) reference the standard in regulation. Kenya (Mou), St. Vincent (MoU), the Philippines (MoU) And Tanzania (MoU) consulted the standard. Kenya (MoU) and Hong Kong normatively reference the standard and Chile (MoU) used it as the basis of their national standards. Columbia purchased the standard.

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

#3 Good Health and Well Being – Under the progress and info section of this goal, the importance of reproductive, maternal, and child health is considered. This section addresses the under-5 mortality rate, which has been positively impacted because of the ASTM infant walker standard. In addition to walkers being mechanically and structurally safer, thus reducing other types of injuries, the standard also includes labeling and warnings requirements that help alert new parents to some of the other hazards associated with walkers such as tipping, scissoring, or pinching. The standard continues to be updated as new incident data is analyzed.

Please provide any additional information not provided above.

Contact Name: Donald Mays
Committee: F15 on Consumer Products
Email Address: donald.l.mays@gmail.com

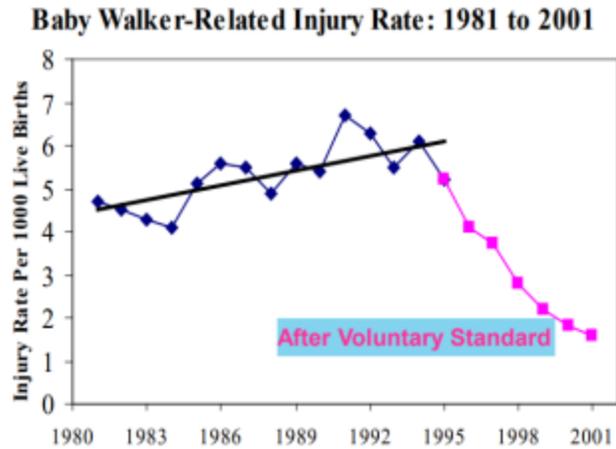
HAZARD IDENTIFICATION – BABY WALKERS

Baby Walker-Related Injury Rate: 1981 to 2001



RISK-INFORMED DECISION MAKING – EVALUATE RESULTS

- Data Analysis
- Trends
 - a reduction of nearly 90%



Source: CPSC Risk-Informed Decision-Making Webinar

2022 CONSUMER PRODUCT SAFETY PROFESSIONAL CERTIFICATION PROGRAM

THE SOCIETY OF PRODUCT SAFETY PROFESSIONALS IN COOPERATION WITH ADK INFORMATION SERVICES

July 19, 2022

Rik Khanna, Fire and Combustion Areas Risk Manager • Office of Hazard Identification and Reduction

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Please identify the designation and title of the standard

ASTM F1169 Standard Consumer Safety Specification for Full-Size Baby Cribs

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

The first version of the standard was published in 1988. The development of the standard started a few years prior in an effort to address an increasing trend of mechanical failures of structural components in cribs that caused or contributed to the deaths of many children. Full-size cribs were first regulated by the U.S. Consumer Product Safety Commission (CPSC) in 1973, under 16 Code of Federal Regulations Part 1508, Requirements for Full-Size Baby Cribs. The regulation contained very few requirements, the most notable ones being the component spacing and cutout requirements (added in 1982). These two performance requirements used specific test probes to ensure the spaces between slats and the size of any decorative panel cutouts were not large enough to admit an infant's hips or head, thereby effectively preventing entrapment and strangulation deaths in these parts of the crib. As mentioned, in the 1980s, stakeholders collaborated to develop an ASTM standard to address the ongoing structural crib failures that were not addressed in the CPSC regulation. Those first ASTM requirements included static and cyclic load testing on the mattress support and crib side rails. In addition, testing of the attachments of the side latches and plastic teething rails were added. The standard also restricted the use of finials on corner posts that were associated with strangulations deaths. Since the initial publication, F1169 has been updated eight times, with the last version published in 2019. The most significant revision to F1169 was in response to over 40 different recalls of over 11 million cribs, issued by the CPSC from 2007-2010, attributed to structural problems or failures of the cribs. Almost all the crib recall issues (detachments, disengagements, and breakages) created openings between the drop side rails and headboards or footboards in which infants became entrapped. During the time between November 2007 and April 2010, there were 36 deaths reported to the CPSC attributable to structural problems or failures of cribs.

Identify the interest groups that participated in the development and/or revision to the standard?

Crib manufacturers, retailers, consumer groups, CPSC staff, Health Canada staff, testing laboratories, industry consultants and other general interest groups.

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

In December 2010, the CPSC issued a new federal safety standard (regulation) for full-size baby cribs, 16 CFR 1219, that became effective in June 2011. The new regulation referenced ASTM's standard F1169-10, with one change to the voluntary standard. The most significant revision in F1169-10 concerned performance requirements that effectively prohibited the manufacture and sale of cribs with drop-side rails. Other important revisions include stricter mattress support and crib slat testing, fastener requirements, and improved labeling and instructions. Since the regulation first became effective, ASTM has revised F1169 three times, and the CPSC has updated its regulation accordingly, to refer to the latest ASTM version. The impact of this voluntary standard cannot be fully emphasized - since June 2011, every crib sold or put into commerce (including at 2nd hand stores) has had to comply with a specific version of the ASTM full-size crib standard, F1169. Manufacturers are required to have their cribs tested for compliance, and all third-party testing laboratories must be certified in order to conduct testing of cribs to the ASTM standard.

After the standard was published, has it impacted health and safety? If yes, please explain.

This standard has had a substantial impact on the safety of our most vulnerable populations, infants and babies. The one place where a parent should feel comfortable leaving their infants alone is in a crib. If a safe crib is not available, parents might resort to other, non-safe options. Having the strictest, safest crib standard that became mandatory through a US federal regulation, essentially saved the lives of many children. Cribs sold in the last decade in the US are substantially safer due to

How do consumers and the public benefit from this standard? (If applicable)

On December 28, 2010, the CPSC published (75 Federal Register 81766) the final rule, 16 CFR 1219, Safety Standard for Full-Size Baby Cribs. In this regulation, (effective June 28, 2011) ASTM F1169-10 was specifically referenced as CPSC's mandatory crib standard. Because the ASTM standard for cribs has been mandatory in the United States since June 28, 2011, consumers do not have to think about the safety of a crib, when buying one for their children. Peace of mind is priceless, for parents, when dealing with child safety.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

According to the U.S. Consumer Product Safety Commission report, entitled “Nursery Product Related Injuries and Deaths Among Children Under Age Five”, dated December 2011, there were approximately 40 deaths resulting from a range of hazards associated with a crib during the three-year period of 2006-2008. The hazards include incomplete assembly, missing, broken, or nonfunctioning components, or ineffective crib repairs (Risana Chowdhury, 2011). The same annual report published in December 2012, also notes 40 deaths due to crib related hazards for the years 2007-2009. Note these counts do not include fatalities due to the presence of hazardous crib surroundings (cord strangulations, plastic bag suffocations, etc.) nor do they include deaths that were attributed to extra or soft bedding in the crib. According to CPSC’s last two annual nursery product reports, published December 2020 and December 2021, the number of deaths attributed to crib related hazards (not associated with soft bedding or crib surroundings) were 11 for the three-year period of 2015-2017 and 10 for the three-year period of 2016-2018. Thus, the number of crib hardware/component related deaths fell substantially from before the standard was significantly revised in 2010 and became a federal regulation, to after. Considering that there are still older cribs being used in homes, and many have been tied to fatalities after the ASTM standard was approved (a saferproducts.gov search from 2011-2020 contains reports for four fatal incidents involving drop-side crib hardware failures and no crib hardware fatalities for ASTM compliant cribs), some if not many of these continuing fatalities are associated with older noncompliant cribs, showing even more than a significant drop in deaths.

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

As mentioned previously, the U.S. Consumer Product Safety Commission directly references the ASTM crib standards in their CPSIA Section 104 rulemaking for both full-size cribs and non-full-size cribs. Additionally, based on the data provided by the Staff Manager from the Global Cooperation Department report, Canada references the standard in its regulation. Hong Kong normatively references the standard. Both Chile and Jamaica use the standard as the basis for their national standards and the Philippines has adopted the standard. Other ASTM MoU bodies have bought and consulted the standard.

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

#3 Good Health and Well Being – Under the progress and info section of this goal, the importance of reproductive, maternal and child health is considered. This section discusses the under-5 mortality rate which has been positively impacted because of the ASTM crib standard. In addition to cribs being mechanically and structurally safer, thus lowering the number of fatalities to the very young, the standard also includes labeling and warnings requirements that help alert new parents to some of the other hazards associated with cribs, such as soft bedding and hazardous sleeping environments.

Please provide any additional information not provided above.

The CPSIA mandated the CPSC to update the crib standard. By working with ASTM and all the participating stakeholders this was accomplished in record time and addressed all the issues know at the time.

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Please identify the designation and title of the standard

ASTM F2417-17 Standard Specification for Fire Safety for Candles

ASTM F2058-07 (reapproved 2021) Standard Specification for Candle Fire Safety Labeling

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

Scented candles gained popularity in the United States in the 1980s and 1990s for decoration and creating a fragranced environment. The NFPA (National Fire Protection Association) routinely collected data on home fires and cited fires initiated by candles as a growing concern. Around 1996, home candles accounted for nearly 3% of all home fires which were estimated to be approximately 12,500 Candle fires annually. The CPSC (Consumer Products Safety Commission) asked the National Candle Association (NCA) for help in developing safety standards for candles to reduce the number of fires and deaths associated with their use. The percentage of home fires attributed to candles continued to rise and peaked at about 5% of all home fires by 2002 when there were an estimated 19,000 candle fires annually. ASTM candle fire safety standards were developed which included testing and requirements for safe burning candles along with the candle labeling standard with candle safety instructions for use. These standards have helped to reduce the percentage of home fires to around 2% of all home fires in 2014 onward, estimated to be 7500 fires annually caused by candles. This is over a 60% reduction in home candle fires annually since the peak in 2002, helping to save numerous lives.

Identify the interest groups that participated in the development and/or revision to the standard?

Interest groups include candle manufacturers, fragrance suppliers, wick suppliers, container suppliers, wax suppliers, testing labs, plastic manufacturers, the CPSC, National Association of Fire Marshalls, National Candle Association, and various retailers and consumers.

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

The standards are used by the manufacturers in the R&D phase of candle development along with candle production.

Candles are developed to meet the following criteria:

- No flame height greater than 3 inches
- No container failures • No second ignition (nothing other than the primary wick(s) can be on fire)
- A new candle must remain upright when tilted to 10 degrees off level
- Free standing candles may not deform such that they tip over as they burn
- The flame of a free-standing candle cannot impinge on the supporting surface (general end of life requirement)
- Plastic containers must meet certain flammability requirements
- If the candle has a coating it is tested in greater numbers to ensure the coating doesn't ignite in use

Candle labeling instructs the user to keep the candle in sight, away from things that catch fire and away from children.

The standards are also used by testing laboratories and retailers to help ensure candles introduced into the stream of commerce are safe. They are used on a routine basis by many companies; manufacturers and retailers alike, prior to release of their production batches to ensure each production batch is safe for sale.

After the standard was published, has it impacted health and safety? If yes, please explain.

After the standards were published, there was a steady decline in the number of home candle fires which has had a direct impact on health and safety for consumers. The reduction in the number of home fires attributable to candles has also meant a reduction of injuries and deaths related to candle fires. This data is available through NFPA reports that have been authored by Marty Ahrens and others. The most current data has a publication date of May 2020.

How do consumers and the public benefit from this standard? (If applicable)

Candles are safer now than they were 25 years ago, so the consumer benefits from a decreased risk of fire, injury, or death in the use of the product. The public benefits because there are less home fires due to candles, reducing the burden on local fire departments and decreasing their risks by reducing the number of home fires.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

The data is provided in reports authored by the NFPA staff. This information has been shared with the National Candle Association and the ASTM Subcommittee F15.45 throughout the years. A recent publication is "Home Candle Fires" by Marty Ahrens, dated May 2020. Another comprehensive report is titled "Home Structure Fires Supporting Tables" dated October 2021, by Marty Ahrens and Radhika Maheshwari. This provides historical data on home fires from 1980 through 2020. Both of these documents include data that show the decline of home fires attributed to candles over the years. While we do not have immediate access to the data, there is reason to believe that the number of candles sold annually has increased substantially from 1996 to present day. This information may be available through the National Candle Association. (See Ahrens and Maheshwari report attached)

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

The standards are voluntary but heavily encouraged. They are used throughout the US, Canada and to some degree in Latin America. European countries have adopted similar requirements for candles and look to the ASTM candle fire safety standards as a reference guide. Around the mid-2000s, the Fire Marshalls Association petitioned to make the ASTM F2417-17 standard mandatory, however, the CPSC determined that the voluntary use of the standards was making an impact in the reduction of home fires attributable to candles, and they declined to make the standards mandatory.

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

In review of the 17 sustainable development goals, there is probably not a direct relationship

Please provide any additional information not provided above.

Contact Name: Robert Moss
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Home Candle Fires

Marty Ahrens
May 2020

Candle fires

In 2014–2018, US fire departments responded to an average of 7,610 home¹ structure fires that were started by candles per year. These fires caused an annual average of 81 civilian fire deaths, 677 civilian fire injuries, and \$278 million in direct property damage.

Overall, candles caused 2 percent of the reported home fires, 3 percent of the home fire deaths, 6 percent of the home fire injuries, and 4 percent of the direct property damage in reported home fires during this period.

On average, 21 home candle fires were reported per day.

Candle fire seasonality

December was the peak month for candle fires, followed closely by January. Eleven percent of these incidents occurred in each of the two months.

Candle fires appear to be related to holiday decorations. Twelve percent of December candle fires began with decorations. Only 4 percent of candle fires in January to November began with such items.

Almost three times as many fires started by candles were reported on Christmas (average of 58 Christmas fires) as the daily average.

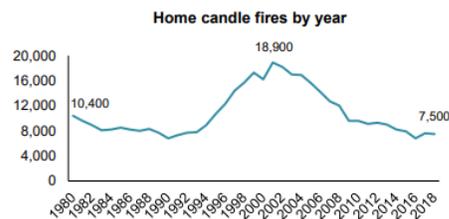
Candle fire victims

Fifty-eight percent of the candle fire fatalities and 54 percent of the non-fatally injured were female. This is the opposite of overall home fires in which 57 percent of the fatalities and 55 percent of the non-fatally injured were male.

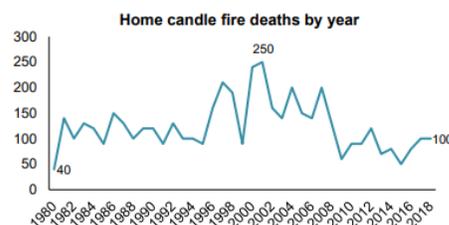
More than one-third of the people who succumbed to candle fires were at least 65 years old (36 percent). Nearly one-fifth were 55–64 years of age (18 percent).

Trends in home candle fires

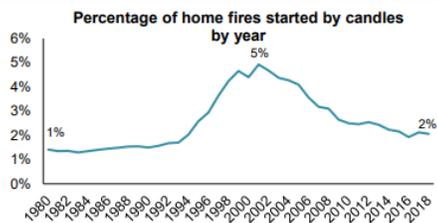
While overall home fires declined through the 1980s and most of the 1990s, candle fires increased sharply through the 1990s as the popularity of candles climbed. These fires peaked in the early years of the 20th century and then started on a downward trend.



While annual deaths from fires involving candles fluctuate more than candle fires, deaths, too, were higher in the late 1990s and the beginning of the 21st century.



The share of home fires caused by candles increased from 1 percent in the early 1980s to 5 percent in the early years of the 21st century before falling back down to 2 percent.



