On 4 cylinder stands, ensure a bodok seals is in place at all cylinder yoke points (these should ideally be replaced at the first sign of wear or damage) and ensure cylinders are firmly clamped in position.

Q. The reservoir bag is emptying during a sedation procedure.

A. The reservoir bag is emptying (going flat) during a sedation procedure with the patient breathing normally and the R A machine set at a flowrate of 6 L/min total. Using the Porter brown breathing system.

As the Porter brown double mask has a superior fit against the patient's face, it effectively means that most of the fresh gas flow is inhaled. With the old style single mask there is often an improper fit which allows room air to be entrained during breaths.

Ensure that the inner liner flutter valve membrane is in place and not damaged. Set the correct scavenging flow (40-45 L/min) with nasal mask in place on patient. Commence the ra session with the bag inflated (but not overinflated) and ensure patient is not breathing too rapidly or taking abnormal breaths.

Inspect all rubber goods e.g. reservoir bag, tubing's to ensure they are not holed or damaged. Note: The outlet non-return valve on the R A flowmeter is set to produce a bias to direct some of the titrated fresh gas flow into the reservoir bag. If the problem continues, ask your service provider for advice.

Q. The pins are broken or missing from my stand?

A. Do not use the stand as broken pin index pins effectively mean that medical gas cylinders can be transposed i.e. nitrous oxide on an oxygen yoke. Notify your service provider immediately to request an engineer attends to refit the pins. This damage is often caused in older types of stands – i.e. Fraser Harlake or early Matrx types which did not have the cylinder restraints fit. Moving the equipment around over uneven surfaces causes the cylinders to swing and puts undue pressure on the pins.

Q. Why should I wash my hands before and after changing cylinders?

A. Hands should be clean and free from contaminants especially hand creams. If grease encounters the cylinder valve or yoke assembly, and oxygen is entrained, there is a possibility of an explosive result. It is therefore good clinical practice to have clean hands when changing cylinders – and as these are often dusty, then washing hands after handling cylinders is a necessity!

Q. How often should the regulators and hoses be changed on my pipeline or 4-cylinder stand?

A. MHRA guidance is to follow Manufacturer recommendation. For inhalation sedation equipment is it recommended that hoses and/or regulators be changed every six years, sooner if worn or damaged.

References

1. Take care with Oxygen HSE (Rev 2).
2. HTM 02-01.

Equipment Damage caused by Excessive use of cleaning materials

Over the past 6 months R A Medical Services have become increasingly aware of damage caused to equipment by cleaning

Recommendations for cleaning – do's and don'ts

Don'ts:

1) Use very wet or foamy wipes - unless they have first been squeezed over a sink to remove excess moisture.
2) Never, never spray onto the equipment.
3) Use excessive moisture of any kind
4) Use any cleaning material containing alcohol or bleach.

Do's:

1) Ensure that any pre-moistened wipe is only just damp – i.e. squeeze out any excessive liquid prior to applying to equipment.
2) Use of an e-cloth is also approved but care must be taken to ensure there is no excessive moisture in the cloth prior to applying to the equipment.
3) After wiping over, polish the equipment with a soft clean cloth or paper towel if applicable.

For further information or advice please contact us

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Dental Nursing
THE JOURNAL FOR A CAREER IN DENTAL NURSING

GUIDE TO...

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CARE AND USE OF OXYGEN/ NITROUS OXIDE MEDICAL GAS CYLINDERS

Learning outcomes

After reading this 'Guide to Care and Use of Oxygen/Nitrous Oxide Medical Gas Cylinders' you should:

- Be able to identify and understand the differences between oxygen and nitrous oxide medical gas cylinders
- Understand medical gas characteristics
- Able to identify the storage requirements
- Know the difference between pin index and bullnose
- Be able to change cylinders safely

This guide is supported by an educational grant from RA Medical Services Ltd Inhalation Sedation Specialists

GUIDE TO... Care and use of oxygen/nitrous oxide medical gas cylinders

This Guide investigates the different sizes, care and application of medical gas cylinders for use with inhalation sedation equipment.

The most commonly used size of medical gas cylinder that dental staff will encounter are: E / F / G and possibly J.

Oxygen cylinders: Colour coding of compressed medical oxygen cylinders is white (RAL 9101). The body colour coding is now also white (RAL 9101). In addition, cylinders will carry the oxygen name on the body. For a limited period, some cylinders in circulation will continue to have black bodies as demonstrated in Fig 1.The programme to convert all compressed medical oxygen cylinders to white bodies will be completed by 2025.

Nitrous oxide cylinders: This product will also be changed to white by 2025 (the programme is for all medical gas cylinders to be changed to white and the collar will be the colour identification) although the medical gas companies would advise that the only way to identify the cylinder is by the label.

Cylinder Bar Pressure: Ensure that only oxygen medical gas cylinders filled to a maximum of 137 Bar are used with Inhalation Sedation equipment.

Important Note: Some cylinders are now increased to 230 and up to 300 bar – these are not suitable for use with IHS equipment and any use will invalidate service or equipment warranty.

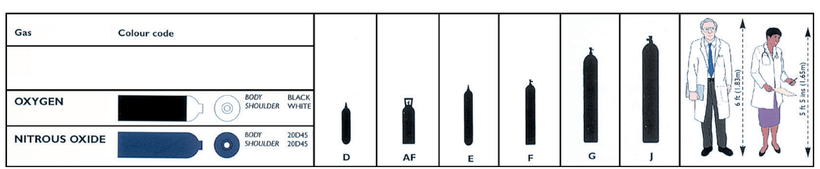

Fig 1: Cylinder identification.

