ISBN 978-0-626-44360-3

SANS 1539:2026

Edition 6

SOUTH AFRICAN NATIONAL STANDARD

Appliances operating on liquefied petroleum gas (LPG) or natural gas (NG) — Safety aspects

WARNING
This document references other documents normatively.

Published by the South African Bureau of Standards
1 Dr Lategan Road Groenkloof ✉ Private Bag X191 Pretoria 0001
Tel: +27 12 428 7911 Fax: +27 12 344 1568
www.sabs.co.za

SABS

This page has been left blank intentionally

COPYRIGHT PROTECTED DOCUMENT

SABS – Standards Division

The objective of the SABS Standards Division is to develop, promote and maintain South African National Standards. This objective is incorporated in the Standards Act, 2008 (Act No. 8 of 2008).

The SABS continuously strives to improve the quality of its products and services and would therefore be grateful if anyone finding an inaccuracy or ambiguity while using this standard would inform the secretary of the technical committee responsible, the identity of which can be found in the foreword.

Buying Standards

Contact the Sales Office for South African and international standards, which are available in both electronic and hard copy format. Tel: +27 (0) 12 428 6883 email: sales@sabs.co.za

South African National Standards are also available online from the SABS Webstore www.store.sabs.co.za

Information on Standards

SABS Customer Services provide comprehensive standards-related information on national, regional and international standards. Tel: +27 (0) 12 428 7911 / 0861 27 7227 email: info@sabs.co.za

SANS 1539:2026
Edition 6

Table of changes

Change No.	Date	Scope

Foreword

This South African standard was prepared by National Committee SABS/TC 1019, *Gas supply, handling and control (fuel, industrial and medical gases)*, 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 April 2026.

This document supersedes SANS 1539:2012 (edition 5).

This document is referenced in the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993).

Annexes A, B, and C form an integral part of this document. Annex D is for information only.

Compliance with this document cannot confer immunity from legal obligations.

Contents

This page is intentionally left blank

Appliances operating on liquefied petroleum gas (LPG), natural gas (NG) and biogas — Safety aspects

1 Scope

1.1 This standard covers the safety aspects of appliances that operate on liquefied petroleum gas (LPG), natural gas (NG), or biogas at a consumption rate not exceeding 10 kg/h for appliances operating on LPG and 500 MJ/h (140 kWh) for appliances operating on NG and biogas.

1.2 This standard also covers appliances where the gas supply is direct from a non-refillable cartridge.

2 Normative references

The following referenced documents, in whole or in part, 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.

2.1 Standards

AS 1869, *Hose and hose assemblies for liquefied petroleum gases (LP gas), natural gas and town gas.*

EN 30-1-1, *Domestic cooking appliances burning gas – Part 1-1: Safety – General.*

EN 417, *Non-refillable metallic gas cartridges for liquefied petroleum gases, with or without a valve, for use with portable appliances – Construction, inspection, testing and marking*.

EN 14800, *Corrugated safety metal hose assemblies for the connection of domestic appliances using gaseous fuels.*

EN 16436-1, *Rubber and plastics hoses, tubing and assemblies for use with propane and butane and their mixtures in the vapour phase – Part 1: Hoses and tubings.*

ISO 10380, *Pipework – Corrugated metal hoses and hose assemblies*.

SANS 198, *Functional-control valves and safety valves for domestic hot and cold water supply systems.*

SANS 199, *Shut-off valves for transportable, refillable liquefied petroleum gas cylinders*.

SANS 827, *The installation of pipes and appliances for use with natural gas*.

SANS 1156-2, *Hose for natural gas and liquefied petroleum gas (LPG) – Part 2: Hose and tubing for use in natural gas and liquefied petroleum gas vapour phase*.

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 50331/EN 331, *Manually operated ball valves and closed bottom taper plug valves for gas installations for buildings.*

SANS 6509/ISO 6509, *Corrosion of metals and alloys – Determination of dezincification resistance of brass.*

SANS 9227/ISO 9227, *Corrosion tests in artificial atmospheres – Salt spray tests.*

SANS 10087-1, *The handling, storage, distribution and maintenance of liquefied petroleum gas in domestic, commercial, and industrial installations – Part 1: Liquefied petroleum gas installations involving gas storage containers of individual water capacity not exceeding 500 L and a combined water capacity not exceeding 3 000 L per installation*.

SANS 60335-1/IEC 60335-1, *Household and similar electrical appliances – Safety – Part 1: General requirements*.

UNI 11353, *Stainless steel corrugated flexible safety hose assemblies for the connection of gas appliances for domestic and similar uses – safety requirements.*

2.2 Other publications

DOT 39, *Disposable cylinders*.

3 Definitions

For the purposes of this document, the following definitions apply.

3.1
acceptable
acceptable to the accredited facility confirming compliance to the standard

3.2
appliance
gas unit that uses liquefied petroleum gas, natural gas or biogas as an energy source

3.2.1
appliances for indoor
appliances intended to be used within a building where natural ventilation can be restricted

3.2.2
appliances for outdoor
appliances intended to be used in open air, or outside a building or shelter where natural ventilation cannot be restricted

3.3
biogas
methane rich gas produced as a result of anaerobic digestion of suitable organic substrate

3.4
boiling table
freestanding cooking appliance with fixed, removable or folding legs for use on a table, worktop or directly on the floor, incorporating one or more burners with fixed pan supports which are a part of the frame of the appliance

3.5
burn-back
phenomenon characterized by the return of the flame inside the body of the burner

3.6
burner
typically, a component or functional unit that allows the gas to burn to fulfil a thermal function for cooking, heating, or lighting purposes

NOTE Burners normally consists of a gas injector; a body forming the mixing tube and a head equipped with ports for the air-gas mixture.

3.7
combustion circuit
circuit within instantaneous water heaters, comprising the air supply circuit, combustion chamber, heat exchanger' and combustion products circuit up to and including the deflector or flue outlet as applicable to the appliance type

3.8
combustion products discharge safety device
flue sensor
heat or other sensing device that shuts down the appliance in the event of an unacceptable spillage of combustion products from the draught diverter of an instantaneous water heater used with a flue

3.9
cooker
appliance designed specifically for cooking with pots/pans etc.

3.10
cooker top
single burner appliances for direct connection to a container fitted with a container valve that complies with SANS 199

NOTE The valve is fitted with a G 3/8 (3/8 BSP) vertical outlet thread. The appliance does not generally include a flow control valve as the container valve controls the gas flow to the appliance burner.

3.11
closed type water heater (pressurized)
storage water heater that is unvented and that is intended to operate at the design working pressure of the water heater, the flow of water being controlled by one or more valves in the water system

3.12
deflector
part of an unflued instantaneous water heater that is intended to deflect the combustion products away from the wall against which it is installed

3.13
draught diverter
part of an instantaneous water heater, placed in the combustion products circuit to reduce the influence of updraught, and to prevent that of downdraught on the stability of the burner flames and on combustion

3.15
drop in gas grate
gas grate that drops into a hole in a plinth

3.16
flame-failure device
safety device that is permanently installed in the appliance and that is used to automatically shut off the gas supply to a burner when the flame of that burner becomes extinguished

3.17
flash fire
uncontrolled vapour cloud explosion

3.18
flash tube
ignition tube used to ignite a burner that is situated in a position where it cannot be ignited by hand easily

3.19
flue
passage through which the products of combustion or flue gases are conveyed to the outside of the building

3.20
flueless space heater
permanently installed or portable appliance designed without a flue where the products of combustion are discharged into the room in which the appliance is installed or used

3.21
gas cartridge
non-refillable container filled with LP gas or a mixture, which may be fitted with a valve

NOTE If the container is not fitted with a valve, the release of gas is carried out following perforation of the container by means of a device incorporated in the appliance.

3.22
gas-pressure regulator
device that automatically regulates, to a predetermined value, the outlet pressure of the gas that passes through it

3.23
griddle
part of a hotplate or grill consisting of a plate placed above the burner that allows the cooking of food by direct contact with the surface of the plate which is brought to a high temperature

3.24
hot plate
freestanding or portable cooking appliance for use on a table or worktop incorporating one or more burners with removable pan supports

3.25
instantaneous water heater
water heater or central heating boiler in which heated water is not stored within the appliance, and where gas, except for any pilot flame, burns only when water is discharged from the outlet of the appliance

3.26
jet
component that has a specific size of orifice, that acts as the main gas injector to a particular burner, and that may or may not be replaceable for the purpose of maintenance

3.27
liquefied petroleum gas
LPG
commercial butane, commercial propane, or a mixture of light hydrocarbons (predominantly propane, propene, butane, and butene) that is gaseous under conditions of ambient temperatures and pressure, and that is liquefied by an increase of pressure or a lowering of temperature

3.28
manifold
common supply pipe or chamber into which tappings are made to supply gas to a number of burners and that may be fitted with gas control valves to shut off or to regulate the rate of flow of the gas to the individual burners

3.29
mixing tube
part of an aerated burner in which the air and the gas are mixed

3.30
natural gas
NG
hydrocarbon gas that consists mainly of methane that is extracted from natural geological resources

3.31
open type water heater (non-pressurized)
storage water heater in which the flow of water is controlled by only a valve in the inlet pipe and in which the expanded or displaced water flows through the outlet from the water heater

3.32
operating pressure
gauge pressure
pressure at which an appliance will operate

3.32.1
direct pressure
pressure that exceeds 150 kPa and obtained direct from the container

3.32.2
high pressure
pressure that exceeds 5 kPa but that does not exceed 150 kPa

3.32.3
low pressure
pressure that does not exceed 5 kPa

3.33
orifice
accurately drilled hole in a jet, which functions as a metering device to control the gas consumption of a burner and also acts as a directional guide for the gas injected into the burner throat

3.34
oven
closed compartment for heating, roasting, baking etc.

3.35
oxygen depletion sensor
ODS
system that causes the gas supply to be shut off before the oxygen level in the ambient air falls below a specified concentration

3.36
permanent free air
continuous supply of air through an open vent

NOTE The open vent can be, for example, an open air brick.

3.37
permanent ventilation
opening to the outside atmosphere that is fixed in the open position

3.38
pilot burner
burner, independent of, and small in relation to, the main burner, that provides a

a) permanent source of ignition that ignites the main burner when the main burner gas valve is opened

b) signal for the operation of the flame-failure device, where such a device is incorporated in the appliance

3.39
reference gas
gas that is used for the testing of various appliances in a controlled environment

3.40
regular tools
any type of regular pliers, screwdriver, or adjustable spanner

3.41
ring burner
appliance consisting of one or more burner rings each ring consisting of a gas injector, a mixing tube and a head equipped with ports for the air-gas mixture

3.42
roll-about heater
wheeled and mobile space heater in which the gas container is fitted in a position within the confines of the heater body and remains within the appliance when in use

3.43
room sealed appliances
appliances designed such that air for combustion does not enter from, or combustion products enter into, the room in which the appliance is located

3.44
secondary flue
flue that is used to direct the flue gas to the outside of the building

3.45
solenoid valve
electric control valve
valve that is controlled by an electrical energized coil

NOTE The valve may be closed by the action of a spring, by gravity or by an electrical energized coil.

3.46
space heater
permanently installed or portable appliance designed to heat a room or occupied space

3.47
storage water heater
appliance intended for heating water in a thermally insulated water container and for the long-term storage of such heated water, and that includes a device for controlling the water temperature

3.48
stove
freestanding cooking appliance comprising of cooker burners, one or more ovens with or without a thermostat and possibly a grill burner

3.49
test point
connection point fitted to an appliance or gas line in a position such that the operating pressure of the appliance can be checked

4 Requirements applicable to all appliances

4.1 All appliances shall comply with the applicable requirements given in 4.2 to 4.20 (inclusive), as well as the appropriate of the specific requirements given in clauses 5 and 6.

4.2 All burners shall

a) be readily accessible for cleaning,

b) be easily replaceable in the correct position, when intended to be removed for cleaning, and

c) include a safe and easy method of adjustment when so required for the correct operation of the burner.

4.3 Where a test point has been fitted to an appliance to verify the pressure it shall be accessible (see also 6.8).

4.4 All appliances and components of appliances shall have a smooth finish. Cut edges shall be free from burrs and sharp protrusions that could easily injure the user. Component parts shall not be buckled or warped. Holding brackets of components shall be finished in a way that will ensure that the component can be securely fitted in its normal operating position.

4.5 Any thermostat shall

a) include a by-pass that, during operation, maintains continuous combustion at the burner,

b) not shut off the gas supply to the pilot burner during operation, or

c) where an electronic controlled mechanism is used, have a means of automatic ignition.

4.6 Any pilot burner shall remain alight at all thermostat settings and at all manual control positions and when the corresponding burner control is turned "on" and "off" at reasonable speed.

4.7 Flash tubes and cross-light burners shall be securely located.

4.8 Pilot burners, igniters and flame sensors shall be securely located.

4.9 Burner mixing tubes shall be properly and securely located in relation to injectors.

4.10 Burner supports shall be stable. For boiling tables the ring burner(s) shall be securely held in position by mechanical means, preferably by a support placed underneath the burner(s). Such support shall determine the position of the burners in a multi-burner setup.

4.11 Burner caps shall be correctly located.

4.12 The gas appliance manifold shall be firmly fixed.

4.13 The appliance shall be gas-tight.

4.14 When lit, a main burner shall ignite promptly and quietly within 5 sec. For ring burners, the same ignition time shall apply, when tested in accordance with 7.17.

4.15 When ignition is delayed in a manually ignited burner for 4 sec after the appropriate gas supply valve has been opened, the burner shall

a) ignite completely,

b) remain alight,

c) not burn-back,

d) not burn outside the appliance,

e) not cause any other burner to be extinguished, and

f) by virtue of its ignition, not cause any damage to the appliance.

4.16 A burner(s) with fixed turndown settings shall burn in a stable manner and shall not be extinguished when turned at reasonable speed from full-on to turndown and vice versa.

4.17 Except for slight fluctuations within acceptable limits, the operation, ignition or adjustment of one burner shall not affect the operation of any other burner.

4.18 Ignition of any burner shall be capable of being carried out easily and safely and without the likelihood of injury to the operator.

4.19 The point of ignition of a burner shall be readily accessible.

4.20 Hoses of 8 mm nominal diameter shall be secured to end fittings by means of swaging, crimping or the use of clamps (for example a Jubilee clamp). Hoses for natural gas or LPG exceeding 8 mm nominal diameter shall all be preassembled by being either swaged or crimped to end fittings. Cable ties, plastic, and nylon clips shall not be used to attach hoses to end fittings.

5 Specific requirements

5.1 Stability of appliances (excluding appliances that are intended to be built-in)

The appliance shall be of such overall size, mass and general design that, when it is tested in accordance with 7.4.1 to 7.4.3 (inclusive),

a) it does not topple over,

b) where the appliance is intended for cooking purposes, the pot placed on the cooking surface does not slip off,

c) the gas container intended to be fitted inside the body of the appliance or attached to the body in any other way, does not become dislodged, and

d) where the appliance is designed with folding or removable legs, it shall be of such design that the legs shall be locked in the open or assembled position to prevent the appliance from collapsing while in use in accordance with 7.4.4.

5.2 Attachment of components

5.2.1 Replaceable components shall be designed to fit in a way that will not result in a hazardous operating condition.

5.2.2 Permanently fitted components shall be of an acceptable rigid construction, fixed in a way suitable for the duty they have to perform and firmly fixed to the body of the appliance.

5.3 Ease of fitting

The method of mounting of all components that are intended to be detached for the purpose of cleaning or replacement (such as cooking tops, glass covers for lamps, heater shades, holding brackets, burners and jets) shall be such that they can be easily detached and correctly replaced. Such detachment or replacement shall be easy to carry out and if tools are required for this purpose, only regular tools shall be necessary.