No standards for candles existed in the 1990s. The Consumer Product Safety Commission (CPSC) requested that ASTM develop candle fire safety standards, a request that the National Candle Association (NCA) supported. An ASTM Consumer Product subcommittee wrote standards addressing safety labels, glass candle containers, maximum flame height, secondary ignitions, end-of-useful-life and tip over requirements.^{2,3} The subcommittee has a task group that reviews publicly available reports of candle fires and recalls to ensure that the circumstances are addressed by the ASTM standards. CPSC's saferproducts.gov is a primary source of candle fire reports and recalls.

Causes and circumstances of home candle fires

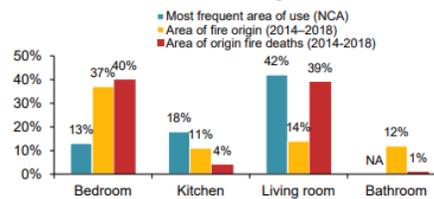
Three of every five (60 percent) candle fires started when something that could burn—such as furniture, mattresses, bedding, curtains, or decorations—was too close to the candle. In 16 percent of the fires, the candles were unattended or abandoned.

Sleep was a factor in 10 percent of the fires, 15 percent of the fire deaths, and 22 percent of the injuries. Drug or alcohol impairment was also a possible factor in 15 percent of the deaths. Only 3 percent of candle fires were intentional.

Based on information on the NCA's website on where candle fires are most frequently used,⁴ candles in the bedroom cause a disproportionate number of fires and fire deaths.

The leading items first ignited are consistent with the leading areas of origin. While upholstered furniture and mattresses and bedding are the leading items associated with overall home fire fatalities,⁵ it is unusual to see 15 percent of deaths resulting from fires associated with magazines, newspapers, or writing paper. Although the data are not sufficiently robust to confirm this, it is likely that in fires that began with items such as paper and curtains, the initial fire spread to other items such as furniture and bedding or into the walls.

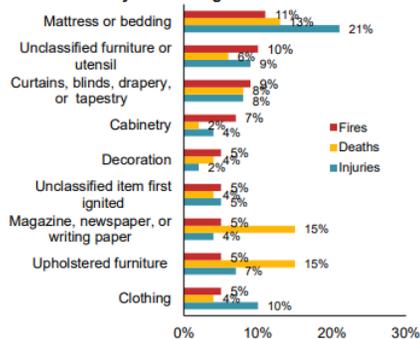
Home candle fires by leading areas of use and fire origin



Smoke detectors alerted occupants of a 25-story California apartment building to a fire that began in the living room of a 12th floor unit when a candle ignited window treatments. The fire was able to spread from the 12th to 16th floor through voids. Property damage was estimated at \$8 million to the structure and \$2 million to the contents.⁶

The fire was confined to the object of origin in 22 percent of home candle fires and only 1 percent of candle fire deaths. Thirty-two percent of candle fire deaths resulted from the three-quarters (74 percent) of fires that were confined to the room of origin.

Home fires started by candles by item first ignited: 2014-2018



Candles used for light

While candles are typically used for mood, decoration, or scent, the situation is different when candles are used for light due to power outages or shutoff.

Several years ago, NFPA reviewed news clips and files on 117 fatal candle fires that caused 177 deaths between January 2005 and December 2010. Unless power was specifically mentioned, it was assumed to be operational. According to reports from the fire service, fire investigators,

or and the newspapers, the home was without power in one-quarter (26 percent) of the fatal candle fires studied and in one-third (34 percent) of the associated deaths. Percentages were based on incidents in which the reason for the lack of power was known. In 68 percent of the fires resulting in 62 percent of the deaths, the power had been shut off or the home lacked utilities. In six fires (24 percent) resulting in six deaths (12 percent), candles were used during a temporary power outage. In two fires (8 percent) resulting in 13 deaths (26 percent), new occupants were moving in and the power had not yet been turned on.

Texas apartment fire claimed the life of an elderly man and injured his wife after a candle started a fire on a bedroom nightstand during a power outage. The deceased had a mobility disability, and his wife had left the candle on the nightstand for him. Her attempts to rescue him and to extinguish the fire were unsuccessful. The fire was confined to the unit of origin.⁷

For more information

The fire estimates in this analysis were derived from the US Fire Administration's National Fire Incident Reporting System (NFIRS) and NFPA's annual Fire Experience Survey. See "How the NFPA National Estimates Are Calculated for Home Structure Fires" for more information.

For more details about candle fires, see the [companion supporting tables](#).

To learn more about research at NFPA, visit nfpa.org/research.

Email: research@nfpa.org

NFPA No. PKG34

¹ Homes include one- or two-family homes, including manufactured homes, and apartments or other multi-family housing.

² National Candle Association, "Key ASTM standards for candles," accessed March 5, 2020, <https://candles.org/industry-standards/>

³ Doug Clauson, "Increasing Candle Safety," *ASTM Standardization News*, March/April 2013, <https://www.astm.org/standardization-news/?q=features/increasing-candle-safety-ma13.html>. Accessed March 5, 2020.

⁴ National Candle Association, "Facts and Figures: Consumer Preferences," accessed March 5, 2020, <https://candles.org/facts-figures-2/>.

⁵ Marty Ahrens, *Home Structure Fires*, Quincy, MA, 2019, 12.

⁶ Stephen G. Badger, "Large-Loss Fires for 2018," *NFPA Journal*, November/December 2019.

⁷ Richard Campbell, "Firewatch," *NFPA Journal*, March/April 2017.

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Please identify the designation and title of the standard

ASTM D2467 Specification For Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80 and companion standard D1785 Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

This standard was originally developed to introduce the use of PVC material in the creation of PVC fittings for PVC piping systems. It was not developed to solve the problem this submission is referring to, however, through the use of this standard, a problem was solved that has since provided a large positive impact on the safety of certain marine life (whales and even more specifically the endangered North Atlantic Right Whale).

This standard was originally created in 1965. Proof that even old but a well-maintained standard can still have an impact far into the future.

Identify the interest groups that participated in the development and/or revision to the standard?

It was a mix of interests from the 1960s that helped developed this important standard, notably producers, users and general interest members.

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

This standard is most normally used with piping systems with “internal” pressures.

However, in this case it is being used in a piping system that must withstand “external” pressures. This case study is showing the versatility of the standard and the product to be used for a variety of applications, including ropeless fishing techniques which remove the need for floating ropes and have saved whales, notably in South Africa. The article attached covers more specific details.

After the standard was published, has it impacted health and safety? If yes, please explain.

Since the inception of this standard, numerous benefits have been experienced by the general public, but this case study relates to the saving of the whales in fisheries.

How do consumers and the public benefit from this standard? (If applicable)

The original intent of the standard was specification establishes minimum manufacturing requirements for Poly (Vinyl Chloride) (PVC) Schedule 80 pressure fittings. These fittings are intended for use in pressure applications where the temperature of the fluid conveyed does not exceed 140°F. It is a very popular and well used standard for piping applications. In this case, the content is being used to save an endangered whale species in South Africa. Article is attached.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

The article highlights it but a quick summary – two ASTM standards (but mainly D2467) would be instrumental in helping save whales in rope entanglements from crab-pots. ARC-2 is a new device and through use of the ASTM standard and testing, it was able to provide a solution. While they had chosen and were using standard 2” PVC pipe from ASTM D1785 they had accidentally neglected to make the socket dimensions to its companion standard, D2467.

Now in South Africa, a large fishing company with multiple fishing vessels is using the ARC-2 in the Octopus fishery. This has made quite some waves because they were shut down for whale entanglements, but have been fishing again for the last year with their ARC-2 pop-ups and have experienced no further whale entanglements.

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

No

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

YES, it does.

Please provide any additional information not provided above.

Contact Name: Jack Roach
Committee: F17
Email Address: jack.roach@ipscorp.com



Whale of a tale

It all started with a phone call to Weld-On Tech Service. That simple call resulted in the estimated saving of 14 whales last year in the fisheries off the coast of South Africa...

The call was from a company that was introducing a more cost-effective model of their sonar release mechanism for crab-pot buoys. This product allows for the crab-pot buoy to be stored with the crab pot. By keeping the buoy and rope with the pot during its time on the ocean floor, it eliminates crab-pot thefts, accidental prop fouling, and most importantly... whale deaths from entanglement with the trailing buoy rope. Last year alone, approximately 14 whales died worldwide from entanglement with crab pot ropes. Once the pot has “soaked” for a given number of days, the device is triggered to release the buoy by a unique sonar signal. This allows crab-pots to be retrieved “at will”.

A short time after the initial call an email arrived with photos/drawings and a description of the problem: “One of the pictures is an ARC-2 cut open after leakage, so this leakage is what we must avoid. The ARC-2 is a new device and we still have options for its depth rating. This may be anywhere in the 100m of sea water (150 PSI) to 300m (450 PSI) range, with a greater depth rating translating to a bigger portion of the lobster fishing market. In any case, your help in coming up with a reliable sealing method for this PVC pressure housing design is much appreciated!”

To keep costs low and to provide a device that would be 100% resistant to corrosion from seawater they chose PVC material. The specialized PVC housing that would hold the sensitive electronics was made with a socket to solvent weld directly onto a standard 2” sch 80 PVC pipe.

A quick review of the part drawing uncovered the most likely cause of failure during test. While they had chosen and were using standard 2” PVC pipe from ASTM D1785 they had accidentally neglected to make the socket dimensions to its companion standard, D2467. This standard provides dimensional requirements on socket dimensions (more specifically the type that produces a tapered interference fit). After pointing this out they made a few changes to the tooling and other assembly procedures.

After modifications were made, we suggested it be tested in a hydrostatic test chamber to simulate the cyclic pressure swings from repeated trips to the ocean floor and back to the surface. We have at our disposal just such a testing machine in our lab in North Carolina. A few weeks later... a fully built ARC-2 (complete with onboard electronics) arrived at the lab in Hillsborough, NC. The test sample was installed in the pressure chamber and in less than a day we had subjected the transponder to over 4,000 simulated trips from the surface to the bottom

of the ocean (over 25 years of use). Knowing the strength of the pipe, the fittings, and the solvent welded joint, we took it to a much greater depth than 1,000 feet; the sample was instead taken to a simulated depth of 1,500 feet or (635 psi).

After successful testing...

”So far, there have been no problems reported with its sealing, including the glued transducer endcap. In South Africa, a large fishing company with multiple fishing vessels is using the ARC-2 in the Octopus fishery. This has made quite some waves because they were shut down for whale entanglements, but have been fishing again for the last year with their ARC-2 pop-ups and have experienced no further whale entanglements. Thanks again for all your help! It made a difference, now even to some whales that might otherwise no longer be swimming, and really helped us get confidence in this lower cost design. Marco”

I never anticipated that two ASTM standards would one day be instrumental in helping save whales in rope entanglements from crab-pots.

Photo of actual tested device inside test chamber



Posted on 19 November 2021

Research finds effective way to reduce whale entanglements in South African waters.

The risk of whale entanglements would be greatly reduced if trap fisheries (commonly used for catching rock lobster and octopus) used **ropeless fishing techniques** which remove the need for floating ropes between the water surface and ocean floor.

This is the finding of a WWF-funded study by the University of Cape Town’s Michael Daniel and Associate Professor Colin Attwood who put various techniques to the test. Their results showed that the ropeless fishing technique is a solution to reducing whale entanglements in South Africa.

In South African waters, Bryde’s whales are particularly vulnerable to entanglement in

trap fishing ropes as they dive deep and fast to catch their food. Other species at risk include southern right and humpback whales due to their natural tendencies to investigate floating objects like rope and kelp.

Ropeless fishing devices allow for traps to be deployed in waters without a surface buoy indicating their position. Instead, the buoy is only released when the time comes for harvesting, thus avoiding the risk of ropes floating in the water for long periods of time.

Techniques for triggering a buoy's release range from a simplistic galvanized release to a more technical electronic or acoustic release, with varying costs attached. The researchers found that the appropriate ropeless fishing techniques for South African trap fisheries would be economically feasible for all trap fisheries. Estimates suggest an increase in costs of less than 5%.

In June 2019 the Department of Forestry, Fisheries and Environment placed a temporary ban on the experimental octopus fishery in False Bay in the Western Cape. This followed concerns over entanglements resulting in whale deaths. The suspension was later lifted given that the fishers implement mitigation measures that would reduce the risks of entanglements. The fishery in False Bay has been using ropeless fishing techniques from the beginning of 2020 and has not had a whale entanglement since then.

WWF **ROPELESS FISHING: A SOLUTION FOR SEA LIFE AND FISHERIES**

THE ISSUE WITH WHALE ENTANGLEMENT

The infographic shows a boat with solid buoys connected to lobster traps and octopus pots on the seabed. A whale is shown entangled in the ropes.

THE SOLUTION TO WHALE ENTANGLEMENT

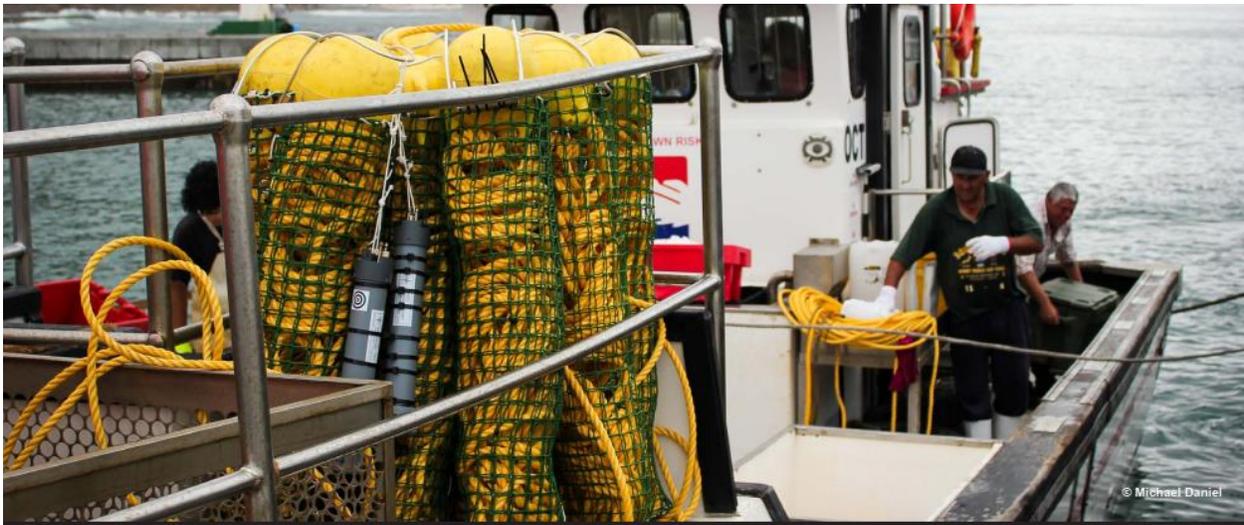
The infographic shows a boat with acoustic release devices, solid buoys, and inflatable bags. The solid buoys and ropes are held on the sea floor. A storage system with coiled rope is also shown.

NEGATIVE IMPACTS

- Whales often get entangled in the rope-based fishing gear of rock lobster and the experimental octopus fisheries.
- Approximately 14 whale entanglements from various types of fishing gear has been recorded every year for the past five years.
- About R10 000 is spent on waste management services for every whale that dies from an entanglement.
- Approximately R4 500 is spent for every whale that is disentangled.

POSITIVE IMPACTS

- Ropeless fishing eliminates the threat of whale entanglement.
- Ropes are put in a rope storage system and placed on the seafloor until such time of retrieval.
- The technique has been tested and proven to work in South Africa.
- The experimental octopus fishery implemented the ropeless fishing method in 2020, and there have been no whale entanglements since then.



Pictured here: An octopus fishing boat with ropeless fishing gear - solid yellow buoys each with a green mesh storage bag containing yellow coiled-up ropes, plus a remote-activated acoustic release device.



