PYR 1129

Standard Method of Fire Test for Covered Fuse on Consumer Fireworks

The 2013 edition of PYR 1129, *Standard Method of Fire Test for Covered Fuse on Consumer Fireworks*, is provided for historical reference only. This edition of PYR 1129 was withdrawn by Standards Council Decision #14-1. In Decision #14-1, the Standards Council directed that NFPA cease all standards development activity regarding the retail sale and storage of consumer fireworks.

2013 Edition

NFPA, 1 Batterymarch Park, Quincy, MA 02169-7471
An International Codes and Standards Organization

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PYR 1129

Standard Method of

Fire Test for Covered Fuse on Consumer Fireworks

2013 Edition

Special Note from the NFPA on Consumer Fireworks. Because the sale and use of consumer fireworks is permitted in many jurisdictions throughout the United States and elsewhere, NFPA standards relating to the storage and retail sales of consumer fireworks, including this standard, are provided in the interest of public safety. The NFPA, however, is opposed to consumer fireworks. Every year thousands of people, most often children and teens, are injured while using consumer fireworks, and the NFPA urges the public to avoid the use of consumer fireworks and, instead, to enjoy displays of fireworks conducted by trained professionals. For more information about the dangers of consumer fireworks, please visit: www.nfpa.org/fireworks

This edition of PYR 1129, *Standard Method of Fire Test for Covered Fuse on Consumer Fireworks*, was prepared by the Technical Committee on Pyrotechnics. It was issued by the Standards Council on August 9, 2012, with an effective date of August 29, 2012.

This edition of PYR 1129 was approved as an American National Standard on August 29, 2012.

Origin and Development of PYR 1129

The 2013 edition marks the first edition of the standard. While a requirement for fuse coverings has been included in Chapter 7 of NFPA 1124, *Code for the Manufacture, Transportation, Storage, and Retail Sales of Fireworks and Pyrotechnic Articles*, since 2003, which was the first edition in which fire and life safety requirements for retail sales venues were added, no specific criteria describing fuse covers existed. Only consumer fireworks complying with the requirements for covered fuse in NFPA 1124 are permitted to be sold in consumer fireworks retail sales facilities complying with that code. The covered fuse is intended to prevent someone from being able to directly touch the fuse or ignition point of the fireworks device without puncturing the packaging or in some other manner damaging or destroying the packaging. What was not clearly identified with the 2003 or the 2006 edition was what materials specifically could qualify for use as fuse coverings. The Pyrotechnics Committee requested that the Standards Council permit the committee to develop a fire test standard that would establish the performance characteristics of covered fuse materials for demonstration in test fires and define the pass/fail criteria. The Council approved the change in the Committee scope permitting the Pyrotechnics Committee to develop this test standard provided that the requirements were coordinated with the NFPA Fire Tests Committee.

NFPA 1124 requires covered fuses but currently does not stipulate what constitutes an acceptable installation; PYR 1129 provides a performance-based means to test the performance of proposed materials.

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Committee Scope: This Committee shall have primary responsibility for documents on the manufacture, transportation, and storage of consumer and display fireworks, pyrotechnic special effects, and model and high power rocket motors. This Committee shall have primary responsibility for the use of display fireworks and for model and high power rocketry, and the construction, launching, and other operations that involve model and high power rocket motors. The Committee shall have primary responsibility for documents on the wholesale and retail sale and storage of consumer fireworks. The Committee shall have responsibility for the development of fire test standards applicable to the packaging, covered fuses, and flame breaks used in retail sales display of consumer fireworks. The Committee shall coordinate the fire test documents with the Fire Tests Committee.

The Committee does not have responsibility for documents on the use of consumer fireworks by the general public; on the use of pyrotechnic special effects before a proximate audience; on the manufacture, transportation, storage for use of military, automotive, agricultural, and industrial pyrotechnics.

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Fire Test for Covered Fuse on Consumer Fireworks

2013 Edition

NOTICE: An asterisk (*) following the number or letter designating a paragraph indicates that explanatory material on the paragraph can be found in Annex A.

A reference in brackets [ ] following a section or paragraph indicates material that has been extracted from another NFPA document. As an aid to the user, the complete title and edition of the source documents for extracts in mandatory sections of the document are given in Chapter 2 and those for extracts in informational sections are given in Annex B. Extracted text may be edited for consistency and style and may include the revision of internal paragraph references and other references as appropriate. Requests for interpretations or revisions of extracted text shall be sent to the technical committee responsible for the source document.

Information on referenced publications can be found in Chapter 2 and Annex B.

Chapter 1 Administration.

1.1 Scope.

1.1.1* This standard describes a method for determining that consumer fireworks being offered for sale to consumers in a retail sales area contain a material over an ignition fuse or ignition point that complies with the requirements for covered fuse in NFPA 1124, *Code for the Manufacture, Transportation, Storage, and Retail Sales of Fireworks and Pyrotechnic Articles.*

1.1.2 This standard does not apply to a fuse or an ignition point on consumer fireworks that are not located in a retail sales area and are intended to be used for fireworks displays in compliance with the NFPA 1123, *Code for Fireworks Display.*

1.1.3 This standard does not apply to a fuse or an ignition point on pyrotechnic articles or fireworks that are not located in a retail sales area and are intended to be used in compliance with NFPA 1126, *Standard for the Use of Pyrotechnics Before a Proximate Audience.*

1.2 Purpose.

1.2.1* This standard sets forth procedures to test the ignition resistance of a consumer fireworks fuse or ignition point to three types of ignition stimuli: open flame, hot surface contact, and incendiary sparks.

1.2.2 These procedures are used to determine whether consumer fireworks offered for sale in retail sales areas comply with the requirements for covered fuses that are specified in NFPA 1124, *Code for the Manufacture, Transportation, Storage, and Retail Sales of Fireworks and Pyrotechnic Articles.*

1.2.3 The performance observed in each test is based on the specific test conditions that are used. If a firework is exposed to a different environment, as in an actual fire, it is possible that the performance of the firework will be different.

