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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

Reference number
ISO 11602-1:2000(E)

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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this part of ISO 11602 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

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

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

— *Part 1: Selection and installation*

— *Part 2: Inspection and maintenance*

Introduction

ISO 11602 is intended to provide guidance to those involved in the application of portable and wheeled fire extinguishers as a means, or partial means, of providing fire protection to various hazards both within and outside buildings. It should be recognized that the rules and recommendations provided herein may not be applicable to all hazards where specific configurations of combustible materials, or other special locations or circumstances, dictate the need for engineered protection.

Requirements are specified in this part of ISO 11602 for the selection and installation of portable and wheeled fire extinguishers. Details relating to inspection and maintenance are contained in ISO 11602-2.

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 should be used in conjunction with ISO 11602-2.

Fire extinguishers are intended as 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).

The requirements in this part of ISO 11602 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 considered to be outside the scope of this part of ISO 11602.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 11602. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 11602 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

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, *Wheeled fire extinguishers —- Performance and construction*.

3 Terms and definitions

For the purposes of this part of ISO 11602, the terms and definitions given in ISO 8421-1, together with the following, apply.

3.1
closed recovery system for extinguishing powder
system employed for the re-use of powder

NOTE It provides for the transfer of powder from an extinguisher to a recovery container that is closed to prevent the loss of media to the atmosphere.

3.2
closed recovery system for halon
system that provides for the transfer of halon between extinguishers, supply containers, and recharge and recovery containers so that the escape of halon to the atmosphere is minimized

3.3
competent person
person with the necessary training and experience and with access to the requisite tools, equipment, parts and information (including the manufacturer's service manual) to be capable of carrying out the inspection, maintenance and recharging procedures of this part of ISO 11602

NOTE See annex A of ISO 11602-2:2000.

3.4
film-forming media
aqueous film-forming foam (AFFF) and film-forming fluoroprotein foam (FFFP) types, including grades suitable for polar solvents (water-soluble flammable liquids), and those not suitable for polar solvents

3.5
fire extinguisher
portable or wheeled fire extinguisher

NOTE "Fire extinguishers" are referred to as "extinguishers" in this part of ISO 11602.

3.6 Hazards

3.6.1
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

3.6.2
Class B hazard
fuel sources where Class B fires, involving materials such as oils, greases and paints, may be expected to develop

3.6.3
Class C hazard
fuel sources where Class C fires, involving materials such as natural and propane gas, may be anticipated

3.6.4
Class D hazard
fuel sources where Class D fires, involving materials such as magnesium, sodium and potassium, may be anticipated

3.7
high-pressure cylinder
cylinder having a service pressure higher than 2,5 MPa at 20 °C

3.8
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.

3.9
low-pressure cylinder
cylinder having a service pressure of 2,5 Mpa or lower at 20 °C

3.10
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.

3.11
non-rechargeable extinguisher
non-refillable extinguisher
fire extinguisher that is not capable of (nor intended for) undergoing complete maintenance, hydrostatic testing, and being restored to its full operating capability by the standard practices used by fire equipment service companies

3.12
occupancy hazard (high)
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

3.13
occupancy hazard (low)
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.

3.14
occupancy hazard (moderate)
location where the total amount of Class A combustibles and Class B flammables are present in greater amounts than expected under low hazard occupancies

3.15
portable extinguisher
portable appliance containing an extinguishing medium which can be discharged and directed onto a fire by the action of internal pressure

NOTE 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).

3.16
rating
comparative number associated with the classification assigned to an extinguisher and indicative of its capability in the extinguishment of a standard fire

3.17
rechargeable extinguisher
refillable extinguisher
fire extinguisher capable of undergoing complete maintenance, including internal inspection of the pressure vessel, replacement of all substandard parts and seals, and hydrostatic testing

NOTE This type of extinguisher is capable of being recharged with media and propellant, and restored to its full operating capability by the standard practices used by fire equipment service companies. Rechargeable (refillable) extinguishers are marked "Recharge Immediately After Any Use" or with a similar equivalent marking.

3.18
recharging
replacement of the extinguishing medium

NOTE This also includes the propellant for certain types of extinguishers.

