



CODE OF PRACTICE 47

**THE SAFE USE OF INDIVIDUAL
PORTABLE OR MOBILE CYLINDER GAS
SUPPLY EQUIPMENT**

REVISION 1: 2018

British Compressed Gases Association

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PREFACE

The British Compressed Gases Association (BCGA) was established in 1971, formed out of the British Acetylene Association, which existed since 1901. BCGA members include gas producers, suppliers of gas handling equipment and users operating in the compressed gas field.

The main objectives of the Association are to further technology, to enhance safe practice, and to prioritise environmental protection in the supply and use of industrial gases, and we produce a host of publications to this end. BCGA also provides advice and makes representations on behalf of its Members to regulatory bodies, including the UK Government.

Policy is determined by a Council elected from Member Companies, with detailed technical studies being undertaken by a Technical Committee and its specialist Sub-Committees appointed for this purpose.

BCGA makes strenuous efforts to ensure the accuracy and current relevance of its publications, which are intended for use by technically competent persons. However this does not remove the need for technical and managerial judgement in practical situations. Nor do they confer any immunity or exemption from relevant legal requirements, including by-laws.

For the assistance of users, references are given, either in the text or Appendices, to publications such as British, European and International Standards and Codes of Practice, and current legislation that may be applicable but no representation or warranty can be given that these references are complete or current.

BCGA publications are reviewed, and revised if necessary, at five-yearly intervals, or sooner where the need is recognised. Readers are advised to check the Association's website to ensure that the copy in their possession is the current version.

This document has been prepared by BCGA Technical Sub-Committee 1. This document replaces BCGA Code of Practice 47: 2018. It was approved for publication at BCGA Technical Committee 159. This document was first published on 10/12/2018. For comments on this document contact the Association via the website www.bcg.co.uk.

CONTENTS

Section		Page
	TERMINOLOGY AND DEFINITIONS	1
1.	INTRODUCTION	3
2.	SCOPE	4
3.	AWARENESS OF THE PROPERTIES OF GASES USED	4
4.	LEGISLATION	5
5.	EXAMINATION, INSPECTION AND MAINTENANCE	6
6.	EQUIPMENT	9
6.1	Pressure regulator	9
6.2	Hose assembly	11
6.3	Safety devices	12
7.	CYLINDER HANDLING AND STORAGE	13
7.1	Cylinder handling	14
7.2	Cylinder storage	15
8.	PREPARATION FOR USE	15
8.1	Personal protective equipment	16
8.2	Work in confined spaces	16
8.3	Changes to the workplace atmosphere	17
8.4	Cylinders	17
8.5	Pressure regulators	18
8.6	Safety devices	19
8.7	Hoses	19
8.8	Pressurising the system	19
9.	CLOSING DOWN PROCEDURE	20
10.	EMERGENCY PROCEDURES	20
10.1	For cylinders involved in fires	20
10.2	Fire damaged gas cylinders	21
11.	SECURITY	21
12.	REFERENCES *	22
APPENDICES:		
APPENDIX 1	GUIDANCE ON INSPECTION AND MAINTENANCE	26

* Throughout this publication the numbers in [] brackets refer to references in Section 12. Documents referenced are the edition current at the time of publication, unless otherwise stated.

TERMINOLOGY AND DEFINITIONS

Bundle (of cylinders)	An assembly of cylinders that are fastened together and which are interconnected by a manifold and carried as a unit. The total water capacity shall not exceed 3000 litres except that bundles intended for the carriage of toxic gases of Class 2 (groups starting with letter T according to ADR [15] 2.2.2.1.3) shall be limited to 1000 litres water capacity.
Cylinder	A transportable pressure receptacle of a water capacity not exceeding 150 litres.
Excess flow cut-off valve	A device which closes in the event of flow exceeding a predetermined value.
Flow meter	A device for measuring gas flow by volume or mass per unit time.
Flame arrestor (Flashback arrestor)	A device which arrests a flame front (caused by flashback or decomposition) and which is suitable for the most severe type of flame, which may occur, i.e. detonation. It shall be effective in stopping a flame coming from either one or both directions depending upon the application and design.
Hose assemblies	The means by which the gases are conveyed from the pressure regulator to the process equipment. Hose assemblies can be used to convey the gas from the cylinder to the process equipment at pressures up to the maximum regulator outlet pressure.
May	Indicates an option available to the user of this Code of Practice.
Multi-functional safety device	A unit, which embodies two or more of the safety devices as defined in these items. <ol style="list-style-type: none">1. Flashback arrestor2. Non-return valve3. Pressure relief valve4. Pressure sensitive cut-off valve5. Temperature sensitive cut-off valve6. Excess flow cut-off valve
Non-return valve	A self-actuating valve which prevents the passage of gas in the opposite direction to the normal gas flow.
Pressure	Pressures referred to in this document are gauge pressures except where otherwise stated.

Pressure gauge	An instrument for indicating, by pointer and scale, the amount by which the pressure applied to it differs from that of the surrounding atmosphere.
Pressure receptacle	A collective term that includes cylinders, tubes, pressure drums, closed cryogenic receptacles, metal hydride storage systems, bundles of cylinders and salvage pressure receptacles.
Pressure regulator	Fitted to the outlet of the gas cylinder valve, the pressure regulator reduces the pressure of the gas from the cylinder pressure to the lower pressure required for the operation of the process equipment.
Pressure relief valve	A valve, which automatically vents gas to the atmosphere in order to prevent a build-up of pressure in a system when the pressure exceeds a predetermined value. The pressure-relief valve automatically re-seats when the conditions causing the over-pressure are corrected.
Pressure sensitive cut-off valve	A valve which automatically stops the gas flow in the event of a slow or sudden back-pressure from the downstream side of the cut-off valve. The valve remains closed until manually reset.
Safety device	A device which, when correctly used and placed, prevents any damage or injury from misuse or malfunction of the process equipment.
Shall	Indicates a mandatory requirement for compliance with this Code of Practice and may also indicate a mandatory requirement within UK law.
Should	Indicates a preferred requirement but is not mandatory for compliance with this Code of Practice.
Temperature sensitive cut-off valve	A valve which automatically stops the gas supply when a predetermined temperature is reached.
Working pressure	The settled pressure of a compressed gas at a reference temperature of 15 °C in a full pressure receptacle.

CODE OF PRACTICE 47

THE SAFE USE OF INDIVIDUAL PORTABLE OR MOBILE CYLINDER GAS SUPPLY EQUIPMENT

1. INTRODUCTION

This Code of Practice has been prepared by the British Compressed Gases Association (BCGA) to provide guidance on the safe use of individual cylinder gas supplies, the gas being controlled by a single cylinder-mounted pressure regulator.

Gas cylinders are designed and constructed to safely contain a gas under pressure. Used with the correct downstream pressure equipment they provide an efficient and effective means of delivering a gas to the end process.

