NDCN Safety Policy 005: **Compressed gas safety**

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2) Introduction

This policy relates local arrangements in the Nuffield Department of Clinical Neurosciences (NDCN) and is in compliance with the university policy statement S5/03 gas cylinders safety[2]. This guidance is aimed at anyone who intends to use, handle and move cylinders.

The main hazards associated with compressed gas cylinders include:

- *Impact from the blast of a gas cylinder explosion or rapid release of compressed gas and debris thereof*
- *Impact from parts of gas cylinders regulator that fail, or any flying debris*
- *Contact with the release gas or fluid (e.g. Chlorine, liquid CO_2, etc…)*
- *Fire resulting from the escape of flammable gases or fluids*
- *Impact from falling cylinders*
- *Manual handling injuries (Musculoskeletal Disorders)*

3) Training requirements and safety checks

All gas canisters used in the NDCN are leased from BOC, associated regulators are maintained and checked yearly by an external engineer.

- **Users of gas canister must have undertaken the Safety Office training for Working Safely with Gas Canisters[3] as well as Manual Handling, an introduction[4].**
- As part of this training, a test must be completed, upon completion of this test, a certificate of training will be provided – a copy of this certificate must be emailed to the Departmental Safety Officer.

- Safe handling and movement of gas canisters is also covered in this training. Once someone is deemed competent, they can be assigned as a 'group gas handler'.

Users should be able to carry out an external visual inspection of the gas cylinder, and any attachments (e.g. valves, and regulators), to determine whether they are damaged. Visible indicators may include dents, bulges, evidence of fire damage (scorch marks) and severe grinding marks, etc.

a) Before the use of any gas, the relevant Risk Assessment should be consulted, read and understood.
b) Always check that the gas that is going to be used is the correct gas for the intended application as well as the correct size cylinder.
c) Check that the cylinder looks to be in good condition and that there are no leaks.
d) If the cylinder sounds as if it is leaking contact Facilities Team.
e) Always ensure that the pipework that is to be connected is in good repair and that the regulator is suitable and intended for the gas to be used.
f) Gas cylinders should always be used and stored in an upright position; unless specifically designed otherwise and when cylinders are being stored or used they must be chained or strapped in this upright position or placed in a suitable cylinder holder.
g) Where possible, secure cylinders out of laboratory traffic areas and when the gas cylinder is not in use the valve should be closed and dust caps put in place where provided. The storage area should be secure and not accessible to non-authorised personnel.
h) When empty a label should applied to the cylinder and advised Facilities in order to raise a return.

4) Raising a request

- Once a research group have identified their need, they will liaise with the Facilities Team (by emailing facilities@ndcn.ox.ac.uk) to raise the necessary Purchase Order (PO) and arrange the delivery of the cylinder.

- Note that rental charges apply to gas cylinders and the relevant research group is required to pay the monthly charges until the cylinder has been returned.

5) Movement of compressed gas cylinders

a) Consider the weight and height of the cylinder and do not attempt to move a cylinder if you think the load will be too large.

b) Personal Protective Equipment must be used during the movement of compressed gas cylinders this includes: suitable gloves, eye protection, lab coat and foot ware with metatarsal protection[1].

c) Never move a gas cylinder with a regulator connected to it as this is likely to cause damage to the regulator and may create unexpected release of gas.

d) Moving cylinders over a short distance (2 metres or less)

- If you are moving the cylinder over a short distance (within the gas storage area) on a firm even surface then 'churning' can be employed.
- Tilt the cylinder slightly away from your body, holding the cylinder at the top.
- Rotate the cylinder away from your body slowly into its new position and secure accordingly.
- This method takes some practice and should be carried out under supervision until the handler is confident and deemed competent.
- Never drop, roll or drag compressed gas cylinders.
- This method is to be used to move a cylinder onto a transport trolley.

e) Moving compressed gas cylinders over medium/long distances including from the store to the laboratory