1.2.4 This standard does not provide information regarding the following:

(1) The pyrotechnic output of the consumer fireworks to which the fuse cover is attached
(2) Toxicity of combustion gases

Chapter 2 Referenced Publications

2.1 General. The documents or portions thereof listed in this chapter are referenced within this standard and shall be considered part of the requirements of this document.

2.2 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

NFPA 1123, *Code for Fireworks Display,* 2010 edition.

NFPA 1124, *Code for the Manufacture, Transportation, Storage, and Retail Sales of Fireworks and Pyrotechnic Articles,* 2013 edition.

NFPA 1126, *Standard for the Use of Pyrotechnics Before a Proximate Audience,* 2011 edition.

2.3 Other Publications.

2.3.1 APA Publications. American Pyrotechnics Association, P.O. Box 30438, Bethesda, MD 20824.

APA Standard 87-1, *Standard for Construction and Approval for Transportation of Fireworks, Novelties, and Theatrical Pyrotechnics,* 2004.

2.3.2 U.S. Government Publications. U.S. Government Printing Office, Washington, DC 20402.

Title 16, Code of Federal Regulations, Parts 1500 and 1507, U.S. Consumer Products Safety Commission.

Title 49, Code of Federal Regulations, Part 172.

2.3.3 Other Publications.

Merriam Webster's Collegiate Dictionary, 11th edition, Merriam-Webster, Inc., Springfield, MA, 2003.

2.4 References for Extracts in Recommendation Sections.

NFPA 1124, *Code for the Manufacture, Transportation, Storage, and Retail Sales of Fireworks and Pyrotechnic Articles,* 2013 edition.

Chapter 3 Definitions

3.1 General. The definitions contained in this chapter shall apply to the terms used in this standard. Where terms are not defined in this chapter or within another chapter, they shall be defined using their ordinarily accepted meanings within the context in which they are used. *Merriam-Webster's Collegiate Dictionary,* 11th edition, shall be the source for the ordinarily accepted meaning.

3.2 NFPA Official Definitions.

3.2.1 Approved. Acceptable to the authority having jurisdiction.

3.2.2 Labeled. Equipment or materials to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the authority having jurisdiction and concerned with product evaluation, that maintains periodic inspection of production of labeled equipment or materials, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.

3.2.3* Listed. Equipment, materials, or services included in a list published by an organization that is acceptable to the authority having jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services, and whose listing states that either the equipment, material, or service meets appropriate designated standards or has been tested and found suitable for a specified purpose.

3.2.4 Shall. Indicates a mandatory requirement.

3.2.5 Should. Indicates a recommendation or that which is advised but not required.

3.3 General Definitions.

3.3.1* Consumer Fireworks. Small fireworks devices containing restricted amounts of pyrotechnic composition, designed primarily to produce visible or audible effects by combustion, that comply with the construction, chemical composition, and labeling regulations of the U.S. Consumer Product Safety Commission (CPSC), as set forth in CPSC 16 CFR 1500 and 1507, 49 CFR 172, and APA Standard 87-1, *Standard for the Construction and Approval for Transportation of Fireworks, Novelties, and Theatrical Pyrotechnics.* [**1124,** 2013]

3.3.2* Covered Fuse. A fuse or designed point of ignition that is protected against accidental ignition by contact with a spark, smoldering items, or small open flame. [**1124,** 2013]

3.3.3 Ignition End. The end of the fuse of the consumer fireworks that is intended to be ignited by the consumer in order to discharge the pyrotechnic contents of the consumer fireworks.

3.3.4* Ignition Point. The location on a fireworks device (that does not use a fuse for ignition purposes) where the user is directed to apply a flame in order to cause the fireworks device to function.

3.3.5 Packaged Fireworks Merchandise. A consumer fireworks device or group of consumer fireworks devices that has been packaged within an unperforated container or packaging material by the manufacturer, distributor, or seller for retail display and sale as a unit. [**1124,** 2013]

3.3.6* Test Sample. The fuse and its associated fuse cover of sufficient size for testing.

Chapter 4 Open Flame Test Procedure

4.1 Summary of the Method.

4.1.1 Test Procedures.

4.1.1.1 This standard consists of the following three sets of test procedures for evaluating the ignition resistance of consumer fireworks fuses and ignition points based on the type of ignition source:

(1) Open flame
(2) Hot surface contact
(3) Pyrotechnically produced incendiary sparks

4.1.1.2 The actual fuse and its associated fuse cover that are removed from the sample consumer fireworks devices shall be used for the open flame test procedure.

4.1.1.3 The actual fuse and its associated fuse cover that are removed from the sample consumer fireworks device shall be used for the hot surface contact test procedure.

4.1.1.4 The actual consumer fireworks containing the fuse or ignition point and the associated fuse cover shall be used for the incendiary spark ignition test.

4.1.1.5 The fuses shall be tested according to the test procedures described in Chapters 4, 5, and 6.

4.1.1.6 A test procedure shall consist of a minimum of three tests which shall be conducted for each of the three ignition test procedures, for a total of nine tests.

4.1.1.7 Additional testing shall be conducted when necessary due to failure of any test required by this document.

4.1.1.8 Retesting shall be conducted if any of the ignition sources do not meet the testing time exposure minima.

4.1.2* Sampling Plan. For each covered fuse to be evaluated as meeting the requirements of this standard, a minimum sample of nine of the same consumer fireworks device shall be selected at random from the available merchandise.

4.1.3 Acceptance Criteria.

4.1.3.1 A covered fuse shall be deemed to satisfy the covered fuse requirements of NFPA 1124, *Code for the Manufacture, Transportation, Storage, and Retail Sales of Fireworks and Pyrotechnic Articles*, if during each of the series of open flame, hot surface, and incendiary spark ignition tests it is determined that the fuse meets the acceptance criteria specified in Chapters 4, 5, and 6, respectively.

4.1.3.2 A failure shall be deemed to occur when the covered fuse of the consumer fireworks ignites before the time specified is reached during any of the three test procedures.