General Guide to Cylinder Storage:

- Cylinders should be stored in a secure, well-ventilated and weatherproof area.
- Cylinders should be secured upright by brackets or chains. E size cylinders may be stored horizontally.
- The storage area should have adequate means of access to facilitate delivery/collection.
- Storage areas should be clearly identified with compressed gases signage.
- So far as is practical, lighting and electrical equipment should be sited away from cylinder storage area.
- Lubricants should be avoided
- When handling cylinders always ensure that hands are clean and free from oil or grease.

Fittings – Pin index and bullnose

Pin Index Safety System: a method of identifying connectors for small cylinders of medical gases that have flush valve outlets rather than threaded outlets. The identifying code consists of a specific combination of two holes in the face of the valve into which connecting pins for a particular type of gas must fit in perfect alignment. For example, the index hole position for a cylinder of oxygen is 2-5, for nitrous oxide it is 3-5 (Fig 2).

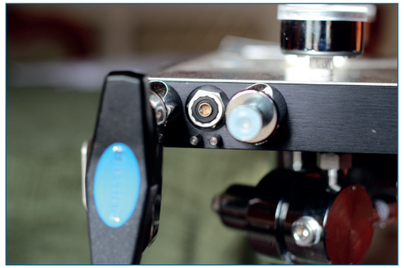

Fig 2: Nitrous oxide pin arrangement.

Bullnose: The Bullnose valve has a threaded valve connection and is primarily fitted to large medical oxygen cylinders; F & G.

Cylinder Size/Usage

E cylinders are used with mobile 4 cylinder stands. The manifold yoke assembly accepts two oxygen and two nitrous oxide cylinders (Fig 3). The latest type of mobile stands has cylinder restraints to prevent the cylinders 'swinging' when moved. This also protects the stand yoke assembly pins. If these pins are damaged or missing, then the stand should not be used until these have been repaired. Air Liquide cylinders have an integral on/off valve. BOC cylinders require a cylinder ratchet key to open/close.

Bodok Seals: This seal is a specialised washer that ensures a gas-tight seal between the cylinder yoke and the E sized medical gas cylinder valve. It is possible, when changing cylinders, for the bodok seal to adhere to the cylinder valve and therefore be lost. A new replacement seal should be put in place on the yoke port before fitting a new full cylinder, otherwise leakage will occur along with a hissing sound, indicating escaping gas (Fig 4).

These seals will also 'flatten' with prolonged use and should be inspected on a regular basis. It is always advisable to keep a spare pack of at least 4 seals for use between maintenance visits – at which point the seals would be changed by the engineer as part of the normal service protocol.

Fig 3: Picture of 4-cylinder stand.

F, G & J cylinders are used with fixed medical gas pipeline installations. F & G being the most commonly observed in a dental setting. J cylinders are very large and heavy, normally being only employed in large facilities and in conjunction with auto-change manifolds.

Regulator fittings:

- If used alone e.g. oxygen therapy, an E sized cylinder requires a pin-index fitting regulator.
- F and G cylinders take regulators with bullnose fitting (screw).
- J cylinders are pin-index fitting (Fig 5-6).

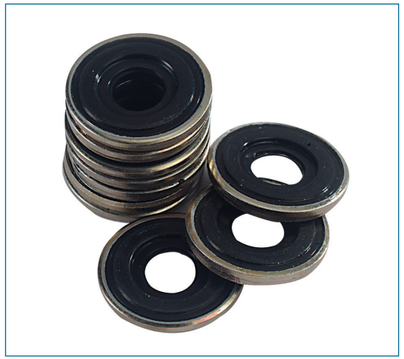

Fig 4: Bodok seals.

Figs 5-6: Bullnose and pin index.

Medical Gas Characteristics

Oxygen – A colourless, odourless gas that normally forms 20.93% by volume of the atmosphere.

Nitrous Oxide – A colourless gas with very faint odour and sweetish taste. The critical temperature being above ordinary air temperature, the nitrous oxide exists in the cylinder in liquid form with a small gaseous layer above which will increase as the cylinder content is used.

F.A.Q.

Q. Why doesn't the nitrous oxide gauge give me an accurate reading?

A. The pressure gauge is not an indication of the cylinder contents. Because nitrous oxide is in liquid form, the pressure gauge is only a reference that some nitrous oxide is in the cylinder. Weighing the cylinder is the only accurate means of determining the contents but this is not very feasible in practice. Tapping the cylinder however, will give some indication of content. Therefore, on a four-cylinder stand, you should always have an 'In-Use' and 'Full' cylinder in place prior to the commencement of the sedation procedure.

Q. My 4-cylinder stand is making a hissing noise?

A. Check that there is a bodok seal in place as these can 'migrate' when changing cylinders.

Q. My stand is still hissing?

A. If it is the type of stand with an 'open gate' yoke facility, then check the gate has not 'cammed' i.e. incorrectly aligned. To prevent this happening rotate the swivel clockwise to close the gate. Pull fully outwards on the Tee Handle and the swivel will lock in place. Check the swivel is in parallel alignment with the E-Block surface. Gaps between swivel and posts should be equal on both sides. The swivel should stay in the locked aligned position when the Tee Handle is tightened – if this is not tightened securely then this may result in cylinder leakage with a resultant loud hissing or popping sound. If this occurs, close the cylinder valve and follow the above procedure to correctly align.

Q. We seem to be using a lot of medical gas?

A. Prior to commencing the R A session, use a check list to ensure all equipment is in good working order, with no holes or tears on the reservoir bag and tubing's.