Due to the properties of gases compliance will be required with the *Health and Safety at Work etc. Act* [1], and will include:

- *The Construction (Design and Management) Regulations* (CDM) [14], which govern the way construction projects of all types and sizes are planned.
- *The Provision and Use of Work Equipment Regulations* (PUWER) [4] which governs the safe use of work equipment.
- *The Pressure Systems Safety Regulations* (PSSR) [6], which covers the safe design and use of pressure systems and whose aim is to prevent serious injury from the hazard of stored energy (pressure) as a result of the failure of a pressure system or one of its component parts.
- *The Dangerous Substances and Explosive Atmospheres Regulations* (DSEAR) [9] which are concerned with protection against risks from fire, explosion and similar events arising from dangerous substances used or present in the workplace.
- *The Control of Substances Hazardous to Health Regulations* (COSHH) [8] which governs how to either prevent or reduce workers' exposure to substances that are hazardous to their health.

Premise owners and users of gaseous equipment should ensure they have adequate insurance to cover their activities and that they use their gases and look after their gas cylinders in a safe and responsible way. They should ensure their insurer is aware that there are gases on-site.

This code of practice is intended for use in conjunction with current guidance and information produced by the Health and Safety Executive (HSE) and other related bodies and trade associations.

2. SCOPE

This Code of Practice gives a guide to minimum safety standards required for the assembly, examination, inspection and maintenance of individual portable or mobile cylinder gas supply pressure equipment, the gas being controlled by a single cylinder mounted pressure regulator, which is used to deliver the gas(es) to downstream equipment.

This guide covers any industry or process where single gas cylinders or bundles are in use, such as industrial, scientific and academic establishments, etc.

As examples, the gases covered can include argon, nitrogen, helium, oxygen, hydrogen, nitrous oxide, acetylene, liquefied petroleum gas (LPG), methane, carbon dioxide and mixtures of these gases.

This Code of Practice only covers the gas delivery equipment. For downstream process equipment the user should refer to the manufacturers' / suppliers instructions for the use of that equipment. The user shall ensure compatibility between the downstream process equipment and the gas delivery equipment.

Excluded are toxic, corrosive and medical gases.

It does not apply to fixed gas distribution systems or oxy-fuel gas equipment which are covered in:

- BCGA Code of Practice (CP) 4 [38], *Industrial gas cylinder manifolds and distribution pipework (excluding acetylene)*;
- BCGA CP 6 [39], *The safe distribution of acetylene in the pressure range 0 - 1.5 bar*;
- BCGA CP 7 [40], *The safe use of oxy-fuel gas equipment (individual portable or mobile cylinder supply)*;
- BCGA CP 18 [41], *The safe storage, handling and use of special gases*.

3. AWARENESS OF THE PROPERTIES OF GASES USED

Each gas will have its own distinctive properties.

On a gas cylinder the label identifies the contents and provides basic information on safe use and the hazard(s) associated with the product.

Safety Data Sheets provide detailed information on the properties of a gas as well as advice on handling and storage. They can be obtained for all gases and are to be available for the user of the gas. It is a legal requirement that the gas supplier provides a Safety Data Sheet to the customer whenever a product is supplied for the first time.

All gases have their hazards, and appropriate control measures, identified by risk assessment, shall be provided to protect all persons who may be affected by an escape, leak or

accumulation of gases into the workplace. Refer to BCGA Guidance Note (GN) 11 [45], *The management of risk when using gases in enclosed workplaces*.

If additional information is required contact your gas supplier for advice.

4. LEGISLATION

The *Health and Safety at Work etc. Act* [1], places duties on organisations and employers to protect the health and safety of employees and / or members of the public. The duties include the provision and maintenance of plant and systems of work that are, so far as is reasonably practicable, safe and without risks to health. This includes the use of pressure equipment.

There are several Regulations which are relevant to the use of pressure equipment.

The *Provision and Use of Work Equipment Regulations* (PUWER) [4] which requires that work equipment should not result in health and safety risks, regardless of its age, condition or origin. The PUWER [4] requires that the employer selects suitable equipment and carries out appropriate maintenance, inspection, identifies any specific risks and provides suitable information, instructions and training.

The Health and Safety Executive (HSE) provide further guidance on the PUWER [4] within HSE L22 [17], *Safe use of work equipment. Provision and Use of Work Equipment Regulations 1998. Approved Code of Practice and guidance*.

Gas pressure equipment operating above 0.5 bar is regulated by the *Pressure Systems Safety Regulations* (PSSR) [6]. The PSSR [6] requires such equipment to be examined and maintained. It should be noted that the overall intention of the PSSR [6] is to prevent serious injury from the hazard of stored energy, as a result of the failure of a pressure system or one of its component parts. The primary responsibility for compliance with these regulations lies with the user of the pressure equipment and it is the users' responsibility to enlist any assistance required to comply with the Regulations.

The HSE provide guidance on the PSSR [6] in HSE L122 [20], *Safety of pressure systems. Pressure Systems Safety Regulations 2000. Approved Code of Practice and guidance*.

The Construction (Design and Management) Regulations (CDM) [14] govern the way construction projects of all sizes and types are planned. The key elements, include:

- managing the risks by applying the general principles of prevention;
- appointing the right people and organisations at the right time;
- making sure everyone has the information, instruction, training and supervision they need to carry out their jobs in a way that secures health and safety;
- duty-holders cooperating and communicating with each other and coordinating their work; and

- consulting workers and engaging with them to promote and develop effective measures to secure health, safety and welfare.

For further information refer to HSE L153 [22], *Managing health and safety in construction. Construction (Design and Management) Regulations 2015. Guidance on Regulations.*

The *Dangerous Substances and Explosive Atmospheres Regulations* (DSEAR) [9] places obligations on site operators who use gas cylinders, especially oxidising or flammable gases, and are concerned with protection against the risks from fire, explosion or substances corrosive to metals. Gases that are under pressure (for example, gas in a cylinder) may present a risk of explosion if not correctly handled in the workplace. Substances that can corrode metals could cause structural damage reducing integrity of structures if not suitably contained. DSEAR [9] places a formal requirement on employers to assess the risks for substances if classified for these properties and put in place suitable control and mitigation measures. BCGA provide a generic risk assessments, refer to BCGA GN 13 [46], *DSEAR Risk Assessment.*

For further information refer to HSE L138 [21], *Dangerous substances and explosive atmospheres Dangerous Substances and Explosive Atmospheres Regulations 2002 Approved Code of Practice and guidance.*

The Control of Substances Hazardous to Health Regulations (COSHH) [8], requires employers to either prevent or reduce workers' exposure to substances that are hazardous to their health.

