

POLICY DOCUMENT
Operational Policy for Medical
Gas Pipeline systems



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HOLY CROSS HOSPITAL

POLICY DOCUMENT


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1. Purpose of Policy:

Holy Cross Hospital recognises that it has a responsibility to provide a safe environment for all patients, staff and visitors while providing high standards of clinical care this policy sets out the arrangements made to ensure the delivery of oxygen and medical suction to patients is at all times safe, secure, sustainable and efficient.

2. Policy Statement/Objective

The Medical Gas Pipeline system (MGPS) is installed to provide a safe and convenient system for the provision of Oxygen and Medical Vacuum to nursing staff at the point of use. It reduces problems associated with the use of gas cylinders such as safety, moving and handling, storage and noise.

The safe operation of the MGPS relies on skilled staff who understand the system and can liaise with the clinical users to ensure continuing patient safety. The pipeline system contains gas under pressure, which can present a hazard to staff, the key to safe operational management is regular inspection and maintenance and the availability of comprehensive installation drawings and maintenance manuals.

Engineering Health Technical Memorandums (HTM's) give comprehensive advice and guidance on the design, installation and operation of specialist engineering technology used in the delivery of healthcare. In the case of MGPS this guidance is found in Health technical memorandum 02-01 Medical Gas Pipeline Systems (Part A- Design, Installation, Validation and verification and part B Operational Management

3. Scope

This policy is intended for use by all staff involved with MGPS in the hospital. It applies throughout the premises to all fixed gas pipeline systems, associated plant, portable cylinders and suction equipment.

It is the hospitals policy that, before work on the MGPS can commence, a permit to work form arranged by an Authorised Person (MGPS) must be completed. The Authorised Person (MGPS) must have specific knowledge of the MGPS on which they take responsibility and liaise with other permit signatories of competent person Designated Nursing officer (DNO)

4. Responsibilities

The following are key personnel who have specific responsibilities within the operational policy

- Chief Executive

- Designated Nursing Officer (DNO)
- Designated porter
- General Manager
- Authorising engineer (Stephen Goddard MGPS Ltd)
- Authorised person
- Competent person
- Quality controller

Due to the specialist requirements associated with MGPS, actual work on the systems is carried out by contractors who are trained and licensed to work on the systems as Competent Persons (MGPS).

Identified Authorised Persons (MGPS) are responsible for the day to day management of the MGPS and it is the Authorised Person (MGPS) alone who can decide whether the MGPS can be taken into or out of use, after written permission (permit to work) by the Designated Medical/Nursing Officer in cases where the effect has a direct impact on the patient.

The Authorised Person(s) (MGPS) will hold and maintain the Medical Gas Permit to Work books. These books are kept in the Support Services office.

4.1 Description of individual responsibilities

Chief Executive

The Chief Executive holds ultimate management responsibility, including allocation of resources and the appointment of personnel, for the organisation in which the MGPS are installed.

The formal responsibility for the MGPS rests with the Chief Executive, although the Authorised Person retains responsibility for day-to-day management of the MGPS.

Authorising Engineer (Engaged under contract to MGPS Services)

An Authorising Engineer (MGPS Services) is appointed by the Hospital. The role of the Authorising Engineer includes the following;

- to recommend to the Chief Executive those persons who, through individual assessment, are suitable to be Authorised Persons (MGPS);
- to ensure that all Authorised Persons (MGPS) have satisfactorily completed an appropriate training course and that all training is documented;
- to ensure that all Authorised Persons (MGPS) are re-assessed every three years and have attended a refresher or other training course prior to such re-assessment;

- to conduct an annual audit and review of the management systems of the MGPS including Permit to Work;
- To assist the Authorised Person (MGPS), when required, with monitoring the implementation of the MGPS Operational Policy and Procedures.

Authorised Person (MGPS) – this role is fulfilled by the General Manager

The Authorised Person is defined as that person(s) designated by the Chief Executive to be responsible for the day-to-day management of the MGPS at the hospital. This includes the issue of permits, the operation of the Permit to Work procedure, management of system documentation and security and safe and effective maintenance and operation of the MGPS in accordance with Statutory requirements and other guidelines.

The Authorised Person is appointed in writing by the Chief Executive.

An individual assessment of the Authorised Persons (MGPS) will be carried out to ensure that they are suitably qualified and experienced to fulfil the necessary requirements. Re-assessment will be carried out every three years to ensure continuation of appointment.

Operating the Permits for the authorisation of work requires the fullest compliance of all staff and their acceptance and understanding of the individual responsibilities involved. The Authorised Persons (MGPS):

- Take the lead in coordinating the work, explaining fully the extent and duration of any disruption to the service.
- Ensure that all contractors' "Competent Persons (MGPS)" follow the procedures set out in the Permit and carry out the work in accordance with hospital policies. This will involve provision and updating of 'As-fitted' drawings, assessments of risk, preparation and assessment of method statements and checks on compliance of Contractors' Health and Safety policies, training records, test equipment etc.

The Authorised Person (MGPS) is responsible for ensuring that:

- All Designated Nursing Officers involved are advised of the estimated duration of the work and the interruption to the MGPS;
- All terminal units affected (out of service) will be identified on the permit to work and the relevant staff informed.

Authorised Persons (MGPS) are required to liaise closely with other professionals in various disciplines. Consequently the appointment will be made known in writing to all interested parties. The Authorised Person (MGPS) will have direct contact with the Quality Controller (QC (MGPS)), users and other key personnel.

The Authorised Persons (MGPS) are responsible for ensuring that work is carried out only by approved specialist contractors, with scope of registration defined as design, installation, commissioning and maintenance of MGPS as appropriate

There are two caretakers who are trained to act as Authorised Person in the event of the General Manager being unavailable. They will ensure that the General Manager is kept informed of any action that

Competent Person (MGPS)

The Competent Person (MGPS) is the specialist contractor / contractor's employee who carries out the work on the MGPS as directed by the Authorised Person (MGPS) in accordance with the MGPS Permit to Work procedures and appropriate Method Statements and Health and Safety policies submitted by the Contractor.

