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Edition 6

SOUTH AFRICAN NATIONAL STANDARD

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

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Table of changes

Change No.	Date	Scope

Foreword

This South African standard was approved by National Committee SABS/TC 1019, *Gas supply, handling and control (fuel, industrial and medical gases),* in accordance with procedures of the SABS Standards Division, in compliance with annex 3 of the WTO/TBT agreement.

This document was published in August 2013.

This document supersedes SANS 10087-1:2008 (edition 5).

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

SANS 10087 consists of the following parts, under the general title *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.

Part 2: Installation of LPG systems in mobile units, including but not limited to caravans, motor homes, park homes and mobile kitchens.

Part 3: Liquefied petroleum gas installations involving storage vessels of individual water capacity exceeding 500 L.

Part 4: The transportation of LP gas including the design, construction, inspection, fittings, filling, maintenance and repair of LP gas bulk vehicles and rail tank cars.

Part 6: The application of liquefied petroleum and compressed natural gases as engine fuels for internal combustion engines.

Part 7: Storage and filling premises for refillable liquefied petroleum gas (LPG) containers of gas capacity not exceeding 9 kg and the storage of individual gas containers not exceeding 48 kg.

Part 8: Filling containers for LP gas operated fork lift vehicles in-situ.

Part 10: Mobile filling stations for refillable liquefied petroleum gas (LPG) containers of capacity not exceeding 9 kg.

This document was written in order to support a specific South African Regulation and, of necessity, includes references to South African legislation. It therefore might not be suitable for direct application in other jurisdictions where conflicting legislation exists.

Annex A forms an integral part of this document. Annexes B, C, D, E and F are for information only.

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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

1 Scope

1.1 This part of SANS 10087 specifies requirements for the materials, the methods of construction and the installation of equipment used in liquefied petroleum gas applications for domestic and commercial installations that involve gas containers of individual water capacity not exceeding 500 L and of a combined water capacity not exceeding 3 000 L.

NOTE For the storage of containers for retail and exchange purposes, see SANS 10087-3 or SANS 10087-7 as applicable.

1.2 It also specifies the maintenance, inspection and testing of the various components of the equipment.

1.3 It covers the installation of appliances, piping, fittings and other components.

NOTE For industrial installations, see SANS 10087-3.

2 Normative references

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

ANSI LC-1/CSA 6.26, *Fuel gas piping systems using corrugated stainless steel tubing (CSST).*

API Spec 5L, *Specification for line pipe*.

AS 4176, *Polyethylene/aluminium and cross-linked polyethylene/aluminium macro-composite pipe systems for pressure applications.*

ASME-BPVC 7, *Construction of pressure vessels.*

ASTM F 1281, *Standard specification for crosslinked polyethylene/aluminum/crosslinked polyethylene (PEX-AL-PEX) pressure pipe.*

ASTM F 1282, *Standard specification for polyethylene/aluminum/polyethylene (PE-AL-PE) composite pressure pipe.*

BS 1600, *Specification for dimensions of steel pipe for the petroleum industry*.

BS 3212, *Specification for flexible rubber tubing, rubber hose and rubber hose assemblies for use in LPG vapour phase and LPG/air installations*.

BS 5292, *Specification for jointing materials and compounds for installations using water, low-pressure steam or 1st, 2nd and 3rd family gases*.

BS 7838, *Specification for corrugated stainless steel semi-rigid pipe and associated fittings for low-pressure gas pipework of up to DN 50.*

EN 853*, Rubber hoses and hose assemblies – Wire braid reinforced hydraulic type – Specification.*

EN 1762, *Rubber hoses and hose assemblies for liquefied petroleum gas, LPG (liquid or gaseous phase), and natural gas up to 25 bar (2,5 MPa) – Specification.*

EN 15266, *Stainless steel pliable corrugated tubing kits in buildings for gas with an operating pressure up to 0,5 bar.*

SANS 24, *Soft solders*.

SANS 62-1, *Steel pipes – Part 1: Pipes suitable for threading and of nominal size not exceeding 150 mm.*

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

SANS 460, *Plain-ended solid drawn copper tubes for potable water.*

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

SANS 1123, *Pipe flanges*.

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 1186-1, *Symbolic safety signs – Part 1: Standard signs and general requirements*.

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

SANS 1453, *Copper tubes for medical gas and vacuum services.*

SANS 1539, *Appliances operating on liquefied petroleum gas (LPG) or natural gas (NG) – Safety aspects*.

SANS 1910, *Portable refillable fire extinguishers*.

SANS 4437/ISO 4437*, Buried polyethylene (PE) pipes for the supply of gaseous fuels – Metric series – Specifications.*

SANS 4633/ISO 4633, *Rubber seals – Joint rings for water supply, drainage and sewerage pipelines – Specification for materials.*

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

SANS 10087-3, *The handling, storage, distribution and maintenance of liquefied petroleum gas in domestic, commercial, and industrial installations – Part 3: Liquefied petroleum gas installations involving storage vessels of individual water capacity exceeding 500 L*.

SANS 10087-7, *The handling, storage, distribution and maintenance of liquefied petroleum gas in domestic, commercial, and industrial installations – Part 7: Storage and filling premises for refillable liquefied petroleum gas (LPG) containers of gas capacity not exceeding 9 kg and the storage of individual gas containers not exceeding 48 kg*.

SANS 10108, *The classification of hazardous locations and the selection of apparaus for use in such locations.*

SANS 10140-3, *Identification colour markings – Part 3: Contents of pipelines*.

SANS 10268-2, *Welding of thermoplastics – Welding processes – Part 2: Electrofusion welding.*

SANS 10400 (SABS 0400), *The application of the National Building Regulations*.

SANS 17484-1/ISO 17484-1, *Plastics piping systems – Multilayer pipe systems for indoor gas installations with a maximum operating pressure up to and including 5 bar (500 kPa) – Part 1: Specifications for systems.*

3 Definitions

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

3.1
acceptable
acceptable to the approving authority

3.2
appliance technician
registered person that has the ability, appropriate training, knowledge and experience to carry out work on specific appliances

3.3
approved
approved by the approving authority

3.4
approving authority
appropriate of the following:

a) within the scope of the Trade Metrology Act, 1973 (Act No. 77 of 1973), and in respect of the control of the mass of gas sold: the Director of Trade Metrology;

b) within the scope of the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993), and in respect of the control of general safety: the Chief Inspector;

c) within the scope of SANS 10400 and in respect of the evaluation and control of installations in accordance with this part of SANS 10087: the local authority in whose area of jurisdiction the installation is installed;

d) within the scope of the Mine Health and Safety Act, 1996 (Act No. 29 of 1996) and in respect of the control of the general safety: the Chief Inspector

3.5
assembly
system that includes connection by pipe or similar ducts, fittings and valves that operate under gauge pressure and are used for the conveyance of liquid or vapour

3.6
competent person
any person that has the knowledge, training and experience specific to the work or task being performed

3.7
container
cylinder that complies with SANS 10019 and that is approved for the storage and conveyance of liquefied petroleum gas of individual water capacity not exceeding 500 L

3.8
critical location
area that is not ventilated for the dispersal of LPG

3.9
domestic installation
gas system installation which is installed on a residential property with the classification H3 or H4

3.10
diversion wall
solid non combustible wall erected with the specific purpose of ensuring and maintaining the appropriate safety distances between the point of gas release and any drains, doors and windows in buildings, and possible sources of ignition

3.11
equipment
combination of pipes, pipe fittings, appliances and any appurtenances connected to the system

3.12
firewall
solid non-combustible wall with a fire rating of 240 min and height of at least 1,8 m, constructed and placed with the specific purpose of preventing the spread of fire as a result of the radiation of heat or direct flame impingement as per SANS 10400 a double brick wall of minimum 190 mm width or reinforced concrete wall of 150 mm width or other barrier with a fire rating of at least 240 min

3.13
fixed appliance
any appliance that is permanently mounted into a fixture, for example, a stove or a fireplace

3.14
installation
single or combination of one or more cylinders connected to a manifold system, including pipework and appliances

3.15
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

3.16
mechanical joint
any joint that is made by the application of a mechanically or manually applied force that uses threads to tighten couplings, or crimping, or sealing rings, or washers, or any other sealing medium

3.17
operating pressure
gauge pressure
pressure at which an appliance will operate

3.17.1
high pressure
pressure that exceeds 150 kPa (gauge pressure)

3.17.2
intermediate pressure
pressure that exceeds 5 kPa but that does not exceed 150 kPa

3.17.3
low pressure
pressure that does not exceed 5 kPa

3.18
pressure regulator
device that reduces the pressure of the gas from a higher pressure to a constant lower pressure

3.19
registered installer
registered practitioner
person that has the ability, appropriate training, knowledge and experience to carry out the work that is undertaken in a safe and proper manner, and who is registered in accordance with the requirements of the Mine Health and Safety Act, 1996 (Act No. 29 of 1996)

3.20
user
person who uses the equipment for his own benefit, or has the right of control over the use of the equipment, but does not include a lessor or any person employed in connection with that equipment

3.21
ventilation
supply and removal of air (by natural or mechanical means (or both)) to and from a space or spaces in a building

3.21.1
permanent ventilation
ventilation opening which is permanently fixed in the open position

3.21.2
ventilation opening
any means of purpose-provided ventilation (whether it is permanent or closable), which opens directly to external air, such as the openable parts of a window, a louvre or a background ventilator

4 Properties of LPG and precautions to be observed

The location of LPG containers shall be planned and put into effect with full regard for the properties of the gas and the construction of installations for conveying this gas in domestic dwellings and commercial buildings. All persons concerned with the installation of containers and appliances shall be registered installers in this respect and shall be familiar with the following characteristics of the gas and the precautions to be observed:

a) The gas is stored as liquid under pressure.

b) Leakage, especially of liquid, will release large volumes of highly flammable gas.

c) A gas-air mixture that contains approximately 1,5 % to 10 % of LPG is flammable. If a large enough volume of gas is so dispersed in the atmosphere as to reach flammable proportions throughout, ignition of the mixture will result in a rate of combustion of near-explosive force.

d) LPG is denser than air and will flow along the ground or through drains. It can be ignited at a considerable distance from the source of leakage, therefore low-level ventilation of buildings shall be provided.

e) LPG is non-toxic, but since it can induce headaches and dizziness when inhaled, inhalation of LPG should be avoided whenever possible.

f) LPG liquid, by its rapid vaporization and consequent lowering of the temperature, can cause severe cold burns when it comes into contact with the skin. Appropriate protective clothing, such as gloves, goggles, aprons, and gumboots, shall be worn when there is any possibility of such contact. Because of the hazard of the generation of static electricity, the soles of gumboots shall be made of leather or conductive rubber, and clothing shall not be made of fabrics that contain artificial fibres.

g) A container that has held LPG and is presumed to be "empty" can still be hazardous. In this state, the internal pressure is approximately atmospheric and, if the valve leaks or is left open, air can diffuse into the container and form a flammable or explosive mixture. Furthermore, even an "empty" container that does not yield gas when the valve is opened, might in fact not be quite empty. In cold weather, the heavier fractions of the liquid might not vaporize and will therefore remain in the container. All containers that are (or appear to be) empty shall be handled with the same care as a full container, and valves shall be kept fully closed at all times when containers are not in use.

h) There are hazards involved with the filling of containers (see annex A).

5 Containers

5.1 Number and size of containers

5.1.1 General

The number and the size of containers recommended for an LPG installation depend on the maximum hourly consumption of the appliances served and the lowest ambient temperature

expected. When an installation is designed, care shall be taken to guard against possible failure of the gas supply due to vaporization problems.

If a supply has to be maintained over a long period, the discharge of gas diminishes slowly until it reaches a state of equilibrium with the vaporization rate of the LPG in the container. This vaporization rate, in turn, depends on the size of the container, the amount of LPG that remains in the container, and the ambient temperature (see also table 1).

One supply container (48 kg) and one reserve container of the same size are normally enough for ordinary installations in permanent dwellings. However, there are larger installations that require more gas, and the maximum gas off-take for these installations and the number of containers required can be calculated in accordance with 5.1.2.

5.1.2 Calculation of container details

5.1.2.1 Table 1 gives the approximate vaporization rates of the larger containers currently available.

5.1.2.2 The calculation of the number of containers required for any installation is based on the appliance consumption for the complete installation. This consumption can be found on the appliance data plate.

NOTE 1 The container requirements may be scaled down if it is unlikely that all appliances will be used simultaneously for long periods of time.

Table 1 — Approximate vaporization rates for containers

1	2	4
Nominal size of container		**Approximate vaporization rates**
Water capacity	**Nominal mass of gas**	
L	kg	g/h
22	9	230
34	13 to 14	320
45	19	460
113	48	920
454	196	2 300
NOTE For the convenience of users of this part of SANS 10087, the LPG mass capacity equivalents for the various container sizes are given in this table. It should, however, be stressed that these are only nominal equivalents and that the exact mass equivalents will depend on the actual density of the product filled into the containers.		

5.2 Location of containers

5.2.1 General

5.2.1.1 The installation of a container(s), complete with all associated equipment and appliances and any subsequent repair or modifications to the installation, shall be carried out by a registered installer qualified to the appropriate grade (domestic or commercial grade).

NOTE This requirement does not include the replacement of containers.

5.2.1.2 Each container shall be located in an upright position with the valve uppermost, and shall be so placed on a solid non-combustible level base that there can be no danger of the container tilting or falling over. Compacted soil shall not be acceptable.

5.2.1.3 Containers shall be so located in an accessible position that

a) full and empty containers can be changed easily,

b) they can be disconnected and removed quickly in case of an emergency, and

c) the container valve can be easily operated.

5.2.1.4 In the selection of a location for containers, the following locations shall be avoided:

a) any position in which the containers are likely to cause obstruction, to become damaged or to be exposed to conditions likely to affect their safety;

b) any position that is subject to extreme temperature (excluding natural elements);

c) any position near corrosive or readily combustible substances; and

d) any position adjacent to cellars, drains, hollows, etc., where escaping gas might collect.

5.2.2 Indoor location

5.2.2.1 Where LPG containers are permanently installed or stored in a building, the type of building (in accordance with SANS 10400-A, see also annex B) and the corresponding size of the container(s) shall be as follows:

a) flats (H3): a maximum of 9 kg per flat;

b) houses (including cluster housing and group housing (not exceeding two storeys)): a total maximum of 19 kg;

c) commercial premises (all occupancies not mentioned in this part of SANS 10087): a total maximum of 19 kg per unit, provided that there is a separating element that complies with the requirements of SANS 10400-T;

d) industrial premises (class of occupancy D1 to D4): a maximum of 19 kg per 600 m^3 of building space with a total maximum of 100 kg; and

e) for special events: consult the local fire authority concerned; and

f) no fixed installation shall be installed inside a garage.

5.2.2.2 Containers shall never be located below ground level in a building, for example, in cellars or basements.

5.2.2.3 Containers shall not be located above or on top of any appliance used for cooking or heating.

5.2.2.4 Containers shall be located in a place with floor-level ventilation to the outside air to prevent any possible accumulation of gas in the event of leakage. An airbrick situated near the bottom of an external wall or a normal gap of at least 6 mm underneath an external door (or a combination of these) usually provides sufficient ventilation (see figure 1).
The gas cylinder, if it is not placed in a cupboard, shall be placed as close as possible to a door leading to the outside of the building. Where this location cannot be attained, there shall be cross ventilation. This can be achieved by having a minimum of two airbricks in close proximity to each other on the external wall and as low as possible to the floor level. They need not be staggered and they can all be at the same level.

NOTE Ventilation normally comprises a combination of purpose-provided ventilation and infiltration.

5.2.2.5 Containers shall be located at least 300 mm away from a gas stove (see figure 1) unless the container is protected from the heat of the stove in an approved manner.

5.2.2.6 Containers shall be located at least 2 m away from any coal stove, except that this distance can be reduced to 1 m if a non-combustible insulating guard is fitted between the container and the stove (see figure 2).

5.2.2.7 Where a gas container needs to be placed inside a cupboard, the cupboard door shall have ventilation available, for example a lattice door or ventilation slots (see figures 3 and 4). The back of the cupboard shall preferably be ventilated to the outside atmosphere no electrical connections or plug points shall be allowed in the same section as the gas cylinder and the cupboard shall be sealed to ensure that no gas can leak from one section of the cupboard to another section.

5.2.2.8 Containers inside a building shall not be manifolded.

5.2.2.9 The dimensions shown in figures 1 and 2 shall be the minimum requirements for container positions.

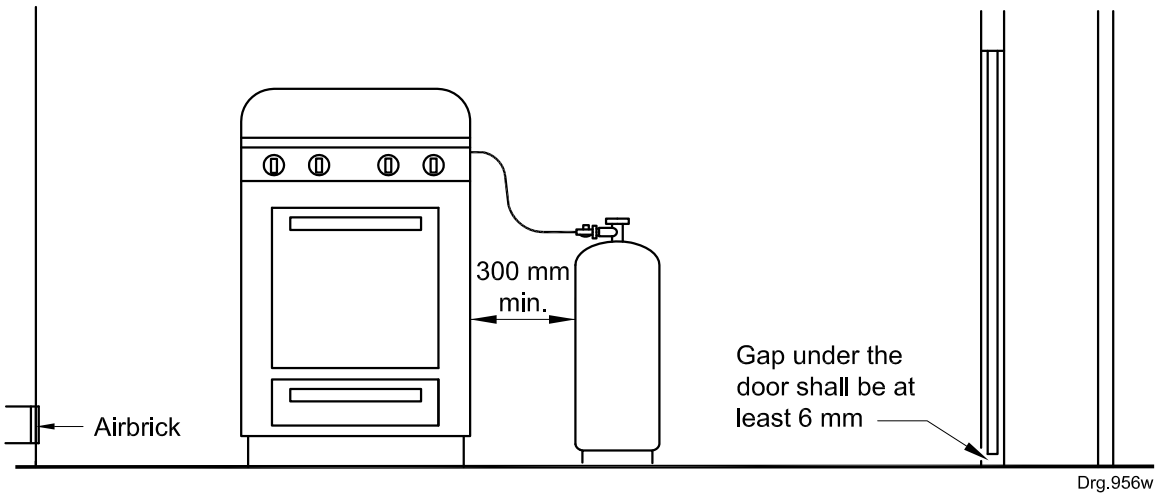


Figure 1 — Ventilation at floor level

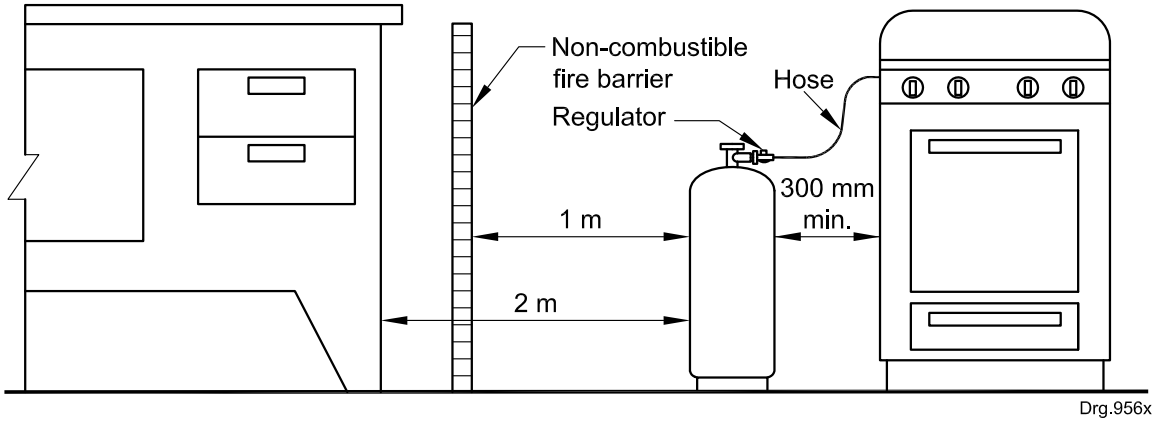


Figure 2 — Containers and coal stoves

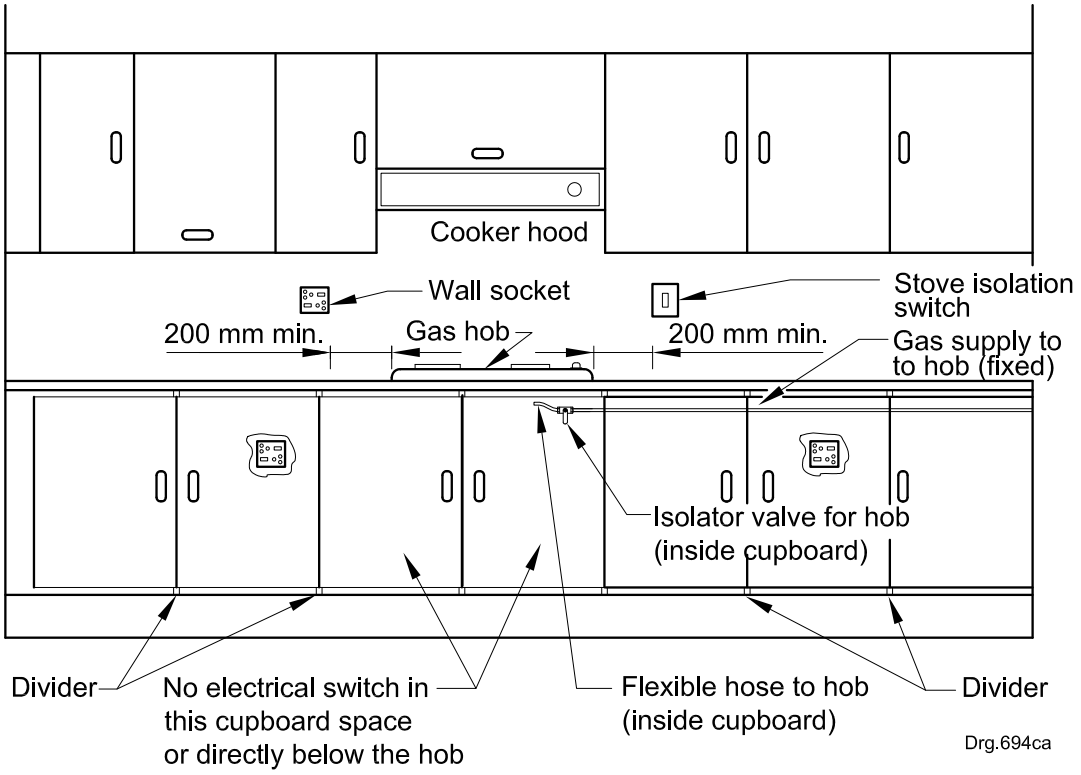
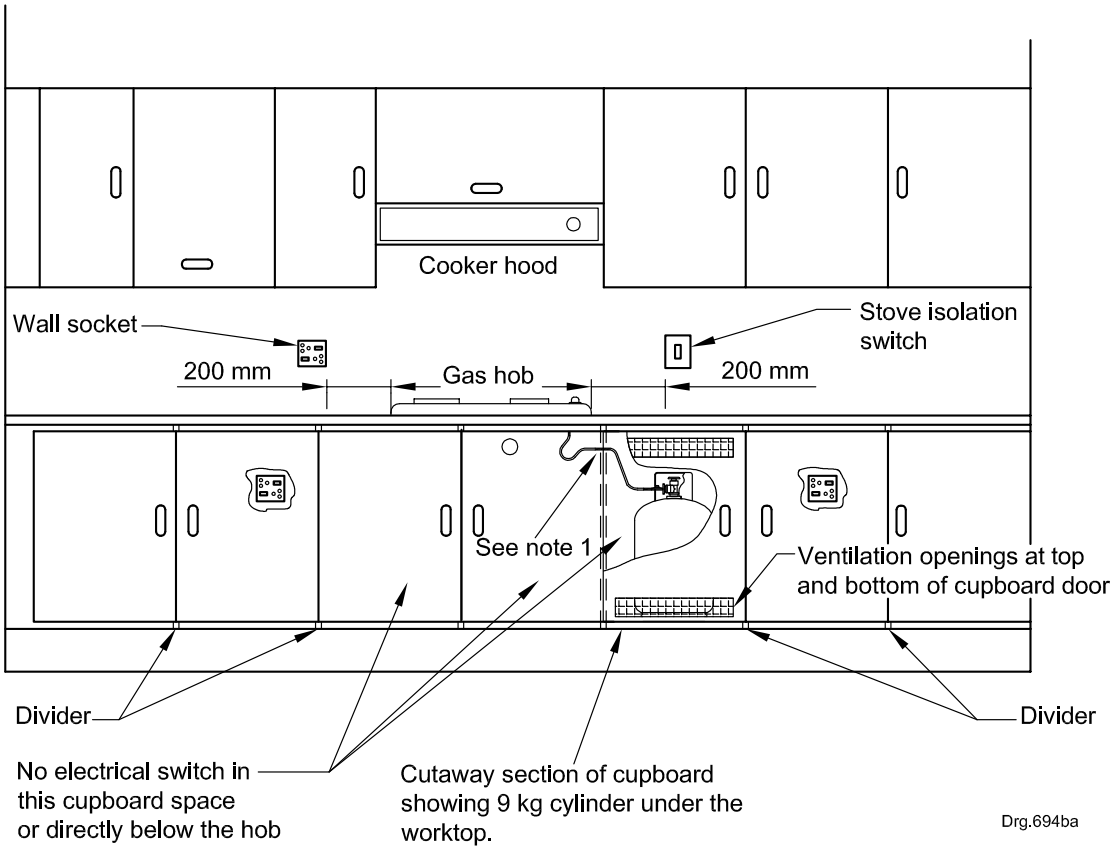


Figure 3 — Typical installation by means of a flexible hose and solid pipe



NOTE 1 The hose does not pass through the solid partition or divider between the cupboards. A fixed metal bulkhead fitting with a hosetail (see figure 5) on each side passes through and is fixed to the partition. The hose from the cylinder is attached to the hosetail in the cupboard in which the cylinder is placed. The hose from the hob is attached to the hosetail in the cupboard space under the hob.

