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SANS 199:2025

Edition 4

SOUTH AFRICAN NATIONAL STANDARD

Shut-off valves for transportable, refillable liquefied petroleum gas cylinders

WARNING
This document references other documents normatively.

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SANS 199:2025
Edition 4

Table of changes

Change No.	Date	Scope

Foreword

This South African standard was prepared by National Committee SABS/TC 058, *Vessels and systems under pressure*, in accordance with procedures of the South African Bureau of Standards, in compliance with annex 3 of the WTO/TBT agreement.

This document was approved for publication in October 2025.

This document supersedes SANS 199:2016 (edition 3.1).

Annexes A and B form an integral part of this document.

Compliance with this document cannot confer immunity from legal obligations.

Introduction

This South African standard is based on the International Standard ISO 15995, *Gas cylinders – Specifications and testing of LPG cylinder valves – Manually operated* and ISO 14245, *Gas cylinders – Specifications and testing of LPG cylinder valves – Self-closing*.

This standard calls for the use of substances and procedures that can be injurious to health if adequate precautions are not taken. It refers only to technical suitability and does not absolve the user from legal obligations relating to health and safety at any stage.

Contents

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Shut-off valves for transportable, refillable liquefied petroleum gas cylinders

1 Scope

1.1 This standard specifies the requirements for the design, specification and type testing of dedicated liquefied petroleum gas (LPG) cylinder valves specifically for use with transportable refillable LPG cylinders from 0,5 L up to and including 150 L water capacity. It includes references to associated equipment for vapour and or liquid service.

1.2 This standard also applies to dedicated cylinder valves for use with transportable refillable cylinders from 0,5 L up to and including 150 L water capacity in commercial Butane or commercial Propane vapour and or liquid service. It includes references to associated equipment for vapour and or liquid service.

1.3 This standard also applies to dedicated cylinder valves for use with transportable refillable cylinders from 0,5 L up to and including 150 L water capacity in Butane and or Propane vapour and or liquid service. It includes references to associated equipment for vapour and or liquid service.

1.4 This standard does not apply to fixed automotive installations.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies. Information on currently valid national and international standards can be obtained from the South African Bureau of Standards.

EN 12245, *Transportable gas cylinders – Fully wrapped composite cylinders.*

EN 14427, *LPG equipment and accessories – Transportable refillable composite cylinders for LPG – Design and construction.*

EN 15202, *LPG equipment and accessories – Essential operational dimensions for LPG cylinder valve outlet and associated equipment connections.*

ISO 14245:2021, *Gas cylinders – Specifications and testing of LPG cylinder valves – Self-closing.*

ISO 15995:2021, *Gas cylinders – Specifications and testing of LPG cylinder valves – Manually operated.*

SANS 1237, *Single-stage regulators for liquefied petroleum gas (LPG)*.

SANS 1306-1/ISO 228-1, *Pipe threads where pressure-tight joints are not made on the threads – Part 1: Dimensions, tolerances and designation*.

SANS 2859-1, *Sampling procedures for inspection by attributes – Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection*

SANS 10019, *Transportable pressure receptacles for compressed, dissolved and liquefied gases – Basic design, manufacture, use and maintenance*.

3 Terms and definitions

For the purposes of this document, the terms and definitions in ISO 15995 and ISO 14245 apply with the exception of the following.

3.1
clip-on valve
valve that is equivalent of a LPG self-closing cylinder valve (see ISO 14245)

3.2
liquefied petroleum gas
LPG
mixture primarily composed of commercial butane (butane stenched with ethyl mercaptan) and commercial propane (propane stenched with ethyl mercaptan) with traces of other hydrocarbon gases
[SANS 1774]

NOTE 1 This mixture is classified under UN number 1965 and UN number 1075.

NOTE 2 In some countries, UN number 1011 and UN number 1978 may also be used to designate LPG.

3.3
manually operated cylinder valve
valve that is equivalent of a LPG manually operated cylinder valve
[ISO 15995]

3.4
pressure relief valve
valve that is held closed by a spring and actuated by pressure, designed to automatically relieve excess pressure by opening when the set pressure is reached and reclosing once the pressure drops below the set point

3.5
special valve
valve which is only used for cylinders up to and including 20 L water capacity, having a wheel diameter less than 30 mm, and where the maximum section of gas is not more than 4 mm diameter

4 Requirements

4.1 General

In addition to the requirements given in ISO 15995 and ISO 14245, the requirements in 4.2 to 4.5 (inclusive) shall apply.

