

## Document Control

<b>Title</b>			
<b>Oxygen Enrichment Standard Operating Procedure</b>			
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<b>Directorate</b>		<b>Department</b>	<b>Team/Specialty</b>
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1.0	May 2021	Final	Discussed at Medical Group meeting 29.04.21. For presentation at Clinical Reference Group meeting 06.05.21. Approval by Deputy Director of Estates & Facilities.
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<b>Document Class</b>		<b>Target Audience</b>	
Standard Operating Procedure		All staff where Hi Flow oxygen is being administered	
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<ul style="list-style-type: none"> <li>Clinical Site Management (Bleep 500)</li> <li>Estates Management</li> <li>Fire, Security &amp; Technical Services Officer</li> <li>Local Ward Management</li> <li>Local Ward Nursing staff</li> </ul>		Trust website	
<b>Superseded Documents</b>			
<b>Issue Date</b>		<b>Review Date</b>	<b>Review Cycle</b>
April 2021		April 2024	3 Year
<b>Consulted with the following stakeholders: (list all)</b>		<b>Contact responsible for implementation and monitoring compliance:</b>	
<ul style="list-style-type: none"> <li>Advanced Practitioner Respiratory Physiotherapist</li> <li>Health and Safety Group</li> <li>Medical Gas Group</li> <li>Respiratory Consultant</li> <li>Head of Quality and Safety</li> <li>Respiratory Nurse Specialist</li> </ul>		Operations and Maintenance Manager	
		<b>Education/ training will be provided by:</b>	
		Fire, Security & Technical Services Officer	

<p><b>Approval and Review Process</b></p> <ul style="list-style-type: none"> <li>• For approval by the Director of Facilities with ratification at the Patient Safety Operational Group</li> </ul>	
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## 1. Background

- 1.1. Estates and Facilities Alert NHSE/I-2020/003, COVID-19 Response – Oxygen Supply and Fire Safety, issued on the 19.11.2020 raises concerns of an increased Fire risk due to oxygen rich environments where CPAP/BiPAP ventilators are being used in a single room environment. As a result of the alert, single rooms administering CPAP/BiPAP, are to be monitored to ensure oxygen levels do not rise above the specified level of 23%. Failing to meet this target will increase the risk of flammability with in the room.
- 1.2. Whilst the Estates and Facilities Alert is solely based around treating COVID-19 positive patients with CPAP/BiPAP, this SOP should also be utilised for any ward administering hi flow oxygen.

## 2. Purpose

- 2.1. The Standard Operating Procedure (SOP) has been written to:
  - Provide operating instructions on how to use the Crowcon SGD O<sub>2</sub> Monitor.
  - Provide clear guidance to follow in the event of an activation of a Crowcon SGD O<sub>2</sub> alarm.

## 3. Scope

- 3.1. This SOP relates to the following staff groups who will be involved in the event of an SDG O<sub>2</sub> activation.
  - Clinical Site Management (Bleep 500)
  - Estates Management
  - Fire, Security & Technical Services Officer
  - Local Ward Management
  - Local Ward Nursing staff

## 4. Location

- 4.1. This SOP can be implemented in all clinical areas where oxygen is being administered to patients and competent staff are available to undertake this role.
- 4.2. Staff undertaking this procedure must be able to demonstrate competence as per this SOP, SDG O<sub>2</sub> operating instructions and the associated risk assessment.

## 5. Equipment

- 5.1. The following equipment will be required to monitor and manage risk associated with O<sub>2</sub> enriched environments:
  - Crowcon SDG O<sub>2</sub> Monitor
  - Jackloc window restrictor key

- 5.2. The Crowcon SGD O<sub>2</sub> monitors are provided by the Facilities Department which will be issued to wards and services delivery high flow oxygen therapies. The monitors will be managed centrally through via Facilities Management software (FM First) and managed via an asset register and planned preventative maintenance (PPM) schedule to ensure bump tests are conducted every 90 days and safety checks of the monitor.
- 5.3. Window restrictor keys will be provided to wards where high flow oxygen therapies are being delivered. The ward manager will be responsible for key management and the safe and secure storage of the window restrictor key which will only be used to de-restrict windows in the event that an O<sub>2</sub> monitor alarm sounding to indicate an O<sub>2</sub> enriched environment.