NOTE 2 If the worktop or cupboard installation is placed against an outside wall of the kitchen, a ventilation slot should also be placed in the outside wall at the bottom level of the cupboard.

Figure 4 — Typical installation for gas cylinder directly connected to hob by means of a flexible hose

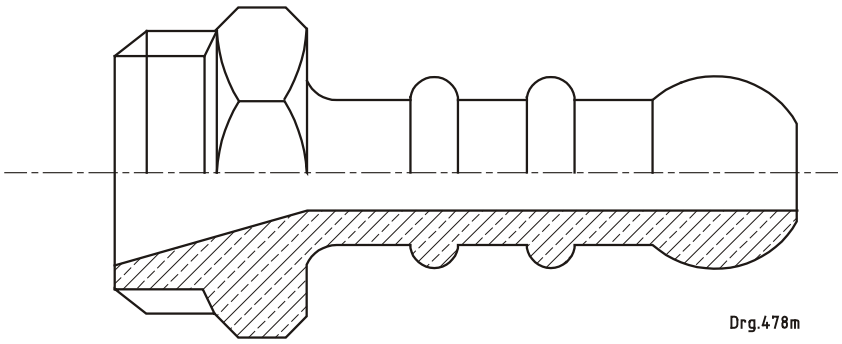


Figure 5 — Hosetail

5.2.3 **Outdoor location** (see figures 6, 7, 8, 9 and 10)

5.2.3.1 Containers shall be located on a firm, clean, well-drained and level base. The area surrounding a container shall be kept clear of combustible materials, for example, weeds, dry grass, paper and waste (see also 8.3.3). Containers shall be located and protected against tampering by unauthorized persons and also damage and interference by, for example, animals and vehicles.

5.2.3.2 Containers shall be at least

a) 1 m away from any opening (into a building) that is below the level of the container valve, i.e. doors, windows and airbricks,

b) 2 m away from any drain, pit or manhole,

c) 3 m away from the property boundary, unless the boundary has a firewall, in which case the containers could be next to the firewall (see figure 8), and where there are only two containers, the boundary distance can be reduced to 1 m, and

d) 3 m away from any opening (or window) directly above the containers. The 3 m distance from the top of the cylinder, valve connection or the manifold whichever is the higher, to the bottom of the window(s) may be reduced to a minimum of 300 mm providing that

i) a non-combustible roof (see SANS 10400) is installed between the containers and the opening. The roof shall extend beyond the cylinder(s) such that when measured from the valve connection and around the roof to the nearest point of the window a minimum of 1,5 m safety distance shall be obtained, or

ii) the window frames shall be steel and the total size of the glazing does not exceed 1 m^2. Glazing shall be of wire woven glass not larger than 450 mm × 450 mm per pane. Such windows shall not be openable.

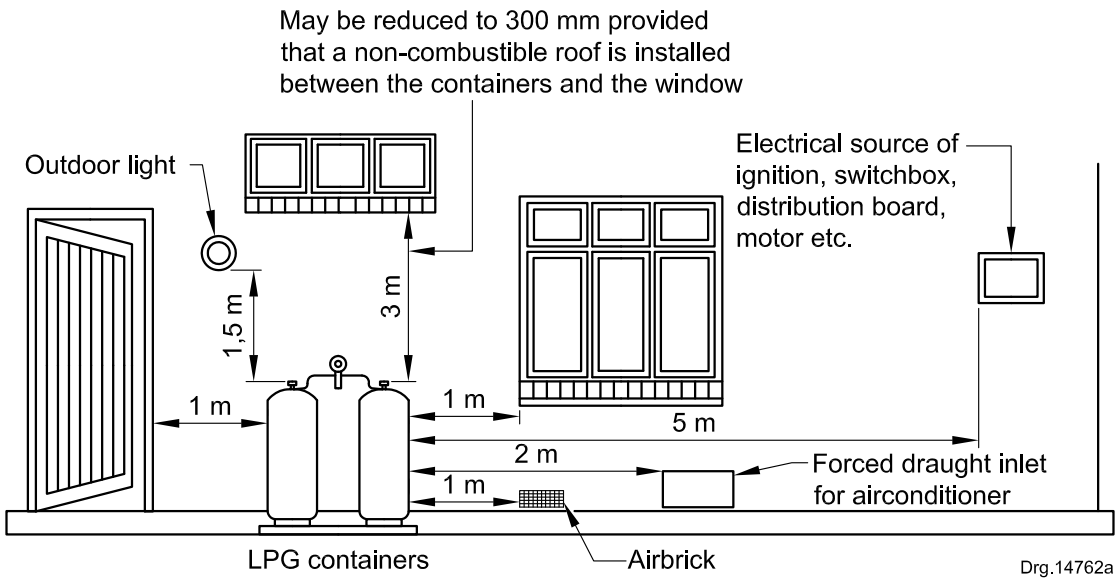
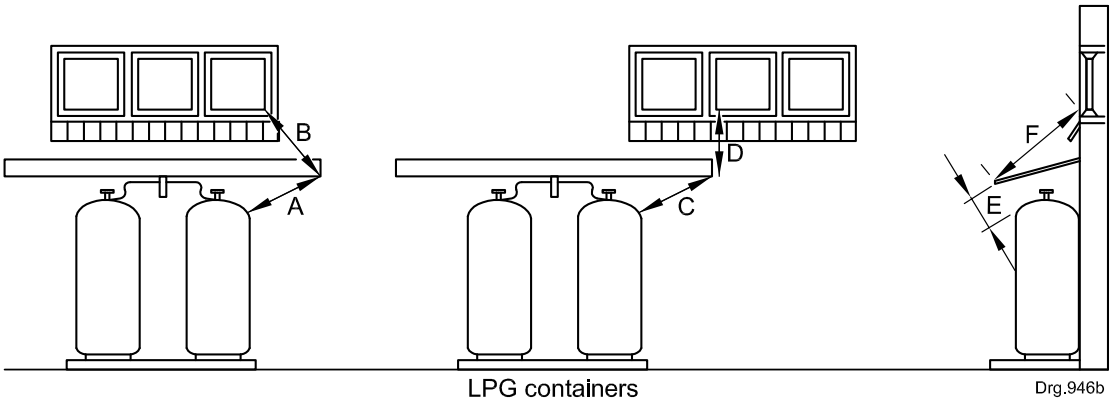


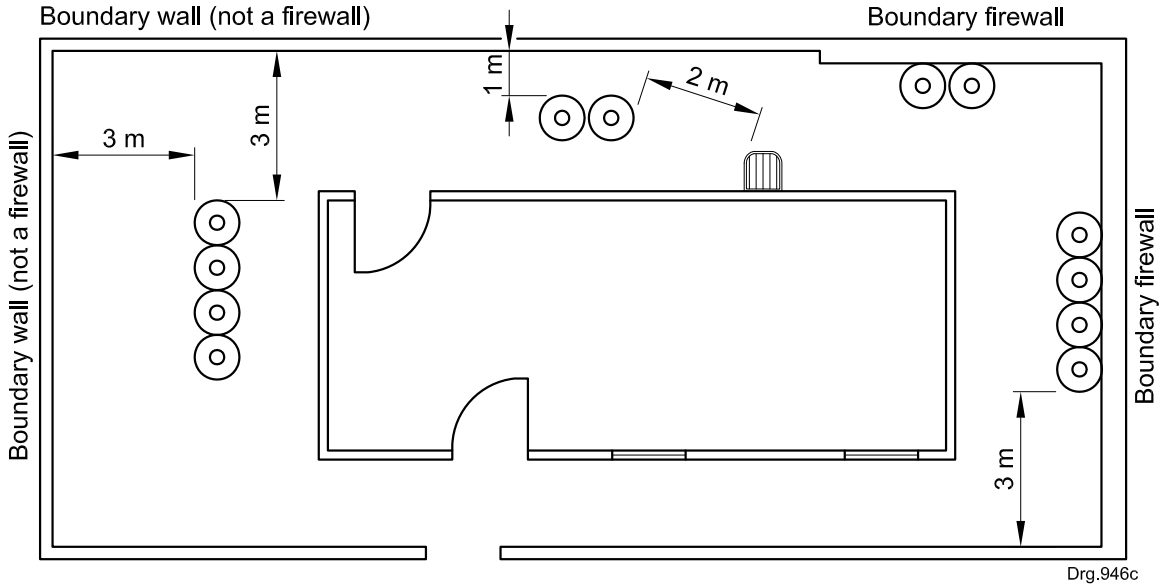
Figure 6 — Minimum distances (electrical, doors, windows and other openings)

e) where a roof is installed over the cylinders there shall be sufficient space above the cylinder valves to facilitate the exchange of cylinders. Roof structures of concrete shall not be installed above the manifold or cylinder (see also 8.3.9).



The distances A + B or C + D or E + F shall not be less than 1,5 m

Figure 7 — Windows over cylinder roof



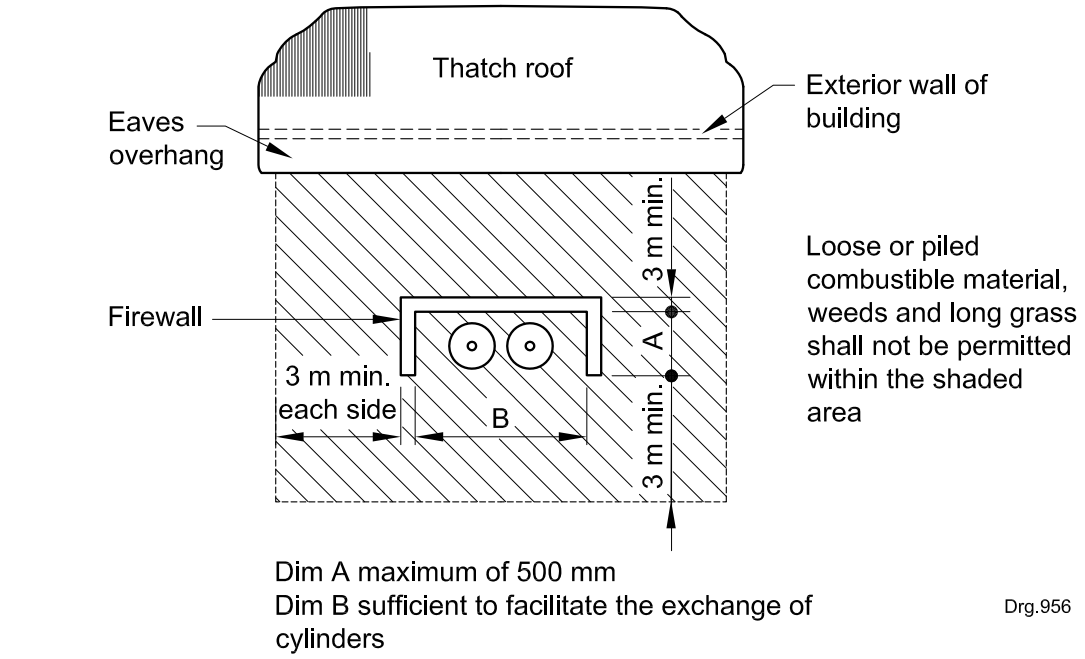
NOTE 1 The minimum required distance from drains is 2 m, irrespective of the number of cylinders.

NOTE 2 Where not more than two cylinders are used, the minimum distance from a boundary is 1 m, unless the boundary is a firewall, in which case the cylinders may be placed directly against the boundary.

NOTE 3 Where more than two cylinders are used, the minimum distance from a boundary is 3 m, unless the boundary is a firewall, in which case the cylinders may be placed directly against the boundary.

Figure 8 — Minimum distances

5.2.3.3 Cylinders shall not be installed directly under the eaves of thatched roof. Cylinders shall be not less than 3 m away from eaves of the thatched roof behind a firewall. Loose or piled combustible material, weeds and long grass shall not be permitted within 3 m of any container (see figure 9).



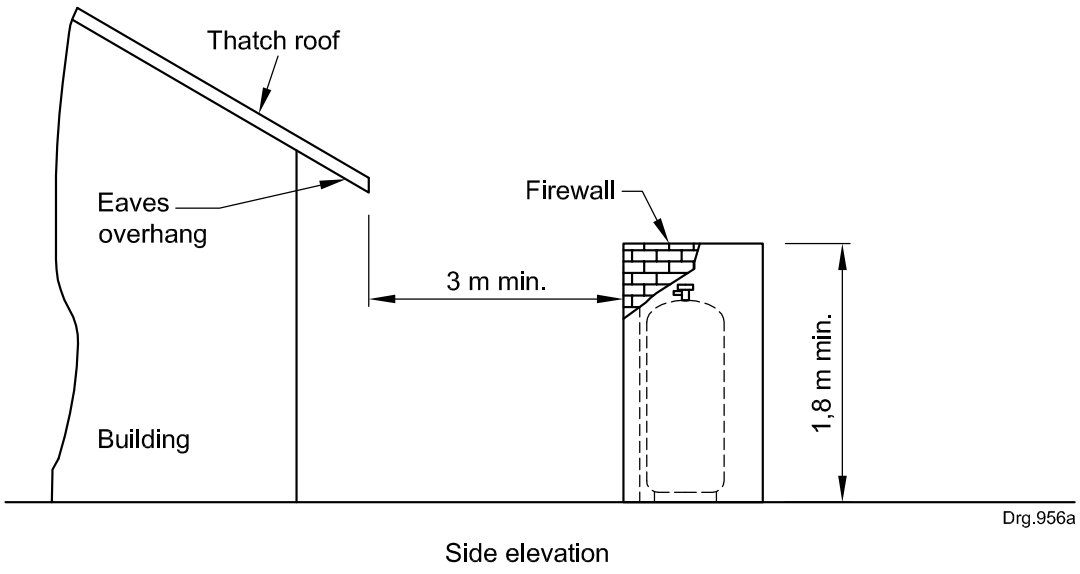


Figure 9 — Cylinder placement in relation to thatched roofs

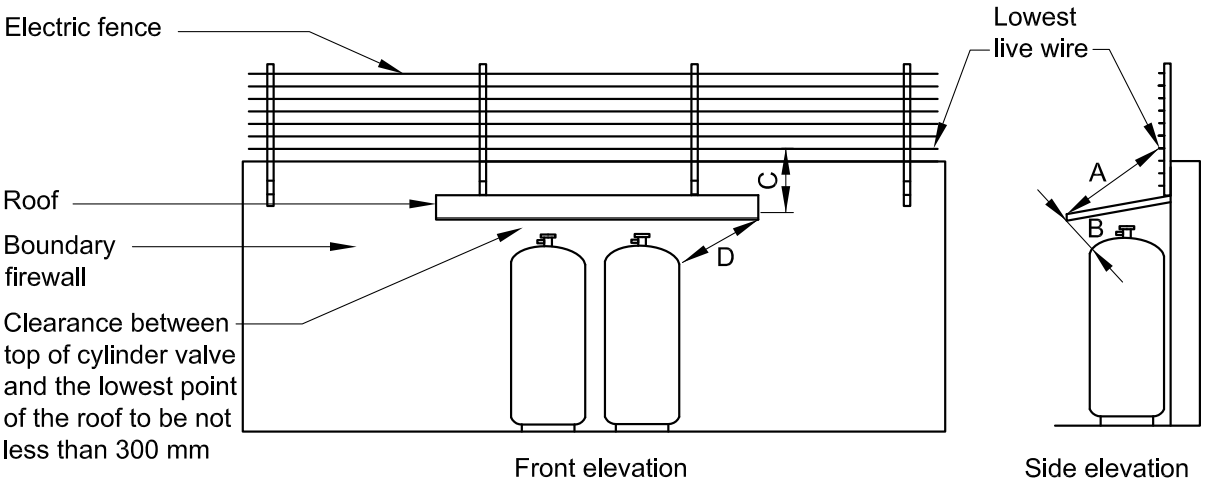


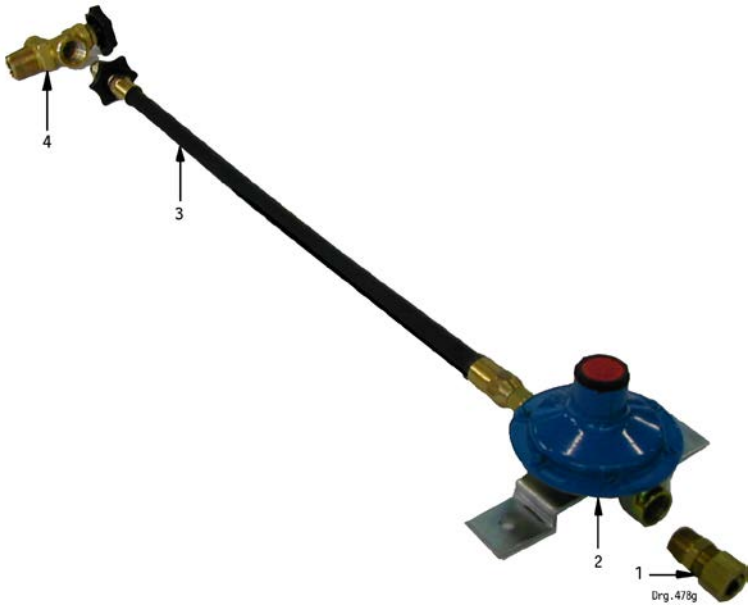
Figure 10 — Cylinder placement in relation to electric fence

5.2.3.4 Where containers are placed adjacent to a wall on top of which is an electric fence, then the safety distances indicated in figure 10 shall apply.

5.2.3.5 In the case of single cylinder connections, where the LPG regulator is fitted into the cylinder valve, a flexible hose shall be attached to the regulator outlet. The free end of the hose shall be fitted onto a hosetail (see figure 5) which itself shall be affixed to a wall adjacent to the cylinder by means of a holder bat (see figure 13). (See also 5.4.1 and 10.1).

Where this connection is used, the hose shall be protected from direct sunlight.

Figure 11 — Single cylinder connection



Key

1. Pipe connector
2. Regulator
3. Pigtail
4. Cylinder valve

Figure 12 — Single cylinder connection with wall mounted regulator

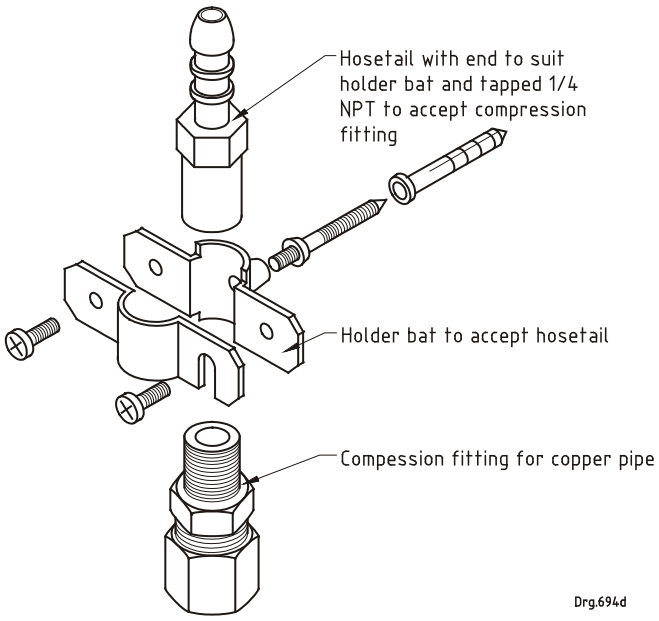


Figure 13 — Wall-mounted connection for alternative single connection

5.2.3.6 All copper or steel pipe installation holder bats shall be of metal. Precautions shall be taken to ensure that galvanic corrosion does not occur between the holder bat and the relevant pipe.

Where the regulator is affixed to the wall by means of a bracket (see figures 12 and 16), the gas supply between the cylinder and the regulator shall be by means of an LPG pigtail with a bull nose fitting at one end, and a threaded connection at the other end to fit the regulator inlet (see figure 14).

Figure 14 — Application for single cylinder connection that shows various components

5.2.3.7 In the case of multi-cylinder connections, where cylinders are connected by means of a changeover valve, the regulator and changeover switch shall be wall mounted (see figure 15), with the gas supply from each cylinder being by means of individual pigtails as shown in figure 12.

Key
1 Pipe connector
2 Regulator
3 Changeover device
4 Pigtail
5 Cylinder valve
6 Connection into cylinder valve (bullnose)

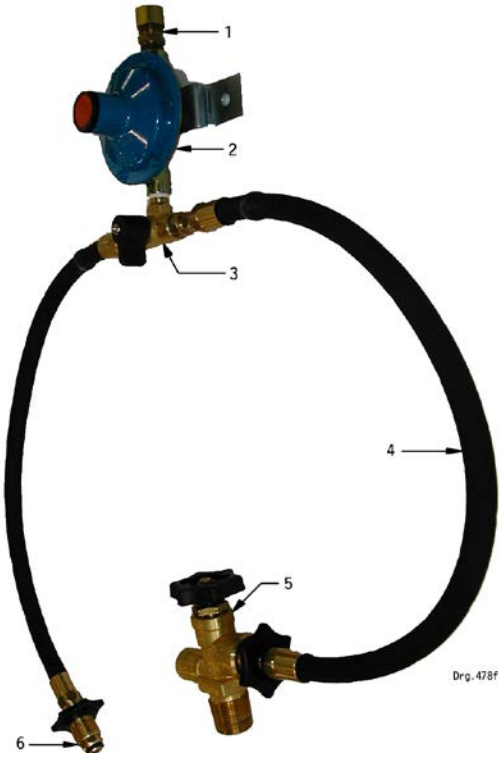


Figure 15 — Application for dual cylinder connection with changeover valve

Figure 16 — Application for dual cylinder connection showing change overvalve and regulator

5.2.3.8 Where more than two containers are used in an installation, the containers shall be connected into a manifold system. A changeover device connected to one container on each side shall not be deemed to be a manifold, however, the safety distances shall still apply.

5.2.3.9 The containers shall be connected to the manifold system by one of the following methods:

a) on a single branch, up to ten containers of size up to and including 113 L (48 kg) with a maximum of 20 cylinders per installation; or

b) on a single or multiple branch, with containers of size in excess of 113 L and up to and including 500 L (196 kg) with a maximum of 6 containers per installation.

NOTE For filling ratios and storage of cylinders see SANS 10087-7.

5.2.4 Containers located on building roofs

Containers may be installed on the roof of a building of fire-resistive construction, or non-combustible construction and having essentially non-combustible contents, or of other construction or contents that are protected with automatic sprinklers, provided that

a) the total capacity of containers connected to a manifold is not greater than 480 kg and that if more than one manifolded group is located on the roof, the distance between one manifolded group and any other such group shall be at least 15 m,

b) the containers are located in areas where there is free air circulation, and that are at least 3 m from building openings (for example, windows and doors), and at least 6 m from air intakes, and air conditioning and ventilation systems,

c) the containers are not located on a roof that is entirely enclosed by parapets of height more than 0,45 m unless

   1) the parapets are breached with low-level ventilation openings that are not more than 6 m apart, or

   2) all openings that communicate with the interior of the building are at or above the top of the parapet,

d) the hose used for connecting to the containers shall be in accordance with the requirements of EN 853;

e) the local fire department is advised of each installation by means of the approved plans, and

f) it can be ensured that

   1) containers shall not be refilled on the roof,

   2) each container valve outlet shall be tightly plugged during movement of the containers within the building, and that the only means of access used shall be emergency stairways not generally used by the public, or freight or passenger lifts not occupied by the public, and

   3) that all precautions shall be taken to avoid damage to containers when they are being taken to and from the roof, and to prevent them from being allowed to fall down stairways or from the roof.

