

BS EN 417:2003



# BSI British Standards

**Non-refillable metallic gas cartridges for liquefied petroleum gases, with or without a valve, for use with portable appliances — Construction, inspection, testing and marking**

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**BSI**  
British Standards

**National foreword**

This British Standard is the UK implementation of EN 417:2003. It supersedes BS EN 417:1992 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PKW/0, Packaging.

A list of organizations represented on this committee can be obtained on request to its secretary.

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EUROPEAN STANDARD

EN 417

NORME EUROPÉENNE

EUROPÄISCHE NORM

May 2003

ICS 23.020.30

Supersedes EN 417:1992

English version

Non-refillable metallic gas cartridges for liquefied petroleum  
gases, with or without a valve, for use with portable appliances -  
Construction, inspection, testing and marking

Cartouches métalliques pour gaz de pétrole liquéfiés, non rechargeables, avec ou sans valve, destinées à alimenter des appareils portatifs - Construction, contrôle, essais et marquage

Metallische Einwegkartuschen für Flüssiggas mit oder ohne Entnahmeventil zum Betrieb von tragbaren Geräten -

This European Standard was approved by CEN on 13 February 2003.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this Europe Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning standards may be obtained on application to the Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and United Kingdom.



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## **Foreword**

This document (EN 417:2003) has been prepared by the Task Force CEN/BT/TF 114, "Non-refillable metallic cartridges" the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by November 2003, and conflicting national standards shall be withdrawn at the latest by November 2003.

In order to avoid a sudden change in the rule of operation of EN 417, the CEN/BT/TF 114 decided that specifications related to single layer valves be moved to an informative annex (annex A) and remain in force during a transitional period of five years after the publication of the revised standard.

Annex C is normative. Annexes A and B are informative.

This document supersedes EN 417:1992.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

## **Introduction**

This standard covers “non-refillable metallic cartridges for liquefied petroleum gases, with or without a valve, for use with portable appliances”.

It has become necessary to establish a specific standard for these cartridges, as the European Directive 75/324/EEC concerning aerosol generators does not cover the essential functions of cartridges for liquefied petroleum gas, i.e. containing a gas suitable for the operation of the appliance and supplying the appliance in a gas tight fashion, taking account of its geometry and the heating that might occur.

The safety of the user therefore depends on the use of cartridges complying with this standard, which in consequence, will be marked, inspected and tested in accordance with the requirements of this standard.

This standard also defines the tests to be used as a basis for type examination and describes a procedure which can serve as a guide to the organizations responsible for issuing type examination certificates.

This standard does not apply to appliances with an integral gas container which is not interchangeable, or to cartridges for filling such containers.

## 1 Scope

This European Standard specifies material, construction, inspection and marking requirements for non-refillable metallic gas cartridges with or without a valve for use with portable appliances which comply with the requirements of EN 521.

This standard is applicable to cartridges with a total capacity of between 50 ml and 1 000 ml, designed to contain stented liquefied petroleum gas or stabilized mixtures of liquefied petroleum gas with propadiene and/or methyl acetylene, where the pressure developed by the contents of the cartridge at 50 °C does not exceed 13,2 bar.

However, stenting of these gases is optional for cartridges with a total capacity not exceeding 150 ml.

This standard is not applicable to aerosol dispensers — manufactured, filled, tested and marked in accordance with the Directive 75/324/EEC.

## 2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 521, *Specifications for dedicated liquefied petroleum gas appliances - Portable vapour pressure liquefied petroleum gas appliances*

## 3 Terms and definitions

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

### 3.1

#### **gas cartridge**

non-refillable container filled once only with gas or a mixture of gases for fuelling portable gas appliances which burn the gas or gases in use

### 3.2

#### **pierceable gas cartridge**

cartridge without a valve

NOTE The gas supply is obtained by piercing the cartridge by means of a specific device which is part of the portable appliance with which the cartridge is to be used.

### 3.3

#### **two piece gas cartridge with valve**

cartridge constructed of two pieces with an aperture at the top end into which a male or female valve is fitted

NOTE The gas supply is obtained by the connection of the portable appliance to the valve.

### 3.4

#### **three piece gas cartridge with valve**

cartridge constructed of three pieces with an aperture at the top end into which a male or female valve is fitted

NOTE The gas supply is obtained by the connection of a portable appliance to the valve.

**3.5**

**total capacity**

internal volume of the empty gas cartridge at 20 °C, expressed in millilitres, before any accessories are fitted, such as valves, etc.

**3.6**

**net capacity**

volume, expressed in millilitres, which is available to receive the contents when the gas cartridge is sealed and fitted with its accessories

**3.7**

**test pressure**

pressure that is equal at a temperature of 50 °C to 1,5 times the pressure which would be developed by gas with which the cartridge will be filled, or 10 bar, whichever is the greater

**3.8**

**burst pressure**

minimum pressure which causes leakage from the gas cartridge

**3.9**

**volume for the liquid phase**

volume occupied by the liquid phase of the gas or gases within the gas cartridge

**3.10**

**liquefied petroleum gas**

mixture of liquefied hydrocarbon gases comprising principally butanes, butenes, propane and propene

**3.11**

**stenched liquefied petroleum gas**

liquefied petroleum gas with the addition of an odourant detectable in the gas/air mix

**3.12**

**female valve**

valve designed so that the spigot fitting of an appropriate appliance enters into the valve to open it

**3.13**

**male valve**

valve fitted with a stem protruding from the centre of the valve which, when depressed, opens the valve

**3.14**

**valve cup**

support of the valve destined to be fixed to the cartridge

## **4 Materials, design and construction**

### **4.1 Materials**

**4.1.1** The body of the gas cartridge and the valve cup where applicable, with the exception of the sealing material, shall be made of metal.

**4.1.2** The materials used for the container, the valve, any internal lining, external coatings and seals shall be compatible with the gases to be contained by the cartridge and shall withstand the reasonably foreseeable mechanical, thermal and chemical conditions which may occur during use and storage.

Gas cartridges designed to contain mixtures of liquefied petroleum gas and methylacetylene shall not be manufactured from materials containing more than 70 % copper.

## 4.2 Design and construction – General

**4.2.1** Gas cartridges shall be constructed from one or more parts, these being assembled by welding, brazing, crimping, etc.

**4.2.2** Gas cartridges with an outside diameter of 40 mm and above shall be provided with a concave base.

**4.2.3** Gas cartridges shall be so designed and constructed that they do not leak or show visible permanent deformation when subjected to an internal pressure equal to the test pressure.

**4.2.4** Gas cartridges shall be so designed and constructed that they do not leak or burst until a pressure 1,2 times the test pressure has been reached or passed.

**4.2.5** The concave form of the base of gas cartridges with an outside diameter exceeding 40 mm shall reverse in form before any leak appears or rupture occurs. However, for three piece construction cartridges with valves, with an outside diameter exceeding 40 mm, either the concave form of the base shall reverse or the domed top shall permanently extend before any leak appears or any rupture occurs.

**4.2.6** Gas cartridges shall be so designed and constructed that they do not leak at temperatures from – 20 °C to + 70 °C.

**4.2.7** The dimensions of the cartridge shall be such as to ensure that it is compatible with the appliances designated on the cartridge (see 8.2).

## 4.3 Pierceable cartridges

### 4.3.1 General

Pierceable cartridges shall not be fitted with valve cups.

### 4.3.2 Type 200 cartridges

For type 200 cartridges, (inside diameter 86 mm, containing approximately 190 g of gas), the dimensions in Figure 1 shall be maintained.

