



United States
Consumer Product Safety Commission

TO: The Commission
Alberta E. Mills, Secretary

Ballot Vote Sheet

THROUGH: Austin C. Schlick, General Counsel
Jason K. Levine, Executive Director

DATE: December 14, 2022

FROM: Daniel R. Vice, Assistant General Counsel, Regulatory Affairs
David M. DiMatteo, Attorney, Regulatory Affairs

SUBJECT: Federal Register Notice: Notice of Commission Determinations Regarding
Voluntary Standards Under the Portable Fuel Container Safety Act of 2020

BALLOT VOTE DUE: Tuesday, December 20, 2022

The Office of the General Counsel (OGC) is forwarding a draft *Federal Register* notice for Commission consideration. Under the Portable Fuel Container Safety Act of 2020 (PFCSA), the Commission must promulgate a rule to require flame mitigation devices in portable fuel containers that impede the propagation of flame into the container, unless the Commission determines that there is a voluntary standard for flame mitigation devices that impedes the propagation of flame into the container. 15 U.S.C. 2056d(b)(3)(A). The PFCSA requires that any such Commission determinations regarding applicable voluntary standards be published in the *Federal Register*. 15 U.S.C. 2056d(b)(3)(B).

On May 24, 2022, the Commission published in the *Federal Register* a notice of availability requesting public comment on a staff draft memorandum, "Voluntary Standards Evaluation Under the Portable Fuel Container Safety Act of 2020." 87 FR 31541. The staff briefing package provides staff's responses to comments submitted in response to the May 2022 notice. Staff recommends that the Commission determine that voluntary standards for two classes of portable fuel containers—together encompassing all portable fuel containers known to staff—establish requirements that impede the propagation of flame into the containers, such that promulgating a rule is not necessary. The draft *Federal Register* notice would make that determination. If approved by the Commission, OGC will send the notice to the *Federal Register* for publication.

**U.S. Consumer Product
Safety Commission**
4330 East-West Highway
Bethesda, MD 20814

**National Product Testing
& Evaluation Center**
5 Research Place
Rockville, MD 20850

[cpsc.gov](https://www.cpsc.gov)



Ballot Vote Sheet

Please indicate your vote on the following options:

- I. Approve publication of the attached notice in the *Federal Register*, as drafted.

(Signature)

(Date)

- II. Approve publication of the attached notice in the *Federal Register*, with the specified changes.

(Signature)

(Date)

- III. Do not approve publication of the attached notice in the *Federal Register*.

(Signature)

(Date)

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**National Product Testing
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5 Research Place
Rockville, MD 20850



Ballot Vote Sheet

IV. Take other action specified below.

(Signature)

(Date)

Attachment: Draft *Federal Register* notice: "Notice of Commission Determinations Regarding Voluntary Standards Under the Portable Fuel Container Safety Act of 2020"

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Safety Commission**
4330 East-West Highway
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Rockville, MD 20850

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Billing Code **6355-01**

CONSUMER PRODUCT SAFETY COMMISSION

[Docket No. CPSC-2022-0017]

AGENCY: Consumer Product Safety Commission.

ACTION: Notice of Commission Determinations Regarding Portable Fuel Container Voluntary Standards Under the Portable Fuel Container Safety Act of 2020.

SUMMARY: The Portable Fuel Container Safety Act of 2020 (PFCSA) provides that the Consumer Product Safety Commission (Commission) must promulgate a rule to require flame mitigation devices in portable fuel containers that impede the propagation of flame into the container, unless the Commission determines that there is a voluntary standard for flame mitigation devices that impedes the propagation of flame into the container. The Commission is announcing in this document that it has determined that such voluntary standards exist for all known classes of portable fuel containers. Therefore, the Commission will not be promulgating a final rule, and pursuant to the PFCSA, the requirements of such voluntary standards shall be treated as a consumer product safety rule under the Consumer Product Safety Act (CPSA).

DATES: The Commission determinations made under the PFCSA for ASTM F3429/F3429M-20, ASTM F3326-21, and Section 18 of UL 30:2022 discussed in this document will be effective by operation of law as consumer product safety rules on [INSERT DATE 180 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

FOR FURTHER INFORMATION CONTACT:

Jennifer H. Colten, Office of Compliance and Field Operations, Consumer Product Safety Commission, 4330 East West Highway, Bethesda, MD 20814-4408; telephone (301) 504-8165; jcolten@cpsc.gov.

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SUPPLEMENTARY INFORMATION:**I. The Portable Fuel Container Safety Act of 2020**

The PFCSA¹ requires the Commission to promulgate, not later than 30 months after December 27, 2020, a final rule to require flame mitigation devices in portable fuel containers that impede the propagation of flame into the container. 15 U.S.C. 2056d(b)(1), (2). However, the Commission is not required to promulgate a final rule for a class of portable fuel containers within the scope of the PFCSA if the Commission determines at any time that:

- there is a voluntary standard for flame mitigation devices for those containers that impedes the propagation of flame into the container;
- the voluntary standard is or will be in effect not later than 18 months after the date of enactment of the PFCSA (*i.e.*, June 27, 2022); and
- the voluntary standard is developed by ASTM International or such other standard development organization that the Commission determines to have met the intent of the PFCSA.

15 U.S.C. 2056d(b)(3)(A). Any such Commission determinations regarding applicable voluntary standards must be published in the *Federal Register*. 15 U.S.C. 2056d(b)(3)(B).

II. Portable Fuel Container Voluntary Standards*A. Background*

The PFCSA requires the Commission to promulgate a final rule to require flame mitigation devices on portable fuel containers by June 27, 2023. 15 U.S.C. 2056d(b)(1). The PFCSA provides an exception to the rulemaking requirement if the Commission determines that

¹ Portable Fuel Container Safety Act of 2020, codified at 15 U.S.C. § 2056d, as stated Pub. L. No. 116–260, div. FF, title IX, § 901, available at: <https://www.govinfo.gov/content/pkg/PLAW-116publ260/pdf/PLAW-116publ260.pdf>.

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a voluntary standard for a class of portable fuel containers has requirements for flame mitigation devices that impede the propagation of flames into the container. 15 U.S.C. 2056d(b)(3)(A).

The Commission must publish any such determination in the *Federal Register*, and the requirements of such a voluntary standard “shall be treated as a consumer product safety rule.” 15 U.S.C. 2056d(b)(3)(B) and (b)(4).

1. Definition of Flame Mitigation Device

The PFCSA does not define the term “flame mitigation device.” However, ASTM F3429, *Standard Specification for Flame Mitigation Devices Installed in Disposable and Pre-Filled Flammable Liquid Containers*, defines a “flame mitigation device” as “a device or feature attached to, installed in, or otherwise integral to, a container that is expected to inhibit the propagation of an external flame into the container.” A common type of flame mitigation device used with portable fuel containers is a flame arrestor (also known as flame arrester or flash arresting screen). A flame arrestor is a screen that quenches and cools a flame so that it cannot pass through the flame arrestor. Other examples of flame mitigation devices include, but are not limited to, expanded metal mesh, screens, bladders, pinhole restrictors, and pumps.

2. Statutory Definition of “Portable Fuel Container”

The PFCSA defines the term “portable fuel container” to mean any container or vessel (including any spout, cap, and other closure mechanism or component of such container or vessel or any retrofit or aftermarket spout or component intended or reasonably anticipated to be for use with such container):

- intended for flammable liquid fuels with a flash point less than 140 degrees Fahrenheit, including gasoline, kerosene, diesel, ethanol, methanol, denatured alcohol, or biofuels;
- that is a consumer product with a capacity of 5 gallons or less; and

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- that the manufacturer knows or reasonably should know is used by consumers for transporting, storing, and dispensing flammable liquid fuels.

15 U.S.C. 2056d(b)(8).

Some examples of portable fuel containers include portable gasoline containers and containers for cigarette lighter fluid, charcoal lighter fluid, and liquid fireplace fuel (such as firepot fuel). Products that store substances like liquified petroleum gas (“LP gas,” commonly called “propane”) are not within scope of the statutory definition of “portable fuel containers” because these substances are only liquid at high pressure, and when exposed to ambient conditions, readily vaporize.

