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

**Part 6:
Vehicle mounted compressed air
foam systems**

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*Protection contre l'incendie — Systèmes d'extinction d'incendie à
mousse —*

*Partie 6: Équipement pour mousse physique à air comprimé monté
sur véhicules*

ISO 7076-6:2016

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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 3: Medium expansion foam equipment*
- *Part 4: High expansion foam equipment*
- *Part 5: Fixed compressed air foam equipment*
- *Part 6: Vehicle mounted compressed air foam systems*

Introduction

Compressed air foam systems (CAFS) complying with this part of ISO 7076 are installed in or used in conjunction with fire-fighting vehicles to improve the efficiency of fire-extinguishing processes. Compressed air foam systems improve the adhesion, penetration and retention time of the fire-extinguishing agent on the burning material, thereby transferring more energy, and improving the cooling effect of the applied foam. This is achieved by adding foam concentrates and compressed air, to be delivered into water under pressure by the fire-fighting pump, to the fire.

Compressed air foam systems generate homogeneous foam that increases the effective contact area of the foam on the burning material, and improves the adhesion and penetration of the foam to non-horizontal surfaces of the burning material, thereby increasing the period in which heat is effectively transferred.

It is assumed that systems defined in this part of ISO 7076 will only be operated by properly trained personnel.

For CAFS to be used at a temperature outside this temperature range, the particular temperature range should be specified by the user and the manufacturer should determine by a risk assessment any need for additional precautions.

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Fire protection — Foam fire extinguishing systems —

Part 6: Vehicle mounted compressed air foam systems

1 Scope

This part of ISO 7076 specifies requirements for compressed air foam systems (CAFS) in which foam concentrate and compressed air are continuously added to the water being discharged from the fire-fighting pump. This part of ISO 7076 is applicable to CAFS that can be permanently installed in fire-fighting vehicles, transportable, or mobile.

This part of ISO 7076 specifies requirements for CAFS which are used at ambient temperatures ranging from $-10\text{ }^{\circ}\text{C}$ to $+40\text{ }^{\circ}\text{C}$.

This part of ISO 7076 does not apply to stationary CAFS.

This part of ISO 7076 does not apply to requirements for hazards related to handling foam concentrates, noise generated by CAFS, drives, auxiliary equipment, power sources, or pumps connected to the CAFS.

This part of ISO 7076 does not specify requirements for special hazards arising from particular conditions under which CAFS are used, for example:

- immunity against electromagnetic fields and electrostatic discharge;
- operation without supervision;
- events specific to the location where the CAFS is set up (e.g. on public roads);
- handling of any equipment, devices, etc., which have to be connected to the CAFS or are joined to it (e.g. branch pipes, nozzles and pressure hoses);
- decommissioning and disposal.

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.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

ISO 7000, *Graphical symbols for use on equipment — Registered symbols*

ISO 12100:2010, *Safety of machinery — General principles for design — Risk assessment and risk reduction*

ISO 13854, *Safety of machinery — Minimum gaps to avoid crushing of parts of the human body*

ISO 13857, *Safety of machinery — Safety distances to prevent hazard zones being reached by upper and lower limbs*

ISO 14120, *Safety of machinery — Guards — General requirements for the design and construction of fixed and movable guards*

ISO 15383, *Protective gloves for firefighters — Laboratory test methods and performance requirements*

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

IEC 60204-1, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements*

IEC 61310-2, *Safety of machinery — Indication, marking and actuation — Part 2: Requirements for marking*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 8421-4, ISO 13943 and the following apply.

3.1 air delivery rate

volume of air, in ambient conditions, that is fed into the CAFS per unit of time

Note 1 to entry: The measurement units are L/min.

3.2 compressed air foam

mixture of water, foam concentrate and compressed air

3.3 compressed air foam delivery pressure

pressure of compressed air foam at the delivery outlet of the CAFS

Note 1 to entry: The measurement units are MPa. [ISO 7076-6:2016
https://standards.iteh.ai/catalog/standards/sist/5ec5fa55-d1b8-4d85-8715-43fce9bf452/iso-7076-6-2016](https://standards.iteh.ai/catalog/standards/sist/5ec5fa55-d1b8-4d85-8715-43fce9bf452/iso-7076-6-2016)

3.4 compressed air foam delivery rate

volume of compressed air foam at the delivery outlet of the CAFS, converted at atmospheric pressure, per unit of time

Note 1 to entry: The measurement units are L/min.

3.5 compressed air foam system

CAFS

system in which a foam concentrate and air are continuously added under pressure to the water being discharged from a fire-fighting pump

3.6 dry foam

operation defined by a nominal foam solution/air volume ratio greater than 1:10, being mixed in the CAFS

3.7 flushing procedure

process to ensure that foam proportioning system associated pipework, to the discharge connection, is adequately cleaned of foam concentrate and solution to avoid any damage

EXAMPLE Procedure to avoid damage by corrosion.

3.8 foam concentrate delivery rate

volume of foam concentrate fed into CAFS per unit of time

Note 1 to entry: The measurement units are L/min.

3.9**foam solution/air volume ratio**

relationship between parts of liquid (foam solution) and air (at atmospheric pressure) being mixed together in a CAFS mixing device

Note 1 to entry: The measurement units are L/min.

3.10**foam solution delivery rate**

volume of foam solution delivered per unit of time by a system

Note 1 to entry: The measurement units are L/min.