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Please identify the designation and title of the standard

ASTM F2023 Standard Test Method for Evaluating the Oxidative Resistance of Crosslinked Polyethylene (PEX) Pipe, Tubing and Systems to Hot Chlorinated Water

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

In the wake of one of the largest class action lawsuits in US history resulting from polybutylene (PB) flexible plumbing piping and fitting failures, the nascent crosslinked polyethylene (PEX) plumbing industry needed to reassure code development bodies, plumbers, and builders that PEX tubing is resistant to elevated levels of disinfectants (i.e., chlorine and chloramines) in treated drinking water and that these products are suitable for long term performance in aggressive hot- and cold-water distribution applications.

The systematic failures experienced by PB tubing and polyacetal fittings in plumbing systems across North America in the late 1980s and 1990s were the result of oxidative degradation of the materials that led to cracking in pipes and fittings and loss of water. Leaks in plumbing systems can cause extensive and costly damage, along with significant inconvenience to homeowners. Subsequent research identified that the oxidation and cracking was caused by the chlorine-derived disinfectants added to drinking water, which was particularly acute at elevated temperatures and pressures in hot-water plumbing systems.

The construction industry looked to PEX systems as the prime alternative for PB piping systems due to the flexibility of PEX tubing, reliability of fittings, and approvals for drinking water safety (e.g., NSF 61), and at the same time, PEX tubing and fitting manufacturers sought an accelerated test method that could accurately demonstrate resistance to hot, chlorinated water and ensure reliable long-term performance in the end-use application.

Identify the interest groups that participated in the development and/or revision to the standard?

The development of the new ASTM test method was driven by the PEX piping industry in conjunction with industry testing and certification partners. The first method was developed under the auspices of the National Sanitation Foundation (now NSF) and was published as the NSF Protocol P171 in 1999. However, this method was not a consensus-developed standard.

ASTM Test Method F2023, the industry consensus standard, was published in 2000 following extensive industry collaboration. Part of the development process for Test Method F2023 included industry cooperation, through The Plastics Pipe Institute, to conduct field testing of water quality throughout the US to identify the most aggressive water qualities, and then to use those data to establish the water quality to be used in the test method, ensuring conservatism in the methodology.

In 2002, mandatory performance requirements for "oxidative stability in potable chlorinated water applications" were added into ASTM Standard Specification F876 for crosslinked polyethylene (PEX) tubing. Similar performance requirements based on Test Method ASTM F2023 were included in ASTM F2788 for PEX pipe, ASTM F2769 for PE-RT tubing and in ASTM F2389 for polypropylene piping as these new product standards were developed.

Test Method F2023 has been refined since its publication with new editions published in 2003, 2004, 2005, 2008, 2009, 2010, 2013, 2015 and 2021. However, no fundamental changes to the test method have been made since its first publication.

F2023 has also been adopted for other polyolefin-based piping materials included in F17.26 standard specifications, including PE-RT tubing according to ASTM F2769. Additionally, the research and methodologies developed have been applied to polyethylene water piping to establish a methodology (ASTM F2263) and industry requirements (ASTM D3350, F714, D3035; AWWA C901, C906) for long-term resistance to water disinfectants. Most recently, F2023 was used as the basis of the new Test Method F3497-21 for polypropylene piping systems.

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

Today, all PEX, PE-RT, and PP piping systems intended for potable water are required to be evaluated by ASTM F2023, or its analogue F3497, and minimum performance requirements for oxidative resistance are in place. In addition, these tubing standards also include higher optional levels of oxidative resistance.

For example, Standard Specification F876 requires that "PEX tubing intended for use in the transport of potable water shall have a minimum extrapolated time-to-time failure of 50 years and comply with the requirements for a first digit of "1" or higher in the PEX Tubing Material Designation Code when tested and evaluated in accordance with 7.11.", which states "The test shall be conducted, and the extrapolated time-to-failure shall be determined in accordance with Test Method F2023."

The F2023 testing requirements are very demanding. Testing typically takes 1 to 2 years to complete and requires testing multiple specimens to failure at three elevated temperatures (typically 239°F (95°C), 221°F (105°C) and 203°F (115°C)) and multiples stresses to capture and characterize the material's temperature and stress dependence. This data is then fitted through multivariate regression to the rate process equation that permits extrapolation of performance to end-use conditions that are directly related to the temperatures and pressures found in plumbing applications.

Furthermore, a cumulative damage model using Miner's Rule is used to account for the intermittent use of the plumbing system at various operating temperatures throughout a typical 24-hour period, from the traditional domestic exposure (6 hours per day at 140°F (60°C)) up to continuous recirculation exposures (24 hours per day at 140°F (60°C)).

With these methodologies in place, the pipe and tubing product standards establish minimum 50-year performance requirements for use in residential and commercial plumbing systems.

The complete oxidative resistance evaluation is done on the tubing materials as a one-time qualification test. On-going verification testing of approved products based on the ASTM F2023 methodology is required by certification bodies according to their policies.

After the standard was published, has it impacted health and safety? If yes, please explain.

Failure of plumbing piping materials while in service can not only cause a lot of physical and economic damage, but when it involves the failure of hot water plumbing it can result in the release of scalding hot water that can be dangerous. ASTM F2023 has proven to be a stringent and reliable test method for evaluating chlorine resistance of PEX tubing, setting very high thresholds for various levels of performance, and ensuring that public water systems and premise plumbing systems utilizing PEX tubing are protected against premature failure and property damage that could result if piping products were not resistance to hot chlorinated water.

Across the global piping industry, no weaknesses with this test method have been discovered. In fact, this ASTM test method is the standard recognized throughout the world for evaluating chlorine resistance of PEX tubing and is also referenced within CSA Standard B137.5 and AWWA Standard C904.

Since 2002, testing according to ASTM F2023 is a mandatory requirement for all PEX cold- and hot-water plumbing tubing, as per tubing standards ASTM F876 and CSA B137.5. As a result, PEX tubing has proven to be a reliable piping material for chlorinated potable water applications.

PEX tubing and pipe for drinking water applications is required to have a minimum extrapolated time-to-failure of 50 years when tested in accordance with ASTM F2023 and evaluated in accordance with ASTM F876 or ASTM F2788. Continuous recirculation, timed recirculation, and traditional domestic conditions are evaluated by ASTM F2023 and categorized within those standards as part of the Thermoplastic Pipe Material Designation Code.

Beyond these four standard chlorine categories, the data generated when testing PEX materials to ASTM F2023 allows for evaluations of extrapolated times-to-failure at other operating conditions, including other pressures and temperatures, within the guidelines of F2023. For example, a laboratory may apply the regression analysis generated from the F2023 data set for a particular PEX formulation, as well as Miner's Rule for other situations of multiple temperatures, to determine an extrapolated time-to-failure for a specific application.

How do consumers and the public benefit from this standard? (If applicable)

ASTM F2023 has proven to be a stringent and reliable test method for evaluating chlorine resistance of PEX tubing, setting very high thresholds for various levels of performance, and ensuring that public water systems and premise plumbing systems utilizing PEX tubing are protected against premature failure and property damage that could result if piping products were not resistance to hot chlorinated water.

PEX has become the leading potable water piping material used in new construction and remodeling. PEX tubing provides several benefits over traditional plumbing materials to the builder and consumer, including flexibility and ease of installation. The testing conducted according to ASTM F2023 and the evaluation of its data according to the aforementioned piping standards provides users with the assurance that PEX and other plastic piping systems have suitable long-term performance in even the most aggressive potable water applications when properly selected and installed.

The underlying requirements and methodology have also been applied to ensure that other plastic plumbing materials such as PE-RT, PP, and fitting materials also have suitable performance. The methodology of F2023 has also been extended to ensure that PE piping used in potable water transmission and distribution is suitable, with the aim of ensuring that our infrastructure provides 100+ years of service.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

The publication of F2023 with mandatory test requirements in ASTM F876 helped the acceptance of PEX plumbing systems by the construction industry and was instrumental to achieving the inclusion of PEX into the California Plumbing Code, among other state and local codes.

The North American PEX pipe market has grown to well over 100 million lbs/year with continued strong growth. According to the Home Innovation Research Lab Builders Practices Report (Sept. 2021), the usage of PEX tubing in residential plumbing systems has increased from less than 10% in 1997 to more than 60% in 2020.

The development and application of Test Method F2023 has played a major role in the adoption and successful use of PEX systems for potable water applications and has also been applied successfully to other piping materials over the past twenty years. It has allowed PEX piping to grow from primarily a residential product to have a significant presence in commercial and multi-story residential properties.

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

ASTM Test Method F2023 is the standard recognized throughout the world for evaluating chlorine resistance of PEX tubing. It is referenced within CSA Standard B137.5, the Canadian standard for PEX tubing systems for pressure applications, which is the mandatory requirement for PEX systems according to the National Plumbing Code of Canada.

ASTM F2023 is also the basis of mandatory chlorine resistance requirements within AWWA Standard C904, the standard for PEX water service line tubing.

Numerous research teams around the world have utilized F2023 to conduct oxidative resistance evaluation testing of various pipe and fitting materials, and those peer-reviewed papers have been presented at global conferences.

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

The development of Test Method F2023, which has led to the use of reliable piping materials for plumbing distribution systems, is directly related to several UN Sustainable Development Goals:

No. 6 "Clean Water and Sanitation" is met through the use of chlorine-resistant plastic piping systems which are reliable and safe for transport of drinking water.

No. 12 "Responsible Production and Consumption" is met through the production of tested and proven piping materials that are fit for purpose and will deliver performance for 50 years or more.

Please provide any additional information not provided above.

Contact Name: Patrick Vibien, Lance MacNevin, Jim Paschal

Committee: F17

Email Address: pvibien@plasticpipe.org

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Please identify the designation and title of the standard

Designation: F496-20 Standard Specification for In-Service Care of Insulating Gloves and Sleeves.
Originally published in 1977. ASTM F496-77

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

Rubber insulating gloves and sleeves were tested to ASTM D120, originally approved in 1921, by the manufacturer before first issue and by several Test Labs. There was no Standard available to address testing of these items after they had been used in the field for several months. These gloves, no longer new but still usable, needed a way to confirm or recertify their ability to be reused in the field. F496 was developed by Committee F18 to resolve this problem. There needed to be some direction as to how to handle and "recertify" rubber insulating gloves and sleeves so that they could be reissued for another period of use. Committee F18 met in 1976 and 1977 to work on this issue. The Committee drafted a Standard to recertify gloves and sleeves under the direction of Art Lewis who was the Chairman of F18 as well as the safety director of PSE&G in New Jersey. Mr. Lewis led the F18 group, and the Standard was drafted but not without controversy. When the Standard was almost completed, a small fraction of F18 wanted the two items, gloves, and sleeves, separated into two Standards, one for each product. Mr. Lewis wanted the Standard to remain as written, and with the spirit of cooperation that has been a part of F18 since its inception, the Standard was passed in 1977.

Identify the interest groups that participated in the development and/or revision to the standard?

The development of the Standard was driven by end users in the electrical distribution field, the telecommunications field, and the commercial and industrial field. All of these groups contributed to the development of the Standard, but Lineman concerned about their day-to-day safety were very large contributors. ASTM F496 has gone through several revisions over its 45-year history, and it continues to evolve to this day. Producers, Users and General Interest Groups have made F496 a much stronger Standard than it was when it was introduced 45 years ago.

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

This Standard is used by Test Labs throughout the country and world to recertify gloves and sleeves to be used safely in the field. This includes power generation, power distribution and maintenance. This "field" is growing ever larger and now includes more than just lineman and electricians. Members of the transportation field (electric cars, buses, and trains), factory workers, telecommunications workers and even farms and prisons maintaining electric fences need rubber protective equipment to work and maintain their systems. Gloves and sleeves recertified to ASTM F496 provides a safe way to maintain all of these systems.

After the standard was published, has it impacted health and safety? If yes, please explain.

Yes. ASTM F496 has provided a reliable way to retest gloves and sleeves. These recertified safety items have prevented countless injuries, accidents, and deaths. Gloves and Sleeves retested to ASTM F496 is an integral part of countless safety programs across the globe. Several national and international organizations reference F496 including OSHA, NFPA-70E, IEEE and several others and have either adopted or referenced F496 further protecting workers in the electrical industry worldwide.

How do consumers and the public benefit from this standard? (If applicable)

Power. Keeping the power on, which most of us take for granted, is the greatest benefit to the public when retesting of rubber gloves and sleeves to F496. It provides electrical workers with a reliable and safe way to ensure that the personal protective equipment used to keep the power on is also protecting the worker and allowing him or her to go home to their families at the end of the day. It is also a cost savings for the consumers and general public. Utilities and other electrical workers do not need to continually buy new rubber insulating gloves and sleeves to perform their duties. Retested gloves and sleeves are a fraction of the cost of similar new product. This reuse of the product also keeps rubber out of the landfills and reduces overall operating costs for several industries allowing them to keep the cost to consumers as stable as possible.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

In the United States, there are approximately 1,000 deaths per year as a result of electrical injuries. Of these, approximately 400 are due to high voltage electrical injuries. * Rubber insulating gloves and sleeves as tested to ASTM F496-20 protects workers from electrical hazards which can cause injury and death. Average cost of a new pair of Class 2 rubber insulating gloves: \$200.00 * Average cost of retesting a pair of Class 2 rubber insulating gloves: \$10.00 Testing is a critical component to electrical safety – not only does it help maintain compliance, but it also increases savings. Rubber insulating products are costly, and these costs are often unnecessarily increased by purchasing replacements for products that could have remained in service with the proper testing and re-certification. * *National Library of Medicine (NIH) *Total Safety Supplies and Solutions *National Association of Safety Professionals

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

The following organizations have adopted or referenced ASTM F496: OSHA, Centers for Disease Control and Prevention, American National Standards Institute, NFPA-70E, International Electrotechnical Commission (IEC) and many other worldwide organizations have referenced or adopted ASTM F496.

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

Yes.

Goal 3 Good Health and Well Being

Providing safe and reliable power for hospitals with electrical workers protected by retested gloves and sleeves.

Goal 7 Affordable and Clean Energy

Progress in advancing renewable energy and adding the over 679 million people without electricity to the grid will involve the production and distribution of power. All with recertified rubber ppe.

Goal 8 Decent Work and Economic Growth

Advancing economic growth with full and productive employment will require reliable power sources built and maintained with rubber ppe tested to F496.

Goal 9 Industry, Innovation, and Infrastructure

Increasing high technology industries will require safe and reliable power.

Please provide any additional information not provided above.

Another issue to consider that also emphasizes the importance and need for ASTM F18 F496 Standard Specification for In-Service Care of Insulating Gloves and Sleeves is the long lead times that many end users are currently seeing from all the major manufacturers and suppliers of these products. Many companies and workers using Rubber Insulating Gloves and Sleeves for personal protection against an electric shock, injury, or even death by electrocution to complete their Live Line Work in the field would previously use their Rubber Insulating Gloves for 6 months and Sleeves for 12 months. This is the expiration date of the manufacturer's completed High Voltage Test requirement per D120 for Gloves and D1051 for Sleeves. They would then simply throw away their expired Gloves after 6 months and Sleeves after 12 months and then purchase new replacement products. With the current supply chain issues and long lead times for Rubber Insulating Gloves and Sleeves most companies cannot get replacements in a reasonable amount of time from the manufacturers and supplies for their employees. The lead times for new product now stretches months and even years. The need to retest them at a Test Lab Facility per F496 is almost a requirement due to these long lead times. If a company has 100 pairs of Rubber Insulating Gloves in their system and they plan to reissue brand new Gloves every 6 months and not have them retested, then they will need 100 brand new pairs of Gloves every 6 months. If their employees Rubber Insulating Gloves are retested every 6 months and then reissued for use under ASTM F18 F496 and only 3 pairs of Gloves fail the retest cycle, then the amount of new product needed is drastically reduced. This is a much more economical option as retesting Rubber Insulating Gloves and Sleeves is a fraction of the cost of new and a time saving option for Electrical Companies as well.

Contact Name: Steve Mayfield

Committee: F18

Email Address: steve.mayfield@totalsafety.com

ASTM Standard Use & Effectiveness Case Study Contest

Please identify the designation and title of the standard

ASTM F1506 - 22

Standard Performance Specification for Flame Resistant and Electric Arc Rated Protective Clothing Worn by Workers Exposed to Flames and Electric Arcs.

