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A330-200-MRTT- Oxygen (ATA35). Functional Tests

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Resumen/Summary

This document defines the Functional Tests to be performed for the modified oxygen subsystems (ATA 35) on the A330-MRTT aircraft for the RAAF.

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José Moreno (Programs Dept.)	**Realizado** **Prepared**		**Firma** **Signature**
Javier Yagüe (Systems Integrator)	Pablo Blázquez Muñoz (ECS Department Engineer)		
Mercedes Visires Sanz (Head of CAP Quality Department)			
Antonio Padín Alcorlo (Conversion center)			
Francisco Javier Sacristán Rodea (General Systems Subdirector)			
Antonio San José Orche (Design Integrator)	**Comprobado** **Checked**	Ángel García Zuazo (ECS Department Engineer)	
Jesús Villasante San Román (Aircraft Systems Department)	**Aprobado** **Approved**	F.J. Redondo Carracedo (Head of ECS department)	

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1. INTRODUCTION

This document defines the Functional Tests to be performed for the modified oxygen subsystems (ATA 35) on the A330-MRTT aircraft for the RAAF.

In this document are highlighted the tests to be performed and their objectives.

1.1 OBJECTIVE

The objective of the Functional Tests is to demonstrate the correct installation, function and operation of the modified subsystems regarding ATA35.

In addition, as stated in its corresponding TPP (Ref.1 & Ref.2), these functional tests will serve to show compliance with:

- **JAR 25.1301 (d)** Checking that new equipment functions properly when installed.
- **JAR 25.1309 (a)** The equipment, systems, and installations whose functioning is required by the JAR and national operating regulations must be designed to ensure that they perform their intended functions under any foreseeable operating conditions.

1.2 APPLICABILITY

This document is only applicable to A330-MRTT for the RAAF.

For the MRTT of the RAAF, two versions will be certified:

- Civil Version (certified by EASA)
- Military Version (certified by INTA)

This document is applicable to the both above-mentioned versions.

1.3 REFERENCES

Ref. 1	DT-FA-SGE-06004	A330-200-MRTT- RAAF- OXYGEN (ATA35). CIVIL CERTIFICATION TEST PROGRAM PLAN
Ref. 2	DT-FA-SGE-06005	A330-200-MRTT- RAAF- OXYGEN (ATA35). MILITARY CERTIFICATION TEST PROGRAM PLAN
Ref. 3	F351A1000000	A330-MRTT Oxygen Installation Drawing
Ref. 4	621253-3	A330-MRTT CRC Installation Drawing
Ref. 5	NWF257A4000-01	CRC Electrical Interfaces Drawing (I)
Ref. 6	NWF257A4001-01	CRC Electrical Interfaces Drawing (II)

1.4 LIST OF ABBREVIATIONS

a/c	Aircraft
ACP	Audio Control Panel
ARBS	Advanced Refuelling Boom System
ARO	Air Refuelling Operator
F/O	First Officer

FFQD	Full Face Quick Donning
GND	Ground
LP	Low pressure
MCO	Mission Coordinator
MRTT	Multi Role Transport Tanker
PBS	Pushbutton Switch
RAAF	Royal Australian Air Force
TPP	Test Program Plan

2. AIRCRAFT CONFIGURATION

The functional test shall be carried out with the oxygen system in its final configuration, that is, with the following modified oxygen subsystems installed and fully operative for the two A330-MRTT certification versions.

ATA 35-10. Crew Oxygen System

35-12: Oxygen Distribution:

The modified LP Oxygen supply lines shall be installed in order to provide oxygen to the five crewmember masks (Captain, F/O, Observer, ARO and MCO).

35-10. Crew Oxygen System:

The five full-face quick donning masks shall be installed and fully operative.

The applicable drawing is:

- Ref.3

ATA 35-20. Passenger Oxygen System

35-21. Passenger Oxygen Storage:

The CRC shall be installed and the two emergency chemical oxygen provisions placed inside CRC shall be also installed and fully operative.

The applicable drawings are:

- Ref.4
- Ref.5
- Ref.6

3. AUXILIARY TEST EQUIPMENT

- Circuit breakers safety clips
- Access platform to get access to door 811
- OXYGEN LEAK DETECTOR (USA MIL-PRF-25567 TYPE I), recommended:
  - Type OC I and OC II supplied by Winton Products Inc., Charlotte N.C. (USA)
  - Sherlock Leak detector fluids Type I and Type II supplied by Puritan Bennett Aero Systems Co Lenexa Kansas (USA)
- Pressure gage with the following characteristics:
  - Range: 0-150 psi (0 – 10,3421 bar)
  - Tolerance: ± 0.1 PSI (0,00689 bar)
  - Able to couple to a pressure port coupling 802856-01

4. PREVIOUS ACTIONS

For test 5.1 and 5.2

Check that oxygen cylinders in the avionics bay are installed, charged and ready.

Check that all the crewmembers oxygen supplies (FFQD masks and stowage boxes) are installed and fully operative according to Ref.3.

