TECHNICAL SPECIFICATION

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Fire protection — Portable and wheeled fire extinguishers —

Part 1: Selection and installation

Protection contre l'incendie — Extincteurs portatifs et extincteurs sur roues —

Partie 1: Choix et installation

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Foreword

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In other circumstances, particularly when there is an urgent market requirement for such documents, a technical committee may decide to publish other types of document:

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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.

ISO/TS 11602-1 was prepared by Technical Committee ISO/TC 21, *Equipment for fire protection and fire fighting*, Subcommittee SC 2, *Manually transportable fire extinguishers*.

This first edition of ISO/TS 11602-1 cancels and replaces ISO 11602-1:2000, of which it constitutes a technical revision.

ISO 11602 consists of the following parts, under the general title *Fire protection — Portable and wheeled fire extinguishers*:

— *Part 1: Selection and installation* [Technical Specification]

— *Part 2: Inspection and maintenance* [Technical Specification]

Introduction

This part of ISO 11602 presents a limited number of provisions for the selection and installation of portable and wheeled fire extinguishers, in the knowledge that different countries have particular environments and climates which can affect the size, shape and occupancy of buildings.

A country's specific building configurations can affect the selection and installation of fire extinguishers; therefore, this part of ISO 11602 could be reinforced in respect of fire-extinguishing performance characteristics in the presentation of a general-purpose standard.

It is proposed that further investigation be undertaken in light of the above for the purposes of a future revision of this part of ISO 11602.

Fire protection — Portable and wheeled fire extinguishers —

Part 1: Selection and installation

1 Scope

This part of ISO 11602 gives requirements for the selection and installation of portable and wheeled fire extinguishers. It is intended as a companion to ISO/TS 11602-2.

Portable fire extinguishers are a first line of defence against fires of limited size. They are needed even if the property is equipped with automatic sprinklers, standpipe and hose, or other fixed protection equipment.

This part of ISO 11602 is not applicable to permanently installed systems for fire extinguishment, even though portions of such systems may be portable (such as hose and nozzles attached to a fixed supply of extinguishing media).

Its requirements are minimum requirements. The use of larger, higher-rated or greater numbers of extinguishers will, in general, improve protection.

Extinguishers for use on board aircraft, watercraft and vehicles are outside the scope of ISO 11602.

2 Normative references

The following referenced documents are indispensable for the application 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 7165, *Fire fighting — Portable fire extinguishers — Performance and construction*

ISO 8421-1, *Fire protection — Vocabulary — Part 1: General terms and phenomena of fire*

ISO 11601, *Fire fighting — Wheeled fire extinguishers — Performance and construction*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 8421-1 and the following apply.

3.1
clean agent
electrically non-conductive gaseous or vaporizing fire extinguishant that does not leave a residue upon vaporization

[ISO 7165:2009, 3.5]

3.2
film-forming foam
extinguishing media comprising the aqueous film-forming foam (AFFF) and film-forming fluoroprotein (FFFP) foam types, and including grades suitable for polar solvents (water-soluble flammable liquids) and those not suitable for polar solvents

3.3
fire extinguisher
extinguisher
appliance containing an extinguishing medium which can be discharged and directed onto a fire by the action of internal pressure

NOTE 1 The internal pressure may be provided by

— a stored pressure (pressurization of the extinguishing medium container at the time of charging), or

— a gas cartridge (pressurization at the time of use through the release of gas from a separate cylinder into the medium container).

NOTE 2 Adapted from ISO 7165:2009, definition 3.11.

