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**Wheeled fire extinguishers — Performance  
and construction**

*Extincteurs sur roues — Performances et construction*

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Printed in Switzerland

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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.

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 International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 11601 was prepared by Technical Committee ISO/TC 21, *Equipment for fire protection and fire fighting*, Subcommittee SC 2, *Manually transportable fire extinguishers*.

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# Wheeled fire extinguishers — Performance and construction

## 1 Scope

This International Standard specifies the principal requirements intended to ensure the safety, reliability and performance of wheeled fire extinguishers.

It is applicable to wheeled fire extinguishers with a total mass when fully charged of greater than 25 kg but not more than 450 kg.

## 2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard 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 37, *Rubber, vulcanized or thermoplastic — Determination of tensile stress-strain properties.*

ISO 3768, *Metallic coatings — Neutral salt spray test (NSS test).*

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

ISO 7165, *Fire fighting — Portable fire extinguishes — Performance and construction.*

ISO 7201-1, *Fire protection — Fire extinguishing media — Halogenated hydrocarbons — Part 1: Specifications for halon 1211 and halon 1301.*

ISO 7202, *Fire protection — Fire extinguishing media — Powder.*

ISO 7203-1, *Fire extinguishing media — Foam concentrates — Part 1: Specification for low expansion foam concentrates for top application to water-immiscible liquids.*

ISO 7203-2, *Fire extinguishing media — Foam concentrates — Part 2: Specification for medium and high expansion foam concentrates for top application to water-immiscible liquids.*

ISO 14520-1, *Gaseous media fire extinguishing systems — Physical properties and system design — Part 1: General requirements.*

### 3 Terms and definitions

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

#### 3.1

##### **batch**

group of the same products made on the same production line using the same lot of materials during one production shift

#### 3.2

##### **body**

metal shell of an extinguisher designed to contain the extinguishing media including any skirt

#### 3.3

##### **bulk range**

discharge range of an extinguisher when 50 % of its extinguishing medium has been expelled with the discharge valve fully open

#### 3.4

##### **burst pressure**

##### **PB**

for low-pressure wheeled fire extinguishers, PB = 2,7 times the maximum service pressure (PMS), 5 times the service pressure (PS), or 5,5 MPa, whichever produces the highest pressure

#### 3.5

##### **charge of extinguisher**

mass or volume of extinguishing medium contained in the extinguisher

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NOTE It is expressed in volume (litres) for water-based extinguishers and in mass (kilograms) for other extinguishers.

#### 3.6 Classification of fires

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##### 3.6.1

##### **Class A**

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

##### 3.6.2

##### **Class B**

fires involving liquids or liquefiable solids

##### 3.6.3

##### **Class C**

fires involving gases

##### 3.6.4

##### **Class D**

fires involving metals

#### 3.7

##### **clean agent**

electrically non-conductive gaseous or vaporizing liquid fire-extinguishing medium that does not leave a residue upon evaporation

#### 3.8

##### **closure**

component, other than a safety device or pressure indicator, subject to the internal pressure and used to close off and seal the body



**3.9****complete discharge**

point in the discharge of an extinguisher when the internal pressure has equalized with the external pressure with the control valve being kept fully open

**3.10****effective discharge time**

time from the commencement of discharge of the extinguishing medium at the nozzle to the gas point of the discharge stream with the control valve fully open

**3.11****extinguisher**

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

NOTE Discharge may be achieved by (1) stored pressure (constant pressurization of the extinguishing media container), or (2) cartridge- or cylinder-operated device (pressurization at the time of use by the release of a pressurizing gas stored in a separate high-pressure cartridge or container).

**3.12****extinguishing medium**

substance contained in the extinguisher which causes extinction of the fire

**3.13****fill density**

mass in kilograms of extinguishing medium per litre of container volume, as fitted for use, complete with valve and internal fittings

**3.14****gas point**

point where the medium discharge changes from predominately medium to predominately expellant gas

**3.15****lowest observable adverse effect level****LOAEL**

lowest concentration at which an adverse physiological or toxicological effect has been observed

**3.16****maximum service pressure****PMS**

equilibrium pressure developed in a normally charged and pressurized extinguisher which is conditioned at 60 °C for at least 18 h

**3.17****propellant**

non-flammable compressed gas used to expel the extinguishing medium

**3.18****rechargeable extinguisher**

extinguisher designed and intended to be recharged after use

**3.19****service pressure****PS**

equilibrium pressure developed in a normally charged and pressurized extinguisher conditioned at 20 °C for at least 18 h

**3.20**  
**test pressure**  
**PE**

for low-pressure wheeled extinguishers, PE = 1,43 times the maximum service pressure (PMS), 2,5 times the service pressure (PS), or 2,0 MPa, whichever produces the highest pressure

**3.21**  
**wheeled fire extinguisher**

appliance on wheels having a total mass of more than 25 kg but not greater than 450 kg, which is designed to be operated and transported to the fire by one person

## **4 Types of wheeled fire extinguishers**

**4.1** Wheeled fire extinguishers are described by the type of extinguishing medium which they contain. At present, the types of wheeled fire extinguishers are as follows:

- water-based;
- powder;
- carbon dioxide;
- clean agent.