Check that LP Oxygen lines for crewmembers are installed according to Ref.3.

Make sure that the electrical bonding for the new LP Oxygen ducts has been done and checked.

For test 5.3

Check that the Passenger Oxygen subsystem is fully installed and operative.

Check that the CRC is fully installed and operative according to Ref.4, Ref.5 and Ref.6.

5. TESTS DESCRIPTION

5.1 LEAKAGE TEST OF THE LP OXYGEN SYSTEM FOR THE CREW

5.1.1 OBJECTIVE

- Demonstrate that there is no leakage on new ducting installation.

5.1.2 PROCEDURE

Tests defined below are required at GND only

WARNINGS:

- KEEP ALL HYDROCARBONS (FUELS, LUBRICANTS, ETC.) AWAY FROM ALL SOURCES OF OXYGEN. OXYGEN BECOMES EXPLOSIVE WHEN IT TOUCHES HYDROCARBONS.
- CLEAN THE TOOLS AND MAKE SURE YOUR HANDS ARE CLEAN TO PREVENT CONTAMINATION OF THE OXYGEN SYSTEM.

1. Put an access platform in position at the access door 811.
2. Open the access door 811.
3. Energize the aircraft electrical circuits
4. In the avionics compartment, open the cover of the oxygen compartment.
5. Do a check of the oxygen pressure on the direct-reading pressure gage of the oxygen cylinders 5750HT and 5751HT, and check that it is between (1500-1850 PSIG).
6. Close the valves of the oxygen cylinders (5750HT & 5751HT).
7. Make sure that this circuit breaker is closed:
    a. CREW OXY CTL (4HT) in panel 742VU
8. On the OXYGEN section of the overhead panel 211VU, release the CREW SUPPLY pushbutton switch (the OFF legend comes on).
9. On one of the FFQD mask stowage: Push the PRESS TO TEST AND RESET control button a sufficient number of times to make the system empty.
10. Remove the blanking cap of the test port (5755HT).
11. Install the pressure gage (See point 3) on the test port (5755HT).
12. Open the valves of the oxygen cylinders (5750HT & 5751HT) as indicated on the following steps:
    a. Open the two valves of the oxygen cylinders very slowly 3.5 to 4 turns.
    b. Let the pressure become stable for approximately 90 seconds.
    c. Fully open the valves of the oxygen cylinders.
13. On the OXYGEN section of the overhead panel 211VU, push the CREW SUPPLY pushbutton switch (the OFF legend goes off).
14. Let the pressure become stable.
15. Close the valves of the oxygen cylinders (5750HT & 5751HT).
16. Measure on the pressure gage the initial pressure P_1 in the LP system between 70 psi (4.8263 bar) and 94 psi (6.4810 bar).
17. Measure the Outside Air Temperature (OAT) and the cockpit temperature on the COND page of the ECAM System Display (SD).
18. Calculate the initial temperature: $T_1 = \frac{OAT + CockpitTemp}{2}$
19. Let the pressure become stable during 1 hour then measure the last pressure P_2.
20. Measure the Outside Air Temperature (OAT) and the cockpit temperature on the COND page of the ECAM System Display (SD).
21. Calculate the last temperature: $T_2 = \frac{OAT + CockpitTemp}{2}$
22. If the temperature has changed, do the pressure correction as follows: $P_C = P_1 \cdot \frac{273 + T_2}{273 + T_1}$

P_1=initial pressure

P_2=last pressure
T_1=initial temperature in deg.C
T_2=last temperature in deg.C
P_C=Corrected pressure

23. After the test, make sure that $P_C-P_2 \leq 2$ psi (0.1378 bar).
24. If $P_C-P_2 \geq 2$ (0.1378 bar):
    Do a leak test with the oxygen leak detector in all the oxygen pipes and connections. Then being sure that the cylinders valves are closed and there is not pressure in ducting replace the faulty components and do again a leak test (**from step 12 to 23**) until you get a stable pressure.
25. If the $P_C-P_2 \leq 2$ psi (0.1378 bar) then there is no leakage on the system and go to step 26.
26. On the OXYGEN section of the overhead panel 211VU, release the CREW SUPPLY pushbutton switch (the OFF legend comes on).
27. On one of the FFQD mask stowage: Push the PRESS TO TEST AND RESET control button a sufficient number of times to make the system empty.
28. Remove the pressure gage from the test port (5755HT).
29. Install the blanking cap on the test port (5755HT).
30. Make sure that the work area is clean and clear of tools and other items.
31. Open the valves of the oxygen cylinders (5750HT & 5751HT) as indicated on the following steps:
    a. Open the two valves of the oxygen cylinders very slowly 3.5 to 4 turns.
    b. Let the pressure become stable for approximately 90 seconds.
    c. Fully open the valves of the oxygen cylinders.
32. Close the cover of the oxygen compartment.
33. De-energize the aircraft electrical circuits
34. Close the access door 811.
35. Remove the access platform

