Reaching Impact, Saturation and Epidemic Control (RISE)

Oxygen Audit Form

Health Facility Inspection/ Oxygen Audit Form: Self-Certification To Be Done By Hospital Management

A. GENERAL INFORMATION OF HOSPITAL

1. Name of Covid Hospital: _____
2. Type of Hospital: Government / Private 3. Hospital Category: CCC / DCHC / DCH
4. Dr. In charge of Covid Hospital: Name: _____Mobile No.: _____
5. Designation of Dr. Incharge: Medical Superintendent / Dean / Administrative Officer / Head of Hospital
6. Hospital Address: _____

   _____

   Hospital Telephone No.: _____ Pin code: _____
7. Total beds in Hospitals: For Covid_____ For Non Covid: _____

Type of Covid Bed	No. of beds
• Isolation	
• O2 Support	
• Ventilator	
• Remaining ICU Beds (Except ventilator)	

8. **Total No. of Patients on Oxygen: _____**

Currently Patient on	For Covid	For Non-Covid
• Oxygen Cylinder		
• Oxygen Piped Bed		
• NIV (Ventilator)		
• Intubation (Ventilator)		
• Bi-PAP		
• HFNO		

NOTE: The HFNO's should be phased out for large consumption of oxygen

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Details of Oxygen Use							
Sr. No.	Device	Lit/Min	No. of Patients	Total Consumption Lit/min	Total Consumption Lit/Day	Total Consumption KL/Day (Total Consumption Lit/day / (1000*860))	Total Consumption in Ton (KL/Day*0.871)
1	Nasal Prongs	(3 LPM)					
2	Nasal Mask	(4 LPM)					
3	Non-Re-breathable Mask (With Bag)	(6LPM)					
4	Invasive Ventilation (Intubetion)	(20 LPM)					
5	BiPAP	(12 LPM)					
6	NIV	(50 LPM)					
7	HFNO	(50 LPM)					
Total							
1) 1000L = 1KL 2) 1KL = 1.14 Ton							

Jumbo Oxygen Cylinder General Information:	
Type of Jumbo System installed: **i) Capacity of Manifold : _____** **e.g. (8 x 8)** **ii)** Capacity of reserved Manifold: _____ **e.g. (4 x 4)** **Total: _____**	**Available Oxygen Cylinder in hospitals:** **i) Type D (7 CuM) :_____** **ii)** Type B (1.5 CuM) **:** _____ **Total: _____**

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Source of Oxygen

Source of Oxygen: Jumbo / Dura / LMO **Frequency of Supply:** _____ **Quantity of Supply in last delivery (in CuM):** _____	**1st Agency Name**: _____ **Address**: _____ _____ **Pin Code:** _____ **Mob. No.** _____
Source of Oxygen: Jumbo / Dura / LMO **Frequency of Supply:** _____ **Quantity of Supply in last delivery (in CuM):** _____	**2nd Agency Name**: _____ **Address**: _____ _____ **Pin Code:** _____ **Mob. No.** _____
Source of Oxygen: Jumbo / Dura / LMO **Frequency of Supply:** _____ **Quantity of Supply in last delivery (in CuM):** _____	**3rd Agency Name**: _____ **Address**: _____ _____ **Pin Code:** _____ **Mob. No.** _____

Sources of Oxygen Storage

Sources of Oxygen Storage	Approximate Availability of liquid medical oxygen in KL	Approximate Availability of liquid medical oxygen in liters (X 1000)	Quantity of Cylinder	Approximate Availability of oxygen in gaseous form	Note
Liquid Medical Oxygen Tank-1					For converting LMO/Dura Litres in gaseous form multiply by 860. 1 Litre=860 Litres gaseous form
Liquid Medical Oxygen Tank-2					
Liquid Medical Reservior-1					
Dura Cylinder-1					
Dura Cylinder-2 (Filled)					

D-Type, Jumbo Cylinder (Filled)	[redacted]				For jumbo Cylinder type D 7000 Litres
B-Type, Jumbo Cylinder (Filled)					For jumbo Cylinder type B 1500 Litres
Total					

Sources of Oxygen Generation				
Sources of Oxygen Generation	**No. of Plants**	**Approximate Capacity of Plants in Litres/Minute**	**Approximate total availability of Oxygen in Gaseous form Litres/Minute**	**Note**
Oxygen PSA Plant-1				
Oxygen PSA Plant-2				
Total				

Note: This information is to be collected from Hospital administration by discussion and examining report of fire and electrical audit.