5.3 Safety distances

5.3.1 The distance between the shell of any one container in an LPG installation and the shell of any one container in another LPG installation shall be at least 6 m. Where there is a firewall

between them with a fire rating of at least 240 min and a height of at least 1,8 m, the distance measured from shell to shell around the wall shall be at least 3 m.

Where a container storage cage is to be placed next to a gas installation the storage cage shall comply with the safety distance requirements in accordance with SANS 10087-7. These safety distances shall be calculated on the total amount of gas installed on the manifold and stored within the cage. These containers shall not be stored within the same cage as the container installation.

5.3.2 The distance between any LPG container and any other type of flammable or oxidizing compressed gas container shall be at least 3 m.

5.4 Container connections

5.4.1 Single cylinders may be connected to a vapour gas system by two methods as follows:

a) For containers up to and including 19 kg gas capacity, where the regulator is a single stage bullnose regulator connected directly to the container valve; a flexible hose compliant with SANS 1156-2 may be attached to the regulator outlet and then connected to a wall mounted fitting incorporating a nozzle (as shown in figure 19) which itself is fitted to the pipe feeding gas to the system (see figures 1, 2, 3, and 4). It is not recommended that this method be adopted where the cylinder and hose is exposed to direct sunlight as this will affect the integrity of the hose to the effects of UV; or

b) For containers with a gas capacity greater than 19 kg, a wire braided pigtail hose compliant with EN 853 (see 5.7.1) with a fitted bullnose connection shall be connected to the cylinder with the free end of the hose fitted to a wall mounted regulator. This is the preferred method. (see figures 11, 12, 15 and 16). See also 5.7.

5.4.2 When connecting two containers (1 on 1 off) to a vapour system they shall share a single wall mounted regulator with the pigtails each connected to a change over valve which itself is connected to the inlet side of the regulator. Such an arrangement shall only supply gas from one cylinder at a time to the system with the other cylinder connected but on stand-by. This facilitates a quick cylinder change when required without disrupting the gas supply to the system. This type of connection is not considered to be a manifold connection (see figures 15 and 16). Where two or more cylinders are connected to one arm at the same time are drawing gas simultaneously it is deemed to be a manifold (see 5.4.3). T-Pieces are not to be used to connect two containers together to draw gas simultaneously.

5.4.3 A LPG cylinder manifold provides a convenient means of connecting containers greater than 9 kg (22 L), in parallel to a common outlet thus deriving the benefit of providing a source of supply many times greater than what is possible from a single cylinder. Manifolds are available for vapour and liquid installations.

5.4.4 Any manifold shall be constructed that the operating cylinder or group of cylinders is duplicated on the other half of the manifold and shall be controlled by means of either a special changeover valve (manual or automatic), or an automatic changeover regulator together with isolating valves. This ensures easy switching from the operating cylinders to the standby group without interrupting the supply.

5.4.5 The use of LPG manifolded cylinders is covered by this part of SANS 10087 for both conventional cylinder installations and for roof installations.

5.4.6 Vapour manifolds (see figures 19(a) and 19(b)) shall be designed to match not less than the maximum consumption required by the appliances it is connected to in relation to the draw-off rates of LPG vapour form LPG containers. (See table 1).

5.4.7 Where containers are manifolded, they shall not exceed ten containers per manifold branch (see figure 17(a) to 17(d). However, containers of water capacity greater than 113 L shall not exceed six in total.

5.4.8 Only containers of the water capacity for which the manifold installation was designed shall be used.

5.4.9 Where the pigtail connections are on a manifold system, the distance between these connections shall not be more than 1 m.

5.4.10 Other layouts are allowed. (See figures 17(a), (b), (c) and (d)).

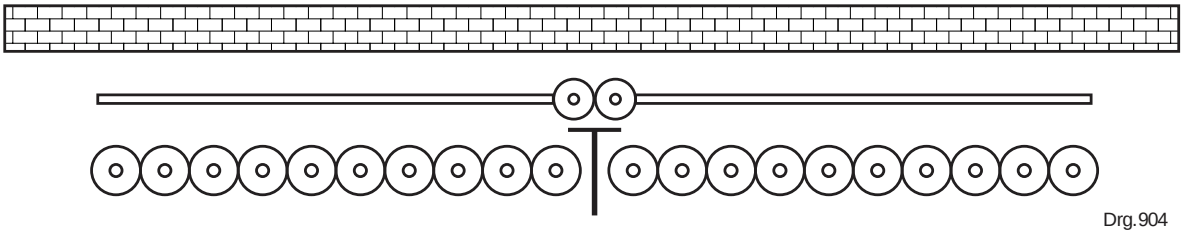


Figure 17 (a)

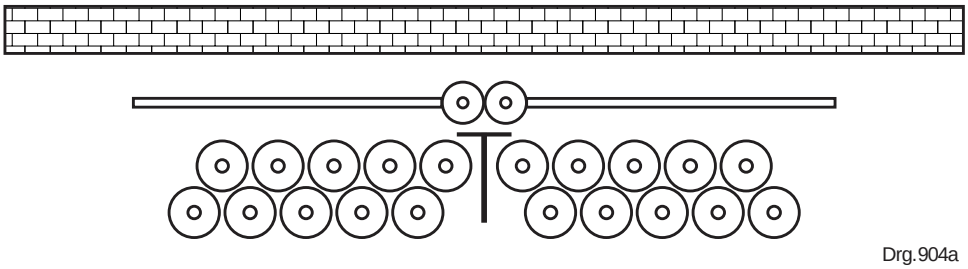


Figure 17 (b)

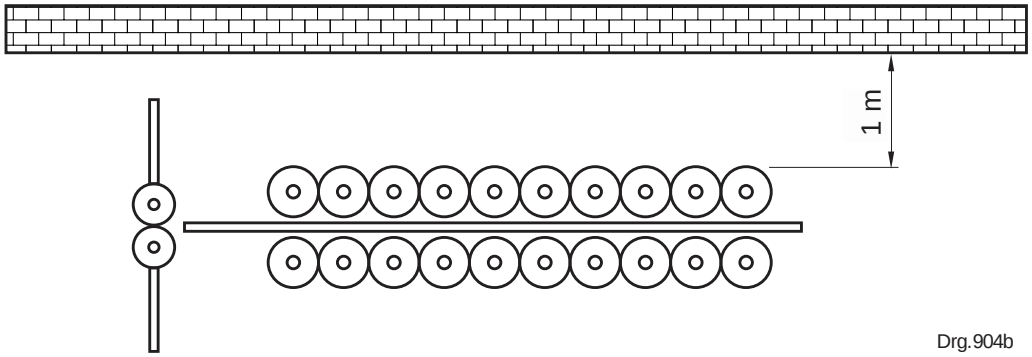


Figure 17 (c)

Figure 17 — Typical arrangement of manifolded cylinders

Figure 17 *(concluded)*

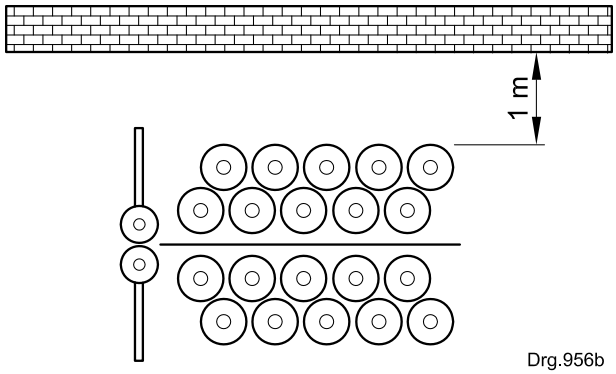


Figure 17 (d)

Figure 17 — Typical arrangements of manifolded cylinders

5.5 Manifold design and construction

5.5.1 General

5.5.1.1 If the consumer's consumption demands exceed the evaporation capabilities of the containers allowed on a site under the applicable national standards (see table 1) , other means of supply, e.g. liquid manifolds (see figure 20), shall be examined. In liquid manifolds, the liquid shall be withdrawn from cylinders equipped with eductor tubes and use shall be made of a vaporizer after the manifold to supply vapour to the consumer’s appliances.

5.5.1.2 LPG manifolds shall be manufactured from:

a) seamless steel piping that complies with the requirements of BS 1600 or API Spec 5L, or equivalent. Where screwed pipes are used in the construction of the manifold, at least schedule 80 piping shall be used. Where the steel manifold is of welded or flanged construction, at least schedule 40 piping shall be used; or

b) SA 312 seamless stainless steel piping that complies with the requirements of ASME-BPVC 7.

5.5.1.3 The connection of the steel manifold pipes to the regulator or changeover valve may be a direct screwed connection, a mechanical union or flexible pigtail (see figure 18). Where the connection is by flexible pigtail the following shall apply:

a) the pigtails shall be a pre-manufactured hose assembly that complies with the requirements for pigtails (see 5.7);

b) the male and female connections to the manifold pipes shall be G5/8 LH bullnose fittings compliant with SANS 199; and

c) each side of the manifold shall be fitted with an isolation valve (see figure 18).

5.5.1.4 Where the manifold pipes are connected to the regulator with a changeover valve between the manifold pipes and the regulator, it is not a requirement that each side of the manifold is fitted with an isolation valve (see figure 19(a)).

Where the manifold pipes are connected to the regulator without a changeover valve between the manifold pipes and the regulator, each side of the manifold shall be fitted with an isolation valve. (see figure 19(b)).

5.5.1.5 All manifolds shall be tested to withstand a pressure test of 3 000 kPa $^{+50}_{0}$ kPa and a test certificate for the pressure test shall be issued by the competent person.

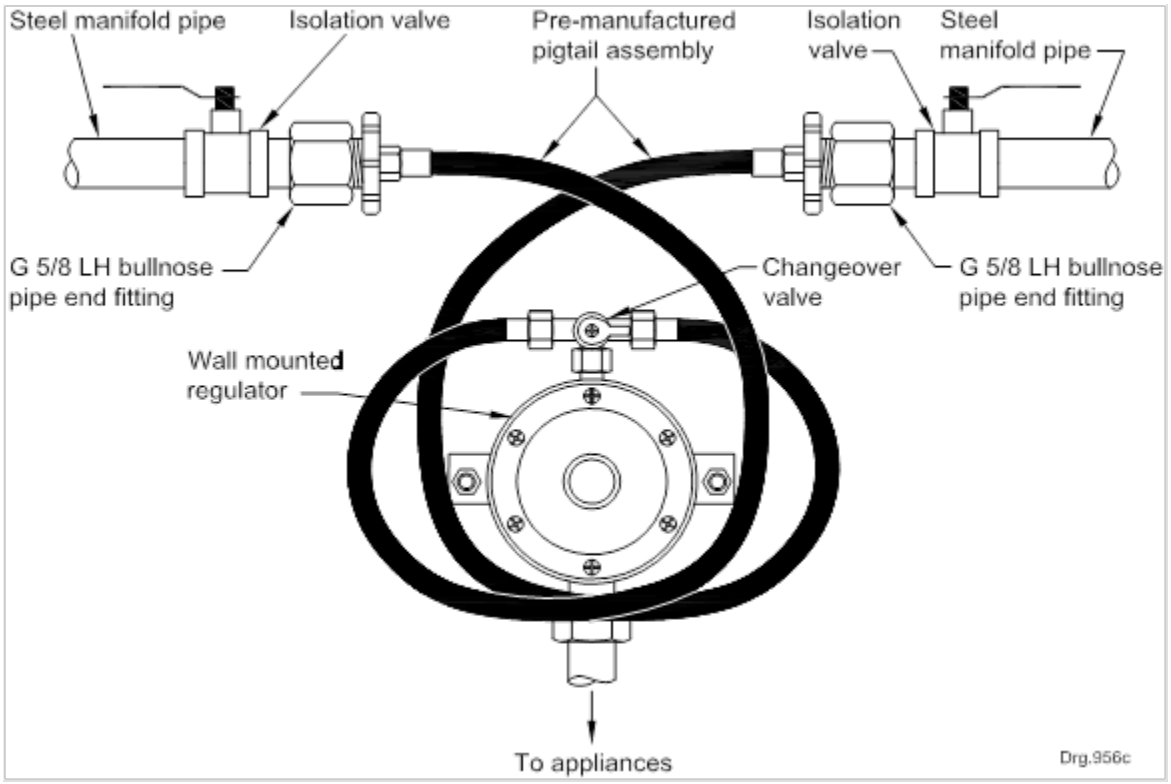


Figure 18 — Manifold — Flexible connections

5.5.1.6 Each side of the manifold shall be permanently marked with:

a) a unique serial number;

b) the test pressure in kilopascals; and

c) the manufacturer's identification symbol.

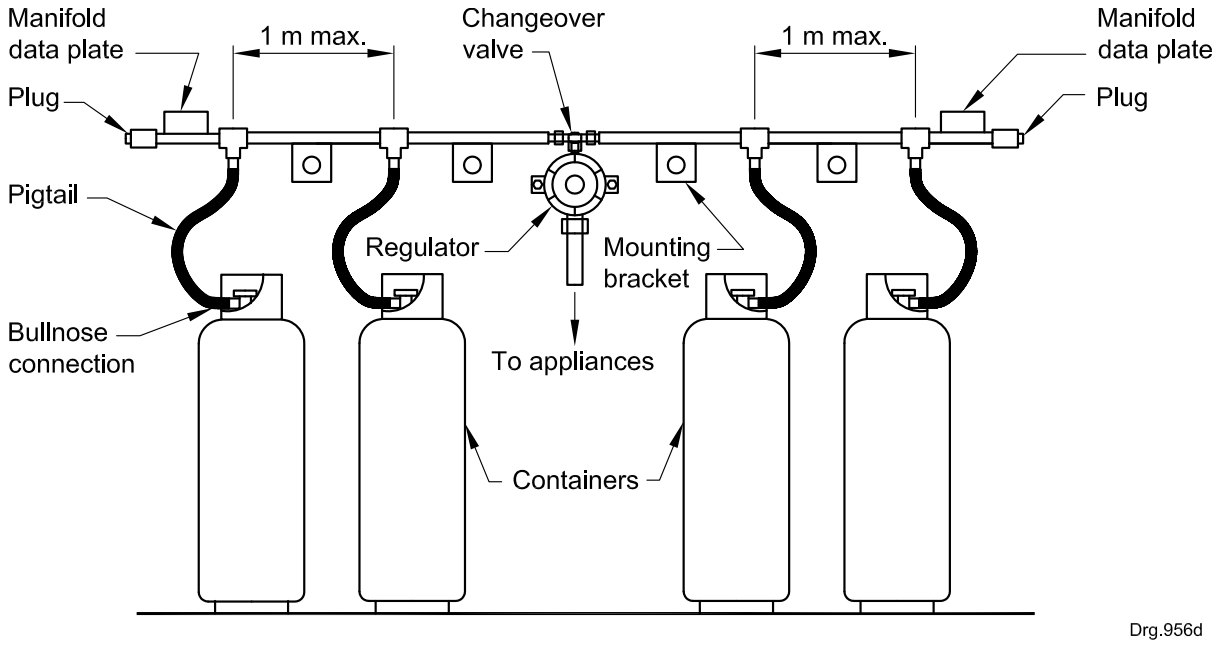


Figure 19(a) — Vapour manifold with changeover valve

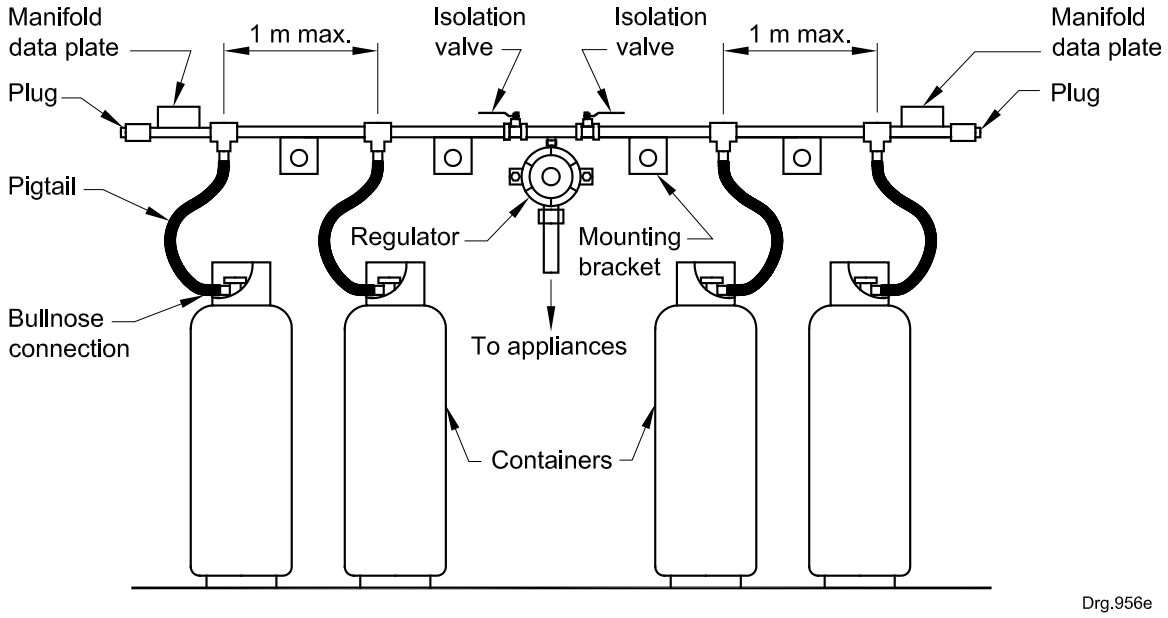


Figure 19(b) — Vapour manifold with isolation valves

Figure 19 — Vapour manifolds

5.5.1.7 The manifold shall be cleaned internally and externally and shall be free from contaminants such as grease, oily deposits and welding slag.

5.5.1.8 Manifolds and their supporting structure shall be protected against corrosion. Manifolds shall be painted or coated for identification and protection with the finish colour ("light stone (C37)" in compliance with SANS 10140-3). Labelling to differentiate vapour and liquid manifolds shall be in accordance with SANS 10140-3.

5.5.2 Liquid manifolds

5.5.2.1 Manifolds for liquid use shall have a hydrostatic relief valve situated between any two points of the system that might cause the containment of liquid. The relief valve shall be set to start to discharge at a pressure of 2 750 kPa $^{+10}_{0}$ %.

5.5.2.2 Each side of the manifold shall be fitted with an isolation valve.

5.5.2.3 Manifolds for liquid use shall use check valves on every pigtail connection (non-return valves) to protect the system in the event of any flexible pigtail rupture.

NOTE In the event of a flexible pigtail rupture, the excess flow valve incorporated in the liquid withdrawal valve will reduce the escape of liquid through the cylinder attached by the pigtail. However, the reverse flow through the system from other manifolded cylinders might not be sufficient to operate all excess flow valves in the remaining cylinders.

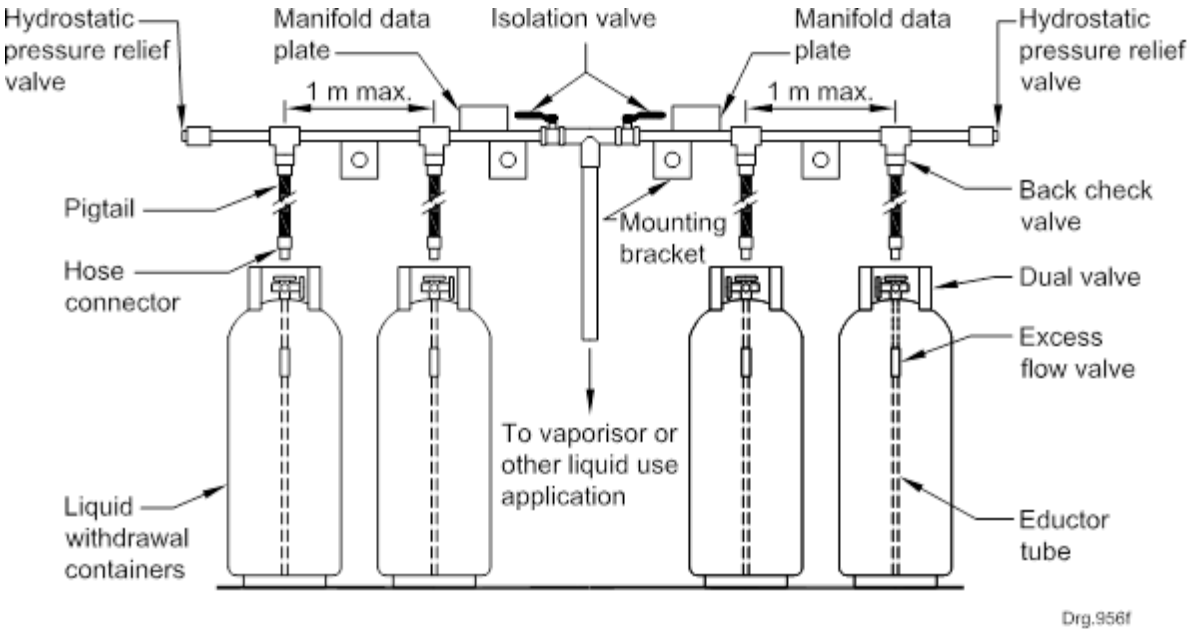


Figure 20 – Liquid manifold

5.6 Manifold installation

5.6.1 The system shall be installed in accordance with the relevant safety distances of this part of SANS 10087 and by a registered installer.

5.6.2 A manifold gas installation in excess of 100 kg shall be approved by and registered with the local authority. Plans shall be submitted to the local authority for approval prior to commencing the installation.

5.6.3 Manifold(s) shall be mounted against a solid wall or a non-combustible structure at an appropriate height using an approved method of bracketing. All manifolds shall be sited at least 100 mm above the valve guard.

5.6.4 Pipe clamps shall clasp the manifold tube in its entirety. An insulation band shall be placed between the tube and the enclosing clamp. The anchor of the pipe clamp shall be at least 40 mm

into the wall or concrete. Pipe clamps shall be made of metal.

5.6.5 If filling operations are intended to be performed on site, the manifold installation shall be effectively connected to earth.

5.7 Pigtails

5.7.1 Pigtails shall be manufactured from rubber hose reinforced with wire braiding. The hose shall be compliant with EN 853. The end connections of pigtails shall be machine crimped onto the hose or of machine threaded re-usable type. (See figures 21 to 24 for threaded and crimped pigtail connections). Hose clamps are not allowed.

Pigtails manufactured from hose made to EN 853 shall require a test report or certificate from an accredited test house that the hose is compatible with LPG.

5.7.2 Pigtails shall be supplied with end fittings for direct connection to a cylinder valve, pipework terminal or manifold inlet as required, without the need for intermediary adaptors.

5.7.3 Pigtails shall not exceed 1 m in length.

5.7.4 Pigtails shall be so constructed that their electrical resistance does not exceed 0,75 Ω/m.

5.7.5 Pigtails for liquid shall be of internal diameter at least 8 mm in order to ensure cylinder excess flow valve closure.

5.7.6 An indication of the date of manufacture of the pigtail hose shall be evident in a manner to facilitate replacement every five years.

5.7.7 The fitting connecting the cylinder to the manifold shall comply with the valve connection requirements of SANS 199 for liquids or vapour, whichever is applicable.

5.7.8 Pigtail assemblies shall be marked indicating their batch identification which shall be traceable back to a batch certificate of compliance held by the manufacturer. Pigtails for vapour and liquid applications shall withstand a test pressure of 3 000 kPa and manufacturers shall issue the test certificate to this effect on demand.