The Competent Person (MGPS) must have received appropriate training, by their employers.

The specialist contractor is responsible for assessing the competence of his directly employed competent staff and maintaining a register of Competent Persons (MGPS). This register must be made available to an Authorised Person (MGPS) on request.

Quality Controller (MGPS) (Under contract to MGPL)

It is the responsibility of the Chief Executive to appoint, in writing, a Quality Controller with MGPS responsibilities.

The persons designated as Quality Controllers (MGPS) are responsible for the quality control of the medical gases in accordance with the latest European Pharmacopoeia and Manufacturers' Product Licenses.

Companies supplying medical gases have their own product licenses and Qualified Person who ensures the quality of gas delivered to site meets the specified criteria.

Designated Nursing Officer (MGPS)

The Designated Medical/Nursing Officer (MGPS) is the person in each ward or department with whom the Authorised Person (MGPS) liaises on any matters affecting the MGPS. It is the Designated Nursing Officer (MGPS) who has ultimate responsibility to give authorising permission for a planned interruption to the supply.

The Designated Nursing Officer (MGPS) must give permission before any interruption to the MGPS that takes place and they must sign the appropriate parts of the permit when satisfied that the interruption may safely proceed.

The Designated Nursing Officer (MGPS) is responsible for ensuring that all relevant staff are aware of the interruption to the MGPS and which terminal units cannot be used.

All Designated Nursing Officers (MGPS) must have received adequate training on the MGPS relevant to their departments and on the action to be taken in the event of an emergency.

The designated Medical or Nursing Officer (MGPS) must fully understand the implications of the permit to work prior to their authorising signature.

The Designated Nursing Officer Competency Framework should be completed prior to them assuming this role. <O:\Health & Safety\MEDICAL GAS PIPELINES\DNO competencies.docx>

It is the responsibility of the Director of Nursing services to ensure that adequate supplies of cylinders are held on site at all times. The cylinders held should be suitable for the normal day to day requirements and to act as a 24 hour supply in the event of a loss of the Primary and Emergency Oxygen manifolds.

The DNS should ensure that minimum stock holding levels are communicated to the caretakers so that they can order adequate stocks. The DNS will communicate with the caretakers when demand increases or decreases so that stocks of cylinders held can be increased or decreased accordingly

Designated Porter (MGPS)

Caretakers trained in the handling of medical gas cylinders will be known as Designated Porters and will be responsible for delivery of emergency supply cylinders to wards, plant rooms etc. No other persons should be involved in cylinder handling unless properly trained or supervised.

Connection of cylinders to manifold systems will be undertaken by the Designated Porter.

5. Description of the System

The Medical Gas Pipeline System (MGPS) for Holy Cross Hospital consists of the source of supply, pipeline distribution system, terminal units and warning / alarm systems installed to ensure convenient distribution of medical gases to European Pharmacopoeia (Ph Eur) quality, for the use of clinical and nursing staff in the provision of patient care. The Medical Gases provided in this way is limited to Oxygen (O₂) and Medical Vacuum (Med Vac)

The Primary Supply is via 2 x LC200 cryotanks which are refilled automatically by BOC on a fortnightly basis. The secondary emergency reserve manifold (ERM) is provided by 4 J Sized cylinders. The ERM will come online automatically either when the cryotank supply fails or if the cryotank supply is empty. The ERM will deliver 24 hours of supply at normal rates.

Medical Vacuum (Suction) is delivered via a triplex plant, this plant is designed to fulfill both the primary and emergency reserve system for medical vacuum. In the event of total failure of this medical vacuum plant, Portable suction machines are provided at ward level.

System drawings and plant schedules are maintained by the Authorised Person's and retained in the Support Services Department.

It is essential that staff with a day-to-day operational responsibility of MGPS have site specific knowledge of plant, systems and procedures.

The Authorised Person (MGPS) is responsible for maintaining record drawings and documentation.

6. Documentation

List of documents to be maintained by the Authorised Person (AP MGPS)

- Up to date and accurate drawings including valve/key numbers for MGPS
- Any MGPS insurance/statutory documentation
- MGPS safe valve replacement schedule
- New and completed permit to work forms
- Schedule of hose replacement
- Plant history and maintenance records
- Manufacturers technical data sheets and manual for all components of the system
- Health technical memorandum O2, all latest editions and associated supplements
- MGPS contractors service contracts, staff training records, equipment calibration certificates
- A register of all personnel associated with MGPS especially the permit to work system
- Emergency and other useful telephone numbers
- Calibration certificates for all test equipment if owned by Hospital. At present all test equipment will be owned by the Competent Person who will supply copies of calibration Certificates
- The MGPS operational policy

General Manager and Caretakers will maintain copies of the following:

- delivery notes for medical gas cylinders;
- sales invoices for medical gas cylinders;
- delivery summary form (tracks cylinder stock information);
- cylinder rental invoices;
- cylinder rental reconciliation form (monitors trends in cylinder use over six months);
- delivery notes for special gas and industrial gas cylinders;
- sales invoices for special gas and industrial gas cylinders;
- rental invoices for special gas and industrial gas cylinders;

BOC will have overall responsibility of delivery and quality of Liquid Oxygen to the LC200

7. Permits

There are two classifications of permit in accordance with defined hazard levels.

A High Hazard Permit is divided into five parts and will require signatures from Authorised Person (MGPS), Competent Person (MGPS), Designated Nursing officer (MGPS) and QC (MGPS). The Low hazard permit is simpler as it does not require QC testing of the work.