5.4 Rigidity of stoves, cookers, hotplates (including boiling tables)

When the appliance is tested in accordance with 7.5, no component shall become dislodged, permanently distorted or broken and, at the end of the test, each component (where relevant) shall still carry its mating component in an acceptable way.

5.5 Burners and jets

5.5.1 Design

The design of a burner and its jet and their method of installation shall be such that, when the appliance is tested in accordance with 7.10, there is no development of soot (except as allowed in 5.7.1(c)).

5.5.2 Marking of replaceable jets

Replaceable jets shall be permanently and legibly marked with an identification mark that will ensure the use of the correct size of jet. In the case of water heaters and hot plates the jet size may be permanently and indelibly marked on the jet assembly or manifold.

5.5.3 Material for the manufacturing of jets

Jets shall be manufactured from materials that have a melting point above 600 °C. Appliances operating on biogas shall be in accordance with annex A.

5.6 Control of gas supply

5.6.1 Valves

5.6.1.1 General

The valve requirements in 5.6.1.2 shall apply to the rotating type, screwed type, ball type, taper type, valves and solenoid valves. Each type shall be of acceptable construction and design.

5.6.1.2 Operation

5.6.1.2.1 Rotating valves

A rotating valve, shall

a) move from the fully closed to the fully open position in less than one full turn, and

b) be self-locking in the closed position. This requirement is optional if

1) the valve knob is concealed,

2) a flame-failure device is fitted to the appropriate burner of the appliance, or

3) the valve is spring-loaded to return to the closed position.

5.6.1.2.2 Screw-type valves

A screw-type valve shall, with the aid of a durable fine-pitch thread on the spindle, allow for fine adjustment of the valve.

5.6.1.2.3 Ball valves and taper-plug valves

All ball valves and taper-plug valves shall

a) comply with the requirements of SANS 50331, and

b) move from the fully open position to fully closed in a quarter turn.

5.6.1.2.4 Solenoid valves

5.6.1.2.4.1 Valves shall be placed in such a way that their strength, operation, and accessibility undergo no damage from actions to which they are subjected in normal use, and they shall be protected against ingress of foreign matter.

5.6.1.2.4.2 In normal operating conditions where the solenoid valve is used as the main control valve when the electrical system is inoperable, the valve shall shut down in the safe condition (closed position).

5.6.2 Leakage resistance

When the design of the appliance requires the valve to be under pressure in the closed position, the design of the valve shall be such that, when the valve is tested in accordance with 7.8, it does not leak.

5.6.3 Gas-pressure regulators

A gas-pressure regulator directly fitted to an appliance or through a hose connection, operating on LPG shall

a) have a gas-flow rating appropriate to the total consumption of the appliance,

b) in the case of a low pressure regulator, comply with the requirements of SANS 1237,

c) in the case of a high pressure regulator, (a pressure exceeding 5 kPa) comply with the requirements of SANS 1237, with respect to the inlet and outlet connection and gas tightness of the regulator,

d) not include a safety relief valve, and

e) be coupled directly to the gas container without the use of special adaptors. Therefore, a regulator with a G⅝ LH bullnose connection shall only be used to connect a container with a G⅝ LH female thread. Similarly, a regulator with a G⅜ RH connection thread shall only be used to connect to a container with a G⅜ RH female thread.

5.6.4 Operating levers and knobs

All levers and knobs that are intended to be handled during the operation of the appliance shall

a) after 1 h of continuous operation of the appliance, the surface temperature of levers and knobs shall not exceed the following:

   1) metal: ambient temperature + 35 °C

   2) glass and ceramic: ambient temperature + 45 °C

   3) plastics: ambient temperature + 60 °C

b) fit on their mating spindle in an acceptably secure way,

c) not be capable of being inadvertently detached,

d) in the case of flow-control valves, if capable of being removed, be easily removed and refitted in the correct way,

e) be readily accessible and easy to operate,

f) have markings (symbols) applied in an acceptable way and in an easily observable position, indicating the setting of the valve (when appropriate, in relation to markings on the appliance). Where no such markings are shown the markings shall be addressed in the instruction leaflet or book (see 8.2), and

g) be of such material, construction and design that

1) when the appliance is tested in accordance with the appropriate procedure given in 7.11, the operating levers and knobs do not break off the spindle but still operate the valve to which it is attached, and

2) when the appliance has been tested in accordance with 7.10, the surface shall not exceed the values as given in (a) above.

5.7 Flame quality

5.7.1 Appliances with fixed primary air intake

When the appliance is tested in accordance with 7.6.1, the primary air intake shall be set by the manufacturer in such a way that

a) the flame ignites immediately,

b) the stability of the flame is such that there is no lifting, floating or burn-back, and

c) there is no visible soot (except in the case of decorative appliances, where minor powdery deposits will be allowed).

5.7.2 Adjustable primary air intake

5.7.2.1 Construction

The components of a primary air intake adjuster shall

a) be of a material that will ensure a robust construction,

b) when threaded, have threads of acceptable design strength, pitch, and mating dimensions,

c) fit hand-tight and in such a way that it will not easily become unadjusted after being adjusted to the correct setting, and

d) be so designed that the aerations port(s) cannot, during adjustment, be shut off completely.

NOTE Ring burners do not have to comply with 5.7.2.1(d).

5.7.2.2 Performance of primary air intake adjuster

5.7.2.2.1 When the appliance is tested in accordance with 7.6.2.7 the primary air intake shall be able to be adjusted in such a way that,

a) the flame ignites immediately,

b) the stability of the flame is such that there is no lifting, floating, or burn-back, and

c) there is no visible soot (except in the case of decorative appliances, where minor powdery deposits will be allowed).

5.7.2.2.2 When the appliance is tested in accordance with 7.6.2.7, a primary air intake adjuster shall

a) be so positioned in relation to the flame that it can be safely adjusted by hand without burning the hand, and

b) have ports of sufficient size, quantity and position that the flame can be adjusted effectively for stable operation.

5.7.3 Appliances fitted with doors or covers

Where an appliance is fitted with doors or covers, all burner flames shall remain stable and unaffected during the opening or closing of the doors or covers under conditions representative of normal use.

5.8 Stability of flame against draught

The appliance shall be so designed (and fitted with a draught protector, where necessary) that, when it is tested in accordance with 7.7, the flame is not extinguished or moved to a position that makes the operation of the appliance ineffective or unsafe.

5.9 Leak-tightness and strength of construction of components

The quality and construction of all components that carry gas under pressure, and the way that the components are interconnected within and connected to the appliance, shall be such that, when the appliance is tested in accordance with

a) 7.8, there is no leakage of gas, and

b) 7.9, no component is warped or broken.

5.10 Gas pipelines

5.10.1 Material

5.10.1.1 All gas supply lines within the appliance from the inlet connection up to the jet shall be of intrinsically corrosion-resistant metal, or otherwise so protected on the outer surface with an acceptable coating of such quality that, when tested in accordance with Natural Salt Spray (NSS) test of SANS 9227 for 150 h, there shall be no sign of pitting or penetration of the metal visible to the naked eye.

5.10.1.2 Hot dip galvanized components shall not be used in the gas stream.

5.10.2 Flexible hoses

5.10.2.1 Non-metallic hoses and hose assemblies shall comply with the relevant requirements of SANS 1156-2, EN 16436-1, or AS 1869.

5.10.2.2 Metallic hoses shall comply with the relevant requirements of ISO 10380, EN 14800, and UNI 11353.

5.10.2.3 Non-metallic hoses near heated areas shall be so positioned and so protected that, when an appliance is tested in accordance with 7.8 and 7.10, the hose surface temperature does not exceed 60 °C, leak, swell, become tacky to the touch, or become so damaged as to render the appliance unsafe for use.

5.10.3 Hose assemblies

A hose assembly shall

a) not exceed 2 m, and

b) be of diameter sufficient for the maximum gas consumption of the appliance.

5.10.4 Joints in metallic gas pipes within the appliance

Joints in metallic pipes shall be made by means of mechanical fasteners, welding, brazing, soldering/capillary or glued joints as follows:

a) mechanical fasteners and welding, brazing and soldering/capillary joints shall comply with the requirements of 5.9; and

b) glued joints shall be compatible with LPG, Natural gas or Biogas and of such quality and design that when tested in accordance with 7.16, the joint does not leak or become unstuck.

NOTE Capillary joints using soft solder are not allowed.

5.11 Flame-failure device

5.11.1 General

Refer to clause 6, for appliances that shall be fitted with a flame-failure device.

5.11.2 Operation

5.11.2.1 Each individual burner shall be controlled by a flame-failure device, except that where burners are so close to each other that one is lit by the other, one flame-failure device is sufficient.

5.11.2.2 The time required for the flame-failure device to open (and remain open) after the flame has been lit shall not exceed 15 sec.

5.11.2.3 A flame-failure device shall

a) for appliances using thermo couples, cut off the gas supply to the corresponding burner within 1 min after disruption of the flame, and

b) for appliances using thermo piles, cut off the gas to the corresponding burner within 2 min after disruption of the flame.

5.12 Oven thermostats

Oven thermostats shall be of such quality that, when a thermostat is tested in accordance with 7.15, the thermostat operates correctly.

5.13 Pilot burner

5.13.1 Where fitted, the gas supply to pilot burners shall be directly linked to a flame-failure device.

5.13.2 Thermostatically controlled burners that include total shut-off as part of the control function shall, in addition to a flame-failure device (see 5.11), incorporate a pilot burner or automatic burner ignition system that re-ignites the main burner when the gas supply to the main burner is automatically reopened (see also 5.14.2 for automatic burner ignition systems).

5.14 Method of ignition of appliances

5.14.1 If the appliance is not supplied with an automatic or a manually operated ignition mechanism, it shall be capable of being easily lit by means of a match or lighter without burning the operator's hand, and without hazardous flash fire or the need to dismantle any permanently fixed component parts of the appliance.

5.14.2 Where appliances use automatic burner ignition systems, the start gas automatic shut off valve shall not be energized before the ignition spark is energized. If the start gas flame is not detected by the end of the safety time, lockout shall occur.

5.15 Visibility of flame

Except when an appliance is protected by a flame-failure device (see 5.11), the flame of each burner of an appliance shall be detectable by direct visual observation, reflection by a mirror, or other acceptable means of observation.

5.16 Joint washers (on detachable components)

5.16.1 Component parts that are designed to be regularly detached from the gas container or other gas supply shall be furnished with a joint washer that cannot become easily dislodged and that is held captive by the male thread of the component. The joint washer material shall be suitable for the gas type.

5.16.2 Where washers would be in close contact to the heat source, it shall be made of heat resistant material.

5.16.3 Where rubber seals are used, the rubber shall have a shore hardness value of between 60 IRHD and 90 IRHD.

5.16.4 The quality of joint washers and their method of mounting shall be such that when tested in accordance with 7.23 the washers shall show no sign of failure or leakage.

5.17 Combustion

When tested in accordance with 7.12, appliances designed to be used

a) with a flue, shall have a CO/CO_2 mass ratio not exceeding 0,04,

b) without a flue, shall have a CO/CO_2 mass ratio not exceeding 0,02, except that in the case of roll about and flueless space heaters, the CO/CO_2 mass ratio shall not exceed 0,01, and

c) for outdoor use (such as ring burners), shall have a CO/CO_2 mass ratio not exceeding 0,04.

5.18 Inlet connections

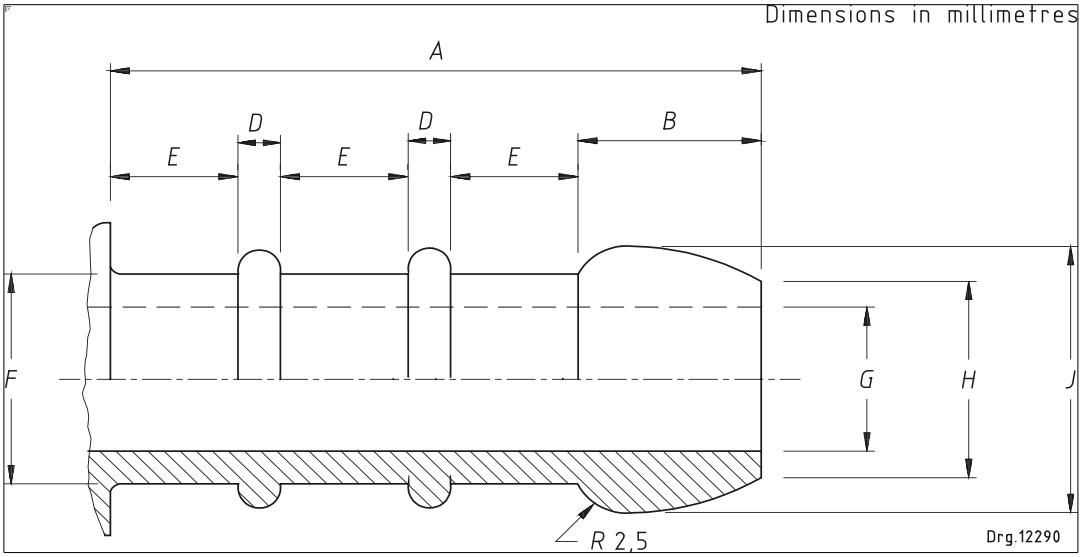
The inlet connection of the appliance shall be fixed rigidly in or to the body of the appliance and shall incorporate an appropriate and acceptable gas fitting or other types of connection as follows:

a) for direct-pressure appliances, a threaded male connector that is compatible with SANS 199;

b) a thread complying with the relevant requirements of SANS 1306-1;

c) a metal nozzle (see figure 1); and

d) for appliances operating on non-refillable disposable cartridges, the inlet connections shall comply with the applicable requirements of clause 6.18.



1	2	3	4	5	6	7	8	9
Nominal size	***A***	***B***	***D***	***E***	**Dia. *F***	**Dia. *G***	**Dia. *H***	**Dia. *J***
8	22	7,0	1,5	4,3	7,9	5,4	6,50	10,3
	min.	+ 1,0 − 0,5	+ 1,0 − 0,3	min.	± 0,3	max.	+ 1,0 − 0,3	+ 0,2 − 0,3
The nominal size of the nozzle corresponds to the corresponding tube given in SANS 1156-2.								

Figure 1 — Standard metal nozzle

5.19 Oxygen depletion sensor

The oxygen depletion sensor fitted to the appliance types referred to in the relevant clauses listed in table 1 shall shut off the gas supply before the concentration of carbon monoxide given in column 3 is reached and the oxygen concentration of the ambient air is not less than the value as given in column 4 when tested in accordance with 7.22.

Table 1 — Oxygen depletion sensor

1	2	3	4
Appliance	**Clause No.**	**CO value**	**Oxygen value**
Instantaneous water heater, type A	6.7.2	0,01 % (100 ppm)	18 % volume fraction
Flueless Space heaters (including Roll-about heater)	6.8.4 and 6.1.2.4	0,01 % (100 ppm)	18 % volume fraction

6 Additional requirements (for specific appliances and components)

6.1 Mobile appliances (wheeled appliances)

6.1.1 General requirements

6.1.1.1 Appliances that are fitted or installed with wheels solely to permit access to the back of the appliances shall not be regarded as mobile appliances. Such appliances shall be provided with a designated attachment point for a restraining chain or other device (see also SANS 10087-1 and SANS 827, as applicable).

6.1.1.2 A mobile appliance shall allow for the appropriate gas container to be so mounted within the confines of the appliance such that the container cannot easily become dislodged during normal moving from one spot to another, but can be easily

a) removed and replaced by the user, and

b) shut-off when not in use.