4.2 Valve outlet and inlet (stem) threads for manually operated cylinder valves

4.2.1 Valve outlets shall comply with the requirements specified in table 1.

4.2.2 Valves with a G ⅜ RH outlet thread, in accordance with SANS 1306-1, shall not be fitted to cylinders with a water capacity that exceeds 20 L.

4.2.3 Valves with a G ⅝ LH outlet, in accordance with SANS 1306-1, shall not be fitted to cylinders with a water capacity less than 20 L. Outlet connections for butane, LPG, and propane shall be as specified in table 1.

4.2.4 Valves with a ¾ NGT inlet shall not be fitted to cylinders with a water capacity less than or equal to 20 L.

4.2.5 Valves with a ½ NGT inlet shall not be fitted to cylinders with a water capacity exceeding 20 L.

4.2.6 Valves with M26 × 1,5 inlet may be fitted to composite cylinders manufactured in accordance with EN 12245 or EN 14427 (or both).

4.2.7 Valve outlets for composite cylinders shall comply with the requirements given in 4.2.1 to 4.2.6 (inclusive).

Table 1 — Sizes of inlet and outlet connections for manually operated cylinder valves

1	2	3
Type of valve	**Type and size**	
	Inlet connection	**Outlet connection**[a]
Liquid withdrawal	¾ – 14 NGT	⅜ SAE (flare) male
Vapour withdrawal	¾ – 14 NGT	G ⅝ (BSP) F (L/H)
	½ – 14 NGT	G ⅜ (BSP) F (R/H)
Liquid withdrawal forklift	¾ – 14 NGT	1¼ Acme
Composite cylinders with metallic liners	In accordance with the inlet connections for the listed valves	In accordance with the outlet connections for the listed valves
Composite cylinders with non-metallic liners	M26 × 1,5 plus O-ring Dia 16 × 3	G ⅝ (BSP) F (L/H) G ⅜ (BSP) F (R/H)
NOTE 1 Dimensional details of NGT threads are given in CGA V-1. NOTE 2 Dimensional details on M 26 × 1,5 inlet connections are given in SANS 1700-2-4. NOTE 3 Dimensional details on O-rings and O-ring grooves are given in ISO 3601-1 and ISO 3601-2 respectively. NOTE 4 Use O-ring Dia 16 × 3, material NBR (Nitrile Buna-N Rubber), shore A hardness 70.		
[a] See figures 1, 2, 3, and 4.		

4.2.8 Strength requirements for valves with internally threaded outlets

4.2.8.1 A strength test shall be carried out as specified in 5.3.

4.2.8.2 The valve body/outlet shall have no visible deformation, distortion, or cracking.

4.3 Valve outlet and inlet (stem) threads for clip-on valves

4.3.1 The valve outlet shall comply with the requirements in table 2.

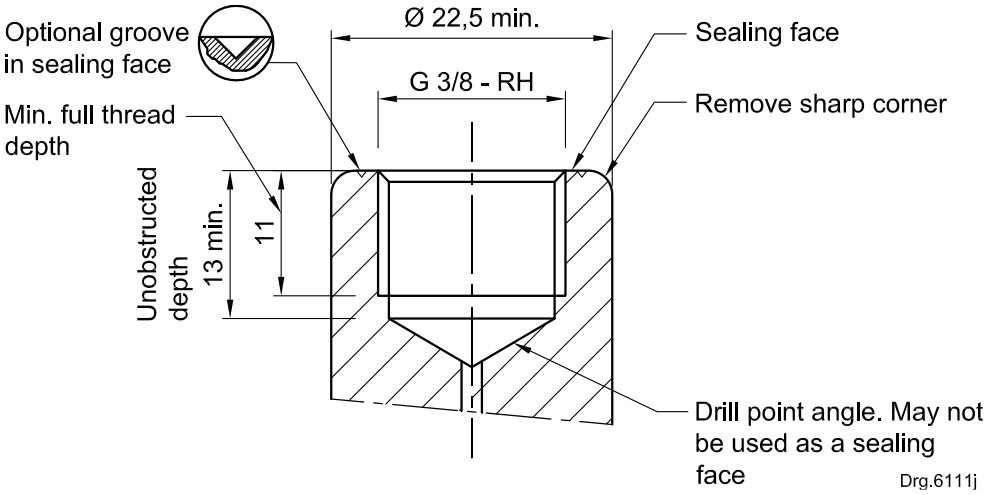
4.3.2 Valves with a type G54 quick coupling outlet, diameter 22 in accordance with EN 15202, shall only be fitted to cylinders with water capacity greater than 20 L and less than 46 L.