At Holy Cross the Authorised person (MGPS), is only qualified to a level to enable them to issue Low Hazard Permits any High Hazard work will be planned works and therefore The Authorising Engineer from MGPS services will act as Authorised Person (MGPS) in any High Hazard Situations and be responsible for the completion of these permits but will involve Holy Cross's Authorised person (MGPS) in the process.

Permits will be retained on site for the life of the Medical Gas Pipelines System

8. Key Inventory

Key Number	Location	Storage arrangements
92292	1st Floor Vac	GM holds all keys. Individual keys are securely stored in a dedicated key case located in Support Services Office(GM only has access)
92380	Grd floor vac	
92320	1st Floor O2	
92237	Grd floor O2	A set is stored in a Key Safe located in St Hugh's (GM has key code)

9. Daily Checks of Oxygen and Suction Plant

The caretaking staff will carry out daily checks of the Oxygen and Suction Compound (Piped services compound) and bring any issues to the attention of the Authorised Person without delay. (Appendix 5)

10. Training Requirements

All training should be in line with requirements if Medical gases Health Technical Memorandum 02-01: Medical gas pipeline systems Part B: Operational management.

It is essential for the safety of patients that no person should operate, or work on, any part of the MGPS unless adequately trained or supervised.

Essential training and refresher training is specific to the functional responsibilities of the key personnel involved in the day to day operation, maintenance and the use of the MGPS, all training must be documented.

All staff that are expected to work with the MGPS will need to be given familiarisation training.

On completion of the initial training course the following table outlines maximum intervals for further updated training requirements:

All staff members with specific responsibilities with regard to the Medical Gas Pipeline System will be required to sign this policy

	Retraining	Reassessment
Authorised Person	Every three years	Every three years
The training is carried out by MGPS, following successful completion of the course the AP is interviewed the AE who will recommend their appointment to the CEO		
Designated Nursing officers	Every three years	Every three years
The General Manager (AP) will carry out training for DNO and will ensure that their competence to fulfil the role is fully assessed (see appendix 7)		
Designated Porter	Annually	Every year
The General Manager (AP) will carry out training for all Designated Porters and will ensure that their competence to fulfil the role is fully assessed		
General Nursing staff	Annually	N/A but regular competency checks should be carried out by Ward Sisters. All general Nurses carry out an annual refresher training course with a short exam completed at the end to test understanding

With the exception of the Authorised person training, all training is carried out in house

11. List of Designated Personal:

	Responsible Person	Contact details

Authorised Person	Joanna Speed	01428 647644 Ext 1324 077667734809
Designated Nursing Officer	Gina Guo Or in her absence all bleep holders	Contact most Senior Nurse on Duty
Designated Porter	Assistant General Manager Caretakers	Refer to on call list
Competent Person	Medical Gas Pipelines Limited	Medical Gas Pipelines Ltd Witheybed Farm, Embley Lane, East Wellow, Romsey SO51 6DN Mobile: 07825187445 Office: 01794 515777 Fax: 01794 511930
Quality Controller	Medical Gas Pipelines Limited	
Authorising Engineer	Steve Goddard (MGPS services Limited)	Tel 0345 652 4901

12. Medical Gas Committee

The medical gas committee meets twice a year. The members of the committee are as follows

- Designated Nursing Officer *
- Authorised Person *
- Infection Control Lead *
- Competent Person for Health and Safety *

The Committee will meet after The Senior Nurse's meeting in March and September. Additional meetings will be scheduled following any incidents and ahead of any planned work on the Medical Gas Pipeline System

**The Director of Nursing Services fulfils the roles of both Infection Control Lead and Designated Nursing Officer and the General Manager is both Authorised Person and Competent Person for Health and Safety*

Medical Gas Safety will also be a permanent agenda item for the Health and Safety Committee.

13. Operating Procedures Wards and Departments

13.1 Delivery of Oxygen via terminal units

In order to deliver an oxygen supply to a patient a flow meter must be inserted into the oxygen terminal in the bedhead unit.

The hospital holds in stock two sizes of flowmeters for ease of delivery of oxygen at the correct rate. In most cases 0-4.5 litre flow meters will be used but for patients requiring higher levels of oxygen a 0-15litre flowmeter can be obtained from the clinical stores.

Flowmeters are not left in patients rooms when there is not a requirement for Oxygen delivery but a start-up kit containing all items required for oxygen delivery will be kept at all times in clean holding. It is the responsibility of the Ward Sister to request additional units from the Clinical stores department. The serial number of all flowmeters must be recorded on the Equipment database on receipt and the flowmeter location must be recorded. It is the Ward Sister's responsibility to ensure that location of the flowmeters is correctly recorded.

(O:Equipment/Medical equipment/MEDICAL DEVICE INVENTORY)

All flowmeters that are in use must be subject to a weekly check to ensure that they are working correctly. The Clinical Stores Coordinator will issue a weekly checking record sheet with each flowmeter and it is the Ward Sister's responsibility to ensure that the weekly checks are carried out and documented.

User instructions for Flowmeters attached to this document

13.2 Prevention of waste of resources and safety considerations

Care should be taken to ensure that devices that are not being used are not left on the beds or armchairs which will pass high oxygen concentrations into the bedding and mattress, or into surrounding atmosphere. Not only is this an extremely dangerous practice from fire risk point of view, it is wasteful and will mean that oxygen supplies will need replenishing more frequently than they would otherwise. After use, Oxygen must be switched off at the flow meter in the terminal unit by a member of staff who has received the correct training. If Oxygen is no longer regularly required the flow meter should be removed from the outlet. It is the Nurse's responsibility to ensure the Patient is receiving the correct flowrate via the correct device to correlate with the patients' oxygen saturations. This should be routinely checked and recorded on the patient's medication chart.

