Post-Commissioning Assessment Form

For Medical Oxygen Plants

Date Published: 21 January 2024
This document was developed by Build Health International for the Global Fund's Project BOXER.

Introduction: This document is a checklist that should be utilized to confirm that a PSA plant 1) has been correctly installed and 2) is performing optimally. Due to the highly technical nature of the checklist, it is recommended that only staff with the technical skillset and appropriate tools utilize this checklist as a means to verify quality assurance.

Hospital Information			
Form Completed By	**Name**		**Title**
Hospital / Facility Name			
Date of Visit			
Hospital Contact Information	**Name**		**Title**
	Number (include country code)		**Email**
	Preferred contact method	☐	**Phone**
		☐	**WhatsApp**
		☐	**Email**

In the sections below, the gray box for "Yes" or "No" indicates the desired answer.

Administrative		
1	Who will be responsible for completing the daily checklist for the oxygen plant (PSA Plant Operator)? List their names and contact information here.	

2	Who will review the daily checklist filled out by the PSA Plant Operator (Biomedical Engineer)? List their name(s) and contact information here.						
3	Does the hospital have contact information for the oxygen plant supplier? If yes, include it here. *Contact Information:*	☐	No	☐	Yes	☐	n/a
4	Has the hospital identified a focal point to communicate with the supplier? If yes, who is it? *Focal Point:*	☐	No	☐	Yes	☐	n/a
5	Does the oxygen plant have a service agreement? If yes, what is the duration of the agreement?	☐	No	☐	Yes	☐	n/a
6	Have the PSA Plant Operators, Biomedical Engineer, and Hospital Oxygen Advocate read and understood the service contract?	☐	No	☐	Yes	☐	n/a
7	Have the PSA Plant Operators, Biomedical Engineer, and Hospital Oxygen Advocate read and understood the oxygen plant warranty?	☐	No	☐	Yes	☐	n/a
8	Who will be responsible for budgeting for spare parts, electrical bills, pay for staff, and other PSA plant operating costs (Hospital Oxygen Advocate)? Often a person in hospital administration. List their name and contact information here.						
9	Has the hospital included oxygen plant staffing needs in the annual budget?	☐	No	☐	Yes	☐	n/a
10	Has the hospital included provisions for increased electricity costs in the annual budget?	☐	No	☐	Yes	☐	n/a
11	If the hospital **does not** have a service contract or spare parts kits, has a provision for spare parts and servicing been included in the annual budget?	☐	No	☐	Yes	☐	n/a
12	If the hospital **does** have a service contract and spare parts kits, are they aware of the need to plan to budget for spare parts after the service contract terminates?	☐	No	☐	Yes	☐	n/a
13	Do hospital technical staff have the tools needed to operate the plant? If no, specify what is missing. Refer to 3.23 tool kit lists.	☐	No	☐	Yes	☐	n/a

Oxygen Plant Area Conditions							
Tools Required: Tape measure							
1	Drop a pin at the oxygen plant location.	☐	Completed				
2	Is the area free of trash and debris that could be a fire hazard, trip hazard or accumulate on cooling vents and filter elements?	☐	No	☐	Yes	☐	n/a
3	Is there sufficient space around the PSA plant for access to operation and maintenance tasks?	☐	No	☐	Yes	☐	n/a

4	Is the plant site located a minimum of 10m away from open flames, smoke, diesel generators, incinerator exhausts, and other similar exhaust emitting equipment or areas to prevent ingestion of fumes?	☐	No	☐	Yes	☐	n/a
5	Is the plant in an area free of standing water and not in an area prone to flooding?	☐	No	☐	Yes	☐	n/a
6	Is the plant protected from blowing dust, dirt, sand, rain, sleet and snow from entering the plant room?	☐	No	☐	Yes	☐	n/a
7	Are the plant & cylinder storage area shaded from direct sunlight?	☐	No	☐	Yes	☐	n/a
8	Is the plant in an area where equipment noise is not objectionable?	☐	No	☐	Yes	☐	n/a
9	Is there a fire extinguisher in the PSA plant container or house?	☐	No	☐	Yes	☐	n/a