4.3.3 Clip-on valves shall not be fitted to cylinders less than 20 L and greater than 46 L water capacity.

Table 2 — Sizes of inlet and outlet connections for clip-on valves

1	2	3
Type of valve	**Type and size**	
	Inlet connection	**Outlet connection**[a]
Vapour withdrawal	¾ – 14 NGT	Type G54 quick coupling diameter 22
Composite cylinders with metallic liners	In accordance with the inlet connections for the listed valves	In accordance with the outlet connections for the listed valves
Composite cylinders with non-metallic liners	M26 × 1,5 plus O-ring Dia 16 × 3	Type G54 quick coupling diameter 22
NOTE 1 Dimensional details of NGT threads are given in CGA V-1. NOTE 2 Dimensional details on M 26 × 1,5 inlet connections are given in SANS 1700-2-4. NOTE 3 Dimensional details on O-rings and O-ring grooves are given in ISO 3601-1 and ISO 3601-2 respectively. NOTE 4 Use O-ring Dia 16 × 3, material NBR (Nitrile Buna-N Rubber), shore A hardness 70. NOTE 5 Type G54-Quick coupling- Diameter 22 complies to EN 15202.		
[a] See figure 5.		

Dimensions in millimetres



NOTE 1 Dimensional details of the G ⅜ thread are given in SANS 1306-1.

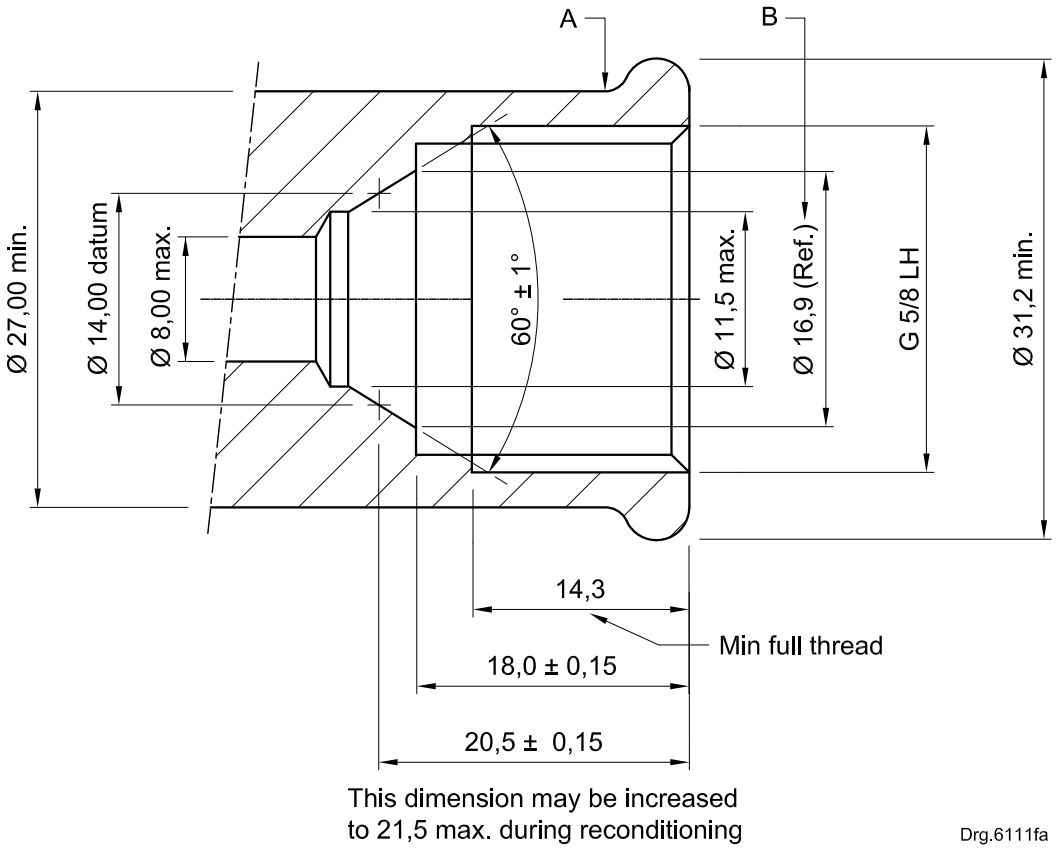
NOTE 2 The tolerances applicable to internal threads are given in SANS 1306-1.

NOTE 3 "Class of fit" given in SANS 1306-1 is only applicable to male threads.

NOTE 4 This outlet connection is only for use with "special valves" (see 3.5).