4.1.3.3 If two or more failures occur during any of the three test procedures, the test sample shall be deemed to have failed the series and to not meet the covered fuse requirements of NFPA 1124.

4.1.4 Personnel Safety.

4.1.4.1 All personnel in the test area shall wear safety glasses and ear protection and respiratory protection to protect against breathing pyrotechnic smoke during the testing.

4.1.4.2 No personnel shall remove or touch pyrotechnics test devices or incendiary spark ignition source devices for 5 minutes after a test.

4.2 Test Equipment.

4.2.1* The open flame ignition source shall be a typical consumer-style butane cigarette lighter that produces a flame not less than 25 mm (1 in.) in length.

4.2.2 The test surface shall be a piece of noncombustible fiber-reinforced silicate board with a dry density of 680 kg/m^3 ± 50 kg/m^3 (42 lb/ft^3 ± 3 lb/ft^3), at a thickness of 9 mm to 13 mm (⅜ in. to ½ in).

4.2.3 The size of the test surface shall be a minimum of 150 mm (6 in.) in width and 300 mm (12 in.) in length.

4.3 Geometry and Construction of the Open Flame Test Environment. The test shall be conducted outdoors or in a well-ventilated room containing no consumer fireworks, flammable or combustible liquids, or explosive materials, other than the test sample.

4.3.1 A table or similar flat, level, elevated horizontal surface shall be used to support the test surface.

4.4 Attachment of the Test Sample to the Equipment.

4.4.1 If an ignition point is used on the consumer fireworks, the consumer fireworks and its associated cover shall be tested.

4.4.2* The test sample of ignition fuse and its associated fuse cover shall be removed from the sample fireworks.

4.4.3* The test sample shall be securely attached to the test surface in a manner that prevents it from being dislodged during the test. The test sample shall extend beyond the edge of the test surface a minimum of 25 mm (1 in.).

4.4.4 The ignition end of the test sample fuse enclosed by the fuse cover shall be the point on the test sample where the open flame ignition source is applied.

4.4.5 Any material used to cover the fuse on the consumer fireworks from which the fuse was removed shall be kept in contact with the fuse in the same manner and orientation as it was installed on the consumer fireworks sample.

4.4.6 If removal of the material covering the fuse is necessary in order to separate the fuse from the consumer fireworks sample, the covering material shall be reattached to the fuse in the same manner as the original configuration.

4.4.7* The fuse-covering material shall be oriented so as to cover the underside of the fuse for testing.

4.4.8 After the covered fuse is attached to the test surface, the test surface shall be placed on the supports with the fuse cover positioned for testing.

4.5 Number of Tests.

4.5.1 Three separate and identical tests shall be conducted for this test procedure.

4.5.2 Additional tests shall be conducted if a failure occurs as determined in accordance with Section 4.9.

4.6 Application of Flame to the Test Sample.

4.6.1 The butane cigarette lighter shall be lit, and the flame shall be adjusted so it is not less than 25 mm (1 in.) in length.

4.6.2 The lighter shall be placed directly under the test sample and raised until the flame tip contacts the fuse cover at the ignition end of the fuse.

4.7 Timing of the Open Flame Exposure.

4.7.1 A stopwatch that measures time in integral seconds shall be started when the flame tip contacts the test sample.

4.7.2 After 5 (+/−0) or more seconds, the flame shall be removed from the test sample.

4.7.3 If ignition of the fuse occurs prior to 5 seconds of exposure to the flame, the time of ignition shall be recorded.

4.8 Environmental and Safety Conditions.

4.8.1 The air temperature in the test area shall be a minimum of 10°C (50°F).

4.8.2* If the test is conducted outdoors, barriers or wind screens shall be placed so that wind does not cause the butane lighter flame tip to lose contact with the test sample during the test.

4.8.3 The test samples shall be conditioned for at least 8 hours at a temperature between 15.6°C and 26.7°C (60°F and 80°F), and the relative humidity shall be 30 to 80 percent 15 minutes or less prior to the start of the test.

4.8.4 A minimum of one Class A portable water fire extinguisher or equivalent shall be located within 15 m (50 ft) of the test area.

4.8.5 There shall not be any precipitation falling in the test area during the test.

4.9 Interpretation of Results.

4.9.1 A failure is indicated if the fuse ignites within 5 seconds during the test, as evidenced by the production of a jet of flame and sparks from under the fuse cover.

4.9.2 A failure is indicated if examination of the test sample fuse, following the application of the open flame ignition source for 5 seconds, indicates that ignition of the fuse has occurred.

4.9.3 If the fuse cover or surrounding paper or cardboard material ignites during the test and continues to burn or smolder after the 5-second exposure of the fuse cover to the open flame, subsequent ignition of the fuse shall not be considered a failure.

4.9.4 If examination of the fuse in 4.8.2 is inconclusive, the fuse shall be uncovered or removed from the consumer fireworks sample and the ignition end exposed to direct contact by an open flame for not less than 10 seconds or until the fuse ignites, whichever occurs first. If the fuse does not ignite, the test shall be considered a failure.

4.10 Acceptance Criteria.

4.10.1 A covered fuse shall be deemed to meet the open flame test procedure component of the covered fuse requirements of NFPA 1124 if no ignition of the fuse or ignition point occurs during the open flame test.

4.10.2 If a single failure occurs during any one of the three tests, the test procedure shall be repeated using six additional identical test samples of the same covered fuse or ignition point.

4.10.3 If no failures occur during the six additional tests, the covered fuse sample shall be deemed to meet the open flame test procedure component of the covered-fuse requirements of NFPA 1124.

4.10.4 If two or more failures occur during the nine open flame tests, the test sample shall be deemed to have failed to meet the covered-fuse requirement of NFPA 1124.

4.10.5 For consumer fireworks that do not have an ignition fuse but do have an ignition point, or for consumer fireworks devices that have an ignition fuse that cannot be covered, or when the manufacturer, wholesaler, distributor, retailer, or vendor chooses not to provide a fuse cover that meets this standard, the covering materials or packaging for the consumer fireworks shall be tested according to this standard as packaged consumer fireworks merchandise with the consumer fireworks inside the packaging used for retail sales.