3. Flame Jetting Hazard

The principal hazards that flame mitigation devices protect against are flame jetting and container rupturing. “Flame jetting,” as defined in ASTM F3429, is a “phenomenon where an external ignition source causes a sudden ignition within a liquid container that directionally propels burning vapor and liquid from the mouth of the container.” Container rupturing is similar to flame jetting, except the burning vapor and liquid exit through a rupture in the container. The injury potential associated with each hazard is the same, severe burns and possible death. Flame jetting typically injures people other than the person holding the container, while container rupturing typically injures the person holding the container. In this notice, references to flame jetting also include container rupturing.

B. Relevant Voluntary Standards

The PFCSA allows the Commission to separate portable fuel containers into different classes. 15 U.S.C. 2056d(b)(3)(A). CPSC staff evaluated the specifications for many portable fuel containers and recommends separating portable fuel containers into two classes: containers

sold pre-filled, and containers sold empty. Below are staff’s descriptions and assessments under the PFCSA of the relevant portable fuel container voluntary standards for containers sold pre-filled, and containers sold empty, which together, encompass all known classes of portable fuel containers. A more detailed description of staff’s assessment of the voluntary standards is available in staff’s memorandum.²

1. Containers Sold Pre-Filled

Containers sold pre-filled are likely to be discarded by the consumer once the contents (the flammable liquid fuel) are completely used; whereas containers sold empty are specifically designed to be reused. Pre-filled containers and empty containers are used differently and have different product lifespans. The differences also mean that the flame mitigation devices will be subjected to different conditions that can affect performance over time, and therefore, requirements differ for pre-filled versus empty containers. For example, pre-filled containers, such as those used for charcoal lighter fluid, can be squeezed easily, and therefore, are likely to create a larger vacuum force pulling external flames into the container.

a. ASTM F3429/F3429M-20

Portable fuel containers sold pre-filled are within the scope of ASTM F3429/F3429M-20, *Standard Specification for Performance of Flame Mitigation Devices Installed in Disposable and Pre-Filled Flammable Liquid Containers*. ASTM lists the standard as a dual standard in inch-pound (F3429 designation) and metric (F3429M designation) units. Both designations of the standard are substantively identical except for the inch-pound vs metric units used in the standard. ASTM F3429/F3429M was first published in 2020 and has not been revised since

² CPSC staff’s memorandum “Voluntary Standards Evaluation Under the Portable Fuel Container Safety Act of 2020” is available at: [\[Insert hyperlink\]](#).

publication of the standard. The standard was developed by the ASTM F15.72 subcommittee for Pre-Filled Containers of Flammable and Combustible Liquids.

The standard requires two performance tests of the container's flame mitigation devices. The first is an endurance test, in which the container is subjected to an external and stationary 2.5-inch flame at the mouth of the container for 30 seconds. The second test is a flashback test, in which the container is subjected to an external flash fire near the container mouth. The container passes each test if the contents of the container do not catch fire or otherwise ignite in each of five consecutive trials. The two tests demonstrate that the flame mitigation device impedes the propagation of two different types of ignition sources, a stationary flame and a moving flame.

2. Containers Sold Empty

Portable fuel containers sold empty, such as gas cans, are designed to receive fuel from a service station pump for transfer later into a fuel-powered product, such as a lawnmower. They are designed to be used in this manner many times and to hold flammable liquids for long periods, over large temperature variations.

Safety cans are portable fuel containers sold empty that the U.S. Occupational Safety and Health Administration (OSHA) generally regulates for use in the workplace. OSHA requires spring-loaded or self-closing openings and flash-arresting screens on safety cans, 29 CFR 1926.155(l). OSHA also requires that safety cans be approved by a nationally recognized testing laboratory (NRTL), 29 CFR 1926.155(a). The OSHA requirements do not specify to which standard an NRTL must test the safety can. Safety cans tend to be more expensive than typical gas cans but are available for purchase by consumers at many physical and online retailers.

a. ASTM F3326-21

Portable fuel containers sold empty for general consumer use are within the scope of ASTM F3326-21, *Standard Specification for Flame Mitigation Devices on Portable Fuel Containers*. “Portable Fuel Containers,” as used in the title of ASTM F3326, refers to containers that meet the scope of ASTM F852, *Standard Specification for Portable Gasoline, Kerosene, and Diesel Containers for Consumer Use*. ASTM F3326 was initially published in 2019 and has been revised twice. The current version of the standard is ASTM F3326-21.

ASTM F3326 requires a performance test of the container’s flame mitigation devices after the container is exposed to several use-and-abuse tests. Use-and-abuse tests are designed to ensure a flame mitigation device still functions after simulating normal use and reasonably foreseeable abuse of the container over time. The flame mitigation device performance test demonstrates that the container prevents a flame traveling at five meters per second from igniting the contents of the container in each of five consecutive trials. The test also demonstrates that the flame mitigation device impedes the propagation of a rapidly travelling flame front into the container.

b. UL 30:2022

Portable fuel containers that are sold empty and meet the OSHA requirements for safety cans are within the scope of ANSI/CAN/UL/ULC 30:2022 (UL 30:2022), *Standard for Safety Metallic and Nonmetallic Safety Cans for Flammable and Combustible Liquids*. UL 30:2022 is a voluntary standard that covers various requirements for safety cans, including requirements for flame mitigation devices. The standard is under the jurisdiction of UL Standard Technical Panel (STP) 30. The current version of the standard, UL 30:2022, was published in 2022, and it has been in effect since April 29, 2022.

Section 18 of UL 30 has two performance test options. The first option is to subject the safety can mouth to an external and stationary 2.5-inch flame for 30 seconds. The safety can pass the test if the interior content of the safety can does not catch fire or otherwise ignite in each of five consecutive trials. The second performance test option is used for safety cans that have a flame arrestor. In this performance test, a 7.5-inch flame is balanced on one side of the flame arrestor as a fuel-air mixture passes through. The flame arrestor fails if the flame crosses the flame arrestor and ignites the fuel-air mixture. CPSC staff advises that compliance to section 18 of UL 30:2022 would meet the OSHA requirement for a “flash arresting screen.” 29 CFR 1926.155(l).

III. Responses to Comments

On May 24, 2022, the Commission published a notice of availability seeking public comment on a CPSC staff draft document, “Voluntary Standards Evaluation Under the Portable Fuel Container Safety Act of 2020,” which provided staff’s initial assessment and recommendations to the Commission regarding whether the relevant voluntary standards qualify for the exception from the rulemaking requirement under the PFCSA. 87 FR 31540. Six comments were submitted in response to the request for comments. The comments generally supported staff’s recommendations and did not suggest any other voluntary standards the Commission should consider when making a determination under the PFCSA, or any class of portable fuel containers that the referenced voluntary standards fail to address. A brief summary of the comments and staff’s responses is provided below.

Comment: The Portable Fuel Container Manufacturers Association (PFCMA) supports CPSC staff’s recommendation to require that products meet the three staff-recommended voluntary standards, as applicable. The PFCMA concurs with CPSC staff’s assessment that the

voluntary standards meet the requirements of the PFCSA. The PFCMA notes that each of the referenced standards was developed in collaboration with industry, consumer safety advocates, and CPSC experts. Consequently, the PFCMA indicates that the standards promote practical approaches to mitigating the risk of flame-jetting for each application. The PFCMA states that its members have been compliant with the relevant voluntary standards for several years.

Comment: Zippo Manufacturing Company (ZMC) states that it supports CPSC staff’s recommendation to require pre-filled portable fuel containers to meet ASTM F3429. ZMC recommends that CPSC refer to the list found in ASTM F3429 when listing “other” flame mitigation devices. The commenter states that the ASTM standard specifies that “other examples of [flame mitigation devices] include, but are not limited to, expanded metal mesh, screens, bladders, pinhole restrictors, and pumps.”

Response: Staff included in its briefing memorandum the examples of flame mitigation devices listed in ASTM F3429/F3429M-2020, which include, but are not limited to, expanded metal mesh, screens, bladders, pinhole restrictors, and pumps.

Comment: Calumet Specialty Products Partners, L.P.’s Performance Brand business unit indicates that it did not object to the Commission requiring pre-filled portable fuel containers to meet ASTM F3429/F3429M-20, but they request a delayed effective date of December 31, 2023, due to supply chain delays, testing delays, and time needed to design flame mitigation devices. The commenter also provides technical suggestions for potential future development of ASTM F3429/F3429M-20.