Dimensions in millimetres

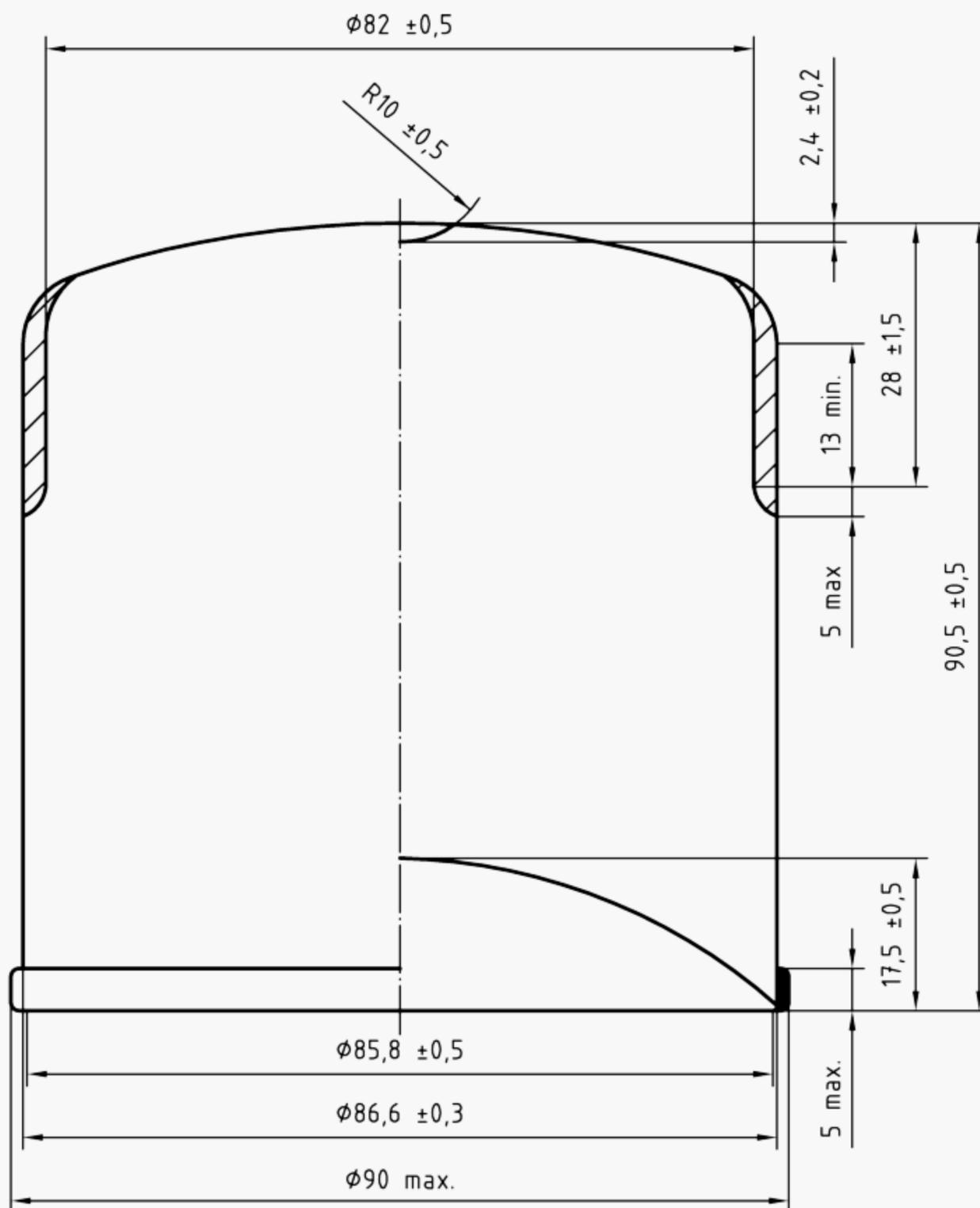


Figure 1 — Cartridge type 200

Across the whole height of the hatched area (except for the rounded edges top and bottom), the diameter shall be :

- a)  $(86,6 \pm 0,3)$  mm; or
- b)  $(82 \pm 0,5)$  mm; or
- c) the design shall be such that the diameter alternates between the dimensions in a) and b) above.

NOTE In this area, each cartridge manufacturer should choose the shape that is best suited to ensure the safety of the connection of the cartridge to the appliance, according to the characteristics of the appliances likely to be fuelled by his cartridges.

### 4.3.3 Other pierceable type cartridges

Other capacities, dimensions and shapes of pierceable cartridges are permitted, provided that they cannot be fitted into and be pierced by appliances designed for type 200 cartridges.

## 4.4 Cartridges with valves

### 4.4.1 Valve design

#### 4.4.1.1 General requirements for every type of valve

Cartridges with valves shall be either:

- a) of such a design that it is not possible to operate the valve without the use of a special adaptor b; or

NOTE The connection on the appliance with which the gas cartridge is designed to be used may be considered as a special adaptor.

- b) provided with adequate protection against inadvertent discharge.

The valves shall be of such a design that, under conditions of normal use, they close when the special adaptor is removed or the valve released. Valves which close by means of internal gas pressure only are not permitted.

After 50 opening and closing operations, the valve shall not show signs of leakage or other defects (see 6.6).

The valve cup, if any, shall be free from burrs and sharp edges.

#### 4.4.1.2 Cartridges fitted with threaded centre boss valve cups

4.4.1.2.1 The valve cup shall be made from carbon or alloy steel of suitable uniform quality, which may be coated, (e.g. hot-dipped tinplate).

4.4.1.2.2 The valve or closure shall be one of the following types:

- type 1: Female valve (see 3.12) mounted in a double layer, threaded centre boss valve cup;
- type 2: Male valve (see 3.13) mounted in a double layer, threaded centre boss valve cup;
- type 3: Female valve (see 3.12) mounted in a single layer, threaded centre boss valve cup (see annex A);
- type 4: Male valve (see 3.13) mounted in a single layer, threaded centre boss valve cup (see annex A).

NOTE For wishing to avoid a sudden change in the rule of operation of EN 417, the CEN/BT/TF 14 decided that specifications related to single layer valves (type 3 and 4) be moved in an informative annex (annex A) and remain in force during a transitional period of five years after the publication of the revised standard.

4.4.1.2.3 The valve shall not break when a torque of 15 N·m is applied as indicated in 6.8.

#### 4.4.1.3 Filled cartridges fitted with type 1 valves

Filled cartridges fitted with type 1 valves shall comply with the following:

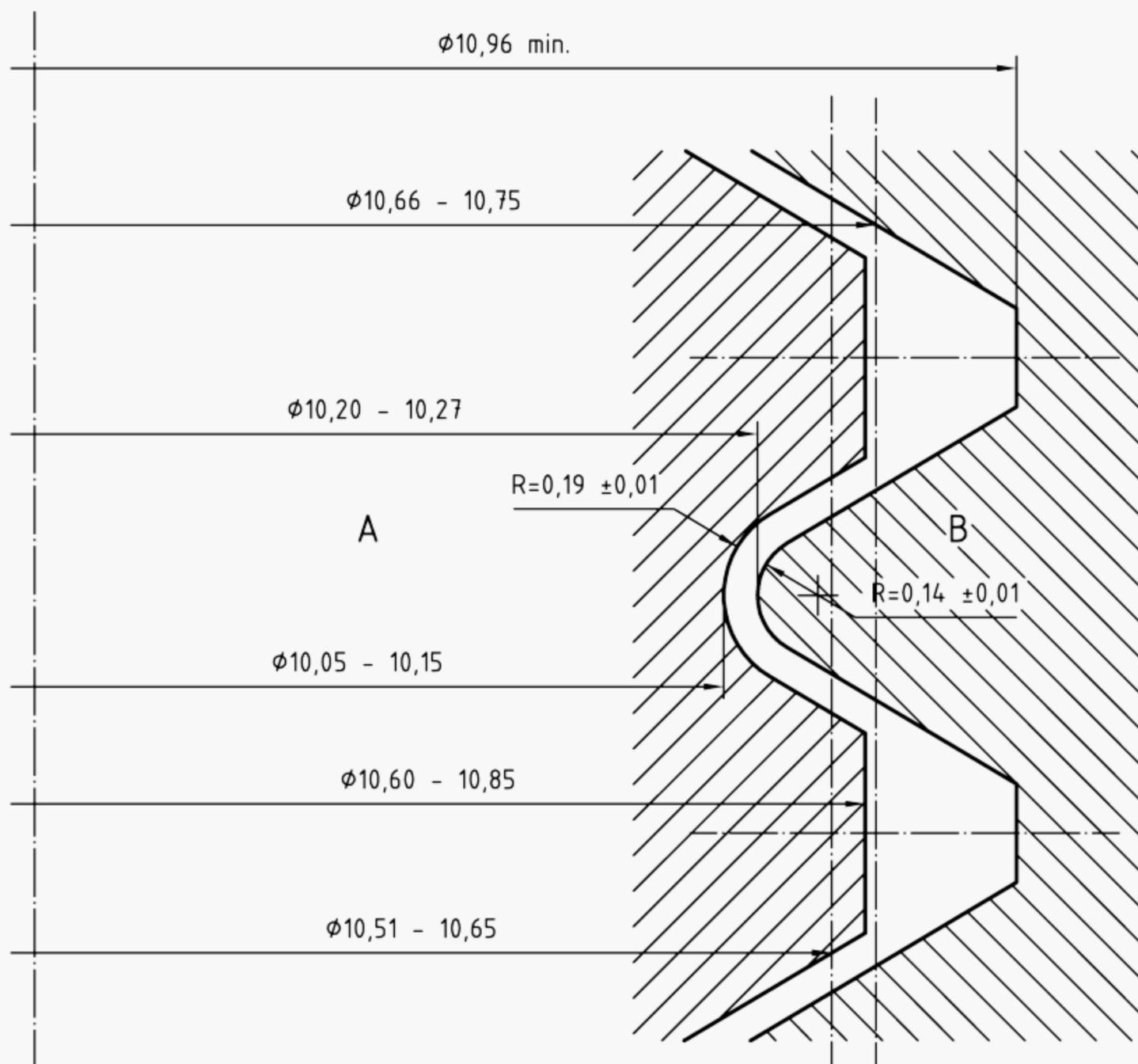
- a) the valve cup component shall be manufactured from a double layer of material;
- b) the thickness of the valve cup shall be between 0,30 mm and 0,57 mm;

