

NFPA®

17

Standard for
Dry Chemical Extinguishing
Systems

2021



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NFPA® 17

Standard for

Dry Chemical Extinguishing Systems

2021 Edition

This edition of NFPA 17, *Standard for Dry Chemical Extinguishing Systems*, was prepared by the Technical Committee on Dry and Wet Chemical Extinguishing Systems. It was issued by the Standards Council on June 1, 2020, with an effective date of June 21, 2020, and supersedes all previous editions.

This edition of NFPA 17 was approved as an American National Standard on June 21, 2020.

Origin and Development of NFPA 17

The Dry Chemical Extinguishing Systems Committee was established in 1952. At that time, there was no dry chemical extinguishing system tested and listed by a testing laboratory, but by late 1954, a system was tested and listed by Underwriters Laboratories Inc. At its meeting in January 1955, the Committee prepared an outline of a standard on dry chemical extinguishing systems and, in the following year, prepared the standard that was tentatively adopted by the National Fire Protection Association on June 7, 1956. Changes to the tentative standard led to approval of the first official NFPA standard on dry chemical extinguishing systems in 1957. Further amendments were made in 1958, 1968, 1969, 1972, 1973, 1975, and 1980. The 1985 edition was a complete revision of the standard. The 1990 edition was a partial revision.

The 1998 edition of the standard was revised to clarify the requirements for protection of unclosable openings and equipment shutdown.

Changes to the 2002 edition consisted of an editorial restructuring of the standard in accordance with the *Manual of Style for NFPA Technical Committee Documents*, a specific reference for the listing of pre-engineered systems, and a simplification of the requirements for common ducts.

The 2009 edition included requirements for service technician qualifications. Definitions were coordinated with the NFPA *Glossary of Terms*.

The 2013 edition of this standard clarified the requirements for inspection and maintenance and provided new requirements for installation acceptance.

The 2017 edition included revisions to clarify the intent of component and system requirements in Chapters 4 and 5, respectively. Editorial changes included an update of the standard to comply with the *Manual of Style for NFPA Technical Committee Documents*.

The 2021 edition of this standard provides new requirements consistent with NFPA 12 and NFPA 2001 on the methods for supporting pipe, and addresses provisions on a common failure of special hazard fire-extinguishing systems, consistent with NFPA 72® and NFPA 2001.

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Committee Scope: This Committee shall have primary responsibility for documents on the design, installation, operation, testing, maintenance, and use of dry and wet chemical extinguishing systems for fire protection.

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NFPA 17

Standard for

Dry Chemical Extinguishing Systems

2021 Edition

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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. 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 and extracted publications can be found in Chapter 2 and Annex B.

Chapter 1 Administration

1.1* Scope. This standard includes minimum requirements for dry chemical fire-extinguishing systems that discharge dry chemical from fixed nozzles or hand hose lines by means of expellant gas.

1.2 Purpose. This standard is prepared for the use and guidance of those charged with the purchasing, designing, installing, testing, inspecting, approving, listing, operating, or maintaining of dry chemical fire-extinguishing systems in order that such equipment will function as intended throughout its life.

1.3 Retroactivity.

1.3.1 The provisions of this document are considered necessary to provide a reasonable level of protection from loss of life and property from fire. They reflect situations and the state of the art at the time the standard was issued.

1.3.2 Unless otherwise noted, it is not intended that the provisions of this document be applied to facilities, equipment, structures, or installations that were existing or approved for

construction or installation prior to the effective date of this document.

1.4 Equivalency. Nothing in this standard is intended to prevent the use of new methods or devices, provided sufficient technical data are submitted to the authority having jurisdiction to demonstrate that the new method or devices are equivalent in quality, effectiveness, durability, and safety to those prescribed by this standard.

1.5 Units and Formulas.

1.5.1 When a primary value for measurement in English units as given in this standard is followed by a parenthetical equivalent value in metric units, the primary English value stated is to be regarded as the requirement.

1.5.1.1* Metric units of measurement in this standard are in accordance with the modernized metric system known as the International System of Units (SI).

1.5.1.2 The conversion procedure used for the SI units is to multiply the primary English quantity by the conversion factor and then round the result (if necessary) to the appropriate number of significant digits.

1.6* Qualifications. Only trained persons shall be considered competent to design, install, and service dry chemical systems.

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 30, *Flammable and Combustible Liquids Code*, 2021 edition.

NFPA 70®, *National Electrical Code*®, 2020 edition.

NFPA 72®, *National Fire Alarm and Signaling Code*®, 2019 edition.

