Test Plan
P1 – 24 Hour Baseline
Phase 4, Medical Concentrator Assessment

Draft C

NOTE: This test plan is to be reviewed and adjusted as required by appropriate LabTest Certification personnel to ensure safety. Appropriate LabTest Certification personnel are to determine the equipment set up that ensures safe operation and accurate results.

The PURPOSE of this high-level test plan is to provide LabTest Certification with information that allows them to write detailed Test Procedures and design a test equipment setup that will be safe and accurate.

The below tests are to be performed on O2 concentrator models supplied by DT Global specifically for Performance Testing.

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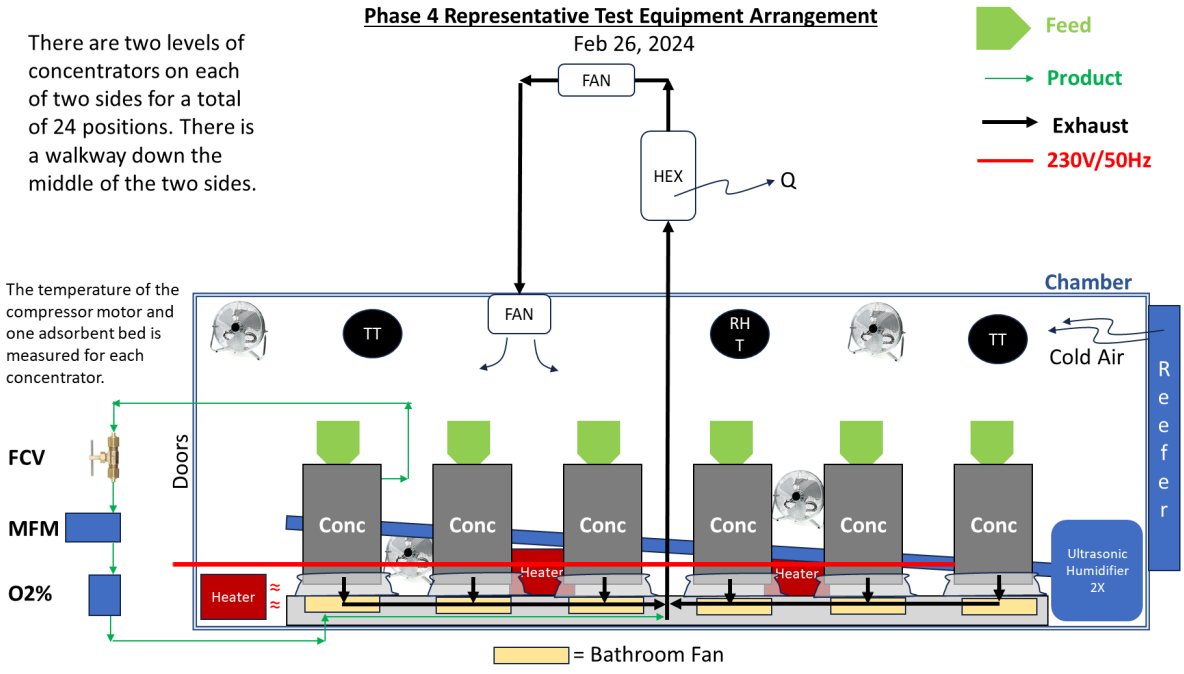
1. Test Name
   - **P1 – 24 Hour Baseline**

2. Relationship with Operation in Low Resource Settings (LRS) – for Reference Only
   - High temperature (~40°C) and average humidity (~50% RH) are typical in LRS.
   - Constant operation of the concentrator, at full flow rate, is typical in LRS.
   - Concentrators have been seen to lose performance during shipping, and arrive at site already degraded. Constant operation has been seen to recover some lost performance.

3. Test Objective (Pass/Fail Criteria)
   - To recover any performance lost during transit and storage (if possible).
   - To confirm the oxygen concentrator model can produce the required oxygen concentration of >82 vol % at a product flow rates 10 SLPM (0°C & 1 atm) when operated at 40°C.

4. Test Apparatus
   - Environmental Chamber, power supply, sensors, data logging.
   - Up to twenty (20) Concentrators, typically in pairs (i.e., two units of each model tested).
   - Schematic shown below.
   - The chamber is at varying temperature and relative humidity during the test. The concentrators are on, and the product flows of all test units are set at 9.5 lpm to 10.0 lpm.