Chapter 5 Hot Surface Contact Ignition Test Procedure

5.1 Test Equipment.

5.1.1* The hot surface ignition source shall be a Pall Mall unfiltered cigarette or equivalent. A new cigarette shall be used for each test.

5.1.2 The test surface shall be a piece of noncombustible fiber-reinforced silicate board with a dry density of 680 kg/m^3 ± 50 kg/m^3 (42 lb/ft^3 ± 3 lb/ft^3), at a thickness of 9 mm to 13 mm (⅜ in. to ½ in).

5.1.3 The size of the test surface shall be a minimum of 150 mm (6 in.) in width and 300 mm (12 in.) in length.

5.2 Geometry and Construction of the Hot Surface Fire Test Environment.

5.2.1 The test shall be conducted outdoors or in a well-ventilated room containing no consumer fireworks, flammable or combustible liquids, or explosive materials, other than the test sample.

5.2.2 A table or similar flat, level, elevated horizontal surface shall be used to support the test equipment.

5.3 Attachment of the Test Sample to the Equipment.

5.3.1* The test sample shall be securely attached to the test surface in a manner that prevents it from being dislodged during the test. The test sample shall extend beyond the edge of the test surface a minimum of 25 mm (1 in.).

5.3.1.1* The test sample of the ignition fuse and its associated fuse cover shall be removed from the sample fireworks device.

5.3.2* If an ignition point is used on the consumer fireworks, the consumer fireworks and its associated cover shall be tested.

5.3.3 The ignition end of the test sample fuse enclosed by the fuse cover shall be the point on the test sample where the hot surface ignition source is applied.

5.3.4 Any material used to cover the fuse on the consumer fireworks from which the fuse was removed shall be kept in contact with the fuse in the same manner and orientation as it was installed or would be installed on the consumer fireworks sample.

5.3.5 If removal of the material covering the fuse is necessary in order to separate the fuse from the consumer fireworks sample, the covering material shall be reattached to the fuse in the same manner as the original configuration.

5.3.6* Where the fuse covering material does not completely surround the entire ignition fuse, the fuse-covering material shall be oriented for testing so it is between the fuse and the ignition source.

5.3.7 After the covered fuse is attached to the test surface, the test surface shall be placed on the supports with the fuse cover positioned for testing,

5.4 Number of Tests.

5.4.1 Three separate and identical tests shall be conducted for this test procedure.

5.4.2 Additional tests shall be conducted if a failure occurs as determined in accordance with Section 5.8.

5.5 Application of Hot Surface to the Test Sample.

5.5.1 The Pall Mall unfiltered cigarette or equivalent shall be lit, air shall be drawn through the unlit end so that the lighted end glows, and any accumulated ash shall be removed by flicking the cigarette.

5.5.2 The glowing end of the cigarette shall be placed directly under the test sample in direct contact with the fuse-covering material at the ignition end of the fuse, and the cigarette shall be manually held in that position.

5.5.3 Minimum force shall be used to hold the glowing cigarette end in place.

5.5.4 The glowing cigarette end shall be applied to the test sample on the fuse cover at the ignition end of the fuse.

5.6 Timing of the Hot Surface Exposure.

5.6.1 A stopwatch that measures time in integral seconds shall be started when the glowing cigarette end touches the fuse cover.

5.6.2 Thirty (+1/−0) seconds after the glowing end touches the fuse cover, the cigarette end shall be removed from the test sample.

5.6.3 If discharge of the consumer fireworks fuse sample occurs, the elapsed time to the ignition of the fuse shall be recorded.

5.6.4 If examination of the fuse in 5.6.3 is inconclusive, the fuse shall be uncovered and the ignition end shall be exposed to direct contact by an open flame for not less than 10 seconds or until the fuse ignites, whichever occurs first. If the fuse does not ignite, the test shall be considered a failure.

5.7 Environmental and Safety Conditions.

5.7.1 The air temperature in the test area shall be a minimum of 10°C (50°F).

5.7.2* If the test is conducted outdoors, barriers or wind screens shall be placed so that wind does not cause the glowing end of the cigarette to be affected during the test.

5.7.3 The test samples shall be conditioned for at least 8 hours at a temperature between 15.6°C and 26.7°C (60°F and 80°F), and the relative humidity shall be 30 to 80 percent 15 minutes or less prior to the start of the test.

5.7.4 A minimum of one Class A portable water fire extinguisher or equivalent shall be located within 15 m (50 ft) of the test area.

5.7.5 There shall not be any precipitation falling in the test area during the test.

5.8 Interpretation of Results.

5.8.1 A failure shall be indicated if the fuse ignites within 30 seconds during the test, as evidenced by the production of a jet of flame and sparks from under the fuse cover.

5.8.2 A failure shall be indicated if examination of the fuse following the application of the glowing end of the cigarette indicates that ignition has occurred.

5.8.3 If the fuse cover or surrounding paper or cardboard material should ignite during the test and continue to burn or smolder after the 30-second exposure of the fuse cover to the cigarette, subsequent ignition of the fuse shall not be considered a failure.

5.8.4 If examination of the fuse in 5.8.2 is inconclusive, the fuse shall be uncovered or removed from the consumer fireworks sample and the ignition end exposed to direct contact by an open flame for not less than 10 seconds or until the fuse ignites, whichever occurs first. If the fuse does not ignite, the test shall be considered a failure.

5.9 Acceptance Criteria.

5.9.1 A covered fuse shall be deemed to meet the hot surface test procedure component of the covered fuse requirements of NFPA 1124 if no ignition of the fuse or ignition point occurs during the hot surface test.

5.9.2 If a single failure occurs during any one of the three tests, this test procedure shall be repeated using six additional identical test samples of the same covered fuse or ignition point.

5.9.3 If no failures occur during the six additional tests, the covered fuse sample shall be deemed to meet the hot surface test procedure component of the covered fuse requirements of NFPA 1124.