6.1.1.3 Mobile appliances shall have a label attached indicating the size and position of the container.

6.1.1.4 All the relevant operating parts shall be supplied and fitted effectively in an appropriate way.

6.1.1.5 The gas-control mechanism shall be so situated that it can be easily controlled when so required by the user.

6.1.1.6 The appliance shall include the appropriate gas-pressure regulator fitted in an acceptable way and the connecting hose shall be clamped at both ends (see also 5.6.3 and 5.10.2).

6.1.1.7 Where an appliance is fitted with a side cooker burner, for example a barbecue, the gas supply between the side cooker and the barbecue manifold may be a flexible hose or hose assembly that complies with the relevant requirements of 5.10.

6.1.1.8 A gas hose supplying gas to a side cooker may not be connected to the gas hose from the container to the main appliance burners unless the connector union is securely attached to the appliance body or frame.

6.1.1.9 Mobile appliances that do not incorporate flame failure devices may not be used indoors and shall be marked "For outdoor use only".

6.1.2 Roll-about heaters

6.1.2.1 All roll-about heaters shall be of such design that the container valve is visible and accessible from the vertical position, i.e. when viewed from the top of the heater.

6.1.2.2 Containers used with roll-about heaters shall be stable when located in the space provided for the container and shall not rely on support by the back cover.

6.1.2.3 In addition to the general marking specified in 8.2 and 8.3, a roll-about heater shall also carry acceptable instructions regarding its safe operation, control and connecting instructions for the regulator on a non-tearable swing tag (see figure B.1 in annex B).

6.1.2.4 A roll-about heater shall include a flame-failure device that when tested, complies with the requirements of 5.11. This shall operate under the control of a pilot flame and thermocouple.

6.1.2.5 A roll-about heater shall also include an acceptable oxygen-depletion safety device that complies with the requirements given in 5.19.

6.1.2.6 A roll-about heater shall be equipped with a means to positively shut-off the gas supply to the burners independent of the container valve.

6.1.2.7 A set of start-up and shutting down instructions, shall be permanently affixed as close as possible to the control knob of the heater. Letters on this label shall be legible and indelible and at least equivalent to an Arial 10 point font size.

6.1.2.8 The hose length of the roll-about heater using the bull-nose connection shall not be less than 500 mm with a tolerance of −0 mm + 50 mm.

6.1.2.9 The hose length of the roll-about heater using the G⅜ fitting shall not be less than 400 with a tolerance of −0 mm + 50 mm.

6.1.2.10 A durable label that complies with the requirements in figure 2 shall be permanently affixed as close as possible to the control knob of the heater.

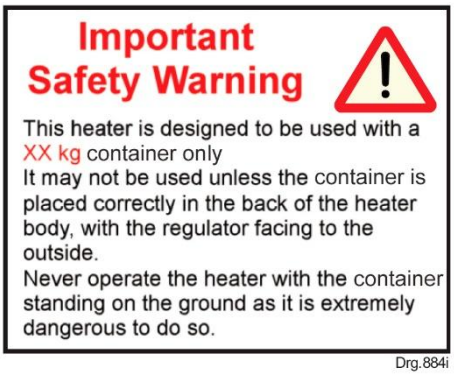
Label information shall be as follows:

a) The label shall be a glossy finish with a self-adhesive backing (for example peel and stick).

b) The black border dimensions shall be 95 mm × 75 mm × 2 point line thickness.

c) The words "Important Safety Warning" (with font red, Arial, 24 point, bold) shall appear on the label and the rest of the information shall be in black text (with font Arial, 14 point, regular).

d) The words "XX" indicate the container size in kilograms to be used with the specific heater.



NOTE 1 The colour of the text indicating the container size does not need to be in red. That is only done on the 6.1.2.10(d) sample label to draw the attention to the fact that there is some editing for suppliers to do.

NOTE 2 The term "XX kg" is replaced with the container size as required by the particular sized product recommended by the manufacturer.

Figure 2 — Safety label

6.1.2.11 Additional label requirements (safety tips) are shown in figure 3 and shall be in the form of a label or one page leaflet not less than A6 in size attached to the top of a roll-about heater where it is clearly visible.

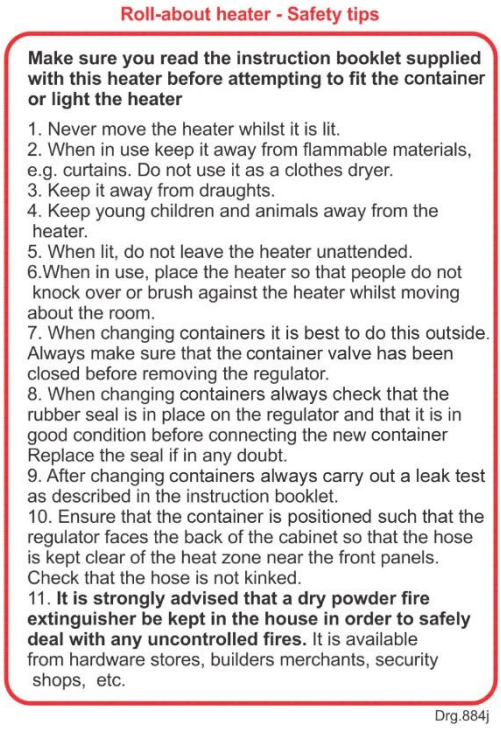


Figure 3 — Safety tips leaflet

6.2 Appliances with a draught diverter fitted in or to the flue

The inlet to a draught diverter shall not be restricted and the size of the flue shall allow an acceptable cross-sectional area for the flue gas.

6.3 Electrical components

All electrical components rated in excess of 40 V, and their method of installation, shall comply with the requirements of SANS 60335-1.

6.4 Stoves and ovens

6.4.1 Burners

All gas burners of a stove or ovens shall be fitted with a flame failure device that, when tested, complies with the requirements of 5.11.

6.4.2 Oven door windows (where fitted)

The window shall be of double glass construction.

6.4.3 Oven door temperatures

The temperature rise of those parts on the front surface of the oven door which can be touched accidently shall not exceed:

a) Metal and painted metal 45 °C

b) Enamelled metal 50 °C

c) Glass and ceramics 60 °C

d) Plastic having a thickness exceeding 0.3 mm 80 °C

6.5 Glass covers for lamps

6.5.1 The glass covers for lamps designed for attachment directly to a container shall be mounted in a way that will, when a lamp assembly is tested in accordance with 7.13, prevent any damage to the glass.

6.5.2 The glass covers for all types of lamps shall be of such quality that, when a lamp assembly is tested in accordance with 7.14, the glass does not crack or shatter or develop any burnt spots.

6.6 Heater burners (safety protection)

The burner of a portable or mobile heater shall be covered with a guard that will prevent

a) any accidental contact with the burner, and

b) any loose, heated components from becoming dislodged from the heater.

6.7 Instantaneous water heaters

6.7.1 General

6.7.1.1 Metallic materials that are intended to come into contact with water during operation shall be of a

a) copper alloy that, when tested in accordance with 7.24, shows no individual penetration reading that exceeds 250 µm, two samples being taken from each cast component (one from the thinnest part and the other from the thickest part) and one sample from every other component, or

b) stainless steel of an acceptable grade.

6.7.1.2 The water heaters are categorized into several types according to the method of evacuation of the combustion products and the admission of the combustion air (see 6.7.1.4). The type of water heater shall be indicated on either the data plate or by additional labelling (see 8.2.2(c)).

6.7.1.3 When the water section is tested in accordance with 7.25, an instantaneous water heater shall withstand a test pressure of 1 000 kPa without warping or leakage.

6.7.1.4 When an instantaneous water heater is fitted with a combustion products discharge safety device, the water heater shall be subjected to the test given in 7.19. When tested at the minimum and maximum flame setting, the water heater shall shut down within 4 min of the flue being

a) completely blocked, and

b) removed from the flue outlet on the appliance.

6.7.1.5 The temperature sensing device (overheat protection) fitted to an instantaneous water heater shall be subjected to the test as given in 7.20. The sensor shall shut off the gas supply to the main burner before the water temperature in the heat exchanger reaches a maximum of 97 °C.

6.7.1.6 When a water heater is fitted with a combustion fan it shall be subjected to the test as given in 7.21. The gas supply shall be shut off to the main burner within 1 min of the fan stopping.

6.7.2 Requirements for type A instantaneous water heaters

6.7.2.1 Type A instantaneous water heaters are appliances with a maximum rated heat input of 42 MJ (11,7 kW) primarily for indoor use and are not intended to be connected to a flue or other device for evacuating the combustion products to the outside of the room.

6.7.2.2 Type A instantaneous water heaters shall be fitted with

a) a flame-failure device that when tested, complies with the requirements of 5.11,

b) an acceptable oxygen depletion sensor that complies with the requirements given in 5.19,

c) a deflector that is an integral part of the appliance and that is intended to deflect the combustion products away from the wall against which it is installed, and

d) a temperature sensing device that will shut down the appliance in accordance with the requirements of 6.7.1.5 in the event that the water temperature in the heat exchanger reaches a pre-set limit. This device is factory set by the manufacturer.

6.7.2.3 In addition to the marking requirements specified in Clause 8, type A instantaneous water heaters shall comply with the following:

a) User instructions which include the following statements:

   1) the wording "This appliance is fitted with an atmospheric sensing device"; and

   2) the wording "This appliance may only be used for short delivery periods and may not be used for the purpose of supplying hot water to a bath or washing machine"; and

b) Installer instructions which include the following statements:

   1) the wording "This appliance may only be installed in a room if the room complies with the appropriate ventilation requirements" (refer to SANS 10087-1 and SANS 827, as applicable); and

   2) the wording "This appliance shall not be connected to a flue".

6.7.3 Requirements for type B instantaneous water heaters

6.7.3.1 Type B instantaneous water heaters are appliances primarily for indoor use and intended to be connected to a flue for evacuating the combustion products to the outside of the building in which the appliances are installed and where the combustion air is drawn directly from the room in which the appliances are installed.

6.7.3.2 Type B instantaneous water heaters shall be fitted with a

a) flame-failure device that when tested, complies with the requirements of 5.11,

b) draught diverter in the combustion products circuit,

c) combustion products discharge safety device (flue sensor), which will shut down the appliance in accordance with the requirements of 6.7.1.4 in the event of a spillage of combustion products into the room in which the appliance is installed, and

d) temperature sensing device that will shut down the appliance in accordance with the requirements of 6.7.1.5 in the event that the water temperature in the heat exchanger reaches a pre-set limit.

   NOTE This device is factory set by the manufacturer.

6.7.3.3 When the appliance is fitted with a fan in the combustion circuit

a) apart from the provision of air from the air supply circuit, the remainder of the combustion products circuit shall be sealed from the room to prevent the combustion products discharge from entering the room, and

b) the appliance shall be fitted with a mechanism that will shut off the gas supply to the burner in the event of fan failure or a flue blockage in accordance with the requirements of 6.7.1.6 or back draft that could cause an overheat situation. If the mechanism is not fitted, 6.7.3.2(c) shall apply.

6.7.3.4 No additional markings are required for type B instantaneous water heaters.

6.7.4 Requirements for type C instantaneous water heaters

6.7.4.1 Type C instantaneous water heaters are room sealed appliances for indoor use where the complete combustion circuit is sealed with respect to the room in which it is installed and are intended to be connected to a flue or other device for evacuating the combustion products to the outside of the building. Combustion air is taken from outside of the building.

6.7.4.2 Type C instantaneous water heaters shall be fitted with the following:

a) a flame-failure device that when tested, complies with the requirements of 5.11;

b) an inlet/outlet connection designed to accept the ducts to be fitted to the appliance; and

c) a temperature sensing device that will shut down the appliance in accordance with the requirements of 6.7.1.5 in the event that the water temperature in the heat exchanger reaches a pre-set limit.

NOTE This device is factory set by the manufacturer.

6.7.4.3 In addition to the marking requirements given in clause 8, the following statement shall be included in the appliance's installation instructions:

"This appliance is required to be connected to a dual duct flue system incorporating separate paths for provision of the combustion air and the exhaust of the combustion products to and from the exterior of the building. Note the manufacturer's specific instructions regarding installation of the appliance".

6.7.5 Requirements for type D instantaneous water heaters

6.7.5.1 Type D instantaneous water heaters are appliances for outdoor installation only.

6.7.5.2 Type D instantaneous water heaters shall be fitted with a

a) flame-failure device that when tested, complies with the requirements of 5.11,

b) deflector that is an integral part of the appliance, where the appliance is of the type for use without a flue, and that is intended to deflect the combustion products away from the wall against which it is installed, and

c) temperature sensing device that will shut down the appliance in accordance with the requirements of 6.7.1.5 in the event that the water temperature in the heat exchanger reaches a preset limit.

NOTE This device is factory set by the manufacturer.

6.7.5.3 When the appliance is fitted with a fan in the combustion circuit, the appliance shall be fitted with a mechanism that will shut off the gas supply to the burner in accordance with the requirements of 6.7.1.6 in the event of fan failure.

6.7.5.4 In addition to the marking requirements given in clause 8, the following markings shall be applied to type D instantaneous water heaters:

a) A label with the words "For outdoor use only" shall be permanently attached to the appliance. This label shall be in addition to and separate from other labelling information or markings. The wording shall be at least 10 mm in height.

b) A label with the words "For outdoor use only" shall be included on the packaging. This label shall be in addition to and separate from other labelling information or markings. The wording shall be at least 10 mm in height.

c) A statement indicating the following shall be included in the appliance installation instructions:

"This appliance shall only be installed in an outside location".

6.7.6 Storage water heaters

6.7.6.1 Design

6.7.6.1.1 Water heaters shall be of the closed (pressurized) type or the open (non-pressurized) type and of general design.

6.7.6.1.2 A flame-failure device shall be fitted that when tested, complies with the requirements of 5.11.

6.7.6.2 Material

Metallic materials that are intended to come into contact with water during operation shall be a

a) copper alloy that, when tested in accordance with 7.25, shows no individual penetration reading that exceeds 250 µm, two samples being taken from each cast component (one from the thinnest part and the other from the thickest part) and one sample from every other component, or

b) stainless steel of an acceptable grade.

6.7.6.3 Hydraulic safety of pressurized heaters

Water heaters shall be fitted with the appropriate of the safety and functional control valves given in SANS 198.

6.7.6.4 Resistance to fatigue

The container of a closed type water heater shall be so designed and constructed that, when subjected to the fatigue test given in 7.26,

a) the container shall, during the test, show no sign of leakage or any deformation that may impair its performance, and

b) when relevant, the lining shall, at the conclusion of the test, still remain intact.

6.7.6.5 Resistance to hydrostatic pressure

When tested in accordance with 7.27, a closed type water heater shall withstand the hydrostatic test pressure without leakage, collapse or any deformation that may impair its operation.

6.8 Space heaters

6.8.1 In addition to 6.6, the following requirements shall apply:

a) if the space heater is intended to be portable, the heater or, if relevant, the container, shall be furnished with a carrying handle that is applied in a position such that the user cannot burn his/her hand; and

b) if the carrying handle is attached to the appliance, the strength of the attachment shall allow the handle to support a carried mass of 20 kg.

6.8.2 The control valve shall be directly attached to an integral part of the body of the appliance.

6.8.3 A flame failure device shall be fitted that when tested, complies with the requirements of 5.11.

6.8.4 All space heaters intended to be installed shall be equipped with a test point. This point shall be easily accessible.

6.8.5 When a space heater is installed as a flueless system (this includes decorative fire equipment) it shall be fitted with an oxygen depletion sensor that complies with the requirements given in 5.19.