FIRE AUDIT	
1. Fire Audit of Hospital has been done?	Yes / No
If yes, pls mention Date of fire Audit	/ /
Faults found (if any)	
Corrective action taken	
If No audit done, please mention What is the Plan for Audit?	

ELECTRICAL AUDIT	
1. Electrical Inspection of Hospital has been done?	Yes / No
If yes, Pls. mention Date of Electrical Inspection	/ /
Faults found (if any)	
Corrective action taken	
If No, electrical inspection done, please mention What is the Plan for inspection?	

Are Lightening Arresters available and installed on building?	Yes / No
If available, where is it?	At Hospital / At Oxygen Cryogenic Tank area

1. Appointment of dedicated technical persons round the clock to check / Monitor Oxygen Pipeline, Cylinders & Tank (24 X 7) :-												Yes / No	
If yes	Name:	Mobile No.											
2. Name of technical Engineer	Name:												
Address:	Mobile No.												
	Alternate Mobile No.												
3. Daily Oxygen Requirement by Hospital (In MT) Before Audit													
4. Projected requirement of Oxygen by Hospital (In MT) As per Audit													
5. Saving of Oxygen Requirement (In MT) which is possible													

B. GENERAL CHECKLIST FOR OXYGEN SYSTEM

Sr. No.	Descriptions	Yes/ No/NA	Comments
1	All oxygen sources or plants should be erected in open spaces and not within the building premises.		
2	All the materials used in the construction of storage facility should be fire retardant. (E.g., Steel, Bison board, Cement paints which are fire retardant, tiles, mud tiles, Steel Fencing Jali example of flammable material that should not be used are plastic, nylon, flammable plastic Jali, Plywood)		
3	Tank Safety Measures taken:		
	i. Safety Net around tank		
	ii. CCTV		
	iii. Ventilation		
	iv. Prohibition of fire explosive elements		
	v. Security guard (24 X 7)		
4	Fire Prevention Measures		
	i. Fire extinguishers		

B. GENERAL CHECKLIST FOR OXYGEN SYSTEM

Sr. No.	Descriptions	Yes/ No/NA	Comments
	ii. Water hydrants / Taps		
	iii. Sand bucket		
5	Access control arrangements with manual pad locks to entry gates to ensure entry of authorized person only in Oxygen Storage area.		
6	Clear Signage indicating “access to authorized person only “should be displayed prominently around Periphery of Storage area.		
7	In case of LMO facility separate gate for vehicle to unload and separate entry for the technical staff should be created		
8	At all given point the gates should be closed unless it is in use.		
9	If padlocks are used to secure the gate, then spare key sets should be easily accessible and available with administration, Fire Department, Security Department and technical man power operating the Oxygen Facility.		
10	Ensure CCTV monitoring of storage areas and such installation should be operating on low voltage systems like DC supply or in a manner where no nearby electrical points are utilized.		
11	The CCTV system should operate from reasonably safe distance as per the layout of storage facility. Farther the better.		
12	The Assembly Points should be far away from Oxygen storage area unless the Oxygen storage facility is reasonably secured by Retainer walls of RCC in case of space constraints.		
13	All Points in Fire safety as per the prevailing policy of Local/state and central Govt. authorities are complied		
14	Proper Fire Extinguishers, Sand Buckets, Fire Hydrant arrangements are available in the area as per the prevailing guidelines.		
15	Ensure Mock Drill are conducted regularly covering incidents like Fire, Leakage and other Emergency situations.		