SolvChem, Inc., also requests additional time to comply with the voluntary standard, requesting an effective date of January 2024, for three reasons: (1) time needed to develop the devices; (2) time needed to test the devices to the standard; and (3) time needed to purchase the

tooling and equipment necessary to produce the devices. This commenter asserts that tooling and equipment lead times are at an all-time high, with some lead times expected to be 6 months to a year. The commenter clarifies that the purchase of tooling and equipment must occur after the development and approval of any potential device.

Response: Under the PFCSA, a voluntary standard that the Commission determines meets the requirements of the rulemaking exception under PFCSA “shall be treated as a consumer product safety rule promulgated under section 2058 of this title beginning on the date which is the later of” either “180 days after publication of the Commission’s determination” or “the effective date contained in the voluntary standard.” 15 U.S.C. 2056d(b)(4). Here, the later date is 180 days after publication of the Commission’s determinations. Therefore, the relevant voluntary standards will be effective pursuant to the PFCSA 180 days after publication of the Commission’s determinations in this document. We note that the voluntary standard referred to by the commenter has been in place since 2020.

Comment: R.B. Howes & Co. Inc., asks whether “additives” would be considered a “fuel.” The commenter understands that, based on its reading of CPSC staff’s voluntary standards evaluation for the PFCSA, the provisions apply to fuels with a flash point below 140 degrees Fahrenheit. The commenter states that it manufactures diesel fuel additives, which, it asserts, are not fuels and have flash points above the 140-degree Fahrenheit threshold. However, the commenter states that it is unclear whether additives with flash points within the scope of the PFCSA would be exempted from the requirements, and therefore, requests clarification.

Similarly, an anonymous commenter asks for the Commission to define “liquid fuels.” This commenter indicates that they represent a contract manufacturer of various chemical products. The commenter understands that, based on their reading of CPSC staff’s voluntary

standards evaluation for the PFCSA, the provisions would apply only to fuels and not “fuel-adjacent products,” such as fuel additives. The commenter requests a definition for “liquid fuels” so that businesses have clarity.

Response: The PFCSA defines “portable fuel containers” as products “intended for flammable liquid fuels with a flash point less than 140 degrees Fahrenheit, including gasoline, kerosene, diesel, ethanol, methanol, denatured alcohol, or biofuels.” 15 U.S.C. 2056d(b)(8)(A). Fuels generally are considered substances that can be burned to release energy, and liquids with a flash point below 140 degrees Fahrenheit are, by the definition of flash point, capable of being burned at that temperature. Staff assessed all known flammable liquid fuels with a flash point less than 140 degrees as part of the evaluation of the voluntary standards under the PFCSA. Accordingly, while classification of a particular container for purposes of the PFCSA is case-specific, as a general matter, when a liquid with a flash point less than 140 degrees Fahrenheit is intended to be used as, or in, a fuel mixture to support combustion, it is a fuel under the definition of “portable fuel containers” as indicated in the PFCSA.

IV. Commission Determinations Regarding Portable Fuel Containers Voluntary Standards

As noted in Section I of this document, under the PFCSA, the Commission is not required to promulgate a final rule if the requirements for an exception are met for a class of portable fuel containers within the scope of the PFCSA. 15 U.S.C. 2056d(b)(3).

Portable fuel containers sold pre-filled and portable fuel containers sold empty are together subject to three voluntary standards. Based on CPSC staff’s assessment and recommendations regarding the three voluntary standards, and consideration of the comments

submitted, the Commission makes the following determinations³ regarding ASTM F3429/F3429M-20, ASTM F3326-21, and section 18 of UL 30:2022 under section 2056d(b)(3)(A) of the PFCSA.

A. Commission Determination Regarding ASTM F3429/F3429M-20

The Commission determines that for portable fuel containers sold pre-filled, ASTM F3429/F3429M-20, *Standard Specification for Performance of Flame Mitigation Devices Installed in Disposable and Pre-Filled Flammable Liquid Containers*, meets the requirements of the exception to rulemaking under the PFCSA. ASTM F3429/F3429M-20 contains effective performance requirements for flame mitigation devices in portable fuel containers that impede the propagation of flame into the container; the standard was in effect before June 27, 2022; and the standard was developed by ASTM International. *See* 15 U.S.C. 2056d(b)(3)(A). Based on these findings, the Commission determines that rulemaking is not required under the PFCSA for portable fuel containers sold pre-filled, because ASTM F3429/F3429M-20 meets the requirements of the PFCSA.

B. Commission Determination Regarding ASTM F3326-21

The Commission determines that for portable fuel containers sold empty, ASTM F3326-21, *Standard Specification for Flame Mitigation Devices on Portable Fuel Containers*, meets the requirements of the exception to rulemaking under the PFCSA. ASTM F3326-21 contains effective performance requirements for flame mitigation devices in portable fuel containers that impede the propagation of flame into the container; the standard was in effect before June 27, 2022; and the standard was developed by ASTM International. 15 U.S.C. 2056d(b)(3)(A). Based on these findings, the Commission determines that rulemaking is not required under the

³ The Commission voted TBD-TBD to publish this notice.

PFCSA for portable fuel containers sold empty, because ASTM F3326-21 meets the requirements of the PFCSA.

C. Commission Determination Regarding UL 30:2022

The Commission determines that for safety cans sold empty, ANSI/CAN/UL/ULC 30:2022, *Standard for Safety Metallic and Nonmetallic Safety Cans for Flammable and Combustible Liquids*, meets the requirements of the exception to rulemaking under the PFCSA. Section 18 of UL 30:2022 contains effective performance requirements for flame mitigation devices in safety cans that impede the propagation of flame into the container; the standard was in effect before June 27, 2022; and the standard was developed by UL, which, like ASTM International, is an ANSI-accredited standards developer and is experienced in the development of consumer product voluntary standards. 15 U.S.C. 2056d(b)(3)(A). Based on these findings, the Commission determines that rulemaking is not required under the PFCSA for portable fuel containers that are safety cans sold empty, because section 18 of UL 30:2022 meets the requirements of the PFCSA.

D. Publication of Notice of Commission Determinations

The Commission is publishing this notice of Commission determinations in the *Federal Register*, as required under section 2056d(b)(3)(B) of the PFCSA. The three portable fuel container voluntary standards will become effective as mandatory consumer product safety rules on [INSERT DATE 180 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]. 15 U.S.C. 2056d(b)(4). The Commission may in the future issue a direct final rule to incorporate the voluntary standards into the Code of Federal Regulations.

**V. Effect of Commission Determinations Regarding Portable Fuel Container
Voluntary Standards**

Under the PFCSA, because the Commission has determined that the three voluntary standards discussed above, collectively covering the two known classes of portable fuel containers, meet the requirements for the exception to the rulemaking requirement, the requirements of those voluntary standards shall be treated as consumer product safety rules promulgated under section 9 of the CPSA (15 U.S.C. 2058), beginning on the date that is the later of 180 days after publication of the Commission’s determination, or the effective date contained in the voluntary standard. 15 U.S.C. 2056d(b)(4). In this instance, the publication of this notice is the later of the two possible statutory dates. Therefore, portable fuel containers manufactured after [180 DAYS AFTER PUBLICATION IN THE FEDERAL REGISTER] must comply with the requirements of either ASTM F3429/F3429M-20, ASTM F3326-21, or section 18 of UL 30:2022, as applicable. Specifically, portable fuel containers sold pre-filled are required to comply with the requirements of ASTM F3429/F3429M-20. Portable fuel containers sold empty (that are not safety cans) are required to comply with the requirements of ASTM F3326-21. Safety cans are required to meet the requirements of either ASTM F3326-21 or section 18 of UL 30:2022.

VI. Certification

Section 14(a) of the CPSA requires that products subject to a consumer product safety rule under the CPSA, or to a similar rule, ban, standard, or regulation under any other act enforced by the Commission, must be certified as complying with all applicable CPSC requirements. 15 U.S.C. 2063(a). Such certification must be based on a test of each product, or on a reasonable testing program. 15 U.S.C. 2063(a)(1). Under the PFCSA, because of the Commission’s determinations, ASTM F3429/F3429M-20, ASTM F3326-21, and section 18 of UL 30:2022, are considered consumer product safety rules under the CPSA. Therefore, portable

fuel containers manufactured after [INSERT DATE 180 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER], are subject to the testing and certification requirements of section 14(a)(1) of the CPSA.