Figure 1 — G ⅜ Valve outlet connection

Dimensions in millimetres



Dimensions

A The reduction of the outside diameter as shown on this drawing is at the manufacturer's discretion. If applied, the profile of the resultant nose is undefined. If the reduction is not applied, the minimum outside diameter shall be 31,2 mm.

B This dimension is a calculated reference taken from the 14,0 mm diameter datum and its stated nominal position.

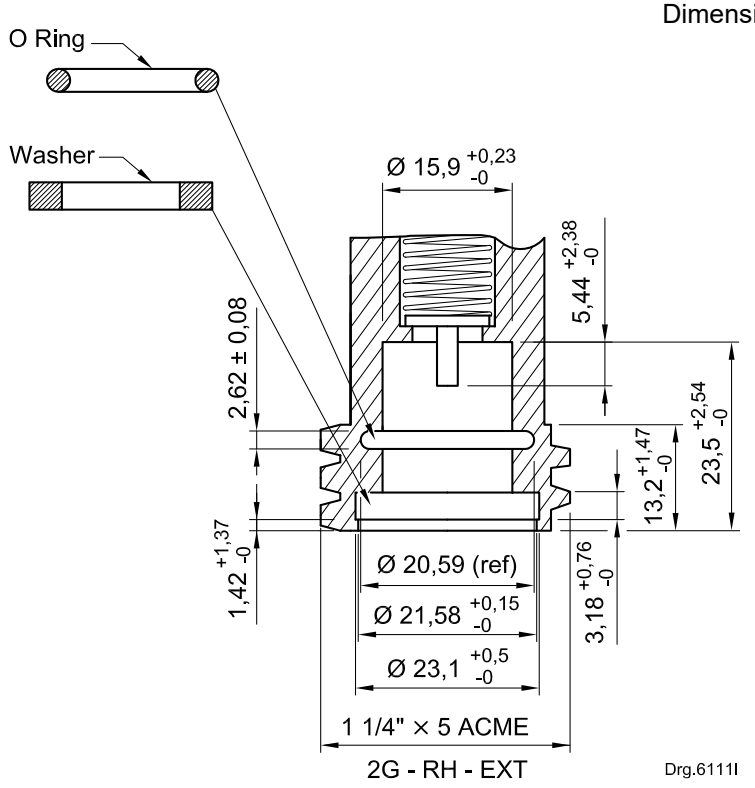
NOTE 1 Dimensional details of the G ⅝ thread are given in SANS 1306-1.

NOTE 2 The tolerances applicable to internal threads are given in SANS 1306-1.

NOTE 3 "Class of fit" given in SANS 1306-1 is only applicable to male threads.

Figure 2 — G ⅝ Bull nose valve outlet connection

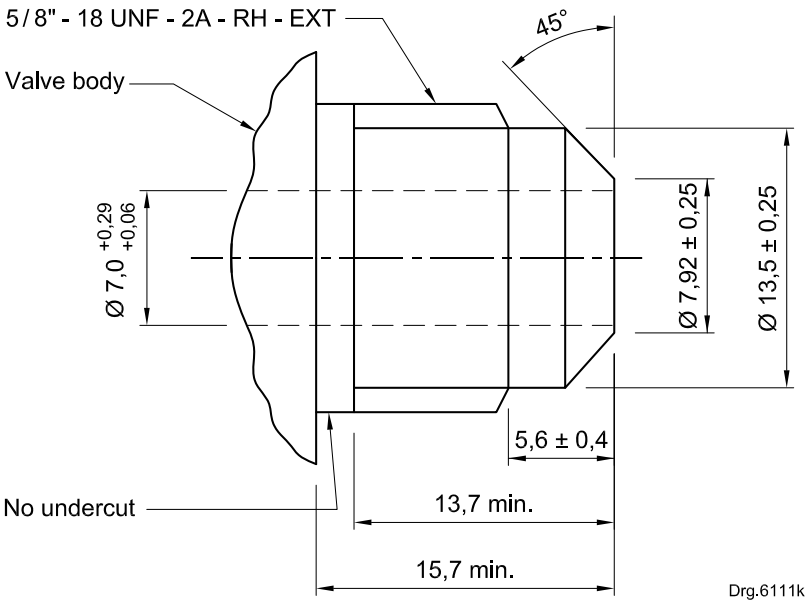
Dimensions in millimetres



NOTE For manufacturing details see CGA V-1 connection No. 790.

