

Test Plan
Repairability Assessment
Phase 4, Medical Concentrator Assessment
Draft A

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

- **Repairability Assessment**

2. Relationship with Operation in Low Resource Settings (LRS) – for Reference Only

- Oxygen concentrators require routine maintenance and repair.
- As the time and difficulty for repair increase, the chance that they will be repaired and repaired correctly decreases.

3. Test Objective

- To partially disassemble and inspect medical oxygen concentrators to determine dust mitigation strategies, moisture mitigation strategies, the number of feed end solenoid valves, the number of product end solenoid valves, the number of check valves in the product lines, the presence of status indicators for key components, and the type of oxygen sensor.
- To perform a series of representative service tasks to assist in assessing and comparing the repairability of medical oxygen concentrators.

4. Test Apparatus

- Medical oxygen concentrator to be assessed
- Tools:
 - Slotted screwdriver
 - Phillips screwdriver
 - Hex screwdriver
 - Ratchet set (metric and imperial)
 - Adjustable wrench
 - Clipper for zip ties
 - Special tools, if needed (e.g., Torx screwdriver)
- Stopwatch
- Video camera (cellphone acceptable) and tripod
- Repairability Assessment Test Record (to be filled in for each unit during procedure)

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5. Test Procedure

- 5.1 Start Video Camera and state name and model of concentrator.
- 5.2 Remove Cabinet Filter(s).
 - 1. Start timer.
 - 2. Remove all cabinet filters.
 - 3. Stop timer.
 - 4. Record time, tools used, and any observations on the Repairability Assessment Checklist.
 - 5. If unit does not have cabinet filter(s), record that on the checklist and skip this procedure.
- 5.3 Remove Feed Filter(s) (to compressor).
 - 1. Start timer.
 - 2. Remove all feed filters.
 - 3. Stop timer.
 - 4. Record time, tools used, and any observations on the Repairability Assessment Checklist.
 - 5. If removing and replacing the feed filter requires dis- and re-assembly of the cabinet, be sure to include the time required to perform both tasks.
 - 6. If the concentrator doesn't have feed filter(s), record that on the checklist and skip this procedure.
- 5.4 Open Cabinet
 - 1. Start timer.
 - 2. Open cabinet.
 - 3. Stop timer.
 - 4. Record number of cabinet panels, time, tools used, numbers of screws and other connectors, complexity rating from 1-10, and any observations on the Repairability Assessment Checklist.
 - 5. Photograph all screws, straps, etc. removed during this task.
- 5.5 Remove Sieve Beds.
 - 1. Start timer.
 - 2. Remove sieve beds.
 - 3. Stop timer.
 - 4. Record time, tools used, numbers of screws and other connectors, complexity rating from 1-10, and any observations on the Repairability Assessment Checklist.
 - 5. Photograph all screws, straps, etc. removed during this task.

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- 5.6 Remove Compressor.
1. Start timer.
 2. Remove compressor.
 3. Stop timer.
 4. Record time, tools used, numbers of screws and other connectors, complexity rating from 1-10, and any observations on the Repairability Assessment Checklist.
 5. Photograph all screws, straps, connectors, hose barbs, etc. removed during this task.
- 5.7 Stop Video Camera.
- 5.8 Identify Components.
1. Complete the Repairability Assessment Checklist.
 2. Photograph or video identified components – take it slow, and hold for a few seconds on each component.
 3. Record observations on accessibility and estimated ease of removing and replacing components as noted.
 4. Note any obvious dust mitigation strategies that are observed during this process.
- 5.9 Record Time and Difficulty in the Repairability Summary Data Worksheet.
1. Record the various times and difficulties in the Repairability Summary Data Worksheet (numbers in [blue](#)).
 2. The worksheet will record the totals and note rankings by cell color.
 3. Force rank the concentrators, based on the overall rankings.