NOTE Special attention is drawn to the material thickness at the root of the thread.

c) the centre boss of the valve cup shall be externally threaded for at least four and a half full threads with the following external screw thread:

- 7/16 28 UNIFIED FORM SPECIAL — EXT. ;
- Major diameter 10,60 mm to 10,85 mm;
- Minor diameter 10,05 mm to 10,15 mm;
- Effective diameter 10,51 mm to 10,65 mm;
- The thread shall be a rolled thread (see Figure 2);

Dimensions in millimetres



**Key**

- 1 Valve
- 2 Adaptor

**Figure 2 — Thread tolerances of the valve and of the adaptor**

d) the top surface of the centre boss shall be raised at an angle of 25° to the horizontal over an area defined by a circle of  $(5,65 \pm 0,15)$  mm which is concentric with the major diameter of the thread tolerance: 0,15 mm maximum (see Figure 3);

- e) the raised portion shall be pierced with a circular hole of  $(3,45 \pm 0,2)$  mm diameter, concentric with the major diameter of the thread (tolerance : 0,15 mm maximum), (see Figure 3);
- f) the flat surface of the boss surrounding the raised area shall be square to the central axis of the thread ( $\pm 2^\circ$ );
- g) the flat surface of the boss surrounding the raised area shall be not less than 0,9 mm and not more than 1,4 mm above the plane of the top surface of the cup rim (see Figure 3) and shall be parallel to that plane ( $\pm 2^\circ$ );
- h) the upper surface(s) of the centre boss shall form the sealing surface(s) for an appliance screwed onto the valve;
- i) the inner diameter of the swaged cup shall not be less than 23 mm and the outer diameter of the swaged cup shall not exceed 34 mm (see Figure 3). The inner and outer diameters of the swaged cup shall be concentric with the major diameter of the thread (tolerance : 0,3 mm maximum);
- j) the horizontal clearance between the centre boss and the inner wall of the valve cup shall not be less than 5,8 mm and shall be maintained over a vertical distance of at least 8 mm below the plane of the flat surface of the centre boss surrounding the raised area (see Figure 3);

NOTE 1 The clearance dimensions between the major diameter of the valve cup boss thread and the inner diameter of the valve cup is a minimum dimension for the valve cup and a reference dimension for the maximum size of the corresponding part of the appliance.

NOTE 2 It is essential that any part of the appliance which makes contact with the cartridge or cartridge valve rim during assembly does not interfere with the safe sealing process of the cartridge to the appliance.

- k) the inner diameter of the inner gasket shall be concentric with the major diameter of the thread (tolerance : 0,3 mm maximum). The inner diameter shall not be less than 2,5 mm and not greater than 2,9 mm when assembled in the valve;
- l) the valve shall be fully closed when the distance from the centre of the spigot seat to the flat surface of the boss surrounding the raised area is less than 1,85 mm (see dimension A in Figure 4). The valve shall be fully opened when the distance is more than 3,5 mm (see dimension B in Figure 4);

It shall be possible to depress the centre of the spigot seat at least 4,15 mm below the flat surface of the boss surrounding the raised area without damage to the valve or the valve-housing (see dimension C in Figure 4).

NOTE When the appliance is attached to the cartridge, the cartridge valve is opened by a spigot on the appliance. The requirements specified in 4.4.1.3 should assist the appliance designer to establish the appropriate size of spigot to avoid leakage of gas when fitting the appliance to the cartridge. In addition, it is essential that when the appliance is fitted, the spigot does not extend more than 4,15 mm below the flat surface of the boss surrounding the raised area, as this can damage the valve possibly leading to unrestricted loss of gas.