For further information refer to HSE L5 [16], *Control of substances hazardous to health. The Control of Substances Hazardous to Health Regulations 2002 (as amended). Approved Code of Practice and guidance.*

The Management of Health and Safety at Work Regulations [5], as well as other legislation, such as the *Confined Spaces Regulations* [3], require employers to conduct risk assessments for their activities.

The *Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations* [12], is applicable for individual gas cylinders, including their valves and permanently fitted accessories. These regulations govern the safe filling, transport and the inspection and maintenance requirements. The owner of a gas cylinder, who is normally the gas supplier, is responsible for compliance.

5. EXAMINATION, INSPECTION AND MAINTENANCE

For gas cylinders, the owner, who is normally the gas supplier, has responsibility for inspection and maintenance. In the case of gas cylinders fitted with a valve with an integral pressure regulator (VIPR), the responsibility for the serviceability of the VIPR is also with the owner of the cylinder. If the user has any queries over the inspection, maintenance or serviceability of a gas cylinder or its permanently fitted valve and accessories, then they should contact the owner of the cylinder for advice.

To ensure all other pressure equipment remains safe and serviceable throughout its operational life it shall be subject to regular inspection and maintenance. Pressure equipment shall also be subject to examination where a Written Scheme of Examination is in place. All examination, inspection and maintenance shall take into account the manufacturers' / suppliers' recommendations. Such a regime shall ensure pressure equipment complies with the PUWER [4] and PSSR [6] Regulations. For detailed information refer to BCGA CP 39 [42], *In-service requirements of pressure equipment (gas storage and gas distribution systems)*.

PUWER [4] requires that work equipment that is in-service is inspected and maintained at regular intervals to ensure that it is safe for continued use and remains in good repair regardless of its age, condition or origin.

PSSR [6] requires that the owner of a mobile system (which does not include the gas cylinders, as these are managed under the *Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations* [12]), shall ensure that the system is properly maintained in good repair, so as to prevent danger. PSSR [6] requires pressure systems to undergo a thorough examination in accordance with a Written Scheme of Examination, unless a specific exclusion applies. The need for a Written Scheme of Examination shall be formally assessed in accordance with the PSSR [6], Regulation 8.

HSE guidance is that owners and users, in consultation with a competent person, have to decide if a Written Scheme of Examination is required. HSE provide an example of a portable oxy-fuel gas welding set being unlikely to require a written scheme of examination (HSE L122 [20], Clause 113). However, it is emphasised that such equipment will still require inspection and maintenance to comply with PUWER [4].

Where assessment of the potential risk of using pressure equipment results in a recognition that injury could result from a failure of the system, then a Written Scheme of Examination shall be drawn up by a Competent Person, as defined in the PSSR [6]. Such a Scheme could use the information in Appendix 1, provided it included information about the nature and frequency of the required examination of all protective devices and parts of the system where a defect would give rise to danger. When a Written Scheme of Examination is implemented for the equipment, written records shall be maintained by the User covering the Scheme itself and the records of examinations carried out by the Competent Person under the Scheme.

It is the duty of the employer to ensure persons undertaking examination, inspection or maintenance activities are competent to do so. For further guidance refer to BCGA GN 23 [47], *Gas safety. Information instruction and training*.

Appendix 1 provides guidance on the recommended inspection and maintenance requirements for typical pressure equipment used in the gas delivery pressure system.

With reference to Appendix 1, the following checks shall be carried out:

- An 'assembly' check. To be carried out when assembling the equipment.

The equipment is assembled in accordance with the manufacturer's instructions, and checked during and after assembly. To include a check that all appropriate equipment is installed in the correct order, any maintenance activities necessary are completed, a

visual inspection for correct assembly and to determine suitability for service, for example, compatibility with the gas, pressure rating, direction of flow, damage, oil, grease or other contamination.

- A '*before use*' inspection check. To be carried out by the user prior to the use of the equipment. The purpose being to check the equipment is serviceable and ready to use.

Typically a visual examination to determine suitability for service, for example, gas, pressure rating, damage, oil, grease or other contamination, and, where appropriate, that the relevant equipment is in-date to the manufacturer's specification.

Any damaged, contaminated or out-of-date equipment shall not be used. This equipment shall be replaced.

- An '*after use*' inspection check. To be carried out by the user on completion of use of the equipment. The purpose being to check that any faults that occur in-service are rectified or reported / recorded

Any damaged or contaminated equipment shall be replaced.

- An '*annual*' inspection with any associated maintenance. To consist of an in-depth inspection and maintenance check. The purpose being to ensure the equipment remains serviceable for continued use.

The risk assessment will determine the control measures required for the frequency of inspection. Inspections should be carried out at least annually or more frequently, dependant on the findings of the risk assessment, based on service conditions, the local environment and the conditions of use.

To include checks that individual components remain within their allowed life, all components operate over their full design range and that they are still fit-for their intended purpose.

The inspection shall be carried out by a person who has:

- (i) sufficient practical experience of using the gas(es) and related gas equipment,

and can demonstrate a theoretical knowledge of:

- (ii) the functioning of the equipment, the properties of gases used, the potential defects and hazards which may occur and their importance to the integrity and safety of the equipment.
- (iii) relevant current legislation, standards and industry documents.

This should be acquired through formal training, for further information on the competency of personnel refer to BCGA GN 23 [47].

Written records of the last inspection carried out shall be retained. These records shall identify the individual assets which have been inspected. This may include localised tagging, labelling etc.

- Examination where required by, and in accordance with, a Written Scheme of Examination. To be carried out by a competent person.

BCGA no longer support refurbishment of components, such as regulators, by the user. It is recommended that the user purchases a new component, or if refurbishment is necessary, then the component is returned back to the manufacturer for refurbishment to take place. Refer to BCGA TIS 19 [51], *Refurbishment of components used with compressed gases for welding, cutting and related processes*.

6. EQUIPMENT

A simple gas delivery pressure systems will consist only of a pressure regulator, safety devices, such as a non-return valve, and a flexible hose assembly which will supply the output from the pressure regulator to the process equipment.

Always refer to the manufacturers' / suppliers' instructions for the correct and safe use of all equipment and materials used.

All equipment should conform to appropriate standards.

Specialist jointing tape may be used by some manufactures of gas equipment. However, jointing tape should not be used by end-users. If your equipment is worn or leaking, replace it. Contact your equipment provider or gas supplier for further advice.

All equipment which is in contact with a gas shall be compatible with that gas. For example, refer to:

- BS EN ISO 11114 [32]. *Transportable gas cylinders. Compatibility of cylinder & valve materials with gas contents. Part 1, Metallic materials. Part 2, Non-metallic materials*.

Where oxygen is used in conjunction with a flammable gas, such as an oxy-fuel application, refer to BCGA CP 7 [40].

6.1 Pressure regulator

Fitted to the outlet of the gas cylinder valve or bundle output valve, the pressure regulator reduces the pressure of the gas from the cylinder pressure to the lower pressure required for the operation of the process equipment.