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

In 1994 OSHA changed its regulations requiring employers to protect their workers from electric arc flashes resulting in burn injuries. This is when the foundation and the need for a standard that guided the use of Personal Protective Equipment (PPE) for electrical workers began to come to realization.

To comply with this regulation and prevent ignition from exposure to arc flash hazards, the electrical industry chose to use Flame Resistant (FR) garments or have employees wear heavy weight natural fibers which can prevent ignition by using a hierarchy of controls such as physical barriers and increased distances.

As OSHA mandates started rolling out in 1994 that provided some guidance by way of requiring clothing to not add to the extent of any burn injuries, safety conscious end users partnered with manufacturers to try and use thermal testing to evaluate performance of FR clothing for arc flash applications.

When ASTM F1506 was first published in 1998, it mandated vertical flame testing (D6413) to qualify materials for applications requiring protection from arc flash hazards. It wasn't until the 2000 revision that Arc Flash testing was introduced and not until 2010 that the term "arc-rated" was recognized in the title. Looking back at the milestones the standard has achieved to develop test methods as well as terminology to recognize and characterize a hazard that was previously unaccounted for, it's important to recognize the significance of the challenges addressed in ASTM F1506.

Identify the interest groups that participated in the development and/or revision to the standard?

The standard was initially developed by the electrical utility industry and manufacturers and has evolved over time with contributions from additional participants, including, PPE distributors, labor unions, federal agencies such as OSHA as well as consultants and other subject matter experts.

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

ASTM F1506 has played a pivotal role in establishing 'arc-rated clothing' as an industry term. More importantly, it has enabled end users to correlate the incident energy available from a hazard assessment and tie it back to appropriate PPE to provide the required level of protection. An example of this is that end users can now choose to wear arc-rated (AR) FR clothing based on the amount of incident energy they could be exposed to in case of an arc-flash event.

In the last 20 years, ASTM F1506 has not only enabled electrical workers to be protected from thermal hazards associated with electrical arcs but has done so by characterizing the hazard and paving the way for performance specifications to be applied by end users as well as the application of standards such as OSHA 1910.269, NFPA 70E and complimentary IEC specifications.

After the standard was published, has it impacted health and safety? If yes, please explain.

Arc-rated clothing saves lives. It has lowered fatalities and reduced the injury level for workers exposed to thermal energy hazards from electrical arc flash incidents. If an end user matches protective clothing (PPE) to the anticipated, calculated hazard, workers are unlikely to receive anything more than a second-degree burn. Before F1506, workers were often wearing garments that posed an ignition hazard. Because ignition of clothing will lead to catastrophic and fatal injuries, AR clothing that meets the requirements of F1506 saves lives and livelihoods.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

In the mid 90's a Major Utility decided to provide full FR arc rated clothing for Electrical workers to protect them from arc hazard burns. Prior to wearing FR arc rated clothing the Company experienced two arc flash events that resulted in a total expense including Medical, Legal & Vocational expenses of approximately \$835,450.79. That same Utility, a short time later, compared those two accident/injury costs, to another two similar arc flash events, which were comparable arc hazard exposures, with the difference being the workers were wearing FR arc rated clothing. The second two events, post the introduction of FR arc rated clothing, resulted in a cost of only \$52,992.13. FR arc rated clothing contributed to a reduction in cost of \$782,458.66 and more importantly, considerably less injury to the two employees.

How do consumers and the public benefit from this standard? (If applicable)

ASTM F1506 has had direct and indirect effects on consumers as well as the general public.

Electrical workers are better protected with clothing that helps prevent serious injuries and fatalities in the event of an arc-flash incident.

The standard has also enabled manufacturers to develop products that can be designed to meet protection requirements established by F1506. This in turn fosters innovation and gives consumers access to better quality and more comfortable products. Additionally, such innovation improves the comfort of products which has improved worker acceptance and overall compliance.

Injuries from arc flash incidents creates a wider economic impact that reaches far beyond an individual, especially in the event of permanent disability. Studies show that in the US electrical industry, \$5.3 million of \$6.3 million accounted or direct costs associated with lasting electrical injuries (R. Wyzga and W. Lindroos, "Health Implications of Global Electrification", Annals of the New York Academy of Sciences, vol. 888, pp. 1-7). The application of ASTM F1506 has resulted in many electrical workers walking away from arc-flash incidents with only minor burns and is testament to the value of the standard.

Following are two "Real World" examples of minimized or eliminated injuries to the public:

Around 2004 a major Utility had an underground splicer exposed to an Electric arc flash while working in a manhole in Philadelphia Pa. The worker was two to three feet away from an electric elbow which flashed, for no known reason, and the worker hit the deck. He had 15 seconds to get out of the manhole before the "circuit tried back" which when it did, a second arc flash went over the workers body just as he was going through the manhole exit. He was wearing FR Arc rated full coveralls, and he survived two close-proximity arc flashes with no burns to his body, except for first-degree burns, on the back of his right hand and the right side of his face, which were uncovered. There were "zero" burns on the part of his body covered by the FR arc rated coveralls, even though he was completely surrounded by the second arc flash. Had the worker been in non-FR arc rated garments, the first arc flash could have ignited his work clothes. Then exposed to the second arc flash, 15 seconds later, there could have been additional body burns until it would have been extinguished. Undoubtedly, ignition of garments during this event would have led to serious disabling injuries. This man was back to work the next day.

In the late 20-teens, also at a large Utility Company, an Electrical Trouble shooter was performing switching in a 10 x 10 x 10-foot manhole with a single manhole opening. While standing on the ladder, down inside the vault, the worker was attempting to test a connection when the high voltage elbow unexpectedly exploded hitting the worker with the subsequent high energy arc flash. The arc was so intense it overwhelmed some of the lighter weight FR clothing, causing some minor burns, but none of the FR clothing ignited which prevented serious life changing burns. In this case the lack of serious burns resulted in minimal time off. Deciding to outfit workers in FR garments rated for the arc exposures, of the Electrical System's energy hazards, continues to save workers form life altering and life ending burn accidents.

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. If this is currently in draft or is a new publication but is expected to have broad use, please note that here with your rationale.

ASTM F1506 has led to adoption of application guides in NFPA 70E as well as guidance in OSHA 1910.269 to match PPE to the anticipated hazard. It has additionally set the precedence for the development of an equivalent European standards, IEC 61482-2.

Notably, incident energy analysis is required by NFPA-70E 2005 and the National Electrical Safety Code (ANSI C2).

OSHA also declared AR protective clothing as PPE in 2014 which makes it mandatory for employees to wear and requires employers to provide as part of their PPE program. This was possible because OSHA was able to implement a required incident energy analysis for all equipment and the arc rating of clothing established via F1506.

ASTM F 18 members have been asked to speak domestically and internationally regarding the value and historic safety performance of the use of garments that meet the ASTM 1506 Standard requirements and guidelines, for the purpose of Domestic and International Utility adoption and use.

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

The case highlighted here for F1506 is aligned with the following UN sustainable development goals.

1. Good health and well-being: The standard promotes safety and wellbeing of electrical workers by protecting them from harm in case they are in an electrical arc-flash incident.
2. Industry innovation and infrastructure: The standard has also enabled manufacturers to develop products that can be designed to meet protection requirements established by F1506. This in turn fosters innovation and gives consumers access to better and more comfortable products.
3. Responsible consumption and production: The clarity of guidance provided to end users and manufacturers, enables development and adoption of new products that are in line with sustainable consumption and production goals.

Please provide any additional information not provided above.

Parts of the information, and edits, contained in this case study were provided by Chuck Kelly, Hugh Hoagland, Roger Parry, Aasim Atiq, Ernie Pauliny, Sam Stonerock, Marcia Eblen, Randy Wade, and other ASTM members.

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Please identify the designation and title of the standard

ASTM F3352-19 Standard Specification for Isolation Gowns Intended for Use in Healthcare Facilities

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

Healthcare workers (HCWs) and emergency medical service (EMS) are routinely exposed to infectious blood and body fluids at work. Engineering controls cannot eliminate all possible exposures, therefore personal protective equipment (PPE) is crucial to reducing the potential for skin contact with microorganisms, blood, body fluids, and other potentially infectious materials. The threat of emerging infectious diseases (e.g., COVID-19, Ebola, pandemic influenza, SARS, etc.) has highlighted the need for effective PPE to protect HCWs, EMS, as well as patients, and visitors. PPE, including isolation gowns, is worn by HCWs and EMS to protect the patient, the healthcare worker, and visitors from the transfer of microorganisms, blood and other body fluids, and other contaminants. Gowns were determined as the second-most-used piece of PPE, following gloves in the healthcare settings. However, until the publication of ASTM F3352 there was no standard available for isolation gowns that lists the minimum physical performance requirements.

In 2011, the ASTM F23.40 Biological Subcommittee work group surveyed infection preventionists to determine use/wear issues, familiarity with gown standards, and to identify compliance perceptions and problems [1]. Results of this survey clearly indicated issues with the physical performance of the isolation gowns used in the healthcare settings. Also, several end user groups indicated that there are issues with the quality of the gowns used in the healthcare. Since there are no minimum performance criteria for isolation gowns, infection preventionists and purchasing agents had been facing several difficulties in the gown selection process, governmental or non-governmental organizations (e.g. CDC, WHO) were facing difficulties when establishing PPE guidelines and technical specifications for infectious diseases, procurement agencies were having difficulties when developing minimum technical requirements. This standard specification addresses the performance of isolation gowns and establishes uniform testing and reporting requirements for isolation gown manufacturers in order to provide information to end users that can be used in making informed decisions in the evaluation, selection, and purchase of isolation gowns according to the anticipated exposures.

Food and Drug Administration (FDA), end users, and representatives from end user groups including Association of Professionals in Infection Control (APIC) and the Association of periOperative Registered Nurses (AORN) initiated the development of the standard. Testing laboratories (Nelson Laboratories), manufacturers, and Centers for Disease Control and Prevention's National Institute for Occupational Safety and Health (CDC/NIOSH), and American Reusable Textiles Association (ARTA) strongly supported the development process.

Identify the interest groups that participated in the development and/or revision to the standard?

Food and Drug Administration (FDA), Centers for Disease Control and Prevention's National Institute for Occupational Safety and Health (CDC/NIOSH), representatives from end user groups including Association of Professionals in Infection Control (APIC) and the Association of periOperative Registered Nurses (AORN), American Reusable Textiles Association (ARTA), manufacturers, testing laboratories (Nelson Laboratories), and end users participated in the development of the standard. The minimum criteria in this specification were established based on the findings of a study in collaboration with CDC/NIOSH and committee discussions.

Manufacturers provided technical input on the performance of gowns and provided gowns for testing, Nelson Laboratories and CDC/NIOSH conducted performance testing, one of the professional organizations (ARTA) facilitated the industrial laundering of gowns, and end users and other organizations provided critical information on the requirements. FDA and CDC/NIOSH also participated in the development of aforementioned survey questions and analysis of the results along with the PPE manufacturers, end users, and academia representatives [1].

Reference:

[1] Cloud, Rinn, et al. "Isolation gown use, performance and potential compliance issues identified by infection control professionals." American Journal of Infection Control 40.5 (2012): e74-e75.)

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

Since its publication, ASTM F3352 has been widely used by end users, large manufacturers (e.g. [DuPont](#), [Medline](#)), and testing laboratories (e.g., Vartest, SGS), governments (U.S, Canada), intergovernmental organizations (WHO and UNICEF), national/international organizations (including Interagency Board), state health departments, researchers, and procurement groups (e.g. Defense Logistics Agency (DLA) and Strategic National Stockpile (SNS), Federal Emergency Management Agency (FEMA)), and academia.

The standard has quickly become a valuable asset for the many entities involved in trying to combat the pandemic. It has been used by the U.S. government as the basis for purchasing products and is recognized by the U.S. Food and Drug Administration (FDA), and stipulated as a recommended product specification by the World Health Organization. SNS, DLA, and FEMA included the standards in the solicitation requirements for isolation gowns.

In addition, several research manuscripts (more than 12) were published that reference or utilize the standard test method.

After the standard was published, has it impacted health and safety? If yes, please explain.

ASTM F3352 establishes uniform testing and reporting requirements for isolation gown manufacturers in order to provide information to end users that can be used in making informed decisions in the evaluation, selection, and purchase of isolation gowns according to the anticipated exposures.

As mentioned about, since its publication, ASTM F3352 has been widely used by the industry, end users, governments, intergovernmental organizations, national/international organizations, state health departments, researchers, and procurement groups.

The standard has quickly become a valuable asset for the many entities involved in trying to combat the pandemic. It has been used by the U.S. government as the basis for purchasing products and [stipulated](#) as a recommended product specification by the World Health Organization. ASTM F3352 was also [recognized](#) by the Food and Drug Administration (FDA). By establishing minimum criteria which result in consistent protection, ASTM F3352 increased the safety and health of millions of workers who provide care to patients every day.

ASTM F3352 specifically focuses on gowns used in healthcare facilities in order to better protect HCWs and patients at risk to exposure to body fluids and infectious materials. It establishes uniform testing, reporting, and minimum performance and labeling requirements for gown manufacturers to provide information to end users that can be used to make informed decisions in the evaluation, selection, and purchase of isolation gowns according to the anticipated exposures. It is expected that minimum criteria set by ASTM F3352 result in improved design and performance and compliance with such use.

One of the most important changes that ASTM F3352 brings is the requirement to add expiration date at a minimum on the primary package of gowns, therefore is expected to help preventing the use of expired gowns. By specifying the minimum performance criteria, ASTM F3352 supported gown manufacturers and designers, those who purchase gowns for hospitals, regulatory bodies, and HCWs and their patients. ASTM F3352 supported end users in correct PPE selection, resulting in higher levels of protection than previously provided. Military and EMS may also be benefiting from new technology and designs originating from an increased understanding of gown performance. Manufacturers have been using the ASTM F3352-recommended performance and design requirements to develop gowns that provide increased protection, comfort, and durability. Having minimum performance criteria is expected to result in a market with consistent gown performance and better protected healthcare personnel, patients, and visitors.

How do consumers and the public benefit from this standard? (If applicable)

ASTM F3352 is a standard specification, which addresses the performance of isolation gowns designed to protect the healthcare worker, the patient, and visitors from exposure to blood, body fluids, and other potentially infectious materials during patient care or patient procedures. By specifying minimum performance criteria for isolation gowns, ASTM F3352 supported different groups including gown manufacturers and designers, those who purchase gowns for hospitals, regulatory bodies, and HCWs, EMS personnel, visitors, and patients. ASTM F3352 assisted end users in correct PPE selection, resulting in higher levels of protection than previously offered by providing minimum performance criteria which include tensile strength, seam strength and tear strength. Military and EMS may also be benefiting from new technology and designs originating from an increased understanding of gown performance. Manufacturers have been using the ASTM F3352-recommended performance and design requirements to develop gowns that provide increased protection, comfort, and durability. Having minimum performance criteria is also expected to result in a market with consistent gown performance and better protected healthcare personnel, patients, and visitors.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

The standard has quickly become a valuable asset for the many entities involved in trying to combat the pandemic. It has been used by the U.S. government as the basis for purchasing products and [stipulated](#) as a recommended product specification by the World Health Organization. ASTM F3352 was also [recognized](#) by the Food and Drug Administration (FDA). By establishing minimum criteria which result in consistent protection, ASTM F3352 increased the safety and health of millions of workers who provide care to patients every day.