VII. Public Access to Portable Fuel Containers Voluntary Standards

ASTM F3429/F3429M-20, ASTM F3326-21, and UL 30:2022 are available to the public for review, free of charge, as described below.

For free-of-charge, read-only online access to ASTM F3429/F3429M-20:

- Access ASTM’s CPSC reading room at: <http://www.astm.org/cpsc.htm>.
- Search for ASTM F3429.

Note: In the future, read-only access to the standard may move to ASTM’s Reading Room at: <https://www.astm.org/products-services/reading-room.html>.

For free-of-charge, read-only online access to ASTM F3326-21:

- Access ASTM’s CPSC reading room at: <http://www.astm.org/cpsc.htm>.
- Search for ASTM F3326.

Note: in the future, read-only access to the standard may move to ASTM’s Reading Room at: <https://www.astm.org/products-services/reading-room.html>.

For free-of-charge, read-only online access to ANSI/CAN/UL/ULC 30:2022:

- Access UL’s Standards Sale Site at: <http://shopulstandards.com>.
- Click “Browse and Buy Standards,” and search for UL 30.
- Click “Digital View,” and sign in, or create a user account.

ASTM F3429/F3429M-20, ASTM F3326-21, and ANSI/CAN/UL/ULC 30:2022 are also available to review in person through CPSC’s Office of the Secretary, 4330 East West Highway, Bethesda, MD 20814.

Dated:

Alberta E. Mills,
Secretary, Consumer Product Safety Commission



Memorandum

TO: The Commission
 Alberta E. Mills, Secretary

THROUGH: Austin C. Schlick, General Counsel
 Jason K. Levine, Executive Director
 DeWane Ray, Deputy Executive Director for Operations

FROM: Duane E. Boniface, Assistant Executive Director
 Office of Hazard Identification and Reduction

Andrew Lock, Ph.D., Project Manager, Fire Safety of Portable
 Fuel Containers, Directorate for Laboratory Sciences

Scott Ayers, Technical Lead, Fire Safety of Portable Fuel
 Containers Project, Directorate for Engineering Sciences

SUBJECT: Voluntary Standards Evaluation Under the Portable Fuel
 Container Safety Act of 2020

DATE: December 14, 2022

Executive Summary

The Portable Fuel Container Safety Act of 2020 (the Act), codified at 15 U.S.C. § 2056d, requires the U.S. Consumer Product Safety Commission (Commission, or CPSC) to promulgate, by June 27, 2023, a final rule requiring flame mitigation devices (FMDs) on portable fuel containers, *i.e.*, that impede the propagation of flame into the container, 15 U.S.C. § 2056d(b)(1). That requirement, however, does not apply to any class of portable fuel containers if the Commission determines that an existing voluntary standard has requirements for FMDs that impede the propagation of flames into the container. *Id.* § 2056d(b)(3). If such a voluntary standard exists, then “the requirements of such a voluntary standard shall be treated as a consumer product safety rule.” *Id.* § 2056d(b)(4).

This memorandum provides background regarding the product hazard and the existing voluntary standards for portable fuel containers. It also provides CPSC staff’s assessment and recommendation that the Commission determine that the existing voluntary standards for

portable fuel containers meet the requirements of the Act, thus satisfying the exception to the rulemaking requirement. Staff also recommends publication in the *Federal Register* of the Commission's determination that the voluntary standards meet the Act's requirements for an exception to the rulemaking requirement. See 15 U.S.C. § 2056d(b)(3)(B).

Background

The Act is codified at 15 U.S.C. § 2056d and requires the Commission to promulgate a final rule to require flame mitigation devices on portable fuel containers by June 27, 2023. The Act provides an exception to this requirement if the Commission determines that an existing voluntary standard for a class of portable fuel containers has requirements for flame mitigation devices for containers that impede the propagation of flames into the container. The Commission must publish any such determination in the *Federal Register*, and the requirements of such a voluntary standard "shall be treated as a consumer product safety rule." 15 U.S.C. § 2056d(b)(3)(B) and (b)(4).

The Act does not define the term "flame mitigation device." However, staff advises that ASTM F3429, *Standard Specification for Flame Mitigation Devices Installed in Disposable and Pre-Filled Flammable Liquid Containers*, which defines a "flame mitigation device" as "a device or feature attached to, installed in, or otherwise integral to, a container that is expected to inhibit the propagation of an external flame into the container," provides a definition consistent with congressional intent. A common type of flame mitigation device used with portable fuel containers is a flame arrester (also known as flame arrester or flash arresting screen). A flame arrester is a screen that quenches and cools a flame so that it cannot pass through the flame arrester. Other examples of flame mitigation devices include, but are not limited to, expanded metal mesh, screens, bladders, pinhole restrictors, and pumps.

Over several years of research, collaboration with varied stakeholders, and experimentation, CPSC staff has gained substantial experience with approaches addressing flame-jetting hazards.

- CPSC staff first became involved with addressing flame jetting as part of the ASTM F15.10 subcommittee on portable fuel containers. In **2007**, the subcommittee decided to start researching FMDs.
- In **2011**, CPSC became aware of a then-emerging, flame-jetting hazard involving firepots, a new decorative outdoor lighting product on the market. Firepots typically used an ethanol-based gel fuel, which came in a plastic bottle for fueling and refueling. These products were highly susceptible to flame jetting. Figure 1 shows an image from a video by CPSC staff demonstrating this hazard.
- In **2017**, CPSC staff worked with the National Fire Protection Association (NFPA), American Chemistry Society (ACS), National Science Teachers Association (NSTA), U.S. Chemical Safety Board and Hazardous Investigation Board (CSB), U.S. Bureau of Alcohol,

Tobacco, Firearms, and Explosives (ATF), Portable Fuel Container Manufacturers Association (PFCMA), Fairfax County (Virginia) Fire Department, ASTM F15, and others, to discuss flame jetting and ways to improve awareness of the hazard. In **2021**, UL, LLC asked CPSC staff participate in developing the next edition of UL 30, specifically because of our knowledge of fire safety, the flame-jetting phenomenon, and FMDs.



Figure 1- Image from CPSC video demonstrating the hazard of flame jetting with gelled alcohol fuels, 2011.

Consistent with these efforts by CPSC staff, in January **2021**, Health Canada issued a “Notice to Interested Parties” determining that pourable alcohol-based fuels that do not meet ASTM F3429 pose a danger to human health and safety. This notice prohibits the manufacture, importation, advertisement, and sale of pourable alcohol-based fuel containers in Canada that do not conform to ASTM F3429.

Statutory Definition of “Portable Fuel Container”

A “portable fuel container” is defined by 15 U.S.C. § 2056d(b)(8) as: “any container or vessel (including any spout, cap, and other closure mechanism or component of such container or vessel or any retrofit or aftermarket spout or component intended or reasonably anticipated for such use with such container),” that is

- “intended for flammable liquid fuels with a flash point less than 140 degrees Fahrenheit, including gasoline, kerosene, diesel, ethanol, methanol, denatured alcohol, or biofuels”;
- “a consumer product with a capacity of five gallons or less”; and
- a container “that the manufacturer knows or reasonably should know is used by consumers for transporting, storing, and dispensing flammable liquid fuels.”

Some examples of portable fuel containers include portable gasoline containers (*e.g.*, gas cans) and containers for cigarette lighter fluid, charcoal lighter fluid, and liquid fireplace fuel (such as firepot fuel). Products that store substances like liquified petroleum gas (LP-gas, commonly called "propane") are not within scope of the statutory definition of “portable fuel containers” because these substances are only liquid at high pressure, and when exposed to ambient conditions, readily vaporize.

Flame Jetting Hazard

The principal hazards that flame mitigation devices protect against are flame jetting and container rupturing. “Flame jetting,” as defined in ASTM F3429, is a “phenomenon where an external ignition source causes a sudden ignition within a liquid container that directionally propels burning vapor and liquid from the mouth of the container.” Container rupturing is similar to flame jetting, except the burning vapor and liquid exit through a rupture in the container. The injury potential associated with each hazard is the same, severe burns and possible death. Flame jetting typically injures people other than the person holding the container, while container rupturing typically injures the person holding the container. Burning liquid from flame jetting generally travels further from the container than when the container ruptures. For this memorandum, references to flame jetting also include container rupturing.