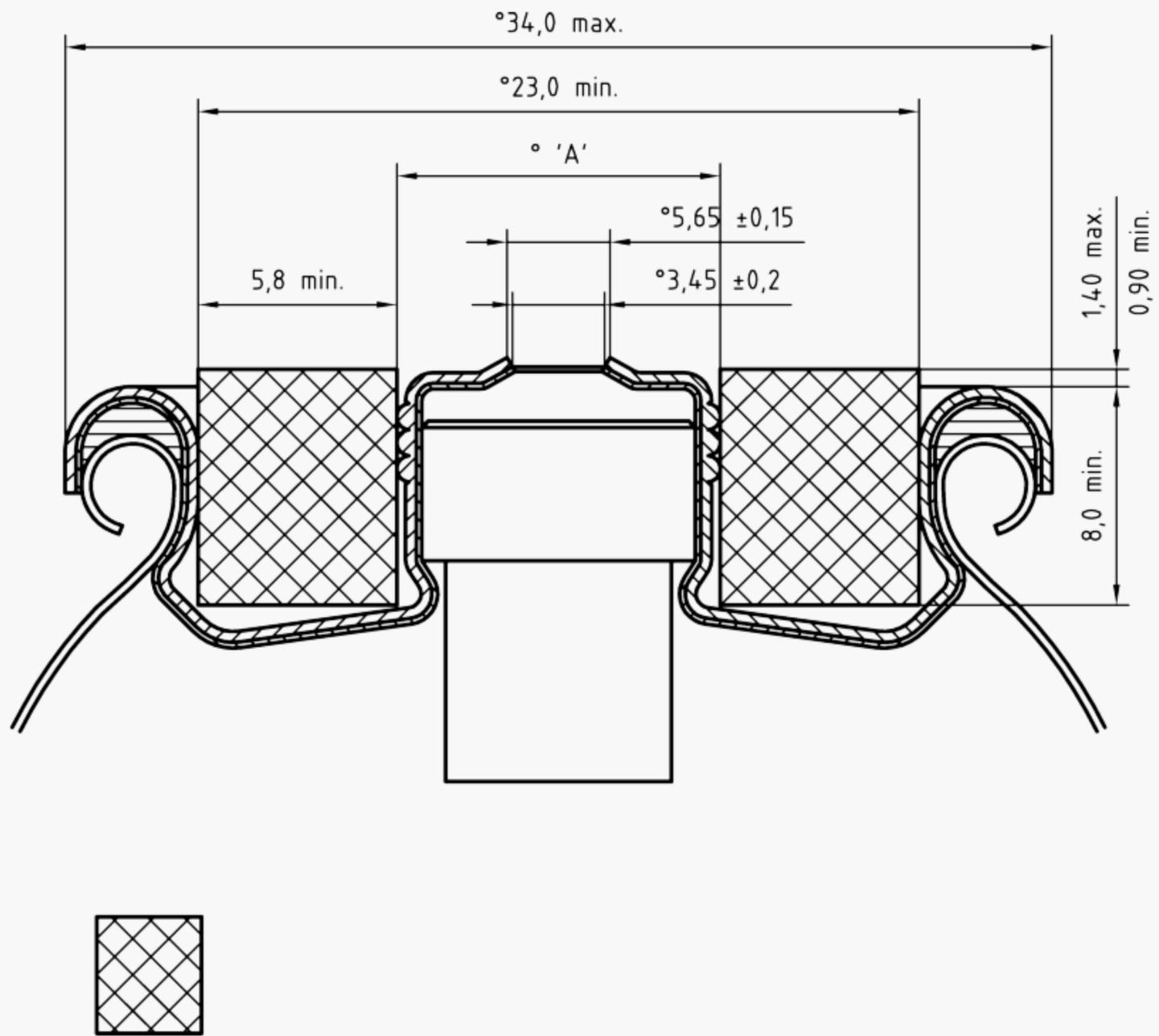
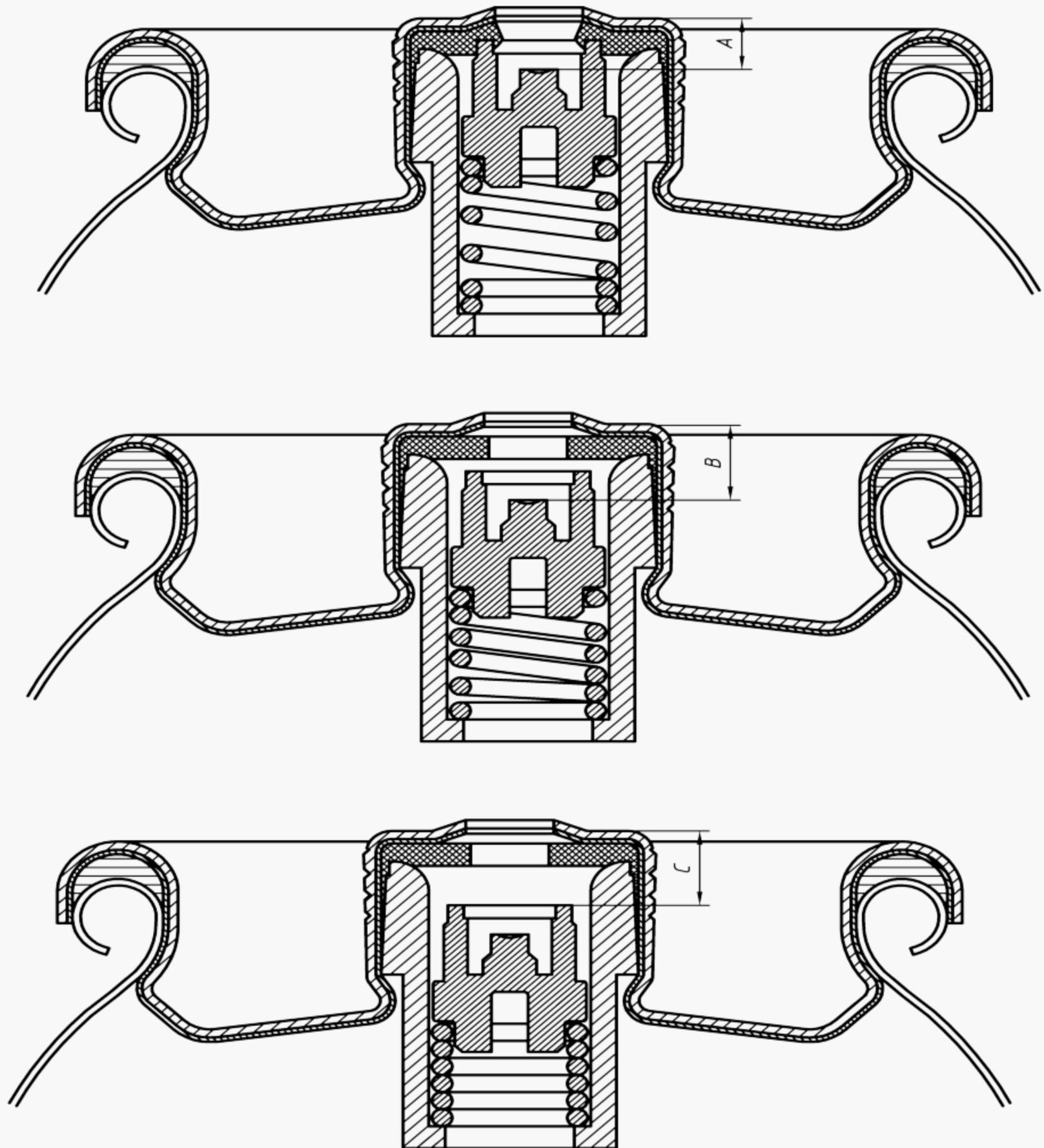


Figure 3 — Section of a threaded centre boss valve cup (type 1)



a) Valve fully closed

b) Valve fully opened

c) Valve fully depressed

Figure 4 — Dimensions related to valve opening and closing

#### 4.4.1.4 Filled cartridges fitted with type 2 valves

Filled cartridges fitted with type 2 valves shall comply with 4.4.1.3 a), b) and c).

#### **4.4.1.5 Filled cartridges fitted with type 3 and 4 valves**

Filled cartridges fitted with type 3 and 4 valves shall comply with annex A.

## **5 Requirements for filled gas cartridges**

The cartridges shall be so filled that at 50 °C the liquid phase does not exceed 95 % of their capacity.

NOTE This volume may be increased to 95 % in the case of gas cartridges which have a concave base which undergoes reversal of its form before any leak appears or rupture occurs.

## **6 Type testing**

### **6.1 General**

The tests specified in 6.2 to 6.7 shall be performed on samples taken from 100 cartridges selected at random from a batch of filled cartridges produced in 1 h.

The test specified in 6.8 shall be performed on samples taken from 10 valves selected at random from a batch produced in 1 h.

Annex B gives a procedure for type testing.

### **6.2 Dimensions**

The dimensions shall be checked on five cartridges.

### **6.3 Net capacity**

This test shall be performed on five cartridges by weighing containers when empty and when filled with water.

The net capacity of each container shall be at least equal to the minimum net capacity indicated by the manufacturer.

### **6.4 Pressure strength**

10 cartridges shall be subjected to a hydraulic test in accordance with the method indicated in clause C.1.

All cartridges shall comply with the requirements of 4.2.3, 4.2.4 and 4.2.5.

### **6.5 Gas tightness of cartridges**

The requirements of 4.2.6 shall be verified on five samples in accordance with the following method:

- the cartridge is cooled to – 20 °C and then immersed in a liquid at – 20 °C. No bubbles shall be observed coming from the cartridge over a period of 3 min;
- when the test at – 20 °C has been carried out, the cartridge is immersed in a liquid at 0 °C for 1 h. No bubbles shall be seen coming from the cartridge over a further period of 3 min;
- the cartridge is then left at an ambient temperature of about 20 °C for 1 h, then placed in a container of water. The assembly is brought to a temperature of 70 °C in a time not less than 30 min. No bubbles shall then be observed coming from the cartridge over a further period of 3 min.

## 6.6 Gas tightness of valves

This test is performed on five samples:

- the valve is subjected to 50 opening and closing operations at  $(20 \pm 5)$  °C using the adaptor of an appliance designed for use with the cartridge;
- each operation consists of fully fitting and fully removing the adaptor from the cartridge;
- after these operations the cartridge is placed in a water bath at a temperature of  $(50 \begin{smallmatrix} +5 \\ -0 \end{smallmatrix})$  °C for 15 min. No bubbles shall be seen coming from the cartridge over a further period of 3 min.

## 6.7 Drop test

The test is carried out on 15 samples. If cartridges are marketed with a protective cover fitted to the valve, the tests are carried out with the protective cover fitted.

- The test is performed by dropping the cartridge from a height of 1,2 m onto a hard surface (concrete, thick steel plate, etc.) ; new cartridges shall be used for each test:
- five cartridges shall be dropped on the top;
- five cartridges shall be dropped on the base;
- five cartridges shall be dropped on the side.

After the test, carried out at an ambient temperature of  $(20 \pm 5)$  °C, the cartridges are plunged into a water bath at  $(20 \pm 5)$  °C. No signs of leakage shall be apparent for a period of 3 min.

