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**Cylinders for acetylene — Basic  
requirements —**

Part 2:  
**Cylinders with fusible plugs**

*Bouteilles pour acétylène — Exigences de base —  
Partie 2: Bouteilles avec bouchons fusibles*  
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ISO 3807-2:2000

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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 part of ISO 3807 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 3807-2 was prepared by Technical Committee ISO/TC 58, *Gas cylinders*.

This first edition, together with ISO 3807-1, cancels and replaces ISO 3807:1977, which has been technically revised.

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ISO 3807 consists of the following parts, under the general title *Cylinders for acetylene — Basic requirements*:  
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— *Part 1: Cylinders without fusible plugs*

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— *Part 2: Cylinders with fusible plugs*

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Annexes A to F form a normative part of this part of ISO 3807.

## Introduction

There are 2 types of acetylene cylinders working safely in certain parts of the world:

- acetylene cylinders designed with a test pressure of at least 60 bar gauge and without fusible plugs or any other safety devices;
- acetylene cylinders designed to a test pressure of at least 52 bar gauge, fitted with fusible plugs or other safety devices which release the gas and hence reduce the pressure if the cylinder temperature increases unintentionally.

It was decided to split International Standard ISO 3807 into 2 parts and specify the basic requirements of both systems separately; the differences are found mainly in the testing requirements.

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# Cylinders for acetylene — Basic requirements —

## Part 2: Cylinders with fusible plugs

### 1 Scope

This part of ISO 3807 specifies the basic requirements for acetylene cylinders with shells made from steel and equipped with fusible plugs with a maximum nominal water capacity of 150 l. It includes the procedures for type testing, production batch testing and the methods for determining the maximum permissible settled pressure in acetylene cylinders and the porosity of the porous mass. It also contains requirements for filling conditions of acetylene cylinders and bundles.

This part of ISO 3807 does not cover acetylene cylinders with safety devices other than fusible plugs.

It does not include details of design for the cylinder shell; these are specified e.g. in ISO 4705, ISO 4706, ISO 9809-1 or ISO 9809-3.

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### 2 Normative reference

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The following normative document contains provisions which, through reference in this text, constitute provisions of this part of ISO 3807. 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 3807 are encouraged to investigate the possibility of applying the most recent edition of the normative document 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 13769:—<sup>1)</sup>, *Gas cylinders — Stamp marking*.

### 3 Terms and definitions

For the purposes of this part of ISO 3807, the following terms and definitions apply.

#### 3.1

##### **acetylene cylinder**

pressure vessel, manufactured and suitable for transport of acetylene, containing a porous mass and solvent for acetylene (or solvent-free where applicable) with valve and other accessories fixed to the cylinder

NOTE 1 For solvent-free acetylene cylinders, see clause 6.

NOTE 2 When there is no risk of ambiguity, the word “cylinder” is used.

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1) To be published.

### 3.2

#### **cylinder shell**

pressure vessel, manufactured and suitable for receiving and containing a porous mass and to be fitted as an acetylene cylinder

### 3.3

#### **porous mass (porous substance)**

single or multi-component material introduced or formed in the cylinder shell in order to fill it and that, due to its porosity, allows the absorption of the solvent/acetylene gas solution

NOTE The porous mass may be monolithic or non-monolithic:

- monolithic porous mass, consisting of a solid product typically obtained by reacting materials or by bonding materials together with a binder;
- non-monolithic porous mass, consisting typically of granular, fibrous or similar materials without addition of a binder.

### 3.4

#### **solvent**

liquid which is absorbed by the porous mass and is capable of dissolving and releasing the acetylene

NOTE The following abbreviations are used:

- "A" for acetone;
- "DMF" for dimethylformamide.

### 3.5

#### **fusible plug**

non-reclosing pressure relief device designed to function by the yielding or melting of a plug of fusible material at a predetermined temperature

### 3.6

#### **acetylene bundle**

transportable unit consisting of two or more cylinders manifolded together within a rigid frame, equipped with all necessary equipment for filling and emptying in the assembled state

### 3.7

#### **tare weight**

reference mass, in kilograms, of the acetylene cylinder with the specified amount of solvent, further specified in accordance with 3.7.1, 3.7.2 or 3.7.3

NOTE For cylinders with solvent, the tare weight is expressed by indicating either one or both of the masses corresponding to TARE A and TARE S. For solvent-free acetylene cylinders, the tare weight is expressed by indicating a TARE F. For the tare weight used for cylinders in bundles, see 7.5.3.