Figure 3 — ACME connections — Liquid withdrawal forklift

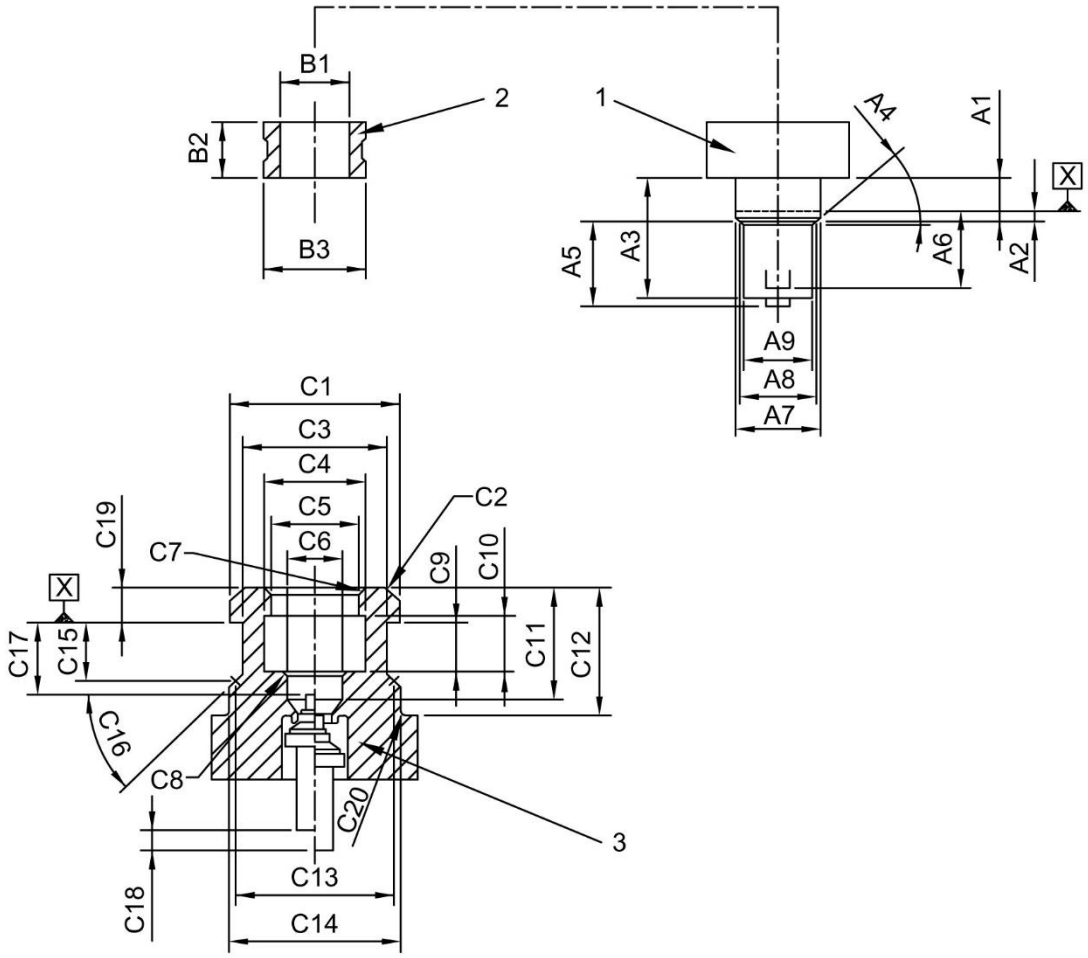
Dimensions in millimetres



NOTE For manufacturing details see CGA V-1 connection No. 182.

Figure 4 — 3/8″ SAE Flare connection

Dimensions in millimetres



Key
1 connector
2 seal
3 valve
x datum

Connector		Seal		Valve			
A1	5,6 – 6,0	B1	Ø 9,65 - Ø 9,75	C1	Ø 21,9 - Ø 22,1	C11	15,1 min
A2	1,8 – 2,2	B2	7,1 – 7,3	C2	Ø 18,7 - Ø 19,1 x 45°	C12	16,1 min
A3	13 – 15	B3	Ø 14,2 - Ø 14,35	C3	Ø 18,25 - Ø 18,55	C13	Ø 20,0 ref. C15
A4	29° - 31°	Material shall be: a) NBR or equivalent; or b) EN 549 A2/H3		C4	Ø 14,1 - Ø 14,4	C14	Ø 22,0 - Ø 22,15
A5	10,025 max			C5	Ø 12,45 - Ø 12,6	C15	6,9 – 7,2
A6	6,25 max			C6	Ø 9,05 - Ø 9,15	C16	44° - 46°
A7	Ø 12,3 - Ø 12,4			C7	0,6 – 1,0 x 45°	C17	8,9 – 9,5
A8	Ø 9,8 ref. A2			C8	0,3 – 0,6 x 45°	C18	2,65 min
A9	Ø 8,5 - Ø 9,0			C9	7,1 – 7,3	C19	3,4 – 3,6
				C10	7,1 – 7,4	C20	R 0,5 – R 0,8