5.9.4* If two or more failures occur during the nine hot surface tests, the test sample shall be deemed to have failed to meet the covered fuse requirements of NFPA 1124.

5.9.5 For consumer fireworks that do not have an ignition fuse but do have an ignition point, or for consumer fireworks devices that have an ignition fuse that cannot be covered, or when the manufacturer, wholesaler, distributor, retailer, or vendor chooses not to provide a cover that meets this standard, the covering materials or packaging for the consumer fireworks shall be tested according to this standard as packaged consumer fireworks merchandise with the consumer fireworks inside the packaging used for retail sales.

Chapter 6 Incendiary Spark Ignition Test Procedure

6.1 Test Equipment.

6.1.1* The incendiary spark ignition source shall be a pyrotechnic device that discharges a jet of flame and a directed spray of sparks while it is burning and shall meet the requirements specified in Section 6.1.

6.1.2 The pyrotechnic device shall burn for a minimum duration of 30 seconds and a maximum duration of 35 seconds.

6.1.3 The pyrotechnic device shall propel a spray of sparks a minimum distance of 1.5 m (60 in.).

6.1.4 The pyrotechnic device shall produce an external flame that is 50 mm (2 in.) to 150 mm (6 in.) in length.

6.1.5 The pyrotechnic device shall be a minimum of 25 mm (1 in.) in diameter and shall not exceed 200 mm (8 in.) in length.

6.2 Geometry and Construction of the Incendiary Spark Test Environment.

6.2.1 The test shall be conducted outdoors or in a well-ventilated room containing no consumer fireworks, flammable or combustible liquids, or explosive materials other than the ignition source and the test sample.

6.2.2 A table or similar flat, level, elevated horizontal surface shall be used to support the test sample and the incendiary spark ignition source, including its supports.

6.3 Attachment of Test Sample and the Incendiary Spark Ignition Source.

6.3.1 The test sample firework with fuse cover shall be placed on a table or similar flat test surface in an upright position as specified by the manufacturer for ignition of the consumer fireworks sample being tested.

6.3.1.1 The test sample of ignition fuse and associated fuse cover shall not be removed from the sample firework.

6.3.2 If an ignition point is used on the consumer fireworks, the consumer fireworks and associated cover shall be tested.

6.3.3 The test sample shall be securely attached to the test surface in a manner that prevents it from being dislodged during the test.

6.3.4 The ignition end of the test sample shall be positioned so that the fuse and its associated covering are parallel to and facing the spark-producing end of the incendiary spark ignition source.

6.3.5* The incendiary spark ignition source shall be positioned so that the spark-producing end of the device is placed 610 mm ± 5 mm (24 in. ± ¼ in.) from the covered fuse on the test sample.

6.3.6* The spark-producing end of the incendiary spark ignition source shall be positioned so it is in a direct horizontal line with the fuse end or ignition point under the fuse cover of the test sample.

6.3.7 The material covering the end of the fuse or the ignition point shall be located so that the longitudinal centerline of the incendiary spark ignition source intersects the approximate center of the covered fuse.

6.3.8* The incendiary spark ignition source shall be secured in position and in a manner that minimizes movement of the device during its discharge.

6.3.9 The test sample shall not be modified in any manner prior to the test.

6.3.9.1 The incendiary spark ignition source used as the ignition source shall be checked for proper positioning.

6.4 Number of Tests.

6.4.1 Three separate and identical tests shall be conducted for this test procedure.

6.4.2 Additional tests shall be conducted if a failure occurs as determined in accordance with Section 6.8.

6.5 Timing of the Incendiary Spark Ignition Source.

6.5.1 The incendiary spark ignition source shall be ignited.

6.5.2* All personnel shall leave the test area once ignition of the incendiary spark ignition source occurs and shall not return to the test area until it is safe to do so.

6.5.3* Personnel observing the test shall be protected from discharged pyrotechnic material.

6.5.3.1 If personnel are located behind a protective screen, any viewing ports shall be made from heat- and impact-resistant transparent material.

6.6 Timing of the Incendiary Spark Ignition Source.

6.6.1 A stopwatch that measures time in integral seconds shall be started when the incendiary spark ignition source begins emitting incendiary sparks.

6.6.2 If discharge of the consumer fireworks sample occurs, the elapsed time to the initiation of the discharge shall be recorded.

6.6.3 If discharge of the fireworks device is not observed, a minimum of 10 minutes shall pass before personnel approach the fireworks device for examination.

6.7 Environmental and Safety Conditions.

6.7.1 The air temperature in the test area shall be a minimum of 10°C (50°F).

6.7.2* If the test is conducted outdoors, barriers or windscreens shall be placed so that wind does not affect the stability of the pyrotechnic device used as the ignition source, the test sample being tested, or the trajectory of the incendiary sparks generated by the pyrotechnic device.

6.7.3 The test samples shall be conditioned for at least 8 hours at a temperature between 15.6°C and 26.7°C (60°F and 80°F), and the relative humidity shall be of 30 to 80 percent 15 minutes or less prior to the start of the test.

6.7.4 A minimum of one Class A portable water fire extinguisher or equivalent shall be located within 15 m (50 ft) of the test area.

6.7.5 There shall not be any precipitation falling in the test area during the test.

6.8 Interpretation of Results.

6.8.1 A failure shall be indicated if the test consumer fireworks sample discharges within 30 seconds after the stopwatch described in 6.6.1 is started.

6.8.2 An ignition of the test device that occurs after 30 seconds of exposure to sparks shall not be considered a failure.

6.9 Acceptance Criteria.

6.9.1 A covered fuse shall be deemed to meet the incendiary spark test procedure component of the covered fuse requirements of NFPA 1124 if no ignition of the test sample or fuse occurs during the incendiary spark test.

6.9.2 If a single failure occurs during any one of the three tests, this test procedure shall be repeated using six additional identical test samples of the same covered fuse or ignition point.