Rulemaking Requirement

As noted, the Act requires the Commission to promulgate, within 30 months of December 27, 2020, a final rule requiring flame mitigation devices in portable fuel containers that impede the propagation of flame into the container, unless the requirements for an exception under section 2056d(b)(3) are met. 15 U.S.C. § 2056d(b)(1). If the requirements for this exception are not met, then a final rule must be promulgated in accordance with section 553 of the Administrative Procedure Act. 15 U.S.C. § 2056d(b)(2)(A).

Voluntary Standard Exception

Rulemaking is not required for a class of portable fuel containers if the Commission determines that an existing voluntary standard applicable to the class has requirements for flame mitigation devices that impede the propagation of flame into the container. 15 U.S.C. § 2056d(b)(3). Specifically, the Commission must rely on voluntary standards instead of the required rulemaking for a class of portable fuel containers within the scope of the Act, if the Commission finds the following requirements are met:

- There is a voluntary standard for flame mitigation devices for containers that impede the propagation of flame into the container;
- The voluntary standard is or will be in effect not later than 18 months (June 27, 2022) after the date of enactment of the Act; and
- The voluntary standard is developed by ASTM International, or such other standard development organization that the Commission determines to have met the intent of this Act.

The Act states that if the Commission determines that a voluntary standard meets the conditions described above, then the requirements of such voluntary standard shall be treated as a consumer product safety rule promulgated under section 9 of the Consumer Product Safety Act (15 U.S.C. § 2058), beginning on the date that is the later of 180 days after publication of the Commission's determination, or the effective date contained in the voluntary standard. 15 U.S.C. § 2056d(b)(4). The Commission must publish any determination regarding a voluntary standard exception in the *Federal Register*. 15 U.S.C. § 2056d(b)(3)(B).

In sum, if the Commission determines that existing voluntary standards meet the statutory requirements for an exception, then the voluntary standards would be considered mandatory standards 180 days after the publication in the *Federal Register*, as required by the statute.

Staff actively participated in the development of voluntary standard requirements for flame mitigation devices and has concluded that three existing voluntary standards meet the voluntary standard exception requirement, as discussed below.

Classes of Portable Fuel Containers

The Act allows the Commission to separate portable fuel containers into different classes, 15 U.S.C. § 2056d(b)(3). Staff evaluated the specifications for many portable fuel containers and recommends separating portable fuel containers into two classes, containers sold *pre-filled* and containers sold *empty*. Figure 2, below shows examples of containers sold *pre-filled* and *empty*.

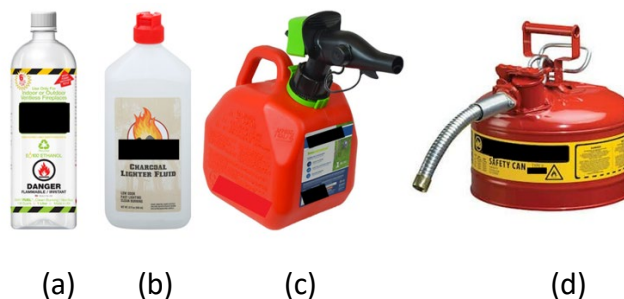


Figure 2- Examples of containers sold *pre-filled*: (a) fireplace liquid fuel and (b) charcoal lighter fluid, and containers sold *empty*: (c) gasoline container and (d) safety can.

Containers Sold Pre-Filled

Containers sold pre-filled are likely to be discarded by the consumer once the contents (the flammable liquid fuel) are completely used, whereas containers sold empty, are specifically designed to be reused many times. Pre-filled containers and empty containers are used differently and have different product lifespans. The differences also mean that the flame mitigation devices will be subjected to different conditions that can affect performance over time, and therefore, requirements differ for pre-filled versus empty containers. For example, pre-filled containers, such as those used for charcoal lighter fluid, can be squeezed easily, and therefore, are likely to create a larger vacuum force pulling external flames into the container.

Containers Sold Empty

Empty containers, such as gas cans, for example, are designed to receive fuel from a service station pump for transfer later into a fuel-powered product, such as a lawnmower. They are designed to be used in this manner many times and to hold flammable liquids for long periods of time, over large temperature variations.

Staff has also identified a subclass of empty containers, *safety cans*. Safety cans are portable fuel containers sold empty that the U.S. Occupational Safety and Health Administration (OSHA) regulates for use in the workplace. OSHA requires spring-loaded or self-closing openings and flash-arresting screens on safety cans, 29 CFR § 1926.155(l). OSHA also requires that safety cans be approved by a nationally recognized testing laboratory (NRTL), 29 CFR § 1926.155(a). The OSHA requirements do not specify to which standard the NRTL must test the safety can. Safety cans tend to be more expensive than typical gas cans but are available for purchase by consumers at many physical and online retailers. Staff considers the generally accepted definition of a “safety can” to be a container that meets the OSHA requirements.¹

Voluntary Standards

There are three voluntary standards that pertain to the elements in the Act, for which staff actively provided support during their development (see Appendix A for details). The three standards are discussed below:

ASTM F3429 - Pre-Filled Portable Fuel Containers

Portable fuel containers sold pre-filled are within the scope of ASTM F3429, *Standard Specification for Performance of Flame Mitigation Devices Installed in Disposable and Pre-Filled Flammable Liquid Containers*. This standard was initially published in 2020, and it has been in effect since September 2020. The standard was developed by the ASTM F15.72 subcommittee

¹ Safety cans are subject to the Act to the extent that they are a “consumer product.” 15 U.S.C. § 2056d(b)(8)(B). As noted, safety cans are available for purchase by consumers in many physical and online stores.

for Pre-Filled Containers of Flammable and Combustible Liquids. CPSC staff chaired the task group that developed the standard.

The standard requires two performance tests of the container's flame mitigation devices. The first test is an endurance test, in which the container is subjected to an external and stationary 2.5-inch flame at the mouth of the container for 30 seconds. The second test is a flashback test, in which the container is subjected to an external flash fire near the container mouth. The container passes each test if the contents of the container do not catch fire or otherwise ignite in each of five consecutive trials. The two tests demonstrate that the flame mitigation device impedes the propagation of two different types of ignition sources, a stationary flame, and a moving flame front. ASTM lists the standard as a dual standard in both metric (F3429M designation) and inch-pound (F3429 designation) units. ASTM F3429/F3429M-20 is the current versions of the standard. Staff finds that ASTM F3429/F3429M-20 effectively addresses the flame-jetting hazard for pre-filled portable fuel containers because containers meeting the standard have flame mitigation devices that impede the propagation of flame into the container.

ASTM F3326 - Empty Portable Fuel Containers

Portable fuel containers sold empty, for general consumer use, are within the scope of ASTM F3326, *Standard Specification for Flame Mitigation Devices on Portable Fuel Containers*. It should be noted that "Portable Fuel Container" in the title of ASTM F3326, refers to containers that meet the scope of ASTM F852, *Standard Specification for Portable Gasoline, Kerosene, and Diesel Containers for Consumer Use*. Both standards are under the jurisdiction of the ASTM F15.10 subcommittee for Flammable Liquid Containers. ASTM F3326 was initially published in 2019, and it has been in effect since March 2019. CPSC staff actively participated in developing ASTM F3326.

The standard requires a performance test of the container's flame mitigation devices after the container is exposed to several use-and-abuse tests. The use-and-abuse tests are designed to ensure an aged flame mitigation device still functions. The flame mitigation device performance test demonstrates that the container prevents a flame traveling at 5 m/s from igniting the contents of the container in each of five consecutive trials. The test also demonstrates that the flame mitigation device impedes the propagation of rapidly travelling flame front into the container. ASTM F3326-21 is the current version of the standard. Staff finds that ASTM F3326-21 effectively addresses the flame-jetting hazard of empty portable fuel containers because containers meeting the standard have flame mitigation devices that impede the propagation of flame into the container.

UL 30 for Safety Cans

Portable fuel containers that are sold empty and meet the U.S. OSHA requirements for safety cans are within the scope of ANSI/CAN/UL/ULC 30:2022, *Standard for Safety Metallic and*

Nonmetallic Safety Cans for Flammable and Combustible Liquids (herein referred to as UL 30:2022). UL 30:2022 is a voluntary standard that covers various requirements for safety cans, including requirements for flame mitigation devices. The standard is under the jurisdiction of UL Standard Technical Panel (STP) 30. The current version of the standard, UL 30:2022 was published in 2022, and it has been in effect since April 29, 2022. Section 18 of UL 30:2022 covers the performance requirements for flame mitigation devices and features. CPSC staff was active in the development of section 18.