**Photo 1: Crowcon SDG O<sub>2</sub> Monitor**



## 6. Balance of risks

- 6.1. Use of high flow open circuit oxygen devices carries a risk of increasing ambient oxygen concentration. If this exceeds 23% this is classed as an oxygen enriched environment and poses a potential fire risk where fires and combustible materials will readily ignite.
- 6.2. Opening windows fully will help dissipate O<sub>2</sub> concentration, returning to near ambient levels. However this also increases the risk of persons falling from un-restricted windows.
- 6.3. During cold spells where windows may be shut for patient comfort, the risks associated with O<sub>2</sub> enriched environments will therefore increase.
- 6.4. See appendix B (risk assessment and control measures to manage fire and patient safety risks).

## 7. Procedure

- 7.1. Outside of the side room or area where high flow O<sub>2</sub> is being administered, switch on the Crowcon SGD O<sub>2</sub> monitor using Button (5). Hold the button for three seconds (see monitor diagram, Appendix A).
- 7.2. The monitor should display approximately 20.9% O<sub>2</sub> level which is the normal background atmospheric level. The monitor will continuously test the atmosphere for presence and concentration of O<sub>2</sub>.

- 7.3. Whilst in the side room or area where the patient is receiving high flow oxygen therapy, press Button (5) twice. The display will indicate the highest level of O<sub>2</sub> detected in the last 15 minutes.
- 7.4. Continue to monitor O<sub>2</sub> levels as part of patient observations i.e. on a regular basis. Where patients are more acute or higher levels of oxygen therapy and higher flow levels of O<sub>2</sub> the frequency of monitoring/observations should increase.
- 7.5. Monitors will continually monitor O<sub>2</sub> levels. If left in side rooms, place on side table or secure surface (on or above 900mm from floor) away from any open windows. Ensure regular side room checks are made.
- 7.6. Every 20 hours the device will require self-calibration in an environment without additional O<sub>2</sub> present. Remove the detector from the side room environment to a corridor or lift landing and press Button (5). Allow the unit to self-test and return to the Side Room.

## 8. Actions to take in event of O<sub>2</sub> enriched environment

- 8.1. The monitor will alarm should the O<sub>2</sub> level reach 23%. If this occurs, the following actions must be taken to mitigate the fire, security and patient safety risks:
  - Open windows and doors to create maximum air flow.
  - De-restrict windows in affected side room / area using window restrictor key (jackloc).
  - Assess patient vulnerabilities (including but not necessarily limited to) safety, security, confidentiality, privacy, dignity and potential of fall from unrestricted window.
  - Mitigate patient risks with additional 1:1 supervision or other control measures as may be necessary.
  - Inform nurse in charge of shift.
  - Continue to monitor atmospheric O<sub>2</sub> levels every 15 minutes whilst windows are de-restricted.
  - Reinstate window restrictors once O<sub>2</sub> levels return to approximately 21%.
  - Continue to monitor atmospheric O<sub>2</sub> levels whilst patient remains on high flow O<sub>2</sub> therapy.
  - Incident report O<sub>2</sub> enriched environment incident and actions taken on DATIX.

## 9. Never event

- 9.1. NHS Improvement Never Events List published January 2018 outlines serious incidents that are wholly preventable provided safety recommendations and protective measures are implemented.
- 9.2. Never event 10: Falls from poorly restricted windows applies “where patients deliberately or accidentally fall from a window where a fitted restrictor is damaged or disabled”.
- 9.3. The never event is applicable to all settings providing NHS funded care.

- 9.4. **Windows must not be de-restricted under any circumstances other than those outlined in this procedure to mitigate risks of fire associated with an O<sub>2</sub> enriched environment.**
- 9.5. Window restrictors must be reinstated immediately once safe O<sub>2</sub> levels are achieved through implementation of control measures to mitigate risks (see Section 8.0)

## 10. References

- [Estates and Facilities Alert NHSE/I – 2020/001. Issued 31 March 2020](#)
- [NHS Improvement Never Events list 2018. Last updated February 2021](#)