6.9.3 If no failures occur during the six additional tests, the test sample shall be deemed to meet the incendiary spark test procedure component of the covered fuse requirements of NFPA 1124.

6.9.4 If two or more failures occur during the nine incendiary spark tests, the test sample shall be deemed to have failed to meet the covered fuse requirements of NFPA 1124.

6.9.5 For consumer fireworks that do not have an ignition fuse but have an ignition point, or for consumer fireworks devices that have an ignition fuse that cannot be covered, or when the manufacturer, wholesaler, distributor, retailer, or vendor chooses not to provide a cover that meets this standard, the covering materials or packaging for the consumer fireworks shall be tested according to this standard as packaged consumer fireworks merchandise with the consumer fireworks inside the packaging used for retail sales.

Chapter 7 Test Report

7.1* Video Test Record. Each test shall be videotaped or otherwise continually visually recorded. Photographs shall be taken of each test consumer fireworks sample prior to each test, during each test, and after each test.

7.2 Test Documentation.

7.2.1 Pass/Fail. Test results shall be manually recorded as "pass" or "fail" immediately after each test is performed.

7.2.2 Times to Ignition.

7.2.2.1 Times to ignition of the test consumer fireworks sample shall be recorded for each test in which ignition occurred.

7.2.2.2 If no ignition of the test consumer fireworks sample occurs during the test, a "did not ignite" shall be recorded.

7.3 Written Report for Associated Fuse Covers over Fuse or Ignition Points.

7.3.1 A written report shall be prepared for each fuse and associated fuse cover (covering material and fuse) or ignition point sample that is evaluated in accordance with this test method.

7.3.2 The report shall indicate if the fuse and associated fuse cover (covering material and fuse) or ignition point sample tested passed or failed each of the three ignition test procedures: open flame, hot surface contact, and incendiary sparks.

7.3.2.1 Where the test samples are recorded as having passed all three ignition test procedures, the report shall state that the test samples comply with the covered fuse requirements of NFPA 1124.

7.3.2.2 If any of the three ignition test procedures is recorded as having been failed, the report shall indicate that the fuse and associated fuse cover test samples failed the test method and do not meet the covered fuse requirements of NFPA 1124.

7.3.3 The report shall include the name of the testing party or laboratory and the test date.

7.3.4 The report shall include the names of the sponsor/customer, the manufacturer, and the material or construction (test sample) tested.

7.3.5 The report shall include how and when the test consumer fireworks sample was prepared.

7.3.6 The report shall document which of the test procedures failed, as appropriate.

7.3.7* Documentation acceptable to the authority having jurisdiction (AHJ) shall be available upon request to substantiate that fireworks devices have been tested for compliance with the covered fuse requirement.

7.4 Written Report for Packaging Used as Covered Fuse.

7.4.1 A written report shall be prepared for each consumer fireworks packaging sample that is evaluated in accordance with this test procedure.

7.4.2 The report shall indicate if the consumer fireworks packaging samples tested passed or failed each of the ignition test procedures: open flame, hot surface contact, and incendiary sparking ignition source.

7.4.2.1 If the test results indicate that the consumer fireworks packaging sample passed all three ignition test procedures, the report shall state the consumer fireworks packaging

samples passed the test method and comply with the covered-fuse requirements of NFPA 1124.

7.4.2.2 If the consumer fireworks packaging sample is recorded as having failed, the report shall indicate that the packaging sample failed the test method and does not meet the covered-fuse requirements of NFPA 1124.

7.4.3 The report shall include the name of the testing party or laboratory and the test date.

7.4.4 The report shall include the names of the sponsor/customer, the manufacturer, and the material or construction (test sample) tested.

7.4.5 The report shall include how and when the test consumer fireworks sample was prepared.

7.5 Written Report — Failed Test Documentation. A report of a failure shall include the name of the test consumer fireworks sample (device) that was tested and what test series created the failure.

7.6 Written Report — Description of Fireworks Sample. The fireworks sample shall be described in writing to identify its construction, geometry, configuration, size, and pyrotechnic component and the generic or brand name of the fireworks sample shall be documented.

7.7 Covered Fuse Markings.

7.7.1 The type of fuse, packaging, or associated fuse cover (covering material) tested in accordance with the series of test methods that comply with the covered-fuse requirements of NFPA 1124 shall be identified with a unique symbol so that it can be identified in a retail sales area.

7.7.2 Each unique symbol shall correspond to a specific test, and all testing reports and documentation shall be available to the AHJ upon request.

7.7.3* Markings. It shall not be permitted to place the name, acronym, or logo of the National Fire Protection Association (NFPA) or any other markings identifying the NFPA on: the fuse; fuse cover (covering material); associated packaging or shipping cartons; and associated manufacturer or third party seals, labels, symbols or other markings, including the unique symbol required by 7.7.1 and 7.7.2.

Annex A Explanatory Material

Annex A is not a part of the requirements of this NFPA document but is included for informational purposes only. This annex contains explanatory material, numbered to correspond with the applicable text paragraphs.

A.1.1.1 Subsections 3.3.22 and 7.10.4 and A.3.3.22 of NFPA 1124 are specific references for the definition of covered fuse and the requirements for them.

A.1.2.1 Wire and wood sparklers are an example of consumer fireworks that have an ignition point instead of an ignition fuse.

A.3.2.3 Listed. The means for identifying listed equipment may vary for each organization concerned with product evaluation; some organizations do not recognize equipment as listed unless it is also labeled. The authority having jurisdiction should utilize the system employed by the listing organization to identify a listed product.

A.3.3.1 Consumer Fireworks. Consumer fireworks are normally classified as Explosives, 1.4G and described as Fireworks, UN 0336 by the U.S. Department of Transportation (U.S. DOT) *(see APA 87-1)*. Some small devices designed to produce audible effects are included, such as whistling devices, ground devices containing 0.8 gr (50 mg) or less of explosive composition (salute powder), and aerial devices containing 2 gr (130 mg) or less of explosive composition (salute powder) per explosive unit. Consumer fireworks that comply with the construction, chemical composition, and labeling regulations of the U.S. DOT for fireworks, 49 CFR 172, and the U.S. Consumer Product Safety Commission (CPSC) as set forth in CPSC 16 CFR 1500 and 1507, are not considered to be explosive materials for purposes of this code.