HVAC							
Tools Required: Infrared thermometer temperature gun							
1	Is the space ventilated? Are there louvers or windows to allow for fresh air intake?	☐	No	☐	Yes	☐	n/a
2	Is the air compressor exhaust directly vented/ducted and prevented from immediately returning into the room?	☐	No	☐	Yes	☐	n/a
3	Measure the temperature in the plant room after compressors have been running for a while (at least 30 min). Record temperature and check against the manufacturer specifications to make sure it is below the maximum ambient temperature for compressor operation.	☐	Completed		*Temperature:*		

Oxygen Plant			
Tools Required: Infrared thermometer temperature gun			
1	Verify oxygen plant specifications by photographing nameplates of: air compressor, air tank, oxygen generator, oxygen tank, booster compressor (if applicable), dryers (external only), and dryer filters (external only).	☐	Completed
2	Ensure correct phase rotation through one of the following methods: 1. Bump test 2. Phase rotation meter	☐	Completed

3	Check that the setpoint (for VSD compressors) or the load/unload point (all other motor types) matches manufacturer specification	☐	Completed		*Setpoint (psi or bar):* *Manual (psi or bar):* *Matching (Y/N)?*	
4	Using a clamp meter, measure inrush current after turning on the compressor & following the start sequence specified in the manual.	☐	Completed		*Current (A):*	
5	Verify that the compressor unloads/stops at the correct pressure as specified in the manual	☐	Completed		*Unload pressure (psi or bar):* *Manual (psi or bar):* *Matching (Y/N)?*	
6	While compressor is running, check for oil leaks. Are there any leaks present?	☐	No	☐	Yes	
7	While compressor is running, check for air leaks in the air line. Are there any leaks? If yes, specify where & take photos.	☐	No	☐	Yes	
8	Check Pressure Dew Point (PDP). Value should be between 3-5 degrees C.	☐	Completed		*PDP (degrees C):*	
9	Refer to manual for instructions on when to read oil level (i.e. while compressor is running, after it is shut off, etc). Is the oil level adequate compared to specifications in the manual?	☐	No	☐	Yes	
10	Check all condensate drains-- are all of them functional? If no, specify which. - Air compressor - Filters - Dryer - Air tank - Any other drains in system This can be done by pressing the test button and watching to ensure that water is flushed out. On manual drains, this will need to be done by hand.	☐	No	☐	Yes	
11	Verify that condensate is collected in a bucket or piped outside of the building	☐	No	☐	Yes	

12	While the compressor is still running, open the inlet and outlet valves to the oxygen concentrator. Turn the concentrator on manual mode. Check feed air regulator setting against the manual	☐	Completed	*Setpoint (psi or bar):* *Manual (psi or bar):* *Matching (Y/N)?*
13	Empty oxygen storage tank(s), run the plant until it is full again, then check the oxygen purity at the output of the tank with a handheld analyzer. This should be between 90% and 96%.	☐	Completed	*Purity (%) after 1 hour:* *Purity (%) after 2 hours:* *Purity (%) after 3 hours:*
14	Observe pressure swing in the sieve beds as purity is building. Note any issues or abnormalities (uneven maximum, minimum, or equalization pressures) and cross-check values against the ranges specified in the manual.	Bed A Max		*Pressure range as specified in manual:*
		Bed A Min		
		Equalization A		
		Bed B Max		
		Bed B Min		
		Equalization B		
15	Take a video of the HMI or the pressure gauges as the oxygen concentrator moves through a full cycle	☐	Completed	
16	Turn the oxygen concentrator on Auto mode. Record the pressure in the O2 storage tank when it goes on standby. Cross-check against pressure switch setpoint specified in manual.	☐	Completed	*Pressure Setpoint:* *Specification in Manual:*
17	Bleed off some oxygen from the tank and record the tank pressure at which the oxygen concentrator resumes generation (while on Auto mode)	☐	Completed	*Pressure Setpoint:* *Specification in Manual:*