3.19
self-expelling-medium extinguisher
extinguisher in which the medium has sufficient vapour pressure at normal operating temperatures to expel itself

3.20
service
servicing
process which includes one or more of the following:

— maintenance,

— recharging, and

— hydrostatic testing

3.21
service pressure
normal operating pressure at 20 °C as indicated on the pressure gauge or indicator and nameplate of a stored pressure extinguisher, or the pressure developed in a cartridge-operated extinguisher upon release of the gas from the cartridge into the medium container at a temperature of 20 °C

3.22
test pressure
pressure at which the extinguisher or its components were tested at time of manufacture

NOTE The pressure at which the shell was tested is shown on the nameplate or the extinguisher body.

3.23
travel distance
distance a person must travel from any point to the closest appropriate extinguisher

3.24
water-type extinguisher
fire extinguisher which contains a water-based medium, such as water, foam (AFFF or FFFP) and antifreeze

3.25
wheeled extinguisher
fire extinguisher having a total mass of more than 20 kg, mounted on wheels, which is designed to be transported and operated by one person

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

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

4.4 Extinguishers used to comply with this part of ISO 11602 shall 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 they are 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.

EXCEPTION: 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.

EXCEPTION: 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 general, in accordance with the International System of Units (SI). Some units (e.g. cm, bar and litre), outside of but recognized by SI, may appear as they are commonly used in international fire protection. See ISO 1000.

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, and other factors. The number, rating, placement and limitations of use of the required extinguishers shall meet the requirements of clause 7.

6.2 Halon fire extinguishers

The use of halon 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.

6.3 Selection by hazard

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.

EXCEPTION: For halon-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.

EXCEPTION: For halon-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 hazards which involve energized electrical equipment shall be of the carbon dioxide, powder, halon, or water-based types which have been tested and found suitable for this application.

EXCEPTION: For halon-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 may be effective in extinguishing fires in delicate electronic equipment, the residue from their media may 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 AFFF or FFFP type unless the extinguishing medium has been specifically tested and found to be suitable for such applications.

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

are 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 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 or D fire hazards as may be present.

7.1.5 Extinguishers provided for building protection may be considered also 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 3.12 to 3.14). 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

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 as recommended in Table 1 shall be provided per floor level.

EXCEPTION: 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 shown 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.

EXCEPTION: 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

Type of hazard	Minimum extinguisher rating	Maximum travel distance to extinguishers 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.

EXCEPTION: 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 shown in Table 2.

7.3.4 At least two extinguishers as recommended in Table 2 shall be provided per floor level.

EXCEPTION: 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 Extinguishers shall not be installed as the sole protection for flammable liquid hazards of appreciable depth (greater than 0,6 cm) where the surface area exceeds 1 m^2.

7.4.2 For flammable liquid hazards of appreciable depth, such as in dip or quench tanks, a Class B extinguisher 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.

EXCEPTION 1: Where approved automatic fire protection devices or systems have been installed for a flammable liquid hazard, additional portable Class B fire extinguishers may be waived. Where so waived, Class B extinguishers shall be provided as covered in 7.3.1 to protect areas in the vicinity of such protected hazards.

EXCEPTION 2: AFFF- or FFFP-type extinguishers may be provided on the basis of 89B of protection per square metre of hazard.

7.4.3 Two or more extinguishers of lower ratings shall not be used in lieu of the extinguisher required for the largest tank.

EXCEPTION: 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.

7.4.4 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.

7.4.5 Travel distances to extinguishers shall not exceed 15 m.

7.4.6 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 the hazard itself is a Class A or Class B hazard, 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 may 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.

Bibliography

[1] ISO 3941, *Classification of fires*.

[2] ISO 5923, *Fire protection — Fire extinguishing media — Carbon dioxide*.

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[7] ISO 8421-6, *Fire protection — Vocabulary — Part 6: Evacuation and means of escape*.

[8] ISO 1000, *SI units and recommendations for the use of their multiples and of certain other units*.

[9] ISO 11602-2:2000, *Fire protection — Portable and wheeled fire extinguishers — Part 2: Inspection and maintenance*.

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