13.3 Cylinder use in wards and departments

The primary means of delivering oxygen in patient's rooms and the physiotherapy gym is via the medical gas pipeline. Cylinders are only provided as a means of delivering oxygen to patients when they are in an area not covered by the pipeline system (activities, grounds, senses garden) or when on an outing

When using cylinders the nursing staff concerned should be aware of the individual requirements of the patient, the contents of the cylinder and the time available within the cylinder. It is the responsibility of nursing staff to ensure that the medical gases are administered correctly and are secured either in a purpose made trolley (ZX sized cylinders) or in a cradle attached to bed or wheelchair (CD sized cylinder). **IN NO CIRCUMSTANCES SHOULD A CYLINDER BE PLACED ON THE PATIENTS BED**

The Contents of a cylinder for the required flow rate is shown in the table below.

Gauge Contents							
	Flow rate ltr/Min	Full (100%)		Half (50%)		Low (25%)	
		hr/Min	mins	hr/Min	mins	hr/Min	mins
CD Cylinder (460 litres)	15	0.30	30	0.15	15	0.07	7
	10	0.46	46	0.23	23	0.11	11
	6	1.16	76	0.38	38	0.19	19
	4	1.55	115	0.57	57	0.28	28
	2	3.50	230	1.55	115	0.57	57
	Flow rate ltr/Min	hr/Min	mins	hr/Min	mins	hr/Min	mins
ZX Cylinder (3040 litres)	15	3.22	202	1.41	101	0.5	50
	10	5.04	304	2.32	152	1.16	76
	6	8.26	507	4.13	253	2.06	127
	4	12.40	760	6.2	380	3.1	190
	2	25.20	1520	12.4	760	6.2	380

- If a cylinder is required, the nurse in charge of the ward or department should contact the duty caretaker to request cylinder delivery. Out of hours the Nurse in Charge will be responsible for arranging for a cylinder to be collected from the cylinder store.
- To ensure patient and staff safety, it is essential that all users ensure a high standard of cleanliness when storing, transporting or connecting medical gas cylinders to regulators or other medical devices, particularly with respect to oil and / or grease (e.g. barrier creams) and alcohol gel products.

If hand creams or gels have been used, wash hands before connecting regulator or flowmeters

- Users should ensure that they open medical gas cylinder valves slowly; if resistance to opening of the cylinder is excessive, the cylinder should not be used and should be returned to the supplier labelled to indicate the problem as either a faulty or incident cylinder
- Cylinders should be transported in a purpose made trolley suitable for the size of cylinder. Small cylinders can be carried, although no more than one at a time. Small cylinders must be secured using a bracket on the bed or wheelchair when in use.
- A manual handling risk assessment should be carried out on each cylinder size, specific to the task to be completed and the person involved.
- Caretaking staff will deliver cylinders to the wards and return the empty cylinders to store

Medical gases in cylinders have a number of hazards that staff, patients and public need to be aware of. In ward areas these relate primarily to the risks associated with oxidizing substances, pressure and manual handling.

No more than 2 CD Sized cylinders will be stored in Ward Offices in a suitable wall bracket for use for patients who require oxygen in areas not served by the Medical Gas Pipeline System.

An emergency reserve of 24 hours supply of oxygen is stored in ZX and CD sized cylinders stored in the cylinder store attached to the Piped Services Compound. Designated Officers may access the compound at any time additional cylinders are required.

Any damaged, faulty or out of date cylinders should not be used and returned to Support Services Department.

13.4 Medical Vacuum

High suction controllers are provided for the delivery of medical vacuum to patients. Any patient who requires suction will have a suction controller, tubing and collection canister permanently installed in their room. A supply of additional suction start up kits are located in the clean holding so they can be accessed at any time. The serial number of all suction controllers must be recorded on the Equipment database on receipt and the suction controller location must be recorded. It is the Ward Sister's responsibility to ensure that location of the suction controller is correctly recorded. (O:Equipment/Medical equipment/MEDICAL DEVICE INVENTORY)

The Clinical Stores Coordinator should be informed if the equipment in clean holding is used so it can be replenished.

13.5 Cleaning Routines

- Cleaning of all equipment should follow the guidelines in the infection control policy. With the exception that medical gas equipment including cylinders, should only ever be wiped down with a damp cloth with warm water containing no solvents.
- All patient connected administration sets and facemasks are designed to be single patient use only and should be disposed of appropriately after use.
- Tracheal suction tubing and Yankeur catheters (oral suction) are disposable and single patient use medical devices. They are changed at least weekly. Tracheal suction tubing are flushed with clean water in the stainless steel kidney dish after every use, and Yankeur suction catheters (oral suction) are flushed in a separate green plastic bowl. Kidney dishes and plastic bowls must be cleaned and dried after each use.
- Tracheal suction catheters are single use items so are detached from the tubing prior to flushing Suction tubing. The catheters are changed each time after suctioning and disposed of as clinical waste.
- Suction canisters should be emptied and cleaned when 2/3 full or at the end of shift (at least twice daily). Suction canisters and removable parts are re-usable and cleaned by disassembling the machine and cleaning with hot water and a mild detergent, rinsed and dried. The canisters are disinfected by sterilising Milton solution fluids and the lids are autoclaved on a weekly basis
- All ward-based equipment is serviced and maintained by the Support Services Department and specialist contractors for ease of use by nursing staff. No person should operate medical gas systems or equipment unless they are adequately trained or supervised. With regard to medical gas systems, the ward equipment covered by this document falls into two main categories.

14. Alarms



14.1 Central Alarm Panel

These panels constitute an array of legends with, in each column, a “Normal” condition followed by 4 alarm conditions. They provide forewarning of imminent failure and under normal circumstances will display a first level alarm when things start to require attention (such as oxygen requiring refilling on the LC200)

The first legend is the most important and advises staff that everything is OK and safe to use. Nursing staff should make a point of checking this every day.

Additionally, an individual alarm condition might occur at position 3 on the panel and this would indicate that the second source of supply, the reserve system, was only 50% full. These would not normally constitute an emergency.