Pressure reduction within the regulator may be in one or two stages (single or two stage regulators).

A pressure regulator shall not be used with any gas other than that for which it is designed and labelled. It shall be suitable for the maximum cylinder pressure being

used. Once a pressure regulator has been in service with a particular gas it shall remain in that gas service for the remainder of its life.

Pressure regulators should be treated as precision instruments and should not be jarred or knocked.

Whether they are in store or in use, pressure regulators shall be kept free of dust, debris, oil, grease, solvents or any other contaminants.

When not in use, protective covers should be placed over the gas ports. They should be stored in clean, dry conditions.

Damaged, contaminated or life-expired pressure regulators shall not be used and shall be removed from service.

Where appropriate, pressure regulators shall comply with a recognized standard such as:

- BS EN ISO 2503 [28], *Gas welding equipment. Pressure regulators and pressure regulators with flow-metering devices for gas cylinders used in welding, cutting and allied processes up to 300 bar (30 MPa)*; or
- BS EN ISO 7291 [31], *Gas welding equipment. Pressure regulators for manifold systems used in welding, cutting and allied processes up to 30 MPa (300 bar)*.

In the case of valves with integrated pressure regulators (VIPR) they shall conform to

- BS EN ISO 22435 [35], *Gas cylinders. Cylinder valves with integrated pressure regulators. Specification and type testing*.

In the absence of an appropriate standard then seek the advice of a manufacturer / supplier who holds a recognised Quality Management System accreditation to ensure that a bespoke pressure regulator is provided that is compatible with the application and meets the essential safety requirements of the above standards.

It is recommended that the following is clearly and permanently marked on the pressure regulator body or cover:

- Gas service. In many cases the gas service will be identified by the manufacturer. Where there is an option to use a regulator designed for a range of gases, the user should label the regulator at first use.
- Maximum inlet pressure.
- Maximum outlet pressure.
- The name or trademark of the manufacturer and / or distributor.
- A date mark showing either the date of manufacture or a date when the regulator is to be replaced or refurbished.

Always refer to the manufacturer / supplier to determine the life of a pressure regulator.

Pressure regulators for industrial use shall not be CE marked in accordance with the European Directives.

6.2 Hose assembly

The hose provides a flexible connection between the pressure regulator, safety device(s) and the process equipment. A hose assembly consists of a hose tail inserted into the end of a flexible hose and secured by a suitable hose clamp. The hose shall be designed for and be compatible with a specific gas and for the pressure required.

Many hoses are colour coded and / or marked with the gas name. Refer to Table 1.

Hose connections are fitted with left-hand threads for flammable gases and right-hand threads for oxygen and inert gases. Refer to Table 1.

Gas	Hose colour	Thread
Oxygen	Blue	Right hand
Inert gases (compressed air, nitrogen, argon and carbon dioxide)	Black	Right hand
LPG, methane, natural gas and MPS ²	Orange	Left hand
Acetylene, hydrogen ¹ and other flammable gases (excludes LPG, methane, natural gas & MPS)	Red	Left hand
Universal fuel gases (included in this table)	Red / orange	Left hand
NOTE: 1. The manufacturer shall be consulted on the suitability of the hose for use with hydrogen. 2. Methylacetylene-propadiene mixtures		

Table 1: Hose assemblies – colours and threads.

The condition of the hose is of vital importance to safety. Correct hose connections, properly fitted and tested and retained by suitable clips or ferrules, are also essential. Re-usable worm-drive clamps shall **not** be used. Hoses shall be protected from heat, mechanical damage, sparks, oil, grease and other contaminants. Hoses with excessive contamination, damage or wear shall not be used.

If using more than one gas for your application and especially if one is a flammable gas, do not tape hoses together. Tape can cover damage to the hose outer layer. To reduce trip hazards, hoses can be joined together by hose clips (plastic or metal) specifically designed for that purpose. Conjoined hose can be used provided that the hose and the assembly conform to the required standards. It is important to remember

that failure in one hose can lead to failure in the other and lead to a potentially more hazardous situation.

Hose lengths should be kept to the minimum necessary. It is recommended that where long lengths of hose are used, a permanent, piped system, in accordance with BCGA CP 4 [38] or BCGA CP 6 [39], should be installed.

As an alternative to hoses, small bore metallic tubing may be used for the same purpose.

WARNING: Copper pipe or copper fittings shall not be used within hose assemblies for acetylene.

Hoses and hose assemblies shall conform to the following standards:

- BS EN 1327 [27], *Gas welding equipment. Thermoplastic hoses for welding and allied processes.*
- BS EN ISO 3821 [29], *Gas welding equipment. Rubber hoses for welding, cutting and allied processes.*
- BS EN ISO 14113 [33], *Gas welding equipment. Rubber and plastics hose and hose assemblies for use with industrial gases up to 450 bar (45 MPa).*
- BS ISO 16964 [34], *Gas cylinders. Flexible hoses assemblies. Specification and testing.*
- Hoses to BS EN ISO 3821 [29] shall be assembled and tested in accordance with BS EN 1256 [26], *Gas welding equipment. Specification for hose assemblies for equipment for welding, cutting and allied processes.*
- Hose connections shall conform to BS EN 560 [24], *Gas welding equipment. Hose connections for equipment for welding, cutting and allied processes.*

Hose connections with non-standard threads shall be tested in accordance with BS EN 1256 [26] or BS EN ISO 14113 [33].

- Quick action couplings shall conform to BS EN 561 [25], *Gas welding equipment. Quick-action coupling with shut-off valves for welding, cutting and allied processes.*

Plastic tubing, of the sort normally encountered in laboratories, is not generally recommended for use with gases. For additional information on plastic tubing refer to BCGA CP 4 [38].

6.3 Safety devices

The incorporation of safety devices shall in no way be considered to be a substitute for safe operating procedures.

6.3.1 Non-return valves

Non-return valves shall be capable of preventing back-flow of gases at low and high pressures.

Where more than one gas is used simultaneously the use of non-return valves should be considered.

Where oxygen or flammable gases are used in a process as individual gases, the use of non-return valves is optional. Non-return valves may be damaged by flashbacks and require periodic testing to ensure that they will not allow reverse flow.

Inert gases, or mixtures of inert gases, do not require non-return valves fitted in the system.

Non-return valves shall comply with a recognized standard such as BS EN ISO 5175-2 [30], *Gas welding equipment. Safety devices. Devices not incorporating a flame (flashback) arrestor*,

6.3.2 Flame arrestors

A device which extinguishes a flame front (for example, caused by a flashback) at the point of installation (often referred to as a flashback arrestor). A composite safety device may incorporate several individual safety devices such as a flame arresting element, a non-return valve, a quick acting shut-off device, for example, a temperature sensitive shut off valve and / or a pressure sensitive shut-off valve.