## 11. Associated Documentation

- 11.1. Northern Devon Healthcare NHS Trust guidelines, procedures and policies for :
- [Estates & Facilities Alert NHSE/I-2020/003. Covid-19 response – Oxygen supply and fire safety](#)
  - [Fire Safety Policy](#)
  - [Fire Safety Strategy](#)
  - [Guidelines for High Flow Nasal Oxygen Therapy \(HNFO\) on General Wards](#)
  - [Guidelines for High Flow Oxygen Therapy \(AIRVO\) on the Ward](#)
  - [Incident Reporting, Analysing, Investigating and Learning Policy and Procedures](#)
  - [Medical Gas Policy](#)
  - [Oxygen Policy \(Prescribing & Administration of Oxygen to Adults in Hospital Policy\)](#)
  - [Oxygen use on the workplace – Fire and explosion hazards \(HSE\)](#)

## Appendix A: Oxygen Monitor Operating Instructions

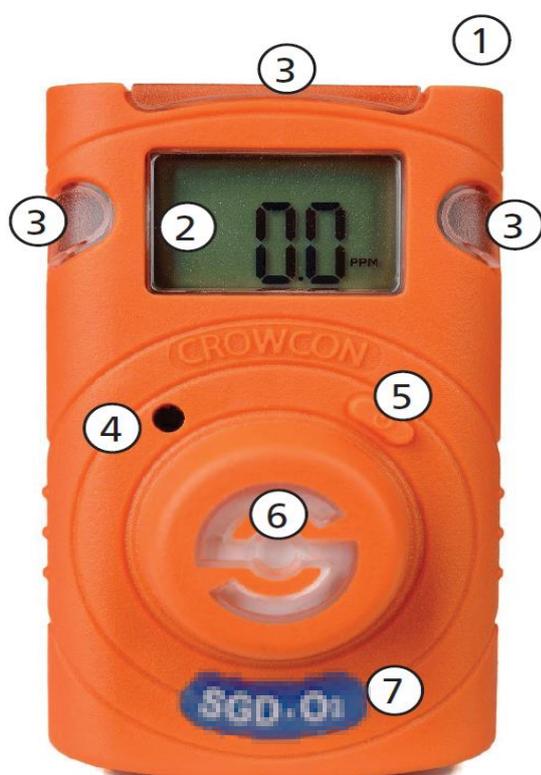
### Crowcon SGD O<sub>2</sub> Monitor



What your detector looks like

The Portable O<sub>2</sub> gas detector has a 24 month life; it is designed to be permanently on and cannot be turned off. To ensure full life avoid operating the user Button (5) too frequently or allowing it to remain in alarm for excessive periods.

#### Manufacturers Diagram and LCD



1. IR Port
2. LCD display
3. Alarm LED
4. Buzzer
5. Button
6. Gas sensor
7. Gas Type

## Activation

Only turn the unit on in a safe environment (fresh air), press the Button (5) for three seconds; the device will start up and run through its diagnostic checks for 10 seconds after which it will be in gas detection mode.

The detector will automatically default to self-test function every **20** hours – you will see the letters **StS** flashing on the screen: Take the device to fresh air such as the ward corridor or lift landing and press the Button (5) - the device will perform a self-test and at the end will automatically revert to detection mode.

If calibration fails an  icon will appear on the display. If this happens, the unit is not monitoring O<sub>2</sub>. You require another unit to monitor O<sub>2</sub>. Contact Estates via FM First.

## Reading the display & Button (5) Functions

1. The detector will display **20.9** % vol Oxygen level – this is normal background atmospheric level – Detection mode – **this level will fluctuate depending on % O<sub>2</sub> in the air.**
2. If you push the Button (5) once, the LCD display will display the lowest level of O<sub>2</sub> detected in the last 15 minutes
3. If you press it again it displays the highest level of O<sub>2</sub> detected in the last 15 minutes
4. Press again and you will see **CLr** – if you press and hold the button for three seconds then it will clear the recorded levels in 1 & 2 above.
5. Press again and a number will be displayed starting at **23** and counting down each month – this is the life span left of the device. Inform Estates via FM First when your device reaches its final month.
6. Press again and it displays – **19.5** – this is the % of O<sub>2</sub> deficiency at which Low the alarm will sound – 1<sup>st</sup> alarm point
7. Press again and **23** is displayed – this is the % of O<sub>2</sub> enrichment that the High alarm will sound – 2<sup>nd</sup> alarm point
8. Press again and **12.6** is displayed – this is the software version of the detector
9. Press again and **18** is displayed - this is the calibration concentration of O<sub>2</sub> used to test it during manufacture & maintenance
10. Press again and it will go back to Detection mode

**At all times the detector will revert to the detection mode display after 15 seconds. So if you press the button and you get a display you don't recognise you can leave it alone and after 15 seconds it will revert back to detection mode.**

## Alarms

When the O<sub>2</sub> level drops below 19% volume or rises above 23% volume the detector will go into alarm.