6.8.6 In addition to the additional information requirements specified in 8.3, flueless heaters shall be supplied with the following information for users and installers:

a) the minimum room size in which the appliance shall be installed without the provision of free area permanent ventilation, and where applicable, the minimum cross-sectional area in square centimetres of free area of permanent ventilation shall be indicated (see annex C);

b) flueless heaters shall not be installed in bedrooms or bathrooms;

c) a statement informing users of the increased levels of moisture in a room associated with the use of flueless space heaters and the action to be taken in respect of this type of occurrence;

d) a statement advising users and installers of the action to be taken in the event of an unexplained shut down;

e) in the case of a drop in gas grate, specific instruction to the installer on method of installation to ensure that sufficient combustion primary air is supplied; and

f) warnings in instruction booklets with the following or similar statements.

(1)

WARNING

This appliance shall not be installed in bedrooms or bathrooms.

(2)

WARNING

This is a flueless gas-fired heater. It uses air (oxygen) from the room in which it is installed. Provisions for adequate ventilation shall be provided. Refer to the appropriate section of the user manual.

(3)

WARNING
CARBON MONOXIDE POISONING CAN LEAD TO DEATH

Carbon monoxide poisoning: Early signs of carbon monoxide poisoning resemble flu symptoms, with headaches, dizziness or nausea. If you have these symptoms, the heater may not be working properly. Get fresh air at once! Have the heater serviced. Some people are more affected by carbon monoxide than others. These include pregnant women, people with heart or lung disease or anaemia, those under the influence of alcohol, and those at high altitudes.

The heading in the boxed warnings in 1, 2 and 3 in 6.8.6(f) shall be in upper case bold type not less than Arial 10 point font size. The body text shall be equivalent to an Arial 10 point font size.

6.9 Commercial ovens

6.9.1 Appropriate flame-failure device(s) shall be fitted, and when tested, shall comply with the requirements of 5.11.

6.9.2 The construction of the unit shall be such as to prevent the accumulation of grease under the burner, unless a means of avoiding ignition of the grease is provided for in the design of the appliance.

6.9.3 The appliance shall not reflect heat downwards to an extent that will cause damage to combustible surfaces below the burner(s).

6.10 Commercial fryers

6.10.1 Flame-failure device(s) shall be fitted to each pan, and when tested, shall comply with the requirements of 5.11.

6.10.2 If the fryer incorporates a lid that is so fitted that the fryer operates above atmospheric pressure, the lid shall be fitted with an acceptable safety relief device. The critical operating pressure of the safety relief device shall be given in the technical literature that accompanies the fryer and shall be clearly marked on the body of the valve.

6.10.3 A gas control valve shall be provided for each pan.

6.10.4 The pan shall incorporate a thermostat to control the temperature of the oil in the pan.

6.10.5 The construction of the unit shall be such as to prevent the passing of grease onto the burner assembly, which could reduce the acceptable operation of the burner.

6.11 Braais and grills

6.11.1 Braais and grills that are marked “for outdoor use only”, in accordance with 8.2(b), are considered outdoor appliances and are not required to be fitted with a flame-failure device.

6.11.2 Where braais and grills are intended to be installed in a confined or indoor space, they shall be fitted with a flame-failure device that, when tested, complies with the requirements of 5.11.

6.12 Commercial hotplates, salamanders, griddles and grillers

6.12.1 Salamanders, where specific installation requirements are not provided which allow for the burner flame to remain visible to the user, shall be fitted with a flame failure device that when tested, complies with the requirements of 5.11.

6.12.2 The appliance shall not reflect heat downwards to an extent that will cause damage to combustible surfaces below the burner(s).

6.12.3 The construction of the unit shall be such as to prevent the passing of grease onto the burner assembly, which could reduce the acceptable operation of the burner.

6.13 Domestic hotplates and hobs

6.13.1 Hobs shall be fitted with a flame-failure device to each burner that when tested, complies with the requirements of 5.11.

6.13.2 Hobs and hotplates shall not reflect heat downwards to an extent that will cause damage to combustible surfaces below the burner(s).

6.14 Single burner cooker tops

6.14.1 General

Cooker tops are single burner appliances for direct connection to a container fitted with a container valve that complies with SANS 199 and the valve is fitted with a G 3/8 (3/8 BSP) vertical outlet thread. The appliance does not generally include a flow control valve as the container valve controls the gas flow to the appliance burner.

Cooker tops may be of the following types:

a) **Type A**

An appliance in which the burner, its mixing tube and the connection threads to the container are mechanically and permanently attached to the pot stand, thus making the assembly of the parts into a complete self-contained appliance. The connection threads to the container may form a part of the mixing tube. The burner head may be removed for cleaning or replacement. The pot stand may incorporate a heat shield.

When fitted to the container, the appliance relies for its rigidity entirely on the connection between the container valve and the appliance. There is no external or additional support for the pot stand when in use, and is therefore not recommended to be used with pots exceeding 300 mm in diameter.

b) **Type B**

An appliance in which the burner, its mixing tube and the container connection thread are mechanically joined and are regarded as one major part of the appliance. The pot stand, regarded as the second part of the appliance, is a device separate from and not joined to the burner assembly. It is supported on the container shroud in such a manner that its stability is secured and that the relationship between the underside of the cooking vessel and the burner is preset and maintained. Subject to the specific diameter of the container shroud and its associated pot stand, type B cooker tops are generally suitable for cooking vessels of a larger diameter than type A cooker tops.

6.14.2 Requirements

6.14.2.1 Type A

When tested for compliance with the relevant requirements of 5.6.4 and 6.9.3, a pot with a diameter not less than the diameter of the pot shown in figure 4 shall be used.

6.14.2.2 Type B

When tested for compliance with 5.6.4 and 6.9.3, a pot with a diameter not less than 50 mm greater than the diameter of the pot stand (pot support) shall be used.

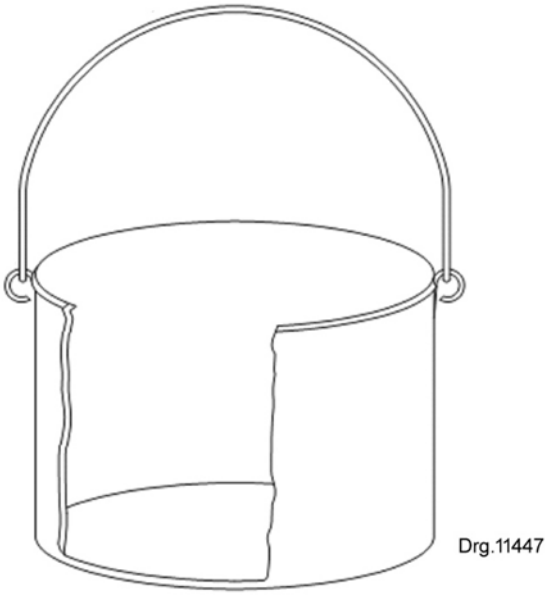


Figure 4 — Aluminium pot

6.14.3 Marking requirements for cooker tops

In addition to the marking requirements given in clause 8, the following shall apply to cooker tops:

a) **Type A**: The recommended maximum pot size shall be included in the instruction manual.

b) **Type B**:

1) the appliance markings (see.8.2(a)) shall be on or underneath the burner or on the mixing tube; and

2) the markings (see 8.3(c), (d) and (f)) shall contain statements advising users that

i) the burner assembly and pot stand shall only be used together and only on the specific container for which they were designed, and

ii) no attempt should be made to fit the burner and pot stand to any other container as it can make the appliance unsafe.

6.15 Boiling tables

6.15.1 Valve assemblies shall be protected from damage in the event that the boiling table is knocked over.

6.15.2 The cooking vessel supports shall be able to support a pot of a minimum diameter 150 mm with a tolerance of 0 mm + 10 mm irrespective of where the pot is placed within the outer perimeters of the support frame.

6.15.3 The gas line between burners in a multi-burner unit shall either be connected by metal tubing (see 5.10) with mechanical gas tight fittings, or a flexible hose that is compliant with the requirements of 5.10. Where a flexible hose is used, it shall be connected to each burner by hose clamps and protected from physical damage or the effects of heat by a metal cover along its full length between burners, rigidly affixed to the frame of the boiling table in such a way that a maximum hose temperature of 50 °C is not exceeded. The boiling table shall be tested in accordance with the test given in 7.10. The diameter of the pot shall be at least the diameter of the outside ring of the burner + 150 mm.

6.15.4 The appliance shall not reflect heat downwards to an extent that will cause damage to combustible surfaces below the burner(s).

6.16 Ring burners

6.16.1 A ring burner may consist of multiple rings. Each ring shall be fitted with a jet and controlled by a valve (see 5.6.1.)

6.16.2 The cooking vessel supports intended for a flat bottom pot shall support the pot in a stable manner.

6.17 Decorative fire equipment

Decorative fire equipment shall

a) be fitted with a flame-failure device that, when tested, complies with the requirements of 5.11.

b) unless designed and fitted as a flueless space heater (heater with no flue outlet), the appliance shall be fitted with a flue outlet for the removal of the products of combustion from the room in which the appliance is installed (see also 6.8.4),

c) be installed with no damper in the chimney or flue. However, if a damper is installed, it shall be fixed permanently in the open position, and

d) when supplied with artificial (decorative) logs, coals or similar, they shall be located in an acceptable position as prescribed by the manufacturer.

6.18 Appliances operating with non-refillable disposable containers and gas cartridges

6.18.1 General

6.18.1.1 This section applies to various types of portable appliances burning liquefied petroleum gas designed to be used with (non-refillable) gas cartridges that comply with the requirements of EN 417 and DOT 39. The following types of appliance are covered:

a) cooking appliances (such as hotplates, grills and barbecues);

b) lighting appliances;

c) heating appliances;

d) blow-torches; and

e) laboratory burners.

6.18.1.2 When an appliance is equipped with a connection for use with disposable containers, the cartridge type shall be specified.

6.18.2 Cartridges

Only the following cartridge types are acceptable:

a) pierceable cartridges manufactured in accordance with EN 417;

b) resealable cartridges manufactured in accordance with EN 417;

c) resealable cartridges manufactured in accordance with DOT 39 with a CGA No. 600 connection; and

d) 250 g horizontal cartridges manufactured in accordance with EN 417.

6.18.3 Markings

Markings of the appliance shall comply with the requirements as listed in 8.2.

6.18.4 Safety requirements

6.18.4.1 Connections

6.18.4.1.1 Whatever the type of gas container (such as a pierceable cartridge, a cartridge fitted with a valve, a cartridge with or without a centre boss, and a refillable reservoir), when following the instructions, connection of the appliance to the gas container shall be easy with minimal, if any, gas leakage.

6.18.4.1.2 For appliances with a direct rigid connection to the gas container(s), the CE type examination technical file for the appliance shall include diagrams and specifications of the gas containers (including their gas outlet connections) intended for the gas supply to the appliance.

6.18.4.2 Appliances directly fitted to the gas container

6.18.4.2.1 Appliances fitted to pierceable cartridges

The following safety requirements shall apply:

a) the design/construction of the appliance shall be such that there is no foreseeable replacement procedure sequence possible which can lead to an unsafe or unintended (or both) piercing of the cartridge by the user; and

b) the cartridge holder and the piercing device shall be such that

1) the piercing is centred in the position provided,

2) the soundness is ensured before piercing, and

3) after fitting the cartridge, it shall not be possible to remove it, instantaneously and unintentionally, without first having to remove the piercing device.

Figures D1 to D4 (inclusive) show the correct sequence for the fitting of a cartridge to the appliance shall be marked on the appliance (see annex D).

6.18.4.2.2 Appliances fixed onto cartridges with a female valve and threaded centre boss as defined in EN 417 (see figure 5)

6.18.4.2.2.1 The female thread of the adaptor (see figure 6) designed to be fixed onto the thread of the boss valve is defined as follows:

a) 7/16" – 28 threads unified form special (see figure 7);

b) major diameter : 10,96 mm minimum;

c) effective diameter : (10,66 to 10,75) mm;

d) minor diameter : (10,20 to 10,27) mm.

6.18.4.2.2.2 The part of the adaptor, with a full thread, shall be 3,10 mm ± 0,1 mm long (see figure 6(a)).

6.18.4.2.2.3 The thread shall penetrate fully into the seal groove without reduction in form.

6.18.4.2.2.4 A valve actuator shall be fixed on the axis of the adaptor in such a way that it allows the drawing off of gas from a full cartridge in accordance with 6.18.4.1. The valve actuator shall allow the release of gas from the cartridge when the appliance is screwed onto the valve with a minimum torque of 3 Nm.

6.18.4.2.2.5 The diameter of the valve actuator shall not exceed 2,20 mm if it is solid and shall be between 3,10 mm and 3,15 mm if it includes a gas way as indicated in figure 6(b). The valve actuator shall be concentric with the "7/16 in – 28 unified form thread" subject to a tolerance of 0,15 mm (see figures 6(a) and (b)).

6.18.4.2.2.6 At the point where the valve actuator comes into contact with the valve seat, the valve actuator diameter shall be at least 1,70 mm (see figure 6(a)).

NOTE It is recommended that adaptor manufacturers contact manufacturers of cartridge valves to establish the preferred design (see figure 6(b)). The valve actuator shown in figure 6(b)) comes in contact with the inner seal of the valve ensuring complete soundness when the cartridge is fitted.

6.18.4.2.2.7 A seal groove shall be machined at the bottom of the threaded part so as to centre and secure a seal (see figure 6(a)). This seal shall come into contact with the valve centre boss. The seal and the seal groove shall be such that there is no visible and permanent distortion of the threaded centre boss when the appliance is screwed onto the valve with a torque of 12 Nm.

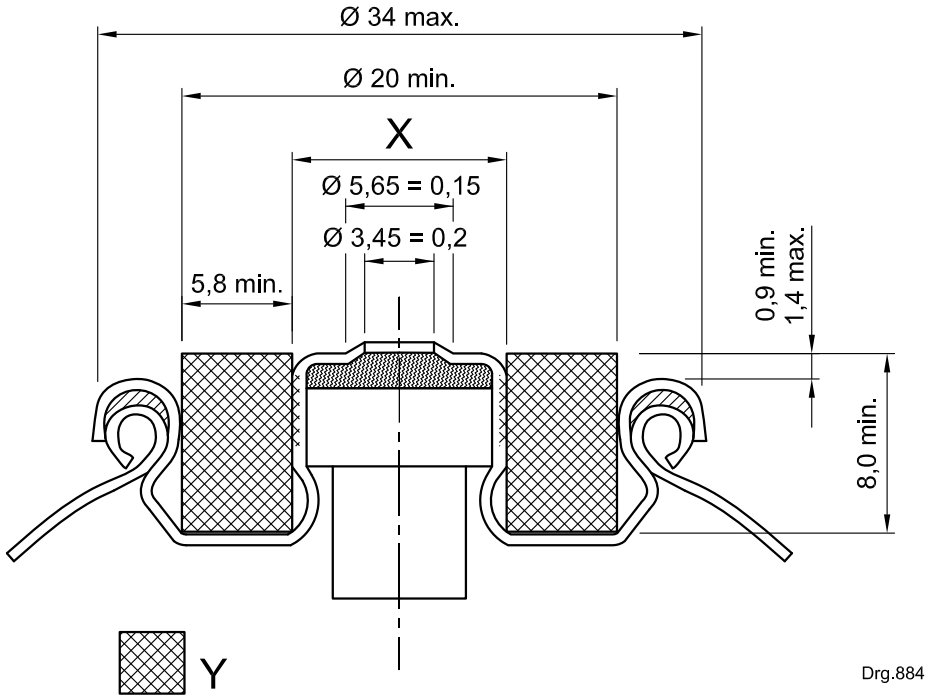
6.18.4.2.2.8 When tested in accordance with 7.18.2.4, the length of the valve actuator shall be such that it does not penetrate the valve for a distance exceeding 4,15 mm below the plane of the upper side of the centre boss when the appliance is screwed onto the valve with a torque of 12 Nm.