Note 2 to entry: At proportioning ratios of up to 1 %, the difference between water delivery rate and foam solution delivery rate can be neglected.

3.11**operating range**

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

3.12**proportioning ratio**

amount of foam concentrate added to water given as a percentage in the foam solution

3.13**water delivery rate**

volume of water fed into CAFS per unit of time

Note 1 to entry: The measurement units are L/min.

3.14**wet foam**

operation defined by a nominal foam solution/air volume ratio between 1:3 and 1:10, being mixed in the CAFS

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4 Requirements**4.1 Compliance****4.1.1 Type assessments**

In order to comply with this part of ISO 7076, the CAFS representative of normal manufacture shall meet the requirements of [Clauses 4, 6 and 7](#), which shall be verified by visual inspection or engineering assessment, shall be tested as described in [Clause 5](#) and shall meet the requirements of the tests (see [Annex A](#) for guidance on conducting the assessments).

It is recognized that minor variations occur in the design of CAFS (e.g. to ensure compatibility with multiple truck types). Where minor variations occur and in the interests of economy, only one variant of each model need undergo type assessments. The CAFS should undergo new type assessments where a design change is likely to affect a requirement of this part of ISO 7076. The extent of the re-assessment can be limited, depending on the type of design change that has been made to the CAFS. In all cases, the manufacturer should maintain appropriate documentation.

4.1.2 Individual assessments

In addition to the requirements of [4.1.1](#), each CAFS produced by the manufacturer shall meet the requirements of [Table 1](#), which shall be verified by visual inspection, engineering assessment or test, and shall meet the requirements of the tests (see [Annex A](#) for guidance on conducting the assessments).

Table 1 — Individual assessment schedule

Assessment	Subclause number
Installation of the CAFS on the vehicle	4.2.2.1
Moving parts	4.2.2.2
Over-pressurization prevention	4.2.3.3
Accumulated water removal	4.2.4.1
Hot parts safety	4.2.5.1
Hot parts notice	4.2.5.2
Electrical equipment safety	4.2.6.2
Operator controls and indicators	4.2.7
Shutdown control	4.2.9
Maintenance and service	4.2.10
Protection against over-speed	4.2.11
Safety from over-heating	4.2.12
Drainage	4.3.1.3
Proportioning ratio and foam solution/air volume ratio	4.3.2.1
Maintenance of proportioning ratio	4.3.2.5
Maintenance of foam solution/air volume ratio	4.3.2.7
Storage vessels	4.3.3
Nominal performance	5.2
Marking	7.1

4.2 Safety and protective measures

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4.2.1 General

Safety of machinery shall comply with the requirements of ISO 12100.

4.2.2 Mechanical equipment

4.2.2.1 Installation of CAFS on the vehicle

CAFS shall be so designed and constructed as to be installed on the vehicle, in such a way as to prevent malfunction, disconnection, or damage caused by vibration during operation of the vehicle.

4.2.2.2 Moving parts

4.2.2.2.1 Personnel shall be protected from injury by moving parts during inspection, operation and service. Where applicable, the following shall be provided:

- a) fixed guards as defined in ISO 14120, complying with the safety distances defined in ISO 13857;
- b) minimum clearance at the end of a motion sequence according to ISO 13854.

4.2.2.2.2 A cautionary notice shall be fitted to, or adjacent to parts that are accessed during inspection, operation and service and may cause injury.

4.2.3 Components under pressure

4.2.3.1 The maximum operation pressure while using CAFS from the designated delivery outlets shall not exceed 1,0 MPa.

NOTE Higher pressures for specific applications might be agreed between users and a manufacturer.

4.2.3.2 A device shall be provided to relieve the internal pressure of the CAFS after operation.

4.2.3.3 Prevention of over-pressurization shall be ensured.

4.2.4 Material, parts and components

4.2.4.1 If water can accumulate in the air system, a means of removing it shall be provided.

4.2.4.2 Material, parts and components shall be resistant to corrosion by the foam concentrate, foam solution and compressed air foam.

4.2.5 Hot parts

4.2.5.1 Personnel shall be protected from injury by hot parts during inspection, operation and service (see ISO 13732-1).

4.2.5.2 A cautionary notice shall be fitted to, or adjacent to parts that are accessed during inspection, operation and service that may cause injury.

4.2.6 Electrical equipment

4.2.6.1 Electrical equipment shall meet the requirements of IEC 60204-1.

4.2.6.2 Design measures shall be taken to protect electrical equipment from damage by water, foam concentrate, and foam solution during filling of storage vessels and operation.

4.2.7 Operator controls and indicators

4.2.7.1 Controls and indicators used by the operator during fire-fighting actions shall be adequately arranged and operated for the purpose of safety, visibility and easier operation [refer to ISO 9335-1, ISO 9335-2, ISO 9335-3 and IEC 61310 (all parts)].

4.2.7.2 Manual operating equipment and other control elements shall be easy to reach and to operate when wearing protective gloves for fire-fighters as specified in ISO 15383 and without having to apply excessive force.

4.2.7.3 The number of switching operations shall be kept to a minimum and the control elements shall be arranged according to the operating sequence, in such a manner that operating errors are minimized.

4.2.8 System failure and continuation of on-going fire-fighting operation

4.2.8.1 Safety-relevant failures in the CAFS shall be clearly indicated.

EXAMPLE Visual indicators on the fire-fighting pump's operating panel, supervision of control valves, etc.