Section 18 of this standard has two performance test options. The first option is to subject the safety can mouth to an external and stationary 2.5-inch flame for 30 seconds. The safety can passes this test if the interior content of the safety can does not catch fire or otherwise ignite in each of five consecutive trials. The second performance test option is used for safety cans that have a flame arrestor. In this performance test, a 7.5-inch flame is balanced on one side of the flame arrestor as a fuel-air mixture passes through. The flame arrestor fails if the flame crosses the flame arrestor and ignites the fuel-air mixture. This is a common performance test for flame arrestors used in industrial process applications. Staff finds that compliance to section 18 of UL 30:2022 would meet the OSHA requirement for a “flash arresting screen.” 29 CFR § 1926.155(l). UL 30:2022, is the current version of the standard. Staff finds that UL 30:2022 effectively addresses the flame-jetting hazard for safety cans.

Public Comments on Staff’s Assessment

On May 24, 2022, the Commission published a notice of availability regarding a draft of this memorandum that requested public comment on the document as published in the *Federal Register* (87 FR 31540). Six comments were submitted. The comments supported staff’s recommendations and did not suggest any other voluntary standards the Commission should consider.

The six comments are summarized below with staff responses as appropriate.

Comment 4: The Portable Fuel Container Manufacturers Association (PFCMA) supported CPSC staff’s recommendation to require that products meet the three listed voluntary standards, as applicable. The PFCMA concurs with CPSC staff’s assessment that the voluntary standards meet the requirements of the Act. It stated that each of the referenced standards was developed in collaboration among industry, consumer safety advocates, and CPSC experts. Consequently, the PFCMA indicated that the standards promote practical approaches to mitigating the risk of flame-jetting for each application. The PFCMA asserted that its members have been compliant with the relevant voluntary standards for several years.

Comment 5: Zippo Manufacturing Company (ZMC) supports CPSC staff’s recommendation to require pre-filled portable fuel containers to meet ASTM F3429. ZMC recommended that CPSC

refer to the list found in ASTM F3429 when listing “other” flame mitigation devices. The commenter stated that the ASTM standard includes the phrase, “other examples of FMDs include, but are not limited to, expanded metal mesh, screens, bladders, pinhole restrictors, and pumps.”

Staff response to Comment 5: The briefing memorandum was updated and now includes the other examples of flame mitigation devices listed in ASTM F3429/F3429M-2020.

Comments 2 and 6: Calumet Specialty Products Partners, L.P.’s Performance Brand business unit indicated that it did not object to the Commission requiring pre-filled portable fuel containers to meet ASTM F3429/F3429M-2020, but they requested an effective date of December 31, 2023, due to outside factors including supply chain delays, testing delays, and time needed to design flame mitigation devices. The commenter provided technical suggestions on potential future development of ASTM F3429/F3429M-2020.

SolvChem, Inc., also asked for additional time to comply with the voluntary standard, requesting an effective date of January 2024, for three main reasons: (1) time needed to develop the devices; (2) time needed to test the devices to the standard; and (3) time needed to purchase the tooling and equipment necessary to produce the devices. The commenter asserted that tooling and equipment lead times are at an all-time high, with some lead times expected to be 6 months to a year. The commenter clarified that the purchase of tooling and equipment must occur after the development and approval of any potential device.

Staff response to Comments 2 and 6: Staff notes that the effective date is set by the Act. The Act states that a voluntary standard that the Commission determines meets the requirements in the Act “shall be treated as a consumer product safety rule promulgated under section 2058 of this title beginning on the date which is the later of” either “180 days after publication of the Commission’s determination” or “the effective date contained in the voluntary standard.” 15 U.S.C. § 2056d(b)(4). Here, the later date is 180 days after publication of the Commission’s determination, so that is when the standard will be effective pursuant to the Act. Staff further notes that the voluntary standards referred to have been in place since 2020.

Staff encourages all interested stakeholders, including those who provided comments, to join the ASTM F15.72 subcommittee and the ASTM F15.72 task group responsible for the continuous maintenance of ASTM F3429

Comments 1 and 3: R.B. Howes & Co. Inc., asked whether “additives” would be considered a “fuel.” The commenter understood that, based on its reading of the CPSC staff’s voluntary standards evaluation for the Act, the provisions apply to fuels with a flash below 140 degrees Fahrenheit. The commenter manufactures diesel fuel additives, which, it asserts, are not fuels and have flash points above the 140-degree Fahrenheit threshold. However, the commenter

stated that it was unclear whether additives with flash points within the scope of the Act would be exempted from the requirements, and therefore, requests clarification.

Similarly, an anonymous commenter asked for the Commission to define “liquid fuels.” This commenter indicated that they represent a contract manufacturer of various chemical products. The commenter understood that, based on their reading of CPSC staff’s voluntary standards evaluation for the Act, the provisions would apply only to fuels and not fuel-adjacent products, such as fuel additives. The commenter requested a definition for “liquid fuels” so that businesses have clarity.

Staff response to Comments 1 and 3: The Act defines portable fuel containers “intended for flammable liquid fuels with a flash point less than 140 degrees Fahrenheit, including gasoline, kerosene, diesel, ethanol, methanol, denatured alcohol, or biofuels.” 15 U.S.C. § 2056d(b)(8)(A). Fuels generally are considered substances that can be burned to release energy, and liquids with a flash point below 140 degrees Fahrenheit are, by the definition of flash point, capable of being burned. Staff believes that generally when a liquid with a flash point less than 140 degrees is intended to be used as, or in, a fuel mixture to support combustion, it is a fuel for purposes of the Act.

Staff Recommendations

Staff has considered the public comments and recommends that the Commission determine that three voluntary standards for three kinds of portable fuel containers described below meet the requirements of the Act for an exception to the rulemaking requirement because these voluntary standards require flame mitigation devices in portable fuel containers that impede the propagation of flame into the container.

Staff Recommendation for Voluntary Standard for Pre-Filled Portable Fuel Containers

Staff recommends that the Commission determine that ASTM F3429-20/F3429M-20, *Standard Specification for Performance of Flame Mitigation Devices Installed in Disposable and Pre-Filled Flammable Liquid Containers*, for portable fuel containers sold pre-filled meets the requirements of the Act. Staff concludes that ASTM F3429/F3429M-20 meets the requirements of the Act’s exception to rulemaking because it contains an effective performance requirements for flame mitigation devices in portable fuel containers that impede the propagation of flame into the container. The standards were in effect before June 27, 2022, and they were developed by ASTM International.

Staff Recommendation for Voluntary Standard for Empty Portable Fuel Containers

Staff recommends that the Commission determine that ASTM F3326-21, *Standard Specification for Flame Mitigation Devices on Portable Fuel Containers*, for portable fuel containers sold empty meets the requirements of the Act. Staff concludes that ASTM F3326-21 meets the

requirements of the Act for an exception to rulemaking because it contains an effective performance requirement for flame mitigation devices in portable fuel containers that impede the propagation of flame into the container. The standard was in effect before June 27, 2022, and it was developed by ASTM International.

Staff Recommendation for Voluntary Standard for Safety Cans

Staff recommends that the Commission determine that UL 30:2022, *Standard for Safety Metallic and Nonmetallic Safety Cans for Flammable and Combustible Liquids*, for safety cans meets the requirements of the Act for flame mitigation devices in portable fuel containers that impede the propagation of flame into the container. Staff concludes that section 18 of UL 30:2022 meets the requirements of the Act because it contains an effective performance requirement for flame mitigation devices in portable fuel containers that impede the propagation of flame into the container. The standard was in effect before June 27, 2022, and it was developed by Underwriters Laboratories (UL), which, like ASTM International, is an American National Standard Institute (ANSI) accredited standards developer and is experienced in the development of consumer product voluntary standards.

Staff Recommendation for Publication of *Federal Register* Notice

If the Commission determines that the three voluntary standards discussed above meet the statutory requirements for flame mitigation devices in portable fuel containers that impede the propagation of flame into the container, the Act requires the Commission to publish notice in the *Federal Register* regarding any such determination. Staff recommends that the Commission determine, with publication in the *Federal Register*, that the three voluntary standards discussed above meet the requirements of the Act regarding flame mitigation. Staff recommends that the Commission set an effective date of 180 days after publication in the *Federal Register*, as specified in the Act.