If any of the cartridges fail the test, the test which caused the failure shall be repeated on five new cartridges. If after the re-test there are no failures, the result of the test is judged to be satisfactory.

## 6.8 Threaded centre boss valve – Mechanical strength torque test

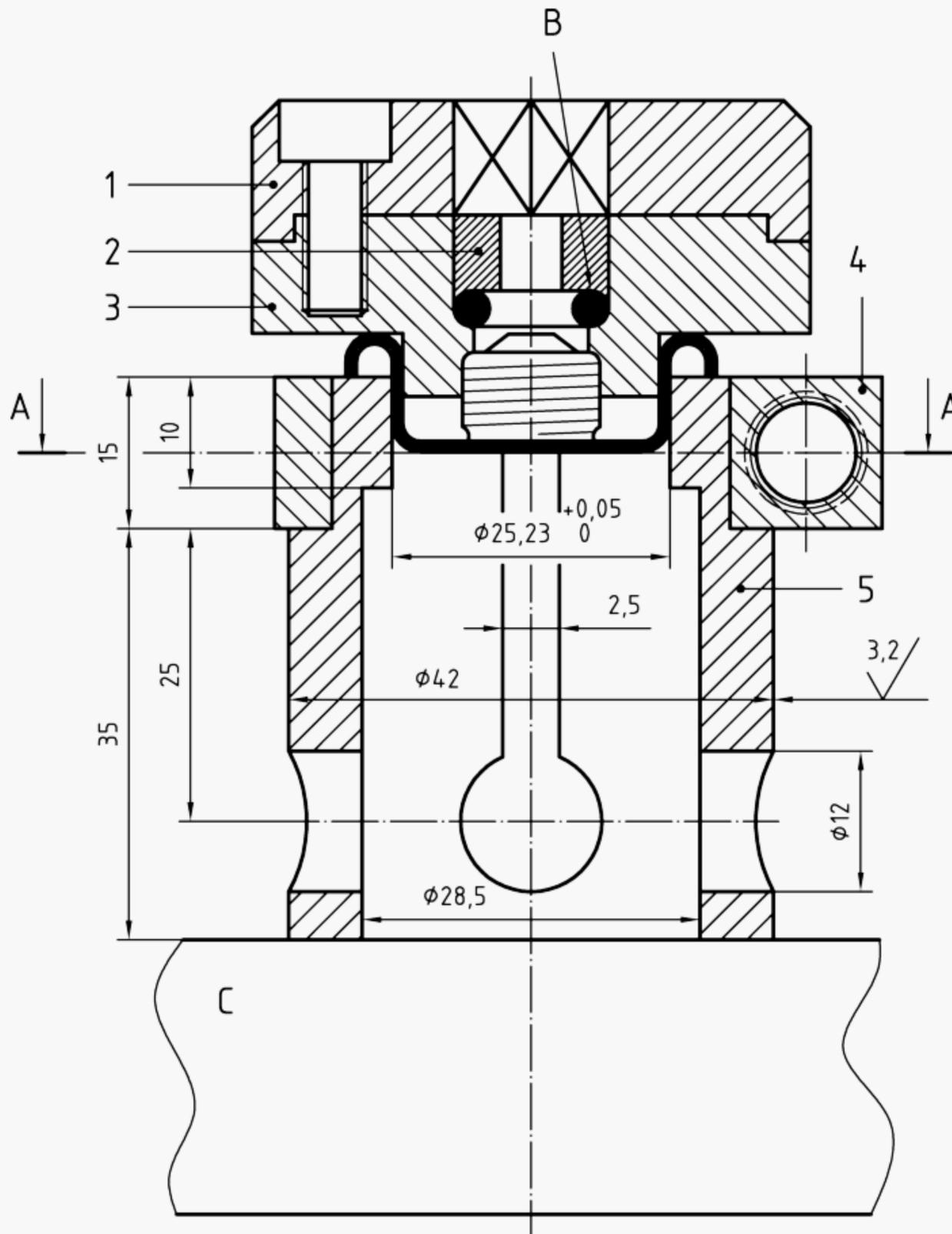
The test is performed on five valves, using the test adaptor and clamping device specified in Figure 5.

Each valve is fitted into the clamping device which is tightened to prevent rotation of the valve.

The test adaptor is screwed onto the valve and tightened to a torque of 15 N·m at a rate of approximately 1 N·m/s.

The valve shall not break.

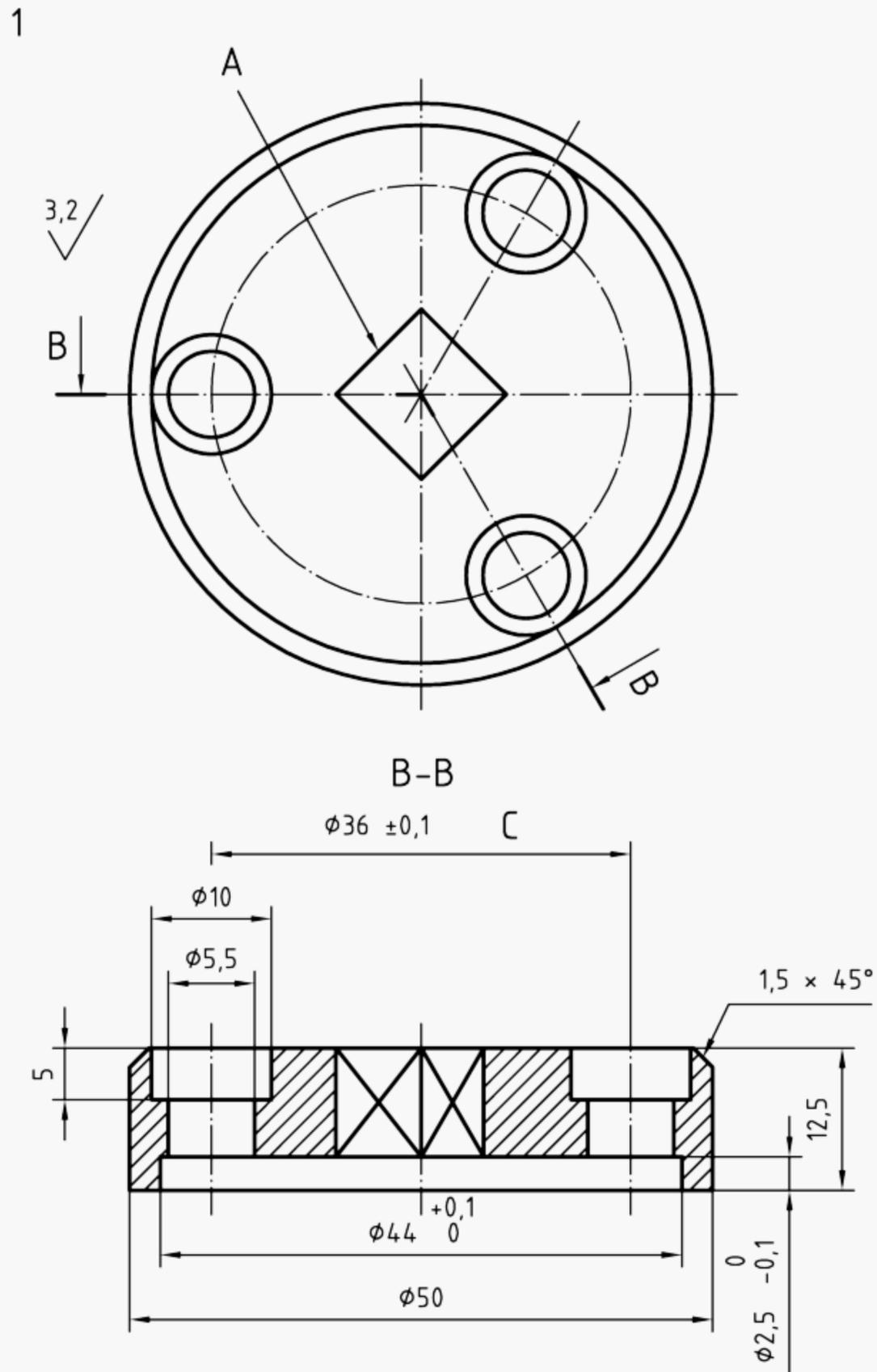
Dimensions in millimetres



**Key**

- B "O" Ring 8 x 3  
Hardness 70°
- C Base

Figure 5 a)