5.7.9 All pigtails shall be pinpricked to allow the release of permeated gas.

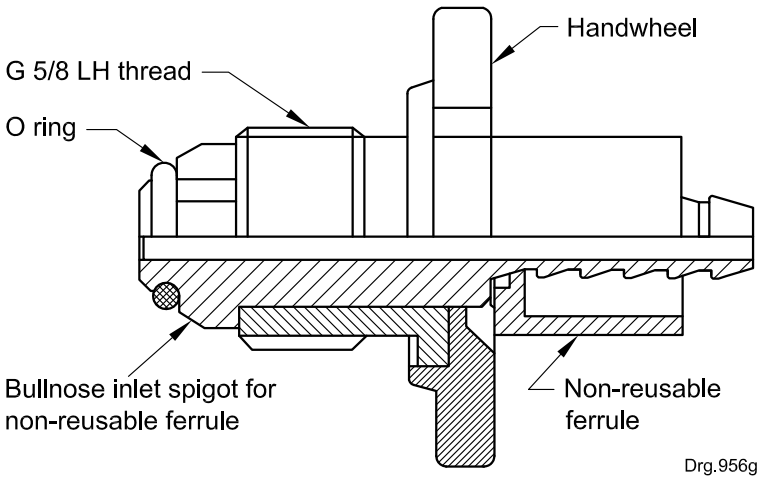


Figure 21 — Bullnose pigtail connection with non-reusable ferrule

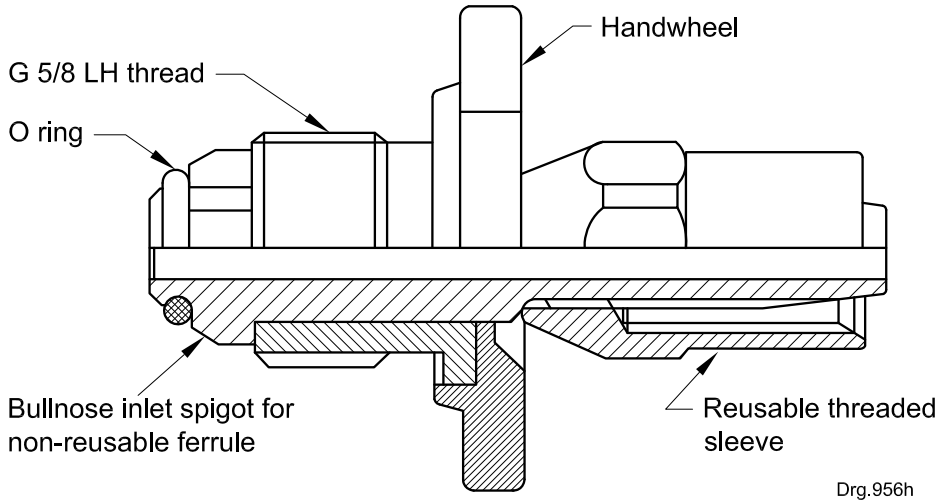


Figure 22 — Bullnose pigtail connection with reusable threaded sleeve

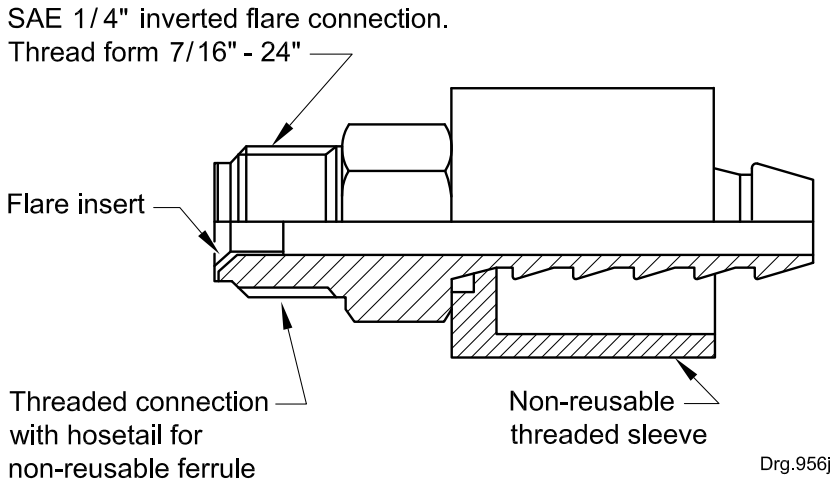


Figure 23 — 1/4” SAE inverted flare pigtail connection with non-reusable ferrule

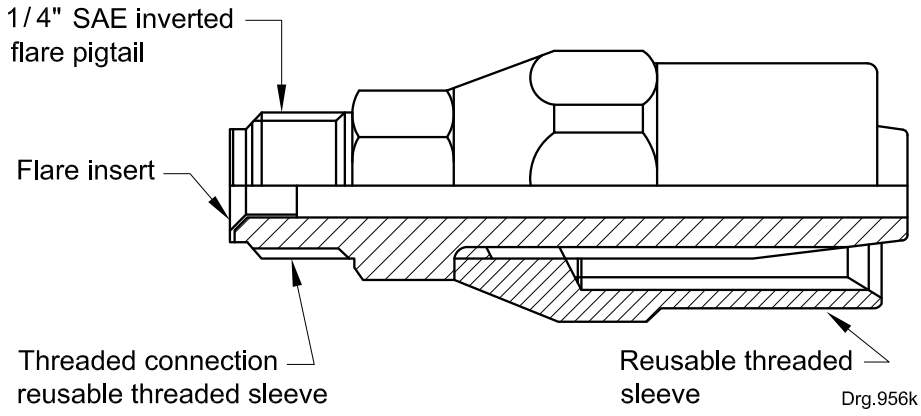


Figure 24 — 1/4” SAE inverted flare pigtail connection with reusable threaded sleeve

5.8 Inspection and maintenance (Manifolds and pigtails)

5.8.1 The manifold system should be maintained on a planned inspection basis at intervals not exceeding five years. A check shall be made to ensure that all safety distances are maintained.

Where applicable the enclosure shall be inspected for the condition of the plinth, and for the condition of any fencing or walling, including the gate. The prescribed signage shall still be in place and legible. The enclosure and immediate surroundings shall be cleared of any uncontrolled weed growth and accumulation of waste products.

NOTE If conditions demand, this period should be reduced.

5.8.2 Repair and maintenance shall only be carried out by a registered installer and the faults in the installation shall be rectified in accordance with the requirements of this part of SANS 10087.

5.8.3 Flexible pigtails shall be inspected for signs of rupture, cracking, chafing and perishing and shall be replaced if necessary. If flexible pigtails are over five years old (see the date mark on the hose/brass fitting, see also 5.7.1 and 5.7.8), they shall be replaced automatically.

5.8.4 The brackets that secure the manifold shall be checked for soundness.

5.8.5 The pipework shall be checked for corrosion.

5.8.6 All valves shall be checked for free and full range of movement, leakage, positive shut off, corrosion and mechanical damage.

5.8.7 The hydrostatic relief valve on liquid manifolds shall be inspected for corrosion and for any ingress of foreign bodies into the operating mechanism. The relief valve shall be replaced if it is more than five years old.

5.8.8 The regulator shall be checked for corrosion and mechanical damage. Where corrosion or mechanical damage is found the regulator shall be replaced or refurbished.

5.8.9 If fitted, gauges shall be checked for correct operation, and gauge faces shall be cleaned.

5.8.10 The system shall be leak-tested at all joints using a leak detection solution or system. All joints where leaks become evident, shall be tightened or remade after the system has been depressurized.

5.9 Records

The manifold shall be supplied together with the certificate of manufacture verifying that the design, construction and test procedures comply with all the requirements given in this part of SANS 10087. The serial number, date of manufacture and the manufacturer’s name shall appear on the certification issued with the manifold.

5.10 Container security and access control

5.10.1 Connecting containers should be located on a firm base, preferably on a concrete or screed plinth raised above the level of the surrounding ground and so constructed as to allow for the drainage of rain water.

5.10.2 Sufficient room shall be allowed within the enclosure to permit the unimpeded exchange of cylinders.

5.10.3 Domestic installations do not require that the cylinders be placed in a cage but shall be secured in such a manner so as not to accidentally fall over. However where public access to the cylinders is possible, the cylinders and manifold, if fitted, shall be in a locked cage or fenced area that meets the requirements of figure 25.

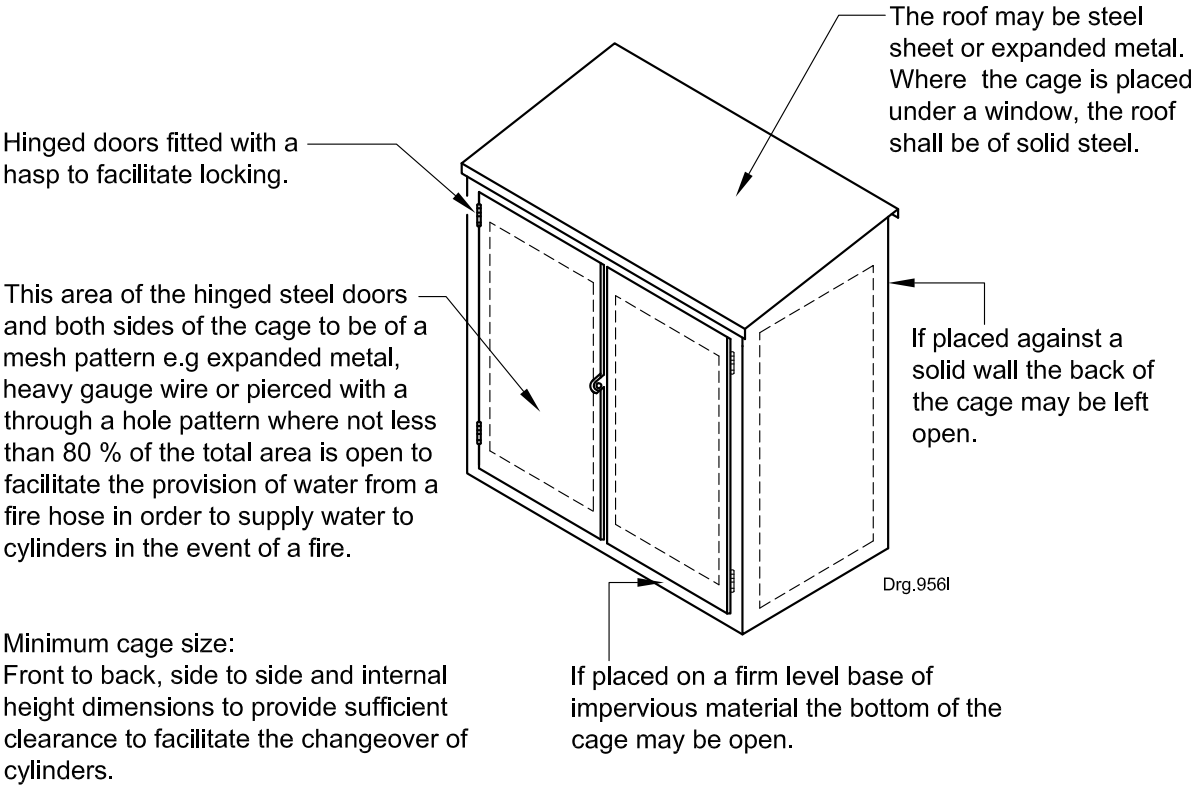


Figure 25 — Typical cage for gas cylinders

5.10.4 Any installation where more than two cylinders are connected shall be fitted with signage indicating no smoking, no naked flame, no unauthorized entry and no cellular phones allowed, i.e. the appropriate pictograms PV 1, PV 2, PV 3 and PV 27 in SANS 1186-1.

5.10.5 The site and its surrounds shall be clear of combustibles, weeds and unauthorized storage.

6 Appliances

6.1 General

Appliances with a consumption rate that does not exceed 10 kg/h shall comply with the requirements of SANS 1539 and the installer shall ensure that the appliance being installed carries the logo of the verification body as stipulated in SANS 1539.

6.2 Installation of appliances

6.2.1 Fixed appliances shall be installed by a registered installer. When positioning an appliance, due regard shall be paid to convenience in use, protection from draughts and damage, and the layout of the gas piping system. Pipe runs shall be as neat, tidy and as short as possible. Pressure regulators shall be of an approved type. Low-pressure regulators shall comply with SANS 1237.

6.2.2 Appliances shall be installed on a firm and level base (this is specially important in the case of refrigerators which require checking with a spirit level during installation). A table or shelf used as a support for an appliance shall be large enough to accommodate the appliance and, unless the support has edges that are flanged upwards, shall provide margins that are wide enough to prevent the appliance from slipping off the support. All appliance supports (including floors, walls and ceilings) shall be strong enough to carry the appliance(s) and all superimposed loads.

6.2.3 Appliances shall be connected to the pipework of an installation in a way that will eliminate undue strain on the pipework and fittings and, if rigid connections are used, the appliances shall also be so rigidly fixed that they are not capable of being moved after their installation. If an appliance needs to be moved for cleaning etc., it shall be connected to the pipework by means of flexible tubing or hose with maximum length of 2 m. To prevent the hose or tubing from being ruptured or torn from its mountings, the appliance shall have a restraining mechanism of a length that is shorter than the hose or tube. Tubing and hoses shall comply with the appropriate requirements given in SANS 1156-2 or BS 3212.

6.2.4 Appliances shall be installed in such a way as to avoid draughts that are strong enough to extinguish the burners when they are set on "low" flame.

6.2.5 Appliances shall not be installed in small, confined spaces that are poorly ventilated. Gas burners require an unrestricted supply of fresh air and when a cooking appliance is being built in, the supply of fresh air for combustion shall not be impeded. Provision shall be made for any accumulations of unburnt gas to disperse safely, and also for the free escape of products of combustion. Where gas appliances that require back ventilation are installed against a wall, there shall be a gap of at least 50 mm between the appliance and the wall.

NOTE For the testing of adjustment of burners, see annex C.

6.2.6 In any bathroom in which a conventional gas water heater (geyser) is installed, the heater shall be flued to the outside and provision shall be made to ensure permanent ventilation (see 6.3).

NOTE The manufacturer's operating instructions should be observed (see also 8.2).

6.2.7 Flueless space heaters shall not be installed in bathrooms and bedrooms. Where flueless space heaters are allowed to be installed in other rooms refer to 6.3.2 for permanent ventilation requirements.

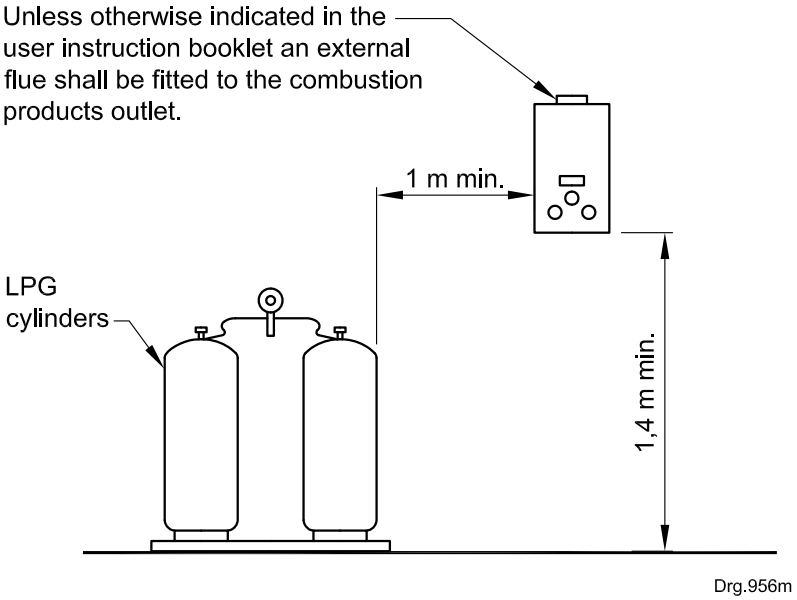
6.2.8 Appliances shall be so sited in a room that there is no danger that they could set fire to furnishings (for example, a gas stove shall not be positioned immediately below a combustible shelf or in a position where curtains could be near its cooking top).

6.2.9 Where combustible or ignitable material near an appliance is liable to attain ignition temperature or to be exposed to heat damage, provision shall be made to protect such material.

The material can be protected by mounting an insulating non-combustible material between the appliance and the combustible material so as to provide an air space of width at least 15 mm. Where built-in kitchen equipment is used, the surfaces of adjacent structures in contact with an appliance shall be of materials that will not deteriorate at temperatures of up to 150 °C.

6.2.10 If several appliances are connected to a system, those with the highest rate of gas consumption should be placed nearest to the gas supply point. Alternatively, the supply point should be brought as close as possible to the high-intake appliance(s).

6.2.11 A water heater should be placed conveniently close to the sink or bath that it serves and, to minimize loss of heat, the run of hot-water piping should be kept as short as possible. Where a water heater is installed outside refer to figure 26.



Placement of a gas water heater outside in relation to the position of gas cylinders

Figure 26 — Water heater placement

6.2.12 Hotplates that are open underneath shall not be placed on any combustible surface. Alternatively, a combustible surface shall be protected from the heat of the burners.

6.2.13 Lighting appliances shall not be installed in positions likely to cause overheating of walls and ceilings, and deflector plates shall be used where necessary.

6.2.14 Open flame fixed appliances installed outdoors, with a flame below cylinder valve level shall be positioned a minimum of 5 m away from the container.

6.3 Ventilation requirements

6.3.1 General

The incorrect installation or use of LPG appliances in buildings can give rise to a variety of hazardous conditions, such as a build-up of unburnt gas, a high concentration of carbon monoxide, carbon dioxide and aldehydes resulting in the depletion of oxygen. The provision of ventilation is therefore of vital importance and in this regard special notice shall be taken of the warnings and recommendations given in the use and installation brochures supplied with the appliance. Ventilation provisions and requirements can also be found in SANS 1539.

Permanent ventilation is required if the oxygen in the air in a room will be used up by flames burning, people breathing, etc. If sufficient ventilation is not provided, the existing oxygen in the air will be used up, the flames will start to smoke and eventually go out and the people will lapse into unconsciousness and eventually suffocate. These processes start to happen when the normal oxygen content of the air in a room (21 % of fresh air is oxygen and 79 % is nitrogen) is reduced to approximately 16 %.

6.3.2 Installation of permanent ventilation openings

Ventilation openings shall be installed in such a way that they cannot be blocked.

NOTE 1 Ventilation opening also includes any door that opens directly to external air.

NOTE 2 An openable window is not permanent ventilation.

6.3.3 Size of permanent ventilation openings

6.3.3.1 The size of permanent ventilation openings is related to the total maximum heat input of all the fuel burning appliances installed in the room.

The following example may be used to determine the size of a permanent ventilation openings:

There are 12 holes in a vent. If the size of each hole is 1 cm × 1 cm (length = 1 cm and height = 1 cm), then the total effective area of free air is 12 cm^2.

6.3.3.2 Where a flued appliance is installed two permanent ventilation openings with each opening having a free cross-sectional area of not less than 3 cm^2/MJ/h of heat input shall be installed, one at high level and one at low level.

6.3.3.3 Where a flueless appliance is installed and permanent ventilation is required two permanent ventilation openings with a total free cross-sectional area of not less than 13 cm^2/MJ/h of heat input shall be installed, one at high level and one at low level.

7 Piping, fittings and other components

7.1 Materials

Materials used in the pipe system shall comply with the appropriate of the following standards or their equivalent and should be clearly marked in accordance with the relevant manufacturing standard to prove such compliance:

a) Copper tubes (class I tubing or better): SANS 460 and SANS 1453

(phosphorus deoxidized copper Cu-DHP)

b) Copper-based fittings: SANS 1067-2

c) Corrugated stainless steel piping and associated fittings: ANSI LC-1/CSA 6.26

BS 7838

EN 15266

BS 7838 requires the pipe cover to be coloured yellow, however, in South Africa this requirement is light stone. If the pipe is banded (see SANS 10140-3) it will comply with the national requirements.

d) Stainless steel piping with associated fittings: SA 312 - ASME-BPVC 7

e) Rubber hose (braided) type 1: EN 1762 and EN 853

f) Flexible rubber tubing or hose: BS 3212 or SANS 1156-2

g) Jointing materials and compounds: BS 5292

h) Ungalvanized steel pipes and wrought steel fittings: SANS 62-1 (medium)

For medium pressure vapour installation not exceeding 150 kPa

i) Ungalvanized steel pipes and wrought steel fittings: BS 1600 (seamless only)

j) Pipe flanges: SANS 1123

k) HDPE pipes and fittings for use with petroleum product: SANS 4437

Where HDPE pipe or couplings are used, except when a HDPE pipe is joined to a metal pipe system as in 7.3.3.2, no mechanical joints shall be allowed. All joints shall be joined by electrofusion welding only, in accordance with SANS 10268-2.

l) PEX/AL/PEX, PE/AL/PE composite pipe system for pressure applications: AS 4176

SANS 17484-1

ASTM F 1281

ASTM F 1282

7.2 Valves

7.2.1 General

Where valves are intended for shutting off the gas supply to (or in) a gas supply line, the valve seats shall be compatible with LPG and certified for use with LPG.

7.2.2 Emergency shut-off valves

Emergency shut-off valves shall be accessible and unobstructed at all times and should be placed as close as possible to where the main gas pipe enters the building. It may be placed inside or outside of the building. Emergency shut-off valves shall not be placed inside a cage.

An emergency shut-off valve may be used as an isolation valve on a single appliance installation.

7.2.3 Isolation valves

Every fixed appliance shall be equipped with an isolation valve to isolate the individual appliance from the system.

Where a gas pipeline between the emergency valve and the appliance is longer than 5 m for a single appliance installation, an additional isolation valve shall be placed as close as possible to the appliance.

7.3 Fixed pipe system

7.3.1 General

The size of a pipe system should be determined by the maximum gas consumption rate of the appliance(s) to be connected (due regard being given to any potential simultaneous demand) and should be large enough to carry the maximum gas flow without excessive pressure loss in the line.

Figures 1 to 4 and 11 to 16 are examples of how the gas pipeline can be connected.

Annex D gives typical sizes of connecting pipes that are connected to individual appliances.

7.3.2 Regulators

7.3.2.1 First-stage regulator

Low-pressure regulators shall comply with the requirements as given in SANS 1237.

A first-stage regulator delivering an intermediate pressure is normally required where gas draw-off points in an installation are a considerable distance (usually over 9 m) from the container position and the gas demand is heavy. The pressure regulator at the container position is set to deliver at a pressure higher than the appliance operating pressure. This regulator shall be fitted outside of the building directly to the gas supply or manifold system.

7.3.2.2 Second-stage regulator

A second-stage regulator shall be installed between the first-stage regulator and the appliance. This second-stage regulator may be installed inside a building, however, if it has a pressure relief valve for gas release, it shall be piped to the outside of the building. The breather hole in a regulator casing does not need to be piped to the outside.

7.3.2.3 Single-stage regulator

For a gas installation under 9 m, a single-stage regulator will suffice. These regulators shall not be installed inside the building unless they are fitted direct to a gas container.

Any low pressure regulator shall be renewed at least every ten years.

7.3.3 Installation and layout of pipework

7.3.3.1 General

7.3.3.1.1 The following requirements shall be considered and applied in addition to any similar specific details that might be introduced by the installer:

a) HDPE pipes shall be used for the conveyance of LPG vapour only, and shall be buried;

b) composite pipe is subject to the following requirements:

1) usage above ground is allowed subject to the pipe being protected from direct sunlight;

2) when embedded in walls or floors, no joints shall be allowed in the embedded sections;

3) no joints are allowed in pipe sections passing through cavity walls;

4) use in ceilings is prohibited unless such pipes are enclosed in a steel sleeve and have no joints.

5) contact with solvents shall be avoided; and

6) the pipe shall not be closer than 150 mm to any heat source;

7) the pipe shall not be used for liquid supply installations;

8) the maximum supply pressure shall not exceed 150 kPa.

9) the pipe shall not be used as a pigtail or connected directly to a cylinder or appliances such as fireplaces or where the appliance needs to be moved on a regular basis;

10) the crimp shall be compatible with the fitting and pipe and shall be in accordance with the manufacturer's instructions;

NOTE The preferred type of crimp style for use in South Africa is the "U" type.

c) schedule 80 steel pipes may, for sizes up to and including 80 mm, be threaded;

d) schedule 40 and SANS 62-1 (medium) steel pipes may, for sizes up to and including 32 mm, together with all attached fittings, be threaded for vapour application only. For sizes above 32 mm, pipes shall be joined only by welding;

e) for liquid applications up to and including 25 mm, nominal bore (NB) pipe shall be schedule 80 steel pipe.

f) where electrical cables are being run on the same wall, gas pipes shall be at least 150 mm apart from the electrical cables and other electrical apparatus. This excludes electric cables in appliances; and

g) when threaded connections are used, only taper threads (male and female) shall be allowed.

7.3.3.1.2 Subject to the requirements of 5.6.2 installations at residential premises that use gas systems with a capacity of not more than 100 kg (1 on 1 off) kg with a changeover device shall not require plans. Where multiple 100 kg gas installations (1 on 1 off) are placed on a single premises (for example a town house complex) the local authority shall be consulted.

7.3.3.1.3 Where plans and drawings are required by the local authority they shall be drawn to one of the following scales, however, where permission from the local authority has been obtained, a marked-up drawing or diagram that indicates the manifold, pipeline, and shut-off valve(s), and the required notes for this part of SANS 10087, shall be acceptable:

a) Site plans: 1:1 000, 1:500, 1:300, 1:200, or 1:100.

b) Layout drawings: 1:100, 1:50 or 1:20, provided that in the case of elevations 1:200 may be used.

NOTE The local authority may, in circumstances deemed exceptional by it, accept a scale not provided for in this subclause.

For other information regarding building regulations, refer to the relevant part of SANS 10400.