However if any other alarm indication arises or if two or more alarm indication are displaying within the same column, then a caretaker should be contacted immediately.

Pressing the “Mute” button on the front of the panel, will silence the alarm. If the supply plant problem is not rectified within 15 minutes, the alarm panel will reset itself and the audible signal will be re-instated.

The Nurse in charge is responsible for carrying out and documenting daily checks of the panel. (Appendix 4)

Medical Oxygen Pipeline system Alarms & Actions

Alarm Panel			
		Meaning	action
Normal	Normal	Normal	No action
1	Liquid low	Primary supply is at 50%	Normal working hours: inform Caretaker to contact BOC to arrange delivery Out of hours – note to inform caretaker at 8am (Monday to Friday) Weekends – call duty caretaker
2	Liquid Very Low	Primary Supply is at 25%. When this is depleted the supply will automatically switch over to Emergency supply manifold	Call duty Caretaker irrespective of time.

3	Reserve Low	The reserve manifold has depleted to its alarm level of 50%. Replace cylinders as soon as possible. If this message is in addition to conditions 1 and 2 then the supply is in danger of imminent failure. Action required immediately.	Call duty Caretaker irrespective of time.
	Pressure Fault	Emergency. Pressure Fault on Oxygen System. The system pressure is outside the set limits, this could mean that the system is over-pressurised or that all gas has been exhausted. Action is required immediately.	AT ALL TIMES: Urgently inform AP (MGPS) and Duty Caretakers of the situation. DNO will need to ensure Caretakers are given precise information about number of cylinders that should be delivered to ward areas

14.2 Local Area Alarm

Local Alarm panels are contained within the central alarm panel. They are provided for nursing staff, who need to be aware of what is happening to the medical gas systems, and the condition of the gas being delivered to the patient. These units work by monitoring the gas supply inside each ward or department, so that if an alarm occurs, the fault has already happened. There is no time allowance, and no forewarning, you will need to act immediately as this could be an emergency.

14.3 Medical Vacuum alarms

The Medical vacuum alarms are incorporated into the Central Alarm panel and have four levels of alarm. The first level being green indicating that the system is operating as normal. The next level is yellow 1 meaning plant fault, an error has been detected on a medical vacuum pump. The system is still functional but could be running on the standby pump set, if

this alarm persists the duty caretaker should be contacted.

The second yellow being plant emergency means that a fault has been detected in the medical vacuum system and this has escalated to a point where the system integrity could be compromised, if alarm persists then duty caretaker should be called. A pressure fault is indicated by a red pressure fault alarm this could mean that the system is low on vacuum capacity or may have already run out so duty caretaker must be contacted immediately and portable suction machines must be made ready

Medical Vacuum Panel Actions

Alarm Position	Alarm Indication	Meaning	Action required
Green	Normal	Normal	No action required
Yellow	Plant Fault	An error has been detected on a medical vacuum pump. The system is still functional but could be running on the standby pump set.	If alarm persists then alert duty caretaker
Yellow	Plant Emergency	The fault in the medical vacuum system has escalated to a point where system integrity could be Compromised. There might be minimal medical vacuum Remaining before the system is completely depleted.	Notify Caretaker
NOTE: There is no 3rd level alarm condition with vacuum systems as there is no emergency reserve manifold			
Red	Pressure Fault	Emergency. Pressure Fault on Medical Air System. The system pressure is outside the set limits, this could mean that the system is outside the set limits, this could mean that the system low on vacuum capacity or that has already run out immediately	Notify Duty Caretaker, ensure all patients requiring medical vacuum have a portable unit ready for use

15. Emergency Procedures – Wards & Department

It is impossible to list here all possibilities or scenarios where an emergency might occur. The following is a selection of emergencies that might arise and the relevant actions to be taken as a result.

15.1

FIRE

Procedures in accordance with the Hospital's Fire Policy should be followed in the event of a fire involving, or likely to involve the MGPS. During a fire the Fire Service Incident Controller, the DNO and Fire Team Leader will assume full control of the area(s) affected.

If a fire occurs in a ward or department covered by the piped medical gas system, the DNO must evaluate the oxygen usage within that area and wherever possible isolate the medical gases at the area valve service unit (AVSU).

UNDER NO CIRCUMSTANCES SHOULD MEDICAL GAS SUPPLIES BE ISOLATED UNTIL THE DESIGNATED MEDICAL NURSING OFFICER HAS CONFIRMED THAT ALL PATIENTS LIKELY TO BE AFFECTED HAVE BEEN EVACUATED AND /OR HAVE ALTERNATIVE GAS PROVISION

15.2 Failure of mains electricity supply

In the event of an electricity failure, medical gas supplies should be maintained by the emergency generator system.

The vacuum plant, and medical gas alarm systems are connected to the "essential" electricity supply and will continue to provide and monitor gas supplies as normal.

In the event of failure of both mains and generator supplies:

- The oxygen system will continue to supply gas from the primary or reserve VIEs.
- The Vacuum plant will not operate and central vacuum service will be lost.
- "Normal" portable vacuum units can be used only if local electricity supplies are available. Ejector or battery driven units will have to be used where available and where vacuum provision is essential for critical care.

- Alarm panels will display a “System Failure” red warning light and give an audible alarm.
- If the electricity supply failure is local and power to an alarm panel only is interrupted the panel will display a “System Failure” red warning light and emit an audible alarm; gas supplies will not be affected.

In any of these circumstances:

- The Authorised Person (MGPS) will be informed of the situation.
- Caretakers will arrange for staff to monitor gas consumption, replacing empty cylinders as necessary, until the electricity supply is restored.
- The Authorised Person (MGPS), will arrange emergency cylinder and regulator supplies as necessary.
- The Authorised Person (MGPS) will monitor the situation and confirm resetting of the (MGPS) plant and system alarms following restoration of supply.