A.3.3.2 Covered Fuse. The purpose of the covered fuse is to minimize the accidental ignition of fireworks in a retail display by a lighted cigarette, a match, a cigarette lighter, or similar small open flame, as well as to reduce the potential for the rapid involvement of fireworks in, and the subsequent acceleration of, a fire originating within a retail display of consumer fireworks. Protection of the fuse can be provided by means of tape covering the exposed (ignitable) end of a safety fuse or by covering the fuse or the entire fireworks device or group of fireworks devices with paper, plastic, metal foil, cardboard, paperboard, or similar or equivalent materials. [**1124,** 2013]

A.3.3.4 Ignition Point. Examples include the tip of a wire sparkler or the twisted paper tip of a Morning Glory-type device.

A.3.3.6 Test Sample. There are basically three types of test samples:

(1) The ignition fuse and its associated fuse cover that have been removed from a consumer fireworks
(2) The ignition fuse and its associated fuse cover, including the consumer fireworks to which they are attached
(3) A consumer fireworks device having an ignition point instead of an ignition fuse, including its associated cover and/or packaging material

A.4.1.2 The intent of random selection of the nine samples is to select the product from the manufacturing line at different manufacturing times of the consumer fireworks prior to the packaging and shipping of the fireworks.

A.4.2.1 A typical consumer-style butane cigarette lighter with a 25 mm (1 in.) flame is shown in Figure A.4.2.1.

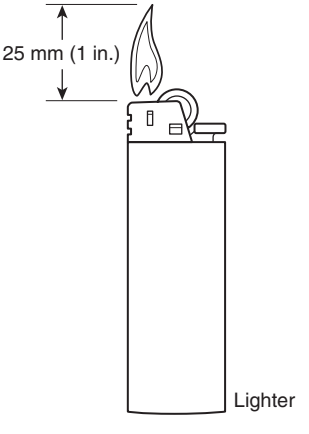

FIGURE A.4.2.1 Typical Butane Lighter.

A.4.4.2 A razor blade or similar cutting tool should be used to separate a fuse and fuse cover from the consumer fireworks sample at the point where the fuse enters the device. Where a 25 mm (1 in.) length of fuse is not available, the maximum length of fuse that can be obtained from the device should be used along with fuse cover.

A.4.4.3 The specific configuration of the fireworks device and its cover will determine the appropriate method of attachment to the test surface, as shown in Figure A.4.4.3.

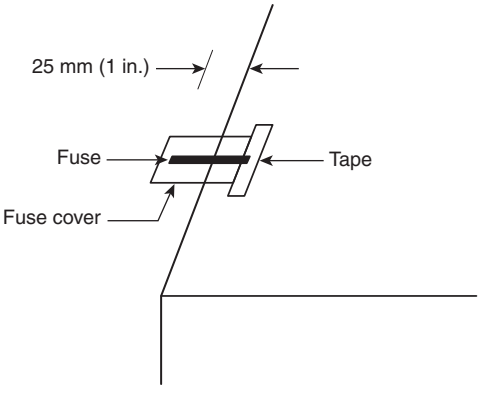

FIGURE A.4.4.3 Covered Fuse Test Setup.

A.4.4.7 Since the open flame is applied from beneath the fuse, the orientation of the fuse cover needs to be facing the open flame.

A.4.8.2 Maximum wind speed for outdoor tests should be 1.3 m/sec (4.4 ft/sec) in accordance with NFPA 285.

A.5.1.1 The Pall Mall unfiltered cigarette is identical to the cigarette used by the U.S. CPSC for testing side ignition of consumer fireworks to determine compliance with their regulations as set forth in 16 CFR 1500 and 1507.

A.5.3.1 See A.4.4.3.

A.5.3.1.1 A razor blade or similar cutting tool should be used to separate the fuse and fuse cover from the consumer fireworks sample at the point where the fuse enters the device. Where a 25 mm (1 in.) length of fuse is not available, the maximum length of fuse that can be obtained from the device along with fuse cover should be used. At the manufacturing level, it might be feasible to test a fuse and fuse cover design that will be used on a related series of devices, such as a fountain series or a multiple-tube mine/shell series. Individual items are typically tested at the wholesale/retail level if a question arises regarding compliance of a fuse cover with this test method.

A.5.3.2 The specific configuration of the fireworks device and its cover will determine the appropriate method of attachment to the test surface.

A.5.3.6 Since the hot surface ignition source is applied from beneath the fuse, the orientation of the fuse cover needs to be facing the hot surface ignition source. In some instances, such as on certain rockets, the fuse cover completely surrounds the fuse, whereas on cylindrical and multiple-tube devices, the fuse cover is placed over the fuse and holds it against the outer surface of the device. When the latter type of fuse and fuse cover are tested, the cover is positioned over the fuse in a manner that will place the fuse cover between the fuse and the ignition source.

A.5.7.2 Maximum wind speed for outdoor tests should be 1.3 m/sec (4.4 ft/sec) in accordance with NFPA 285.

A.5.9.4 Two failures on the initial testing of three devices using this procedure is considered a failure to meet the covered fuse requirements, and no additional testing is performed. If one failure occurs during the initial testing of three devices, six additional samples are then tested using this procedure. One additional failure during the testing of six additional samples constitutes a failure to meet the covered fuse requirements as well.

A.6.1.1 See Figure A.6.1.1 for an example of an incendiary spark ignition source.

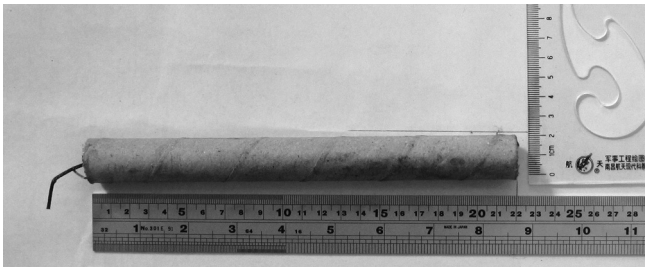

FIGURE A.6.1.1 Incendiary Spark Ignition Source.

