
**Fire protection — Foam fire
extinguishing systems —**

Part 5:

Fixed compressed air foam equipment

*Protection contre l'incendie — Installations fixes d'extinction par
mousse physique —*

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Partie 5: Équipement fixe pour mousse physique à air comprimé

ISO 7076-5:2014

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 21, *Equipment for fire protection and fire fighting*, Subcommittee SC 6, *Foam and powder media and firefighting systems using foam and powder*.

ISO 7076 consists of the following parts, under the general title *Fire protection — Foam fire extinguishing systems*:

- *Part 1: Foam proportioning equipment*
- *Part 2: Low expansion foam equipment*
- *Part 5: Fixed compressed air foam equipment*

The following parts are under preparation:

- *Part 3: Medium expansion foam equipment*
- *Part 4: High expansion foam equipment*
- *Part 6: Vehicle mounted compressed air foam systems*

Introduction

This part of ISO 7076 is prepared by ISO/TC 21/SC 6, and is based on FM Global Class 5130 Approval Standard on Foam Extinguishing Systems.

Fixed compressed air foam equipment is required to function satisfactorily not only in the event of fire, but also during and after exposure to conditions it is likely to meet in practice, including corrosion, vibration, direct impact, and indirect shock. Specific tests are intended to assess the performance of the equipment under such conditions.

The aim of using such systems is to improve the fire suppression effectiveness of the fire extinguishing agent on the burning materials for both Class A and Class B fires, by producing uniform and more stable bubbles, which improves the cooling effect of the applied media.

This part of ISO 7076 is not intended to place any other restrictions on the design and construction of fixed compressed air foam equipment.

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Fire protection — Foam fire extinguishing systems —

Part 5: Fixed compressed air foam equipment

1 Scope

This part of ISO 7076 specifies requirements, test and assessment methods, and performance criteria for fixed compressed air foam equipment of fixed foam extinguishing systems for indoor or outdoor utilization, or both.

Technical safety requirements concerning the design and manufacturing of drives, auxiliary equipment, sources of energy, or pumps are outside the scope of this part of ISO 7076.

Special hazards arising from the particular conditions under which these systems are used are outside the scope of this part of ISO 7076.

Hazards relating to any kind of mechanical, electrical, hydraulic, pneumatic, and other equipment dealt with by the respective standards for such equipment are outside the scope of this part of ISO 7076.

Hazards arising from the noise of systems are outside the scope of this part of ISO 7076.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60068-1, *Environmental testing — Part 1: General and guidance*

ASTM B117, *Standard practice for operating salt spray (fog) apparatus*

NFPA 11-2010, *Standard for Low-, Medium-, and High-Expansion Foam*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

air delivery rate

volume of air, in normal condition, that is fed into a fixed compressed air foam system per unit of time

Note 1 to entry: While inside the system, the air volume will be compressed according to the pressure applied. Once it leaves the system from the nozzle to the atmosphere, the air will expand to its normal volume again.

3.2

air/foam solution volume ratio

ratio stating how many parts of air (at normal condition) are mixed with one part of the foam solution in a fixed compressed air foam system

Note 1 to entry: The ratio is expressed as the pair of values one part foam solution to x parts air (1:x).

3.3

approved

acceptable to the authority having jurisdiction

3.4

authority having jurisdiction

AHJ

organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure

3.5

compressed air foam

CAF

homogenous foam produced by the combination of water, foam concentrate, and air or nitrogen under pressure

3.6

compressed air foam generating method

method of generating compressed air foam recognized in this part of ISO 7076 using a mixing chamber to combine air or nitrogen under pressure, water, and foam concentrate in the correct proportions

Note 1 to entry: The resulting compressed air foam flows through piping to the hazard being protected.