6.18.4.2.2.9 The inlet of the adaptor prior to the thread shall be a maximum of 2,00 mm deep and have a diameter of between 11,0 mm and 12,0 mm. In addition, the inlet of the adaptor shall begin with a 1,0 mm × 45° chamfer (see figure 6(a)).

6.18.4.2.2.10 The diameter of the adaptor that penetrates the valve seal groove shall not exceed 22,90 mm. This part shall not extend more than 3,5 mm from the start of the adaptor thread (see figure 6(a)).

6.18.4.2.2.11 The diameter of the adaptor beyond the 3,5 mm distance as defined in 6.18.4.2.2.10 shall be at least 30,0 mm. It shall be designed so as to rest on the roiled edge of the outer rim when fixing the appliance onto its cartridge and after the seal ensuring soundness has come in contact with the cartridge valve. If the appliance incorporates other parts at this point (for example blowlamp handles and plastic mouldings), the requirements of 6.18.4.2.2.10 shall be met, when these parts are in position.

6.18.4.2.2.12 The requirements of 6.18.4.2.2 shall be verified under the test conditions given in 6.18.1.2.



Key

X Thread Ø7/16 in – 28 unified form special 41/2 full threads min.
Y Clearance

Figure 5 — Cross section of a valve with centre boss

Dimensions in millimetres

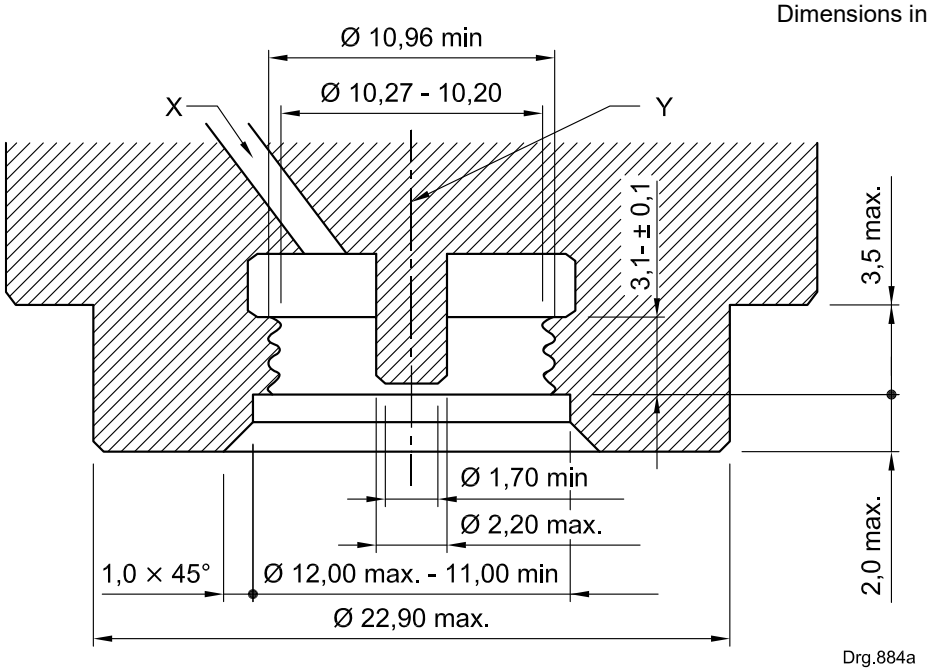
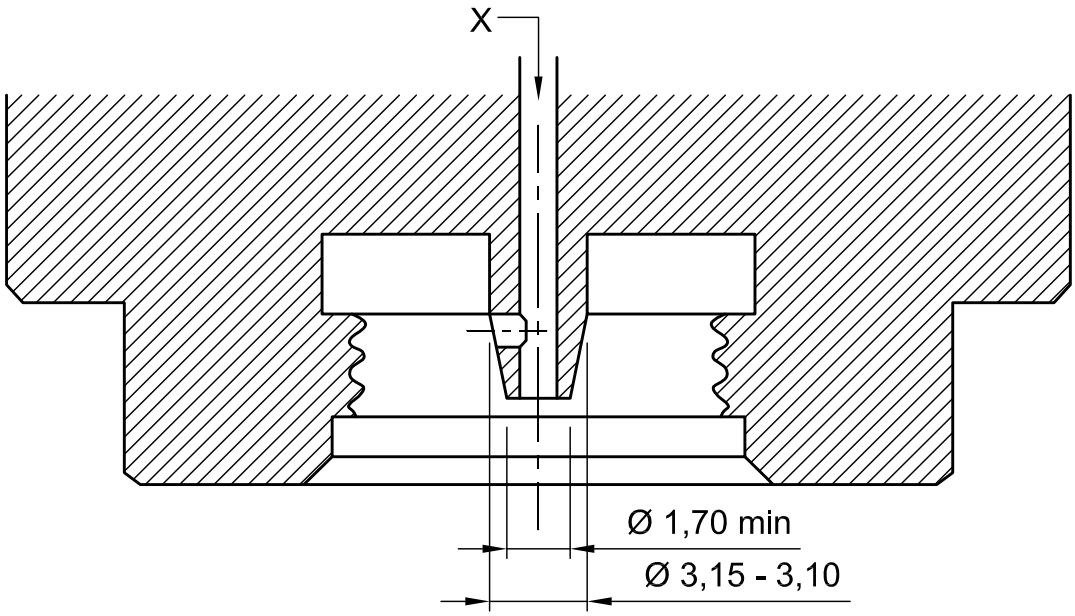


Figure 6(a) — Appliance adaptor with solid gas release device



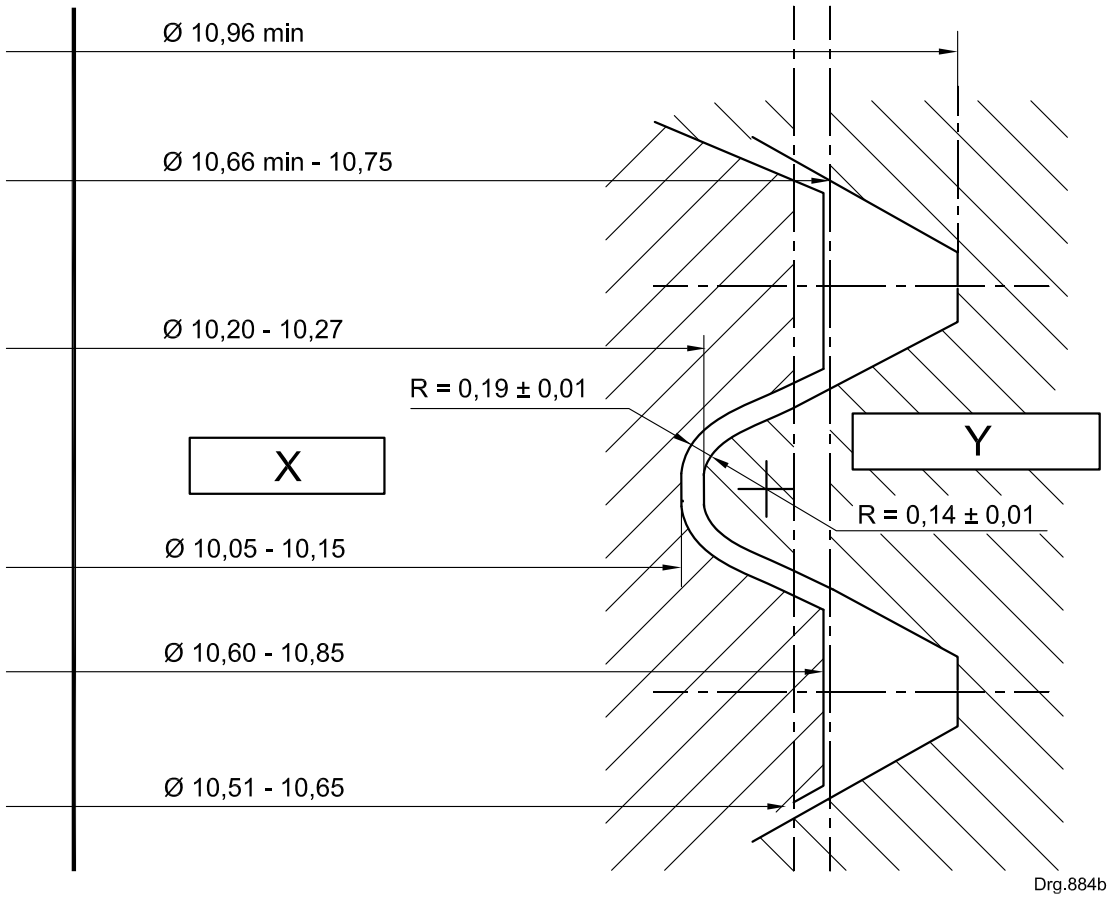
Key

X Gas passage
Y Valve actuator

Figure 6(b) — Appliance adaptor with hollow gas release device

Figure 6 — Appliance adaptor

Dimensions in millimetres



Key

X Valve
Y Adaptor

Figure 7 — Tolerances of valve and adaptor threads

7 Inspection and methods of test

7.1 Inspection

Visually examine each appliance in the sample for compliance with all the requirements of this standard for which tests to assess compliance are not given in 7.4 to 7.27 (inclusive).

7.2 Reference gas

7.2.1 For all LPG appliance tests, the appliances shall be tested with LPG with a ratio of 60/40 propane/butane with a tolerance of ± 5 %. Where appliances use non-refillable type cartridge containers, they shall be tested with the correct type of cartridge and correct gas type as prescribed for the appliance.

7.2.2 For all natural gas appliance tests, the appliances shall be tested with natural gas available in South Africa.

7.2.3 For all bio gas appliance tests, 35 % methane balance CO_2.

7.3 Setting up of appliance in the test room

Set up the appliance in accordance with the manufacturer's instructions and allow it to operate at maximum setting for a period of 10 min before any testing commences.

7.4 Stability of appliance

7.4.1 Place the appliance, with the appropriate gas container filled and fitted in the applicable way, on an inclined platform at an angle of 10° to the horizontal. Maintain the appliance on the platform for 1 min and check for compliance with 5.1(a) and 5.1(c).

7.4.2 In the case of a stove or boiling table, place a pot on each of the cooking tops (of size as illustrated in figure 4).

7.4.3 Fill the pot three-quarters full with water and maintain the appliance in the position for 3 min and check for compliance with 5.1(b). Repeat the above procedure in three other directions, each 90° from the preceding one.

7.4.4 Place the appliance with the mass pieces (refer to 7.5.1) fitted onto each of the pot stands and maintain the appliance in the positions stated in 7.4.1 and 7.4.3 for 1 min each and check for compliance with 5.1(d).

7.5 Test for rigidity and rigid attachment of stove and hotplate components (including boiling tables)

7.5.1 Apparatus

10 kg ± 0.1 Kg masspiece(s), of diameter 250 mm ± 3 mm.

7.5.2 Procedure

7.5.2.1 The procedure shall be carried out with both the room and the appliance at ambient room temperature.

7.5.2.2 Place the appliance on a level surface, fit all components in the normal way, and place the masspiece on top of the pot stand above the burner of the appliance. After 5 min, remove the masspiece and inspect the appliance and components for compliance with 5.4.

7.5.2.3 For multi-burner appliances and appliances with folding, removable or collapsible legs fit all components in the normal way, and place one 10 kg mass piece on top of the pot stand above each burner of the appliance. After 5 min, remove the masspieces and inspect the appliance and components for compliance with 5.4.

NOTE A five-burner appliance will carry five masspieces with a total weight of 50 kg.

7.6 Test for flame quality

7.6.1 For appliances with fixed primary air intake

Set the appliance up in the test room. Open the gas supply, adjust the gas flow as in normal practice, allow it to flow for 5 sec, and then ignite the flame. Check for compliance with 5.7.1.

7.6.2 For appliances with adjustable primary air intake

7.6.2.1 Adjust the primary air intake to the position that produces the most stable flame.

7.6.2.2 Adjust the primary air intake to decrease the quality of the flame.

7.6.2.3 Readjust the primary air intake to find a position that produces the most stable flame.

7.6.2.4 Extinguish the flame by closing the gas supply.

7.6.2.5 After 5 min, open the gas supply, allow it to flow for 5 sec, and ignite the flame.

7.6.2.6 Check for compliance with 5.7.2.2.1.

7.6.2.7 Allow the appliance to burn at full rate for 15 min and try to readjust the air intake. During the test, check for compliance with. 5.7.2.2.2.

7.7 Test for stability of flame against draught

7.7.1 Apparatus

Fan, that produces a wind velocity of up to 3 m/s over the entire side area of the appliance.

7.7.2 Procedure

Fit all relevant components to the appliance (including, when relevant, the draught protector), ignite the flame and allow it to burn for 1 min. Switch on the fan and place it at such a distance away from the appliance that the wind speed at close proximity to the appliance is equal to the appropriate of the following:

a) 1,0 m/s ± 0,1 m/s for built-in appliances and appliances generally intended to be used inside a building; and

b) 3,0 m/s ± 0,1 m/s for other appliances.

Check the stability of the flame for compliance with 5.8.

7.8 Test for leak-tightness

7.8.1 Apparatus

7.8.1.1 Pressure measuring devices , calibrated up to 3 000 kPa.

7.8.1.2 Air supply, at a pressure of at least 1 400 kPa.

7.8.1.3 Soap solution and brush.

7.8.2 Procedure

7.8.2.1 Attach the pressure gauge and air supply to the inlet of the appliance. Set the appliance as follows:

a) if no control valves are included, replace the jets with blank undrilled jets, and carry out the test in 7.8.2.2;

b) if control valves are included,

1) place all control valves in the fully closed position, carry out the test in 7.8.2.2, and then

2) place all control valves in the fully open position, block off the jets or replace the jets with blank jets, and repeat the test in 7.8.2.2.

7.8.2.2 Open the air supply and adjust the pressure to

a) 22 kPa for appliances that operate on a controlled supply not exceeding 5 kPa,

b) 200 kPa for appliances that operate on a controlled supply exceeding 5 kPa but less than 100 kPa inclusive, or

c) 1 400 kPa for appliances that operate on LPG supplied direct from a container.

Using the soap solution and brush, inspect all joints and valves for compliance with 5.6.2, 5.9(a) or 5.10.4(a) as applicable.

7.8.2.3 Maintain the pressure for 5 min and check the manifold (under pressure) for compliance with 5.9(a).

7.9 Test for strength of construction of manifolds

7.9.1 Apparatus

7.9.1.1 Pressure measuring devices, calibrated up to 3 000 kPa.

7.9.1.2 Water supply, at a pressure of up to 3 000 kPa.

7.9.2 Procedure

7.9.2.1 Attach the pressure gauge and water supply to the inlet of the manifold.

7.9.2.2 Close all valves.

7.9.2.3 Increase the water pressure to

a) 44 kPa for manifolds with a controlled supply not exceeding 5 kPa (can also be tested with air),

b) 400 kPa for manifolds with a controlled supply exceeding 100 kPa inclusive, and

c) 2 800 kPa for manifolds intended to be connected to the container direct.

7.9.2.4 Maintain the pressure for 5 min and check the manifold (under pressure) for compliance with 5.9.

7.10 Test for durability of non-metallic tubes, and for temperature and ease of operation of levers and knobs

With the appropriate gas container filled and fitted to the appliance in the applicable way, place a pan or pot filled with water (see table 2 or 6.15.3 as it is applicable) over the burners, open the gas supply, ignite the flame and allow it to burn at full rate for 3 h. While the appliance is operating, check for leakage, swelling, bursting or any other degrading of the tubes or hoses and check for compliance with 5.10.2. At the end of the test record the surface temperature of the operating lever or knob. Check for compliance with 5.6.4(g)(2).