3.4 Hazard classes

3.4.1
class A hazard
occupancies or fuel sources where Class A fires, involving materials such as wood, cloth, paper, rubber and many plastics, may be expected to develop

3.4.2
class B hazard
fuel sources where Class B fires, involving materials such as oils, greases and paints, may be expected to develop

3.4.3
class C hazard
fuel sources where Class C fires, involving materials such as natural and propane gas, may be expected to develop

3.4.4
class D hazard
fuel sources where Class D fires, involving materials such as magnesium, sodium and potassium, may be expected to develop

3.4.5
class F hazard
fuel sources where Class F fires, involving materials in cooking appliances such as combustible cooking media (vegetable or animal oils and fats), may be expected to develop

3.5 Hazard types (see also Annex A)

3.5.1
high hazard
location where the total amount of Class A combustibles and Class B flammables present, in storage, production use and/or finished product, is over and above those expected under moderate hazard occupancies

3.5.2
low hazard
location where the total amount of Class A combustible materials, including furnishings, decorations, and contents, is of minor quantity

NOTE This classification anticipates that the majority of items contained are either non-combustible or so arranged that a fire is not likely to spread rapidly. Small amounts of Class B flammables used for duplicating machines, art departments, etc., are included provided that they are kept in closed containers and safely stored.

3.5.3
moderate hazard
location where the total amount of Class A combustibles and Class B flammables are present in greater amounts than expected under low hazard occupancies

3.6
inspection
brief examination to ensure that an extinguisher is available and will operate

NOTE This is intended to give reasonable assurance that the extinguisher is fully charged and operable. This is done by seeing that it is in its designated place, that it has not been actuated or tampered with, and that there is no obvious damage or condition to prevent its operation.

3.7
maintenance
thorough examination of the extinguisher

NOTE This is intended to give maximum assurance that an extinguisher will operate effectively and safely. It includes a thorough examination and any necessary repair or replacement. It will normally reveal if hydrostatic testing is required.

3.8
portable fire extinguisher
fire extinguisher that is designed to be carried and operated by hand and that, in working order, has a mass of not more than 20 kg

NOTE Subject to local acceptance, extinguishers having a total mass of 25 kg when fully charged are permitted.

[ISO 7165:2009, 3.15]

3.9
rating
comparative number associated with the classification assigned to an extinguisher and indicative of its capability in the extinguishment of a standard fire

3.10
travel distance
distance a person must travel from any point to the closest appropriate extinguisher

3.11
water-type extinguisher
fire extinguisher which contains a water-based medium, such as water, aqueous film-forming foam (AFFF) or film-forming fluoroprotein (FFFP) foam and/or antifreeze

3.12
wheeled extinguisher
fan appliance on wheels having a total mass of more than 20 kg but not greater than 450 kg, which is designed to be transported to the fire and operated by one person

NOTE See ISO 11601.

4 Classifications, ratings and performance of extinguishers

4.1 Extinguishers are classified for use on certain classes of fires and rated for relative extinguishing effectiveness by testing laboratories. This is based on the classification of fires and the fire-extinguishing potentials as determined by fire tests.

4.2 The classifications are as follows:

— Class A: fires involving solid materials, usually of an organic nature, in which combustion normally takes place with the formation of glowing embers;

— Class B: fires involving liquids or liquefiable solids;

— Class C: fires involving combustible gases;

— Class D: fires involving combustible metals;

— Class F: fires involving combustible cooking media (vegetable or animal oils and fats) in cooking appliances.

4.3 The classification and rating systems referenced in this part of ISO 11602 are those specified in ISO 7165 and ISO 11601.

4.4 Extinguishers conformant with this part of ISO 11602 shall also be in accordance with ISO 7165 and ISO 11601.

4.5 The identification of the certification organization, the fire-extinguishing classification and rating and the performance standard that the extinguisher meets are clearly marked on each extinguisher.

5 General requirements

5.1 Extinguishers shall be maintained in a fully charged and operable condition, and shall be kept in their designated places at all times when not being used.

5.2 Extinguishers shall be conspicuously located where they will be readily accessible and immediately available in the event of fire. Preferably, they shall be located along normal paths of travel, including exits from areas.

5.3 Cabinets housing extinguishers shall not be locked, with the exception that where extinguishers are subject to vandalism, locked cabinets may be used, provided they include means of emergency access.

5.4 Extinguishers shall not be obstructed or obscured from view, with the exception that in large rooms and in certain locations where visual obstruction cannot be completely avoided, means shall be provided to indicate the location of the extinguishers.

5.5 Extinguishers shall be installed on hangers or in brackets, or mounted in cabinets, unless the extinguishers are of the wheeled type.