NFPA 96, *Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations*, 2021 edition.

2.3 Other Publications.

2.3.1 ASME Publications. American Society of Mechanical Engineers, Two Park Avenue, New York, NY 10016-5990.

ANSI/ASME B31.1, *Power Piping*, 2018.

Boiler and Pressure Vessel Code, 2018.

2.3.2 ASTM Publications. ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.

ASTM A53/A53M, *Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless*, 2018.

2.3.3 IEEE Publications. IEEE, 3 Park Avenue, 17th Floor, New York, NY 10016-5997.

National Electrical Safety Code (NESC), 2017.

▲ **2.3.4 UL Publications.** Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062-2096.

UL 300, *Fire Testing of Fire Extinguishing Systems for Protection of Commercial Cooking Equipment*, 2019.

UL 1254, *Pre-Engineered Dry and Wet Chemical Extinguishing System Units*, 2019.

2.3.5 U.S. Government Publications. U.S. Government Publishing Office, 732 North Capitol Street, NW, Washington, DC 20401-0001.

Title 29, Code of Federal Regulations, Part 1910, Subpart S.

2.3.6 Other Publications.

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

2.4 References for Extracts in Mandatory Sections.

NFPA 17A, *Standard for Wet Chemical Extinguishing Systems*, 2021 edition.

NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*, 2020 edition.

NFPA 72®, *National Fire Alarm and Signaling Code®*, 2019 edition.

NFPA 96, *Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations*, 2021 edition.

NFPA 122, *Standard for Fire Prevention and Control in Metal/Nonmetal Mining and Metal Mineral Processing Facilities*, 2020 edition.

NFPA 820, *Standard for Fire Protection in Wastewater Treatment and Collection Facilities*, 2020 edition.

NFPA 2001, *Standard on Clean Agent Fire Extinguishing Systems*, 2018 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* Authority Having Jurisdiction (AHJ). An organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure.

3.2.3 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.

3.2.4* 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.

3.2.5 Shall. Indicates a mandatory requirement.

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

3.2.7 Standard. An NFPA Standard, the main text of which contains only mandatory provisions using the word “shall” to indicate requirements and that is in a form generally suitable for mandatory reference by another standard or code or for adoption into law. Nonmandatory provisions are not to be considered a part of the requirements of a standard and shall be located in an appendix, annex, footnote, informational note, or other means as permitted in the NFPA Manuals of Style. When used in a generic sense, such as in the phrase “standards development process” or “standards development activities,” the term “standards” includes all NFPA Standards, including Codes, Standards, Recommended Practices, and Guides.

3.3 General Definitions.

3.3.1 Auxiliary Equipment. Listed equipment used in conjunction with the dry chemical systems, for example, to shut down power, fuel, or ventilation to the hazard being protected or to initiate signaling devices.

3.3.2 Caking. A phenomenon that occurs when moisture chemically reacts with a dry chemical fire-extinguishing agent. This reaction results in materials that, being hydrated by moisture, stick together to form a large agglomerate, or what is more commonly referred to as lumps.

3.3.3* Calculation and Design. The process of computing, with the use of equations, graphs, tables, or computer software, the system characteristics such as flow rate, pipe size, area, or volume protected by each nozzle, nozzle pressure, and pressure drop.

3.3.4 Clearance. The air distance between extinguishing system equipment, including piping and nozzles, and unenclosed or uninsulated live electrical components not at ground potential. [2001, 2018]

3.3.5 Discharge Nozzle. Device from which the extinguishing agent is discharged to provide for suppression of a fire in the designated hazard. [17A, 2021]

3.3.6 Dry Chemical. A powder composed of very small particles, usually sodium bicarbonate-, potassium bicarbonate-, or ammonium phosphate-based, with added particulate material supplemented by special treatment to provide resistance to packing, resistance to moisture absorption (caking), and the proper flow capabilities.

3.3.6.1 Multipurpose Dry Chemical. Ammonium phosphate-based extinguishing agent that is effective on fires involving ordinary combustibles, such as wood or paper, and fires involving flammable liquids.

3.3.7 Duct.

3.3.7.1 Branch Duct. The duct work that contains the exhaust air from a single hood or hazard area.

3.3.7.2 Common Duct. The duct work containing the exhaust air from two or more branch ducts.

3.3.8 Expellant Gas. The medium used to discharge extinguishing agent from its container. [17A, 2021]

N 3.3.9 Hose. A flexible circular conduit for conveying extinguishing agent to discharge nozzles.