Table 2 — Pot diameter and mass of water depending on the heat input of the burner

1	2	3
Nominal heat input of the burner kW	**Nominal internal diameter of the pot** mm	**Mass of water m_{e1} to be used** kg
,0 to 1,64	220	3,7
1,65 to 2,0	240[a]	4,8
2,1 to 4.2	260[a]	6,1
>4,2	300[a]	9,4
[a] If the indicated diameter (260 mm or 240 mm) is greater than the maximum diameter given in the user instructions supplied with the appliance, the test will be carried out using a pan with the next lower diameter (240 mm or 220 mm), containing the corresponding quantity of water (4,8 kg or 3,7 kg).		

7.11 Test for strength of operating levers and knobs (as relevant)

7.11.1 Apparatus

7.11.1.1 Scale, calibrated up to 5 kg.

7.11.1.2 Torque wrench.

7.11.2 Procedure

7.11.2.1 Fit the lever to the gas-operating spindle, as in normal practice. Attach the scale to the furthest extremity of the lever, and apply a load of 5 kg for 3 min

a) in a direction parallel to the axis of the operating spindle, and

b) at right angles to the axis of the lever.

7.11.2.2 Using the torque wrench, apply a torque of 2,5 Nm to each knob.

7.11.2.3 Remove the scale or torque wrench, as appropriate, and inspect the operating lever or knob and attachment for compliance with 5.6.4(g)(1).

7.11.2.4 By means of the operating lever or knob, operate by hand the valve to which it is attached and check for compliance with 5.6.4(g)(1).

7.12 Test for combustion

7.12.1 Apparatus

7.12.1.1 Pot, as illustrated in figure 4. Depending on the nominal heat input of the burner being tested,

a) the diameter of the pot to be used and the volume of water which it shall contain are given in table 2 above, and

b) for ring burners, the diameter of the pot shall be at least the diameter of the outside ring of the burner + 150 mm.

7.12.1.2 Collecting hood, as illustrated in figure 8. For burners with a heat output of more than 4.2kW, consider a suitable hood as specified in EN 30-1-1.

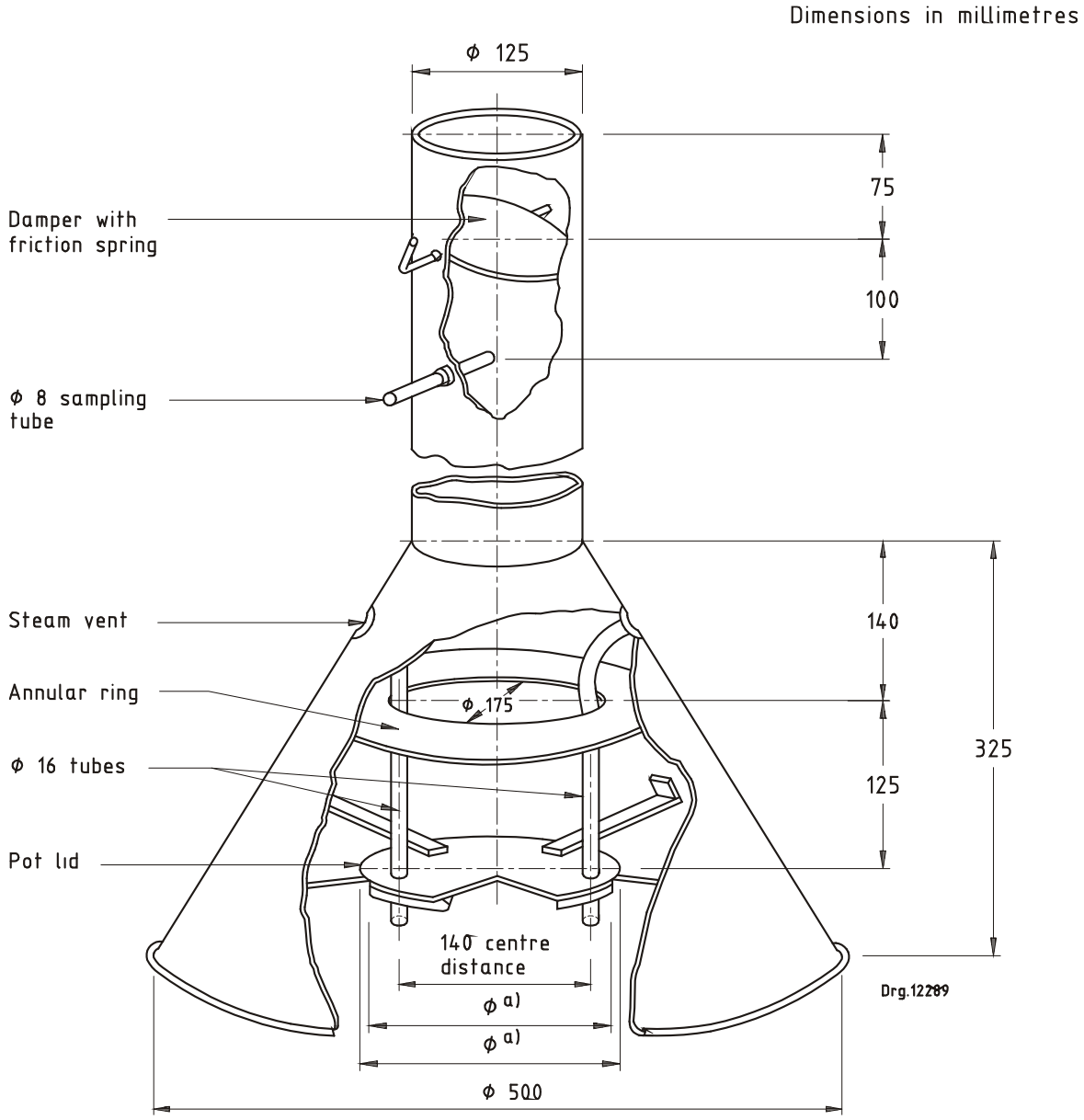
7.12.1.3 Gas-measuring instrument, that can measure the quantity of carbon monoxide and carbon dioxide developed inside the collecting hood while the appliance is in operation.

7.12.2 Procedure

7.12.2.1 Open the gas supply, ignite the flame and allow it to burn at full rate until the flame has become stable in performance. In the case of a cooker, place the pot filled with water on the cooking grid. Adjust any primary air intake adjusters to obtain an effective and stable flame. Place the collecting hood over the appliance. Ensure that the lid that is mounted in the hood (see figure 8), fits so securely on the pot that any steam that is developed is conveyed, via the vents, to the outside of the hood.

7.12.2.2 Insert the probe of the gas-measuring instrument into the sampling tube and measure the quantity of carbon monoxide and carbon dioxide evolved. Determine the CO/CO_2 ratio and check for compliance with 5.17.

7.12.2.3 In the case of space heaters and decorative fire equipment, a period of 30 min shall be allowed between ignition of the fire and before testing for CO/CO_2. This is to allow the appliance time to reach working temperature.



a) To match the diameter of the pot being used in the test.

Figure 8 — Collecting hood

7.13 Test for mounting of glass covers for lamps

7.13.1 Apparatus

7.13.1.1 Flat concrete floor, covered with a mild steel plate of thickness 5 mm.

7.13.1.2 Cycling device, that in one cycle lifts the lamp assembly under test to a height of 25 mm and then drops it. The device operates at a rate of at least 10 cycles per minute.

7.13.2 Procedure

For lamps intended for attachment directly to a container or gas cartridge, fit the lamp, complete with glass cover, to a gas cartridge or 3 kg container filled with gas to form a lamp assembly. Place the lamp assembly on the steel plate. Attach the cycling device to the lamp assembly, carry out 100 cycles, and inspect the lamp for compliance with 6.5.1.

7.14 Test for quality and durability of glass covers for lamps

To test for quality and durability of glass covers for lamps, the following shall be carried out:

a) Place the lamp in the normalizing enclosure for 24 h at 5 °C. Remove the lamp from the enclosure, fit it to a gas cartridge or a 3 kg container filled with gas to form a lamp assembly. Open the gas supply, light the lamp, and allow it to burn at full rate for 1 h.

b) Extinguish the flame and immediately return the lamp to the normalizing enclosure for 30 min. Check for compliance with 6.5.1.

c) Repeat the procedure given in 7.13.2 for a further five cycles, and check for compliance with 6.5.2.

Place the lamp in the normalizing enclosure for 24 h at 5 °C. Remove the lamp from the enclosure. fit the lamp, to a gas cartridge or 3 kg container filled with gas to form a lamp assembly open the gas supply, light the lamp and allow it to burn at full rate for 1 h. Extinguish the flame, and immediately return the lamp to the normalizing enclosure for 30 min and check for compliance with 6.5.1. Now repeat the procedure given in 7.13.2 a further five cycles and check for compliance with 6.5.2.

7.15 Test for operation of oven thermostats

7.15.1 Apparatus

Calibrated thermometer or temperature gauge, with a tolerance of 1 %.

7.15.2 Procedure

7.15.2.1 Place the thermometer in a position where the sensing tip does not touch any surface. The thermometer shall be placed in the centre of the oven.

7.15.2.2 Set the oven control to 100 °C or the minimum setting of the oven and ignite the burner. Let the burner burn through three cycles and record the maximum and minimum.

7.15.2.3 Repeat the procedure in 7.15.2.1 and 715.2.2 at 180 °C. Let the burner burn through three cycles and record the maximum and minimum.

7.15.2.4 At the end of the test, check for compliance with the requirements of 5.12.

7.16 Test of glued joints

7.16.1 Apparatus

7.16.1.1 An air supply, at a pressure of 1 400 kPa with a tolerance of – 0 kPa + 20 kPa.

7.16.1.2 A heating oven.

7.16.2 Procedure

7.16.2.1 Place the component in a heating oven at a temperature of 50 °C for a period of 48 h.

7.16.2.2 Remove the component and within 10 min, close one end and connect the air supply to the other end.

7.16.2.3 Increase the pressure to 1 400 kPa, allow the pressure to remain for 5 min and then inspect the joint for compliance with 5.10.4(b).

7.17 Test for ignition time of ring burners

7.17.1 Apparatus

7.17.1.1 Multiple ring burner.

7.17.1.2 Pot or steel plate, to suit the size of the ring burner.

7.17.1.3 Lighter, to allow proper ignition of all rings, with the pot or plate on, without burning the hand of the testing officer.

7.17.2 Procedure

7.17.2.1 Attach all necessary components.

7.17.2.2 Place the pot or plate on the ring.

7.17.2.3 Open the gas supply for 3 sec before ignition.

7.17.2.4 Ignite the gas and ensure that all rings ignite in accordance with 4.14.

7.18 Connections

7.18.1 Appliances fixed onto pierceable cartridges

The requirements of 6.18.4.2.1 shall be verified by visual examination and manipulation of the appliance with its gas container.

7.18.2 Appliances fixed onto female valve cartridges with a threaded centre boss

7.18.2.1 General

The general requirements of 6.18.4.2.2 shall be verified by visual examination, dimensional verification, and manipulation of the appliance with its gas container.

7.18.2.2 Valve opening

The appliance is screwed onto the cartridge supplied with a torque of 3 Nm. Check that the valve actuator opens the cartridge valve and that gas supplies the burner as required by 6.18.4.2.2.4.

7.18.2.3 Resistance to tightening torque

7.18.2.3.1 The test shall be carried out on samples of female valves with a threaded centre boss similar to those fixed onto the cartridges that have been supplied by the manufacturer of the appliance.

7.18.2.3.2 The valve shall be held tight by the clamp illustrated in figure 10 so as to avoid rotation.

7.18.2.3.3 The appliance adaptor shall be tightened until a torque of 12 Nm is obtained at a speed less than 1 Nm/s.

7.18.2.3.4 The appliance adaptor shall then be unscrewed and the requirements of 6.18.4.2.2.7 and 6.18.4.2.2.8 shall be met.

7.18.2.4 Maximum opening of the valve

7.18.2.4.1 The dimensions A and B shown in figure 9(a) shall be measured on a sample of a female valve with threaded centre boss and recorded.

7.18.2.4.2 The valve measured shall be fixed on the clamp (see figure 10), which is held so as to avoid rotation of the valve.

7.18.2.4.3 The appliance adaptor shall be screwed until a torque of 12 Nm is obtained for a speed less than 1 Nm/s.

7.18.2.4.4 The clamp shall then be loosened and the valve-adaptor assembly removed from the clamp.

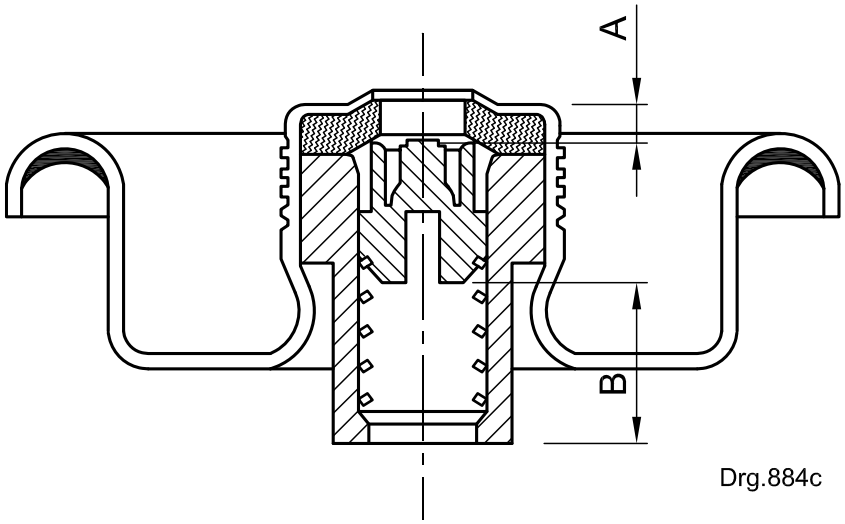
7.18.2.4.5 The dimension C (see figure 9(b)) shall be measured and the dimension *X* (see 6.18.4.2.2.8) shall be calculated as follows:

$$X = (A + B) - C$$

where

X shall not be greater than 4,15 mm.

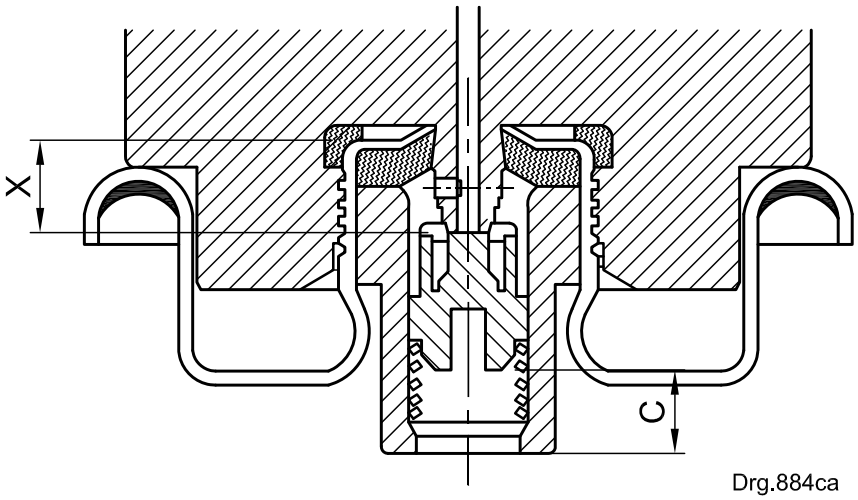
NOTE This test is carried out on a valve that has not been fixed onto a cartridge. Consequently, the valve centre boss will be pulled upwards in the appliance adaptor during the test. This is due to the abnormal tightening torque applied to the valve during the test. This raising of the centre boss during the test is not taken into account.