7.3.3.1.4 If the building shows any sign of settlement or cracking and in places where expansion joints are applied, the pipework shall be protected against stresses caused by further movement of the building. For example, the pipework should be mounted on wooden battens or ample bends that will allow the pipe to flex without being excessively stressed in the affected area.

7.3.3.1.5 Gas piping shall not be used as an earth for electrical circuits. Gas piping shall be identified for type of use and appropriately marked with "LPG-vapour or LPG-liquid" as applicable every 2 m.

7.3.3.1.6 In buildings with wooden floors that consist of floor boards supported on joists and in which the piping is installed before the boards are laid, the pipes shall run between and parallel to the joists and shall be provided with proper supports. The usual method of securing the pipes to the side of a joist with clips is recommended. Where this is not possible, they can be laid across the joists in notches, provided that the depth of the notches does not exceed one-fifth of the depth of a joist and their distance from the edge of the nearest support for the joist does not exceed one-sixth of the span between joist supports. Where practicable, notches should have radiused corners, for example, the notches should be formed by cutting into drilled holes. Where pipes cannot be laid

parallel to joists and the depth of the joists and the depth of the required notches do not allow the use of a pipe of the required size, a number of smaller pipes of equivalent total capacity can be used (see also 7.3.3.3).

7.3.3.1.7 Burrs formed when a pipe is cut, shall be removed, and any dust, dirt and scale inside the piping and pipe fittings shall be cleaned out before assembly. During the installation stage, care shall be taken to ensure that the bore of a pipe is not restricted by the entry of any material. While pipe fitting is in progress, all open pipe ends shall be temporarily capped or plugged (with a screwed plug or a cap specifically designed for the purpose) pending extension or completion of the installation. The use of wooden and similar plugs shall be strictly forbidden.

7.3.3.1.8 Emphasis shall be placed on the need to

a) avoid interference with other installed services,

b) provide reasonable access for inspection, and

c) obviate the exposure of the pipes to abnormally high or low temperatures.

When piping will be laid in positions where abnormally low temperatures can occur, the piping should be lagged.

7.3.3.2 Buried pipelines

All pipes shall be installed to a depth of at least 500 mm to the top face of the pipe. For pipelines that are buried, the backfill shall incorporate an approved means (for example, chevron tape placed about halfway between the pipe and the surface) to identify the existence of the pipe. Joints in steel pipelines shall be made by welding or brazing. Joints in copper pipes shall comprise soldered capillary fittings (see SANS 1067-2) or be hard-soldered. All buried pipes shall be corrosion protected.

All other joints that are not welded, soldered or electrofusion joints (for example mechanical joints) shall be available for maintenance and shall not be buried.

HDPE pipes and fittings shall not be used above ground. When used underground these assembled joints shall be electrofusion welded to the pipe. Mechanical joints shall not be used underground however where a riser is used the mechanical joint shall be above ground with the riser section not being more than 500 mm. Such risers shall be physically covered against the effect of direct sunlight and protected against physical damage.

NOTE Welded, soldered or, in the case of HDPE piping, electrofused jointing are excluded and not deemed to be mechanical joints.

7.3.3.3 Concealed pipework

7.3.3.3.1 If a gas installation is required in a building that has floors of concrete or other solid material, where the building plans are required (see 7.3.3.1.2), they shall indicate one of the following concepts:

a) ducts or trenches of approved depth; or

b) sleeves; or

c) fully embedded pipes.

7.3.3.3.2 When pipes are chased in a concrete floor,

a) they shall require floor plans,

b) any portion of the pipe shall be placed at least 50 mm below the top of the concrete,

c) all joints in steel pipes shall be welded,

d) all joints in copper pipes shall be soldered, and

e) no mechanical joints shall be buried or embedded in floors or walls, and

f) steel and copper pipes shall be protected against corrosion in an approved manner.

NOTE Protection may mean an electrical conduit for copper tubing, or a wrapping for copper or steel piping, or plastic coating, etc.

7.3.3.3.3 Pipes that are to be embedded in concrete before the completion of a floor shall

a) not have any type of mechanical joint,

b) require floor plans,

c) when steel or copper piping is used for this purpose, be protected against corrosion in an approved manner, and

d) be placed at least 50 mm below the top of the concrete.

7.3.3.3.4 If a system of ducts is used, ventilation to open air shall be provided at the lowest point.

7.3.3.3.5 Branches in pipelines shall be developed with the use of standard wrought steel pipe fittings.

7.3.3.3.6 Copper pipes passing through any wall or ceiling shall be sleeved.

7.3.3.4 Pipes in critical locations

7.3.3.4.1 Critical locations are locations where gas cannot be vented freely to the atmosphere. Examples of these locations are basements, the cavities of cavity walls, lift shafts, flues, ceiling voids or air ducts.

7.3.3.4.2 Pipes passing through the cavity walls, lift shafts, flues, ceiling voids or floor voids and air ducts shall be sleeved (see 7.3.3.1.1(b)(4), 7.3.3.3.6 and 7.3.3.4.7). Where pipes pass through walls that might or might not be regarded as cavity walls, such pipes shall be sleeved. Pipes shall not be placed vertically or horizontally in the void of a cavity wall.

7.3.3.4.3 Where copper tubes are used, they shall have no joints and shall be sleeved.

7.3.3.4.4 Gas pipelines should not be installed in any dedicated emergency route. However, where approval from the local authority has been granted for installation in emergency routes, the pipe shall be schedule 40 piping, be of welded construction (see also 7.3.3.4.7), have no joints and shall be for vapour use only.

7.3.3.4.5 Gas piping shall not be laid in the same service as “Electrical Bus-Bars”.

7.3.3.4.6 Gas piping shall be at least 150 mm away from any electrical cables where they run parallel to each other (see also 7.3.3.1.1(f)). Gas piping may cross electric cables or vice versa, provided that these do not come into contact with each other and there are no joints in either line within 150 mm of such crossings.

7.3.3.4.7 The steel pipes listed in 7.1 may be installed in critical locations, provided that no mechanical joints shall be made within these areas. Where pipes are to be welded, a competent person (welder) shall undertake this work.

7.3.3.4.8 Where pipes are installed in accordance with the requirements of 7.3.3.4.7, a pressure test of at least 400 kPa shall be done to ensure that no leaks are in the system. The pressure shall be maintained for at least 15 min to ensure that no pressure drop occurs.

7.3.3.5 Supports and fixings for pipework

7.3.3.5.1 Piping shall be firmly supported, and particular attention shall be given to the strength and security of hangers and similar supports.

7.3.3.5.2 The intervals between supports and fixings shall be as given in tables 2 and 3.

Table 2 — Intervals between pipe supports for rigid steel pipes

1	2	3
Nominal size of pipe mm	**Maximum interval between pipe supports** m	
	Vertical runs	**Horizontal runs**
10	1,8	1,2
15	2,4	1,8
20	3,0	2,4
25	3,0	2,4

Table 3 — Intervals between pipe supports other than rigid steel pipes

1	2	3
Nominal size of pipe mm	**Maximum interval between pipe supports** m	
	Vertical runs	**Horizontal runs**
8	1,2	0,6
10	1,5	0,9
15	1,8	1,1
20	2,4	1,8

7.3.3.5.3 A support shall be provided within 150 mm of each pipe fitting. Supports shall be provided adjacent to each bend in a pipe. Heavy components installed in the pipeline (for example, regulators, changeover valves, and manifold valves) shall be supported independently of the pipeline. On single applications where the joint is made between the hose and the pipe, the pipe shall be supported at that joint. Metal saddles should be used. Care shall be taken to ensure metal to metal contact is prevented where saddle and pipe are of dissimilar metals. PVC saddles should not be used outdoors as these become brittle due to UV radiation and break easily.

7.3.3.5.4 To allow for the use of tools on a joint without damaging the supporting surface, pipework and supports shall be so arranged that joints stand clear of the surface on which they are supported.

7.3.3.6 Disconnection and clearing

Pipe runs require enough connectors or unions to allow the removal or alteration of lengths of pipe with minimum damage to the structure and surrounding decorations. To effectively purge a pipeline, appropriate gas bleeding arrangements shall be included in the pipeline, if not available on the appliance.

7.3.3.7 Reduction of resistance to flow

To prevent restriction of gas flow, the number of pipe fittings shall be kept to a minimum, and sharp changes of direction shall be avoided. A bend in a pipe shall be of radius at least five times the diameter of the pipe and shall be free from kinks. When fittings are used to cause a change of direction, bends shall be preferred.

7.3.3.8 Separation of occupancy and tenancy

When pipes pass through sleeves or apertures in a fire-resistant structure, the space between the pipe and the sleeve or aperture shall be solidly filled with a water-resistant, non-abrasive, fire resistant, non-corrosive material, and the duct or channel shall be completely sealed with fillings of fire resistance at least equal to that of the surrounding structure. Every filling or seal subsequently disturbed shall be restored to its original condition. Provision shall be made for the expansion of pipes between fixed points. PVC sleeves shall not be used in this instance.

7.3.3.9 Position of fixed gas supply points

7.3.3.9.1 Each gas supply point shall be situated to suit the position of the appliance that it serves, and shall allow for convenient coupling to the appliance. Until the appliances are connected, each point shall be securely capped or plugged, and so marked as to indicate that it is a gas point. Where the appliance is removed from the system in use, such a gas point shall also be capped or plugged.

7.3.3.9.2 The gas supply point to a built-in space heater shall be as recommended by the manufacturer.

7.3.3.9.3 Each point intended for connection to an appliance shall have a shut-off valve.

7.3.3.9.4 Shut-off valves shall be accessible at all times.

7.4 Joints and fittings (cocks, valves and unions)

7.4.1 Except for welded, soldered or electrofused joints, all joints, cocks, valves and unions (including the unions on gaslight fittings) shall be readily accessible for maintenance and repair, and all joints shall be so made as to avoid undue strain in the pipe system.

7.4.2 Compression-type and capillary-type jointing are recommended for copper piping. Brazed or silver soldered joints are also acceptable. Only soft solder that complies with S19 and S20 of SANS 24 shall be used for capillary fittings. Where compression fittings are used, they shall only be used with class II copper pipe.

7.4.3 Joints in steel pipes can be made by welding, brazing or screwed connection (see also 7.3.3.1.1). Only a competent person, who can provide proof of competency in welding, shall carry out welding and brazing.

7.4.4 Screwed connections, both male and female threads shall be tapered. Particular care shall be taken to ensure that mating screw threads are of the same type, form and designation. No joint shall be made by over-torque of unmating threads or by relying on the jointing compound for sealing.

7.4.5 Only approved jointing material shall be used on male threads of screwed components. Hemp shall not be used.

7.4.6 Washers, gaskets and joint rings used for flanged joints shall be strong, gas-tight, durable and shall comply with at least SANS 4633.

7.4.7 In installations involving a number of branch lines, each branch line shall have a shut-off valve to allow its repair without shutting off the whole installation.

7.5 Flexible tubing and hose

7.5.1 Appliances that have to be moved for cleaning shall be connected to the gas system by flexible tubing or hose (see 6.2.3).

7.5.2 Flexible tubing or hose can also be used for simple single container installations in which the container is located indoors and directly connected to one appliance by means of a regulator.

7.5.3 The length of a flexible tube or hose shall not exceed 2 m, and flexible piping shall not extend from one room to another or pass through any wall, partition, ceiling, window or floor.

7.5.4 Flexible tubing and hose shall be installed away from any position of mechanical damage and in a position where it can be inspected at appropriate intervals (see 10.1).

7.5.5 Only approved types of nozzle (see SANS 1237) shall be used as end connections. The ends of the tubes or hoses shall fit tightly over the inlet part of the nozzle.

7.5.6 All hose shall be clamped in position on the nozzle with a hose clamp.

7.5.7 Flexible tubing and hose shall not be exposed to heat in excess of 50 °C. Particular care shall be taken when connecting a gas stove or a hotplate to ensure that the run of tubing or hose is kept well below the level of the open burners. The tubing or hose shall also be kept well clear of the oven vent and should not be taken around the back of the stove or flue outlet.

7.5.8 Each connecting tube or hose shall be in one piece and shall supply only one appliance, i.e. there shall be no joints or T-junctions along its length.

7.5.9 Flexible tubing and hose shall be checked for signs of rupture, cracking and perishing, and shall be replaced if necessary. If over five years old and exposed to UV light, flexible tubing and hose shall be replaced automatically.

7.5.10 For manifold pigtail hoses see 5.7.

7.6 Provision of flues

7.6.1 The design and installation of flues should be designed and installed as described in annex E.

7.6.2 The provision of flues on appliances is covered in SANS 1539 and flues shall be installed in accordance with the requirements of SANS 1539 and this subclause.

7.6.3 A permanently installed space heater, unless designated as a flueless heater in terms of SANS 1539, shall be flued to the outside air when

a) the output rating of the heater exceeds 16 MJ/h, and

b) the ratio of the input rating of the appliance(s) to the volume of the room exceeds 0,25 MJ/h/m^3 of free room space.

7.6.4 In the case of flueless space heaters, no flues are required (see 7.6.6) however, the heaters shall be installed in accordance with the manufacturer's requirements, 6.3 and relevant subclauses.

7.6.5 Except as allowed in terms of 7.6.6, all appliances other than space heaters shall be flued to the outside air when the ratio of the total input rating of all the appliances in the room to the volume of that room exceeds 0,25 MJ/h/m^3 of free room space.

WARNING If instantaneous water heaters (geysers) without a balanced flue system are fitted in bathrooms, permanent ventilation is of the utmost importance because of the high gas consumption rate of the appliance, the small size of normal bathrooms, and the tendency of most users to keep air entry into a bathroom to a minimum.

7.6.6 If two or more appliances that are not in the categories described in 7.6.3 and 7.6.4 are located in the same room, one or more shall, if applicable, be so flued as to ensure that the ratio given in 7.6.5 shall not be exceeded.

7.6.7 Gas stoves, hotplates and sink water heaters installed in kitchens may be exempted from the requirements of 7.6.4 and 7.6.5 if they are to be used at maximum rating for short periods only. However, kitchens shall be adequately ventilated by the use of at least one airbrick (in an external wall) that has a ventilating area of at least 160 cm^2.

7.6.8 Appliances that have a high rate of gas consumption or that operate for long periods shall be equipped with flue pipes that lead to the outside air (see 6.3). Typical examples of such appliances are multipoint and bath-size water heaters, showers and high-output space heaters.

WARNINGS

1 LPG appliances consume oxygen and, in enclosed or restricted spaces, this will cause the depletion of the oxygen content of the available air.

2 Although the exhaust gases from an LPG burner (i.e. nitrogen, water vapour and carbon dioxide) are clean, colourless and non-toxic, they can cause heavy water condensation inside a room if the ventilation is inadequate. Moreover, too much carbon dioxide in the air might upset the performance of an LPG appliance and lead to the formation of carbon monoxide, which is highly toxic.

3 All LPG appliances that are likely to need a flue, have connections for a flue pipe. In most cases, the appliance will incorporate a draught diverter, the purpose of which is to prevent downdraughts that might cause the accidental blowing out (extinguishing) of the burner flames.

4 Where so required permanent ventilation shall be provided for appliances that require a flue to be fitted (see 7.6.3, 7.6.4, and 7.6.5).

7.6.9 A flue or vent shall not be connected to a chimney leading from a fireplace unless the bottom of the chimney is permanently sealed. Where a flue pipe is extended into an existing sealed chimney, care shall be taken to ensure that the end of the flue pipe does not protrude into the chimney space and that the chimney is free from soot etc. Brick and masonry chimneys shall be so treated as to obviate condensation problems.

7.6.10 A flue shall be clear of all obstructions that might impede the flow of exhaust gases, and the cross-sectional area of the flue shall nowhere be less than that of the flue collar on the appliance. A flue pipe shall not enter into a draught diverter far enough to cause an obstruction.

7.6.11 Dampers and an excessive number of bends or sudden changes in the size and shape of the cross section of flues shall not be allowed.

7.6.12 Where two or more appliances are vented into a common flue, the individual flue pipes shall be joined by Y-pieces situated at the greatest practicable height above the appliances. The cross-sectional area of the common flue pipe shall be at least equal to the combined area of the flue collars on the individual appliances.

7.6.13 A flue pipe shall run as near to the vertical as possible throughout its full length. Horizontal runs are not recommended and shall be kept to a minimum and be as short as possible. Joints in the flue shall be so constructed that condensate cannot seep through the joint and out of the flue.

7.6.14 Where horizontal runs cannot be avoided entirely, the horizontal sections shall be positioned as far above the appliance as the layout will allow, and their total length shall not exceed 75 % of the total vertical run. The horizontal pipes shall also rise slightly towards the flue outlet (enough to ensure that any water that might condense in the flue will drain back towards the appliance). If the use of bends in a flue is unavoidable, a bend of 45° is preferred. Where, however a 90° change in direction is unavoidable, a 90° bend with a radius of at least three times the flue diameter shall be used.

7.6.15 The flue outlet shall be so positioned as to prevent down draughts. Frequently this means that the outlet shall be above the highest point on the building, for example, approximately 1 m above the roof ridge or, in the case of a flat-roofed building, 1 m above the parapet. The outlet shall have a rainproof terminal or cowl of a type that does not restrict the flue. This cowl shall be screened to prevent birds from nesting in it (see also annex E).

7.6.16 Over cooling of flue pipes might cause reduction of draught or heavy condensation inside the pipes (or both), therefore flues shall be run indoors as far as possible and thermally insulated where necessary. If cooling and condensation are likely to be a problem, a condensate trap shall be fitted at a convenient point low down in the flue.

7.6.17 The entire flue installation shall be completely fire resistant. Flue pipes shall be so secured that they stand clear of walls and ceilings, and wherever they pass through a ceiling, sleeves and ceiling plates shall be fitted.

7.6.18 When a flue pipe system is designed, careful consideration shall be given to the danger of a flue causing the overheating of woodwork or other combustible material in a building. Where necessary, a fire resistant, heat-insulating screen shall be fixed between the flue pipe(s) and the combustible materials to ensure that the surface temperatures of the latter do not rise above 65 °C. The clearance between any such screen and the flue pipe(s) shall be at least 10 mm.

7.6.19 Flue pipes shall be securely fixed and supported and, when possible, should extend through a roof. Where a flue pipe passes through a roof or an outside wall, the junction shall be rendered fully weatherproof and fire resistant, and the materials used to effect this shall, in addition, be corrosion resistant.

NOTE If it is inconvenient or impossible for a flue pipe to pass through a roof (i.e. if it has to be taken through a wall), a vent tile or other approved wall terminal may be used provided that it is properly positioned. Alternatively, where the eaves permit, the flue may have a vertical section (riser) that is fitted with a suitable terminal that does not obstruct or reduce the effective cross-sectional area of the flue or vent outlet.

8 Inspection, testing and instructions to users

8.1 Inspection and testing of new installations

8.1.1 General

On completion, and before commissioning, the installation shall be inspected, tested and approved by the registered installer, and the user shall be issued with a certificate of compliance that indicates that the installation has been tested and that it complies with this part of SANS 10087. A copy of the certificate of compliance shall be sent to a body appointed by the Chief Inspector of the Department of Labour for record purposes (see annex F).

Installations shall be tested in the following sequence:

a) high-pressure stage;

b) intermediate-pressure stage (when used); and

c) low-pressure stage.

8.1.2 High-pressure stage

The valves and high-pressure connections shall be tested for leaks as described below. A test method applicable to a twin container installation is described as follows:

a) Close off the reticulation line.

b) Open the gas container(s) and use a soapy solution to test the manifold and pigtails connection(s) for soundness.

8.1.3 Intermediate-pressure stage (when used)

An intermediate-pressure stage shall be tested, with inert gas, air or nitrogen, at a pressure of 300 kPa for a minimum period of 30 min as described below. Before this test is carried out, the outlet of the secondary pressure regulator shall be closed.

a) Ensure that a test point or valve connection is available in the section of the line being pressure tested.

b) Check the operating pressure of in-line equipment prior to testing. Isolate such equipment where the equipment is not able to withstand the required test pressure.

c) Connect the pump to the test point and pressurize the pipeline to 300 kPa.

d) Isolate the pump once the correct pressure has been attained.

e) Leave the pipeline under pressure for at least 30 min and check for a pressure drop.

f) Depressurize the system.

g) In line components not rated at 300 kPa shall be isolated before testing.

8.1.4 Low-pressure stage

The complete low-pressure stage shall be tested in accordance with an acceptable method.

Isolate the downstream regulator at the outlet and use the test method as described in the intermediate-pressure stage with the exception that the pressure for this test shall be at least 22 kPa.

Leave the pipeline under pressure for at least 30 min and check for any leaks in the system.

8.1.5 Commissioning an appliance

An appliance shall be commissioned as follows:

a) Connect a manometer or an approved tester (see figure 27) to some convenient point in the low-pressure system as close as possible to the further most appliances, and in cases where more than one appliance is used the appliance with the largest consumption regulator outlet.

b) Turn on the gas supply and purge the air from the system.

c) Check and note the gas pressure with

   1) all the burners alight,

   2) only the smallest burner in the installation alight, and

   3) all the burners turned off.

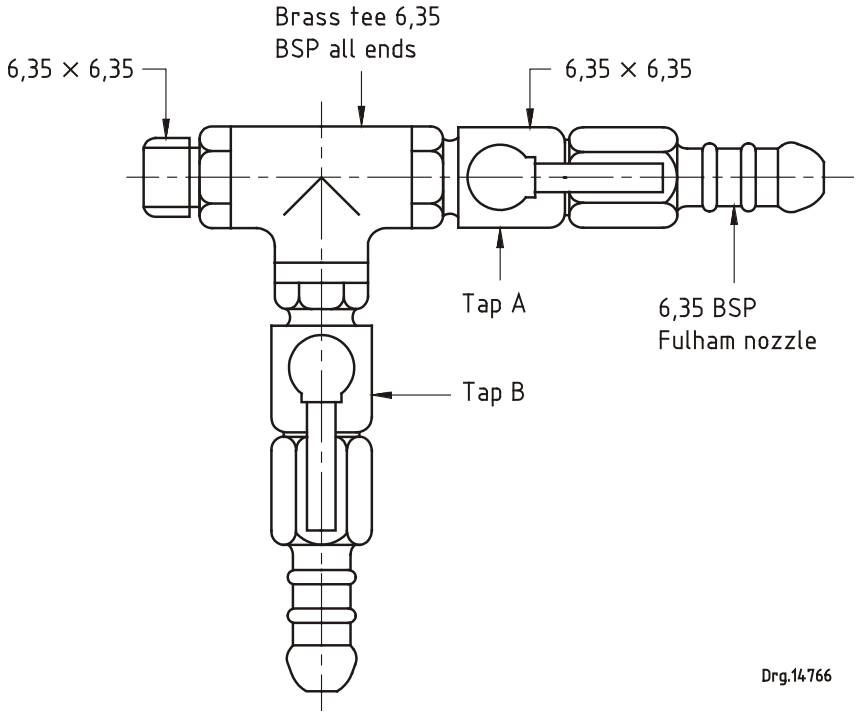
d) The type and size of the regulator and the performance of the system can be regarded as satisfactory if there is no fluctuation of pressure in c) 1) and c) 2), and if the pressure

   1) does not fall below 2,8 kPa in c) 1) above,

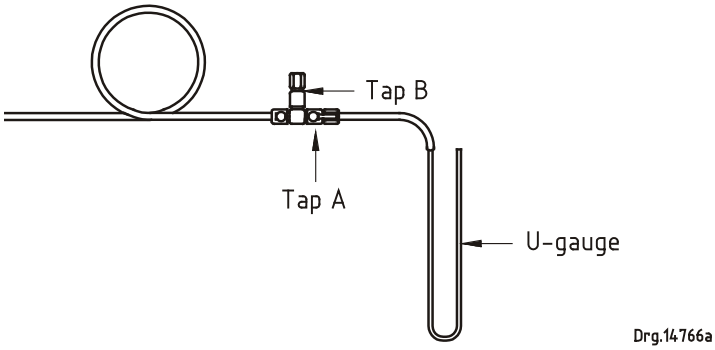
   2) does not exceed 3,5 kPa in c) 2) above, and

   3) does not exceed 3,8 kPa in c) 3) above.

NOTE Certain appliances operate at a different pressure; therefore cognisance of the operating pressure of the appliance is to be considered. The correct type of regulator is to be used (for example adjustable high pressure regulator) for these appliances.



a) Test fitting



b) Test arrangement

Figure 27— U-gauge test

8.2 Instructions to users

8.2.1 On completion of the installation, the registered installer shall provide a certificate of compliance to the user.

8.2.2 The following markings shall be permanently displayed in a prominent position on or near the installation:

a) the installer's name;

b) the date of installation;

c) the installer's registration number;

d) whether it is LPG vapour/LPG liquid (whichever is applicable); and

e) the installer's telephone number.