**Key**

- A Square hole to suit torque tool
- C 3 Holes 120°

**Figure 5 b)**



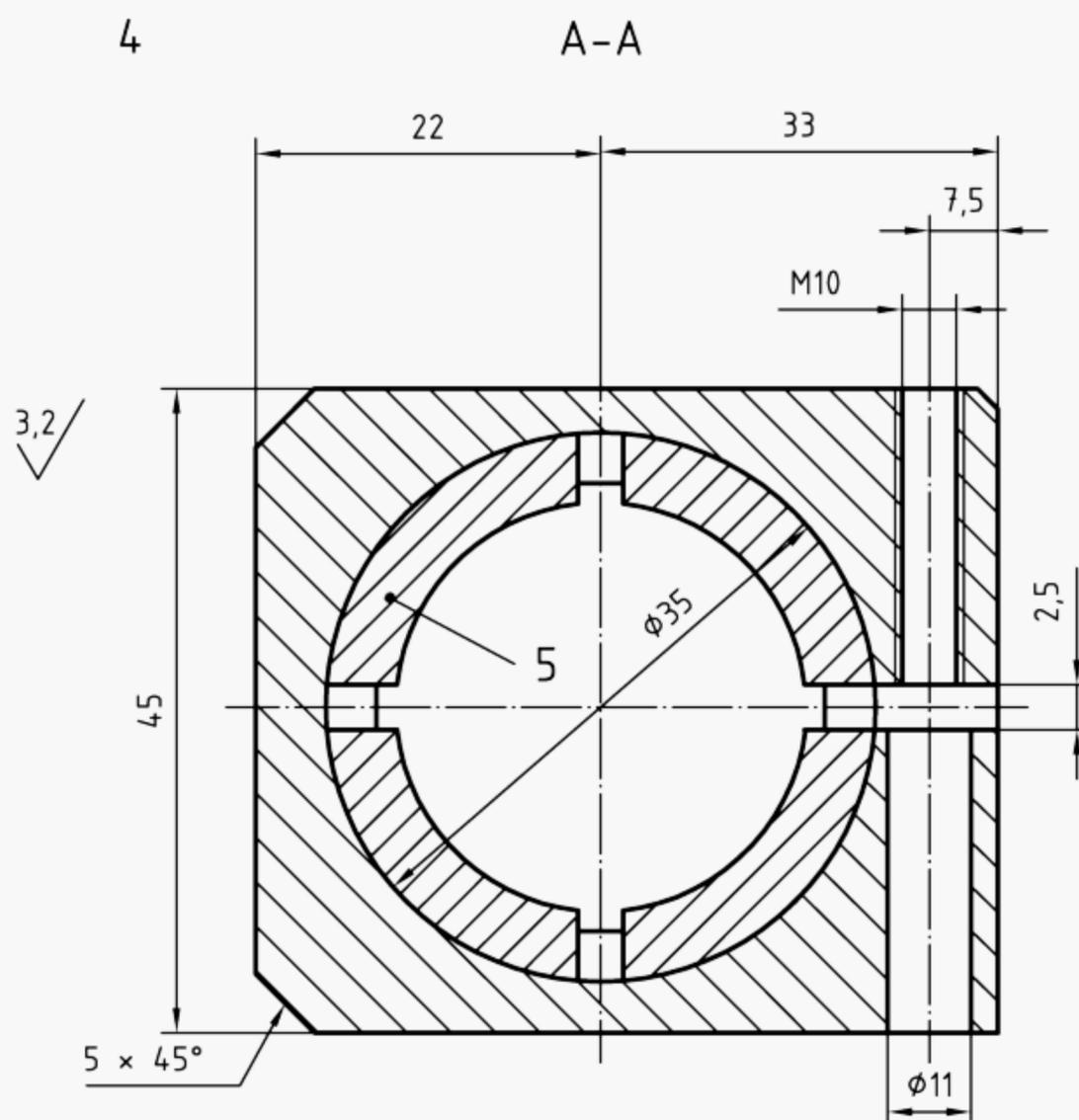


Figure 5 d)

Figure 5 — Test adaptor and clamping device for threaded valve mechanical strength torque test

## 7 Manufacturing and filling tests and examination

### 7.1 General

The following tests and examinations shall be performed in order to ensure the safety of the marketed product.

### 7.2 Tests and inspection performed by the cartridge manufacturer

#### 7.2.1 Material examination

The manufacturer shall ensure that:

- the condition of internal and external surfaces of the walls of the cartridge do not have any defects which may be detrimental to safety;
- the characteristics of the material and the thicknesses of the walls are in accordance with his specifications.

### **7.2.2 Pressure test**

To check that cartridges meet the requirements of 4.2.3, 4.2.4 and 4.2.5, the manufacturer shall carry out tests on samples taken from either:

- one uniform batch of cartridges, i.e. consisting of containers manufactured with the same materials and the same manufacturing process in continuous production for half a day maximum;
- or from a batch constituting hourly production.

Five containers shall be taken from every batch at random and subjected to the test described in clause C.2.

If any one of these containers does not satisfy the test, 10 additional containers shall be taken at random from the same batch and subjected to the test described in clause C.2.

If any one of these containers does not satisfy the test, the entire batch shall be rejected.

If the manufacturer of the cartridge is also the filler then the pressure test shall be carried out only once, after filling.

### **7.3 Test performed by the valve manufacturer**

The test shall be performed in accordance with 6.8 on a random sample of three valves taken from a batch constituting hourly production.

If any valve fails the test, 10 further samples taken from the same batch shall be tested. Any additional failure shall result in rejection of the batch.

Valves used for testing purposes shall be destroyed after the test.

### **7.4 Tests and inspection performed by the filler**

**7.4.1** The cartridge gas charge shall be verified on one cartridge, taken at least every 10 min. If the maximum charge specified in clause 5 is exceeded, the gas charge of each cartridge filled since the last sampling shall be checked to eliminate over-filled cartridges.

**NOTE** The cartridge gas charge may also be verified using the techniques of statistical process control. In order to minimize the quantity of overfilled cartridges, it is recommended to verify the gas charge delivered by each filling head before filling commences. The weighing devices and manometers used in the filling of cartridges should be verified at least once per day.

**7.4.2** The filler shall ensure that threaded centre boss valves comply with the requirements for mechanical strength (see 7.3) either by obtaining documented evidence from the manufacturer or by conducting the test in 6.8 on samples from each consignment of valves.

**7.4.3** Each filled cartridge shall be immersed into a bath of hot water so that the pressure inside the container reaches at least 90 % of the pressure developed by the gas contained at 55 °C.

No leakage or visible deformation shall occur.

Defective cartridges shall be destroyed.

**WARNING** These tests are designed to subject cartridges to relatively high pressures, and to detect gross over-filling. It is essential that adequate precautions should be taken to safeguard operators carrying out these tests.

**7.4.4** In order to check that cartridges meet the requirements of 4.2.3, 4.2.4 and 4.2.5, the filler shall carry out the following tests on samples taken from either:

- a) one uniform batch of cartridges, i.e. filled cartridges of the same design and construction filled in continuous production for half a day maximum; or
- b) a batch constituting hourly production.

Five cartridges shall be taken from every batch at random, emptied of gas, and subjected to the test described in C.2.

If a single one of these cartridges does not satisfy the test, 10 additional cartridges shall be taken at random from the same batch, emptied of gas, and subjected to the test described in clause C.2.

If any one of these cartridges does not satisfy the test, the entire batch shall be rejected.

## **8 Marking**

### **8.1 General**

The markings on cartridges shall be durable, in characters which are easy to read (size, colour) and in the language(s) of the country where they will be marketed.

### **8.2 Marking applicable to all cartridges**

- a) risk, safety phrases and hazard symbol(s) according to the appropriate current regulations;

**NOTE** Since the first edition of this European Standard, a number of Directives relating to the classification, marking and handling of cartridges covered by this standard have come into force, of which users of this standard should be aware.

