



**International
Standard**

ISO 7076-6

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

Part 6:

**Vehicle-mounted compressed air
foam systems**

Second edition

Standards
(<https://standards.iteh.ai>)
Document Preview

ISO/PRF 7076-6

<https://standards.iteh.ai/catalog/standards/iso/8a79318a-7e97-47f7-91b3-ea30cdc18f79/iso-prf-7076-6>

PROOF/ÉPREUVE

Reference number
ISO 7076-6:2024(en)

© ISO 2024

iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

ISO/PRF 7076-6

<https://standards.iteh.ai/catalog/standards/iso/8a79318a-7e97-47f7-91b3-ea30cdc18f79/iso-prf-7076-6>



COPYRIGHT PROTECTED DOCUMENT

© ISO 2024

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

PROOF/ÉPREUVE

© ISO 2024 – All rights reserved

Contents

	Page
Foreword	v
Introduction	vi
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 Requirements	3
4.1 Conformance.....	3
4.1.1 Type assessments.....	3
4.1.2 Individual assessments.....	3
4.2 Safety and protective measures.....	4
4.2.1 General.....	4
4.2.2 Mechanical equipment.....	4
4.2.3 Components under pressure.....	4
4.2.4 Material, parts and components.....	5
4.2.5 Hot parts.....	5
4.2.6 Electrical equipment.....	5
4.2.7 Operator controls and indicators.....	5
4.2.8 System failure and continuation of on-going fire-fighting operation.....	5
4.2.9 Shutdown control.....	6
4.2.10 Maintenance and service.....	6
4.2.11 Protection against over-speed.....	6
4.2.12 Safety from over-heating.....	6
4.3 Performance.....	6
4.3.1 Operation.....	6
4.3.2 Proportioning ratio and foam solution/air volume ratio.....	6
4.3.3 Storage vessels.....	7
5 Tests	7
5.1 General.....	7
5.1.1 Atmospheric conditions for tests.....	7
5.1.2 Mounting arrangements.....	7
5.1.3 Operating conditions for tests.....	7
5.1.4 Tolerances.....	8
5.1.5 Provision for tests.....	8
5.1.6 Test schedule.....	8
5.2 Nominal performance.....	8
5.2.1 Objective.....	8
5.2.2 Procedure.....	8
5.2.3 Measurements.....	8
5.2.4 Requirements.....	8
5.3 Endurance.....	9
5.3.1 Objective.....	9
5.3.2 Procedure.....	9
5.3.3 Measurements.....	9
5.3.4 Requirements.....	9
6 Classification and designation	10
7 Marking and data	10
7.1 Marking.....	10
7.2 Operator instructions.....	11
7.2.1 General.....	11
7.2.2 CAFS information.....	11
7.2.3 Description.....	11
7.2.4 Commissioning, operating and decommissioning.....	12

ISO 7076-6:2024(en)

7.2.5	Servicing and maintenance.....	12
7.2.6	Fault causes and corrections.....	13
7.2.7	Other technical documents.....	13
7.2.8	Short-form operating instructions.....	13
8	Test report.....	13
Annex A (informative) Guidance on the inspection and testing of CAFS.....		14
Annex B (normative) Classification of CAFS.....		20
Bibliography.....		21

iTeh Standards (<https://standards.iteh.ai>) Document Preview

[ISO/PRF 7076-6](https://standards.iteh.ai/catalog/standards/iso/8a79318a-7e97-47f7-91b3-ea30cdc18f79/iso-prf-7076-6)

<https://standards.iteh.ai/catalog/standards/iso/8a79318a-7e97-47f7-91b3-ea30cdc18f79/iso-prf-7076-6>

PROOF/ÉPREUVE

© ISO 2024 – All rights reserved

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 document 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).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

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

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 21, *Equipment for fire protection and fire fighting*, Subcommittee SC 6, *Foam and powder media and firefighting systems using foam and powder*.

This second edition cancels and replaces the first edition (ISO 7076-6:2016), which has been technically revised. It also incorporates the Amendment ISO 7076-6:2016/Amd. 1:2020.