C. OXYGEN PIPELINE GENERAL INSPECTION CHECKLIST

Sr. No.	DESCRIPTION	Yes/ No/NA	COMMENTS
1	Leakages found at pipeline, Valve & Joints		
2	If leakages found, then repairing done immediately		
3	Is there finding of Oil / Grease on pipeline		
4	Are there explosive elements found near Pipeline		

D. GENERAL OXYGEN WEANING PROTOCOL

Sr No.	Description	Compliance Yes/No/NA	Comments
1	Establish Oxygen weaning protocol as per the guidelines of Maharashtra Task Force for Covid 19		
2	Conduct staff training for Oxygen Weaning protocol.		
3	Display boards and sign ages for oxygen weaning protocol at Patient Bedside		
4	Display sign boards so Patient should be aware that they do not touch and change Oxygen LPM Delivery settings.		
5	Take good quality branded oximeter and SPO2 has to be measured every 2 hours as per chart given. (Preferable to oximeter with respiratory rate)		
6	Step Up and Step Down of Oxygen to be done as per established Oxygen weaning Protocol		
7	Ensure that LPM delivery settings changes are carried with precautions and staff is trained for same, (Accidentally increasing pressure above 15 LPM will cause breakage of humidifier bottles which are in short supply)		
8	Is there patient briefing taken for Oxygen Usage?		
9	Are staff Checking Carefully leakages of Oxygen Pipeline Cylinder & Cryogenic tank daily?		
10	Is patient Oxygen requirement finalized carefully by using prone position after giving sufficient time by the Doctor? (Left Lateral, Right Lateral, lying on belly, Sitting up)		
11	Are Reclining Beds being used to reduce Oxygen requirement and better saturation levels in patients		

E. JUMBO OXYGEN CYLINDER STORAGE CHECKLIST

Sr. No.	DESCRIPTION	YES / NO/NA	COMMENTS
1	Are storage rooms for Oxygen cylinders dry, cool, and well ventilated? (Note: The storage rooms should be fire-resistant, and the storage should not be in subsurface locations.)		
2	Are cylinders stored away from incompatibles, excessive heat, continuous dampness, salt or other corrosive chemicals, and any areas that may subject them to damage?		
3	Are cylinders maintained at temperatures below 51 Degree C or 125 degrees Fahrenheit? (Check with thermal gun)		
4	Are only Oxygen gas cylinders separately stored?		
5	Are cylinders stored in upright positions and immobilized by chains or other means to prevent them from falling?		
6	Are cylinders stored away from electrical connections, sources of ignition, combustible waste material?		
8	Are charged or full cylinders labeled and stored away from empty cylinders?		

F. JUMBO OXYGEN CYLINDER OPERATION & MAINTENANCE CHECKLIST

Sr. No.	DESCRIPTION	Yes/ No/NA	COMMENTS
1	Are all Oxygen cylinders subjected to periodic hydrostatic testing and interior inspection by suppliers?		
2	Are all Oxygen cylinders regularly inspected for corrosion, pitting, cuts, gouges, digs, bulges, neck defects and general distortion?		
3	Are suitable pressure-regulating devices in use whenever the gas is emitted to systems with pressure-rated limitations lower than the cylinder pressure.		
4	Are all Oxygen cylinder connections (pressure regulators, manifolds, hoses, gauges, and relief valves) checked for integrity and tightness?		

F. JUMBO OXYGEN CYLINDER OPERATION & MAINTENANCE CHECKLIST

Sr. No.	DESCRIPTION	Yes/ No/NA	COMMENTS
5	Are all Oxygen cylinders regularly subjected to leak detection using an approved leak detecting liquid?		
6	Are procedures established when a Oxygen cylinder leak cannot be remedied by tightening the valve? The procedures should include: (a) Attach tag to the cylinder stating it is unserviceable. (b) Remove cylinder to a well-ventilated outdoor location. (c) Place an appropriate sign on a flammable or toxic gas cylinder warning of these hazards. (d) Notify the Oxygen gas supplier and follow his/her instructions regarding the return of the cylinder.		
7	Are Oxygen handled only by experienced and properly trained people?		
8	Is the bottom of the cylinder protected from the ground to prevent rusting?		
9	Are cylinder valves closed at all times, except when the valve is in use?		
10	Are all Oxygen cylinder valve covers in place when cylinders are not in use?		
11	Is using wrenches or other tools for opening and closing valves prohibited? (Note: Hammering on valve wheels to open them should be strictly prohibited. For hard-to-open valves, contact the supplier for instruction.) (Ask Questions to field staff)		
12	Are all Oxygen cylinders subjected to periodic hydrostatic testing and interior inspection by suppliers?		
13	Is repair or alteration to the cylinder, valve, or safety relief devices prohibited? (Note: All alterations and repairs to the cylinder and valve must be made by the compressed gas vendor. Modification of safety relief devices beyond the tank or regulator should only be made by a competent person appointed by management.) (Ask questions to field staff)		
14	Are Oxygen cylinders always moved, even short distances, by a suitable hand trolley? (Note: They must never be dragged across the floor.) (Check visually)		