Flame arrestors are marked with the direction of gas flow, a manufacture or an inspection / replacement date and the manufacturing standard.

For acetylene a minimum of a 3 function flame arrestor shall be placed within one metre of the pressure regulator. Refer to *The Acetylene Safety (England and Wales and Scotland) Regulations* [13].

Flame arrestors are advisable for use with oxygen and other flammable gases.

Inert gases, or mixtures of inert gases, do not require flame arrestors fitted in the system.

Flame arrestors shall comply with a recognized standard such as BS EN ISO 5175-1 [30], *Gas welding equipment. Safety devices. Devices incorporating a flame (flashback) arrestor*.

7. CYLINDER HANDLING AND STORAGE

Cylinder mishandling and unsafe storage have the potential to cause incidents. It is essential that sufficient training and instruction is given to all staff who are involved in cylinder handling and storage. BCGA TIS 15 [48], *Model risk assessment for the storage and use of oxy-acetylene cylinders*, is a generic risk assessment which can be used to assist in developing a site risk assessment.

7.1 Cylinder handling

Gases supplied in cylinders can be in compressed, liquefied or dissolved form. The cylinders vary in weight, size and shape. These physical characteristics present potential manual handling hazards. Appropriate risk assessment, training and handling aids are required.

The *Manual Handling Operations Regulations* [2] require that before any manual handling takes place an assessment of manual handling operations is conducted. Following the assessment, appropriate training should take place. Where the assessment indicates that the work exceeds guideline limits, wherever practicable the operation should be mechanised or handling aids provided.

BCGA GN 3 [44] *Safe cylinder handling and the application of the manual handling operations regulations to gas cylinders*, defines the principles of safe practice for handling and moving cylinders and provides a basic understanding of the *Manual Handling Operations Regulations* [2] relating to gas cylinders. BCGA TIS 17 [49], *Model risk assessment for manual handling activities in the industrial gas industry*, can be used to assist in developing a site risk assessment.

The following points are of note:

- Always wear appropriate personal protective equipment, for example, eye, hand and foot protection. Safety shoes or boots with metatarsal protection are strongly recommended. Refer to Section 8.1.
- Purpose designed trolleys should be used for moving cylinders wherever practicable.
- Do not lift cylinders by using the valve protection device unless they have been designed for that purpose. Do not use ropes, chains or slings to suspend cylinders unless the supplier has installed appropriate lifting attachments such as lugs. Suitable cradles, platforms or pallets to hold the cylinders may be used for lifting. Refer to BCGA TIS 38 [53], *Moving gas cylinders and bundles within the workplace*.
- Subject to risk assessment, for moving over even level floors and only for short distances, by competent operators, the 'churning' method may be considered.
- Cylinders shall not be rolled along the ground since this may damage or even open the valve and will also damage identifying marks and symbols.
- Cylinders shall not be moved with the valve open.
- Cylinders shall not be moved with the regulators and hoses attached, unless on a purpose designed trolley or carrier.
- Cylinders shall not be used as work-supports or rollers.

7.2 Cylinder storage

Gas cylinders and cylinder bundles shall be stored in accordance with BCGA CP 44 [43], *The storage of gas cylinders*, which defines the principles of safe practice for storage.

All gas cylinder stores should follow these basic principles:

- The store is in an external location;
- The store is in a secure location and has adequate security;
- The store and the local area has good ventilation;
- Cylinders are away from sources of ignition or combustible material (which is not a necessary part of the store);
- Cylinders are not exposed to excessive heat. Take care to prevent the heating of cylinders from the process or any other external heat source;
- Cylinders are stored in a vertical position, properly restrained to avoid them falling over;
- In a store, all cylinders have their valves closed. This includes empty cylinders as this prevents the ingress of moisture or other contaminants. If available fit protective covers.

8. PREPARATION FOR USE

Before commencing any activity, risk assessments should be carried out in accordance with the *Management of Health and Safety at Work Regulations* [5]. All potential hazards shall be assessed and appropriate control measures put in place.

All persons handling and using gaseous cylinders and pressure equipment shall have received adequate information, instruction, training and, as appropriate, supervision. The employer is responsible for ensuring that each individual is competent to carry out each task safely and correctly. For further information, refer to BCGA GN 23 [47].

The supplier or employer of a person who puts into service, modifies or repairs a mobile system, or components of it, shall provide sufficient information to enable the user of a pressure system to determine how to operate and maintain it safely.

Such information for equipment for use with individual portable or mobile cylinder supply may include the following:

- Safe operating limits for pressure and temperature.
- Operating and maintenance instructions.

This information may be included in the operating instructions supplied to the user, or marked on the equipment.

Where flammable gases are used the areas should be kept free of other flammable and combustible materials. A fire risk assessment shall be carried out in compliance with *The Regulatory Reform (Fire Safety) Order* [10]. Appropriate fire extinguishing equipment should be provided and be readily available for use.

Always wear appropriate personal protective equipment, for example, where noise is excessive wear ear protection. Refer to Section 8.1.

8.1 Personal protective equipment

The work activity risk assessment will determine the requirement for the use of hazard controls, including personal protective equipment (PPE). PPE may only be considered as a control to achieve an acceptable level of residual risk after other levels of control have been addressed. Where PPE is required a PPE Assessment is to be carried out. PPE is to be provided as required by the *Personal Protective Equipment Regulations* [7]. The PPE shall be selected for a particular task and location and shall be appropriate and chosen to effectively reduce the overall risk. Thus there are different PPE requirements for differing products, different tasks and possibly different personnel. Due regard is to be given to the requirements of the *Control of Substances Hazardous to Health Regulations* [8], any relevant equipment publications, manufacturers information and the product Safety Data Sheet.

HSE L25 [18], *Personal Protective Equipment at Work*, provides guidance on the *Personal Protective Equipment Regulations* [7]. The European Industrial Gases Association (EIGA) Document 136 [37], *Selection of personal protective equipment*, provides guidance for selecting and using PPE at work.

Eye protection is essential at all times and is a legal requirement in factory premises to provide safeguard against heat, glare and flying sparks. Safety glasses should be used when connecting or disconnecting gas cylinders.

8.2 Work in confined spaces

If work is required in a confined space comply with the *Confined Spaces Regulations* [3]. A specific confined spaces risk assessment is required. HSE L101 [19], *ACOP Safe work in confined spaces*, provides guidance and detailed recommendations. Refer also to HSE INDG 258 [23], *Confined spaces. A brief guide to working safely*. In particular the use of a Permit to Work is strongly recommended.

Following a release of gas into a confined space the local atmosphere can quickly change and become hazardous. This may require testing of the atmosphere and the use of appropriate control measures to manage the hazard, refer to Section 8.3.

Gas cylinders should not be taken into a confined space. Gas delivery equipment shall not be left in a confined space after the actual work has been completed, or at times when work has ceased for more than a few minutes. This will prevent the build-up of gases from leaks.

