



Glasgow City Council
EDUCATION SERVICES
Technician Support Service



Technician Guidance Sheets

TGS/10a

**Use & Inspection of Gas Cylinders & Associated
Regulators**

Issued by Technician Support Service

Date February 2019 (revised)

Objectives: The objective of this Guidance Sheet is to instruct Senior Support Service Technicians and Support Service Technicians in the annual inspection and safe use of gas cylinders and associated regulators

Persons responsible: Senior and Support Service Technicians (Science & Technical)

Gas Cylinders & Regulators

The purpose of this Guidance Sheet is to provide information on the safe use and inspection of gas cylinders and associated regulators.

Anyone who examines, refurbishes, fills or uses a gas cylinder should be suitably trained and have the necessary skills to carry out their job safely. They should understand the risks associated with a gas cylinder and its contents. Health & Safety Executive (HSE) Safe Use of Gas Cylinders 2004.

Gases that are normally stored and used for educational purposes are as follows:

- Oxygen
- Nitrogen
- Carbon Dioxide
- Argon Mix

Due to the differences in cylinder and regulator design, sulphur dioxide is covered separately in Technician Guidance Sheet TGS/10b.

The following notes are guidance concerning the handling, storage, and use of gas cylinders and inspection of gas regulators to ensure that they are safe for use. The two main sets of regulations covering gas cylinders/regulators are:

The Carriage of Dangerous Goods & Use of Transportable Pressure Equipment Regulations 2004 The Pressure Equipment Regulations 1999

The law requires that all gas cylinders, which in the case of Glasgow schools are hired via a reputable supplier, are examined and tested by the company that supplies the cylinder. **The use of gifted cylinders or regulators is strictly forbidden.**

Gas regulator must **only** be used if it is less than 5 years old. If the regulator is more than 5 years old, it **must** be replaced. Information on purchase date can be found on the record sheet, contact TSS if further information is required. Gas regulators must be barcoded and added to the TSS inventory for each school.

An HSE approved body, carries out the initial examination. Within Glasgow City Council Education Services all regulators are owned by the individual school. It is the responsibility of the school to ensure the test records are retained for a period of at least five years.

Purchase, inspection and certification will be arranged by Technician Support Service through a registered outside agency. Regulators purchased after 1998 carry the marking BS EN ISO2503.

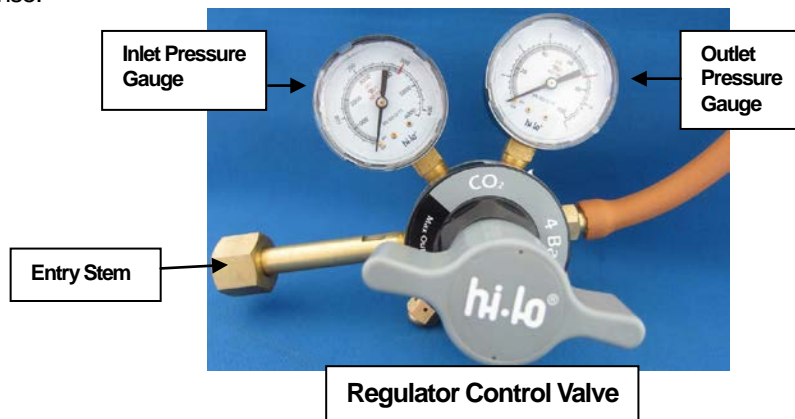
General Inspections

Senior Support Service Technicians are responsible for maintaining records of regulator inspections as well as the safe handling and storage of cylinders and regulators.

Support Service Technicians (core science or technical) are responsible for carrying out the following inspections:

Regulators

Check that the regulator is suitable for use with the gas in the cylinder, under no circumstances should a regulator be used on a gas cylinder that contains a different gas from that which the regulator is designed to dispense.



Users should carry out and **record** an external visual inspection of the gas regulator **3 times per year**. This will determine whether there are obvious signs of physical damage to the valves, gauges, casing or coupling. If the regulator is not attached at the time of inspection, the regulator threads should be checked for signs of damage, before attaching to carry out the leak test described below. An external visual inspection should also be carried out on **each** occasion of use.