8.2.3 The registered installer or authorized company representative shall supply the user with a printed instruction sheet or booklet describing the correct and safe handling of the LPG systems and appliances, and appropriate general emergency procedures.

In particular, attention shall be drawn to

a) the changing of containers and the risks involved,

b) the fact that the stand by side of the installation shall not be left disconnected from the containers,

c) the action to be taken to disperse accidental accumulation of gas,

d) the action to be taken in case of fire,

NOTE LPG fires should not normally be extinguished unless the source of LPG can be isolated.

e) the fact that the so-called "empty" containers can be dangerous and shall be kept closed at all times, and

f) the premises where gas is installed or used in excess of 100 kg shall be registered with the local authority. The installer shall ensure that the user or occupier is informed of such requirements before commissioning the installation.

g) the service intervals and maintenance requirements as indicated in 10.1.

All the above details shall be discussed with the user to ensure that he fully understands all the details. His attention shall also be drawn to the information and warnings (when relevant) given in the product brochures supplied with the appliance.

8.3 Fire prevention — Design, instructions and training

8.3.1 The local fire department shall be consulted prior to installation when a LPG manifold system is to be installed.

8.3.2 The user shall be advised regarding the use of approved fire extinguishers. The acquisition and installation of dry powder fire extinguisher(s) of at least 9 kg total capacity (i.e. 2 x 4,5 kg or 1 x 9 kg extinguisher) that complies with SANS 1910 shall be required for installations of combined capacity in excess of 100 kg of gas. The extinguisher(s) shall be installed near to the installation. It shall be securely mounted and its position shall be indicated (where necessary) in an approved manner with appropriate symbolic signs.

8.3.3 Loose or piled combustible material, weeds and long grass shall not be permitted within 3 m of any container.

8.3.4 Where relevant, dikes, diversion wall(s), or grading shall be used to prevent the accumulation of flow of liquids that have flash points below 93,4 °C under LPG containers.

8.3.5 A diversion wall is used to divert the flow of gas and may therefore be used to meet the safety distance requirements for potential point of gas release to any drain, door, window in a building and electrical sources provided that the distance shall be measured from the potential point

of gas release horizontally around such wall to the drain, door, or window in a building or electrical source.

Furthermore where potential point of gas release is higher than the diversion wall the safety distance shall also be measured over such wall.

NOTE A single brick wall may only be built to a height that does not exceed 1,2 m (see SANS 10400).

8.3.6 LPG containers shall be located at least 3 m from the centre line of the wall of bunded areas containing flammable or combustible liquids.

8.3.7 Where LPG installations are closer than 3 m to any other compressed gas, special fire protection precautions shall be considered, for example, a firewall.

8.3.8 No part of an LPG container shall be located in the area 1,8 m horizontally from a vertical plane beneath overhead electric power lines that are over 600 V.

8.3.9 Structures such as firewalls, concrete barriers, and other similar structures shall be avoided around or over installed containers. A maximum of two walls joined perpendicularly shall be allowed (see also 5.2.3.2(d) and figure 28).

8.3.10 A firewall shall be used to prevent potential fire spread to or from an installation into a building or other elements that could be ignited due to radiated heat or direct flame impingement. Safety distance shall be measured horizontally around such firewall and over such firewall for potential sources of ignition higher than the firewall.

NOTE A firewall can therefore fulfill the function of a diversion wall and firewall, a diversion wall should only be used to divert gas release and not as a firewall.

8.3.11 No two walls enclosing a manifold installation shall form an angle of less than 90°. A third wall of honey comb type shall not be allowed where two walls join perpendicularly.

8.3.12 No manifold installation shall be installed into a recess into a building or structure unless the recess or structure has no roof cover (see also 8.3.10.13).

8.3.13 A straight manifold installation against a firewall that is enclosed with single brick walls at the ends of the containers (for example wire mesh in front) with a clearance of at least 3 m to the left, front and right of the enclosure. Where the side walls are of length not exceeding 500 mm this enclosure shall not be deemed to be an installation enclosed by three walls see figure 28.

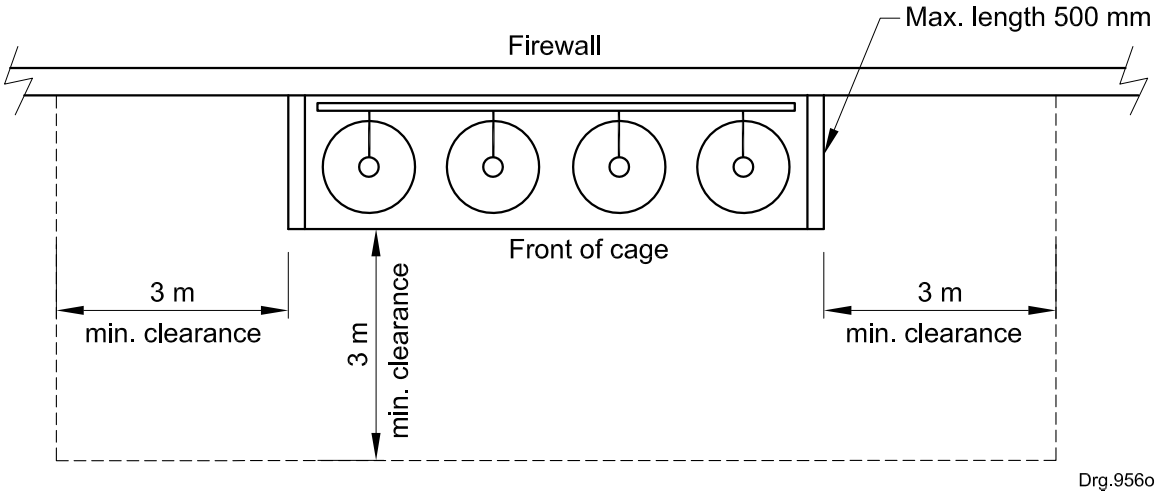


Figure 28 — Straight manifold installation against a firewall

8.3.14 Where a third perpendicular wall is either 3 m from the shell of the nearest LPG container or a distance equal to the length of the installation (dimension A), whichever is the greater, it shall not be deemed to be a third wall (see figure 29).

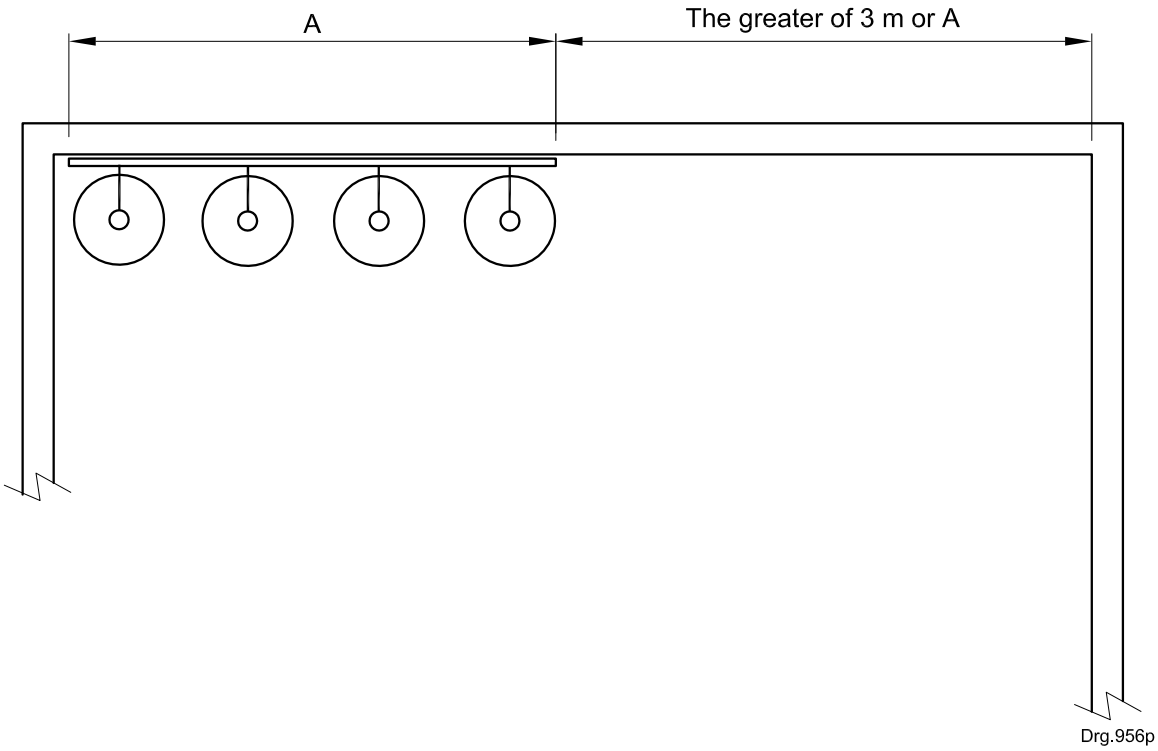


Figure 29 — Safe distance for manifold installation from firewall

8.3.15 Where containers are installed in an L shape or back to back then a maximum of two walls joined perpendicularly shall be allowed (see figure 30).

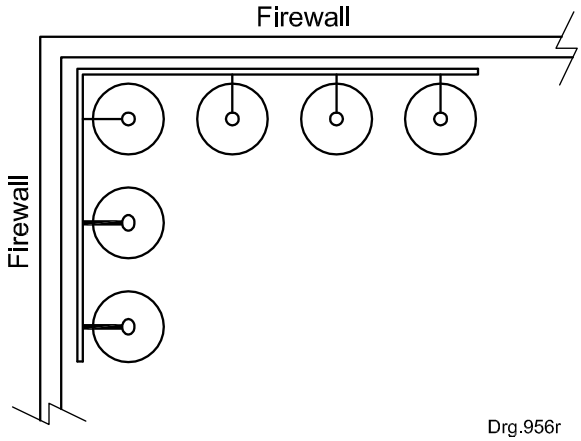


Figure 30 — L shape or back to back manifold installation against a firewall

8.16 The planning for effective measures for the control of inadvertent LPG release or fire shall be coordinated with local emergency handling agencies, such as fire departments. Planning shall consider the safety of emergency personnel.

8.17 Access to and around the installation shall be provided for fire-fighting purposes and this area shall be kept free of obstacles at all times.

8.18 Every person who manufactures, imports, sells or supplies LPG or related equipment and persons on whose premises LPG is stored or used shall ensure that they are familiar with the relevant regulations of the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993), to ensure that he and other persons who may be directly or indirectly affected by his activities are not exposed to hazards to their health or safety.

8.19 Fire protection plan for a gas installations can be carried out in terms of a rational design as described in SANS 10400.

8.20 No risk assessment will be required if the requirements of this part of SANS 10087 have been complied with.

9 Electrical equipment and other sources of ignition

Where electrical equipment is placed within the safety distance as specified in figures 3, 4 and 6 such equipment shall be in accordance with the requirements of SANS 10108.

Electrical equipment, such as light switches and plugs, shall be at least 200 mm away from any burner and potential point of gas release. Where it is necessary to install a gas hob together with an electric oven, a three-point plug socket shall not be used to connect the electric oven. A proper isolator switch shall be in place above the level of the hob and it shall have at least 200 mm clearance from the hob.

No electrical connection shall be made below the hob. See figures 3 and 4 for further connections.

10 Ongoing inspection and repair

10.1 Inspection

The user shall be informed that appliances, components of the installation and the distributing system shall be inspected at regular intervals (not exceeding five years) to ensure that all components are still operating effectively and that the system is leak free. All hoses used on outdoor installations shall be replaced five years after the date of installation.

10.2 Supplier of gas and equipment

The supplier of gas and gas equipment shall inform the user of his responsibilities in respect of safe operation, use and maintenance of the gas and equipment as applicable (see also the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993) for duties of the supplier).

10.3 Repair

The incorrect repair (or adjustment) of the various components of an LPG installation can result in hazardous conditions. Only a registered installer or a registered appliance technician, as appropriate to the appliance being installed, shall therefore carry out such repair. This also includes the removal of appliances from a gas system.

Where such appliances are removed from the installation or where an installation has not been completed all open ends shall be permanently capped (with a screwed plug or a cap specifically designed for the purpose) pending extension or completion of the installation. The use of wooden and similar plugs shall be strictly forbidden.

Annex A
(normative)

In-situ container (dumpies) filling requirements

Containers (dumpies) can be filled in situ subject to the following conditions:

a) an individual container (dumpie) shall have a water capacity in excess of 120 L;

b) each container (dumpie) shall be fitted with an approved pressure relief device;

c) each container (dumpie) shall

1) have an automatic shut-off valve which should operate at the maximum allowed liquid level applicable to the container being filled (this should be complied with when the containers being filled are on a manifold with a single filling connection), or

2) be fitted with a permanent fixed liquid level gauge device so that the relevant mass fill ratio shall not be exceeded for the particular container size;

NOTE This filling method can be allowed subject to a quantified assessment of the vapour release and to subsequent approval by the local authority.

d) filling trucks shall be at least 3 m away from any container;

e) where no fixed filling point is provided but filling is done individually, such container(s) shall have at least 1 m clearance for accessibility for the filler.

f) no person shall fill a container with gas (see requirements given in SANS 10019) unless

1) he is fully conversant with the relevant subclauses of this part of SANS 10087,

2) he is satisfied that the container complies with the requirements of an approved manufacturing specification or the provisions of an approved manufacturing code (if necessary, this may be ascertained from the relevant container documents),

3) he employs staff trained and experienced in the pre-filling inspection and actual filling of containers with those gases that he handles,

4) the container is not due for periodic inspection or testing, and

5) permission to fill the container has been granted by the owner of the container;

NOTE This precaution is solely for safety reasons, since the cylinder containment history is an essential reference for correct filling.

g) classification and electrical zoning (see SANS 10087-3).

Annex B
(informative)

Occupancy classification in accordance with SANS 10400-A

Table B.1 gives the occupancy or building classifications in accordance with SANS 10400-A.

Table B.1 — Occupancy or building classifications in accordance with SANS 10400-A

1	2
Class of occupancy	**Occupancy**
A1	**Entertainment and public assembly**
	Occupancy where persons gather to eat, drink, dance or participate in other recreation.
A2	**Theatrical and indoor sport**
	Occupancy where persons gather for the viewing of theatrical, operatic, orchestral, choral, cinematographical or sport performances.
A3	**Places of instruction**
	Occupancy where school children, students or other persons assemble for the purpose of tuition or learning.
A4	**Worship**
	Occupancy where persons assemble for the purpose of worshipping.
A5	**Outdoor sport**
	Occupancy where persons view outdoor sports events.
B1	**High risk commercial service**
	Occupancy where a non-industrial process is carried out and where either the material handled or the process carried out is liable, in the event of fire, to cause combustion with extreme rapidity or give rise to poisonous fumes, or cause explosions.
B2	**Moderate risk commercial service**
	Occupancy where a non-industrial process is carried out and where either the material handled or the process carried out is liable, in the event of fire, to cause combustion with moderate rapidity but is not likely to give rise to poisonous fumes, or cause explosions.
B3	**Low risk commercial service**
	Occupancy where a non-industrial process is carried out and where neither the material handled nor the process carried out falls into the high or moderate risk category.
C1	**Exhibition hall**
	Occupancy where goods are displayed primarily for viewing by the public.
C2	**Museum**
	Occupancy comprising a museum, art gallery or library.
D1	**High risk industrial**
	Occupancy where an industrial process is carried out and where either the material handled or the process carried out is liable, in the event of fire, to cause combustion with extreme rapidity or give rise to poisonous fumes, or cause explosions.
D2	**Moderate risk industrial**
	Occupancy where an industrial process is carried out and where either the material handled or the process carried out is liable, in the event of fire, to cause combustion with moderate rapidity but is not likely to give rise to poisonous fumes, or cause explosions.
D3	**Low risk industrial**
	Occupancy where an industrial process is carried out and where neither the material handled nor the process carried out falls into the high or moderate risk category.
D4	**Plant room**
	Occupancy comprising usually unattended mechanical or electrical services necessary for the running of a building.

Table B.1 (*concluded*)

1	2
Class of occupancy	**Occupancy**
E1	**Place of detention** Occupancy where people are detained for punitive or corrective reasons or because of their mental condition.
E2	**Hospital** Occupancy where people are cared for or treated because of physical or mental disabilities and where they are generally bedridden.
E3	**Other institutional (residential)** Occupancy where groups of people who either are not fully fit, or who are restricted in their movements or their ability to make decisions, reside and are cared for.
E 4	**Health care** Occupancy which is a common place of long term or transient living for a number of unrelated persons consisting of a single unit on its own site who, due to varying degrees of incapacity, are provided with personal care services or are undergoing medical treatment.
F1	**Large shop** Occupancy where merchandise is displayed and offered for sale to the public and the floor area exceeds 250 m^2.
F2	**Small shop** Occupancy where merchandise is displayed and offered for sale to the public and the floor area does not exceed 250 m^2.
F3	**Wholesalers' store** Occupancy where goods are displayed and stored and where only a limited selected group of persons is present at any one time.
G1	**Offices** Occupancy comprising offices, banks, consulting rooms and other similar usage.
H1	**Hotel** Occupancy where persons rent furnished rooms, not being dwelling units.
H2	**Dormitory** Occupancy where groups of people are accommodated in one room.
H3	**Domestic residence** Occupancy consisting of two or more dwelling units on a single site.
H4	**Dwelling house** Occupancy consisting of a dwelling unit on its own site, including a garage and other domestic outbuildings, if any.
H5	**Hospitality** Occupancy where unrelated persons rent finished rooms on a transient basis within a dwelling house or domestic residence with sleeping accommodation for not more than 16 persons within dwelling unit.
J1	**High risk storage** Occupancy where material is stored and where the stored material is liable, in the event of fire, to cause combustion with extreme rapidity or give rise to poisonous fumes, or cause explosions.
J2	**Moderate risk storage** Occupancy where material is stored and where the stored material is liable, in the event of fire, to cause combustion with moderate rapidity but is not likely to give rise to poisonous fumes, or cause explosions.
J3	**Low risk storage** Occupancy where the material stored does not fall into the high or moderate risk category.
J4	**Parking garage** Occupancy used for storing or parking of more than 10 motor vehicles.

Annex C
(informative)

Testing the adjustment of burners

C.1 Check the operation of each burner of each appliance and ensure that the aeration controls are correctly adjusted and locked.

C.2 Check the performance of the thermostats on ovens, etc. with a suitable thermometer.

C.3 Ensure that the pilot lights and flame failure devices function correctly.

C.4 Check all water heaters for water discharge temperature and ensure that their adjustments are correctly set.

Annex D
(informative)

Determination of pipe sizes

D.1 Calculation of pipe size in relation to demand rate

D.1.1 To determine the size(s) of pipe required in a gas pipe system, it is necessary to establish the amount of gas (expressed in terms of MJ/h) that passes through each section of pipe when all the appliances are turned full-on.

D.1.2 The rating of each appliance is given in the manufacturer's service manual or on the appliance data plate. The ratings given in table D.1 may be used as a guide.

D.1.3 The principles used to establish the required pipe diameter is commonly called the ‘Index Length Method’. Another term for this is the ‘Longest Length Method’. As the descriptive name indicates, it uses as the starting point for establishing the pipe diameter required per section, the pipe run in metres to the most remote appliance from the low pressure regulator.

The pipe size for each section shall be determined using the longest length of piping from the point of delivery to the most remote outlet and the load of the section. This means from the outlet of the low pressure regulator to the connection point of the appliance furthest from the regulator outlet.

D.1.4 The practical effect of this is that if there are three appliances to be installed, measure the distance that each appliance is from the low pressure regulator. For example we have one at 10m, one at 5 m and one at 12 m. Then the Index Length to be applied when using the pipe sizing tables below would be 12 m. This figure would be used for all the individual appliances, with the only difference between them when reading the tables being the actual gas demand for each appliance.

D.1.5 In the following examples, the pipe length per section is given. However, this is only given to easily identify the longest total run in order to establish the Index Length that is used in reading the pipe sizing tables. The individual pipe section lengths are not referred to when determining from the pipe sizing tables the actual pipe diameter required per section. Only the Index Length is used.

D.1.6 The important figure per individual section is the total gas demand that each section is

required to carry.

D.1.7 Always carry out this exercise on each installation to ensure that the pipe diameter per section has enough capacity to carry the gas demand. Failure to do this can easily result in the pipe being too small to supply sufficient gas to meet the appliance demand.

D.1.8 When a pipework system is designed, provision should be made for additional appliances which might be installed at a later date and pipe sizes should, therefore, be large enough to cater for such future extensions.

D.1.9 The pipe sizing tables below refer only to copper or steel pipe. For information on pipe sizing tables for other pipe materials such as composite pipe or corrugated stainless steel pipe, refer to the manufacturer's published tables.

Table D.1 — Appliance ratings

1	2
Appliance	**Typical rating MJ/h**
Gas stove, normal domestic	42
Gas stove, large domestic	63
Gas hob	35
Portable hotplate (2 burner)	16
Instantaneous water heater-multi point heater (14 L)	117
Instantaneous water heater-multi point heater (11 L)	90
Instantaneous water heater-single point or sink heater	37
Storage water heater – large (135 L)	95
Storage water heater – medium (80 L)	90
Storage water heater – small (60 L)	58
Gas light	2
Refrigerator	2
Space heater – large size with flue	40
Space heater – size flueless	30
Space heater – portable e.g. roll about heater	15

NOTE 50 MJ/h = 1100 g/h

Example A is a fully worked example of a basic layout involving three different appliances each with its own gas demand.

NOTE An allowance for bends, elbows and T-pieces is included in tables D.1, D.3 and D.4.

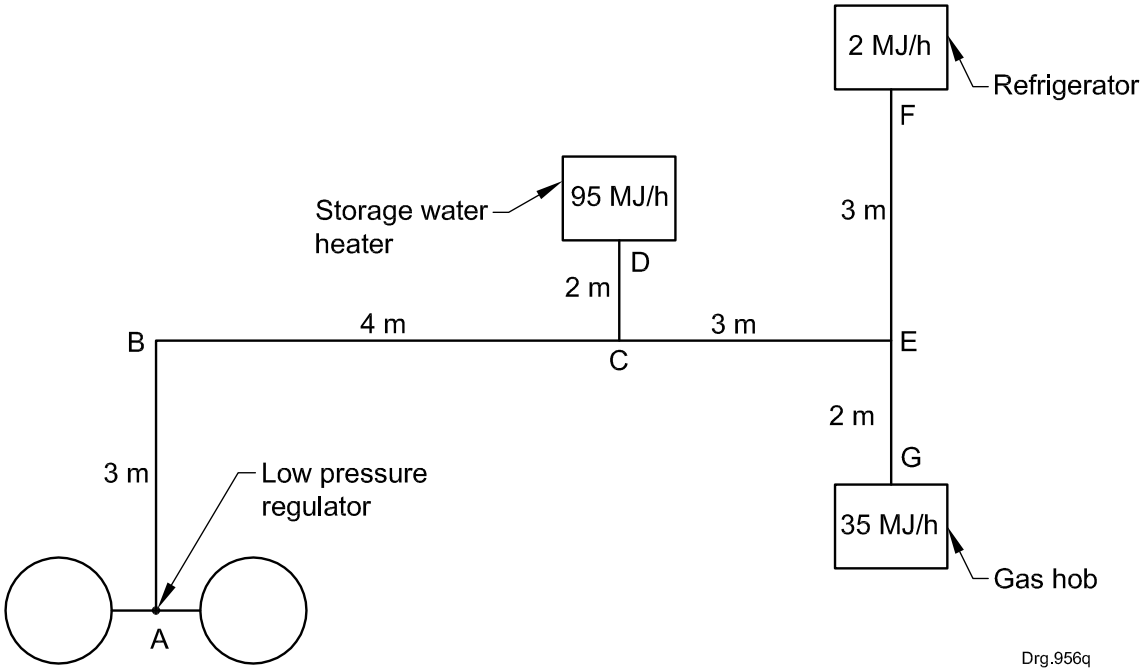


Figure D.1 — Pipe sizing

Example A

The objective of this example is to;

a) explain the process to establish the Index Length, and

b) having established the Index Length, identify the minimum pipe diameter per identified pipe section by using the relevant pipe sizing table.

For the purposes of the exercise it is to be assumed that;

a) the installation is low pressure, and

b) the piping material is copper.

The information below refers to figure D.1

Step 1

Find Index Length =AB + BC + CE + EF = 13 m

Ignore the lengths CD and EG as these branches do not contribute to the calculation of the index length.

Step 2

Find total gas demand for each section

AB + BC = AC = 95 + 35 + 2 = 132 MJ/h

CD = 95 MJ/h

CE = 35 + 2 = 37 MJ/h

EF = 2 MJ/h

EG = 35 MJ/h

Step 3

Find the row to match the Index length using table D.3 for a low pressure installation in copper pipe. As our index length is 13 m we shall use the row for 15 m. Never size down always use the next higher figure if your measured index length falls between two figures.