3.7

compressed air foam discharge device

device specifically designed to discharge compressed air foam in a predetermined pattern

3.8

fixed compressed air foam system

fixed CAFS

system employing compressed air foam discharge devices attached to a piping system through which foam is transported from a mixing chamber

Note 1 to entry: Discharge of fixed CAFS begins with automatic actuation of a detection system, or manual actuation that opens valves permitting compressed air foam, generated in the mixing chamber, to flow through a piping system and discharged over the area served by the discharge devices.

3.9

drainage time 25 %

time taken for 25 % of the foam to collapse into solution

3.10

wet foam

foam produced by a fixed compressed air foam system and which has a foam solution/air volume ratio of between 1:3 to 1:10

3.11

dry foam

foam produced by a fixed compressed air foam system and which has a foam solution/air volume ratio of more than 1:10

3.12

foam expansion ratio

ratio of the volume of expanded foam and its solution

3.13

foam solution

mixture of water and foam concentrate

3.14 (foam solution) delivery rate

Q_w

volume (of water plus foam concentrate) delivered per unit of time by a system

Note 1 to entry: At proportioning ratios of up to 1 %, the difference between water delivery rate and foam solution delivery rate can be neglected.

3.15 foam quality

quality of foam based on foam expansion ratio and 25 % drainage time

3.16 nozzle

specially designed device that can discharge foam in a predetermined pattern

3.17 operation pressure of the fixed CAF system

pressure at the system input connection at which all performance and safety requirements are met and which shall be specified by the fixed compressed air foam system

3.18 operation range

range (of conditions) specified by the manufacturer of a system and within which the system can be operated without limitations while achieving the intended performance characteristics

3.19 proportioning ratio

volume of foam concentrate added to water by volume, given as a percentage of the solution

3.20 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 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

4 Abbreviated terms

CAF compressed air foam

CAFS compressed air foam system

5 Requirements

5.1 Compliance

In order to comply with this part of ISO 7076, the fixed CAF system shall meet the requirements of this clause, which shall be verified by technical inspection or engineering assessment, shall be tested as specified in [Clause 6](#), and shall meet the requirements of the tests.

5.2 General

5.2.1 The fixed CAF system shall be designed in accordance with the requirements of Chapter 7 of NFPA 11-2010 and of this clause.

5.2.2 A fixed CAF system shall generate at least wet foam.

5.2.3 A homogeneous, finely pored foam shall be discharged at the nozzles.

5.3 Operation and control of systems

5.3.1 The operating range(s) for dry foam and wet foam shall be specified by the system manufacturer.

5.3.2 There shall be no compressed air pulses at the fixed CAF system outlet cross section when the system is switched on and off.

5.3.3 Within the operating range and at a foam solution delivery pressure of between 0,4 MPa and 1 MPa, the deviation from the set proportioning ratio shall not exceed

- a) 0 to +20 % for proportioning ratios up to 1 % and
- b) 0 to +30 % for proportioning ratios between 1 % and 3 %.

5.3.4 The pressure drop across the fixed CAF system when operated at the nominal delivery rate shall not exceed 0,2 MPa.

5.3.5 The CAF unit shall be equipped with an air pressure regulating system that prevents the flow of air when the liquid discharge is interrupted.

5.3.6 System controls shall be designed in accordance with 4.9 of NFPA 11-2010.

6 Tests

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6.1 General

6.1.1 CAF shall demonstrate extinguishing performance in Class B fire tests. Fires shall be extinguished by the end of the allowable discharge time and shall not reignite during the post-extinguishment observation period.

6.1.2 Atmospheric conditions for tests

6.1.2.1 Unless otherwise stated in a test procedure, conduct the testing after the test specimen has been allowed to stabilize in the standard atmospheric conditions for testing as specified in IEC 60068-1 as follows:

- temperature: (15 to 35) °C;
- relative humidity: (25 to 75) %;
- air pressure: (86 to 106) kPa.

6.1.2.2 The temperature and humidity shall be substantially constant for each test where the standard atmospheric conditions are applied.