3.3.10 Indicator. A mechanical or electrical device that shows when an extinguishing system or a critical component of it is ready to operate or if it has already operated.

3.3.11 Inspection. A visual examination of a system or portion thereof to verify that it appears to be in operating condition and is free of physical damage. [820, 2020]

3.3.12 Lumps. Agglomerations of dry chemical that do not crumble into particles when dropped from a height of 4 in. (101 mm) onto a hard surface.

3.3.13 Maintenance. Work, including, but not limited to, repair, replacement, and service, performed to ensure that equipment operates properly.

3.3.14 Manual.

3.3.14.1* Manufacturer's Design, Installation, and Maintenance Manual. The document referenced for the design, installation, and maintenance of the listed dry chemical extinguishing system equipment.

3.3.14.2 Owner's Manual. A pamphlet containing the manufacturer's recommendations for the proper inspection and operation of the extinguishing system.

3.3.15 Operating Devices. Mechanical, electrical, or pneumatic devices involved in the operation of a system. [17A, 2021]

3.3.16 Operation.

3.3.16.1 Automatic Operation. Operation without human intervention. [25, 2020]

3.3.16.2 Manual Operation. Operation of a system or its components through human action. [25, 2020]

Δ 3.3.17* Pipe. A rigid circular conduit for conveying the extinguishing agent to the discharge nozzle(s).

3.3.18 Recharge. The replacement of the extinguishing agent and expellant gas. [17A, 2021]

3.3.19 Selector Valve. A device used to direct dry chemical to the hazard being protected.

3.3.20 Servicing. Performing maintenance, recharging, or hydrostatic testing.

3.3.21 Signal. An indication of a condition communicated by electrical, visible, visual, audible, wireless, or other means. [72, 2019]

3.3.22 Trained. A person who has undergone the instructions necessary to safely design, install, and reliably perform the maintenance and recharge service in accordance with the manufacturer's design, installation, and maintenance manual.

3.3.23 Transport Canada (TC). The department that has jurisdiction over design and transportation of compressed gas cylinders and cartridges in Canada.

3.3.24 U.S. Department of Transportation (DOT). The department that has jurisdiction over the design and transportation of compressed gas cylinders and cartridges in the United States.

3.4 Systems Definitions.

3.4.1 Dry Chemical System. A means of applying dry chemical that can be automatically or manually actuated to discharge through a distribution system onto or into the protected hazard, which could include auxiliary equipment.

3.4.2 Engineered Systems. Those systems requiring individual calculation and design to determine the flow rates, nozzle pressures, pipe size, area, or volume protected by each nozzle, quantities of dry chemical, number and types of nozzles, and their placement in a specific system.

3.4.3 Hand Hose Line System. A hose and nozzle assembly connected by fixed piping or connected directly to a supply of extinguishing agent. [122, 2020]

3.4.4 Local Application System. A supply of dry chemical permanently connected to fixed piping with nozzles arranged to discharge directly onto the fire.

3.4.5* Pre-Engineered Systems. Those systems having predetermined flow rates, nozzle pressures, and quantities of extinguishing agent and having specific pipe size, maximum and minimum pipe lengths, flexible-hose specifications, number of fittings, and number and types of nozzles.

3.4.6 Total Flooding System. A supply of dry chemical permanently connected to fixed piping and nozzles that are arranged to discharge dry chemical into an enclosure surrounding the hazard.

Chapter 4 Components

N 4.1 General.

N 4.1.1 Only system components referenced or permitted in the manufacturer's design, installation, and maintenance manual or alternative components that are listed for use with the specific extinguishing system shall be used.

N 4.1.2 Used components shall not be permitted to be installed in new systems.

4.2 Detectors. Automatic detection equipment shall be capable of detecting and indicating heat, flame, smoke, combustible vapors, or an abnormal condition in the hazard that is likely to produce fire.

4.2.1 Automatic detection equipment utilized in engineered systems shall be listed devices.

4.2.2 Automatic detection equipment used in a pre-engineered system shall be included within the listing of the pre-engineered system.

Δ 4.3 Hose Line.

4.3.1* Hose. Hose lines on systems shall be coupled to the dry chemical supply and shall incorporate hose listed for this use.

4.3.2 Hose Nozzle. A hose nozzle shall be so designed that it can be handled by one person.

4.3.2.1 A hose nozzle shall incorporate a shutoff device to control the flow of dry chemical.

4.3.3 Hose Line Storage. The hose shall be coiled on a hose reel or rack so that it can be readily uncoiled with a minimum of delay.