The index length is used to all the succeeding length references. The section lengths are not used in determining the pipe diameter to be used.

Step 4

Now that we have identified the row in table D.2 select the pipe diameter for the sections as listed in step 2.

Then: AB + BC = 132 MJ/h

Reading along the row for 15 m in table D.2 and taking note that the rule is to always go to the next higher figure if the rating you are trying to match falls between two figures, we require a pipe diameter for that section of 22 mm.

Then: CD = 95 MJ/h

Reading along the row for 15 m in table D.2 we require a pipe diameter for that section of 22 mm.

Then CE = 37 MJ/h

Reading along the row for 15 m in table D.2 we require a pipe diameter for that section of 15 mm.

Then EF = 2 MJ/h

Reading along the row for 15 m in table D.2 we require a pipe diameter for that section of 9,5 mm.

Then EG = 35 MJ/h

Reading along the row for 15 m in table D.2 we require a pipe diameter for that section of 15 mm.

Table D.2 — Low pressure pipe sizing — Copper pipe

1	2	3	4	5
Index length m	**Pipe diameter** mm			
	9,5	15	22	28
	MJ/h	MJ/h	MJ/h	MJ/h
3	48	199	495	1 057
6	33	137	340	726
9	27	110	273	583
12	22	94	233	499
15	20	84	207	442
18	18	75	188	401
21	17	70	173	369
24	16	65	161	343
27	15	60	151	322
30	14	57	142	304
38	12	51	126	269
45	11	47	114	244
53	N/A	42	105	225
60	N/A	39	98	209
75	N/A	35	87	186
90	N/A	32	78	167

Table D.3 — Low pressure pipe sizing — Schedule 40 pipe

1	2	3	4
Index length m	**Pipe diameter** mm		
	15 (1/2)	19 (3/4)	25 (1)
	MJ/h	MJ/h	MJ/h
3	308	644	1 219
6	212	443	834
9	170	356	670
12	145	304	573
15	129	270	509
18	117	245	460
21	107	225	424
24	100	209	394
27	94	196	370
30	89	186	350
38	78	164	310
45	71	148	281
53	66	137	258
60	61	127	241

D.2 Two-stage regulation

The installation of a two-stage system with one high pressure regulator at the cylinder to compensate for varied inlet pressures, and one low pressure regulator at the building to supply a constant delivery pressure to the appliances, helps ensure maximum efficiency and trouble-free operation. This type of installation is preferred when the appliances are a long way from the cylinders. In a single stage system the transmission line piping between the cylinder and the appliances shall be large enough to accommodate the required volume of gas at a maximum pressure drop of 0,28 kPa. In contrast, the line between the first and second stage regulators in two-stage systems can be a smaller diameter as it delivers gas at 100 kPa to the second stage regulator. Therefore in addition to the improved performance reliability regarding pressure at the appliance(s), the savings in piping costs would often be found sufficient to pay for the second regulator.

Table D.4 (copper pipe) gives pipe sizes for first stage high pressure installation with an assumed inlet pressure of 100 kPa and a 10 % pressure drop at the end of the line.

NOTE The total length of piping given is from the outlet of the first stage regulator to the inlet of the second stage regulator (or to the inlet of the second stage regulator furthest away where multiple second stage regulators are installed).

Table D.4 — High pressure pipe sizing — Copper pipe

1	2	3	4	5
Index length m	**Pipe diameter** mm			
	9,5	15	22	28
	MJ/h	MJ/h	MJ/h	MJ/h
3	544	2 279	5 650	12 084
6	373	1 569	3 890	8 300
9	300	1 261	3 116	6 667
12	257	1 081	2 671	5 703
15	228	955	2 364	5 056
18	206	865	2 141	4 579
21	190	796	1 972	4 219
24	176	741	1 834	3 992
27	165	694	1 728	3 678
30	156	656	1 632	3 447
38	139	582	1 442	3 085
45	125	527	1 304	2 788
53	116	484	1 198	2 565
60	107	452	1 124	2 385
75	95	400	991	2 120
90	86	363	898	1 919

Annex E
(informative)

Flue design

E.1 Flue design for appliances with atmospheric burners

E.1.1 Introduction

The tables have been calculated to allow for approximately 50 % burner excess air and approximately 100 % draught diverter dilution air.

Flues required to convey flue gases with greater quantities of excess air, dilution air, or other combustion products are to be designed for the total quantity of flue gas discharge, using sound engineering practice.

Tables E.1 to E.7 show the extent and limitations of natural draught flues, relative to the thermal input, height, total length, diameter and other important factors to suit a wide variation in flue configuration.

Table E.8 shows equivalent sizes for round and rectangular flues.

Table E.9 shows the relationship between percentage carbon dioxide (% CO_2), volume of flue gases and amount of excess air.

E.1.2 Factors influencing flue design

E.1.2.1 Heat loss

In determining the correct size and configuration for a flue, the heat losses that will occur due to the materials used and the environment in which the flue will be located shall always be considered. Since the motive force in a flue is due to the heat of the flue gases, the ideal conditions are those in which heat losses from the flue are very low.

Materials which are insulated against heat loss (e.g., certified twin-wall flue) or materials of low thermal conductivity are particularly suitable when the flue is located outdoors or is very long.

Non-insulated flue materials when located indoors and not exposed to draught can be classified as ‘low heat loss’ in applying the flue tables contained in this part of SANS 10087. The same materials when located outdoors are classified as ‘high heat loss’.

E.1.2.2 Resistance to flow of flue gases

Resistance to the flow of flue gases needs to be considered in the design of the flue. The capacities shown in the tables for flues with laterals make an allowance for two 90° changes of direction.

Where more than two 90° changes of direction are required, the flue is to be sized using one of the following methods:

a) A 10 % capacity reduction is made to the table for each additional bend or change of direction (e.g., one additional change, 90 % of table capacity or two additional changes, 80 % of table capacity).

b) Increase the flue diameter from the draught diverter outlet size to one size larger.

NOTE For calculation purposes, the flue capacity will be increased by approximately 60 % of the difference in capacity of the actual appliance or draught diverter flue size, and the capacity of a similar flue one size larger. Any further increase in size is not recommended because it will not have a similar corresponding effect.

When using the tables to determine the flue size of wall furnaces and room heaters (but not forced air central heaters), appliance gas consumption is to be regarded as 40 % greater than the nominal figure on the data plate, e.g., a wall furnace having a gas consumption of 40 MJ/h would need to be sized for 40 × 1,4, that is, 56 MJ/h.

E.1.3 Designing individual appliance flues

E.1.3.1 Design procedure

The procedures for using the tables for individual flues, whether for low heat loss or high heat loss, are identical.

Use table E.2 or E.3, as appropriate, based on the type of material selected and the location of the flue in regard to heat loss.

STEP 1 Determine the total flue height (H) of the system and the length of any lateral (see figure E.1.)

STEP 2 Refer to table E.2 for low heat loss situations or table D.3 for high heat loss situations. Read down the ‘Total height of flue’ column at the left of the appropriate table until a height equal to the height of the flue or the next lower flue height figure is listed.

STEP 3 Select the horizontal row for the appropriate ‘Length of lateral’ (L). (Zero for straight vertical systems).

STEP 4 Read across to the first column that shows a capacity equal to or greater than the appliance gas consumption (after any factor indicated by E.1.2.2 has been applied).

STEP 5 If the flue diameter shown at the top of the column listing the appliance gas consumption (or corrected gas consumption) is equal to or larger than the appliance flue outlet, use the diameter indicated in the table.

If the diameter indicated is less than the appliance flue outlet size, the smaller diameter may be used only where:

a) the flue height is greater than 3 m;

b) flues exceeding 300 mm in diameter are not reduced by more than two sizes (600 mm to 500 mm is a two size reduction); or

c) flues 300 mm in diameter or less are not reduced by more than one size (200 mm to 175 mm is a one size reduction).

However, under no circumstances shall a 75 mm flue be connected to an appliance having a 100 mm flue outlet.

NOTE Contact should be made with the technical regulator if a greater heat input into a flue is required.

E.1.3.2 Example of flue design for individual appliance flue

A water heater is to be installed with a flue configuration as in figure E.1. The overall height is 2,5 m while the lateral length is 600 mm and the appliance gas consumption is 120 MJ/h. The appliance

flue connection (draught diverter) is 125 mm diameter. The flue will be located in a duct within the building except for 600 mm through the roof.

STEP 1 Because the flue will be inside the building, the appropriate table will be table E.2.

STEP 2 Under the column headed 'Total height of flue' locate 2,5 m.

STEP 3 Locate the line in the next column corresponding to a lateral of 0,6 m.

STEP 4 Reading across the line to the right, note that the figures in the first two columns (i.e. 42 and 79) are less than the appliance gas consumption (120 MJ/h). The figure in the third column is greater than the appliance gas consumption and so the diameter (125 mm) at the top of this column would be suitable. Therefore a 125 mm diameter flue would be used.

If it is essential to locate the 2,5 m of vertical flue on an external wall using non-insulated materials, then table E.3 would need to be used. Adopting the former procedure, table D.3 indicates that a 150 mm diameter flue would be required.

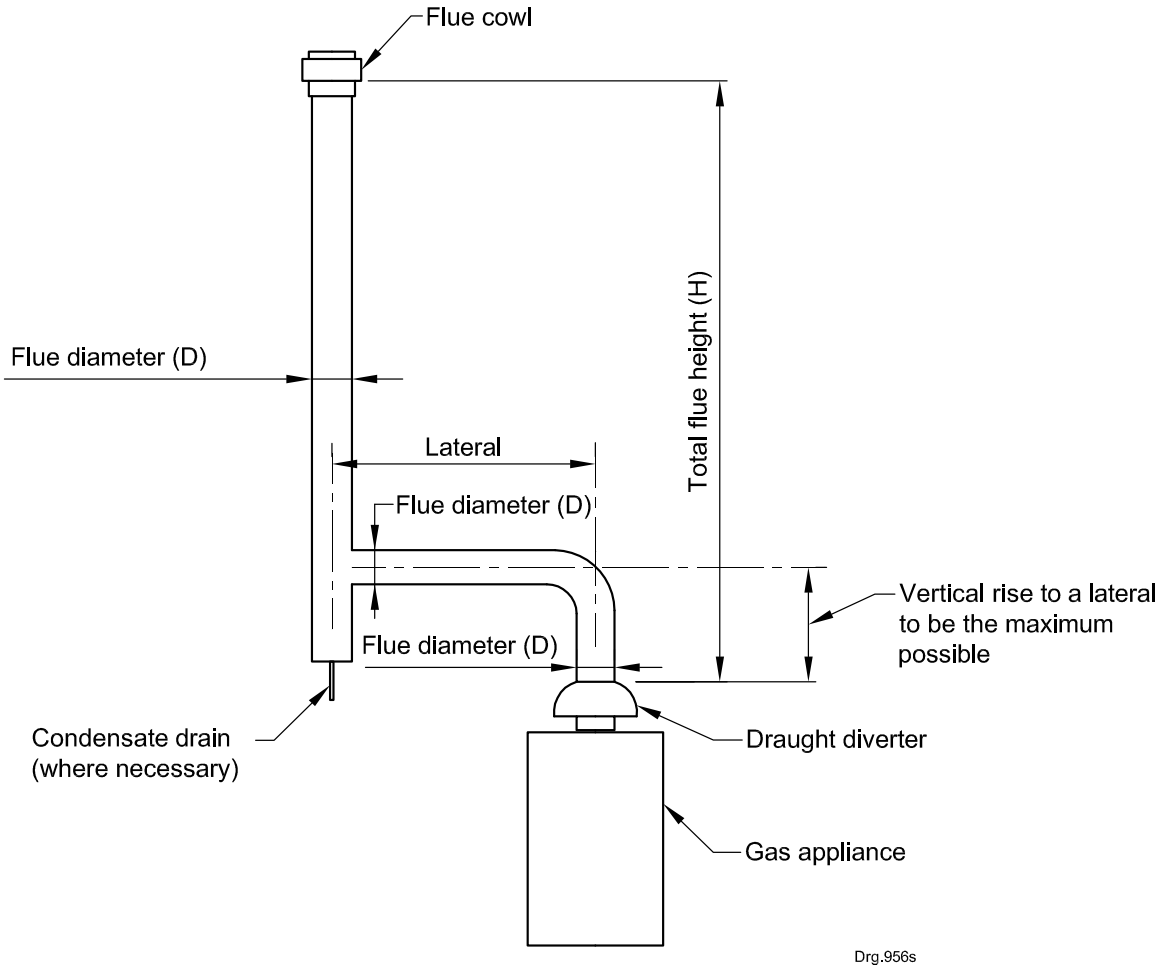


Figure E.1 — Individual appliance flue

The common flue tables, tables E.4 to E.7, apply when the individual draught diverter outlets from appliances connected to the common flue are within range of table E.1. Use tables E.4 to E.7 as appropriate for low heat loss or high heat loss situations.

If the largest draught diverter outlet exceeds the range in table E.1, then increase the flue connector rise by 300 mm in excess of that shown in tables E.4 and E.6, (see figure E.4).

Table E.1 — Common flue-maximum draught-diverter size

1	2
When the smaller draught diverter diameter is mm	**The larger diverter diameter shall not exceed** mm
75	200
100	250
125	300
150	400
175	450
200	500
250	600

E.1.4 Performance of common flue

E.1.4.1 General

Satisfactory performance of a common flue system depends on careful design of the flue connector, i.e. the part of the system connecting the individual appliances from the draught diverter outlet to the common flue (see figures E.2 and E.3).

The flue connector configuration in diameter, lateral, rise and total length is of major importance not only to prevent spillage at the appliance draught diverter but also to contribute to the correct performance of the common flue. In all cases the flue connector diameter shall be equal to or larger than the draught diverter outlet size.

E.1.4.2 Flue connector-change of direction

The flue connector tables, tables E.4 and E.6, allow for two 90° changes of direction. If a further change of direction is necessary, then —

a) provide the next size larger flue connector; or

b) increase the flue connector rise by 300 mm; or

c) deduct 10 % for each additional change of direction from the listed capacity in the relevant table.

E.1.4.3 Resistance to flow of flue gases — Manifolds and laterals

Where a common flue has a manifold or lateral at the base (see figure E.3) the design shall allow for additional resistance to flow due to the change of direction. The (L) lines in table E.5 include an allowance for this increased resistance.

The length of a manifold or lateral shall be as short as possible, and designed in accordance with tables E.2 and E.3. Where these tables do not cover the particular installation, the lateral flue shall not exceed 50 % of the total flue height.

Where two or more appliances are installed to operate simultaneously, and not independently of each other, the manifold and vertical flue can be designed as an individual appliance flue using tables E.2 or E.3. The manifold is then designed as a lateral length.

E.1.5 Design of common flue — Appliances at different levels

E.1.5.1 Design factors

The flue from the first or lowest appliance connector to the common flue can be designed as an individual flue to the first interconnection or tee. The other appliance flues joining the common flue are designed using the common flue tables (see tables E.5 and E.7).

In applying the tables to several appliances installed at different levels, the 'total height of flue' is the rise in the flue connector plus the vertical height between the connection to the common flue and the next connection above (see figure E.2). The top floor appliance has a total flue height that is the rise in the flue connector plus the vertical height from the connection with the common flue to the flue terminal.

Consideration should be given to providing a separate flue for the top appliance if its total height will be insufficient.

Where the diameter of the common flue is more than seven times the diameter of the flue connector, the rise of the flue connector is to be increased by 300 mm more as shown in figure E.4.

E.1.5.2 Example of flue design for appliances at different levels

Water heaters are to be installed on each of four levels in a building (see figure E.2). The height between floors is 3 m and each appliance has a 100 mm flue outlet and a gas consumption of 50 MJ/h. The length of each lateral is 600 mm.

STEP 1 The lowest appliance flue is designed using table E.2. For 0,6 m lateral and 3 m total height, a 100 mm flue diameter has a capacity for a gas consumption up to 85 MJ/h which is above that required (i.e., 50 MJ/h).

STEP 2 The tee connection to receive the second appliance flue and the next section of common flue shall have capacity to serve the two appliances i.e., 100 MJ/h, but first the flue connector size is determined.

From table E.4, under 'Least total height' locate 3,0 m. Reading across, note that with 0,3 m flue connector rise, a 100 mm flue has capacity for 53 MJ/h, which is adequate.

STEP 3 The common flue size to carry 100 MJ/h is determined next. From table E.5, under 'Least total height', locates 3,0 m. As the common flue is vertical, without change of direction and the appliances are individually attached, Type V (for vertical) applies.

Read across to the right to find that a 125 mm common flue is satisfactory up to 131 MJ/h.

STEP 4 The third appliance is now considered for addition to the common flue, which then requires capacity for 150 MJ/h. Two alternatives may be considered:

a) Design the third section of common flue using the same total height between connections as previously, i.e., 3 m on the assumption that the top floor appliance will be connected to the common flue.

b) Design on the basis that the top floor appliance will not be joined to the common flue but flued separately.

This then provides an increase in the total flue height above the third appliance. Assume that this is now 6 m. Reading table E.5, for alternative (a):

Under 'Least total height' 3,0 m, reading across the table, a 150 mm common flue would be suitable, having capacity up to 188 MJ/h; or

Reading table E.5, for alternative (b):

Under 'Least total height' 6,0 m, reading across the table, a 125 mm common flue would be suitable, having a capacity up to 169 MJ/h.

This illustrates the increase in capacity through additional total height. The choice between the two alternatives may be decided on the grounds of economy and availability of space.

E.1.5.3 Alternative method using oversize common flue

Another method of designing flues for high-rise buildings is to provide an oversize common flue of constant diameter over its total length, and then design the connectors as individual flues (see figure E.2). They are then classified as self venting.

The common flue acts as a duct for the conveyance of flue gases but not necessarily contributing to satisfactory draught in the flue connectors.

E.1.6 Design of common flue – Appliances at same level

E.1.6.1 Total flue height

In applying the tables to several appliances installed at the same level, the 'total flue height' is the rise in the flue connector to the manifold plus the vertical height between the flue connector and the top of the common flue (see figure E.3).

E 1.6.2 Example of flue design for appliances at same level

Four water heaters are to be installed on the ground floor of a four level building and connected through a manifold to a common flue (see figure E.3). Each appliance has a 100 mm flue outlet, a gas consumption of 50 MJ/h and will operate independently.

The space available limits the flue connector rise to 600 mm. The spacing between the connectors is 750 mm.

STEP 1 The flue connector size is determined from table E.4. The total height from the appliance draught diverter to the flue terminal is 18 m. In order to have a rise in the manifold it is assumed that the connector rise of the appliance farthest from the common flue is 300 mm.

From table E.4, with a total height of 18 m and a rise of 0,3 m, a 100 mm diameter flue connector has a capacity of 70 MJ/h, which is adequate.

STEP 2 The manifold shall be sized as a common flue since all appliances do not operate simultaneously. Using table E.5, the type L line is used. For a total height of 18 m, on the L line, a 150 mm diameter flue has a capacity of 273 MJ/h that is greater than the total appliance gas consumption of 200 MJ/h. A 125 mm diameter flue cannot be used as it has a capacity of only 188 MJ/h.

STEP 3 Ensure the manifold length 'A' (see figure E.3.) does not exceed 50 % of total flue height.

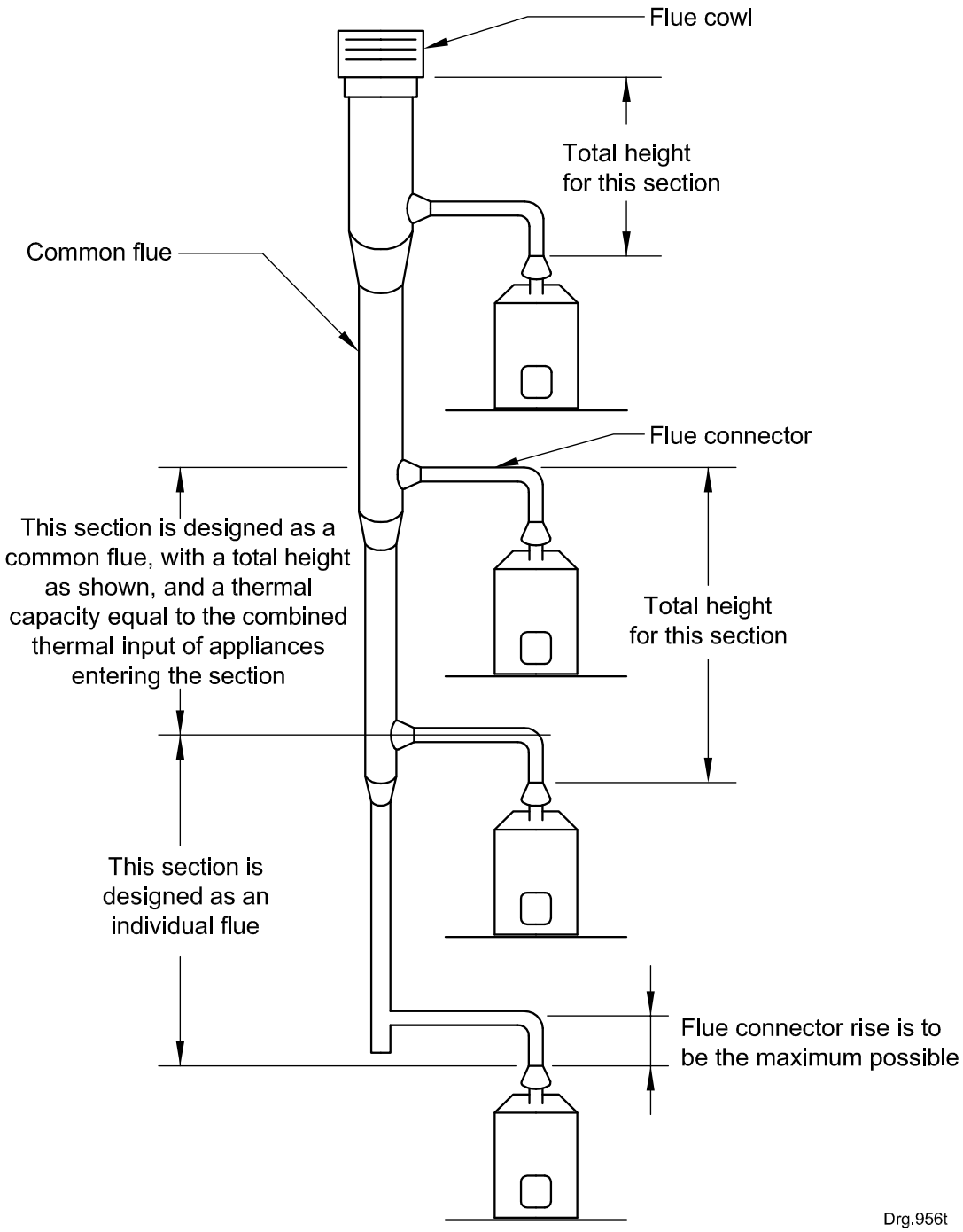


Figure E.2 — Common flue for several appliances installed at different levels and using self-venting flue connectors