6.1.3 Operating conditions for tests

6.1.3.1 If a test method requires a specimen, such as nozzle or mixing chamber, to be operational, then connect the specimen to a suitable water supply and foam concentrate having the characteristics required by the manufacturer's data. Unless otherwise specified in the test method, the fixed CAF system

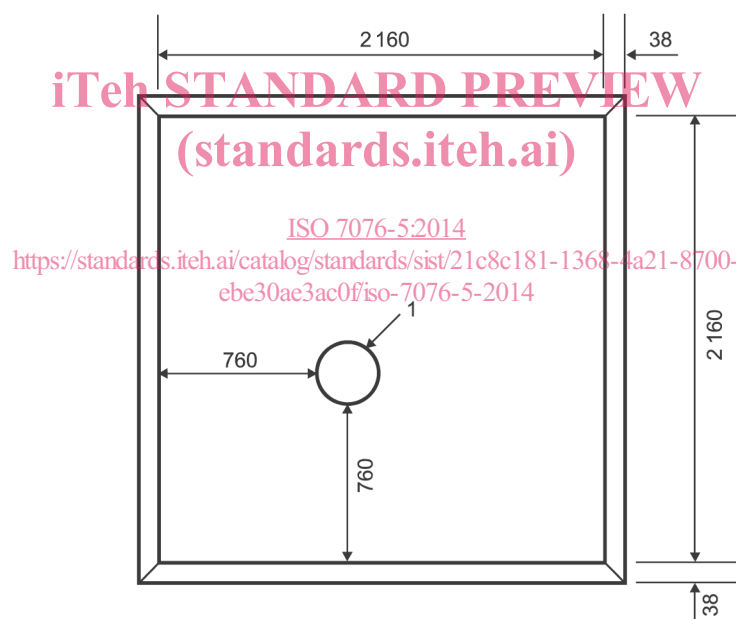
parameters applied to the specimen shall be set within the manufacturer's specified range(s) and shall remain substantially constant throughout the tests. The value chosen for each parameter shall normally be the nominal value, or the mean of the specified range.

6.1.3.2 The details of the water supply and foam concentrate used shall be given in the test report (see [Clause 7](#)).

6.2 CAF fire extinguishment tests/verification

6.2.1 The fire test pan (see [Figure 1](#)) shall be square and fabricated of steel with a minimum thickness of 4,8 mm. The inside dimensions shall be 2,16 m² by a minimum of 305 mm deep. All surfaces shall meet at 90° angles and shall be joined by continuous, liquid-tight welds. The upper edge of the pan shall be reinforced by an externally attached 38 mm steel angle of 4,8 mm minimum thickness. The angle shall be attached to the pan by continuously welding its outside corner to the top edge of the pan, so that the upper surface of one leg of the angle is flush with the top of the pan and the other leg of the angle is tight against the outside wall of the pan. The lower leg of the angle shall be attached to the pan by approximately 12-mm-long tack welds spaced approximately every 50 mm. The pan can be fitted with a drain connection and lifting lugs below the reinforcing angle, if desired. Other equivalent construction shall be allowed, provided that minimum section thicknesses are met or exceeded.

Dimensions in millimetres



Key

- 1 typical location for stovepipe insertion

Figure 1 — Low expansion fire test pan

6.2.2 The fire test shall be conducted with the pan resting on a flat surface or elevated no more than 305 mm above that surface. If the pan is to be so elevated, then a continuous skirt shall be used to prevent air circulation below the pan during the test.

6.2.3 At minimum, the concentrate shall be tested with commercial grade heptane for the test fuel. After the pan has been levelled, heptane shall be added to a minimum depth of 50 mm. Then water shall be added to raise the heptane level to provide a minimum freeboard of 203 mm. For water-miscible fuels, water cannot be used to adjust the fuel level in the pan. Therefore, a shallower pan can be used if the manufacturer does not wish to test with a freeboard greater than 203 mm.