Leak tests should be carried out and recorded on the record sheet provided, **see appendix 1**, on the following occasions -

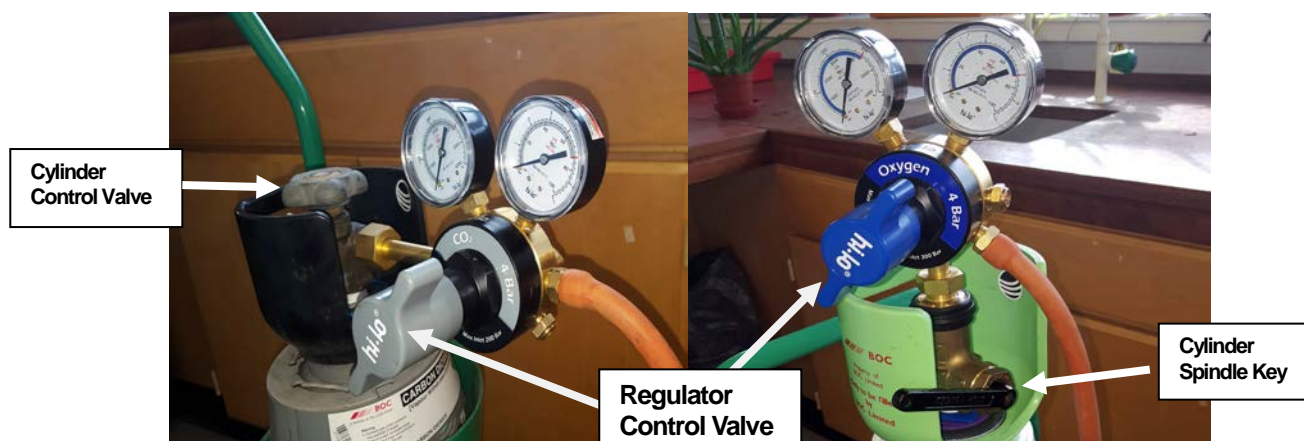
1. Annually
2. After fitting a regulator to the gas cylinder

In addition - Leak tests should be carried out if there is reason to suspect a leak and the results recorded in the additional comments section of the record sheet.

The record sheet must be retained by the school for a minimum period of five years and be made available to council safety officers and officers of the HSE as requested.

Cylinders

Gas cylinders, which in the case of Glasgow schools are hired via a reputable supplier, are inspected and tested by the company that supplies the cylinder. Gas should be added to TSS Chemical Inventory within 2 days of receipt.



Cylinders cont.

Users should carry out an external visual inspection annually and on **each** occasion of use to determine whether there is obvious damage.

External visual inspection involves checking

- If the regulator doesn't seat properly
- If mounting cylinder threads are damaged (if regulator is not attached)
- If the spindle valve requires greater force than normal to turn on or off the supply

Should any of the above be applicable, **do not use and immediately return the cylinder to the supplier.**

Precautions

- Do not use gas cylinders for any other purpose than the transport and storage of gas
- Always double-check that the cylinder / gas is suitable for the intended use
- Fire extinguishers must **never** be used as a source of carbon dioxide for laboratory use
- When using a carbon dioxide cylinder (with jet freezer adaptor) to make dry ice, suitable protective equipment must be worn to prevent burns i.e. gloves and goggles/face visor. This is only possible if the cylinder is a 'siphon type' cylinder (see [SSERC dry ice maker](#) for further info)
- **Hydrocarbon Contamination**
Do not use oil, grease or other hydrocarbon substances on the cylinder valves for lubrication. Where there is contamination of this kind contact with oxygen can, in certain conditions result in an explosion. The dangers of this practise both to the users of the cylinders and to the employees of the supplier are obvious. If any cylinders do accidentally become contaminated, they should not be used but set aside and clearly labelled. The supplier should then be informed immediately
- Never use PTFE tape on the regulator or cylinder to create a seal
- Cylinders or regulators gifted to the school must **never** be used or accepted

Storage

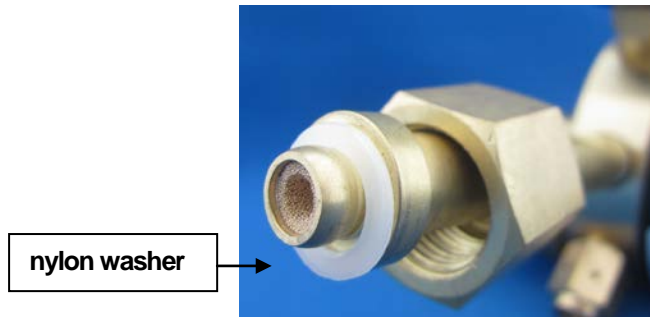
- Entry door(s) to storage area(s) must display "Compressed Gases" safety sign. **See Science Safety File, Appendix 4**
- Cylinders should **not** be stored within chemical stores or in classrooms
- Access to cylinder keys should be restricted to authorised staff i.e. keys should not be kept with the cylinder
- Protect gas cylinders from external heat sources that may adversely affect their mechanical integrity. Do not store next to radiators or other heat sources
- Ensure the valve is kept shut on empty cylinders to prevent contaminants entering the cylinder.
- Store gas cylinders securely when they are not in use, they should be properly restrained against the wall or in trolleys designed for the purpose. This will prevent them from falling over
- Gas cylinders must be clearly marked to show their contents and the associated hazards
- Store cylinders where they are not vulnerable to hazards caused by impact, e.g. under shelves