- b) "protect from direct sunlight";
- c) "do not expose to temperatures exceeding 50 °C";
- d) name or mark of the company responsible for putting the product on the market;
- e) commercial designation and type of the cartridge;
- f) type of gas contained in letters not less than 3 mm high, (for example : butane or butane/propane mixture);
- g) net weight of gas contained in grams;
- h) indication (possibly coded) for identification of the filling batch;
- i) brand and type of the appliance(s) intended to be used exclusively with the cartridge, in the form:  
"this cartridge shall only be used with the XYZ <sup>1)</sup> butane <sup>2)</sup> appliances <sup>3)</sup>";
- j) "this cartridge complies with EN 417", for cartridges complying with this standard;
- k) "follow the instructions for use supplied with the appliance".

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1) For example : brand A, model B.

2) Type of gas corresponding to the gas category of the appliance(s) (butane, or propane, or butane-propane mixture).

3) The designation of a range is possible.

### **8.3 Additional marking for cartridges with valves**

#### **8.3.1 General**

In addition to the markings in 8.2, cartridges with valves shall also be marked with the following:

- **"WARNING: DO NOT REFILL"**;
- "do not puncture/pierce or incinerate, even after use";

and the markings specified in 8.3.2 and 8.3.3 relating to the changing of the cartridge.

#### **8.3.2 Cartridges with threaded centre boss valve**

"Changing the cartridge: perform this operation in a well ventilated area, free from ignition sources. Close the appliance valve. Remove the appliance from the cartridge. Replace the connection seal if it is damaged or lost <sup>4)</sup>. Avoid cross-threading. Screw down hand tight only".

#### **8.3.3 Cartridges with other types of valve**

"Changing the cartridge: perform this operation in a well ventilated area, free from ignition sources. Close the appliance valve. Remove the appliance from the cartridge. Replace the connection seal if it is damaged or lost"

### **8.4 Additional marking for pierceable cartridges**

In addition to the markings in 8.2, pierceable cartridges shall also be marked with the following:

- "changing an empty cartridge: perform this operation in a well ventilated area, free from ignition sources. Close the appliance valve. Ensure that the cartridge is empty (shake for liquid content). Completely unscrew the upper unit <sup>5)</sup>. Replace the connection seal if it is damaged or lost <sup>4)</sup>. Introduce the new cartridge into its support and screw in completely the upper unit <sup>5)</sup>";
- diagram showing how the cartridge is fitted to and removed from the appliance.

### **8.5 Additional marking for cartridges of diameter or height less than 40 mm**

In addition to the markings in 8.2, cartridges of diameter or height less than 40 mm shall be marked with the following:

- "follow all fitting instructions supplied with the appliance";

and, in the case of cartridge with valve:

- **"WARNING: DO NOT REFILL"**;
- "do not puncture/pierce or incinerate, even after use".

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4) This advice is to be indicated only where it is applicable.

5) This sentence can be adapted according to the appliance design.

## 8.6 Optional marking

The following optional markings may appear on the cartridge:

- "store in a cool, dry place";
- "discard in a safe place".

Other markings may be added to the cartridges.

## **Annex A** (informative)

### **Cartridges with valves, mounted in a single layer, threaded centre boss valve cup**

NOTE In order to avoid a sudden change in the rule of operation of EN 417, the CEN/BT/TF 114 decided that specifications related to single layer valves be moved to an informative annex (annex A) and remain in force during a transitional period of five years after the publication of the revised standard.

#### **A.1 General**

The objective of this annex is to define the specification for the valves, mounted in a single layer threaded center boss valve cup (type 3 and 4). See 4.4.1.2.2.

All the specifications of this standard are applicable for this type of valves (manufacturing and filling test, examination, marking, ...), with this following indications:

#### **A.2 Filled cartridges fitted with type 3 valves**

Filled cartridges fitted with type 3 valves should comply with the following:

- a) the valve cup component should be manufactured from a single layer of material;
- b) at no point should the thickness of the valve cup component be less than 0,18 mm nor greater than 0,46 mm.

NOTE Special attention is drawn to the material thickness at the root of the thread.

- c) the requirements specified in 4.4.1.3 c) to l).

#### **A.3 Filled cartridges fitted with type 4 valves**

Filled cartridges fitted with type 4 valves should comply with A.2 a), b) and 4.4.1.3 c).

Dimensions in millimetres

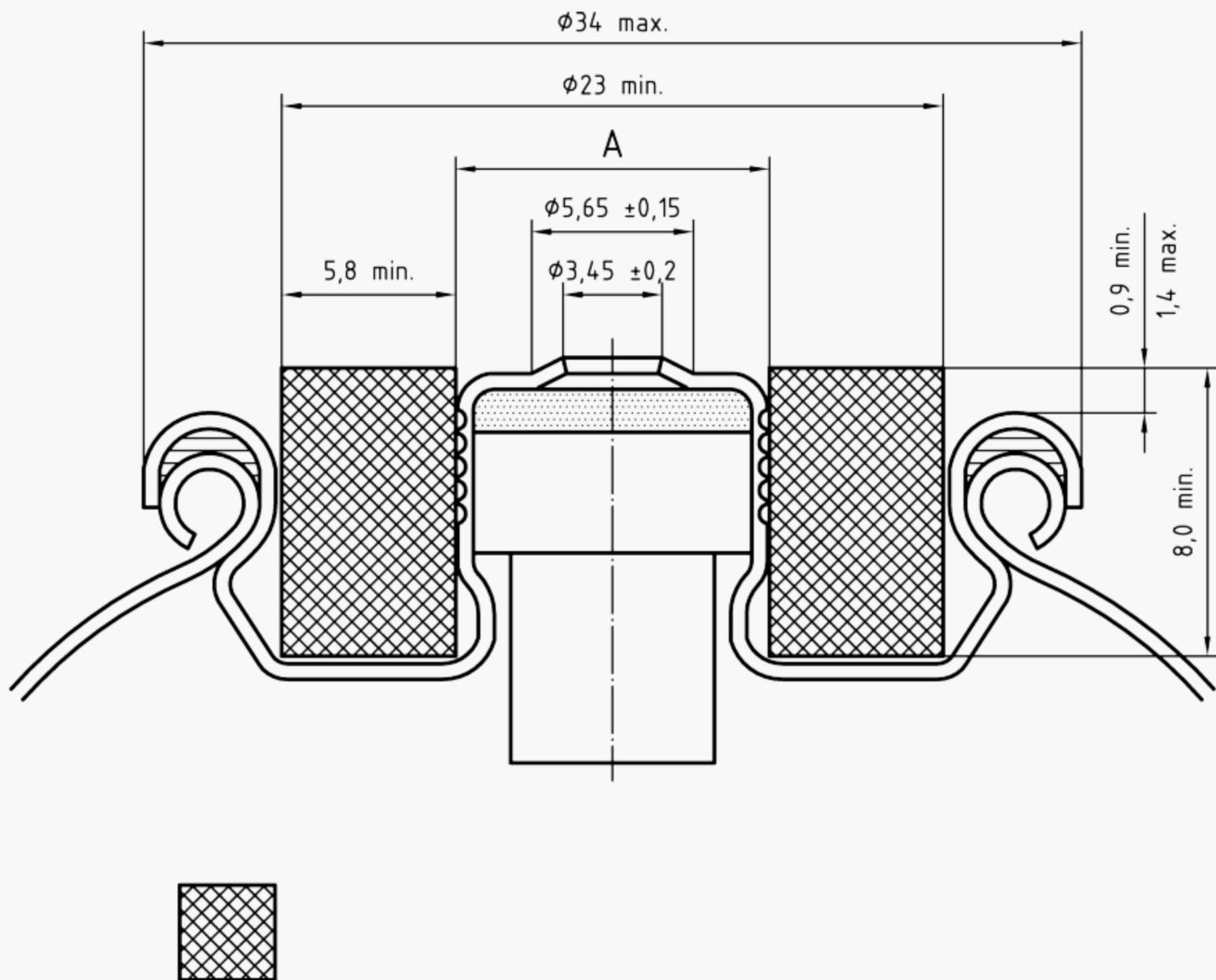
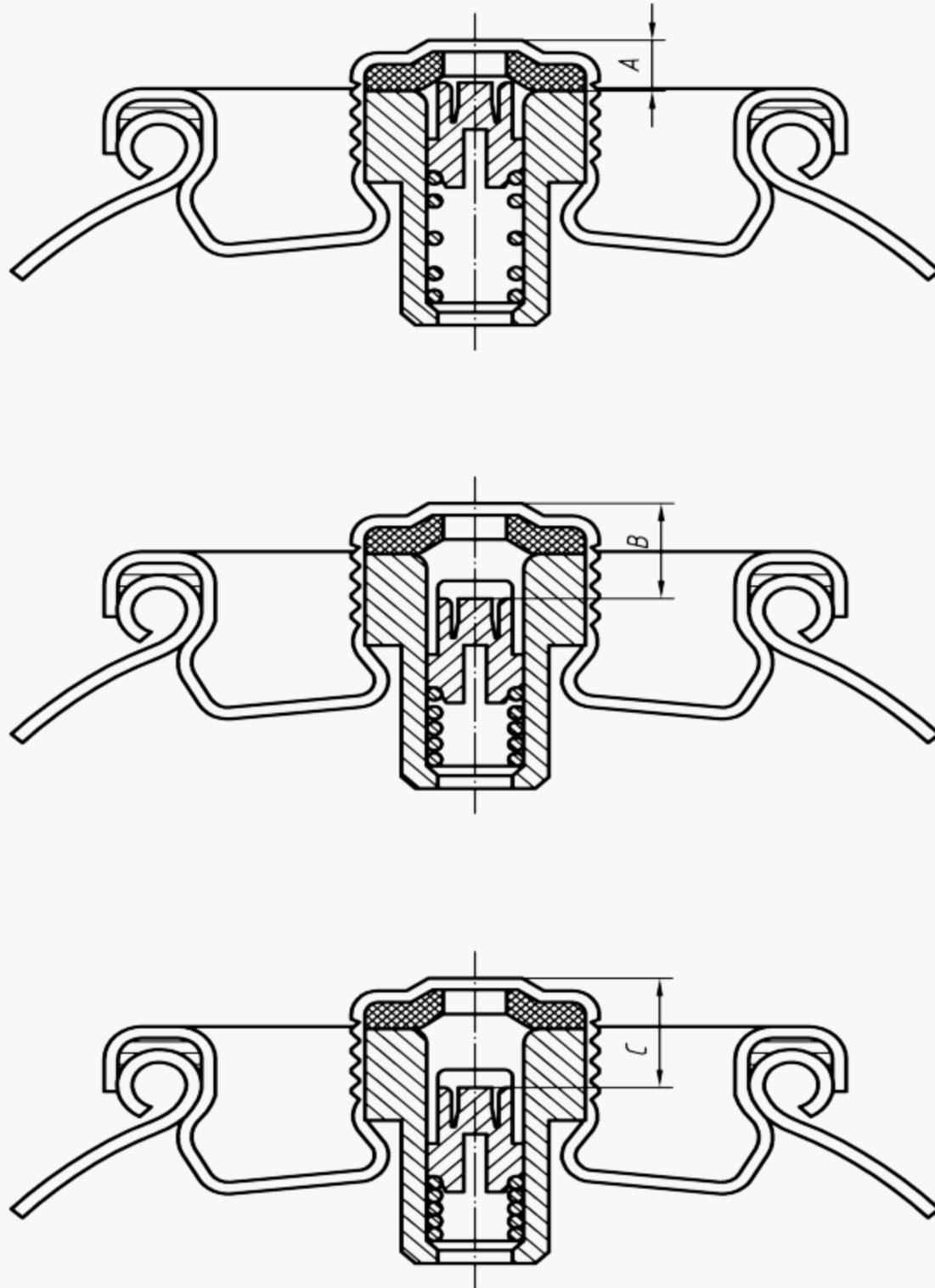