You can test the alarm by exhaling onto the Gas sensor (6) this should reduce the level of O<sub>2</sub> to below 19% volume and the % O<sub>2</sub> level will be shown on the screen; likewise if you were to put the detector next to an O<sub>2</sub> supply it would do the same but show the increased % O<sub>2</sub>.

The detector will vibrate, the alarm LED's will flash, and the buzzer will sound.

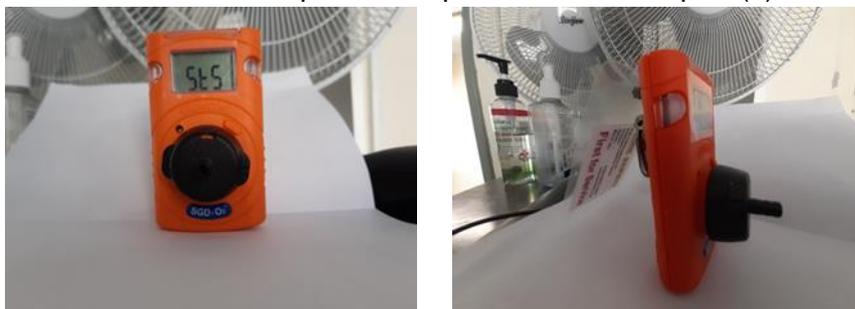
Once the O<sub>2</sub> levels return to within normal range: 19% - 23% it will automatically return to silent and detection mode – **there is no way to manually reset the alarm**

## Cleaning

You must NOT get the gas sensor (6) wet as this will stop it from working.

Use only the following products and procedures:

- Fit the Aspiration Cap onto the sensor port (6)
- Use an alcohol wipe taking care not to overly wet the monitor.
- Gently wipe the surface of the detector avoiding the gas sensor port (6) in diagram.
- The alcohol may cause erroneous alarm whilst cleaning, allow to dry and alarm should silence.
- Remove the aspiration Cap from the sensor port (6) and return to use.



## Use

As directed by Ward Manager, clip to uniform between waist and chest, the detector will automatically test the atmosphere.

Enriched / Deficient Alarm - Identify location, ventilate, waft the air, inform manager, move to a place where alarm stops sounding.

Consider what actions can be taken to reduce the oxygen saturation. This can generally be achieved by improving ventilation, but also check that there are no leaks from the supply or cylinders have been left open.

## Appendix B: Caring for patients on high flow oxygen therapy risk assessment

<b>Division:</b> Nursing	<b>Location:</b> Any wards or other clinical space caring for patients who require high flow oxygen therapy	<b>Ref. No.:</b>
<b>Section:</b> N/A		
<b>Assessor Team:</b> Compliance Team, Corporate Governance	<b>Date:</b> 07/12/20	<b>Review Date:</b>
<p><b>Task / Activity:</b> The care of any patients who require high flow oxygen therapy</p> <p><b>Risk:</b> There is an enhanced risk of fire through failure to manage oxygen enriched environments where an ignition source is present. Fire burns more ferocity and speed in oxygen enriched environments. There is a risk that a patient or other person may come to harm should they fall from an unrestricted window where the restrictors have been disabled to mitigate the fire risks associated with oxygen enriched environments.</p> <p><b>Balance of risks:</b></p> <ol style="list-style-type: none"> <li>Creation of enriched oxygen levels (O<sub>2</sub> in excess of 23%) and potential fire risks.</li> <li>Patient or other person intentionally or unintentionally falling from an unrestricted window.</li> </ol> <p><b>Background and context</b></p> <ol style="list-style-type: none"> <li>Estates and Facilities Alert issued 19.11.20 (NHSE/I-2020/003) concerns the COVID 19 response, oxygen supply and fire safety. There are increased fire risks associated with oxygen enriched environments which may occur during the care of patients who require high flow oxygen therapies e.g. high flow nasal oxygen (HFNO) therapy which is increasingly used for patients with type 1 respiratory failure. Equipment such as the AIRVO<sub>2</sub> can deliver warmed and humidified inspiratory gas flow rates up to 60 litres per minute.</li> <li>NHS Improvement Never Events List published January 2018. Never event 10: Falls from poorly restricted windows applies to “where patients deliberately or accidentally fall from a window where a fitted restrictor is damaged or disabled” - applicable to all settings providing NHS funded care.</li> </ol> <p><b>Mitigation of risks</b> Window restrictors will remain in situ to limit a maximum opening of 100mm during high flow oxygen therapies, however should an O<sub>2</sub> monitor alarm, the window / windows will be de-restricted and fully opened to mitigate the fire risks associated with an oxygen enriched environment.</p> <p>Whilst windows are de-restricted, clinicians will complete a dynamic risk assessment to manage any associated risks of patient or other person intentionally or unintentionally falling from the unrestricted and fully opened window. This may include (but is not limited to) revising care plans for patients with vision impairment, confusion, delirium, dementia, psychosis, experiencing auditory hallucinations or other factor that may increase their level of vulnerability.</p>		