5.6 Extinguishers installed under conditions where they are subject to dislodgement shall be installed in specifically designed brackets.

5.7 Extinguishers installed under conditions where they may be subject to physical damage shall be protected from impact.

5.8 Extinguishers having a gross mass of 18 kg or less shall be installed so that the top of the extinguisher is not more than 1,5 m above the floor. Extinguishers having a gross mass greater than 18 kg (except wheeled types) shall be installed so that the top of the extinguisher is not more than 1,0 m above the floor. The clearance between the bottom of extinguishers mounted on hangers or brackets and the floor shall not be less than 3 cm.

5.9 When mounted or placed in their intended location, the operating instructions shall face outwards or towards the most likely direction of access.

5.10 Where extinguishers are installed in closed cabinets that are located outdoors, or are exposed to elevated temperatures, such cabinets shall be provided with ventilation openings.

5.11 Extinguishers shall not be installed in areas where temperatures are outside the range marked on the extinguisher, or where they may be exposed to elevated temperatures from heating sources.

5.12 Units of measurement in this part of ISO 11602 are in accordance with the International System of Units (SI). Other commonly used non-SI units, such as bar, are given in brackets after the appropriate SI unit. See ISO 80000-1.

6 Selection of extinguishers

6.1 General

The selection of extinguishers for a given situation shall be determined by the character and extent of the fires anticipated, the construction and occupancy of the individual property, the hazard to be protected against, the ambient temperature conditions, as well as other factors, as appropriate. The number, rating, placement and limitations of use of the required extinguishers shall meet the requirements of Clause 7.

6.2 Clean agent fire extinguishers

The use of clean agent fire extinguishers shall be limited to applications where a clean medium is necessary to extinguish fire efficiently without damaging the equipment or area being protected, or where the use of alternative media could cause a hazard to personnel in the area.

NOTE In some countries the manufacture and use of clean agents is regulated by the Montreal Protocol or by national regulations. See also ISO 7165:2009, 10.2.2.2.

6.3 Selection by hazard class

6.3.1 Extinguishers shall be selected for the specific class(es) of hazards to be protected against.

6.3.2 Extinguishers for protection against Class A hazards shall be selected from extinguishers with the appropriate Class A rating, with the exception of clean agent-type extinguishers (see 6.2).

6.3.3 Extinguishers for protection against Class B hazards shall be selected from extinguishers with the appropriate Class B rating, with the exception of clean agent-type extinguishers (see 6.2).

6.3.4 Extinguishers for protection against Class C hazards shall be of the powder type.

6.3.5 Extinguishers and extinguishing media for protection against Class D hazards shall be of types suitable for use on the specific combustible-metal hazards.

6.3.6 Extinguishers for protection against Class F hazards shall be selected from extinguishers with the appropriate Class F rating.

6.3.7 Extinguishers for protection against hazards which involve energized electrical equipment shall be of the carbon dioxide, powder, clean agent or water-based types which have been tested and found suitable for this application, with the exception of clean agent-type extinguishers (see 6.2).

Carbon dioxide extinguishers equipped with metal horns are not considered safe for use on fires involving energized electrical equipment.

While powder extinguishers can be effective in extinguishing fires in delicate electronic equipment, the residue from their media could seriously damage the equipment they are intended to protect.

6.4 Selection for pressurized flammable liquid and gas fires

6.4.1 Extinguishers containing media other than powder are relatively ineffective on pressurized flammable liquids and pressurized gas fires. The selection of extinguishers for this type of hazard shall be made on the basis of recommendations by the manufacturers of this specialized equipment. The system used to rate the effectiveness of extinguishers on Class B fires (flammable liquids in depth) is not applicable to these types of hazard. It has been determined that special nozzle design and rates of media application are required to cope with such hazards.

WARNING — It is undesirable to attempt to extinguish this type of fire unless there is reasonable assurance that the source of fuel can be promptly shut off.

6.4.2 Extinguishers for three-dimensional Class B hazards involving Class B materials in motion, such as pouring, running or dripping flammable liquids, shall be selected on the basis of recommendations by the manufacturers of the extinguishers. The system used to rate extinguishers on Class B fires (flammable liquids in depth) is not directly applicable to this type of hazard.