Figure A.1 — Section of a threaded centre boss valve cup (type 3)



a) Valve fully closed

b) Valve fully opened

c) Valve fully depressed

Figure A.2 — Dimensions related to valve opening and closing (type 3)

## **Annex B** (informative)

### **Type testing procedure**

#### **B.1 General**

The objective of this annex is to define a procedure which can be used as a guide by the organizations responsible for issuing type examination certificates.

#### **B.2 Application for type testing**

The application for type testing should comprise:

- assembly drawing of the cartridge, and detailed drawings of its components and marking;
- specification of the materials used, the minimum net capacity, the test pressure, the maximum weight of gases contained, and the maximum pressure developed, by the gas contained at 50 °C;
- description of manufacturing and filling processes for the cartridge and of the controls set up by the manufacturer.

The responsible organization verifies that the type testing application is complete and allows inspection of the manufacturing facilities to be carried out.

#### **B.3 Factory inspection**

The factory inspection comprises:

- the verification of the means of production and filling and of the tests performed during this process, in particular, conformity of materials to the manufacturer's specifications and the tests indicated in clause 7;
- performing the tests described in clause 6.

A certified test report covering these tests and verifications should be issued by the responsible organization and should indicate if the requirements of this standard are met.

## Annex C (normative)

### Pressure strength test on finished cartridges — Test method

#### C.1 Type testing

##### C.1.1 Cartridges with valves

The cartridge is emptied of gas and filled with liquid at  $(20 \pm 5)$  °C through the valve, removing the air contained (for example after machining a hole in the valve seat). A hydraulic pump is then connected to the cartridge through the adaptor of an appliance intended to be used with the cartridge.

A pressure gauge, sensitive to 0,1 bar pressure reached when a pressure drop in the system occurs, is connected to the system. It shall be put under pressure parallel to a pressure recorder.

The cartridge, which is left free, except for the connection to the pump, without any constraint on the walls, is then put under pressure.

The pressure is increased at a rate, not exceeding 1 bar/s.

When the test pressure is reached, this pressure is maintained for 25 s.

The pressure is then increased until the concave base, if there is one, reverses (container of diameter greater than 40 mm) at the same time there is a sudden drop in pressure.

The pressure is increased again until the cartridge leaks or ruptures.

The performance of the cartridge in relation to the requirements of 4.2.3, 4.2.4 and 4.2.5 shall be recorded.

This test is also carried out with the pressure system connected to a hole drilled either in the bottom or in the cylindrical part of the cartridge opposite to the longitudinal joint (if any) in order to check the deformation of the top of the cartridge.

##### C.1.2 Pierceable cartridges

The concave depression at the top of the cartridge is punctured to allow it to be filled with liquid at  $(20 \pm 5)$  °C, removing the air contained.

A hydraulic pump is then connected to the cartridge through the adaptor of an appliance intended to be used with the cartridge. This adaptor modified as appropriate shall allow the greatest surface area of the cartridge to be visible and shall not restrict deformation of the walls.

The hydraulic pressure test is then performed as for the cartridges with valves.

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6) 1 bar :  $10^5$  N/m<sup>2</sup> :  $10^5$  Pa.

## **C.2 Testing during manufacture and filling**

### **C.2.1 Preparation**

#### **C.2.1.1 Cartridges with valves**

When the test is to be carried out by a cartridge manufacturer who is not the filler, i.e. on a cartridge which is not yet closed, the connection to the hydraulic pump circuit is made by a compression joint to the aperture designed for the fitting of the valve.

When the test is carried out by a filler on a cartridge which is closed during the filling process, the cartridge is emptied of gas and the connection to the hydraulic pump circuit is made either by connection to the valve or by a compression joint to a hole punctured opposite any longitudinal seam.

#### **C.2.1.2 Pierceable cartridge**

The cartridge is punctured and connected to the hydraulic pump circuit as described in C.1.2. The assembly of the cartridge to the hydraulic pump circuit shall not restrict any foreseeable deformation of the cartridge.

### **C.2.2 Pressure strength test**

A pressure gauge, sensitive to 0,2 bar, with an indicator capable of retaining the indication of the maximum pressure reached when a pressure drop in the system occurs, is connected to the system. It shall be put under pressure in parallel to a pressure recorder.

The pressure is then increased at a rate between 1 bar/s and 2 bar/s.

NOTE The pressure may be increased without maintaining constant pressure at the test pressure.

The performance of the cartridge in relation to the requirements of 4.2.3, 4.2.4 and 4.2.5 shall be recorded.

## Bibliography

- [1] *Council Directive 75/324/IEC of 20 May 1975 on the approximation of the laws of the Member States relating to aerosol dispensers.*