Handling

- Cylinders must be transported and securely stored in the trolleys provided for this purpose
- Use gas cylinders in a vertical position, unless specifically designed to be used otherwise
- Cylinders of capacity greater than 19.5 Kg for Oxygen (X), 6.35 Kg for Carbon dioxide (VB), 6.35 Kg for Nitrogen (F) and 19 Kg for Argon mix (X) **must** not be used within schools. **See appendix 1** for cylinder sizes
- Do not drop, roll or drag gas cylinders
- Wear suitable eye protection, gloves and when required, suitable safety shoes for handling gas cylinders/regulators
- Do not use valves, shrouds and caps for lifting cylinders unless they have been designed and manufactured for this purpose
- Any cylinders or regulators involved in an incident (i.e. subject to a fall) must be withdrawn from service, set aside and clearly marked. No repairs to either cylinder or regulators should ever be attempted

Installation of Regulator

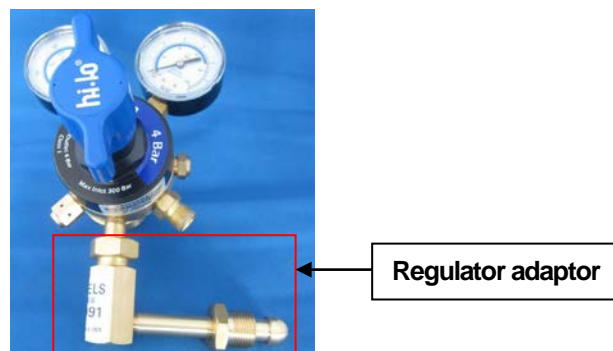
- Before connecting a gas regulator to a gas cylinder check they are suitable for the type of gas and pressure being used, i.e. the pressure of gas in a gas cylinder should never exceed that maximum pressure allowed for the regulator – both values are displayed on the equipment. **See instruction below for oxygen gas regulators**
- Do not attempt to attach the regulator unless both values are known
- Remove the protective cap from the cylinder, clean with a dry, lint free cloth to remove any debris, do not use if any debris remains and return to supplier
- **Note:** carbon dioxide regulators are provided with a nylon washer which must be fitted within the side entry stem prior to installation



- The nylon washer should be checked for signs of damage on an annual basis and each time the regulator is installed. Replacement nylon washers are available from TSS
- Make sure the cylinder outlet is not facing yourself or in close proximity to the wall, slowly open the cylinder valve just enough to allow gas to blow any debris out and quickly close again. This process is known as 'sniffing'
- Remove the protective cap from the regulator, clean with a dry, lint free cloth to remove any debris. Retain the protective cap for use when regulator is in storage
- Check for marks or damage on the thread and regulator seating, which may cause a loose fit and result in gas leakage
- Check the regulator control valve is in the closed (no flow) position by turning fully anticlockwise
- Using a spanner, attach the regulator to the cylinder, there is no need to over tighten the regulator connection
- Carry out a leak test and record the results on the inspection record, **see appendix 1**

Installation of oxygen regulator adaptor

- Oxygen regulators will require an adaptor to be attached before the steps above can be followed
- The adaptor will be supplied on the first occasion of delivery from the supplier of the oxygen gas cylinder. The adaptor is required in order to ensure that the regulator does not foul the shroud surrounding the neck of the cylinder
- The adaptor should be checked for signs of damage on the thread, which may cause a loose fit and result in gas leakage
- Using a spanner, the adaptor can be easily attached to the gas regulator, there is no need to over tighten the regulator/adaptor connection
- If the adaptor does not attach easily, remove and re-attach **only** if there are no signs of damage to the adaptor or regulator threads. Should the threads be damaged, please contact TSS for further advice
- Once the adaptor is attached, please follow the steps above for installation of regulator



Producing a flow of gas

Cylinder and regulator control valves should always be opened slowly. Hammers, mallets or excessive leverage must **never** be used on a stiff or frozen cylinder valve. Should this be the case, return to supplier.