#### 3.7.1

##### **TARE A**

sum of empty mass of the cylinder shell, the mass of the porous substance (see 3.3), the specified mass of solvent, the valve and the mass of all other parts which are permanently attached (e.g. by clamping or nut-and-bolt fixing) to the cylinder when it is going to be filled

#### 3.7.2

##### **TARE S**

TARE A plus the acetylene mass required to saturate the solvent at normal atmospheric pressure (1,013 bar) and at a temperature of 15 °C (saturation gas)

#### 3.7.3

##### **TARE F**

TARE A minus the specified mass of solvent



**3.8****maximum acetylene content**

specified maximum mass of acetylene the cylinder is designed to contain, in kilograms "KG" [see 4.6.2 e)]

NOTE When a solvent is used, it includes the saturation gas.

**3.9****total weight**

total mass, in kilograms "KG" equal to TARE A (or TARE F for solvent-free cylinders) plus the maximum acetylene content [see 4.6.2 e)]

**3.10****water capacity (cylinder shell volume)**

actual capacity of the cylinder shell, in litres, measured by filling the shell with water

NOTE The cylinder shell is defined as being empty of any porous mass, see 3.2.

**3.11****porosity**

ratio, expressed as a percentage, of the total volume (water capacity) of the cylinder shell minus the volume of the solid material of the porous mass, to the water capacity of the cylinder shell, and determined in accordance with annex A or annex B

**3.12****acetylene/solvent ratio**

ratio of the maximum acetylene content to the specified solvent content

**3.13****maximum permissible settled pressure**

maximum permissible pressure, in bar gauge, at a uniform temperature of 15 °C, in a cylinder containing the maximum acetylene content and the specified solvent content

**3.14****manufacturer**

company responsible for filling the cylinder shell with porous mass and which generally prepares it for the first charge of acetylene

**4 Basic requirements****4.1 Cylinder shell**

**4.1.1** The cylinder shell shall conform to the requirements of the relevant International Standard or the national requirements of the country(ies) of use.

**4.1.2** The minimum test pressure for acetylene cylinders equipped with fusible plugs shall be 52 bar gauge.

**4.2 Porous mass**

**4.2.1** The porous mass in each cylinder shall be of such quality that it enables each completed cylinder to pass all the tests included in annex C.

For safety reasons, the porous mass shall be able to prevent the propagation of decomposition of the acetylene.

**4.2.2** There shall be no hazardous reaction between the porous mass, the cylinder shell, the acetylene, the solvent and any parts in contact with them during preparation and use.

### 4.3 Solvent content

The specified mass of solvent for an acetylene cylinder shall be such that the cylinder will meet the requirements of all tests specified in annex C. Specific requirements for solvent content in acetylene cylinders and bundles are given in annex D.

### 4.4 Maximum acetylene charge

The total mass of acetylene in a cylinder shall not exceed the amount specified by the manufacturer. For specific requirements for individual cylinders and bundles, see annex D.

### 4.5 Settled pressure

When the cylinder has been charged with the specified solvent content and the maximum acetylene content, and the pressure has reached equilibrium at a uniform temperature of 15 °C, the gauge pressure in the cylinder shall not exceed the maximum permissible settled pressure for the type of cylinder — calculated using the formula in annex E.

### 4.6 Cylinder identification

**4.6.1** The identification of acetylene cylinders shall comply with relevant national requirements and standards for identification (e.g. stamp marking, labelling and colour-coding) in the country(ies) of use.

**4.6.2** Irrespective of the requirements of 4.6.1, each acetylene cylinder shall be stamp-marked with at least the following information:

- a) the number of this part of ISO 3807, i.e. 3807-2;
- b) cylinder serial number;
- c) gas identification, in the format of the chemical symbol " $C_2H_2$ ";
- d) identification of the porous mass, enabling the mass, the country and factory of origin to be clearly identified;
- e) tare weight as defined in 3.7.1 or 3.7.2. If this tare weight includes fixed parts other than the valve (normally fixed cap or valve guard), the total mass of those parts shall be indicated by a stamp marking in front of the letters "TARE" (e.g. 2.3 TARE 75.1/75.6 KG, see ISO 13769). For solvent-free acetylene cylinders, see 6 d);
- f) total weight of the acetylene cylinder as defined in 3.9;
- g) identification of the solvent including the specified mass of solvent, in kilograms (e.g. A 12.4 KG or DMF 16.0 KG). For solvent-free acetylene cylinders, see 6 d);
- h) test pressure of the cylinder shell, in bar gauge;
- i) maximum permissible settled pressure, in bar gauge, as defined in 3.13;
- j) actual water capacity of the cylinder shell, in litres "L".

### 4.7 Fusible plugs

**4.7.1** Each acetylene cylinder shall be equipped with one or more pressure relief devices of the fusible plug type, sized and selected as to location and quantity so that the pressure relief device(s) are capable of preventing rupture of the normally charged cylinder when subjected to a fire test in accordance with C.4.