G. PRECAUTION FOR EFFICIENT UTILIZATION AND STORAGE OF JUMBO CYLINDERS (JUMBO SECTION)

Sr.No.	Descriptions	Yes/ No/NA	Comments
Note: Every Type of Oxygen Container depletes in small quantities through valves			
1	**Precautions for efficient utilization of Jumbo Cylinders.**		
Note: Jumbo Cylinders stored eventually will deplete and, in few weeks, or months will be empty, during the time of emergency such cylinders become useless, following precautions need to be taken up by hospital administration to avoid the above condition			
1.1	The Hospital administration should establish this date based on weekly check with the help of flow meter and the percentage loss observed. This needs to be done as every cylinder manufacturer as uses different component, thus there is no other alternatives to establishing it manually over a period of two three months. Intermittently hospital should maintain the last refill date on tag.		
1.2	Check all humidifier bottles and Gauges on arrival for leakages and reject faulty ones.		
1.3	Check all spanners and replace all spanners which have lost grip because of wear and tear. Using them may not fine tune the fitting of gauges and humidifiers bottles.		
1.4	Rotate all Jumbo Cylinders regularly which are kept in reserved stock		
1.5	All jumbo cylinders should be marked with permanent paint and Numbered		
1.6	All such jumbo cylinders should be tagged with an non tear able tag.		
1.7	Last jumbo refilling date should be mentioned by Refiller with help of clearly legible stickers on the tag		
1.8	Next refilling date if cylinders stay unused like the fire extinguisher should be maintained		

H. DURA OXYGEN SYSTEM

Tank Inspection Checklist

Sr. No.	Descriptions	Yes/ No/NA	Comments
1	Do all cylinders have safety valves?		
2	Are safety relief devices in the valve or on the cryogenic tank free from any indication of tampering?		
3	Dura Cylinders handled only by experienced and professionally trained people? (Ask Questions to filed staff)		
4	If LMO Supply Fails / Breakdown, then alternative system is ready? Then is backup system available? Is Manifold system for Oxygen Cylinders Ready? (4 to 8 hours backup as per location (Urban/Rural)		
5	If LMO and Manifold System Fails, then are refilled cylinders kept in wards with regulators (Conversion kit)		

Storage

Sr. No.	Descriptions	Yes/ No/NA	Comments
1	All oxygen sources or plants should be erected in open spaces and not within the building premises.		
2	Dura oxygen storage facility should be covered from top and ensured that it is not exposed to sunlight and any source of heat directly.		
3	All the materials used in the construction of storage facility should be fire retardant. (Eg. Steel, Bison board, Cement paints which are fire retardant, tiles, mud tiles, Steel Fencing Jali example of flammable material that should not be used are plastic, nylon, flammable plastic Jali, Plywood)		

Precautions for efficient utilization of Dura Cylinders			
Sr. No.	**Descriptions**	**Yes/ No/NA**	**Comments**
Note: Dura Cylinders are also also susceptible to the leakages and if the dura cylinders are not used for 2 to 3 days they will vaporize and the Oxygen will be released to through the safety valve into atmosphere, while this happens there is a big whistling sound that accompanies it. To avoid such wastage of oxygen the dura cylinders should be used when they are bought in the hospital premises within 48 hours. They should be avoided stored in an area where the temperature is high. In dura cylinders the oxygen is stored in cryogenic form as the temperature increases it vaporizers and if not attended all the oxygen is lost the atmosphere does if the dura is being used as a backup facility to the main element tank then every 2 days the dura pressure has to be increased more than the oxygen pressure the LMO pressure and using the pressure differential the standby bank should be made as the primary bank and emptied and refilled again this is of utmost importance and when during cylinders are being used for backup for their own use for large number of days all Oxygen will be lost.			
1	Importance and when during cylinders are being used for backup for their own use for large number of days all Oxygen will be lost.		
1.1	Rotate all Dura Cylinders regularly which are kept in reserved stock		
1.2	Check all spanners and replace all spanners which have lost grip because of wear and tear. Using them may not fine tune the fitting of gauges and humidifiers bottles.		
1.3	All Dura cylinders should be marked with permanent paint and numbered		
1.4	All such Dura cylinders should be tagged with an non tearable tag.		
1.5	Last Dura refilling date should be mentioned by Refiller on clearly legible Tag		
1.6	Next refilling date of cylinders if it stays unused like the fire extinguisher should be maintained		
1.7	Fasten the spanners Near work area with rope in a manner that they can be easily used and are readily available		
1.8	Ensure spare spanner stocks are maintained in store in sufficient numbers.		