NOTE In some countries, the manufacture and use of clean agents is regulated by the Montreal Protocol or by national regulations.

**4.2** Water-based wheeled fire extinguishers may contain plain water, or water with additives such as wetting agents, viscosity-increasing agents, flame-retardant, or foaming agents, etc.

NOTE At present there are no International Standards covering additives added to water to produce antifreeze, wetting or other special characteristics.

**4.3** Powders may be of the "BC" or "ABC" types, or may be specially prepared for Class D fires.

**4.4** Wheeled fire extinguishers may have two extinguisher bodies per axle. Each extinguisher body may contain the same or a different extinguishing medium provided they are compatible with each other.

## **5 Extinguishing media, propellants and fill densities**

### **5.1 Extinguishing media**

#### **5.1.1 Carbon dioxide**

Carbon dioxide used in wheeled fire extinguishers shall comply with ISO 5923.

#### **5.1.2 Clean agents**

Clean agents used in wheeled fire extinguishers shall comply with ISO 7201-1 or ISO 14520-1.

NOTE In some countries, the manufacture and use of clean agents is regulated by the Montreal Protocol or by national regulations.

#### **5.1.3 Powder**

Powder used in wheeled fire extinguishers shall comply with ISO 7202.

EXCEPTION: Powders for use on Class D fires.

#### 5.1.4 Foam concentrates

Foam concentrates used in wheeled fire extinguishers shall comply with ISO 7203-1 or ISO 7203-2.

### 5.2 Propellants

The propellant for stored-pressure and cartridge-operated wheeled fire extinguishers shall be air, argon, carbon dioxide, helium, nitrogen or mixtures of these gases having a maximum dew point of  $-55\text{ }^{\circ}\text{C}$ .

EXCEPTION: The propellant for stored-pressure water-based wheeled fire extinguishers need not meet the dewpoint requirement.

### 5.3 Fill density

The fill density for carbon dioxide wheeled fire extinguishers shall not exceed 0,75 kg/l.

The fill density for clean-agent wheeled fire extinguishers shall not exceed the values given in ISO 7201-1 or ISO 14520-1.

NOTE These fill densities may be modified subject to national pressure vessel regulations.

### 5.4 Filling tolerance

The actual charge of a wheeled fire extinguisher shall be the nominal charge within the following limits:

- a) water-based extinguishers:  $0$  % by volume;  $-5$  % by volume;
- b) powder extinguishers:  $\pm 2$  % by mass;
- c) carbon dioxide and clean agent extinguishers:  $0$  % by mass;  $-5$  % by mass.

### 5.5 Charges

#### 5.5.1 Nominal charge

The following are the recommended charges for wheeled fire extinguishers:

- a) water-based extinguishers: 20 l, 45 l, 60 l and 125 l;
- b) powder-based extinguishers: 20 kg, 50 kg, 100 kg and 150 kg,
- c) carbon-dioxide and clean-agent extinguishers: 10 kg, 20 kg, 30 kg and 50 kg.

#### 5.5.2 Gross mass

The gross mass of a wheeled fire extinguisher shall not exceed 450 kg.

## 6 Performance

### 6.1 Operating temperatures

Wheeled fire extinguishers shall be capable of operating reliably within one of the following temperature ranges:

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+5°C to +55°C

–5°C to +55°C

–10°C to +55°C

–20°C to +55°C

–30°C to +55°C

–40°C to +55°C

–55°C to +55°C

The temperature range selected from the above ranges shall be marked on the extinguisher (see 9.2.5).

## 6.2 Effective discharge time and bulk range of discharge

### 6.2.1 Effective discharge time

**6.2.1.1** The effective discharge time of water-based wheeled fire extinguishers shall be not less than 40 s nor more than 210 s.

**6.2.1.2** The effective discharge time of wheeled fire extinguishers with a Class A rating, except water-based types, shall be not less than 30 s.

**6.2.1.3** The effective discharge time of wheeled fire extinguishers other than water-based types shall be not less than 20 s.

### 6.2.2 Bulk range

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**6.2.2.1** The bulk range of wheeled fire extinguishers with a Class A rating shall be not less than 6 m when tested in accordance with 6.2.2.2.

**EXCEPTION:** For water-based wheeled fire extinguishers fitted with a spray nozzle, the bulk range may be reduced to 3 m.

**6.2.2.2** Condition the extinguisher for not less than 18 h at a temperature of  $(20 \pm 3)$  °C and place it in its normal operating position with the discharge nozzle held horizontally at a height of 1 m.

Fully discharge the extinguisher with the control valve fully open within 5 min of conditioning.

Record the bulk range at the time corresponding to 50 % of the effective discharge time.

**NOTE** If the range of effective discharge is difficult to determine visually, supplementary means, such as collection boxes for water, foam or powder extinguishers or condensing plates for carbon dioxide and clean agent extinguishers may be used.

## 6.3 Resistance to temperature changes

### 6.3.1 Requirements

Wheeled fire extinguishers shall be able to operate at temperatures between the minimum marked on the extinguisher (see 6.1) and +55 °C.