NOTE The installation of fixed systems for such hazards should be considered when applicable.

6.4.3 Extinguishers for use on water-soluble flammable liquid fires, such as alcohols, esters, ketones, etc., shall not be of the aqueous film-forming foam (AFFF) or film-forming fluoroprotein (FFFP) foam type recommended by the manufacturer of this equipment.

6.4.4 Wheeled extinguishers shall be considered for hazard protection in high hazard areas or where

— high media flow rates,

— increased media stream range, or

— increased media capacity

is required.

7 Distribution of extinguishers

7.1 General requirements

7.1.1 The minimum number of extinguishers needed to protect a hazard shall be determined as outlined in this clause.

Additional extinguishers may be installed to provide more suitable protection for special hazards. Consideration shall be given to the protection of high storage items and other hazards requiring extinguishers with a suitable vertical range. Extinguishers having ratings less than those specified in Tables 1 and 2 may be installed, provided they are not used to fulfil the minimum protective requirements of this clause.

7.1.2 Extinguishers shall be provided for the protection of both the building structure, if combustible, and the hazards contained therein.

7.1.3 Required building protection shall be provided by extinguishers suitable for Class A fires.

7.1.4 Protection of building contents shall be provided by extinguishers suitable for such Class A, B, C, D, or F fire hazards as may be present.

7.1.5 Extinguishers provided for building protection may also be considered for the protection of occupancies having a Class A fire potential.

7.1.6 Buildings having Class B and/or Class C hazards shall have a standard complement of Class A extinguishers for building protection, plus additional Class B and/or Class C extinguishers. Where

extinguishers have more than one letter classification, they may be considered to satisfy the requirements of each letter class.

7.1.7 Occupancies shall be classified generally as low hazard, moderate hazard, or high hazard occupancies (see 3.5). Limited areas with greater or lesser hazards shall be protected as required. Consideration shall also be given to the number of occupants, their ages, and their ability to evacuate in the case of fire.

7.1.8 On each floor level, the area protected and the travel distances are based on extinguishers installed in accordance with Tables 1 and 2.

7.2 Fire extinguisher ratings and placement for Class A hazards

7.2.1 Fire extinguishers for the different types of hazards shall be provided on the basis of Table 1.

Table 1 — Characteristics of fire extinguishers for the listed types of hazards (Class A)

Type of hazard	Minimum extinguisher rating	Maximum travel distance to extinguisher m	Maximum area per extinguisher m^2
Low	2-A	20	300
Moderate	3-A [a]	20	150
High	4-A [a]	15	100

[a] Two 2-A rated water-type extinguishers, provided they are installed adjacent to each other, may be used to fulfil the requirements of one 3-A or 4-A rated extinguisher.

7.2.2 At least two extinguishers in accordance with Table 1 shall be provided per floor level, with the exception that for floor levels having an area of less than 100 m^2, one extinguisher may be provided.

7.2.3 The protection requirements may be fulfilled with extinguishers of higher ratings, provided the travel distance to such larger extinguishers does not exceed the distance specified in Table 1.

7.3 Extinguisher rating and placement for Class B hazards other than hazards in flammable liquids of appreciable depth (in excess of 0,6 cm) and for Class C hazards

7.3.1 Extinguishers for the listed types of hazard shall be provided on the basis of Table 2, with the exception that extinguishers of lesser rating, for small specific hazards within the general hazard area, may be used, but shall not be considered as fulfilling any part of the requirements of Table 2.

Table 2 — Characteristics of fire extinguishers for the listed types of hazards (parts of Class B, Class C)

Type of hazard	Minimum extinguisher rating	Maximum travel distance to extinguisher m	Maximum area per extinguisher m^2
Low	55 B	15	300
Moderate	144 B	15	150
High	233 B	15	100

For pressurized flammable liquid and gas fires, see 6.4.

For fires involving water-soluble flammable liquids, see 6.4.3.