Public Access to the Voluntary Standards

The referenced voluntary standards are available to the public for review, free of charge.

For free-of-charge online, read-only online access to ASTM F3429-20/F3429M-20:

1. Access ASTM's CPSC reading room at: <http://www.astm.org/cpsc.htm>.
2. Search for ASTM F3429.
Note: In the future, read-only access to the standard may move to ASTM's Reading Room at: <https://www.astm.org/products-services/reading-room.html>.

For free-of-charge, read-only online access to ASTM F3326-21:

1. Access ASTM's CPSC reading room at: <http://www.astm.org/cpsc.htm>.
2. Search for ASTM F3326.

Note: in the future, read-only access to the standard may move to ASTM's Reading Room at: <https://www.astm.org/products-services/reading-room.html>.

For free-of-charge, read-only online access to ANSI/CAN/UL/ULC 30:2022:

1. Access UL's Standards Sale Site at: <http://shopulstandards.com>.
2. Click "Browse and Buy Standards," and search for UL 30.
3. Click "Digital View," and sign in, or create a user account.

ASTM F3429-20/F3429M-20, ASTM F3326-21, and ANSI/CAN/UL/ULC 30:2022 are available to review in person through CPSC's Office of the Secretary, 4330 East West Highway, Bethesda, Maryland 20814.

Appendix A – Summary of Voluntary Standards

ASTM F3326, *Standard Specification for Flame Mitigation Devices on Portable Fuel Containers*, was first published in 2019, and subsequently revised in 2019 and 2021. The ASTM subcommittee began developing this test method in 2008. This test method uses a premixed, fuel-air mixture inside the container and outside the nozzle in an enclosed cylinder. The fuel-air mixture is ignited outside the nozzle, creating a deflagration-type flame front and pressure front. The flame front is designed to reach the FMD at a speed of 5 m/s. This speed challenges a quenching type of FMD, by significantly reducing the interaction time that the FMD material interacts with the flame and gas. Additionally, the pressure wave requires the FMD to be securely attached to the container. If the FMD dislodges from the pressure wave, it would allow the flame to penetrate into the container. This standard also requires a permanency test; the FMD must withstand both a pushing and pulling force of 15 lb. This ensures that a consumer that does not know whether the FMD should be there, cannot easily remove the FMD without the use of tools. Figure 2 illustrates a diagram of how ASTM F3326 is conducted.

ASTM F3429, *Standard Specification for Performance of Flame Mitigation Devices Installed in Disposable and Pre-Filled Flammable Liquid Containers*, was first published in 2020, and it has not been revised by ASTM. The ASTM subcommittee reached consensus on a performance requirement based on an FMD endurance test method in 2019, and it added a second, based on an FMD flashback test method in 2020 to address the specific scenario of some plastics swelling in the presence of heat. In the FMD endurance test, the container with a fuel-air mixture is mounted with the mouth positioned at a downward 45-degree angle, illustrated in Figure 3. A 2.5-inch flame is then applied to the mouth of the container for 30 seconds; the container passes if the fuel inside of the container does not ignite. In the FMD flashback test, a thin-walled plastic tube is attached to the container with a fuel-air mixture, illustrated in Figure 4. The tube is ignited away from the container and allowed to burn towards the container; the container passes if the fuel inside of the container does not ignite.

UL 30:2022, *Standard for Safety Metallic and Nonmetallic Safety Cans for Flammable and Combustible Liquids*, includes two performance-based test options for FMDs. The first is a flame arrestor-specific test based on established industrial test methods for flame arrestors. Flame arrestors are frequently used in industrial applications and this test method mirrors the methods used to test flame arrestors in those applications. Figure 5 shows one such flame arrestor. In this test, a 7.5-inch flame is balanced on the down flow side of the flame arrestor. The flame arrestor passes if the flame does not cross the flame arrestor and does not ignite the fuel-air mixture upstream of the flame arrestor within 1 minute. This test does not test the flame arrestor while attached to the safety can.

The second test is based on the ASTM F3429 FMD endurance test procedure for FMDs in general. The safety can, with a fuel-air mixture, is mounted with the mouth positioned at a downward 45-degree angle, illustrated in Figure 6. A 2.5-inch flame is then applied to the mouth of the container for 30 seconds. The safety can passes the test if the fuel inside of the container does not ignite. This test would work for a variety of flame arrestors. The FMD flashback test was not needed because safety can FMDs are metal and do not swell like plastic FMDs typically used on gas cans and prefilled containers. This test is performed with the FMDs installed on the container. The CPSC contractor verified effective equivalency of the two test methods: a flame arrestor with a slightly larger hole size fails both tests; whereas a flame arrestor with a slightly smaller hole size passes both tests.

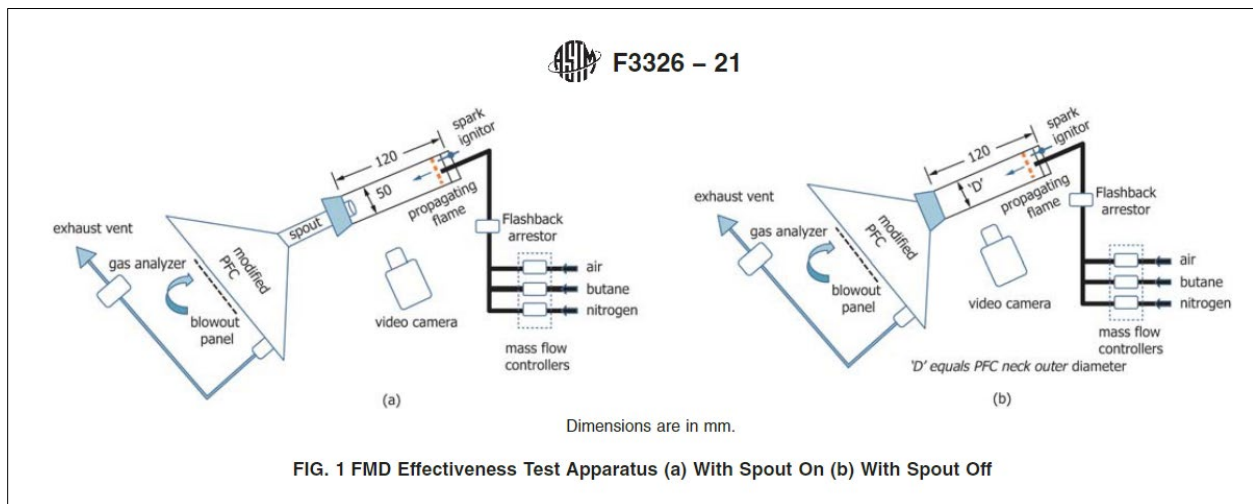


Figure 3- ASTM F3326 Test set-up diagram (Reprinted, with permission, from ASTM F3326-21 Standard Specification for Flame Mitigation Devices on Portable Fuel Containers, copyright ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428. A copy of the complete standard may be obtained from ASTM International, www.astm.org).