A.6.3.5 Figure A.6.3.5 shows the spark ignition test setup.

A.6.3.6 This is best accomplished by placing bricks or similar noncombustible fire-resistant materials under the incendiary spark ignition source to raise it to the proper height.

A.6.3.8 This is best accomplished by placing bricks or similar noncombustible fire-resistant materials on top of and surrounding the incendiary spark ignition source to keep it in position.

A.6.5.2 The safety of all personnel and the test area should be reviewed prior to the test and should include a consideration of the smoke produced by all pyrotechnic test devices.

A.6.5.3 Personnel observing the testing should be located behind a protective screen or an adequate distance away so as to not be in danger of being injured by the discharge from the pyrotechnic device or the test sample.

A.6.7.2 Maximum wind speed for outdoor tests should be 1.3 m/sec (4.4 ft/sec) in accordance with NFPA 285.

A.7.1 Digital photography/video is recommended for electronic transmittal.

A.7.3.7 Shipping cartons containing a numbered, removal-resistant seal applied by the American Fireworks Standards Laboratory or other recognized, independent third-party testing agency that performs covered fuse testing as part of their required acceptance test methodology might be deemed acceptable by the AHJ to meet this provision. In the absence of such markings, test reports generated by a recognized testing laboratory that performs the covered fuse test procedures might be acceptable to the AHJ to meet this requirement.

A.7.7.3 In the interest of advancing public safety, NFPA makes available this and other standards related to the distri-

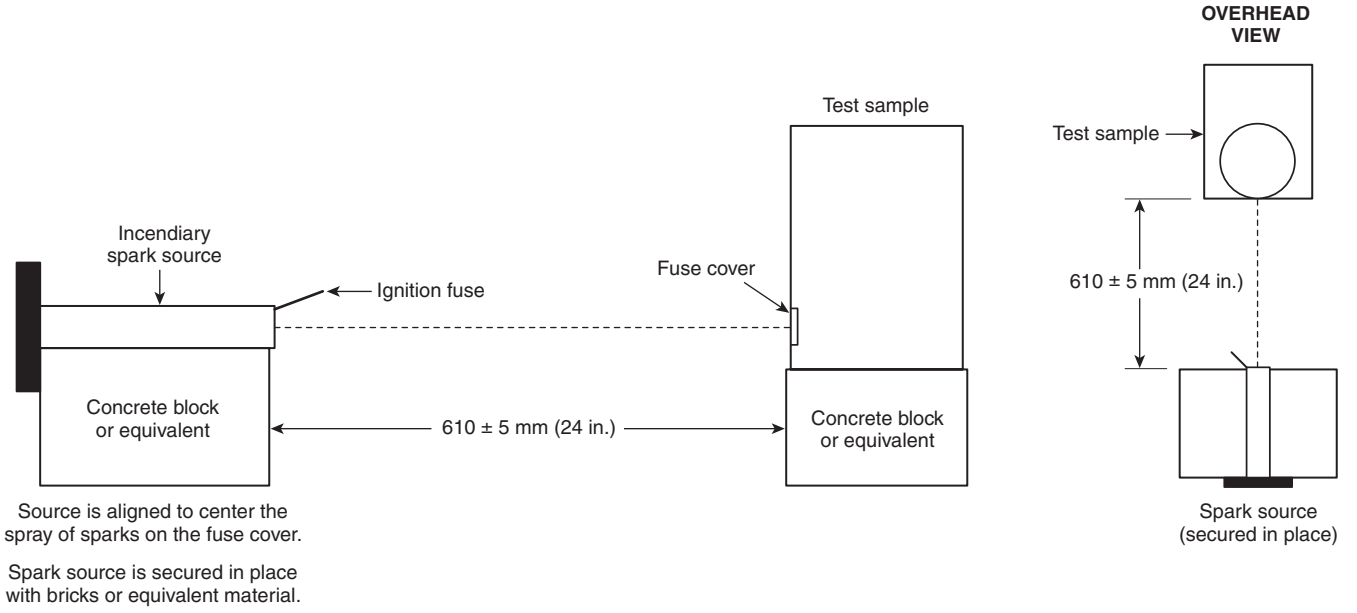

FIGURE A.6.3.5 Spark Ignition Test Setup.

bution and retail sales of consumer fireworks for use in those jurisdictions where such sales are permitted. This provision, therefore, is intended to avoid any implication, direct or indirect, that the NFPA is associated with or endorses the sale, distribution, or use of consumer fireworks.

Annex B Informational References

B.1 Referenced Publications. The documents or portions thereof listed in this annex are referenced within the informational sections of this standard and are not part of the requirements of this document unless also listed in Chapter 2 for other reasons.

B.1.1 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

NFPA 285, *Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components*, 2012 edition.

NFPA 1124, *Code for the Manufacture, Transportation, Storage, and Retail Sales of Fireworks and Pyrotechnic Articles*, 2013 edition.

B.1.2 Other Publications.

B.1.2.1 American Pyrotechnics Association, P.O. Box 30438, Bethesda, MD 20824.

APA Standard 87-1, *Standard for Construction and Approval for Transportation of Fireworks, Novelties, and Theatrical Pyrotechnics*, 2004.

B.1.2.2 U.S. Government Publications. U.S. Government Printing Office, Washington, DC 20402.

Title 16, Code of Federal Regulations, Parts 1500 and 1507, U.S. Consumer Products Safety Commission.

Title 49, Code of Federal Regulations, Part 172.

B.2 Informational References. (Reserved)

B.3 References for Extracts in Informational Sections.

NFPA 1124, *Code for the Manufacture, Transportation, Storage, and Retail Sales of Fireworks and Pyrotechnic Articles*, 2013 edition.