No.	Hazard	Risk & Effect	Control Measures	Risk Rating			Further Controls	Risk Rating		
				L	C	RR		L	C	RR
1	<p>Fire risks associated with high ambient oxygen levels</p> <p>Source of risk: NHSE/I-2020/003</p>	<p><b>Impact on Safety domain</b> Use of high flow oxygen therapies has the potential to create an oxygen enriched environment where natural ventilation / mechanical air handling is not sufficient to circulate air and dissipate O<sub>2</sub>.</p> <p>Raw risk: 3x5=15</p>	<ul style="list-style-type: none"> <li>Fire Safety Policy.</li> <li>Fire safety risk assessments &amp; fire safety logbook.</li> <li>Smoke Free Policy</li> <li>Oxygen Policy.</li> <li>Neonatal and Paediatric High Flow Nasal Cannula Oxygen Therapy Guideline.</li> <li>Guideline for High Flow Nasal Oxygen Therapy (HFNO) on General Wards.</li> <li>Guidelines for High Flow Oxygen Therapy (AIRVO2) on the Wards.</li> </ul>	2	5	10	<ul style="list-style-type: none"> <li>Identify clinical space used for the care of patients on high flow oxygen therapy e.g. HFNO</li> <li>Purchase of Crowcon Clip SGD-O2 gas detectors.</li> <li>Issue gas detectors to clinical staff caring for patients on HFNO.</li> <li>Training, instruction &amp; information in use of O<sub>2</sub> monitors.</li> <li>Develop a standard operating procedure.</li> </ul>	1	5	5
2	<p>Fall from unrestricted window</p>	<p><b>Impact on Safety domain</b> Risk of intentional or unintentional fall from unrestricted window, contrary to NHS Improvement list of never events</p> <p>Raw Risk: 3x5=15</p>	<ul style="list-style-type: none"> <li>Windows restricted to limit opening width to 100mm</li> <li>Planned preventative maintenance (PPM) schedule to check condition of window restrictors</li> <li>Visual checks of restrictors</li> <li>Incident reporting policy and procedures</li> <li>FM Portal &amp; procures to log requests for maintenance / repairs</li> </ul>	1	5	5	<ul style="list-style-type: none"> <li>Clinical staff to agree dynamic risk assessment approach to mitigate risks associated with intentional or unintentional falls from unrestricted windows.</li> <li>Window restrictor keys to be allocated to wards caring for patients on HFNO. Ward manager, deputy or equivalent accountable for management of window restrictor keys issued.</li> <li>Windows only to be de-restricted when the O<sub>2</sub> monitor alarm sounds.</li> </ul>	2	5	10
<b>The above identified control measures will be implemented including, where appropriate, safe systems of work.</b>										
<b>Risk Assessor's signature: As for Assessor Team. Mike Cousins, H&amp;S Manager &amp; LSMS</b>							<b>Date: 07.12.20</b>			
<b>Director or nominated Senior Manager's signature:</b>							<b>Date:</b>			