Key

A and B See 7.18.2.4.

Figure 9(a) — Valve fully closed



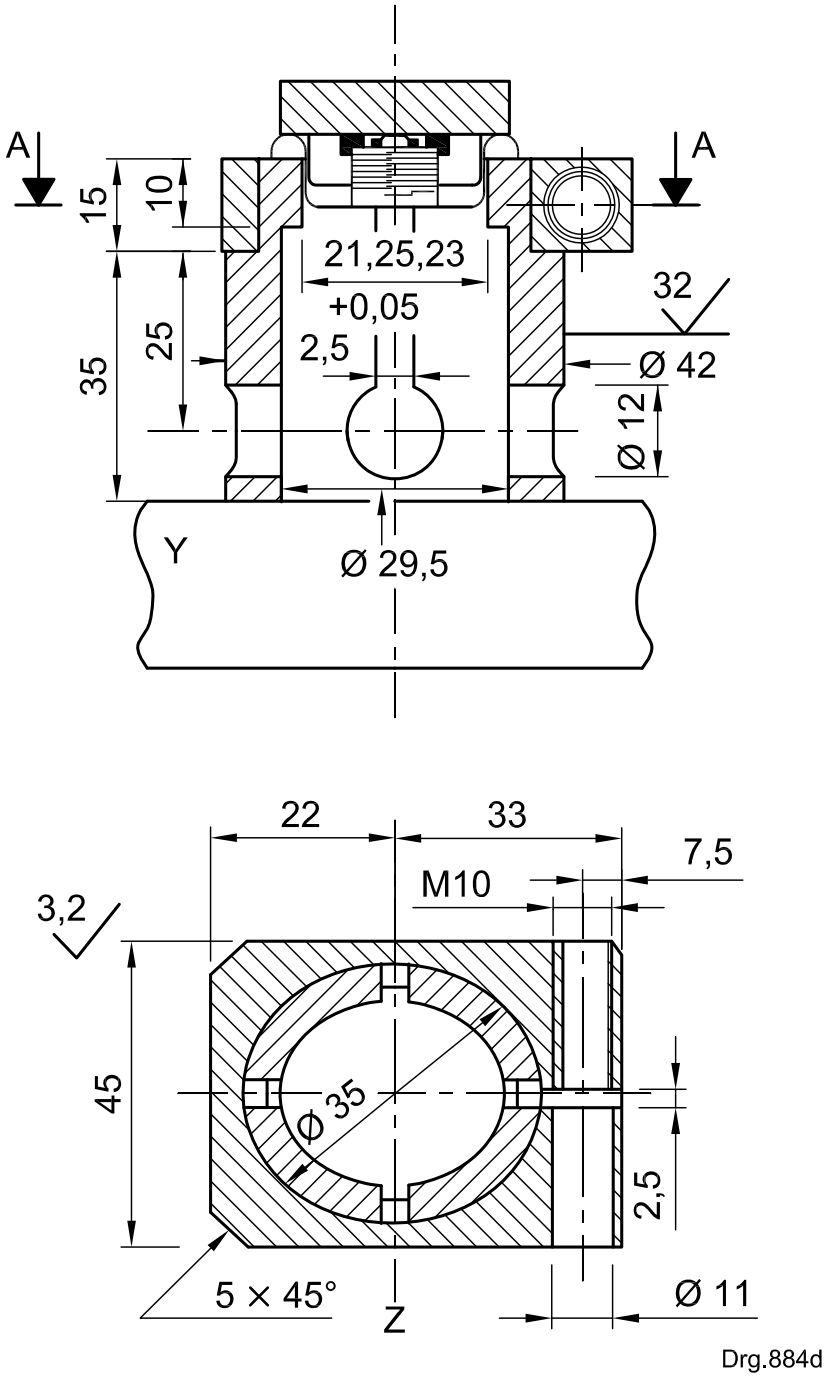
Key

C and X See 7.18.2.4.

Figure 9(b) — Valve fully opened

Figure 9 — Relative dimensions of the opening of the valve by adaptor

Dimensions in millimetres



Key

X Appliance adaptor
Y Base
Z View on 'AA'

Figure 10 — Test clamp

7.19 Test for combustion products discharge safety device

7.19.1 Test room

The test shall be conducted indoors in a well-ventilated room.

7.19.2 Apparatus

7.19.2.1 Flue of at least 1m in length .

7.19.2.2 A suitable item, to block (close off) the flue.

7.19.2.3 Stop watch.

7.19.3 Procedure

7.19.3.1 Install the water heater on a test bench in accordance with the manufacturer's installation instructions.

7.19.3.2 Fit a flue pipe vertically to the flue outlet.

7.19.3.3 Operate the water heater at minimum flame setting for at least 5 min to ensure that the installation is done correctly.

7.19.3.4 Whilst the heater is still in operation, block the top of the flue pipe outlet completely.

7.19.3.5 Record the duration from the time that the outlet was blocked until the heater shuts-off and check for compliance with 6.7.1.4(a).

7.19.3.6 Switch off the heater for 10 min before continuing with the test.

7.19.3.7 Remove the blockage from the flue pipe and operate the water heater at minimum flame setting for at least 5 min to ensure that the installation is done correctly.

7.19.3.8 Remove the flue pipe from the flue outlet.

7.19.3.9 Record the duration from the time that the flue pipe was removed until the burner shuts off and check for compliance with 6.7.1.4(b).

7.19.3.10 Repeat the procedure 7.19.3.2 to 7.19.3.9 (inclusive) with the flame setting on the maximum position.

7.20 Temperature sensing device (overheat protection)

7.20.1 Apparatus

7.20.1.1 Temperature measuring device.

7.20.1.2 External heating device.

7.20.2 Procedure

7.20.2.1 Install the water heater on the test bench in accordance with manufacturer's installation instructions and allow to run for at least 5 min to make sure that the installation is done correctly.

7.20.2.2 Switch the water heater off, and remove the overheat protection temperature device.

7.20.2.3 Mount the sensing device on the side of the external heating device in a way that will simulate the normal operating condition of the temperature sensing device.

7.20.2.4 Connect a temperature measuring device adjacent to the sensor on the external heating device.

7.20.2.5 Connect the temperature sensing device to the wire harness of the water heater as in normal use (an additional electrical cord can be used as an extension), switch the water heater on and allow it to operate as in normal use.

7.20.2.6 Increase the temperature of the external heating device.

7.20.2.7 Record the temperature at which the safety device switches the water heater off and check for compliance with 6.7.1.5.

7.21 Combustion fan (electronic control water heaters)

7.21.1 Apparatus

7.21.1.1 Toggle switch.

7.21.1.2 Electrical wire with connection lugs.

7.21.1.3 Hand tools.

7.21.2 Procedure

7.21.2.1 Remove the outer cover of the water heater and bypass one of the two wires leading to the fan through a toggle switch. Place the toggle switch where it will be easy to operate once the water heater is in operation.

7.21.2.2 Reassemble the water heater.

7.21.2.3 Install the water heater on the test bench in accordance with the manufacturer's installation instructions and allow to run for at least 5 min to make sure that the installation is done correctly.

7.21.2.4 Switch the fan off and note whether the water heater switches off and record the duration from the moment that the fan was switched off to the actual time of total shutdown of the gas supply and check for compliance with 6.7.1.6.

7.22 Oxygen depletion sensor (ODS)

7.22.1 Appliances with removable ODS system

7.22.1.1 Apparatus

7.22.1.1.1 Metal box, approximately 800 mm high × 500 mm wide × 400 mm deep with a hinged, sliding or removable door or cover through which it is possible to see the ODS being tested and that is sealed against the ingress of air into the box when in the closed position. The door or cover shall be fitted on one of the 800 mm × 500 mm sides of the box.

The box shall be fitted with a mounting bracket to which the ODS being tested can be attached whilst under test. When attached to the mounting bracket, the ODS shall be positioned in the approximate geometric centre of the box.

The box shall have a hole conveniently positioned to accept a probe from a CO/CO_2 monitoring device.

The box shall have a facility to remotely supply LPG or NG as required to the ODS being tested. The gas supply shall be connected to the ODS from a control valve mounted with the control knob outside the box. The control valve shall be fitted with a flame failure device connected to the thermocouple on the ODS being tested, which will automatically shut off the gas supply when the pilot flame on the ODS is extinguished.

7.22.1.1.2 Calibrated flue gas analyser, that can measure the oxygen level and quantity of carbon monoxide developed inside the box whilst the test is being carried out.

7.22.1.2 Procedure

7.22.1.2.1 Place the box securely on a worktop with the longer side in a vertical orientation.

7.22.1.2.2 Attach the ODS to the mounting bracket.

7.22.1.2.3 Fit the gas supply to the control valve.

7.22.1.2.4 Fit the gas supply pipe from the control valve to the ODS.

7.22.1.2.5 With the door in the open position ignite the ODS pilot burner and allow to burn for a minimum of 2 min.

7.22.1.2.6 Place the flue gas analyser probe in a position such that the free end of the probe is adjacent and not above the ODS.

7.22.1.2.7 With the ODS pilot burner still ignited, close the door of the box and monitor the O_2 and CO readings indicated by the flue gas analyser. Record the levels of O_2 and CO at the point where the ODS pilot burner flame is extinguished.

7.22.1.2.8 Check for compliance with 5.19.

7.22.2 Appliances with non-removable ODS system

7.22.2.1 Test room

7.22.2.1.1 Configuration

Volume: (9 ± 1) m^3.

Height to ceiling: (2,5 ± 0,2) m.

Maximum difference between length and width (internal surfaces): 0,50 m.

7.22.2.1.2 Construction

A 110 mm flue outlet shall be installed above the water heater with an air tight latch.

Lower ventilation holes with a total free-air supply of 100 cm^2 distributed equally on opposite walls to the appliance. Each ventilation hole shall be air tight when closed.

7.22.2.1.3 Equipment

The test room shall contain the following:

a) supply points for the various gases; and

b) a sink having the following approximate useful dimensions:

1) width: (40 ± 10) cm;

2) length: (50 ± 10) cm;

3) depth: (10 ± 3) cm;

4) with its base located 0,7 m from the floor; and

5) a drain for the waste water.

7.22.2.2 Apparatus

Calibrated flue gas analyser, to measure the oxygen level and quantity of carbon monoxide developed inside the room whilst the test is being carried out.

The sampling point for the test is located in the centre of the room at the following height above the floor:

a) type A water heaters – 1,4 m; and

b) space heaters – 0,5 m.

7.22.2.3 Installation of the appliance in the test room

7.22.2.3.1 Type A water heaters

The appliance shall be installed in the test room above a sink and centred on one of the sides of the room. It shall be fixed in accordance with the manufacturer's instructions on a support plate measuring 80 cm in width and 100 cm in height, placed 10 cm away from the test room wall and such that the burner is located about 1,4 m from the floor.

7.22.2.3.2 Space heaters

The space heater shall be installed in the test room in accordance with the manufacturer's instructions and placed at least 10 cm away from the test room wall.

7.22.2.4 Test procedure

7.22.2.4.1 Test for oxygen depletion system for type A water heaters

NOTE Ensure the test room is carefully ventilated before each test.

7.22.2.4.1.1 The tests are carried out with each of the reference gases as applicable.

7.22.2.4.1.2 The appliance shall be tested with a water supply at ambient temperature. The water rate shall then be adjusted to obtain a temperature rise of 25 °C at the maximum heat input.

7.22.2.4.1.3 With the door, air vents and flue outlet in the open position, ignite the water heater and allow it to operate for a minimum of 2 min.

7.22.2.4.1.4 Close the door, vents and outlet flue and monitor the values of O_2 and CO in the test room continuously until, after operation of the ODS, the O_2 contents no longer decreases, and the CO contents no longer increases.

7.22.2.4.1.5 Check the values for compliance with the requirements of 5.19.

7.22.2.4.2 Space heaters

NOTE Ensure the test room is carefully ventilated before each test.

7.22.2.4.2.1 The tests shall be carried out with each of the reference gases as applicable.

7.22.2.4.2.2 With the door, air vents and flue outlet in the open position, ignite the water heater and allow it to operate for a minimum of 2 min.

7.22.2.4.2.3 Close the door, vents and outlet flue and monitor the values of O_2 and CO in the test room continuously until, after operation of the ODS, the O_2 contents no longer decreases, and the CO contents no longer increases.

7.22.2.4.2.4 Check the values for compliance with the requirements of 5.19.

7.23 Determination of sealing ability of joint washers

7.23.1 Apparatus

LPG container, that is filled to its normal working capacity and that has an undamaged outlet connection designed to accept the connection/appliance under test.

7.23.2 Procedure

7.23.2.1 Fit the connection/appliance to the container and screw it in hand-tight, as in practice.

7.23.2.2 Seal the outlet of the connection/appliance and open the container valve.

7.23.2.3 Using a soap solution and brush, check for leakage of gas around the sealing washer.

7.23.2.4 With the container valve still in the open position, loosen the connection/appliance until excessive leakage occurs at the sealing washer or through two full turns, whichever occurs first.

7.23.2.5 Tighten the connection/appliance again and check for leakage (7.23.2.3).

7.23.2.6 Repeat this procedure four times (i.e. to a total of five times), each time checking for leakage of gas past the sealing washer.

7.23.2.7 Check for compliance with 5.16.

7.24 Test for dezincification resistance

Subject copper alloy components that are intended to be in direct contact with water to the test given in SANS 6509 and check for compliance with 6.7.1.1. Alternatively, a manufacturer's test report obtained from an accredited test laboratory, which includes SANS 6509 within its scope of accreditation, shall be acceptable.

7.25 Hydraulic test

7.25.1 Apparatus

7.25.1.1 Water supply, of which the pressure can be adjusted up to 1 200 kPa.

7.25.1.2 Calibrated pressure gauge.

7.25.1.3 Shutoff valve.

7.25.1.4 Timing device.

7.25.2 Procedure

7.25.2.1 Connect the water supply to the water heater inlet and fit the pressure gauge.

7.25.2.2 Connect the shutoff valve to the outlet.

7.25.2.3 With the outlet of the water heater closed, adjust the inlet pressure to 1 000 kPa. Allow the pressure to remain for 5 min and then check the water heater for compliance with 6.7.1.3.

7.26 Test for resistance to fatigue (closed type water heaters)

7.26.1 Connect the cycling timer to the water heater, one valve fitted close to the water heater inlet and the other valve close to the water heater outlet. Connect the inlet valve to a water supply (ambient temperature) at a pressure equal to the rated pressure of the water heater under test subject to a tolerance of −10 %. In the case of appliances that incorporate heat exchangers, pressurize the heat exchanger to its marked (rated) working pressure before and during the fatigue test and the hydrostatic pressure test.

7.26.2 Fill the water heater with water, ensuring that no air is entrapped, and set the cycling timer in action. Adjust the setting of the valves to ensure that, during each cycle the water pressure in the water heater rises to the rated pressure of the water heater −10 % and reduces to a value of between 5 % and 10 % of the rated working pressure.

7.26.3 Subject the water heater to 250 000 cycles under these conditions.

7.26.4 During the test, inspect the container for any deformation or leakage and verify for compliance with the requirements of 6.7.6.4. At the conclusion of the test visually examine any lining, when relevant, for compliance with the requirements of 6.7.6.4.

7.27 Test for resistance to hydrostatic pressure

At the conclusion of the fatigue test (see 7.26), close the outlet pipe of the water heater, subject the water container for 15 min to the appropriate hydrostatic test pressure given in column 2 of table 3 and then examine the water container for compliance with the requirements of 6.7.6.5.