4.3.3.1 If installed, hose line stored outdoors shall be protected against the weather.

4.4 Nozzles.

4.4.1 Discharge Nozzles. Discharge nozzles shall be listed for their intended use.

4.4.1.1 Discharge nozzles shall be of adequate strength for use with the expected working pressures.

4.4.1.2 Discharge nozzles shall be of brass, stainless steel, or other corrosion-resistant materials or shall be protected inside and out against corrosion.

4.4.1.3 Discharge nozzles shall be made of noncombustible materials and shall withstand the expected fire exposure without deformation.

4.4.1.4 Discharge nozzles shall be permanently marked for identification.

4.4.2 Protective Devices for Discharge Nozzles.

4.4.2.1 Discharge nozzles shall be provided with blowoff caps or other suitable devices or materials to prevent the entrance of moisture, environmental contaminants, or other foreign materials into the piping.

4.4.2.2 The protective device shall blow off, blow open, or blow out upon agent discharge.

4.5 Operating Devices.

4.5.1 Operating devices shall be listed.

4.5.1.1 All operating devices shall be designed for the service they will encounter, shall not be rendered inoperative or susceptible to accidental operation, and shall operate at least from 32°F to 120°F (0°C to 49°C).

4.5.1.2 Operating devices shall be marked to indicate their listed minimum and maximum temperature limitations, but all devices shall operate at least from 32°F to 120°F (0°C to 49°C).

4.5.2 Manual Actuators.

4.5.2.1 Manual actuators shall not require a force of more than 40 lbf (178 N) to initiate operation.

4.5.2.2 Manual actuators shall not require movement of more than 14 in. (356 mm) to secure operation.

4.5.2.3 All readily accessible manual operating devices on systems with fixed nozzles shall identify the hazards they protect.

4.5.2.3.1 The operating instructions shall be permitted to include the use of pictographs and shall have lettering at least ¼ in. (6.35 mm) in height. (See 5.7.1.7.)

4.5.2.4 All remote manual operating devices shall be identified as to the hazard they protect.

4.5.3 Shutoff Devices. Shutoff devices shall require manual resetting prior to fuel or power being restored.

4.5.4 Valves.

Δ **4.5.4.1** All valves shall be listed for the intended use.

4.5.4.2 Selector valves shall be of the quick-opening type.

4.5.4.3 Selector valves shall allow free passage of the dry chemical.

4.6 Pipe and Fittings.

4.6.1* General. Pipe and fittings shall be of noncombustible material having physical and chemical characteristics such that their integrity under stress can be predicted with reliability. The pipe, fittings, and connection joints shall withstand the maximum expected pressure in the piping system.

4.6.1.1 Pipe and fittings shall be galvanized steel, stainless steel, copper, or brass. Special corrosion-resistant materials or coatings shall be required in severely corrosive atmospheres. Black steel pipe and fittings shall be permitted in noncorrosive atmospheres.

4.6.1.2 For pre-engineered systems, pipe, tubing, and fitting materials shall be in accordance with the manufacturer's design, installation, and maintenance manual.

Δ **4.6.1.3*** For all other systems, the thickness of the piping shall be calculated in accordance with ANSI/ASME B31.1, *Power Piping*.

4.6.1.3.1 The internal pressure used for the calculation in 4.6.1.3 shall not be less than the greater of either of the following values:

- (1) The normal charging pressure in the agent container at 70°F (21°C)
- (2) 80 percent of the maximum pressure in the agent container at a maximum storage temperature of not less than 130°F (54°C)

Δ **4.6.1.3.2** If higher storage temperatures are approved for a given system, the internal pressure used for the calculation shall be adjusted to the maximum pressure in the container at the higher temperature using ANSI/ASME B31.1, *Power Piping*.

4.6.2 Cast iron pipe and fittings; steel pipe conforming to ASTM A53/A53M, *Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless*; aluminum pipe; or nonmetallic pipe shall not be used.

4.6.3* Flexible piping (hose) shall be used only if specified in the manufacturer's design, installation, and maintenance manual.

4.6.4* Other types of pipe and fittings that have been investigated and listed for this service shall be permitted to be used.

4.6.5 Previously installed piping shall not be permitted to be used in new fire-extinguishing systems unless approved by the authority having jurisdiction.

4.7 Dry Chemical.

4.7.1* The type of dry chemical used in the system shall not be changed unless listed for that system.

4.7.2 Systems shall be designed on the basis of the flow and extinguishing characteristics of a specific make and type of dry chemical.

4.7.3* Different types of dry chemical shall not be mixed.