Drg.1153

Figure 5 — Type G54 quick coupling Diameter 22 (C14)

4.4 Pressure relief valve

Pressure relief valves shall be fitted to valves in accordance with the requirements of SANS 10019 and shall comply with the following:

a) the inlet of the valve shall be so arranged that it will have direct communication with the vapour portion only of the shut-off valve of which it forms part;

b) the valve shall be tamper-proof and shall form an integral part of the shut-off valve or shall be so designed that there is no projection beyond the valve body, and the components of the relief valve shall be copper alloys and the spring shall be stainless steel;

c) the flow rating pressure shall not exceed 1,25 times the test pressure of the cylinder for which the valve is intended;

d) the set pressure shall be 2 580 or 2600 kPa (gauge);

e) when tested in accordance with 5.4.1,

   1) the start-to-discharge pressure shall be not less than 95 % and not more than 120 % of the set pressure, and

   2) the closing pressure shall be at least 90 % of the start-to-discharge pressure.

f) when tested in accordance with 5.4.2, the discharge capacity in standard cubic metres per minute, at an inlet pressure equal to the flow rating pressure of the pressure relief device, shall be at least the relevant value given by the following formula:

$$Q = 2{,}75 \times 10^{-5}\, P\, W_c$$

where

Q is the discharge capacity, in cubic metres per minute (m^3/min);

P is the flow rating pressure, in kilopascals (kPa);

W_c is the water capacity of the cylinder, in kilograms (kg);

NOTE 1 For cylinders less than 8kg W_c = water capacity of 8 kg cylinder.

NOTE 2 For cylinders between 9kg and 50 kg W_c = water capacity of 50 kg cylinder.

NOTE 3 For cylinders greater than 50 kg W_c = water capacity of the specific cylinder (dumpy tanks).

g) when tested in accordance with 5.4.3, there shall be no sign of leakage or failure of mechanical parts.

4.5 Bleed valve or bleed screw

4.5.1 A bleed valve or a bleed screw shall not be included as an integral part of a valve.

4.5.2 A bleed valve or a bleed screw shall not be included in a cylinder as a separate component.

5 Valve type tests

5.1 General

The tests in table 3 are required in addition to the tests specified in table 1 of ISO 15995:2021 and in table 1 of ISO 14245:2021.

Table 3 — Valve test conditions

1	2	3	4	5
Test details	**Subclause**	**Condition of test valve/Test sequence**	**Temperature at which the test is performed**	**Valve sample number relates to the respective ISO standard**
Valve closure with sealing element removed Applies to valves compliant to ISO 15995	5.2	Conduct this test immediately after the first External and Internal Leak tightness test	Room temperature	1
Strength test for valves with internally threaded outlet Applies only to valves compliant to ISO 15995 This test is Not applicable to valves compliant to ISO 14245	5.3	Use valves from the last External and Internal Leak tightness test	Room temperature	9 to 13
Relief valve Applies to valves compliant to ISO 15995 and ISO 14245	5.4	Complete this test before completing the Hydraulic pressure test	Room temperature	1
NOTE Room temperature means typically between 15 °C and 30 °C.				

5.2 Valve closure test with sealing element removed

5.2.1 If test number 2 from table 1 of ISO 15995:2021 is satisfactory, examine the valve to determine if there is metal-to-metal contact between the valve body and the operating mechanism with the sealing element removed.

5.2.2 There shall be sufficient travel distance for the operating mechanism so that the seal housing makes contact with the seat.

5.3 Strength test for internally threaded valve boss

5.3.1 Use valves from the last external and internal leak tightness test.

5.3.2 Secure the valve body in a vice. Screw the connection piece (complete with metal bullnose in accordance with type A in SANS 1237, where applicable) into the outlet of the valve body and tighten the connection piece to a torque in accordance with table 4.

5.3.3 After a period of 1 min, inspect the valve outlet externally. Thereafter remove the connection piece and bullnose and inspect the valve outlet internally.

Table 4 — Torque values

1	2
Valve outlet size	**Torque** Nm
G ⅝ (BSP) LH	125
G ⅜ (BSP) RH	50

5.3.4 The valve shall comply with the requirements in 4.2.8.

5.4 Test for pressure relief valve

5.4.1 Procedure valve start to discharge and closing pressure

5.4.1.1 Use the valve that will be used for the hydraulic pressure test.

5.4.1.2 Connect the inlet of the cylinder valve number 1 to an air supply and, with the cylinder valve closed, slowly increase the inlet pressure. Record the pressure at which the relief device starts to discharge. Slowly decrease the inlet pressure and record the pressure at which the valve closes.