15.3 Serious leak of Medical Gases

In these circumstances:

- The Duty Caretaker should be contacted. If there is likely to be a requirement for large numbers of cylinders, the caretakers will make arrangements for an emergency delivery from BOC.
- Details of the leak should be confirmed: i.e. the floor level, department, room number and if patient ventilators are in use. During out of hours working – the On-call Caretaker should notify the Authorised Person (MGPS).

It is the responsibility of the DNO to authorise isolation of medical gases to the area, after ascertaining that no patients will be put at risk in any area(s) affected by the isolation.

- The DNO shall notify the Health and Safety Competent person when a serious leak of medical gas occurs.
- The DNO will issue appropriate instructions to make the situation safe, such as to open windows in the affected area and close doors. If necessary, evacuation will be considered.
- The caretaker will remain on standby to provide extra gas cylinders as required.
- The Authorised Person (MGPS) will arrange for repairs to the system(s) to be carried out under the Permit to Work system.

15.4 Total or Partial failure of medical gas supply

In these circumstances:

The person discovering the failure will inform The Designated Nursing Officer(s). The DNO will then contact the Duty Caretaker and the Authorised Person (MGPS).

- Details of the failure should be confirmed: i.e. floor level, department, room number(s), the gas involved and if patient ventilators are in use.

Depending on the reason for the failure and its possible duration:

- The Authorised Person (MGPS) will decide the most appropriate method of long-term emergency gas provision. This may involve establishing locally regulated cylinder supplies at ward / department entrances
- Nursing and medical staff should attempt to reduce gas consumption to a minimum during the emergency.
- Caretaking staff will be required to monitor / replenish cylinders at any emergency stations and at plant room emergency supply manifolds.
- Caretakers will arrange emergency cylinder deliveries as necessary.

The Authorised Person (MGPS) will liaise with the approved contractor and competent person (MGPS) to complete emergency repairs needed to re-instate the gas supply, using the Permit to Work system.

15.5 Contamination of a medical gas supply:

(Evidenced by unusual fumes coming from connected equipment)

It is not unusual for a smell to be noticed when using “plastic” equipment hoses to deliver gas to a patient. This smell usually disappears rapidly after first uses of the hose and will generally be familiar to operatives.

However, if either operatives or patients complain of any unusual or strong smells from equipment, or if any patient suffers an adverse reaction to the provision of medical gas, the situation MUST be treated seriously and IMMEDIATE action taken to ascertain the cause. Where it is obvious that the smell is coming from the pipeline rather than a piece of connected equipment, the GAS SUPPLY MUST NOT BE USED and steps taken to prevent others from using the same supply. In this event the fault should be treated as a complete gas failure to that area and the actions described above taken IMMEDIATELY.

The AP should be informed immediately.

15.6 Contamination of a medical vacuum system

Contamination of the medical vacuum system can occur where the vacuum regulators or jars are incorrectly assembled. This will usually be detected during routine maintenance inspection and evidenced by the presence of liquid in the on-line bacteria filter drain flask, however contamination in sufficient quantity can also cause a blockage of the pipeline system. The Infection Control lead should be informed immediately where any contamination has been found or suspected. They should advise on any additional precautions required and to effect bacterial filter changes safely.

Portable suction units may be used in areas where there is a possibility of the vacuum system being contaminated. (The need for portable suction units should be discussed with the Infection Control Team)

It is the responsibility of the approved Competent Person (MGPS) to change the filter in accordance with the procedure described in HTM 02-01 taking into consideration any additional advice from the Infection Control Team.

If the contamination is due to system misuse, the ward/department must complete an Incident Report Form.

Decontamination of pipework (if necessary) should be carried out in accordance with the procedure described in HTM 02-01 BEFORE filters are changed.

15.7 High or Low Pressure of one or more systems

All medical gas systems are protected by the use of pressure safety valves. However, these units operate at pressures 25% above the normal system working pressure. Although all connected equipment should be designed to withstand this (and higher) excess pressures, it is not good practice to operate with system pressures higher than normal. In some instances, gas-mixing devices may give incorrect mixtures if one gas supply to the mixer is subjected to higher than normal pressures.

A similar effect can take place with lower than normal pressures but a more serious consequence of the latter is the inability of some equipment e.g. ventilators and surgical tools to operate below certain pressures. Be especially aware that a low pressure alarm could actually mean that there is no pressure and that no gas is getting to the equipment / patient.

High (or low) pressure problems are signaled local alarm displays and should be reported in accordance with this Policy.

15.8 Emergency Cylinder Request Procedure

In the event of a shortage of cylinders the DNO officer should contact the caretakers who will arrange further cylinder deliveries.

16. Maintenance

Planned preventative maintenance of the pipeline system and medical vacuum is completed on a three monthly basis by a suitably qualified medical gas contractor. In most cases this work will not result in an interruption of supply. Prior notice will always be given of any work which has the potential to cause any interruption to supply.

For all routine planned servicing a Low Hazard permit will be completed.

The Cryotanks and associated alarm panels in the plant room are owned by BOC and these are serviced by BOC on an annual basis

17. Audit

The Authorising Engineer will carry out an annual audit The Purpose of this audit is to confirm that site familiarity is being maintained and that the competence of the APS (MGPS) is

sufficiently high. It also examines compliance of on-site medical gas systems with the requirements of HTM 02-01, and other necessary documents, including PSSR 2000.

The General Manager will carry out regular spot checks with all Designated Nursing Officers to ensure that they have a good knowledge of their responsibilities with regard to Permits and also that they can demonstrate a good understanding of their role.

18. Appendices

Appendix 1

Signatures of key personnel

The Following staff have read and understood their duties and responsibilities with regard to the safe operation of the Medical Gas Pipeline System.