- WHO included ASTM F3352 in the technical requirements for gowns used when managing patients with COVID-19. [WHO-2019-nCoV-PPE_specifications-2020.1-eng \(2\).pdf](#)
- FDA recognized ASTM F3352 in 12/20/2021 [Recognized Consensus Standards \(fda.gov\)](#)
- Pan American Health Organization (PAHO) included the ASTM F3352 in the requirements for procurement of Personal Protective Equipment (PPE) in the context of the COVID-19 emergency. [requirements for procurement of personal protective equipment finalversion.pdf \(paho.org\)](#)
- Several state health departments included ASTM F3352 in the minimum requirements for procurement of PPE for COVID 19. Example: [Identified Resource Specifications \(portoflosangeles.org\)](#)
- Laboratories started offering testing specified in ASTM F3352. Example: [MedicalPPEGown.pdf \(vartest.com\)](#)
- Manufacturers started to offer products that meet the minimum requirements listed in ASTM F3352. Example: [DuPont ProShield 80 Coveralls:Personal Protective Equipment:Safety Clothing | Fisher Scientific](#)
- The [Office of the Assistant Secretary for Preparedness and Response \(HHS\)](#) specified ASTM F3352 in the requirements for gown procurement. Example: [Notice of Intent- Isolation Gowns Manufactured in the U. S. or its Outlying Areas 75A50122R00005 - GovTribe](#)

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

ASTM F3352 was also recognized by the Food and Drug Administration (FDA) and World Health Organization included ASTM F3352 in the technical requirements for PPE for COVID. Pan American Health Organization (PAHO), Interagency Board, and UNICEF included the ASTM F3352 in the requirements for procurement of Personal Protective Equipment (PPE) in the context of the COVID-19 emergency.

- WHO included ASTM F3352 in the technical requirements for gowns used when managing patients with COVID-19. [WHO-2019-nCoV-PPE_specifications-2020.1-eng \(2\).pdf](#)
- FDA recognized ASTM F3352 in 12/20/2021 [Recognized Consensus Standards \(fda.gov\)](#)
- Interagency Board included ASTM F3352 in the technical requirements for emergency response workers. [IABPUB-2020-01A-01-Minimum-PPE-and-Decon-Recommendations-for-Emergency-Response-to-COVID-19-Quick-Reaction-Guide-ER-TIPS-and-IPP-UPDATED-17APR2020-1.pdf \(nasemso.org\)](#)

- Pan American Health Organization (PAHO) included the ASTM F3352 in the requirements for procurement of Personal Protective Equipment (PPE) in the context of the COVID-19 emergency. [requirements for procurement of personal protective equipment finalversion.pdf \(paho.org\)](#)

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

ASTM F3352 addresses the following goals:

- Goals 3: Ensure healthy lives and promote well-being for all at all ages
- Goal 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation
- Goal 12: Ensure sustainable consumption and production patterns

By providing minimum criteria ASTM F3352,

- Promotes the safety and health of workers, patients, and visitors (Goal 3)
- Stimulates for innovations by providing minimum performance criteria (Goal 9)
- Fosters for products with consistent quality and protection (Goal 12)

Please provide any additional information not provided above.

NA

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Please identify the designation and title of the standard

ASTM F1930-18, Standard Test Method for Evaluation of Flame-Resistant Clothing for Protection Against Fire Simulations Using an Instrumented Manikin

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

The ASTM F1930 standard was motivated by the need for a standardized test method for evaluating the thermal protective performance of heat resistant protective clothing ensembles when exposed to full-scale laboratory simulation of flash fire. Fire manikin testing facilities had begun proliferating in North America and across the world. There was a need to have a standardized procedure to ensure consistent measures of garment thermal protective performance when testing garments at the same conditions. The initial standard development received inspiration and invaluable technical expertise and experience from Mr. Wally Behnke of DuPont. Wally was a ground breaking pioneer in the development of instrumented methods for evaluating the thermal protective performance, including the TPP test and fire manikin testing systems.

Identify the interest groups that participated in the development and/or revision to the standard?

The standard was developed with participation from academic and industry experts in the testing of heat resistant textiles for thermal protective performance using bench scale and instrumented fire manikin test methods. It included experts from the laboratories in North America that operated instrumented fire manikin tests. It received valuable input from the industry by way of supplying heat resistant materials and garments, and from end users of heat protective garments. Dr. Roger Barker of the NC State University Textile Protection and Comfort Center (TPACC) chaired the first ASTM Task Group that developed the first edition of the standard. The late Dr. J. Doug Dale of the University of Alberta chaired the second F23 Task Group, leading several successful revisions of the method over the years. Mr. John Morton-Aslanis of NC State (TPACC) is the current chair of the ASTM F23 Task Group responsible for the ASTM F1930 Standard.

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

ASTM F1930 testing is used in multiple instances across many industries for the protection of industrial personnel against short-duration thermal exposures from fire where ignitable substances are present and workers in the oil, gas, chemical industries and specific manufacturing industries need to take every precaution to protect themselves from severe burns caused by flash fires.

The unique aspect of this standard its usage for the evaluation of materials used in the construction of PPE as well as "as sold" garments. An example of that is ASTM F2733. In this standard, not only is the rainwear material tested in accordance with F1930, but finished representative rainwear goods are tested for structural seam integrity and closure function.

In addition, the US Military and manufacturing industries use ASTM F1930 in the early stages of development and throughout the lifespan of a system to see how materials and the design of a system affect flammability and the potential for injury. The Product Manager Soldier Clothing and Individual Equipment use it to conduct monthly quality assurance surveillance testing to ensure that clothing performance does not degrade over time and to have a baseline for current flame-resistance protection to serve as a reference to evaluate new products.

After the standard was published, has it impacted health and safety? If yes, please explain.

Yes. Because the ASTM F1930 test method measures the thermal protective performance of whole items of heat protective gear, it provides unique information about how materials and clothing design together perform when exposed to consistent, reproducible laboratory simulated flash fires. The information provided on whole garment fire protection far exceeds that gained from bench-scale tests made on fabric swatches used in the garment construction. This has enabled the design, development and fielding of more thermally protective gear to workers exposed to flash fires, and to firefighters. ASTM F1930 has been incorporated into multiple standards evaluating the thermal protective performance of protective clothing worn for flash fire protection.

The ability to show an end-user how and why you should wear PPE has proven invaluable. Examples would include, the importance of wearing FR garments vs. non FR, how undergarments or layering of garments can provide greater protection, and having a shirt tucked into the pant can prevent flames from encroaching the torso and not having the undergarment catch fire. Not only does the test method provide a quantifiable result but the visual aspect of seeing how garments can or cannot catch fire, melt/drip and or disintegrate when exposed to a high intensity flash fire stresses the importance of PPE.

Here are examples of standards that incorporate ASTM F1930 as a test method for Personal Protective Equipment (PPE) testing

- NFPA 2112 "Standard on Flame-Resistant Clothing for Protection of Industrial Personnel Against Short-Duration Thermal Exposures from Fire"
- Canadian standard CGSB 155.20 "Workwear for protection against hydrocarbon flash fire and optionally steam and hot fluids"
- ASTM F2733 "Standard Specification for Flame-Resistant Rainwear for Protection Against Flame Hazards"
- ANSI/ISEA 203 "American National Standard for Secondary Single-Use Flame Resistant Protective Clothing for Use Over Primary Flame Resistant Protective Clothing"

How do consumers and the public benefit from this standard? (If applicable)

ASTM F1930 is perhaps the most impactful Standard Test Method ever developed for evaluating the thermal protective performance of heat resistant protective clothing. It is a transformative fire testing technology, providing a much more realistic simulation of actual fire exposures in comparison to bench-scale tests of materials flammability and thermal protective insulation. By measuring heat transfer through clothing when used in conjunction with algorithms based on the estimated tolerance of human tissue to second and third degree burn injury it provides a unique metric of a garment's thermal protective performance. It produces a visual representation of the distribution of burn injury over the manikin's form. The color-coded display of predicted skin injury instantly conveys the thermal protective performance of tested garments, even to an untrained end-user. The test provides a powerful visual demonstration of after-flame and shrinkage behavior of protective garments when worn on a human-shaped form exposed to heat from intense flames.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

A research study conducted over six years by Col. Evan Renz of the Burn Unit at the U.S. Army Institute of Surgical Research assessed the usage of a fire-resistant combat uniform. One component of the uniform, the "Army Combat Shirt" resulted in a decrease of burn casualty admission from 325 admissions in 2005 to just 96 admissions in 2011.

"https://www.army.mil/article/64076/the_fire_resistant_uniform_an_effective_mitigation_strategy_in_the_prevention_of_burn_casualties"

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

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Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

This standard addresses three of the Sustainable Development Goals

#3 “Good Health and Well Being” : Oil and gas, chemical plant and people in similar industries are all at risk of coming into contact with a flash fire hazard every day on the job. By providing a much more realistic simulation of actual fire exposures in comparison to bench-scale tests of a materials flammability and thermal protective insulation, end users wearing FR clothing and put in dangerous flash fire situations can help have a healthier mental outlook that they are protected.

#8 “Decent Work and Economic Growth”: Workers placed in dangerous environments such as “combustible dust”, oil and gas industry, as well as military personnel have had work safety improved when wearing PPE clothing tested to ASTM F1930

#9 “Industry, Innovation and Infrastructure”: The innovation and industries required to produce a material that withstand a simulated flash fire as tested in ASTM F1930 are multiple. Manufacturing and chemical facilities for inherent FR and treated FR materials. The innovative research and development of new FR treatments and fabric blends are tested with ASTM F1930 as no current bench scale test method shows how a fabric reacts to a flash fire.

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Committee: ASTM F23

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Please identify the designation and title of the standard

F3502, Standard Specification on Barrier Face Coverings (first adopted in February 2021 and updated in 2022).

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

At the beginning of the COVID-19 pandemic, it became evident there would be shortages of PPE to protect healthcare workers for a disease where the transmission mode was not clearly understood. As it became evident that the general population would need to some form of a mask for diminishing the spread of COVID-19 as hospitals were overwhelmed, the U.S. Centers for Disease Control and Prevention (CDC) began to promote the use of face coverings as providing some measure of disease control and protection without taking away from the conventional PPE (namely medical masks and respirators) greatly needed by healthcare professionals. Committee F23 recognized the need for creating criteria on a previously undefined product and convened a special meeting of the committee to solicit priority actions for improving PPE standards in the wake of the worsening pandemic. Foremost among the identified needs, was developing a product specification for face coverings, which eventually were referred to as "barrier face coverings." The activity was undertaken by the relatively new F23.65 Subcommittee on Respiratory Protection. Additional attention was brought forward for this topic by the National Institute for Occupational Safety and Health (NIOSH) within CDC who learned from an industry trade group that alternative materials were available to support the use of face coverings that would not take away from badly needed respirators and surgical masks.

Identify the interest groups that participated in the development and/or revision to the standard?

With the announcement of the new work item committee, nearly 100 individuals representing government officials (including CDC, the U.S. Food & Drug Administration (FDA), National Institute for Standards and Technology (NIST), and other national organizations including representatives from foreign governments}, universities and research institutes, testing laboratories, health care provider organizations, end user companies (e.g., Disney and Merck), personal protective equipment (PPE) manufacturers, material suppliers, trade associations, product innovators, and general consumers joined the work group. Several participants had no prior PPE experience or interests. The influx of interested individuals rapidly doubled the membership of the F23.65 subcommittee and further led to large percentage increase in overall F23 membership. The increased membership included participants from several other countries outside the United States.

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

The newly adopted ASTM F3502 standard is primarily used by producers to make claims of barrier face covering products providing appropriate levels of particle filtration efficiency and pressure drop (as a measure of material breathability) as well as an assessment for their ability to fit the wearer’s face and limit leakage around the sides of the face covering. Manufacturers have been able to use this standard to position their product for consumers, healthcare workers, and others. As described below, the standard has been referenced by CDC, become a FDA-recognized standard for medical devices, used by the Federal governments in purchasing 25 million face coverings for disadvantaged populations*, was specified by different organizations such as the Veterans Administration for its hospital system as well as other workplaces for employee use, and has been promoted by a range of face covering manufacturers and material suppliers for various products. The non-design restrictive nature of the standard has resulted in a multitude of product configurations in both disposable and reusable designs with a range of acceptable performance.

* <https://www.whitehouse.gov/briefing-room/statements-releases/2021/02/24/fact-sheet-president-biden-announces-new-actions-to-deliver-masks-to-communities-hit-hard-by-the-pandemic/>

After the standard was published, has it impacted health and safety? If yes, please explain.

Specification F3502 was intended to impact health and safety. The standard filled an important gap where a new product area had not defined design, performance, or labeling criteria. The specific topic of this type of product effectiveness has been subject of multiple articles for determining the relative effectiveness for source control and protection features of face coverings that has led to a better understanding for mitigating disease spread when the products are properly worn. An example article appears in: Brousseau, LM, Stull, JO. (2022). Feature, Barrier Face Coverings for Workers. New Solutions. DOI: 10.1177/ 10482911221116664.

Its use as a mandatory minimum specification for certain applications in the healthcare profession is under consideration by the U.S. Occupational Safety and Health Administration (OSHA), which had already referenced the standard as part of its COVID-19 regulations and is in the process of preparing new regulations for workplace control of infectious diseases (not just COVID-19). The later proposed regulations will cite the use of specific PPE for specific types of diseases depending on their transmission mode and risk of exposure – Specification F3502 is recommended as one of the cited standards recommended by OSHA to mitigating disease transmission.

How do consumers and the public benefit from this standard? (If applicable)

Clearly, the standard was adopted at a time where it could provide a basis for qualifying a product where no prior specifications existed. It was developed at a time of considerable confusion within the public for the wearing of masks. As part of the specification, a simple classification scheme was instituted, which could easily be understood by the public for rating minimum and higher performance. CDC added its own criteria on top of F3502 criteria and created a list of reviewed face covering products positioned against the standard, which could be accessed by the public for discerning products complying with the standard.

Just as importantly, a comprehensive introduction combined with an extensive significance and use section and other portions of the standard were used to educate the public about the differences between a respirator, surgical mask, and barrier face covering, which have different performance characteristics and performance levels. The specification provided a consensus approach for distinguishing between these products and highlighted the differences between inhalation protection (protecting the wearer) and source capture or control (protecting the public), which became important precepts for the global response to the pandemic.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

Safety data were provided for barrier face covering effectiveness based on a metric within the standard for relative inhalation protection and source capture effective (see Brousseau and Stull indicated above) that included findings for the length of time needed for reducing potential infection by wearing barrier face coverings at different leakage levels on both infected individuals and non-infected individuals. In addition, work undertaken directly by CDC was able to distinguish characteristics of different face covering products for relative effectiveness for the purpose of source capture as demonstrated by Brooks, John T., et al. "Maximizing fit for cloth and medical procedure masks to improve performance and reduce SARS-CoV-2 transmission and exposure," [Morbidity and Mortality Weekly Report 70.7 (2021): 254]. Specification F3502 has promoted proper fit (leakage resistance) among face covering products. The open criteria of the specification has also established a wide range of affordable products at similar costs related to respirators and surgical masks.

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

As pointed out above, ASTM F3502 has been rapidly referenced by several government organizations. Within 2 weeks of its adoption, it became a recognized FDA standard for medical devices; a couple of months later it was included in the updated FDA's enforcement policy for masks, which also addresses surgical masks and respirators.

The standard was cited on the CDC webpage for pandemic masks, where CDC used the F3502 standard as the basis to establish additional "workplace protection" and "workplace protection plus" face covering requirements for workers. CDC further instituted a listing of products complying with F3502 as part of its "PPEInfo" page at <https://wwwn.cdc.gov/PPEInfo/RG/FaceCoverings>. This page is continually updated and new products have been regularly added.

OSHA made reference to the F3502 standard as part of its recommended requirements in interim regulations for COVID-19 and is planning to position the use of the specification as part of the broader PPE requirements against infectious disease protection for healthcare workers planned for public rulemaking in 2023.

The World Health Organization also adopted F3502 as recommended basis for community face masks in early 2022. Through its outreach efforts, F3502 is being adopted as the national standard in other countries (e.g., Jordan).

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

The development and promulgation of F3502 clearly addresses Goal 3, which is to “Ensure healthy lives and promote well-being for all at all ages.” The COVID-19 pandemic has and will continue to require a range of solutions for minimizing disease transmission where the use of masks and face coverings is a principal part of an agreed upon effective approach. The development of a standard on this product that has been adopted around the world helps to fulfill this goal.