When carrying out work in a confined space, it is essential to have an assistant stationed outside who is competent to control the gas cylinder(s) and the gas delivery equipment and who can monitor the safe progress of the work. The assistant shall comprehend the possible hazards associated with working in confined spaces and know the correct emergency actions required.

8.3 Changes to the workplace atmosphere

Any changes to the atmosphere, for example, by a gas leak, can create a hazardous atmosphere. Gases have many different properties and individual gases will create their own particular hazards. The significant gas for humans is oxygen and the normal oxygen content in air is approximately 21 %.

Oxygen enrichment of the atmosphere, even by a few percent, considerably increases the risk of fire and also increases the rate of propagation and intensity of a fire or explosion. Concentrations of oxygen above 23.5 % should be avoided. A spark or lit cigarette is sufficient as a source of ignition. Oils, greases and some solvents may react violently in oxygen enriched atmospheres and some metals may also burn. Equipment cleanliness is essential and, to avoid possible contamination, clothing, tools and the working area should be kept clean.

Likewise, a reduction in the oxygen content can lead to an asphyxiation hazard. Oxygen-deficient atmospheres can be difficult to identify. Hazardous areas may be highly localised, for example, heavier than air gases may collect at the bottom of a tank.

For further information refer to BCGA GN 11 [45], *The management of risk when using gases in enclosed workplaces*.

8.4 Cylinders

Ensure you have the correct gas product. Prior to use check and confirm that it is the gas you require. The primary method for identifying the gas contents of a cylinder is the label. If the label is defaced or missing the cylinder is not to be used and is to be returned to the gas supplier. Additional information is available on the Safety Data Sheet. As necessary, seek further advice from your gas supplier.

It is essential to locate the cylinders in a safe place relative to the work about to be carried out. Cylinders are normally designed to be used in the vertical position. Cylinders shall be restrained to avoid toppling and are to be protected from mechanical damage and sources of contamination.

The number of cylinders in the work area should be kept to a minimum. If a cylinder is not required for use then it should be returned to the gas cylinder store.

Before connecting a pressure regulator or any other fitting to the cylinder valve, check the valve is closed, then ensure that the cylinder valve outlet is clean, dry, and free from damage, dirt and contamination. Refer to BCGA TIS 22 [52], *Connecting gas cylinders*.

Should there be any visible trace of oil or grease on a cylinder valve, especially in oxygen service, the cylinder shall be put aside for return to the supplier. Contaminated cylinders shall be suitably marked to prevent accidental re-issue.

8.5 Pressure regulators

Before attaching a pressure regulator to a cylinder, check that the regulator is in a serviceable condition and that:

- the gas inside the cylinder is correctly identified and that the regulator is suitable for that specific gas;
- the regulator can be fitted in a suitable orientation. Traditionally, gas cylinder valve outlet connections were predominantly bottom entry. However, many valves now use side entry outlet connections. Regulators are designed to fit either a bottom entry or a side entry gas cylinder outlet;
- the cylinder valve outlet thread is mechanically compatible with the regulator inlet connection. There are a variety of inlet connectors available. Adaptors shall not be used;
- the inlet connection is free from damage. If a washer or an 'O' ring is fitted to the inlet, check it is serviceable and replace, as appropriate, with a washer or an 'O' ring recommended by the regulator manufacturer. Check the inlet is clean and free of dirt (use a lint free cloth to clean the outlet). Refer to BCGA TIS 22 [52];
- the regulator is within its expiry date. All regulators have a life, on expiry of which they require either replacement or refurbishment. Refer to Appendix 1;
- the cylinder working pressure (the pressure inside a cylinder when it is full) and the pressure regulator design pressure are compatible, and it is safe to allow cylinder working pressure at the regulator inlet.

NOTE: Gas cylinders have a variety of working pressures to which they may be filled, for example, 25 bar, 230 bar, 300 bar.

- the regulator outlet thread is in good condition;
- the regulator has a suitable outlet pressure for the process equipment;
- the pressure gauges are not damaged, do not show signs of over pressurisation and zero correctly;
- the regulator pressure adjusting screw is set to the zero pressure position by turning the control knob fully anti-clockwise.

To prevent ignition of components, oxygen regulators shall be kept free from oil or grease and be suitable for the maximum cylinder pressure being used.

Do not use any form of jointing paste or tape between the regulator and cylinder valve.

Use only the correct sized spanner when connecting equipment.

8.6 Safety devices

When fitting safety devices to hose assemblies, ensure that all threads and seats are in good condition. Fit the device in accordance with supplier's instructions, taking particular care of the correct direction of flow.

8.7 Hoses

Before fitting a hose assembly to the safety device or pressure regulator, examine all fittings, threads, connection seatings and clips. Re-usable worm-drive clamps shall **not** be used. Check for signs of damage or contamination. Reject hose assemblies that show signs of any damage or whose condition is in any way unsatisfactory.

Since a fire in a coiled hose is difficult to extinguish, oxygen or flammable gas hoses should not be coiled around the cylinders, regulators or cylinder trolley during operation.

8.8 Pressurising the system

Before first use, carry out a '*before use*' inspection, refer to Section 5.

The cylinder outlet valve shall only ever be opened slowly. Rapid opening of the cylinder valve can place stress on the internal components of the pressure regulator and in oxygen service will increase the likelihood of an ignition from adiabatic compression of the gas.

The following procedure should be followed:

- (i) Check the pressure regulator(s) and downstream valve(s) are closed.
- (ii) **Slowly** open the cylinder valve hand-wheel fully and then close a quarter of a turn. This will enable others to distinguish readily between an open and a closed valve.

Where the valve is not fitted with a hand-wheel, use a gas cylinder key (as approved by the gas supplier) and ensure that once the valve is open, the gas cylinder key is left fitted to the valve.

- (iii) Adjust the regulator to give the required gas pressure and check the equipment for leaks using a suitable leak detection fluid. Adjust flowing gas pressure to the required level.

NOTE: Only use leak detection fluids that are free of ammonia. For information on leak detection fluids refer to EIGA Document 78 [36], *Leak detection fluids cylinder packages*.

- (iv) Purge the system to establish that the correct gas is present in the system.

Sufficient time should be allowed to allow ambient gases to be removed from the system and a pure gas to flow. As a guideline, a purge time of 5 seconds for every 3 meters of hose is usually adequate. Care should be taken when purging gases to prevent the possible creation of an unsafe atmosphere. For further information, refer to BCGA GN 11 [45].

9. CLOSING DOWN PROCEDURE

Close down the process equipment according to the manufacturer's instructions.

To close down the gas delivery equipment:

- (i) Close the cylinder valve.
- (ii) Vent away the small amount of residual gas via the process equipment.
- (iii) Turn the regulator pressure adjusting screw to the zero delivery position (by turning anti-clockwise).
- (iv) Close the flow-meter valve if fitted.