The main changes are as follows:

- in [4.3.2.5](#), the deviation from the set proportioning ratio has been modified;
- the title of [Clause 6](#) has been modified; within the clause, a citation to [Annex B](#) has been added.
- in [Table A.1](#), the rows for [4.2.3.3](#) and [4.2.4.1](#), the descriptions in the “individual assessment” column have been modified;
- [Annex B](#) has been added;
- editorial corrections have been made throughout the document.

A list of all parts in the ISO 7076 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Compressed air foam systems (CAFS) conforming to this document are installed in fire-fighting vehicles, or used in conjunction with fire-fighting vehicles, to improve the efficiency of fire-extinguishing processes. CAFS 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.

CAFS generate homogeneous foam that increases the effective contact area of the foam on the burning material. This 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 document are only operated by suitably trained personnel.

For CAFS to be used at a temperature outside the temperature range defined in this document (i.e. from -10 °C to $+40\text{ °C}$), the particular temperature range is specified by the user. The manufacturer should determine any need for additional precautions by means of a risk assessment.

iTeh Standards
(<https://standards.itih.ai>)
Document Preview

[ISO/PRF 7076-6](https://standards.itih.ai/catalog/standards/iso/8a79318a-7e97-47f7-91b3-ea30cdc18f79/iso-prf-7076-6)

<https://standards.itih.ai/catalog/standards/iso/8a79318a-7e97-47f7-91b3-ea30cdc18f79/iso-prf-7076-6>

Fire protection — Foam fire extinguishing systems —

Part 6: Vehicle-mounted compressed air foam systems

1 Scope

This document 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 document is applicable to CAFS that can be permanently installed in fire-fighting vehicles, or that are transportable or mobile.

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

This document does not apply to stationary CAFS.

This document 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 document 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 are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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 13943, *Fire safety — Vocabulary*

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

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 13943 and the following apply.

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

— ISO Online browsing platform: available at <https://www.iso.org/obp>

— IEC Electropedia: available at <https://www.electropedia.org/>

3.1

air delivery rate

volume of air, in ambient conditions, that is fed into the *compressed air foam systems* (3.5), per unit of time

Note 1 to entry: The measurement unit is 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* (3.2) at the delivery outlet of the *compressed air foam systems* (3.5)

Note 1 to entry: The measurement unit is MPa.

3.4

compressed air foam delivery rate

volume of *compressed air foam* (3.2) at the delivery outlet of the *compressed air foam systems* (3.5), converted at atmospheric pressure, per unit of time

Note 1 to entry: The measurement unit is l/min. [ISO/PRF 7076-6](https://standards.iteh.ai/catalog/standards/iso/8a79318a-7e97-47f7-91b3-ea30cdc18f79/iso-prf-7076-6)

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

compressed air foam (3.2) defined by a nominal *foam solution/air volume ratio* (3.9) greater than 1:10, being mixed in the *compressed air foam systems* (3.5)

3.7

flushing procedure

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

EXAMPLE Procedure to avoid damage by corrosion.

3.8

foam concentrate delivery rate

volume of foam concentrate fed into *compressed air foam systems* (3.5), per unit of time

Note 1 to entry: The measurement unit is 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 *compressed air foam system* (3.5) mixing device

3.10

foam solution delivery rate

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

Note 1 to entry: The measurement unit is l/min.

Note 2 to entry: At *proportioning ratios* (3.12) of up to 1 %, the difference between *water delivery rate* (3.13) 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 *compressed air foam systems* (3.5) per unit of time

Note 1 to entry: The measurement unit is l/min.

3.14

wet foam

compressed air foam (3.2) defined by a nominal *foam solution/air volume ratio* (3.9) between 1:3 and 1:10, being mixed in the *compressed air foam systems* (3.5)

4 Requirements

ISO/PRF 7076-6

<https://standards.iteh.ai/catalog/standards/iso/8a79318a-7e97-47f7-91b3-ea30cdc18f79/iso-prf-7076-6>

4.1 Conformance

4.1.1 Type assessments

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

It is recognized that minor variations can 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 document. 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 the subclauses listed in [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

4.2.1 General

Safety of machinery shall conform to 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 the 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 in accordance with ISO 14120, conforming to the safety distances defined in ISO 13857;
- b) minimum clearance at the end of a motion sequence in accordance with ISO 13854.

4.2.2.2.2 A cautionary notice shall be fitted to, or adjacent to moving 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.