- **Note that cylinders transport should be minimised as much as possible. In practice this means that gas cylinders for a specific building should be delivered by BOC directly at the building storage area. Gas cylinders must not be moved from one building to another without prior arrangements in place.**

- A transport trolley, designed solely for the movement of gas cylinders, must be used in any movements beyond 2m.
- Settle the cylinder into the trolley so that it sits in the cradle and then secure using a chain or strap (check that these are in a good state of repair).
- Cylinders should always be moved in an upright position and the valve should always be closed, this applies for empty cylinders.

f) Moving compressed gas cylinder using a lift

- **This procedure requires two people:**
  - The first person is to stand outside the lift on the floor the cylinder is to be moved to, this will ensure that anyone else can be informed of what is occurring
  - The Second person calls the lift and when it arrives place the cylinder, secured in the trolley, in the lift
  - Place a sign warning people not to enter or place other goods in the lift with the canister

g) Other issues to consider

- If you find cylinders leaning, do not move the cylinders alone.
- Get help and ensure that everyone is aware of what you are going to do.
- This will ensure that you avoid trapping fingers and being hit by falling cylinders.

- When a cylinder is upright, always ensure that is it securely fastened and not left free standing.
- Employ the 'churning' technique[1] to move cylinders against walls and into positions where they can be secured.

h) Cylinders on the floor

- If a cylinder is found lying on the floor you must be certain that you are able to lift it.
- If you feel that you cannot lift it alone seek help from a colleague.
- If you feel that you can lift the cylinder employ the following guidance:
    - Ensure that the cylinder valve is off, using appropriate cylinder key.
    - If regulator is present ensure that there has been no damage, then remove if it is safe to do so.
    - Position your feet hip width apart with one foot slightly in front of the other, astride the valve of the cylinder.
    - To ensure that you are using your thigh muscles do most of the lifting, bend your knees to lower your body.
    - Grip the cylinder neck (if a valve guard is present and is secure then you can use this to lift) using both hands.
    - Keep your back straight (this does not necessarily mean vertical), pull your chin in to lock your back in a straight line and look in front rather than at the ground.
    - Lift in a fluid, purposeful and non-jerking motion. Do this by initially straightening your legs and following through with your arms at the same time as working forward until the cylinder is upright.
    - Ensure that the cylinder is then stored properly and securely.
    - Never attempt to stop a falling cylinder – get out of its way!

6) Fitting and Removal of regulators

a) Only trained user are allowed to fit and remove regulators

- On a fresh cylinder there will be a dust cover that will need to be snapped away from the access port.
- Ensure that the port is not pointed out into an open working area, ideally facing a wall.
- This will ensure that in the event of opening the valve too far that the valve screw is fired into the wall and not into any passing individuals or yourself.
- Ensure that the port is clear and clean of debris. Place the regulator in position and hand screw into the port.
- The regulator should screw cleanly and easily into the port, tighten with a cylinder key a quarter turn.
- There is never a need to use Teflon tape to seal this connection as the brass fittings, when connected properly, are gas tight.

b) A leak check should be performed after each installation.

- When removing a gas cylinder, close the regulator off first, then cylinder valve using a cylinder key.
- Vent the content of the regulator by opening the regulator valve and then close.
- Remove the regulator valve from the cylinder using the cylinder key.

7) Reference

- [1] BOC - How to move gas cylinders safely https://www.youtube.com/watch?v=-uGWOkcBX7s

- [2] Safety with Gas cylinder University Policy Statement S5/03 https://safety.admin.ox.ac.uk/gas-safety

- [3] Compressed Gas Safety Training: https://cosy.ox.ac.uk/accessplan/LMSPortal/UI/Page/Courses/book.aspx?courseid=SAFE00004

- [4] Manual Handling, Introduction training https://cosy.ox.ac.uk/accessplan/LMSPortal/UI/Page/Courses/book.aspx?courseid=SAFE00009

8) Document Control

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