**4.7.2** The fusible plug shall utilize a fusible alloy having a yield temperature of no more than 107 °C and no less than 98 °C. The nominal yield temperature shall be 100 °C. The yield temperature is the temperature at which the fusible alloy becomes sufficiently soft to extrude from its holder to permit discharge of acetylene.

**4.7.3** The fusible alloy may be installed in a threaded steel or brass plug or in the cylinder valve. The threaded plug shall be fitted into a boss or pad on the cylinder top or bottom. Bottom plugs are not permitted for cylinders used in bundles.

**4.7.4** The fusible plugs shall be sample tested for yield temperature, and for resistance to extrusion and leakage as a quality control procedure during manufacture prior to installation into the cylinder. Detailed test procedures are given in annex F.

## 5 Type approval

### 5.1 General requirements

Representative cylinders, selected according to 5.3 by, or on behalf of, the approving authority, shall successfully withstand the type tests as required in 5.4 prior to type approval being granted to the manufacturer of the porous mass (see 5.2).

The massing factory and the process of filling of the porous mass into the cylinder shell shall be audited by, or on behalf of, the approving organization.

### 5.2 Approval requirements **STANDARD PREVIEW** (standards.iteh.ai)

#### 5.2.1 Range of a single approval

A request for approval of acetylene cylinders may cover a range of different cylinder sizes provided that:

- a) the cylinders contain the same porous mass from the same factory and the same solvent;
- b) the maximum acetylene content per litre water capacity of the cylinder shell is the same;
- c) the acetylene/solvent ratios are the same;
- d) the nominal outside diameter of the cylinder falls within the range of either:
  - 1)  $\leq 270$  mm or
  - 2)  $> 270$  mm;
- e) the construction is similar (welded or seamless).

**NOTE** The maximum acetylene content per litre water capacity (b) and the maximum acetylene/solvent ratio (c) may be lower than the values approved, provided they are within the safe operating area of the safe operating diagram in Figure D.1.

#### 5.2.2 Information to be supplied

Each request for approval shall include the following information:

- a) A schedule of the different types, as defined in 5.3.2, of acetylene cylinders which form the subject of the request for approval and which includes, for each size of cylinder, the following information:
  - 1) nominal water capacity in litres;
  - 2) solvent to be used;

- 3) specified solvent content in kilograms;
  - 4) maximum acetylene content in kilograms;
  - 5) test pressure of the cylinder shell in bar gauge;
  - 6) maximum settled pressure at 15 °C;
  - 7) name of manufacturer and place of production of porous mass;
  - 8) identification (trade name) of porous mass to be stamped on to the cylinder;
  - 9) rejection criteria (maximum top clearance between mass and shell);
  - 10) number and location of fusible plugs.
- b) A description of the porous mass as it exists in the cylinder, which gives sufficient information concerning production process and quality control procedures (see annex B). The description shall include the following:
- 1) maximum top clearance as manufactured, which shall be consistent with periodic inspection criteria;
  - 2) core hole size and packing material where applicable.
- c) A report on the porosity determinations carried out by, or on behalf of, the manufacturer according to the method given in annex A and a statement of the maximum and minimum limits of porosity within which the porous mass will be manufactured.

### 5.2.3 Declaration of the manufacturer

The request for approval shall be accompanied by a declaration from the manufacturer stating that, provided type approval is granted, the production of the porous mass will be in accordance with the information given in the request for approval in 5.2.2.

## 5.3 Test cylinders

### 5.3.1 Submission of test cylinders

The manufacturer shall submit an adequate number of cylinders representative of production of that cylinder type (e.g. with regard to top clearance, etc.), including spare cylinders. These cylinders shall be complete with porous mass and all fittings, but without solvent and acetylene, unless otherwise specified by the approving organization.

### 5.3.2 Selection of test cylinders

Cylinders for tests shall be selected as follows:

- a) for cylinders with a nominal water capacity  $> 60$  l and  $\leq 150$  l, test cylinders with a capacity considered to be representative of the size under consideration shall be selected;
- b) for cylinders with a nominal water capacity  $\leq 60$  l, tests shall be carried out on the smallest and the largest cylinders of every range proposed by the manufacturer;
- c) for cylinders with a nominal water capacity  $< 20$  l, no tests need to be carried out on cylinders having a maximum acetylene content of not more than 90 % of the equivalent proportional content used in approved cylinders of water capacity  $\geq 20$  l. However, in such a case the maximum acetylene content per volume (water capacity) shall not exceed 0,180 kg/l. For cylinders having a higher acetylene content, tests shall be carried out on cylinders with a nominal water capacity representative of the size under consideration.