On completion of use, the following additional operations should be carried out:

- Disconnect and remove the pressure regulator from the cylinder.
- Carry out an '*after use*' check, refer to Section 5.
- Make a final check to ensure that the cylinder valve(s) is closed and that there is no leakage of gas. Return gas cylinders to their store, refer to Section 7.2.
- Return gas delivery equipment to a safe place of storage, as appropriate fit protective covers. Report any unserviceability.

10. EMERGENCY PROCEDURES

The user should have a site-specific emergency procedure in place for fire situations in compliance with *The Regulatory Reform (Fire Safety) Order* [10].

BCGA Leaflet 6 [54], *Cylinders in fires*, provides further guidance on dealing with gas cylinders involved in a fire.

Correct location of cylinders, correct assembly of equipment and correct operation will all contribute to minimising the risk of an incident involving gas cylinders.

The operator should ensure that fire extinguishers are readily available at all times when oxygen or flammable gases are in use.

If a gas leak occurs and / or ignites (flammable gases) in the presence of an operator, if safe to do so, isolate by turning off the cylinder valve. If a fire continues carry out the actions in '*For cylinders involved in fires*'.

10.1 For cylinders involved in fires

- KEEP AWAY - DO NOT approach or attempt to move the cylinder or operate the valve.

- Raise the alarm.
- Evacuate the immediate area and keep others away
- Contact the Fire and Rescue Service.

If gas cylinders are directly involved in a fire, keep well clear until the Fire and Rescue Service arrive and then follow their instructions.

Inform the Fire and Rescue Service immediately of the location and type of any gas cylinders involved in the fire. Also tell them the location and type of other gas cylinders on the premises.

Cylinders which are not directly involved in the fire and which have not become heated, should be moved as quickly as possible to a safe place, provided that this can be done without undue risk. Make sure that cylinder valves are closed.

10.2 Fire damaged gas cylinders

Following an incident the Fire and Rescue Service will inform you when it is safe to approach the gas cylinders. Do not use any cylinders which have been involved in a fire. Some may have obvious damage but others may have had their mechanical properties affected by heat, unnoticeable to the naked eye. Inform your gas supplier whenever a cylinder has been involved in a fire or if it is suspected that it has been affected by excessive heat. Your gas supplier will provide advice on what to do next, which will vary depending upon the circumstances. Refer also to BCGA Leaflet 6 [54].

11. SECURITY

Gas cylinders and the gases they contain are hazardous. When not in use they should be located in a secure store, refer to Section 7.2.

When in use at the workplace they should be accountable and be subject to routine management checks.

If gas cylinders are empty, or no longer required, then they should be returned to the gas supplier at the earliest opportunity.

Additional advice is available from your gas supplier and the BCGA.

12. REFERENCES

Document Number	Title
1.	The Health and Safety at Work etc. Act 1974.
2. SI 1992: No. 2793	Manual Handling Operations Regulations 1992.
3. SI 1997: No. 1713	The Confined Spaces Regulations 1997.
4. SI 1998: No. 2306	The Provision and Use of Work Equipment Regulations 1998 (PUWER).
5. SI 1999: No. 3242	The Management of Health and Safety at Work Regulations 1999.
6. SI 2000: No. 128	The Pressure Systems Safety Regulations 2000 (PSSR).
7. SI 2002: No. 1144	The Personal Protective Equipment Regulations 2002.
8. SI 2002: No. 2677	The Control of Substances Hazardous to Health Regulations 2002 (COSHH).
9. SI 2002: No. 2776	The Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR).
10. SI 2005: No. 1541	The Regulatory Reform (Fire Safety) Order 2005.
12. SI 2009: No. 1348	The Carriage of Dangerous Goods and the Use of Transportable Pressure Equipment Regulations 2009 (as amended).
13. SI 2014: No. 1639	The Acetylene Safety (England and Wales and Scotland) Regulations 2014.
14. SI 2015 No. 51	The Construction (Design and Management) Regulations 2015.
15. ECE/TRANS/257	European Agreement concerning the international carriage of dangerous goods by road (ADR) (as amended).
16. HSE L5	Control of substances hazardous to health. The Control of Substances Hazardous to Health Regulations 2002 (as amended). Approved Code of Practice and guidance.
17. HSE L22	Safe use of work equipment. Provision and Use of Work Equipment Regulations 1998. Approved Code of Practice and guidance.
18. HSE L25	Personal Protective Equipment at Work. Personal Protective Equipment at Work Regulations 1992. Guidance on Regulations.

Document Number	Title
19. HSE L101	Safe work in confined spaces. Confined Space Regulations 1997. Approved Code of Practice, regulations and guidance.
20. HSE L122	Safety of pressure systems. Pressure Systems Safety Regulations 2000. Approved Code of Practice and guidance.
21. HSE L138	Dangerous substances and explosive atmospheres. Dangerous Substances and Explosive Atmospheres Regulations 2002. Approved Code of Practice and guidance.
22. HSE L153	Managing health and safety in construction. Construction (Design and Management) Regulations 2015. Guidance on Regulations.
23. HSE INDG 258	Confined spaces. A brief guide to working safely.
24. BS EN 560	Gas welding equipment. Hose connections for equipment for welding, cutting and allied processes.
25. BS EN 561	Gas welding equipment. Quick-action coupling with shut-off valves for welding, cutting and allied processes.
26. BS EN 1256	Gas welding equipment: Specification for hose assemblies for equipment for welding, cutting and allied processes.
27. BS EN 1327	Gas welding equipment. Thermoplastic hoses for welding and allied processes.
28. BS EN ISO 2503	Gas welding equipment. Pressure regulators and pressure regulators with flow-metering devices for gas cylinders used in welding, cutting and allied processes up to 300 bar (30 MPa).
29. BS EN ISO 3821	Gas welding equipment. Rubber hoses for welding, cutting and allied processes.
30. BS EN ISO 5175	Gas welding equipment. Safety devices. Part 1 – Devices incorporating a flame (flashback) arrestor Part 2 - Devices not incorporating a flame (flashback) arrestor
31. BS EN ISO 7291	Gas welding equipment. Pressure regulators for manifold systems used in welding, cutting and allied processes up to 30 MPa (300 bar).
32. BS EN ISO 11114	Transportable gas cylinders. Compatibility of cylinder & valve materials with gas contents: Part 1, Metallic materials. Part 2, Non-metallic materials.