Cylinder-Filling System								
Skip this section if the plant does not have cylinder-filling capability								
Tools Required: Handheld oxygen analyzer								
1	Are cylinder valves compatible with the pigtails?	☐	No	☐	Yes	☐	n/a	
2	Try turning the booster compressor ON while the output valve of the O2 tank is closed. Confirm that it does not power on, or that it stops quickly if it does.	☐	Completed					

3	Open the valve & turn the booster compressor on to Manual/Hand mode. Record the inlet/suction gauge pressure. Ensure that it matches setpoint specified in the manual.	☐	Completed	*Pressure:*
	RIX 2V3B should be 30-40PSI			
	RIX 2PS should be 30-40PSI			
	Bailian GOW-15/4-150 0.3-0.4MPa			
	Bailian GOW-3/4-150 0.4MPa			
4	Switch the booster compressor to auto mode & begin filling 1 cylinder. Confirm that the booster compressor shuts off automatically when the cylinder is filled and record the cylinder pressure at that time (should be around 150 bar)	☐	Completed	*Pressure (psi or bar):*
5	Record the amount of time to fill 1 cylinder. Cross check with booster compressor design filling rate to ensure efficiency. *Booster compressor design filling rate (m3/h or other units of flow):*	☐	Completed	*Time to fill (h):* *Cylinder size (L):* *Booster flow (Nm3/h):*
6	Check oxygen purity of filled cylinders.	☐	Completed *Number of cylinders checked and purity:*	

Piping				
Capture existing piping information and/or details of the incoming system if it has been purchased or if a contract has decided what they will install.				
Tools required: Calipers, spray bottle & grease-free dish soap				
1	Record regulator output pressure setting at the outlet of the oxygen storage tank. Cross check against manual.	☐	Completed	*Pressure (psi or bar):* *Cross check against manual if specified*
2	Confirm there are shut off valves between each component and between the PSA plants and the wards.	☐	Completed	
3	If pipeline is supplied directly from the plant, confirm that there is a backup manifold	☐	Completed	
4	Test low oxygen pressure alarm and automatic changeover. Shut off supply to hospital from the tank to confirm that the changeover works (supply should switch to backup manifold - ensure at least 1 full cylinder attached).	☐	Completed	
5	Measurement of main branch pipe (diameter)	☐	Completed	*Diameter (mm):*

6	Measurement of ward pipes (diameter)	☐	Completed				*Diameter (mm):*	
7	Check the pipeline: Are there any deformed pipes or unacceptable bends in the pipe?	☐	No	☐	Yes	☐	n/a	
8	Inspect sample of brazing work for quality. Check 1-2 locations for leaks (soapy water test or visual/audible inspection)	☐	Completed		*Note locations checked:* *Note location of any leaks:*			
9	Check the oxygen purity and leaks at the outlets.	☐	Completed				*Number of outlets checked and purity:*	
10	Are the flow meters compatible with the outlets? *Outlet & probe standard:*	☐	No	☐	Yes	☐	n/a	
11	Check the location of zone valves/alarms (for fire safety and quick access/detection by nurses).	☐	Completed					
12	Test all zone alarms by shutting the zone valves & confirming that the alarm sounds	☐	Completed					

Oxygen Use							
1	How many cylinders does the hospital have on site? *As a rule of thumb, it is recommended to have approximately 3x the number of cylinders you plan to fill in a 24 hour period.*	☐	Completed		*Quantity:* *Size (L):* *Note how many are damaged:*		
2	Is there a dedicated space for cylinder storage?	☐	No	☐	Yes	☐	n/a
3	Does the cylinder storage space include racks and/or chains to secure cylinders safely?	☐	No	☐	Yes	☐	n/a
4	Speak with hospital staff: are they getting enough oxygen at the oxygen outlet?	☐	No	☐	Yes	☐	n/a