The standard indirectly addresses Goal 12 to “Ensure sustainable consumption and production patterns” by avoiding definitive product and material requirements and instead focusing on design and resources that can meet requirements that address reuse, reprocessing, and safe disposal. For example, in citing F3502, the World Health Organization promotes the use of reusable barrier face coverings that meet the standard. The responsible committee is also investigating future revisions of the standard that will distinguish products that provide greater sustainability and less waste. Already, F3502 does require manufacturer to identify products that are reusable and asks the manufacturer to describe procedures for cleaning and reuse of such products.

Please provide any additional information not provided above.

The most noteworthy aspect for the development of Specification F3502 is how it demonstrated the nimbleness of the full open and transparent ASTM International process. Its promulgation in a 7-month period from the first work group meeting to an approved standard involving a 100-member work group with a diverse set of represented interests attained a level of success in meeting a global need not demonstrated by any other standards development organization. For example, one of the first face covering standards from France was developed by an ad hoc group without full consensus. Likewise, CEN developed its standard through CEN Workshop Agreement and did not use its full process (it is not described as an official European Norm). In contrast, Committee F23 fully followed the ASTM regulations in not only providing a timely standard but one that properly incorporated the latest scientific findings for product design and performance as well as anticipating the correct disease transmission mode in how it set the requirements. The embodiment of addressing face covering leakage was one of the key features of the standard that appealed to the World Health Organization and for which CDC was able to establish additional criteria building from F3502 for protective workers without access to respirators.

Ultimately, the promulgation of the standard brought needed attention to not only masks in general related products, namely surgical masks and respirators. The standards development process had the further impact of greatly expanding the membership of Committee F23 and overall interest in PPE. The future of F3502 and this particular standards development process is expected to have far reaching consequences not only on barrier face coverings but how the overall producer, user, research, and regulatory organizations approach source control and inhalation practices.

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Please identify the designation and title of the standard

F770; The Standard Practice for Ownership, Operation, Maintenance, and Inspection of Amusement Rides and Devices.

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

First published in 1982, F770 was developed to create a consistent standard and a unified level of safety, originally in the United States and now around the world, for the owners and operators of amusement rides and devices in amusement parks, theme parks, traveling shows, and by independent organizations.

Identify the interest groups that participated in the development and/or revision to the standard?

Throughout the past 40 years, experts from numerous disciplines throughout the amusement industry have contributed to the development of F770. Today, over 800 industry professionals from 30 different countries are members of the F24 Committee. From the designers, engineers, and manufacturers to the owners, operators, and end users, as well as regulators, safety advocates, and academics; each group has provided valuable input and feedback on the language in the standard. "Thanks to the hard work of designers, engineers, operators, owners, and others, amusement rides have become both more exciting and safer over the years."¹

While the work of F24 and specifically F770 continues year-round, meetings are held each February and October and allow these experts to meet and work on the improvement of F770 face to face. This frequency provides opportunities for the members to focus attention on the subcommittee actions related to prior and future balloted language, and to collaborate among the larger F24 membership. These twice annual events garner upwards of 30% committee membership attendance and allow recent incidents in the industry to be discussed and addressed. "Reaction time is a key strength of F24. When new knowledge is acquired, a standard can be often modified to include that knowledge in less than a year."² This process will continue into the future, as the F770 task group values the perspective from every facet of the industry for any future revisions to the standard.

¹Maxwell, Jack (2018). The Evolution of Amusement Ride Standards. Standardization News.

²Maxwell, Jack (2018). The Evolution of Amusement Ride Standards. Standardization News. (Quote by Harold Hudson)

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

F770 is considered a “core” standard in the F24 committee. The F770 standard forms the foundation and framework of owner/operator programs across the gamut of multinational corporations to local family- owned businesses across the U.S. and the world. It addresses all primary functions, responsibilities, and activities necessary to set up and maintain a park operation that complies with the safety standards promulgated by ASTM F24 for all aspects of amusement rides and devices. As a result, any other standard with requirements that pertain to the owner/operator of an amusement ride or device point to F770, and any jurisdiction that adopts or references the F24 standards as a whole or F770 in particular will require compliance by applicable owner/operators.

Depending on the level of adoption either as required by regulation or via voluntary implementation, compliance with F770 includes how an amusement ride or device is operated, inspected, or maintained as well as how the training for each of those disciplines is conducted and the need to maintain documentation of those actions. There are also sections in F770 regarding the information that is required to be transferred when an amusement ride or device is sold, how the industry expects patrons to behave as a guest of an amusement ride or device, and the classification of injuries and illnesses as they relate to amusement rides and devices.

After the standard was published, has it impacted health and safety? If yes, please explain.

Harold Hudson, a founding member of F24 noted that the advent of a formalized voluntary, standards development process designed to ensure consensus among the many stakeholders was a real game-changer.³ “Many of the early standards had tremendous impact on the industry because suddenly there was a bar to be met,” he says. “The effect was that overall safety throughout the industry was improved. The parks had a reference for what they needed to do – that is, there was an industry standard.”⁴

While it is difficult to measure the impact of a standard in comparison to what may have happened without it (the preparedness paradox), one can be confident that the use of F770 has provided a safer and healthier environment for patrons and guests of amusement rides and devices. There is a clear trend in North America of a significant reduction in injuries at fixed-site rides⁵, 7.0 injuries per million attendance in 2003 down to 3.7 injuries per million attendance in 2021. This is a 47% reduction in injuries just at fixed rides in North America. It is safe to say a similar trend can likely be applied to mobile rides in North America as well as fixed and mobile rides in international countries where the F24 standards, including F770, are adopted.

3, 4Maxwell, Jack (2018). The Evolution of Amusement Ride Standards. Standardization News.

5National Safety Council. (2022). North America Fixed Site Amusement Ride Injury Survey, 2021 Update. Table 1.

How do consumers and the public benefit from this standard? (If applicable)

The work on F770 brings normally fierce competitors to the table where a focus on safety is shared by all and allows for a free exchange of information. While the number and types of attractions are very diverse, there exists a basic formula for operating safely. The standard requires each owner/operator to train, operate, inspect, and maintain each amusement ride or device based upon a number of information sources, one of the foremost being the designer/engineer's and manufacturer's supplied documentation. The subcommittee responsible for F770, F24.40, has also had a strong hand in ensuring the precursor design, engineering, and manufacturing standards produce the information that the owner/operators consume and apply under F770.

As stated earlier, it is clear that the use of standards has had a dramatic impact on the safety of consumers and the general public that choose to participate on amusement rides and devices. North America has the greatest adoption of the F24 standards and F770, and its foray into the broader international community is relatively recent. As a result, there is more data for amusement rides and devices based in North American than in other parts of the world. To provide further insight to the earlier examples, the total number of reported injuries in 2021 was 1,281, an estimated 3.7 per million attendance, which is down from 2,044 in 2003, an estimated 7.0 per million attendance⁶. These examples are using attendance-based data, but ridership-based data shows a very similar trend.

⁶National Safety Council. (2022). North America Fixed Site Amusement Ride Injury Survey, 2021 Update. Figure 1.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

The amusement industry has a high visibility in the media, especially in the unfortunate circumstance of a serious incident. The adoption and use of F770 has shown to have reduced the number and average severity of these mishaps. As a result, there is a reduction in the time lost and economic impact for the guest subjected to injury, the undesirable impact to park operations due to adverse safety-related press is avoided, and the insurance and defense related financial liability impact for all companies potentially involved in the incident is diminished.

This financial incentive is real to the business involved, but the more significant driver may be ethics; employees of all companies involved are highly unlikely to remain at a company not taking public safety seriously and complying with F770 is broadly viewed as a gold standard in its category of public safety.

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

The F24 standards, including F770, have been widely adopted throughout the United States by state, regional, and local jurisdictions. More than 40 states call out F24 in general and many specifically point to F770 in their amusement ride regulations. In other areas of the country, individual counties utilize F770 in local requirements; Clark County Nevada, which regulates amusement rides and devices for Las Vegas is one example. Even in those areas where the state and local agencies do not point to F24 or F770, many insurance carriers for amusement rides and devices often require compliance with the standard.

From an international perspective, more than 14 countries around the world, have reported the use and adoption of F770 in regulations and park operations. In addition, individual park operators like Disney, Universal Parks and Resorts, Six Flags, SeaWorld, Herschend Family Entertainment, and others require the use of F770 as a minimum practice for operations in each of their facilities, both domestic and international.

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

We have mentioned earlier how the adoption of the F24 standards including F770, can be linked to the health and safety of all patrons and guests of amusement rides and devices. This addresses the 3rd of the 17 Sustainable Development Goals as the amusement industry strives to provide healthy and safe amusement and entertainment for the general public of all ages.

The F770 standard also addresses the 8th of the 17 Sustainable Development Goals. The Amusement Industry is a major driver of economic growth in many markets and a strong contributor to productive employment and sustainable tourism throughout much of North American and many parts of the world. The standard's improvement of safety on amusement rides and devices works to reduce life and health related incidents and provides a safe place for patrons to enjoy with friends and family. Facilities also endeavor to provide easy access to attractions for each individual without prejudice provided they meet necessary safety restrictions.

Please provide any additional information not provided above.

As mentioned earlier, numerous amusement industry organizations base their operations on the F770 standard and audit compliance to the standard on a regular basis, utilizing both internal auditors as well as third party auditing companies.

Education sessions on ASTM International, the F24 standards, and specifically F770 are topics that are always well attended at the annual industry safety seminars offered by the Amusement Industry Manufacturers and Suppliers (AIMS International), National Association of Amusement Ride Safety Officials (NAARSO), and other education and certificate organizations, where industry experts teach the importance of the standards and their direct application to the amusement industry. Some of these organizations also provide numerous educational outreach opportunities around the world each year where F770 is a major topic of study.

The largest amusement industry trade organization, the International Association of Amusement Parks and Attractions (IAAPA) has been a long-time supporter and active proponent for the use of F770 and other F24 standards. IAAPA and ASTM International have partnered on several occasions to meet with jurisdictional leaders throughout the world to encourage the adoption of the F24 standards, urging countries to make amusement industry safety a top priority as more amusement rides and devices continue to be built and operated.

ASTM International also has professional liaisons with the European Standards Committee (EN) and the International Organization for Standardization Committee (ISO) for harmonization of standards in regions where the ASTM F24 standards have not yet been adopted such that a consistent safety standard of care is applied across the amusement industry.

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Please identify the designation and title of the standard

ASTM F3353 – Standard Guide for Shipboard Use of Lithium-Ion (Li-ion) Batteries

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

There is increased interest in Lithium-ion (Li-ion) batteries as a low-carbon or zero emissions stored energy technology onboard marine vessels. Unique safety concerns are associated with these technologies due to system complexities, fire prevention and extinguishing system requirements, and the lack of published regulations or marine standards on the topic. This standard establishes design guidance for commercial vessels using Li-ion batteries, but could also be applied to military vessels or the recreational boating industry. The purpose of the guide is to provide standard methods for the safe design, testing and use of Li-ion batteries onboard vessels. The guidelines in this document were developed primarily for larger Li-ion marine battery installations, such as for motive propulsion or ships service electrical power. This standard was initiated by the marine industry, including government experts and representatives from ship classification societies, when it was realized that existing standards for traditional batteries, such as lead-acid and nickel-cadmium designs, would not be sufficient to address the unique concerns associated with Li-ion battery installations.

Identify the interest groups that participated in the development and/or revision to the standard?

United States government agencies such as the U.S. Navy, U.S. Maritime Administration (MARAD), and the U.S. Coast Guard (USCG).

Classification societies such as the American Bureau of Shipping (ABS), Bureau Veritas, DNV GL, and Lloyd's Register.

Other recognized consensus standard organizations such as UL.

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

Li-ion batteries are used in many applications aboard vessels, from portable or fixed tools with small power requirements all the way to high motive power applications such as ships service electrical power, emergency power, and even vessel propulsion. Battery installations provide an immediate power response, and have proven to be a reliable clean energy power source. Presently, for electrical power and vessel propulsion, applications in the U.S. have been limited to smaller vessel designs, but in theory the battery systems could be scaled up to the high megawatt (MW) requirements of larger ships. Because the industry has set significant carbon reduction goals for the decades ahead, Li-ion systems and other stored energy installations will play a major role in achieving those environmental goals. Li-ion batteries comprise a wide range of unique battery chemistries and physical characteristics. Vessel designers, system integrators, and onboard operators should take particular note of recommendations and operating requirements prescribed by the battery manufacturer.

ASTM F3353, Guide for Shipboard Use of Lithium-Ion (Li-ion) Batteries, provides industry guidance and also a basis for establishing a regulatory framework for implementation of Lithium-ion batteries on marine vessels.

After the standard was published, has it impacted health and safety? If yes, please explain.

the standard was published, has it impacted health and safety?

Defining safety concerns for marine Li-ion battery installations is a primary focus of this standard. The rigorous testing requirements for battery designs, based on published UL and IEC standards, serve to ensure that battery electrical problems such as overload, overcharging or short circuit are resolved at the lowest possible system level and do not result in a hazardous “thermal runaway” condition unique to Li-ion batteries.

The shipboard environment presents many safety challenges for mechanical, electrical and fire protection engineering systems. ASTM F3353 makes users aware of the unique safety issues associated with Li-ion installations, relative to traditional, older battery system designs.

Safety concerns related to Li-ion battery installations are addressed by the Guide for Shipboard Use of Lithium-Ion (Li-ion) Batteries, ASTM F3353. Battery technology is rapidly developing, and users should also be aware of additional safety practices unique to particular battery chemistries.

The “zero emissions” design of battery systems, if used in increasing numbers within the industry for vessel propulsion and electrical power, will have long-term health benefits for both the vessel crew and the general public.

How do consumers and the public benefit from this standard? (If applicable)

Both consumers and the general public will benefit from ASTM F3353, Guide for Shipboard Use of Lithium-Ion (Li-ion) Batteries, primarily because the document provides a basis for establishing a regulatory safety framework for implementation of Li-ion systems on marine vessels.

ASTM F3353 provides guidance on the following issues associated with marine Li-ion installations:

- i. Testing requirements – Battery design tests such as short circuit, impact, and overcharging.
- ii. Operating environment – Control and monitoring of the shipboard battery operating environment.
- iii. Fire safety – Measures to detect, contain, and mitigate emergency situations through battery temperature monitoring, structural fire protection, fire detection, and fire-fighting systems.
- iv. Battery system design – Battery Management System (BMS) requirements.
- v. Testing and maintenance – Testing procedures for automation systems installed in vessel propulsion, ships service electrical or emergency power applications.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

For many decades, internal combustion engines used in nearly all industries and modes of transportation have been subject to increased environmental scrutiny and regulations. In order to comply with regulations for engine emissions such as NO_x, SO_x and CO₂, significant investments have been made to both the engine designs and the service installation. As a zero emissions power source, Li-ion and other battery systems completely eliminate the need for the types of costs associated with engine emissions reduction.

It is well documented that machinery noise, often from large diesel and turbine engines on ships, is a significant negative factor in the permanent hearing loss of crew members who regularly work in machinery spaces. The increased use of maritime battery installations as a power source will unquestionably have a positive impact towards the prevention of hearing loss. This should be considered both a health and economic benefit.

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

ASTM F3353, Standard Guide for Shipboard Use of Lithium-Ion (Li-ion) Batteries, has been adopted by Flag Administrations and classification societies. As per the USCG CG-ENG-Policy Letter No. 02-19, DESIGN GUIDANCE FOR LITHIUM-ION BATTERY INSTALLATIONS ONBOARD COMMERCIAL VESSELS, ASTM F3353-19 provides an equivalent level of safety to the existing federal regulations in 46 CFR Subchapter J for Li-ion battery installations.