I. LMO OXYGEN SYSTEM

Tank Inspection Checklist

Sr. No.	Descriptions	Yes/ No/NA	Comments
1	If LMO Supply Fails / Breakdown, then alternative system is ready? Is Manifold system for Oxygen Cylinders Ready? (4 to 8 hours backup as per location (Rural/Remote))		
2	If LMO and Manifold System Fails, then are filled cylinders kept in wards with regulators (Conversion kit)		

Storage

Sr. No.	Descriptions	Yes/ No/NA	Comments
1	All LMO Plants should be erected in open spaces and not within building premises		
2	All Materials used in the construction of storage facility should be fire retardant. (Eg. steel, bison board, cement paints which are fire retardants, tiles, mud tiles, steel fencing jali. Example of flammable material that should not be used are plastic, nylon, flammable plastic jali, plywood)		
3	Are there separate entrances for operational persons and the LMO tankers?		
4	Is the LMO facility secured by using padlock?		
5	Are the keys of LMO easily available with fire / security / administration / operation staff?		
6	Is there a mechanism to de-ice the vaporizer by using water showers?		
7	Is the water being recycled by creating underground tanks or collecting it in any way?		
8	Is the pipeline from LMO tank to vaporizer also getting de-ice?		
9	Is the flooring in the LMO decanting perfectly horizontal? so all the LMO is properly decanted in the tank.		

J. DURA OXYGEN SYSTEM PRECAUTION FOR HUMIDIFIER BOTTLES AND OXYGEN POINTS

Precautions

Sr. No.	Descriptions	Yes/ No/NA	Comments
1	Is clean distilled water/ boiled water being used in humidifier bottles? (No Saline water should be used)		
2	Are the humidifier bottles cleaned and made sterile every 3-4 days?		
3	Are humidifier bottles being cleaned and made sterile after every patient is discharged		
4	Is the water level in humidifier bottles being properly maintained between minimum and maximum?		

K. DURA OXYGEN SYSTEM PRECAUTION FOR HUMIDIFIER BOTTLES AND OXYGEN POINTS

Sr. No.	Descriptions	Yes/ No/NA	Comments
1	Are the NIV masks being recycled by making them sterile?		
2	Are the Nasal Prongs / NRBM being recycled by making them sterile for at least 1 or 2 times?		
3	Are Safety Goggle being reused by the staff and not thrown away?		

Note: Sterile- Cidex or equivalent solution (Phthalaldehyde) and UV chambers can be used for sterilization. Sterilization must be carried out meticulously.

L. INVENTORY REPORT

Inventory of Tools and Spares required for Each Liquid tank				
Sr. No.	**Description**	**Required**	**Actual Available**	**Remarks**
1	Liquid Tank Valves of all type	3 Nos. each		
2	Safety relief valves, Internal valves, Excess flow Valves	3 Nos. each		
3	SMPV High Flow Regulators	3 Nos. each		
4	Liquid Tank gauges	3 Nos. each		

5	Nut, Couplings, joints	3 times of fitted Quantity		
6	Rubber / Metal Diaphragms of Regulator	4 Nos. each		
7	Rubber washers / Teflon washers 'O' Rings	10 times of fitted Quantity		
8	Teflon Tapes	10 Nos.		
9	Tool Box (Spanners, wrench, screwdrivers, Adjustable spanners etc)	3 sets		
* All these spares and tools should be kept in separate store in lock and key. 4 Nos. of keys should be available & distribute to four different person.				

(Name & Sign of Auditor)

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_____

(Name & Sign of Auditor)

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Date of Inspection / Audit: ____ / _____ /2021

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