Table 3 — Test pressure

1	2
Type of water heater	**Hydrostatic test pressure**
Rated at ≤ 50 kPa	50 kPa
Rated at > 50 kPa	2 × working pressure

8 Packing and marking

8.1 Packing

All appliances submitted for testing and verification shall be packed in the intended resale packaging. Such appliances shall be so packed that the product is protected from damage during normal handling, storage, and transportation.

8.2 Marking

8.2.1 The indelibility of the marking shall be such that when rubbed by hand for 15 sec with a piece of cloth soaked with water and again for 15 sec with a piece of cloth soaked with petroleum spirit, the marking shall be clearly legible and not be easily removed.

8.2.2 Each appliance shall be legibly and indelibly marked, in an easily identifiable position, either directly on the body or on an acceptable nameplate securely attached to the body, with at least the following information:

a) The markings shall appear on at least one major component part of the body:

1) the manufacturer's name, trade name or trademark;

2) the operating pressure in kilopascals (kPa);

3) the design consumption for LPG appliances in grams per hour (g/h) and for natural gas and biogas in kilowatts (kW), megajoule (MJ) or cubic metres per hour (m^3/h);

4) the type of gas for which the appliance is intended; and

5) the model number.

b) When required, the words "FOR OUTDOOR USE ONLY" shall be legible and permanently displayed on the appliance. The wording shall be at least 10 mm in height.

c) Where applicable, the type of water heater (see 6.7).

d) Where applicable, the appliance shall be additionally marked as follows:

1) where the operating pressure of the appliance requires a regulator with a capacity in excess of 2,8 kPa, and the appliance is sold through a normal retail outlet, an additional label shall state the requirement for such special regulators (see 8.3(t));

2) when the appliance is designed for use with a disposable cartridge, the type of cartridge shall be identified; and

3) for dual fuel appliances, an additional label is required indicating the type of gas for which the appliance is set up. The label shall be durable and located permanently as near as possible to the inlet connection.

8.3 Additional information

Each appliance shall have the following information given on a sticker or in a booklet:

a) statements such as "Read these instructions carefully before using the appliance and retain them for future reference".

b) the type of gas for which the appliance is intended;

c) instructions for the correct and safe operation of the appliance;

d) any dangerous practices or conditions that should be avoided;

e) the proper procedure for maintenance of the appliance, and the service intervals (where applicable); flexible tubing and hose shall be checked for signs of rupture, cracking, and perishing, and shall be replaced if necessary but at least every 5 y from date of installation

f) a caution as to what adjustments should not be carried out;

g) such adjustments as might be necessary for the effective use and operation of the appliance;

h) the use of automatic ignition devices (where applicable);

i) the location of pilot flame(s), flash tubes and other points of burner ignition (where applicable);

j) the use of thermostatic control (where applicable);

k) the "off" position of all manual control valves and the method of opening and closing such valves;

l) the "open/closed" position of ball and taper plug valves;

m) the method of adjusting primary air requirements to individual burners;

n) how to relocate burner caps correctly;

o) the action to be taken in the event of burn-back, i.e. ignition under the burner cap or aeration adjustment;

p) the action to be taken in the event of gas leakage;

q) that all appliances fitted with an integral draught diverter (for example, instantaneous water heaters) be fitted with a secondary flue;

r) that ventilation is vital for the efficient performance of all appliances and for the safety of the occupants of the room in which the appliance is installed (see also annex C);

s) that sealing washers should be correctly located and tested in accordance with the manufacturer's instructions;

t) a reference to the correct pressure regulator that should be used, if applicable;

u) when an appliance is intended to be permanently installed, that the installation shall only be carried out by a registered installer and that such installations shall comply with the requirements of SANS 10087-1 or SANS 827, as applicable.

Annex A
(normative)

Biogas appliances

A.1 Due to biogas being a naturally produced source of energy, the energy and composition could vary from day to day from the same source. Flame and combustion stability are influenced by variable supply pressure and calorific value.

A.2 Special care should be taken to the fact that corrosive elements like Hydrosulphide, Carbon dioxide and moisture is present in the gas.

A.3 Applicable filters in accordance with manufacturers specification shall be installed upstream of the appliance.

A.4 Additional safety features like gas detectors could be an option as an additional measure.

A.5 Modification of standard natural gas or LPG appliances to biogas is not permitted.

A.6 Only appliances supplied by the manufacturer designed for multiple fuel types may be converted in accordance with the instruction to use biogas.

A.7 The manufacturer shall state that the appliance is suitable for biogas.

Annex B
(normative)

Safe connecting instructions of regulator to container

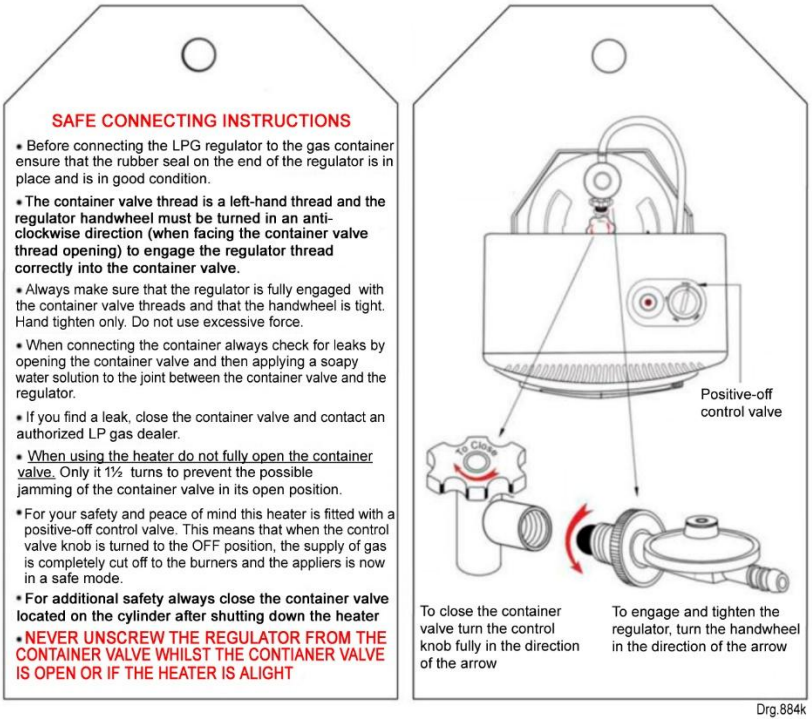


Figure B.1 — Swing tag for bull nose regulator

The above swing tag is for use only on roll-about heaters used with a 9 kg container.

Annex C
(normative)

Flueless space heater requirements with specific reference to information to be provided in the user/installer manual

C.1 Instructions for flueless space heater systems shall include information to the installer/user indicated in C.2 to C.5 (inclusive).

C.2 The appliance may not be installed/used in a bedroom or bathroom.

C.3 The minimum size room volume in cubic metres in which the appliance may be installed/used without the provision of permanent ventilation. The calculation to develop the minimum room volume shall be based on the following requirement:

Where the heat input is greater than 0,2 MJ/h (0,056 kW) per cubic metres of room volume then permanent ventilation shall be provided in the room.

Example:

A 25 MJ appliance requires a minimum room volume of 25 ÷ 0,2 = 125 m^3.

The calculation itself need not be shown in the user/installation manual but the result of the calculation shall be indicated together with the warning that if the room volume is not at least of that size then permanent ventilation shall be provided.

C.4 When applying the calculation in C.3, the heat input of any other gas/solid fuel or paraffin burning appliances shall be added to the heat input of the flueless heater to be installed. A note shall be included in the user/installer instructions that it is the installer's responsibility to ensure that if relevant, this calculation is carried out.

Example 1:

If existing appliances of the type indicated above having a heat input of 15 MJ share the same room volume as the flueless heater with a heat input of 40 MJ, then the calculation to be done to establish the minimum room volume allowed for the installation of the flueless heater without the provision of permanent free air ventilation would be:

(15 + 40) ÷ 0,2 = 275 m^3

Example 2:

If the total available room volume is 95 m^3 and there are already appliances in the room with a heat input of 12 MJ then find the maximum heat input that may be added to that room volume without the provision of permanent free air ventilation:

12 ÷ 0,2 = 60 m^3

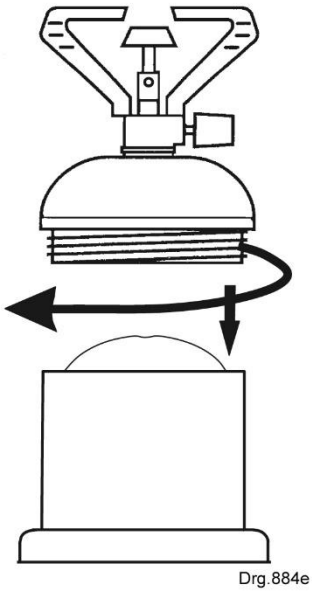
95 − 60 = 35 m^3

35 × 0,2 = 7 MJ/h

C.5 Where permanent ventilation is required (flueless appliances) in relation to the room volume or as a result of installation, the user/installer instructions shall indicate that two permanent ventilation openings with each opening having a free cross-sectional area of not less than 6.5 cm^2/MJ/hr of heat input shall be installed, one at high level and one at low level.

Annex D
(informative)

Examples of acceptable solutions for pierceable devices

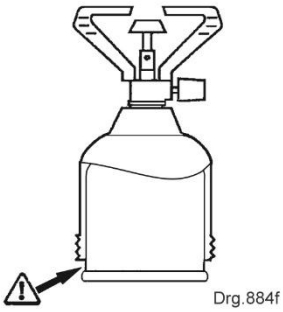


Note: The pierceable device is fixed with the top housing.

The cartridge is held by a housing that is
made in two pieces screwed together: small upper part, large bottom.

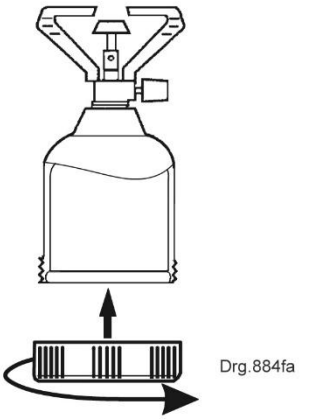
Figure D.1 — Pierceable device in small upper part

Note: The pierceable device is fixed with the top housing.



Not possible

Note: The cartridge should not extend beyond the lower edge of the housing.



Note: The cartridge is held by a large housing that has a small removable part (screw type system) at the bottom to close the housing.

Figure D.2 — Fixed Pierceable device in a large- housing

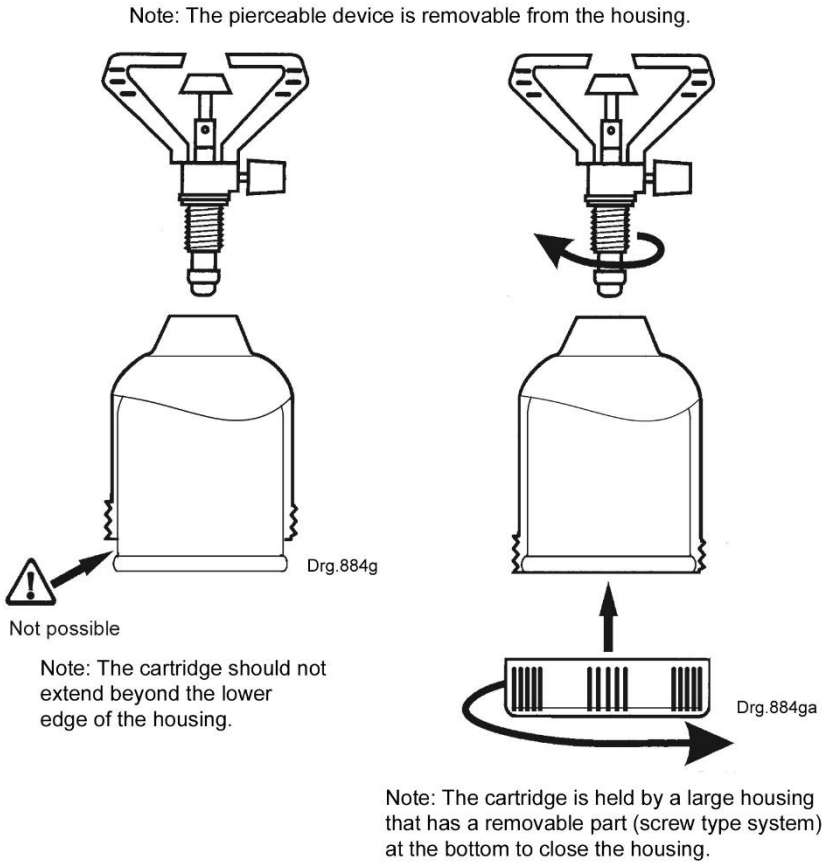
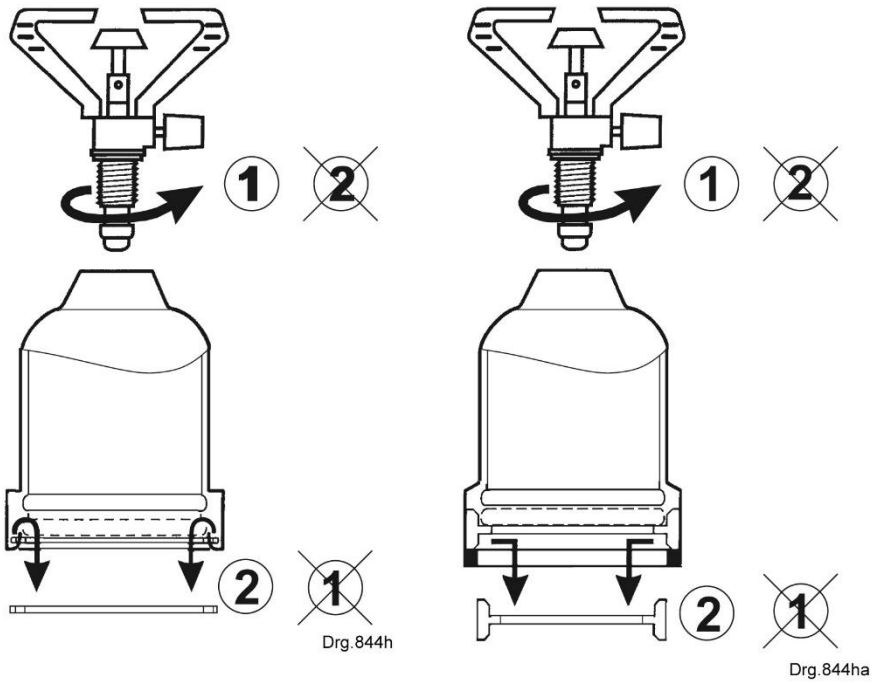


Figure D.3 — Removable fixed pierceable device



Note: The pierceable device is removable from the housing.

The cartridge is held by a large housing that has a removable part 2, which cannot be removed unless the piercing device 1 has been removed before.

Figure D.4 — Removable fixed pierceable device

Bibliography

SANS 1067-1, *Copper-based fittings for copper tubes – Part 1: Compression fittings*.

SANS 1067-2, *Copper-based fittings for copper tubes – Part 2: Capillary solder fittings*.

SANS 1109-1/ISO 7-1, *Pipe threads where pressure-tight joints are made on the threads – Part 1: Dimensions, tolerances and designation*.

SANS 1109-2/ISO 7-2, *Pipe threads where pressure-tight joints are made on the threads – Part 2: Verification by means of limit gauges*.

SANS 1774, *Liquefied petroleum gases*.

SANS 9001/ISO 9001, *Quality management systems – Requirements*.

SANS 12942/EN 12942, *Respiratory protective devices – Power assisted filtering devices incorporating full face masks, half masks or quarter masks – Requirements, testing, marking.*