ASTM F3353 has also been referenced by guidance provided by classification societies such as the American Bureau of Shipping (ABS) GUIDE FOR USE OF LITHIUM-ION BATTERIES IN THE MARINE AND OFFSHORE INDUSTRIES.

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

Yes, in particular the goals of SDG 7 (Affordable and Clean Energy), 9 (Industry Innovation and Infrastructure) and 13 (Climate Action).

Currently in worldwide marine applications, the internal combustion engine is by far (over 95 percent) the source of power choice for propulsion. This standard will greatly aid the industry in the widespread application of a zero emission power source.

The United Nations (UN) Agenda for Sustainable Development, which includes 17 Sustainable Development Goals (SDGs), provides a blueprint for the transition to a healthier planet.

As the industry's understanding of the technical, economic and environmental advantages that marine applications of battery power distribution systems have over their traditional internal combustion engine counterparts grows, batteries are expected to play significant role in helping owners to meet their emission-reduction goals.

Please provide any additional information not provided above.

ASTM F25 recognizes the increasing use and benefits of batteries as an energy source in the marine and offshore industries. Lithium-ion batteries, as the dominant rechargeable battery, exhibit favorable characteristics such as high energy density, lightweight design, faster charging, low self-discharging rate, and low memory effect. The development of lithium-ion batteries for large energy applications is still relatively new, especially in the marine and offshore industries. ASTM has produced this Guide to provide consideration of the issues and reference other related standards in order to facilitate the effective installation and operation of marine lithium-ion battery systems.

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F1484 Standard Test Methods for Performance of Steam Cookers and F1217 Specification for Cooker, Steam

These two standards are applied as a complementary set for commercial steam cookers used for cooking in commercial foodservice kitchens (example – restaurants, cafeterias, schools, universities, stadiums, military bases, navy and cruise ships, prisons). F1217 is the product specification that the government and military use as a procurement document. F26 is considering adding an ENERGY STAR[®] Component Inspection Checklist to all product specifications to further highlight and strengthen the relationship between the ASTM F26 standards and the ENERGY STAR program. F1484 is the test method that ENERGY STAR uses for calculation of performance parameters for validation of a new product and verification of existing ENERGY STAR products to remain active in the ENERGY STAR Program.

For this case study application, we will concentrate on F1484 Standard Test Method for Performance of Steam Cookers. In this document all references to steam cookers are for commercial applications.

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

According to the Commercial Buildings Energy Consumption Survey (CBECS) “Electricity Consumption Totals and Conditional Intensities by Building Activity Subcategories, 2012” published in 2016, food service takes up just over 2% of total commercial floorspace, but accounts for over 6.5% of primary electricity energy consumption. The energy intensity of the food service industry illustrates one of the core reasons why it’s critical to have ASTM standards for commercial kitchen equipment, which is to allow fair, unbiased evaluation of equipment performance. F1217 was developed first, in the 1989 per a U.S. Department of Defense (DoD) request of a standard for procurement (and competitive bid by manufacturers) of commercial cooking equipment for navy and army bases and ships. F1484 was developed in the 1993 at the request of users (such as foodservice consultants, fast food chains with multiple commercial kitchens, etc.) for a standard test method to compare energy use and performance (efficiency) of commercial cooking equipment manufactured by multiple suppliers. It is based on testing steam cookers that are compliant to F1217 standards.

Identify the interest groups that participated in the development and/or revision to the standard?

1. Manufacturers – AccuTemp, Alto-Shaam, Inc., ITW Food Equipment Group (Vulcan-Hart), Middleby Corporation (Market Forge), Welbilt Inc., (Cleveland Range), Unified Brands (Groen)
2. Users – McDonald’s Corporation, Burger King (Restaurant Brands International), Marriott International, Inc., Darden Restaurants, Avantica Restaurant Group, Safeway, Inc., Applebees International, University of California-Berkeley, University of California-Davis, Penn State University
3. Utilities – Pacific Gas & Electric Co. (PG&E); Southern California Gas Co. (SoCalGas), Southern California Edison (SCE), Food Service Technology Center (FSTC -now Frontier Energy), Duke Energy, Southern Company (Georgia Power), Metropolitan Water District of Southern California, Enbridge Gas Distribution, Gas Technology Institute, Electric Power Research Institute
4. Test Labs – National Sanitation Foundation (NSF International), Underwriters Laboratories (UL), American Gas Association Laboratories (CSA Group), Food Service Technology Center
5. U.S. Department of Defense (DoD) through the US Navy, US Army, Foodservice Equipment Industry Stakeholders
6. Industry Groups – Commercial Food Equipment Service Association (CFESA), Foodservice Consultants Society International (FCSI), National Restaurant Association (NRA), North American Association of Food Equipment Manufacturers (NAFEM), California Restaurant Association, International Facility Management Association
7. U.S. Environmental Protection Agency (EPA) – ENERGY STAR Specifications & ENERGY STAR Component Inspection Program, ICF International (on behalf of ENERGY STAR), WaterSense program

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

1. Serves as the foundation of the ENERGY STAR Program Requirements for steam cookers.
2. Encourages development of energy efficient steam cookers and certification to the ENERGY STAR Product Specification, which references ASTM F1484 to evaluate energy efficiency of electric and gas heated (energy source) steam cookers.
3. Allows consultants and foodservice operators to accurately compare steam cooker water use and production capacity.
4. Utilities (Gas & Electric) in North America structure their rebate programs for new equipment purchase based on ENERGY STAR and ASTM F1484 test data. ZIP CODE SEARCH FOR REBATES (<https://www.energystar.gov/rebate-finder>)
5. Sets a foundation for ENERGY STAR’s Pilot Program for Component Inspection using an Energy File Report as an alternate to annual Verification Testing by the Certification Body (CB). This is a program improvement advantage for all ENERGY STAR partners/manufacturers, especially for small- to medium-sized manufacturers being a significant cost savings and helps level the competitive playing field for all ENERGY STAR program partners.
6. Allows buyers of steam cookers to evaluate sustainability and life cycle cost of steam cookers (use ASTM F2687- Life Cycle Cost Analysis and F2916 – Environmental Impact Analysis).
7. Provides a uniform steam cooker Product Specifications for competitive bids.
8. Growth of ENERGY STAR products vs. non-ENERGY STAR products sold is enhanced by the public’s ENERGY STAR brand awareness.

After the standard was published, has it impacted health and safety? If yes, please explain.

1. Properly cooked nutritious meals are an essential requirement for the society to function. Steam cooking is utilized at thousands of locations in North America.

2. ASTM F1217 establishes minimum safety (ANSI/UL and CSA Standards) and sanitation requirements (NSF/ANSI Standard) for steam cookers.

- The specification is used to procure steam cookers in Federal and State government agencies (e.g., U.S. Department of State and Department of Education) to cook and serve sanitary and healthy meals.
- This equipment is used in military kitchens to cook meals for all branches of the U.S. military worldwide.
- Steam cookers are also installed at many businesses including restaurants, schools, healthcare, senior living facilities, lodging, corporate dining facilities, colleges & universities, prisons, and supermarkets/grocery stores.

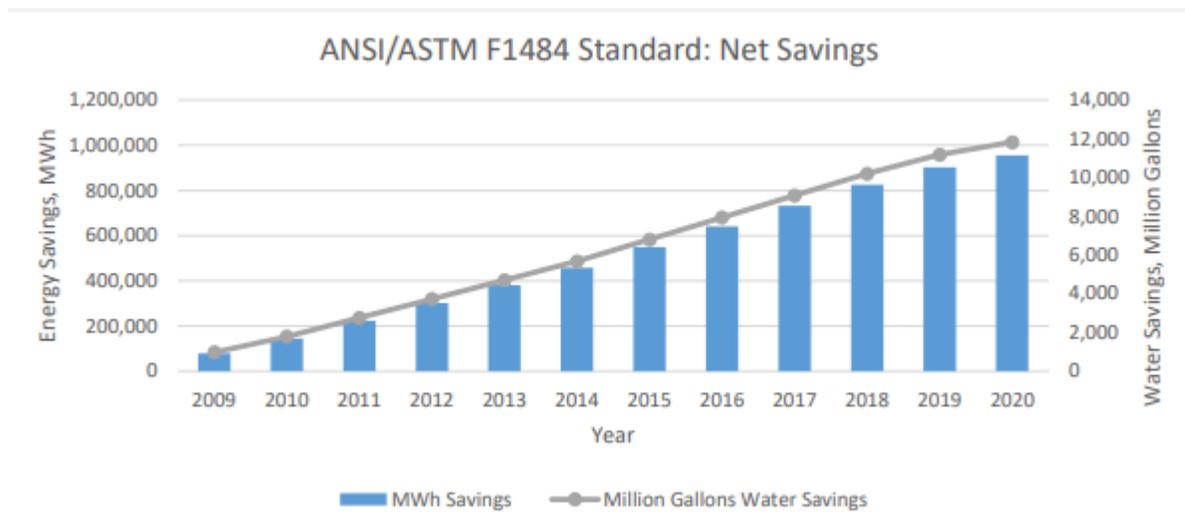
How do consumers and the public benefit from this standard? (If applicable)

NOTE: For this industry, the 'consumer' is a buyer and user of commercial cooking equipment in a kitchen facility.

1. Use of ENERGY STAR steam cookers reduces energy consumption of gas and electrically heated steam cookers with each batch of food cooked and during idle periods where the unit is powered on and ready-to-cook. Actual energy reduction is based on the specific make and model. By adopting reference to the ASTM F1484 standard test method, the EPA was able to establish an ENERGY STAR specification for the commercial steam cooker product category comparing baseline to high efficiency performance results. ENERGY STAR steam cookers' average annual energy savings is approximately 47 MWh and 1.3 million therms for electric and gas steam cookers, respectively or total of 38,137 MWh

(<https://www.energystar.gov/sites/default/files/FINAL%20CFS%20Sell%20Sheet%20-%20Steam%20Cookers%205.2.22.pdf>)

2. Buyers of ENERGY STAR steam cookers can select equipment that uses less water and thus save on water usage and water utility expense. ENERGY STAR steam cooker's average annual water savings is approximately 722 million gallons or 1.16 million CCF since the initial ENERGY STAR Commercial Steam Cooker specification went into effect in 2003. The graph illustrates cumulative energy savings over a 12-year period (2009 – 2020) totaling 975,000 MWh of energy and 12,000 million Gallons of water.



3. Buyers have benefitted by receiving rebates from local utility for purchasing ENERGY STAR Certified steam cookers. Since adoption of the ENERGY STAR Program, utilities have offered rebates ranging from \$ 50 to \$ 3,600 per steamer. This program has saved consumers hundreds of thousands of dollars (\$) through the reduction of energy and water usage.

4. ENERGY STAR's Component Inspection Program is a bi-annual inspection verification process that has been applied to two of the nine Commercial Food Service Equipment products, with steam cookers being one of those products. Simply auditing an component energy file instead of cooking or operating a new appliance avoids converting it into a used product after the verification testing which saves manufacturers up to a 60% depreciated value of the new test unit as well as the shipping and handling costs, has been a financial lifesaver for small companies who compete with large companies in the commercial food service equipment segment estimated to be an annual

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

Analyzing the estimated energy savings (noted above) from a different perspective, the reduced energy use over 12 years has resulted in a 1.5 billion pounds of Carbon Dioxide emissions reduction that is equivalent to removing nearly 150,000 cars from the roads. Quantitative energy and water savings estimates, as well as Greenhouse Gas (GHG) emission reduction, derive from the EPA's ENERGY STAR program resources, such as the ENERGY STAR Commercial Kitchens online calculator and the annual Unit Shipment Reports.

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

ENERGY STAR certified steamers are referenced in Canada by Natural Resources Canada (NRCan) recommending preferential purchase of ENERGY STAR certified steam cookers.

(<https://www.nrcan.gc.ca/energy-efficiency/products/product-information/appliances-forcommercial-use/13749>)

ENERGY STAR steam cookers are referenced for energy efficient kitchen operation in The International Green Construction Code (IgCC.)

ENERGY STAR certified steam cookers are referenced on the US Green Building Council (USGBC) criteria for green buildings and its Leadership in Energy & Environmental Design (LEED) certification program specifications. (<https://www.usgbc.org/credits/new-construction-existing-buildingscommercial-interiors-core-and-shell-schools-new-constr-4>)

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

Contributes to SDG's –

- SDG6 – Contributes to sustainability manage water resources by reducing water use for cooking and user awareness of reduced water consumption.
- SDG7 – Contributes to energy efficiency reduced energy use. Reduces gas fuel or electric power required for commercial meal preparation.
- SDG9 – Contributes to manufacture of medium tech products. Small manufacturing companies can remain competitive by participating in ENERGY STAR's component evaluation file review and certification program.
- SDG13 - Contributes to reduction of greenhouse gas emissions - based on energy and water use reductions as described above.

Please provide any additional information not provided above.

ASTM F26 Committee has developed forty-three Standard test methods for evaluating energy efficiency and performance of commercial kitchen equipment. Of these, twelve Standards are the basis for ENERGY STAR Qualification Standard for specific category of equipment. Standards other than F1484 (for Commercial Steam Cookers) are listed below:

1. ENERGY STAR certification for Commercial Deep Fat Fryers a. F1361 - Standard Test Method for Performance of Open Vat Fryers b. F2144 – Standard Test Method for Performance of Large Open Vat Fryers
2. ENERGY STAR certification for Commercial Griddles a. F1275 - Standard Test Method for Performance of Griddles b. F1605 - Standard Test Method for Performance of Double-Sided Griddles
3. ENERGY STAR certification for Commercial Dishwashers a. F1696 - Standard Test Method for Energy Performance of Stationary-Rack, DoorType Commercial Dishwashing Machines b. F1920 - Standard Test Method for Energy Performance of Rack Conveyor Commercial Dishwashing Machines
4. ENERGY STAR certification for Commercial Ovens a. F1496 - Standard Test Method for Performance of Convection Ovens b. F2861 - Standard Test Method for Performance of Combination Ovens in Various Modes c. F2093 - Standard Test Method for Performance of Rack Ovens
5. ENERGY STAR certification for Commercial Hot Food Holding Cabinets a. F2140 - Standard Test Method for Performance of Hot Food Holding Cabinets
6. ENERGY STAR certification for Commercial Coffee Brewers a. F2990 - Standard Test Method for Commercial Coffee Brewers

Per our estimate each of the above standard contributes energy savings roughly equal to the ASTM F1484 for Commercial Steam Cookers.

In conclusion, all forty-three ASTM F26 standard test methods have provided the international community with a standard method to compare efficiency, performance and production capacity of equipment used in commercial cooking industry. This ability has undoubtedly spurred manufacturers to introduce products with higher efficiency and reduced energy use even though a quantified impact of improvements is not available.

Contact Name: Catherine Erickson

Chair, Committee F26 on Food Service Equipment

Committee: F26 on Food Service Equipment

Email Address: catherine.erickson@fda.hhs.gov

ASTM Standard Use & Effectiveness Case Study Contest

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The contest will be based on written submissions reviewed and selected by a collection of ASTM Board Members. Multiple submissions from a variety of industry segments will be selected. The winning submissions will be featured as part of our 125th anniversary celebration, and include recognition by the ASTM President, on social media channels, and at our anniversary celebration event. As an additional incentive for participation, ASTM International will deposit \$1,250 into each of the winning committees' funds to be used as desired.

To participate, please notify your staff manager and complete the below form in its entirety (6 page maximum).

Final submissions must be approved by Executive Committees (limit 3 per committee) prior to submittal.

Approved submittals must be sent to kkoperna@astm.org and mlynyak@astm.org by **September 23, 2022**.

Please identify the designation and title of the standard

F3411-22a, Standard Specification for Remote Identification and Tracking

F3586-22, Standard Practice for Remote ID Means of Compliance to Federal Aviation Administration Regulation 14 CFR Part 89

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

Why Do We Need Remote ID?

Remote identification (or Remote ID) is the ability of an unmanned aircraft in flight to provide certain identification and location information that people on the ground and other airspace users can receive. This is an important building block in the unmanned traffic management ecosystem. Remote ID is the ability of a drone in flight to provide identification and location information that can be received by other parties.