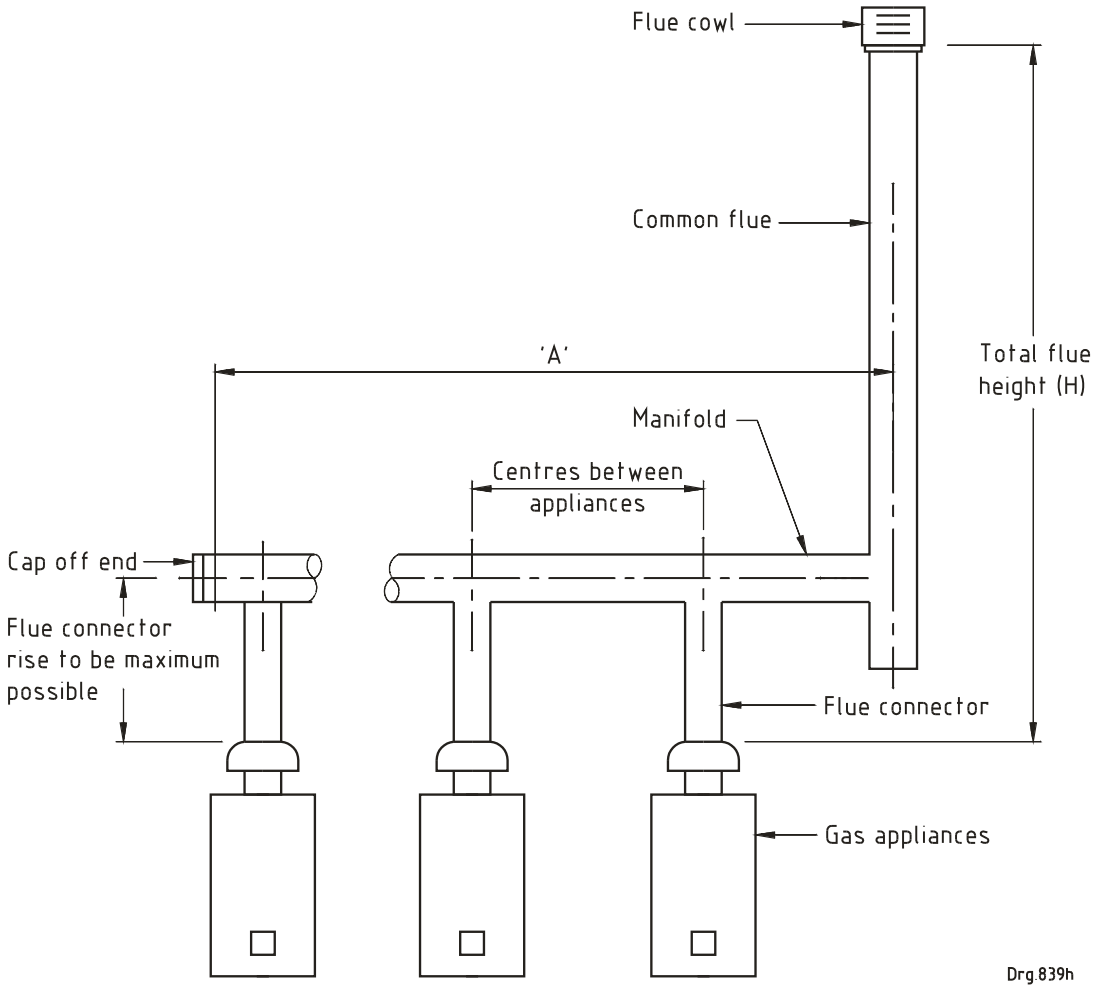


Figure E.3 — Common flue for several appliances installed at the same level

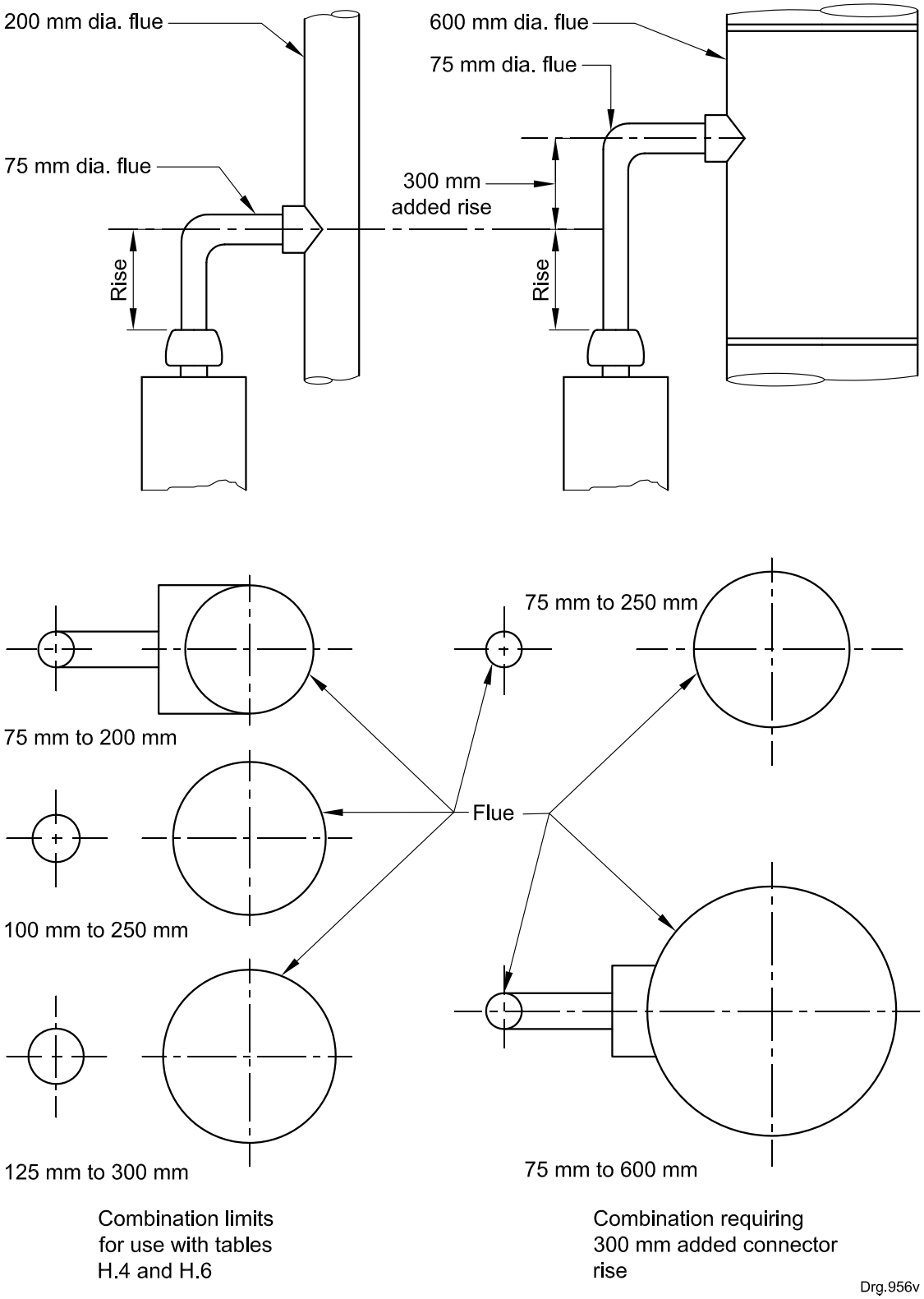


Figure E.4 — Combining a small flue into a large flue

Table E.2 — Individual appliance flues low heat loss materials and environments (ondoor locations or insulated flues)

1	2	3													
Total height of flue m	**Length of lateral** m	**Capacity of flue** MJ/h													
		Diameter of flue (D) mm													
H	**L**	**75**	**100**	**125**	**150**	**175**	**200**	**250**	**300**	**350**	**400**	**450**	**500**	**550**	**600**
2	0	49	91	149	216	301	390	601	897	1234	1614	2068	2564	3112	3714
	0,6	38	71	111	166	229	301	480	686	939	1234	1561	1952	2342	2817
	1,5	34	64	106	157	216	288	459	665	918	1213	1551	1920	2332	2796
2,5	0	53	99	164	248	338	438	696	1023	1393	1836	2342	2901	3545	4231
	0,6	42	79	127	190	261	340	543	786	1076	1414	1794	2226	2701	3218
	1,50	40	74	121	181	252	329	531	772	1066	1403	1778	2205	2685	3210
3,0	0	56	106	175	269	364	475	760	1118	1530	2031	2585	3218	3914	4695
	0,6	44	85	136	206	288	375	591	897	1192	1561	1994	2469	2996	3576
	1,5	42	81	131	197	279	364	578	879	1173	1541	1974	2443	2971	3566
4,5	0	61	118	197	301	411	554	886	1308	1815	2395	3060	3819	4653	5592
	0,6	51	98	158	237	333	437	712	1039	1424	1867	2384	2954	3598	4304
	1,5	47	94	154	231	323	422	696	1029	1396	1844	2358	2930	3571	4280
	3,0	44	87	147	220	307	399	670	1013	1359	1805	2314	2889	3526	4239
6	0	64	126	213	324	454	607	981	1424	2005	2659	3429	4283	5254	6330
	0,6	54	106	175	263	365	496	797	1161	1604	2110	2711	3376	4125	4959
	1,5	51	101	169	254	356	482	779	1142	1578	2085	2683	3348	4093	4919
	3,0	46	94	158	241	339	467	749	1102	1540	2047	2638	3302	4041	4853
	4,5	41	89	151	230	329	450	728	1076	1504	2018	2605	3261	4010	4844
9	0	68	135	232	354	501	686	1118	1635	2289	3081	3977	5011	6172	7488
	0,6	59	118	195	295	416	564	913	1382	1899	2511	3218	4020	4906	5908
	1,5	55	114	190	288	406	553	898	1360	1873	2479	3186	3991	4876	5857
	3,0	51	106	180	275	391	536	875	1323	1828	2427	3133	3945	4826	5772
	4,5	—	100	172	263	377	517	850	1287	1785	2374	3081	3897	4776	5686
	6,0	—	95	162	250	362	499	827	1250	1741	2321	3028	3851	4726	5602

Table E.2 *(concluded)*

1	2	3													
Total height of flue m	**Length of lateral** m	**Capacity of flue** MJ/h													
		Diameter of flue (D) mm													
H	**L**	**75**	**100**	**125**	**150**	**175**	**200**	**250**	**300**	**350**	**400**	**450**	**500**	**550**	**600**
12	0	70	139	241	372	528	723	1203	1825	2532	3408	4110	5560	6858	8292
	0,6	62	124	209	314	443	611	1013	1498	2110	2806	3608	4537	5549	6668
	1,5	57	120	203	306	435	599	1005	1478	2079	2767	3569	4492	5502	6623
	3,0	54	114	194	296	422	581	965	1457	2031	2703	3505	4418	5427	6549
	4,5	50	108	184	286	410	562	936	1414	1875	2639	3401	4346	5351	6477
	6,0	—	101	176	275	398	544	907	1382	1931	2595	3376	4273	5275	6404
18	0	—	143	249	394	564	770	1319	2026	2847	3851	5001	6330	7786	9495
	0,6	—	132	225	348	496	686	1118	1693	2374	3186	4136	5233	6467	7803
	1,5	—	126	217	342	487	674	1104	1674	2351	3159	4104	5203	6422	7762
	3,0	—	120	207	331	474	656	1078	1643	2313	3113	4051	5154	6346	7680
	4,5	—	115	196	321	460	638	1054	1612	2276	3068	3998	5105	6292	7611
	6,0	—	—	186	310	446	621	1030	1518	2238	3033	3946	5056	6195	7536
	7,6	—	—	175	300	433	603	1005	1550	2200	2977	3893	5005	6120	7640
24	0	—	—	252	405	580	797	1361	2131	3038	4115	5381	6805	8440	10286
	0,6	—	—	229	369	522	721	1208	1836	2595	3503	4547	5750	7111	8651
	1,5	—	—	217	363	514	711	1194	1817	2571	3474	4514	5712	7071	8605
	3,0	—	—	206	352	501	695	1171	1785	2533	3427	4459	5650	7006	8529
	4,5	—	—	—	331	476	664	1125	1723	2455	3333	4352	5524	6875	8376
	6,0	—	—	—	342	488	679	1148	1757	2492	3379	4406	5587	6941	8452
	7,6	—	—	—	321	464	648	1102	1691	2416	3285	4298	5462	6810	8300
30	0	—	—	—	422	591	812	1382	2163	3112	4273	5592	7069	9073	10867
	0,6	—	—	—	396	538	739	1234	1920	2690	3693	4853	6119	7596	9284
	1,5	—	—	—	382	531	730	1223	1902	2670	3666	4816	6085	7556	9238
	3,0	—	—	—	368	519	716	1204	1873	2638	3622	4756	6030	7991	9161
	4,5	—	—	—	354	507	703	1186	1842	2604	3578	4696	5976	7424	9084
	6,0	—	—	—	—	496	689	1167	1812	2571	3534	4635	5921	7359	9007
	7,6	—	—	—	—	484	675	1148	1783	2538	3490	4574	5866	7292	8930
	9,1	—	—	—	—	473	661	1129	1753	2506	3446	4515	5806	7227	8853

Table E.3 — Individual appliance flues high heat loss materials and environments (outdoor locations with non-insulated flues)

1	2	3													
Total height of flue m	**Length of lateral** m	**Capacity of flue** MJ/h													
		Diameter of flue (D) mm													
H	**L**	**75**	**100**	**125**	**150**	**175**	**200**	**250**	**300**	**350**	**400**	**450**	**500**	**550**	**600**
2	0	41	74	122	179	245	329	528	791	—	—	—	—	—	—
	0,6	33	58	99	149	205	274	438	654	—	—	—	—	—	—
	1,5	30	54	93	135	187	255	411	633	—	—	—	—	—	—
2,5	0	44	80	133	195	266	359	572	860	1224	1604	—	—	—	—
	0,6	34	64	108	162	222	300	476	717	1023	1340	—	—	—	—
	1,50	31	59	100	149	205	279	454	684	995	1308	—	—	—	—
3,0	0	47	89	146	213	294	392	639	962	1393	1846	2279	3102	—	—
	0,6	37	71	117	177	246	328	563	802	1161	1540	2005	2585	—	—
	1,5	34	64	110	161	227	305	506	764	1129	1505	1965	2541	—	—
4,5	0	52	96	159	235	329	445	722	1097	1530	2099	2722	3418	4241	5180
	0,6	41	76	129	196	274	369	601	913	1277	1751	2268	2849	3534	4326
	1,5	37	71	116	179	253	343	570	870	1242	1712	2236	2801	3479	4271
	3,0	32	61	109	167	235	325	542	839	1182	1646	2152	2722	3387	4178
6	0	56	107	172	266	361	496	812	1255	1772	2416	3165	3988	4937	6066
	0,6	44	84	143	222	302	414	676	1044	1477	2015	2638	3323	4115	5064
	1,5	40	78	130	203	279	384	644	997	1438	1973	2587	3264	4051	4998
	3,0	34	69	121	188	260	364	602	960	1372	1899	2500	3165	3946	4885
	4,5	—	58	110	172	241	344	580	918	1319	1825	2416	3075	3890	4779
9,0	0	59	114	193	291	405	558	926	1445	2026	2775	3608	4558	5697	7227
	0,6	46	89	156	243	338	665	770	1203	1688	2310	3007	3798	4748	6014
	1,5	—	82	145	222	312	433	732	1139	1646	2260	2948	3735	4677	5934
	3,0	—	72	132	207	289	409	692	1108	1572	2173	2849	3629	4558	5803
	4,5	—	—	119	187	272	386	659	1055	1509	2094	2754	3518	4442	5676
	6,0	—	—	109	172	253	363	629	1013	1445	2015	2659	3408	4326	5549
15	0	—	127	222	327	467	622	1034	1635	2321	3165	4115	5275	6583	8229
	0,6	—	100	180	274	390	519	865	1361	1931	2638	3429	4399	5486	6858
	1,5	—	—	168	247	361	500	823	1298	1880	2578	3362	4333	5407	6763
	3,0	—	—	154	233	335	481	770	1255	1794	2479	3249	4220	5275	6604
	4,5	—	—	—	211	308	429	744	1192	1725	2384	3139	4093	5138	6467
	6,0	—	—	—	195	291	405	707	1139	1656	2289	3028	3967	5001	6330
24	0	—	—	—	—	—	—	—	—	2659	3587	4695	5855	7332	9115
	0,6	—	—	—	—	—	—	—	—	2216	2986	3904	4959	6119	7638
	1,5	—	—	—	—	—	—	—	—	2156	2919	3776	4879	6024	7524
	3,0	—	—	—	—	—	—	—	—	2057	2806	3703	4748	5866	7332
	4,5	—	—	—	—	—	—	—	—	1978	2701	3576	4600	5718	7174
	6,0	—	—	—	—	—	—	—	—	1899	2595	3450	4452	5570	7016

Table E.4 — Maximum flue connector pipe carrying capacity — Low heat loss materials and environments

1	2	3										
Least total height m	**Common flue type** m	**Capacity of flue** MJ/h										
		Diameter of flue (D) mm										
H	**L or V**	**100**	**125**	**150**	**175**	**200**	**250**	**300**	**350**	**400**	**450**	**500**
1,5	L	51	80	115	157	206	327	480	665	876	1118	1403
	V	63	100	145	196	255	404	578	793	1036	1308	1614
1,8	L	55	87	123	169	222	343	494	747	976	1234	1524
	V	69	109	155	211	274	433	620	860	1124	1419	1751
2,4	L	61	96	137	188	243	385	549	837	1092	1382	1709
	V	77	120	172	235	306	491	688	962	1255	1593	1962
3,0	L	66	103	150	204	264	417	599	913	1192	1509	1862
	V	83	131	188	255	332	522	751	1050	1372	1735	2142
4,5	L	77	120	173	236	306	485	692	1063	1387	1757	2173
	V	96	152	217	295	385	596	870	1222	1593	2015	2490
6,0	L	85	134	192	264	343	538	768	1188	1551	1962	2427
	V	108	169	242	327	427	675	966	1361	1783	2258	2785
9	L	99	155	223	306	396	622	890	1400	1830	2310	2859
	V	124	195	281	380	496	781	1081	1609	2099	2659	3281
12	L	111	173	249	338	443	696	997	1574	2057	2606	3218
	V	138	214	311	427	554	865	1245	1809	2363	2986	3693
18	L	—	188	273	371	485	760	1161	1846	2405	3049	3766
	V	—	236	342	464	607	950	1456	2121	2764	3505	4326
24	L	—	—	290	395	515	807	1300	2057	2690	3408	4199
	V	—	—	363	494	644	1008	1625	2374	3091	3914	4842
30	L	—	—	—	404	528	823	1408	2258	2943	3724	4600
	V	—	—	—	505	659	1029	1762	2585	3376	4273	5275

Table E.5 — Maximum common flue carrying capacity — Low heat loss materials and environments

1	2	3										
Least total height m	**Common flue type**	**Capacity of flue** MJ/h										
		Diameter of flue (D) mm										
H	**L or V**	**100**	**125**	**150**	**175**	**200**	**250**	**300**	**350**	**400**	**450**	**500**
1,5	L	51	80	115	157	206	327	480	665	876	1118	1403
	V	63	100	145	196	255	404	578	793	1036	1308	1614
1,8	L	55	87	123	169	222	343	494	747	976	1234	1524
	V	69	109	155	211	274	433	620	860	1124	1419	1751
2,4	L	61	96	137	188	243	385	549	837	1092	1382	1709
	V	77	120	172	235	306	491	688	962	1255	1593	1962
3,0	L	66	103	150	204	264	417	599	913	1192	1509	1862
	V	83	131	188	255	332	522	751	1050	1372	1735	2142
4,5	L	77	120	173	236	306	485	692	1063	1387	1757	2173
	V	96	152	217	295	385	596	870	1222	1593	2015	2490
6,0	L	85	134	192	264	343	538	768	1188	1551	1962	2427
	V	108	169	242	327	427	675	966	1361	1783	2258	2785
9	L	99	155	223	306	396	622	890	1400	1830	2310	2859
	V	124	195	281	380	496	781	1081	1609	2099	2659	3281
12	L	111	173	249	338	443	696	997	1574	2057	2606	3218
	V	138	214	311	427	554	865	1245	1809	2363	2986	3693
18	L	—	188	273	371	485	760	1161	1846	2405	3049	3766
	V	—	236	342	464	607	950	1456	2121	2764	3505	4326
24	L	—	—	290	395	515	807	1300	2057	2690	3408	4199
	V	—	—	363	494	644	1008	1625	2374	3091	3914	4842
30	L	—	—	—	404	528	823	1408	2258	2943	3724	4600
	V	—	—	—	505	659	1029	1762	2585	3376	4273	5275

Table E.6 — Maximum flue connector pipe carrying capacity — High heat loss materials and environments

1	2	3					
Least total height m	**Common flue type**	**Capacity of flue** MJ/h					
		Diameter of flue (D) mm					
H	**L**	**75**	**100**	**125**	**150**	**175**	**200**
1,8 to 2,4	0,3	22	42	72	108	154	216
	0,6	30	56	91	131	188	248
	0,9	36	64	103	155	215	290
4,5	0,3	24	46	81	123	189	253
	0,6	32	59	97	141	205	280
	0,9	37	68	108	164	228	314
9,0 and over	0,3	26	52	89	136	200	285
	0,6	33	61	102	153	223	311
	0,9	38	72	113	173	245	339

Table E.7 — Maximum common flue carrying capacity — High heat loss materials and environments

1	2						
Least total height m	**Capacity of flue** MJ/h						
	Diameter of flue (D) mm						
H	**100**	**125**	**150**	**175**	**200**	**250**	**300**
1,8	51	82	117	164	216	338	—
2,4	58	94	135	185	247	385	533
3,0	62	100	143	200	264	417	591
4,5	75	121	177	241	322	506	728
6,0	84	136	196	274	359	580	833
9,0	—	155	227	317	422	686	992
15,0	—	—	—	380	517	855	1255

Table E.8 — Equivalent sizes for round and rectangular flues

1	2								
Round flue diameter mm	**Rectangular flue sizes** mm								
100	100 x 100	—	—	—	—	—	—	—	—
125	125 x 100	100 x 125	—	—	75 x 200	—	—	—	—
150	200 x 100	150 x 125	125 x 150	100 x 175	100 x 200	—	—	—	—
175	275 x 100	200 x 125	175 x 150	150 x 175	125 x 200	—	—	—	—
200	375 x 100	275 x 125	225 x 150	225 x 175	175 x 200	150 x 225	—	—	—
225	500 x 100	375 x 125	300 x 150	250 x 175	225 x 200	200 x 225	—	—	—
250	—	475 x 125	375 x 150	300 x 175	275 x 200	250 x 225	200 x 250	—	—
300	—	—	500 x 150	425 x 175	350 x 200	350 x 225	300 x 250	250 x 300	—
350	—	—	—	600 x 175	500 x 200	475 x 225	450 x 250	350 x 300	300 x 350
400	—	—	—	—	700 x 200	600 x 225	575 x 250	450 x 300	400 x 350
450	—	—	—	—	—	850 x 225	725 x 250	575 x 300	500 x 350
500	—	—	—	—	—	—	975 x 250	750 x 300	625 x 350

NOTE Sizes outside of those indicated are not normally used.

Table E.9 — Flue gases — Relationship between % CO_2, volume flow rate and % excess air

1	2	3
CO_2	**Volume**	**Excess air**
%	L/s/MJ/h	%
10	0,10	33
9	0,11	50
8	0,13	67
7	0,14	90
6,7	0,15	100
6	0,17	120
5	0,20	170
4,4	0,23	200
4	0,25	230
3,3	0,30	300
3	0,33	400
2,2	0,45	500
2	0,50	570
1,7	0,60	700
1,2	0,80	1000
1,0	1,00	1200
0,8	1,20	1500
0,6	1,60	2000
0,5	2,00	2600

Annex F
(informative)

Certificate of conformity

CERTIFICATE OF CONFORMITY FOR GAS INSTALLATIONS
OCCUPATIONAL HEALTH AND SAFETY ACT, 1993
Regulation 17(3) of the Pressure Equipment Regulations, 2009

Certificate of conformity by an authorised person

Certificate No:
LPG

Installer details and declaration

I, _____ declare that I am an authorised person for gas installations with the registration number _____ and ID number _____

Address: _____ Telephone number (____) _____
_____ Cell number _____
_____

I further declare that I inspected and tested the installation at:

Street _____ Stand No: _____

Name of Building _____ Name of Farm _____ Farm No:_____

Township/ Municipality/ District _____

Name of Gas supplier: _____ Amount of Gas stored on premises _____ kg

and that in terms of regulation 17(3), the installation complies with the provisions of 17(2) and that the installation is safe. I am aware that I am liable to prosecution in the case of a false declaration

Signature _____ Date _____

Owner/user details and declaration

I, _____ the owner/ user of the installation and equipment described below, confirm that I have been informed of the following:
The safe handling and storage of LPG cylinders; The importance of ventilation when using gas equipment; Emergency action in the event of a gas leak or fire; Maintenance of the gas installation; Approved appliances and user instructions

Signature _____ Telephone number (_____) _____ Cell number _____

Installation and equipment details

This installation complies with the requirements of SANS 10087-1

Cylinders	Qty		Sizes	9	19	48

Regulators	Brand		Model No:	
	Brand		Model No:	

Pipework	Total Length installed	Surface Mounted Pipe		Embedded Pipe		Buried Pipe	
	m	Yes	No	Yes	No	Yes	No

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The Liquefied Petroleum Gas Safety Association of Southern Africa
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For assistance contact us at:
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v2-2010

Note:
Only appliances that comply with SANS 1539 may be installed. If in doubt contact the appliance supplier or the LPGSASA

Appliances	Type		Brand		Model No	
	Type		Brand		Model No	
	Type		Brand		Model No	

Please ensure that you read the contents of this certificate and have been made aware of the safe use of the LP Gas system

Bibliography

ASME B 16.5, *Pipe flanges and flanged fittings NPS ½ through NPS 24*.

ASME B 16.9, *Factory-made wrought steel buttwelding fittings*.

ASME B 16.21, *Nonmetallic flat gaskets for pipe flanges*.

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