1. Open the two valves in the following order
2. Turn the cylinder spindle key or cylinder control valve (whichever is applicable). This will introduce some gas to the regulator head. The inlet pressure gauge should show a reading
3. Slowly open the control valve until the required flow rate is achieved. The outlet pressure gauge will show almost zero unless pressure is applied to the outlet i.e. connected to gas equipment

Turning off

1. Close the regulator control valve and then the cylinder control valve
2. Vent the regulator by turning the regulator control valve on until all gas contained within the regulator is released
3. Once all gas in the regulator is released, fully close the regulator control valve
4. Both the inlet pressure gauge and outlet pressure gauge will read zero

Removal of Regulator

1. Make sure both control valve and regulator valve are fully closed and that any excess gas has been vented
2. Use an adjustable spanner to remove the regulator
3. Clean both regulator outlet connection and cylinder inlet connection with a clean dry cloth to remove any debris and replace protective caps
4. If the cylinder is empty, mark 'empty' and arrange uplift as soon as practicable

Inspection Record

The Senior Support Service Technician should maintain a record of inspections, using the record sheet provided. Any faults detected in the gas cylinder should be reported to the supplier immediately and recorded under additional comments. Any faults detected in the regulator should be reported to TSS and recorded under additional comments.

Inspection records should be made available to Health and Safety Officers, TSS Staff and any Officer of the Council if so requested. Records of completed inspections must be retained, in a safe place, for minimum period of five years after the last entry.

APPENDIX 1

General Inspections

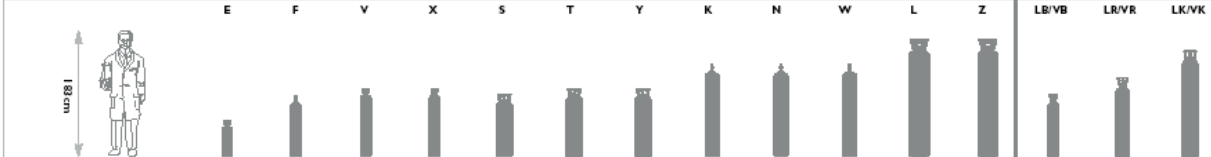
The gas regulator must be checked for leaks by carrying out a simple **Leak Test** on the occasion of:

- Each assembly of regulator and cylinder
- On an annual basis, the results of which should be recorded
- If there is a suspected leak

Leak Test

- Wear goggles or face visor for this test
- With the regulator fitted to the cylinder attach a short length of rubber tubing to the outlet and close the open end with a lab screw clip
- With a paintbrush apply a 1% Teepol solution over the joints and the outside of the regulator. Other generic detergents should never be used due to the hydrocarbon content which may result in contamination
- Adjust the output pressure to a very low flow rate
- If any leaks are indicated by the appearance of small bubbles and if there is obvious signs of damage, return the cylinder to the supplier for further testing. Contact TSS if there is damage to the regulator
- If there are no obvious signs of damage, remove the regulator, wipe clean with a clean dry, lint free cloth and re-attach the regulator to re-test
- If leak remains, return cylinder to the supplier and contact TSS for further advice regarding the regulator
- Once leak test is complete please ensure that you remove any remaining Teepol solution with a damp cloth and dry the regulator
- Vent the regulator by turning the regulator control valve on until all gas contained within the regulator is released
- Ensure all valves and/or connections are closed, before returning to storage

Cylinder size

Approximate Dimensions (cm)	50 x 15	86 x 14	94 x 14	94 x 14	87 x 20	93 x 20	93 x 20	146 x 23	146 x 23	146 x 23	164 x 23	164 x 23	94 x 14	87 x 20	150 x 23
Approximate Gross Weight (kg)	7	18	19	19	34	34	40	75	82	85	87	77	22	44	99
	E	F	V	X	S	T	Y	K	N	W	L	Z	LB/VB	LR/VR	LK/VK
															

References have been made to:

- SSERC Bulletin 205
- SSERC Bulletin 227
- SSERC Hazardous Chemicals
- Safe Use of Gas Cylinders HSE 2004
- Safe Guards in the school laboratory 11th Edition



Glasgow City Council

EDUCATION SERVICES Technician Support Service TGS10/a

Gas Cylinder Regulator Inspection

Gas Regulator: **Oxygen**

Barcode:

Date of Purchase:

Inspection Date	Visual Inspection Physical damage – Yes/No	Regulator Leak test (✓)	Comments	Signed

Gas Regulator: **Carbon Dioxide**

Barcode:

Date of Purchase:

Inspection Date	Visual Inspection Physical damage * – Yes/No	Regulator Leak test (✓)	Comments	Signed

Gas Regulator: **Argon**

Barcode:

Date of Purchase:

Inspection Date	Visual Inspection Physical damage – Yes/No	Regulator Leak test (✓)	Comments	Signed

Additional Comments:

*Carbon Dioxide regulators should include an additional physical check of the nylon washer annually