	Name	Designation	Signature	Date
Authorised Person And Health and Safety Competent Person	Joanna Speed	General Manager		
Designated Nursing officer & Infection Prevention Lead	Gina Guo	Director of Nursing Services		
Designated Nursing Officer	Dee Du	Ward Sister		
Designated Nursing Officer	Daniel Pecheanu	Charge Nurse		
Designated Nursing Officer	Donna Seaton	Senior Staff Nurse		

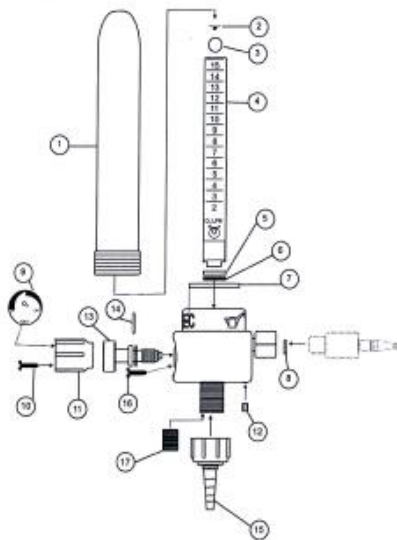
Designated Nursing Officer	Jenny Hornby	Senior Staff Nurse		
Designated Nursing Officer	Marsada Myrie-Chambers	Ward Sister		
Designated Nursing Officer	Louis Tansie	Senior Staff Nurse		
Designated Nursing Officer	Gelu Vrabie	Senior Staff Nurse		
Designated Nursing Officer	Felicia Vrabie	Senior Staff Nurse		
Designated Nursing Officer	Carolyn Sombillo	Senior Staff Nurse		
Designated Nursing Officer	Helen Evans	Senior Staff Nurse		
Designated Nursing Officer	Agnes Nowak	Senior Staff Nurse		
Designated Porter	Campbell Whitehead	Caretaker		
Designated Porter	Renato Bachmann	Caretaker		
Designated Porter & AP	Matthew Brace	Caretaker		
Designated Porter & AP	Alan Pearce	Caretaker		



FLOWMETERS

MEC Medical Limited
 Unit 3 Trust Estate
 Wilbury Way
 Hitchin
 Hertfordshire
 SG4 0UZ
 UK
 Tel: (+44) 01462 436396

Warnings: Flowmeter must be vertically mounted. NEVER use oil or grease as a lubricant. If the flow meter bobbin sticks at all it is not suitable for use until repaired.



User instructions

1. **Nut & Liner version :**
 Attach a gas specific probe to the flowmeter. Tighten nut making sure the slot in the probe is uppermost
Direct probe version :
 Probe is already in place
2. If an accessory is to be attached to the flowmeter, remove tubing nipple [15] and replace with the accessory. Otherwise attach suitable tubing to tubing nipple
3. Plug the flowmeter into an appropriate gas specific socket.
 When attaching the device to supply, ensure that this device is in the **Vertical** position (scale tube upright)
4. Using the control knob [11] slowly open the flowmeter valve to the required flow rate reading to the **top of the ball**
DO NOT TURN KNOB BEYOND MAXIMUM SCALE READING
5. When not in use the flowmeter should be turned off
6. Do not apply excessive torque to the flow valve.

Cleaning

DO NOT allow moisture to enter the flowmeter
DO NOT use any form of polish, including spray
 Clean the flowmeter exterior with a clean, dry, lint free cloth
 During servicing, individual internal parts of the flowmeter may be cleaned with a clean, dry, lint free cloth
 The filter [5] may be cleaned using clean, dry air

Servicing and maintenance

Use only recognised spare parts as listed below. For additional spare part information please contact MEC Medical Ltd

High flow flow-meters (0-15 lpm) should be checked for function on a weekly basis by :

- Slowly open the valve to give a flow of 15 lpm
- Close the valve to zero

This procedure will ensure there are no blockages in the unit

Low flow flow-meters (0-4.5 lpm) should be checked for function on a weekly basis by :

- Slowly open the valve to 4.5 lpm
- Close the valve to zero

This procedure will ensure there are no blockages in the unit

Spares

Tubing Nipple Oxygen	Part Number 60168
Tubing Nipple Air	Part Number 60168BL

Warning Only authorised /trained personnel may service this unit.

MEC reserve the right to change or alter product design and/or specifications without prior notice or warning

ILFM60 R4/2015



Flowmeter weekly check (high flow)

Flowmeter	Serial Number		High Flow (0-15l)	Checking Regime- High Flow meter				
SERVICE DATE				Week 1	Week 2	Week 3	Week 4	Week 5
Date	October							
Initials								
Date	November							
Initials								
Date	December							
Initials								
Date	January							
Initials								
Date	February							
Initials								
Date	March							
Initials								
Date	April							
Initials								
Date	May							
Initials								
Date	June							
Initials								
Date	July							
Initials								
Date	August							
Initials								
Date	September							
Initials								

Flowmeter weekly check (low flow)

Flowmeter	Serial Number		Low Flow 0-5lpm	Checking Regime- High Flow meter <ul style="list-style-type: none"> • Slowly open valve to give a flow of 4.5lpm • Close valve to zero • This procedure will ensure there are no blockages in the unit • Ensure this is documented 				
SERVICE DATE								
			Week 1	Week 2	Week 3	Week 4	Week 5	
Date	October							
Initials								
Date	November							
Initials								
Date	December							
Initials								
Date	January							
Initials								
Date	February							
Initials								
Date	March							
Initials								
Date	April							
Initials								
Date	May							
Initials								
Date	June							
Initials								
Date	July							
Initials								
Date	August							
Initials								
Date	September							
Initials								

Daily Senior Nurse Check

There is an alarm system located in each ward office which contains a main plant or central alarm system that monitors the supply units or failure or imminent failure of supply and a local area alarm system that monitors the condition (Pressure) of gas at the point of use.

Nurse-in-Charge of the ward should make a daily check to the **alarm panel**, including **pressing the test button**, and document it on the chart below to ensure that the system display “Normal” on the panel. Otherwise, a duty caretaker should be contacted.