7.3.2 Two or more extinguishers of lower rating shall not be used to fulfil the protection requirements of Table 2 with the exception that up to three AFFF- or FFFP-type extinguishers, provided the sum of their ratings equals or exceeds the minimum required rating, may be used to fulfil the requirements of a single extinguisher of the required rating.

7.3.3 The protection requirements may be fulfilled with extinguishers of higher ratings, provided the travel distance to such larger extinguishers does not exceed the distance specified in Table 2.

7.3.4 At least two extinguishers as specified in Table 2 shall be provided per floor level, with the exception that for floor levels having an area of less than 100 m^2, one extinguisher may be provided.

7.4 Extinguisher size and placement for Class B hazards in flammable liquids of appreciable depth (in excess of 0,6 cm)

7.4.1 For flammable liquid hazards of appreciable depth, such as in dip or quench tanks, additional Class B extinguishers shall be provided on the basis of at least 144 numerical units of Class B extinguishing potential per square metre of the estimated maximum fire area, with the exception that AFFF- or FFFP-type extinguishers may be provided on the basis of 89B of protection per square metre of hazard.

7.4.2 Two or more extinguishers of lower ratings shall not be used in lieu of the extinguisher required for the largest tank, with the exception that up to three AFFF- or FFFP-type extinguishers may be used to fulfil the requirements of a single extinguisher of the required rating, provided the sum of their ratings equals or exceeds the minimum required rating.

7.4.3 When the size of a Class B hazard of appreciable depth is such that it cannot be protected by portable extinguishers, the use of a wheeled extinguisher may be considered when it can be demonstrated that it is capable of protecting against the hazard. Where so used, Class B portable extinguishers shall also be provided, as covered in 7.3.1, to protect areas in the vicinity of such a hazard.

7.4.4 Travel distances to extinguishers shall not exceed 15 m.

7.4.5 Scattered or widely separated hazards shall be individually protected. An extinguisher in the proximity of a hazard shall be carefully located to be accessible in the presence of a fire without undue danger to the operator.

7.5 Extinguisher size and placement for electrical hazards

7.5.1 Electrical hazards include hazards either directly involving or surrounding electrical equipment.

7.5.2 As these hazards are themselves either Class A or B hazards, the extinguishers shall be sized and located on the basis of the anticipated Class A or B hazard.

7.5.3 Where energized electrical equipment could be encountered, the extinguishers shall have been proved to be suitable for use on energized electrical equipment and so marked.

Electrical equipment should be de-energized as soon as possible to prevent re-ignition.

7.6 Extinguisher size and placement for Class D hazards

7.6.1 Class D extinguishers shall be provided for hazards involving combustible metals.

7.6.2 The travel distances to extinguishers for Class D hazards shall not exceed 20 m.

7.6.3 The size and number of extinguishers shall be determined on the basis of the specific combustible metal, its physical particle size, and the area to be covered.

7.7 Extinguisher size and placement for Class F hazards

7.7.1 Class F extinguishers shall be provided for hazards involving combustible cooking media (vegetable or animal oils and fats) in cooking appliances.

7.7.2 The travel distances to extinguishers for Class F hazards shall not exceed 10 m.

7.7.3 The size and number of extinguishers shall be determined on the basis of the total cooking area to be covered, in accordance with Table 3.

Table 3 — Class F — Size and number of extinguishers

Minimum extinguisher rating	Maximum cooking area per extinguisher m^2
5F	0,03
15F	0,05
25F	0,08
75F	0,25

Annex A
(informative)

Hazard types

Table A.1 is an example of specific criteria for selection of the hazard type. See 3.5 for definitions.

Table A.1

Parameter	Type of hazard		
	Low	**Moderate**	**High**
Height of building (m)	Up to 25	Not applicable	In excess of 25
Number of occupants	Less than 15	Between 15 and 250	In excess of 250
Building surface area (m^2)	Less than 300	Between 300 and 3 000	In excess of 3 000
Flammable gases (litres)	Less than 500	Between 500 and 3 000	In excess of 3 000
Flammable liquids (litres)	Less than 250	Between 250 and 1 000	In excess of 1 000
Combustible liquids (litres)	Less than 500	Between 1 000 and 2 000	In excess of 2 000

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