5.4.1.3 Check for compliance with the requirements of 4.4(e).

5.4.2 Procedure discharge rate

5.4.2.1 With the cylinder valve number 1 connected as in 5.4.1, increase the inlet pressure to the relevant flow rating pressure and measure the rate of airflow from the pressure relief valve.

5.4.2.2 Check for compliance with the requirements of 4.4(f).

5.4.3 Procedure endurance test

5.4.3.1 With the cylinder valve number 1 connected as in 5.4.1, cause the pressure relief valve to operate (alternatively opening and closing) at a rate of not more than five (5) cycles per minute. After completion of fifty (50) cycles, decrease the pressure to 50 % of the test pressure of the cylinder for which the valve is intended and inspect for leakage. Release the pressure and inspect the valve for any failures.

5.4.3.2 Check for compliance with the requirements of 4.4(g).

6 Marking

In addition to the requirements given in ISO 15995 and ISO 14245, the following shall apply:

a) the inlet stem thread type, for example ¾-NGT;

b) the safety valve discharge capacity in cubic metres per minute (m^3/min) (air) and the set pressure in kilopascals (kPa); and

c) the manufacturer's model number.

7 Handwheel fire exposure test (for valves manufactured in South Africa)

The handwheel fire exposure test shall be conducted in accordance with the requirements specified in annex A.

8 Batch tests (for valves manufactured in South Africa)

The production testing and inspection shall be carried out in accordance with the requirements specified in annex B.

Annex A
(normative)

Handwheel fire exposure test (for valves manufactured in South Africa)

NOTE This test is not applicable to clip-on valves.

A1 Apparatus

A.1.1 **Flame blow tube**, that is manufactured in accordance with figure A.1.

A.1.2 **Gas**, that is commercially available propane.

A.1.3 **Temperature measuring device**, capable of measuring temperatures in the range of 700 °C to 1 200 °C to an accuracy of ± 10 °C.

A.1.4 **Pressure measuring device**, capable of measuring in the range of 5 kPa to 15 kPa at an accuracy of ± 0,2 kPa.

A.2 Procedure

Subject valve number 3 (see table 1 of ISO 15995:2021) to this test in accordance with the following procedure for 1 cycle:

a) set the valve handwheel in the half open position;

b) ignite and adjust the flame to achieve a supply pressure of 10 kPa ± 1 kPa, and a flame temperature of between 800 °C and 1 000 °C measured at 15 cm from the tip of the flame blow tube;

c) place the valve handwheel, while fitted to the valve, at 15 cm from the tip of the blow tube, in the flame.

d) ensure that the valve handwheel is fully engulfed in the flame;

e) after 1 min (+5/0 s) remove the flame from the handwheel; and

f) within 1 min from removing the flame, ensure that the complete sample is doused with water to cool it sufficiently so it can be handled with a bare hand without discomfort.

A.3 Requirement

The valve shall still be capable of being closed manually after cooling.