5. Test Procedure

5.1 This is the initial test in the series, so the chamber will be starting from ambient conditions. The chamber doors should be closed, and remain closed throughout the test. Continue data logging all measurements at a rate of 0.2 Hz (1 reading/5 seconds).

5.2 Turn on concentrators, using the remote on/off mechanism (pre-programmed). Fans under concentrators should turn off automatically.

5.3 Bring chamber to High Temperature Baseline of 40°C and 50% RH.

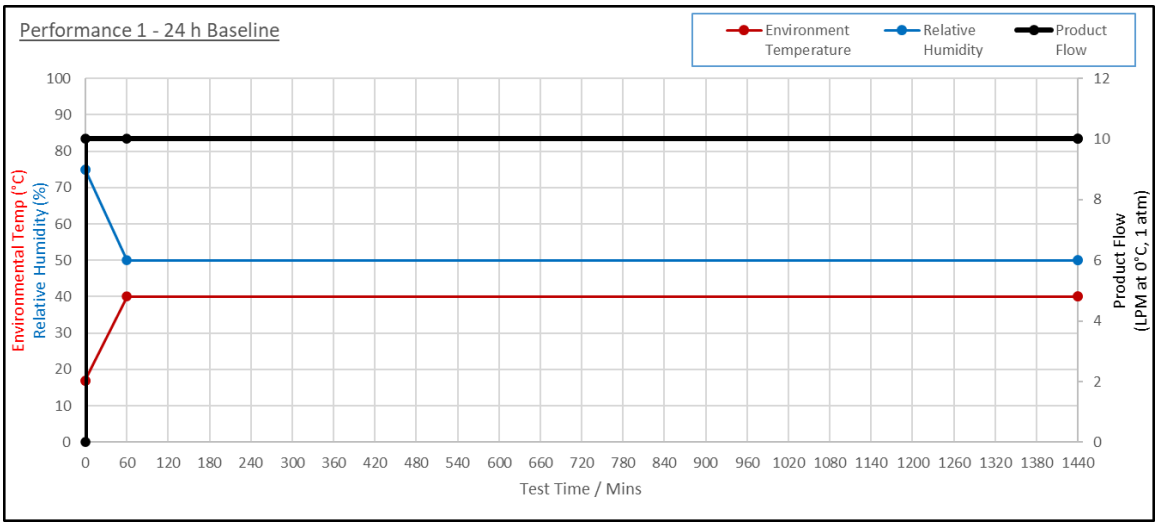
5.4 Hold at baseline test conditions of 40°C and 50% RH for 23 hours.

- Concentrator product flow rate as indicated by the Mass Flow Meters must stay between 9.7 lpm and 10.0 lpm at 40°C & 50% RH. Therefore, the manual needle values at the instrument rack will be used periodically to adjust the flow rates. This will be done by downloading data at the beginning and checking the averages, then updating the needle valves where needed. This will be repeated a few times during this test, especially in the last hour or two.

5.5 The next test (**Protocol 2 – Low and High Temperature Characterization**), is run continuously (sequentially) with this test. Do not shut down the test station.

5.6 If the test is interrupted, the test will be restarted as soon as possible, and the team will determine how much of the test should be repeated.

6. Planned Profile of Chamber T & RH and Product Flow vs. Time



7. Data Table

- Chamber temperature and humidity vary during this test, but product flow remains constant.
- If product O_2 concentration declines more than 2 percentage points (at the same temperature and humidity) during the test, report this to the client.

Stream	Parameter	Test Range	Unit	Input/Output	Logging Rate
Chamber	Temperature	20 or 40	°C	Input	0.2 Hz
Chamber	RH	50	%	Input	0.2 Hz
Chamber	Pressure	Atmospheric	kPa	Input	NA
Feed	O_2 Conc.	21%	Vol %	NA	NA
Feed	Flow	~100 to 150	SLPM	NA	NA
Product	O_2 Conc.	82 to 95	Vol %	Output	0.2 Hz
Product	Flow Rate	10.0	SLPM	Input	0.2 Hz
Exhaust	O_2 Conc.	<21 %	Vol %	NA	NA
Exhaust	Flow Rate	~90 to 140	SLPM	NA	NA
Bed Temp.	Temperature	Est. 40 to 80	°C	Output	0.2 Hz
Comp. Temp	Temperature	Est. 60 to 100	°C	Output	0.2 Hz

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