Remote ID helps the FAA, law enforcement, and other government agencies to find the control station when a drone appears to be flying in out of compliance or where may present an airspace conflict. Remote ID also lays the foundation of the safety and security groundwork needed for more complex drone operations.

The standard was requested by the Federal Aviation Administration.

Identify the interest groups that participated in the development and/or revision to the standard?

Industry Associations, Operators, Academia, Telecom Industry, Regulators , Manufacturers

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

This standard is used to comply with 14 CFR Part 89. Part 89 requires **virtually all types of manufactured drones to broadcast remote ID messages via unlicensed radio frequencies that will be compatible with personal wireless devices**. Consequently, drones are subject to various types of new operational, performance, and message element requirements.

Public officials can use it to address non-compliant flights.

Other airspace operators can use it to identify potential airspace conflicts.

The general public can use it to identify/report non-compliant operations.

After the standard was published, has it impacted health and safety? If yes, please explain.

This standard will be the means of compliance for Remote ID and **will provide information about drones in flight, such as the identity, location, and altitude of the drone and its control station** thereby ensuring safety and security to allow authorities to identify and locate those operators that are “clueless, careless or criminal”. This is the first step in counter-drone operations.

In addition to identifying those with mal intent, what is more common is identifying those who may not realize that they are operating outside the rules (the clueless). Although they may have no mal intent, they may still present a danger to the public. For example, if someone is flying a drone over a crowd of people, which is generally non-compliant, public officials will be able to more easily confront and remedy such situations.

How do consumers and the public benefit from this standard? (If applicable)

Since the standard creates a uniform method of transmitting the required data elements in a way that will enable interoperability with existing and new hardware and software systems – particularly handheld devices. This enables developers to create compatible apps that can be used by the general public to identify drones that may present a safety issue.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

“Reports of unmanned aircraft (UAS) sightings from pilots, citizens and law enforcement have increased dramatically over the past two years. The FAA now receives more than 100 such reports each month.”

- FAA UAS Sightings Report,

https://www.faa.gov/uas/resources/public_records/uas_sightings_report

Although the FAA has so many reported sightings, Remote ID (and these standards) will enable safety officers to find and contact the responsible individuals to drive down these safety incursions.

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

Japan Civil Aviation Bureau,
<https://www.mlit.go.jp/koku/content/001444589.pdf>

European Union (EU)/European Aviation Safety Association (EASA)/ASD-STAN,
https://asd-stan.org/wp-content/uploads/ASD-STAN_DRI_Introduction_to_the_European_digital_RID_UAS_Standard.pdf

US Federal Aviation Administration (FAA),
<https://www.federalregister.gov/documents/2022/08/11/2022-16997/accepted-means-of-compliance-remote-identification-of-unmanned-aircraft>

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

Remote ID will serve to indirectly support several of these sustainable development goals.

1. Goal 7, Affordable and Clean Energy

Many of the modern drone service applications are using only electric aircraft to perform jobs that were previously done by manned aircraft which consume large amounts of fuel. Remote ID Standards will enable such missions to be performed in a safe, interoperable, and orderly way.

2. Goal 9: Industry Innovation and Infrastructure

New utility applications (such as powerline inspection) have been discovered as most applicable to drones. In order to perform many of these critical tasks, Remote ID and these standards provide key building blocks to enable these applications.

Please provide any additional information not provided above.

Contact Name: Phil Kenul

Committee: F38

Email Address: philip.kenul@gmail.com

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CALL FOR PARTICIPATION!

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Please identify the designation and title of the standard

F1562 the Standard Guide for Use-Oriented Foreign Language Instruction

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

Foreign language professionals Karen Decker, Kathleen Diamond, and Bill Rivers tell the story of seeing advertisements in in-flight magazines that bragged that using whatever system a person could “Speak Spanish like a diplomat in six weeks by listening to these tapes!” These experts knew that these sorts of advertisements were so misleading. First, learning to speak a language at a professional level takes at least six months of intensive study, not six weeks of casual listening. Second, six months won’t even be enough if a language learner isn’t committing many hours daily and working with a live instructor with a smaller number of students. These advertisements were characteristic of the many fads they had in language learning in the 70s and 80s - none of them really worked - such as Suggestopedia and the Lozanov Method, Cuisenaire rods and Total Physical Response, Community Learning, and the Rassias Method, among many others. A coalition of language training companies, academic researchers, and government experts decided to do something about all the misleading fads.

Such was the impetus for the F1562 Standard Guide for Use-Oriented Foreign Language Instruction, convened in 1991 by Dr. Richard Lambert, Director of the National Foreign Language Center at the School for Advanced International Studies at the Johns Hopkins University, in Washington, DC. At the time, ASTM International was broadening its focus from U.S. manufacturing to internationally available standards that included service products. Dr. Lambert and the group that wanted to create a foreign language instruction standard decided to go with ASTM International for this reason, and for the credibility they knew the organization would give their foreign language instruction standard.

The F1562 standard – the first standard on Language Services and Products that was written long before Technical Committee F43 on Language Services and Products even became its own technical committee – was written within the F15 Consumer Products Committee. Current ASTM International President Kathie Morgan was the Staff Manager for the F15 subcommittees that produced the first U.S. language standards. Those subcommittees and their formation years are as follows: F15.35 Use Oriented Foreign Language Instruction (1991), F15.48 Translation Services (1997), F15.34 Interpreting Services (1997), F15.64 Testing (2009). The team recalls working alongside those who were writing standards about cribs, gliders, ultra-light airplanes, and amusement park rides as they built the first three U.S. language standards.

The F1562 Standard Guide for Use-Oriented Foreign Language Instruction was groundbreaking for so many reasons, though the team didn’t necessarily understand at the time how groundbreaking their work was. The “use-oriented” in the title of the very first language standard was intentional, since the standard sought to systematize the consequential adult use and learning of language for consequential purposes.

Identify the interest groups that participated in the development and/or revision to the standard?

Numerous interest groups have participated over the past 30 years:

- Private sector language schools: Diplomatic Language Services (DLS), ICA Language Services, International Center for Language Studies (ICLS), Language Learning Enterprises (LLE), Berlitz, InLingua
- Federal language schools: Defense Language Institute Foreign Language Center, Defense Language Institute-Washington, Foreign Service Institute, Intelligence Language Institute, National Cryptologic School, US Department of Agriculture Graduate School
- Higher education institutions: National Foreign Language Center at John Hopkins, University of Maryland, Monterey Institute, and others
- Federal agencies; Federal Interagency Roundtable, Census Bureau, Library of Congress
- Non-profit organizations: American Council on the Teaching of Foreign Languages, American Councils for International Education

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

The standard is used as a benchmark for private sector language schools, including several in the greater Washington, DC area, which serve the national security sector. The standard serves as a reference for major US Government language schools, including the Defense Language Institute (both the Monterey, California, and Washington, DC locations), which trains more than 6000 US military members in more than 20 languages each year, as well as the US Department of State, Foreign Service Institute, School of Language Studies. In addition to use as a benchmark for internal processes, these institutions use the standard as part of their evaluation of contracted language schools. Finally, global language teaching organizations, have used the standard for benchmarking their processes.

After the standard was published, has it impacted health and safety? If yes, please explain.

F1562 is widely used by US public and private sector schools training diplomats and military personnel in languages. The improvements in language training matter to the battlefield, to embassy receptions, to diplomatic and intelligence work, international commerce.

How do consumers and the public benefit from this standard? (If applicable)

In general, the primary benefit to consumers and the public is that advertising by language learning providers is now honest. In effect, no company promises to teach languages to professional levels of proficiency in a few weeks of passive work.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

Although anecdotal, we assert that the standard has helped to ensure that quality language training is being provided to students whose professional lives are impacted in that they become more successful in their careers. In many cases national security is protected by those who represent US and global interests through the ability to communicate in difficult situations. Additionally, students who achieve high proficiency in foreign language for use in healthcare settings are undoubtedly saving lives. Privacy Acts prevent us from being able to provide citations of specific examples where professional use of foreign language has had significant safety, economic and financial impact.

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.

While there has been no regulatory adoption of ASTM F1562, it served as the basis for the development of ISO 29991, which addresses the same area of standardization. As noted above, global language learning organizations have used ASTM F1562. Domestically, the standard is a critical tool for private sector language schools which serve federal agencies, including the Department of Defense, the Department of State, the National Security Agency, and the Central Intelligence Agency. It is in wide use in this sector.

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

F1562 addresses goal 4, Quality education, by raising awareness of the requirements for quality language learning worldwide. English teaching in the private sector alone is estimated at a \$120b/year industry. F1562, and the closely related ISO 29991, are the ONLY standards available in this sector. Organizations such as DuoLingo - which is active in ASTM F43 - base their claims about their service in the framework established by ASTM F1562.

Please provide any additional information not provided above.

ASTM Committee F43 on Language Services and Products looks to the future as its standards are updated. F1562 is no exception. It is currently being reviewed by an expert team of drafters to ensure that it maintains its relevance by incorporating the use of remote language learning/training technology; redefining the look of the classroom and the way instruction is delivered to students at home and abroad.

Contact Name: Kathleen Diamond – F43 Chair

Committee: F43 on Language Services and Products

Email Address: duchess47@comcast.net

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Please identify the designation and title of the standard

ASTM G57 Standard Test Method for Field Measurement of Soil Resistivity Using the Wenner Four-Electrode Method

Identify the need for the development of this standard. (What problem was this standard trying to solve? Who initiated the development of the standard?)

This test method was originally published over 44 years ago in 1978. Unfortunately, no known members of the committee who developed the standard are still alive or could be contacted. It is unknown who initiated the development of the standard. As this standard was developed during the same time period Federal Regulations regarding Corrosion and Corrosion protection of regulated oil and gas pipelines were being implemented, it is speculated the need for the standard was related to implementation of those Federal Regulations.

Identify the interest groups that participated in the development and/or revision to the standard?

As stated previously, no known members of the committee who developed the standard are still alive or could be contacted so those who initially developed the standard could not be positively identified. However, the following interest groups participated in a round robin study in 1993, and it is speculated some of these interest groups may have participated in the original development of the standard: Port Authority of New York and New Jersey, M.C. Miller Co., New Jersey Bell, Elizabeth Town Gas, New Jersey Natural Gas, and Bellcore. Other interest groups which have participated in the revision of the standard over the years include, but are not limited to, the U.S. Army, U.S. Bureau of Reclamation, Ductile Iron Pipe Research Association, Metal Samples Co., CORRPRO, U.S. Pipe, California Dept. of Transportation, and Dean Corrosion Technology.

How is this standard commonly used by industry? (Provide as many detailed/specific examples)

This standard is commonly used to evaluate soil corrosivity by almost all industries who are interested in asset preservation and sustainability of underground metal structures. AWWA Manual M27 (External Corrosion Control for Infrastructure Sustainability – third edition) states: “It is generally accepted that soil resistivity is one of the most important tests to be conducted when evaluating the potential corrosivity of a soil”. The resistivity of the soil is used by many industries to determine if corrosion protection is necessary, the severity of corrosion which can be expected (i.e. expected life of the asset), and what type(s) of corrosion protection is most effective in a specific environment.

For example, for steel pipelines, NACE/AMPP publications “Corrosion Basics”, and “Peabody’s Corrosion Control of Pipeline Corrosion” reports Soil Resistivity vs. Degree of Corrosivity as follows: 0-500 ohm-cm very corrosive, 500-1,000 ohm-cm corrosive, 1,000-2,000 ohm-cm moderately corrosive, 2,000-10,000 ohm-cm mildly corrosive, and above 10,000 ohm-cm negligible. For Ductile Iron Pipe, ASTM A674 (Standard Practice for Polyethylene Encasement for Ductile Iron Pipe for Water or Other Liquids) uses resistivity as the main soil property needed to determine if a soil should be considered corrosive to ductile iron pipe and if corrosion protection is needed. The Ductile Iron Pipe Research Association / CORRPRO DDM® Design Decision Model uses resistivity as one of the main tests to use in a risk assessment model for corrosion protection recommendations for ductile iron pipe. For underground steel tanks, ASTM G158 (Three Methods of Assessing Buried Steel Tanks), lists soil resistivity per ASTM G57 in all three methods as needed when evaluating the condition of underground steel tanks. For concrete pressure pipe, AWWA Manual M9 (Concrete Pressure Pipe) uses soil resistivity and chloride content to give recommended corrosion control options.

After the standard was published, has it impacted health and safety? If yes, please explain.

YES. Testing of soil resistivity using this standard has provided engineers, designers, specifiers, consultants, and owners guidance as to whether a soil is corrosive to buried metallic objects for over 40 years. This knowledge has allowed proper selection of corrosion protection methods for metals when buried in corrosive soils. In the Oil and Gas industry where pipeline failures can result in environmental damage, explosions, fires, injury, and loss of life, prevention of these types of failures by identifying in advanced corrosive soils has had a significant impact on health and safety. In the water works industry, identifying corrosive soils and allowing corrosion prevention methods to be employed has resulted in not only asset preservation and sustainability of underground metal structures, but has also helped prevent pipeline corrosion failures and leaks which can result in contaminated drinking water, sickness, and possibly death

How do consumers and the public benefit from this standard? (If applicable)

See above discussion on health and safety. Also, consumers and the public benefit from asset preservation and sustainability by this ASTM Standard which allows design and operation decisions to be made based on soil corrosivity characteristics.

Can you provide any data to support the safety, economic or other impacts of the standard? If yes, please summarize the data and provide citations.

The safety, economic, and other impacts of this standard are related to prevention of corrosion of buried infrastructure and assets. By identifying whether corrosive conditions exist prior to installation of metallic pipelines and structures, appropriate corrosion protection methods can be specified and implemented to promote asset preservation and sustainability.

A 2016 NACE (National Association of Corrosion Engineers), international study titled "NACE IMPACT STUDY) estimated "the global cost of corrosion is 2.5 trillion dollars and that by using available corrosion control practices, it is estimated that a savings of 15 to 35% of the cost of corrosion could be realized." Much of the cost of corrosion is for underground utilities and metal structures, and by identifying in advance whether corrosive conditions exist, proper corrosion control methods can be designed and implemented.

Are you aware of any regulatory adoption (domestic or international) or broad international use of the standard? If yes, please provide details. *If this is currently in draft or is a new publication but is expected to have broad use please note that here with your rationale.*

Not directly, but there are a number of regulations in the oil and gas industry, and underground storage tank industry related to corrosion protection methods and requirements. Although ASTM G57 is not specifically required in these regulations, determination of soil corrosiveness is required, and determination of soil resistivity is one of the most important, if not the most important, soil property when making this determination. And, ASTM G57 is the most common method of evaluating soil resistivity.

Does this standard address one of the 17 Sustainable Development Goals (<https://sdgs.un.org/goals>)?

(If yes, please identify which one(s) and describe how?)

Yes,

Goal #3 Good Health & Well Being – In the water and wastewater industry, G57 helps identify corrosive soils for underground piping which allows selection of proper corrosion protection methods to prevent pipeline failures which can result in water contamination for drinking water, and release of harmful wastewater to the environment.

Goal #6 Clean Water & Sanitation – Same as above #3

Goal #7 Affordable & Clean Energy – In the oil & gas industry, G57 helps identify corrosive soils for underground piping which allows selection of proper corrosion protection methods to prevent pipeline failures which is promotes asset preservation and sustainability which is a key component of affordable energy.

Goal #9 Industry Innovation & Infrastructure – G57 helps identify corrosive soils allowing for proper selection of corrosion prevention methods, which in turn promotes asset preservation and sustainability of underground infrastructure such as metallic pipelines and metallic structures.

Please provide any additional information not provided above.

In the underground corrosion control industry, ASTM G57 is known and used by almost all practicing certified corrosion engineers. It is used not only for identifying corrosive soils, conducting failure analysis, and specifying corrosion control methods, but is also used extensively in the design of cathodic protection systems.

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