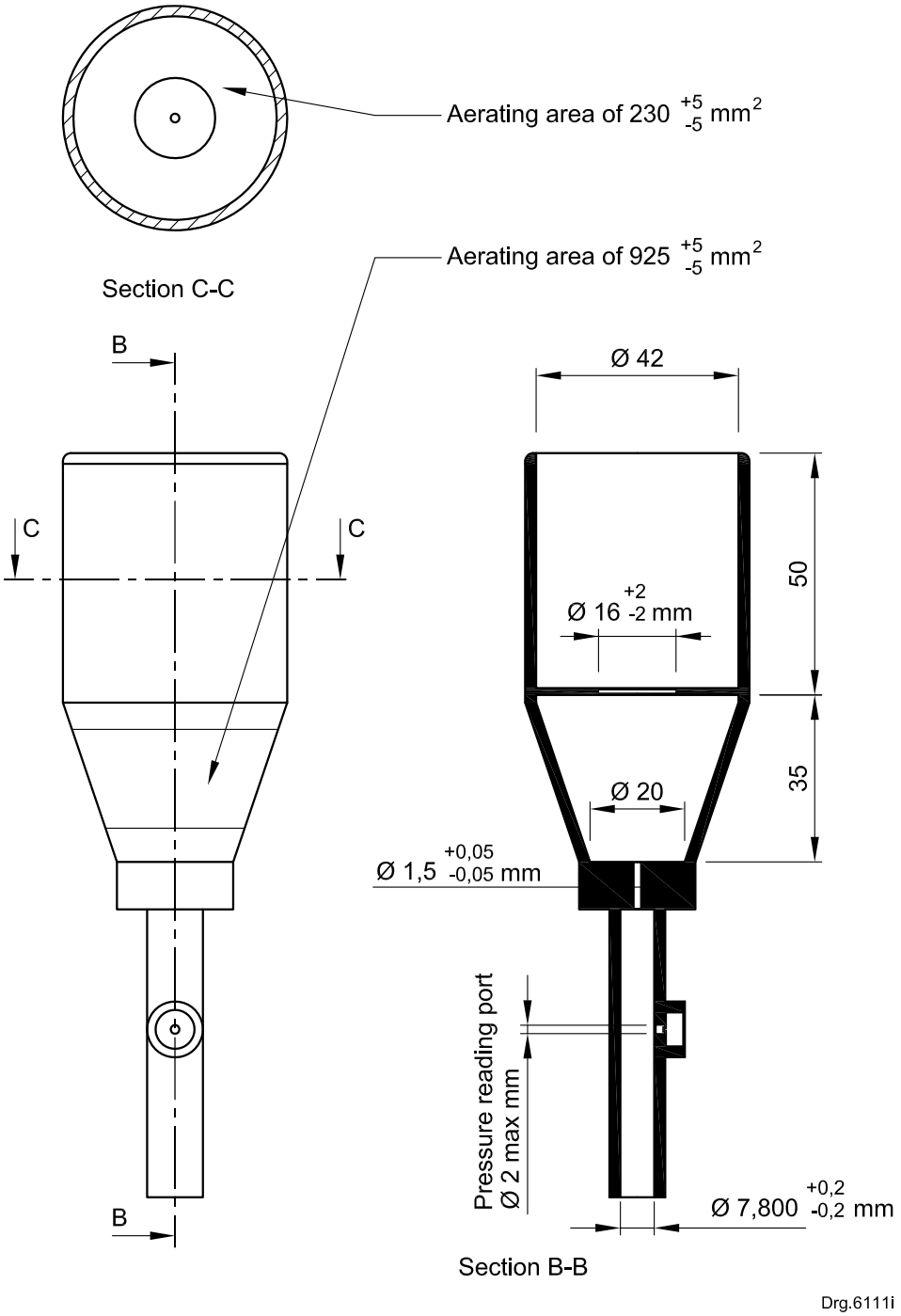


Figure A.1 — Flame blow pipe/tube

Annex B
(normative)

Production testing and inspection (for valves manufactured in South Africa)

B.1 The manufacturer shall implement a conformity assessment procedure to ensure that the quality and performance of the manufactured valves comply with the quality and performance of the valves subjected to and approved by type tests.

B.2 Every valve shall be tested for the following:

a) external and internal tightness.

b) Each pressure relief device shall be adjusted so that the start-to-discharge pressure is at the nominal set pressure.

c) There shall be no leak at any inlet pressure less than the re-seat pressure.

d) Excess flow devices shall, when applicable, be tested to verify the required flow rates and operations.

B.3 Batch samples shall be taken in accordance with SANS 2859-1 or any other acceptable sampling plan, and the following tests and inspections shall be carried out:

a) an external tightness test;

b) an internal tightness test;

c) dimensional verification;

d) an inspection for material suitability; and

e) an inspection for marking.

B.4 The rejection criteria shall be applied as follows:

a) valves that do not comply with the requirements of B.2 shall be rejected; and

b) batches of valves that do not comply with the requirements of B.3 shall follow the rejection criteria of SANS 2859-1 or as defined in the manufacturer’s sampling plan.

B.5 Results of production testing shall be recorded and retained.

Bibliography

CGA V-1, *Standard for compressed gas cylinder valve outlet and inlet connections*.

EN 549, *Rubber materials for seals and diaphragms for gas appliances and gas equipment*.

EN 13175, *LPG equipment and accessories – Specification and testing for liquefied petroleum gas (LPG) pressure vessel valves and fittings*.

ISO 3601-1, *Fluid power systems – O-rings – Part 1: Inside diameters, cross-sections, tolerances and designation codes.*

ISO 3601-2, *Fluid power systems – O-rings – Part 2: Housing dimensions for general applications.*

ISO 13341, *Gas cylinders – Fitting of valves to gas cylinders*.

SANS 1700-2-4/ISO 724, *Fasteners – Part 2: Screw threads – Section 4: ISO general-purpose metric screw threads – Basic dimensions.*

SANS 1774, *Liquefied petroleum gases*.

SANS 10297, *The reconditioning of external LPG cylinder valves*.