Nov 17	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
Normal																																
Initials																																
Dec 17	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
Normal																																
Initials																																
Jan 18	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
Normal																																
Initials																																
Feb 18	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
Normal																																
Initials																																
Mar 18	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
Normal																																
Initials																																
Apr 18	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
Normal																																
Initials																																
May 18	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
Normal																																
Initials																																

Oxygen and Suction Daily Checks

- Confirm no mechanical damage is visible
- No abnormal frosting/ice patches on outer shell
- No visual/audible leaks from any part of the system
- No obvious changes in the visual appearance such as excessive icing on the vaporiser
- Pipework downstream of vaporisers ice and frost free
- Compound is free of any stored materials that are not part of the gas storage system, especially flammable materials
- Adequate liquid level Detail in box below
- Pressure with normal operating tolerances (check against vessel data plate) Detail in box below

Indicated level	%
Pressure	Bar

- Check all valves are in normal operating position
- All panels indicating “on”
- No alarms displaying on the alarm panel interfaced units
- Panels and wiring in good condition
- Compound is secure and levels of security are being maintained
- All signs and warning notices in place and clearly visible
- Lighting working correctly

Readings from panel

Left hand side	Right hand side
bar	bar
Line P	bar
P Tank	bar

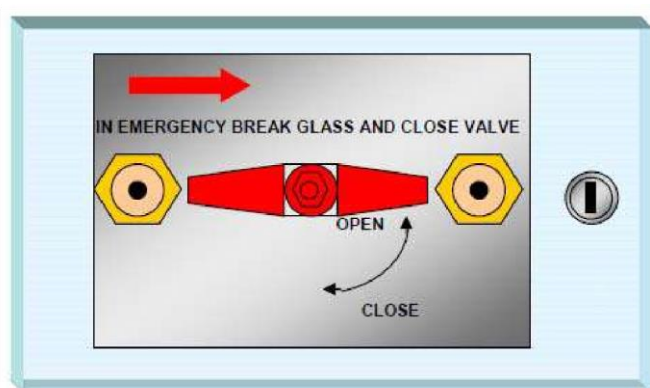
Comments

Signed

Date Time

Reviewed by authorised personDate.....

Emergency AVSU Isolation Procedure



Typical Area Valve Service Unit in normal supply condition is shown above

The Area Valve Service Unit (AVSU) valve operating handle is

Shown in the “on” position supplying gas to the ward or department.

Adjacent to each AVSU there should be a sign detailing which areas / beds will be isolated. If the sign is not perfectly clear detailing the exact extent of supply from that

Particular AVSU, the valve should not be operated.

Before isolation of a gas supply it is essential that patients connected to the system be provided with alternative supplies.

Be aware that ISOLATION CAN KILL.

ENSURE THAT ESSENTIAL LIFE SUPPORT IS MAINTAINED

To isolate a gas supply:

BREAK THE GLASS WINDOW in the valve box door with a hard / heavy object.

Be sure that all glass shards are out of the opening before reaching in to

Turn the valve quarter-turn from fully on to fully off i.e. to the vertical position, as

Shown below. . Be aware of splintering glass and any shards that may be left in the door aperture.

Appendix 7

Designated Nursing Officer Competencies

No	Performance criteria	Evidence reviewed	Sign Candidate	Sign Supervisor
1	Demonstrates understanding of policy and procedure	Has a knowledge of the policy and the procedures within it.		
2	Demonstrates full understanding of their responsibilities as a Designated Nursing officer			
3	Able to demonstrate understanding of layout of medical gas pipelines system	<ul style="list-style-type: none"> • ASVU locations and which outlets are served • Location of Alarm Panels and what the legends refer to • Location of main plant and equipment • Able to identify Primary and ERM 		
4	Able to demonstrate understanding of how to read alarm panel & describe actions that should be taken	Able to talk with confidence about the alarm panel and the action should be taken in each instance.		
5	Able to demonstrate understanding of the Permit system and their duties with regard to the system	Able to describe their actions in the event of the AP requesting to take the system out of service		
6	Able to demonstrate an understanding of what should be considered in the event of a Fire Alarm with regard to the medical gas pipeline	Able to describe actions that should be taken to ensure that patients have an uninterrupted supply in the event of the MGPS being isolated due to a fire emergency		
6	Understanding of information regarding location of cylinders that would need to be relayed to the fire brigade in the event of a fire emergency	Able to describe the locations of O2 Cylinders permanently located on wards and the importance of recording any additional cylinders on the fire checklist		

7	Understanding of how to calculate 24 hour oxygen demand to ensure that the correct number of cylinders are held on site			
8	Can describe the roles within the Operational Policy for Medical Gas systems and identify individual responsibilities			
9	Can correctly locate <ul style="list-style-type: none"> • ASVU • Central Alarms • Medical Vacuum alarms • Local Alarms 	Correctly located areas listed		
10	Is able to describe how to gain access to <ul style="list-style-type: none"> • Cylinder store 	Talked through the key required		
11	Is able to demonstrate knowledge of where to locate flow meters & medical vacuum controllers			
12	Is able to demonstrate where to record information regarding location of flow meters and medical vacuum controllers			
13	Can describe action to be taken in the event of an electrical power failure in relation to medical gas			
14	Can describe action to be taken in the event of suspected contamination of the medical vacuum system.			

15	Can describe the action to be taken in the event of a suspected leak of the medical oxygen pipeline system			
Identified learning needs		Candidate's remarks	Supervisor's remarks	
Competency assessment by supervisor				
I consider _____ to be competent to undertake Role of Designated Nursing Officer				

Signed:	Print name:	Date:
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Competency self-assessment by candidate		
I consider myself to be competent to undertake Role of Designated Nursing Officer		
Signed:	Print name:	Date:

Review due date