Document Number	Title
33. BS EN ISO 14113	Gas welding equipment. Rubber and plastics hose and hose assemblies for use with industrial gases up to 450 bar (45 MPa).
34. BS ISO 16964	Gas cylinders. Flexible hoses assemblies. Specification and testing.
35. BS EN ISO 22435	Gas Cylinders. Cylinder valves with integrated pressure regulators. Specification and type testing.
36. EIGA Document 78	Leak detection fluids cylinder packages.
37. EIGA Document 136	Selection of personal protective equipment.
38. BCGA Code of Practice 4	Industrial gas cylinder manifolds and distribution pipework (excluding acetylene).
39. BCGA Code of Practice 6	The safe distribution of acetylene in the pressure range 0 - 1.5 bar.
40. BCGA Code of Practice 7	The safe use of oxy-fuel gas equipment (individual portable or mobile cylinder supply).
41. BCGA Code of Practice 18	The safe storage, handling and use of special gases.
42. BCGA Code of Practice 39	In-service requirements of pressure equipment (gas storage and gas distribution systems).
43. BCGA Code of Practice 44	The storage of gas cylinders.
44. BCGA Guidance Note 3	Safe cylinder handling and the application of the manual handling operations regulations to gas cylinders.
45. BCGA Guidance Note 11	The management of risk when using gases in enclosed workplaces.
46. BCGA Guidance Note 13	DSEAR Risk Assessment.
47. BCGA Guidance Note 23	Gas safety - Information instruction and training.
48. BCGA Technical Information Sheet 15	Model risk assessment for the storage and use of oxy-acetylene cylinders.

Document Number	Title
49. BCGA Technical Information Sheet 17	Model risk assessment for manual handling activities in the industrial gas industry.
50. BCGA Technical Information Sheet 18	Date marking of gas accessories.
51. BCGA Technical Information Sheet 19	Refurbishment of components used with compressed gases for welding, cutting and related processes.
52. BCGA Technical Information Sheet 22	Connecting gas cylinders.
53. BCGA Technical Information Sheet 38	Moving gas cylinders and bundles within the workplace.
54. BCGA Leaflet 6	Cylinders in fires.

Further information can be obtained from:

UK Legislation	www.legislation.gov.uk
Health and Safety Executive (HSE)	www.hse.gov.uk
British Standards Institute (BSI)	www.bsigroup.co.uk
International Organization for Standardization (ISO)	www.iso.org
European Industrial Gases Association (EIGA)	www.eiga.eu
British Compressed Gases Association (BCGA)	www.bcgaco.uk

GUIDANCE ON INSPECTION AND MAINTENANCE

EQUIPMENT	INTERVALS				
	AT ASSEMBLY	BEFORE USE	AFTER USE	ANNUAL	REPLACEMENT / REFURBISHMENT INTERVALS
<p>REGULATORS and their integral protective devices</p> <p><i>Section 6.1, 8.5.</i></p>	<p>Check compatible with the gas.</p> <p>Ensure within life for use.</p> <p>Check the regulator inlet pressure is compatible with the maximum cylinder pressure.</p> <p>Ensure the Pressure Adjustment control is firmly fixed to the body and operates freely.</p> <p>Check the inlet and outlet connections sit square to the regulator's body.</p> <p>Check condition of threads and sealing surfaces. Ensure no signs of PTFE tape.</p> <p>Check both gauges on regulator naturally face the front and are undamaged.</p>	<p>Check body for any signs of soot, oil, grease or other contamination.</p> <p>Check compatible with the gas.</p> <p>Ensure the Pressure Adjustment control is firmly fixed to the body and operate freely.</p> <p>Ensure the regulator gauges start at zero prior to use.</p> <p>Ensure the pressure rises on the high pressure gauge when opening the cylinder outlet valve.</p> <p>Check the low pressure gauge rises smoothly when setting the gas pressure.</p> <p>Leak test all joints at working pressure.</p>	<p>Check for any damage, contamination, defects or faults.</p> <p>Check that gauges return to zero during the venting process.</p>	<p>Full visual inspection.</p> <p>Check life dates.</p> <p>Functional tests to ensure correct operation. Typically this will include a creep test to ensure regulator integrity.</p>	<p>5 years from date of manufacture or manufacturer's recommendations.</p> <p>Replace with a new, or refurbished unit</p> <p>NOTE 1. NOTE 2.</p>

	<p>Ensure both gauge needles reset to zero.</p> <p>No oil, grease or other contamination.</p> <p>Leak test all joints at working pressure.</p>				
<p>FLAME ARRESTORS and their integral cut off valves.</p> <p><i>Section 6.3.</i></p>	<p>Check correct type fitted.</p> <p>Check manufacturing standard.</p> <p>Ensure within life for use.</p> <p>Check condition of threads and sealing surfaces.</p> <p>Check the Direction of Flow is correct.</p> <p>No oil, grease or other contamination.</p> <p>Leak test all joints at working pressure.</p> <p>Check the Pressure sensitive cut-off valve button is not restricted / damaged / tied down.</p>	<p>Ensure flame arrestors are fitted.</p> <p>Leak test all joints at working pressure.</p>	<p>Check for any damage, contamination, defects or faults.</p>	<p>Check unit for leaks, flow restrictions and reverse flow to ensure correct operation of non-return valves.</p> <p>Where pressure sensitive cut off valves are fitted, they shall operate at a pressure of no greater than 1.2 bar.</p> <p>If of a pressure sensitive type, check shut-off in the tripped condition in the direction of flow.</p> <p>Check life dates.</p>	<p>5 years from date of manufacture or manufacturer's recommendations.</p> <p>Replace with a new, or refurbished unit.</p> <p>NOTE 1. NOTE 2.</p>

<p>HOSE ASSEMBLIES (including NON-RETURN VALVES) <i>Section 6.2, 6.3, 8.7.</i></p>	<p>Check the manufacturing standard.</p> <p>Check suitability of hose colour, internal bore size and length</p> <p>Check threads and sealing surfaces.</p> <p>Check hoses condition for damage (e.g. kinking twisting or cracking).</p> <p>Ensure HCV and Nut & Tails are fitted using correct ferrules and are located in the correct place.</p> <p>Leak test of all joints at working pressure.</p>	<p>Ensure all the gas hose is unwound from gas cylinder trolley prior to use.</p> <p>Check hoses condition for damage (e.g. kinking twisting or cracking).</p> <p>Leak test of all joints at working pressure.</p>	<p>Check for any damage, contamination, defects or faults.</p>	<p>Reverse hose to ensure the correct operation of non-return valve where fitted. Bend hose in a tight radius to ensure reinforcement is not visible and there is no sign of collapse or distortion.</p>	<p>Determined by local operating conditions. Replace as required. NOTE 2</p>
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NOTE 1: Components such as elastomers, seals and diaphragms, will wear and deteriorate from their date of manufacture whether in gas service or not. Items stored out of gas service for one year or over should receive checks in accordance with the annual requirements.

NOTE 2: Some equipment is marked to either identify the date it was manufactured or the date when it needs replacement or refurbishment. Refer to BCGA TIS 18 [50], *Date marking of gas accessories*.



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