4.8 Expellant Gas.

4.8.1 Carbon dioxide used in expellant gas cartridges shall meet the following specifications:

- (1) The vapor phase shall not be less than 99.5 percent carbon dioxide.
- (2) The water content of the liquid phase shall not be more than 0.01 percent by weight [-30°F (-34.4°C) dew point].
- (3) The oil content shall not be more than 10 ppm by weight.

4.8.2 Nitrogen used as an expellant gas shall be standard industrial grade with a dew point of -60°F (-52.2°C) or lower.

4.9 Electrical Wiring and Equipment. Electrical wiring and equipment shall be installed in accordance with *NFPA 70*.

4.10 Storage Containers.

4.10.1 The dry chemical containers used in dry chemical systems shall be designed to meet the requirements of the U.S. Department of Transportation (DOT) or Transport Canada (TC) if used as shipping containers under pressure.

4.10.2* If not shipping containers under pressure, the dry chemical containers shall be designed, fabricated, inspected, certified, and stamped in accordance with the *ASME Boiler and Pressure Vessel Code*.

4.10.3 The design pressure shall be suitable for the maximum pressure developed at 130°F (55°C) or at the maximum controlled temperature limit.

4.11 Indicators. Dry chemical systems shall be provided with an audible or a visual indicator to show that the system is in a ready condition or is in need of recharging.

4.12 Assembly.

4.12.1* During assembly, the piping system shall be examined internally to detect and remove contaminants or other foreign materials.

4.12.2 All extinguishing agent storage containers shall be examined to ensure that they are fastened securely to their mounting brackets.

- (4) Electrical hazards such as oil-filled transformers or circuit breakers
- (5) Textile operations subject to flash surface fires
- (6) Ordinary combustibles such as wood, paper, and cloth
- (7) Restaurant and commercial hoods, ducts, and associated cooking appliance hazards such as deep-fat fryers

5.1.2 Limitations. Dry chemical extinguishing systems shall not be considered satisfactory protection for the following:

- (1) Chemicals containing their own oxygen supply, such as cellulose nitrate
- (2) Combustible metals such as sodium, potassium, magnesium, titanium, and zirconium
- (3) Deep-seated or burrowing fires in ordinary combustibles where the dry chemical cannot reach the point of combustion

5.1.2.1* Multipurpose dry chemical shall not be used on machinery such as carding equipment in textile operations and delicate electrical equipment.

5.1.2.2 Before dry chemical extinguishing equipment is considered for use in protecting electronic equipment or delicate electrical relays, the effect of residual deposits of dry chemical on the performance on electronic equipment shall be evaluated.

5.1.2.3 Dry chemical extinguishing system equipment shall be used within its listed temperature limitations.

5.1.2.3.1 The agent storage container shall be marked to indicate the listed minimum and maximum temperature limitations of the fire suppression system equipment.

5.1.2.3.2 The minimum temperature limitation shall be at most 32°F (0°C).

5.1.2.3.3 The maximum temperature limitation shall be at least 120°F (48.9°C).

5.2 Multiple Systems Protecting a Common Hazard.

5.2.1 Where two or more systems are used to protect a common hazard, they shall be arranged for simultaneous operation. Operation of a single actuator shall cause all systems to operate.

5.2.2 Pre-engineered systems shall be designed in accordance with Chapter 9.

5.3 Systems Protecting Two or More Hazards.

5.3.1 Where two or more hazards could be simultaneously involved in fire by reason of their proximity, the hazards shall be protected by either of the following:

- (1) Individual systems installed to operate simultaneously
- (2) A single system designed to protect all hazards that could be simultaneously involved

5.3.2 Any hazard that will allow fire propagation from one area to another shall constitute a single fire hazard.

5.4 Dry Chemical Requirements and Distribution.

5.4.1 General.

5.4.1.1* The following factors shall be considered in determining the amount of dry chemical required:

- (1) Minimum quantity of dry chemical
- (2) Minimum flow rate of dry chemical

Chapter 5 System Requirements

5.1 Use and Limitations.

5.1.1* Use. The types of hazards and equipment that shall be protected using dry chemical extinguishing systems shall include the following:

- (1) Flammable or combustible liquids
CAUTION: Extinguishment of flammable liquid fires, especially Class I liquids (*see NFPA 30*), can result in a reflash unless all sources of ignition have been removed.
- (2) Flammable or combustible gases
CAUTION: Flammable gases present a potential explosion hazard if the flow of gas is not stopped before or during extinguishment.
- (3) Combustible solids, including plastics, that melt when involved in fire