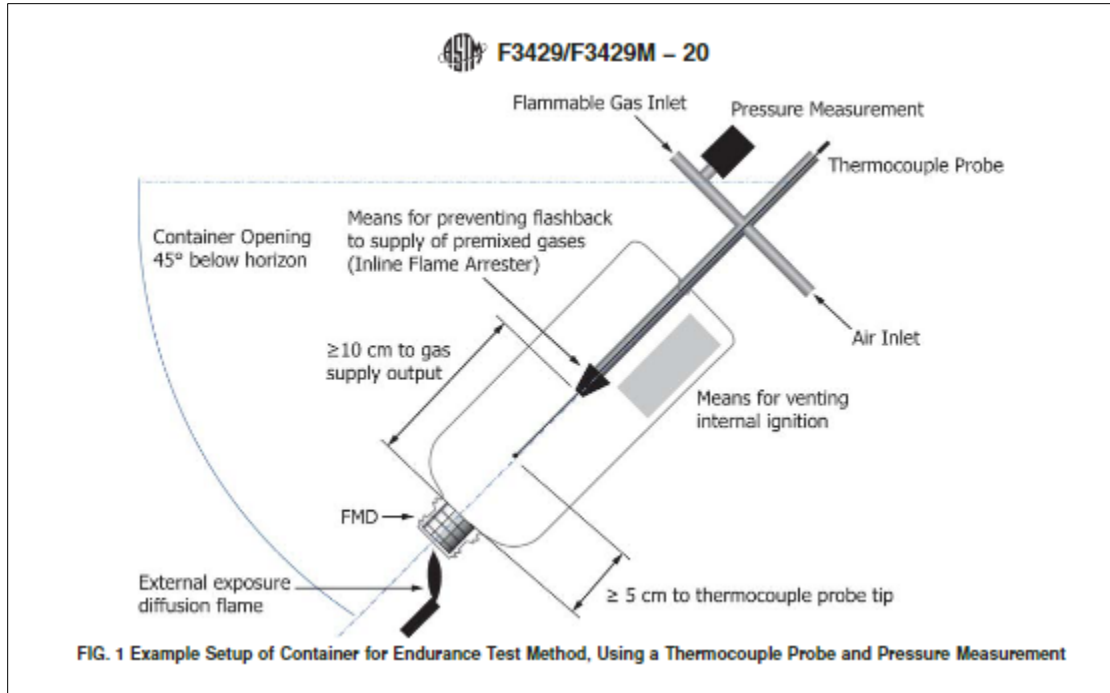


Figure 4- ASTM F3429 Endurance Test set-up diagram (Reprinted, with permission, from ASTM F3429/F3429M-20 Standard Specification for Performance of Flame Mitigation Devices Installed in Disposable and Pre-Filled Flammable Liquid Containers, copyright ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428. A copy of the complete standard may be obtained from ASTM International, www.astm.org).

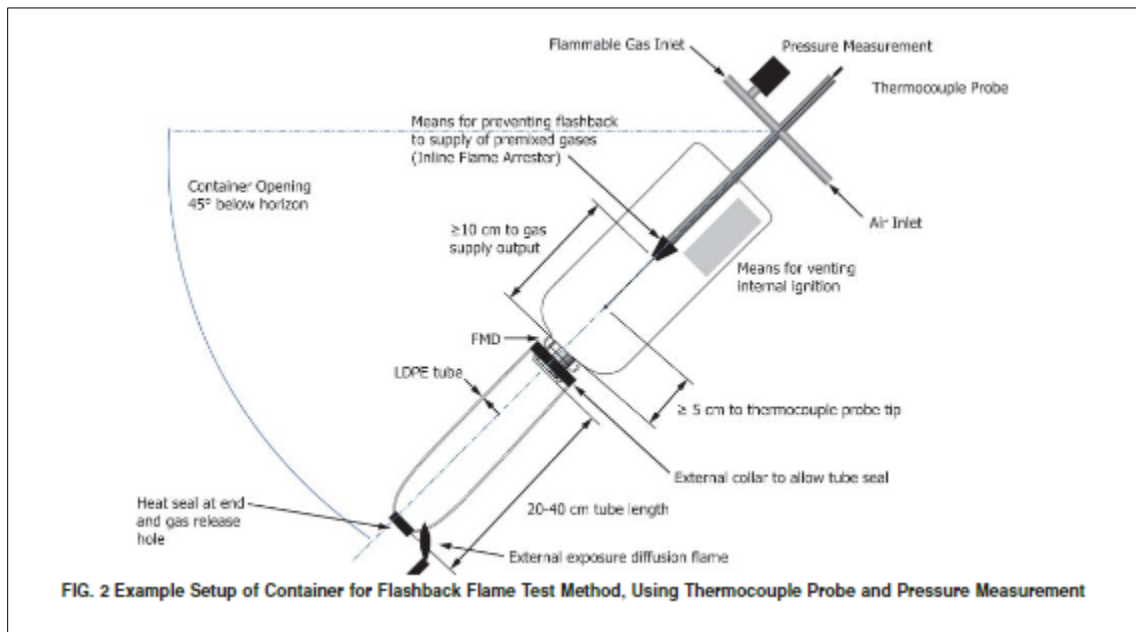


Figure 5 - ASTM F3429 Flashback Test set-up diagram (Reprinted, with permission, from ASTM F3429-20/F3429M-20 Standard Specification for Performance of Flame Mitigation Devices Installed in Disposable and Pre-Filled Flammable Liquid Containers, copyright ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428. A copy of the complete standard may be obtained from ASTM International, www.astm.org).



Figure 6 - UL 30 Flame Arrester Test picture (From ANSI/CAN/UL/ULC 30:2022, Standard for Safety Metallic and Nonmetallic Safety Cans for Flammable and Combustible Liquids, Figure 18.4 Example of Correct Stoichiometric Flame. Copyright ULS Inc. 2022).

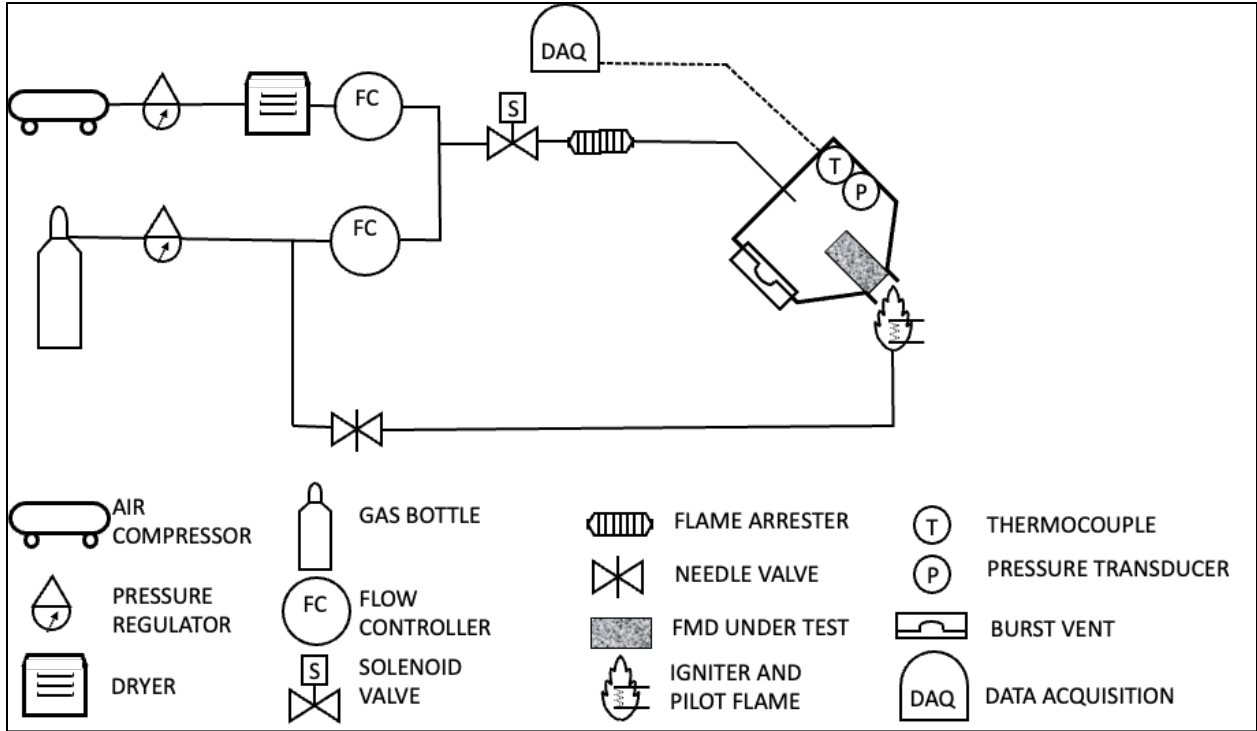


Figure 7 - UL 30 Generic FMD test set-up diagram (from UL 30 - UL 30 Generic FMD test set up diagram (From ANSI/CAN/UL/ULC 30:2022, Standard for Safety Metallic and Nonmetallic Safety Cans for Flammable and Combustible Liquids, Figure 18.2 Example of Set Up Using Compressed Air, and Ethane Gas from a Bottle, a Data Acquisition System, a Thermocouple, a Pressure Transducer, a Solenoid Valve, and a Needle Valve, to Test a Safety Can Without a Spout. Copyright ULS Inc. 2022).