5.2 OPERATIONAL TEST OF THE FULL-FACE/QUICK-DONNING OXYGEN MASK

5.2.1 OBJECTIVE

- Demonstrate there is effective oxygen supply for all crew members inside cockpit.
- Demonstrate that the new FFQD mask works correctly:
  - Harness inflation control plate
  - TEST and EMERGENCY Knob
  - N/100% rocker
  - Microphone
- Demonstrate that the new FFQD mask stowage box works correctly:
  - Flow indicator
  - RESET/TEST control button
  - Microphone pressure switch
  - OXY ON flag

5.2.2 PROCEDURE

Tests defined below are required at GND only. Performances of the Crew Oxygen Mask do not depend on altitude but for the in-built oxygen regulator. The mask manufacturer provides testing evidence of this component on the ATP's record of the equipment. Therefore, for functional tests defined at EADS-CASA level Flight Tests are deemed not necessary.

WARNINGS:

- KEEP ALL HYDROCARBONS (FUELS, LUBRICANTS, ETC.) AWAY FROM ALL SOURCES OF OXYGEN. OXYGEN BECOMES EXPLOSIVE WHEN IT TOUCHES HYDROCARBONS.
- CLEAN THE TOOLS AND MAKE SURE YOUR HANDS ARE CLEAN TO PREVENT CONTAMINATION OF THE OXYGEN SYSTEM.

1. Put an access platform in position at the access door 811.
2. Open the access door 811.
3. Energize the aircraft electrical circuits
4. Make sure that this circuit breaker is closed:
    a. CREW OXY CTL (4HT) in panel 742VU
5. On the panel 211VU, push the OXYGEN/CREW SUPPLY pushbutton switch (the OFF legend goes off).
6. Do a check of the oxygen pressure on the OXY page of the ECAM System Display (SD), and make sure that the pressure is between (1500-1850 PSIG).
7. On the door of the Captain's stowage box push the PRESS TO TEST AND RESET control button and check that:
    a. The flow rate indicator comes into view at the same time for a while (colour changes from black to yellow).
    b. You hear the oxygen flow-rate for a while.
8. On the door of the Captain's stowage box release the PRESS TO TEST AND RESET control button.
9. Repeat the steps from 7 to 8 for the following crewmember masks:
    a. First Officer
    b. Air Refuelling Operator
    c. Mission Coordinator
    d. Observer
10. On the **new** full-face/quick-donning oxygen-mask (Observer mask):
    a. Extract the FFQD mask from the stowage box.
    b. Close the doors of the Stowage box.
    c. Check that the OXY ON mark comes into view.
    d. Depress harness inflation control plate and check the harness inflates and acquires the diameter and rigidity that enables it to be donned.
    e. Don the FFQD mask.
    f. Release the harness control plate and check the harness is depressurized, and maintains the mask tightly against the face.
    g. Operate the N/100% rocker and lock it in each position. Check that the control operates and locks correctly.
    h. Set the N/100% rocker to NORMAL position and take several breaths. Check that the flow rate indicator comes into view when breathing.
    i. Set the N/100% rocker to 100% position and take several breaths. Check that the flow rate indicator comes into view when breathing.
    j. Maintain the N/100% rocker to 100% position and turn the PRESS TO TEST/EMERGENCY knob to emergency position during 1 second. Check that without inhaling, oxygen at positive pressure is diverted to the mask and you can hear the oxygen flow-rate.
    k. Take the mask off from the face.
11. On the Audio Control Panel (ACP) of the Captain station:
    a. Set the INT volume knob to ON.
    b. Adjust the audio level of INT reception knob to the minimum level that you can hear.
    c. Set the SPKR reception knob to ON
12. On the Audio Control Panel (ACP) of the station in maintenance (Observer station):
    a. Set the INT volume knob to ON.
    b. Adjust the audio level of INT reception knob to the minimum level that you can hear.
13. On the **new** full-face/quick-donning oxygen-mask (Observer mask):
    a. Speak into the oxygen mask microphone
    b. Verify that you hear your voice in the captain's loudspeaker
    c. Push the PRESS TO TEST AND RESET control button of the Stowage box
    d. Speak into the oxygen mask microphone
    e. Verify that you do NOT hear your voice in the captain's loudspeaker.
14. On the Audio Control Panel (ACP) of the Captain station:
    a. Set the INT volume knob to OFF.
    b. Set the SPKR reception knob to OFF
15. On the Audio Control Panel (ACP) of the station in maintenance (Observer station):
    a. Set the INT volume knob to OFF
16. Open the doors of the observer's stowage box and house the FFQD mask inside the Stowage box as indicated on the following steps:
    a. Wind three quarters of the full length of the microphone cable and flexible hose and put them at the bottom of the stowage box.
    b. During the steps that follow, make sure that the microphone cable and the flexible hose stay in position.

c. Put the harness straight against the mask and then, the microphone cable and the flexible hose straight against the harness. Make sure that the harness is not folded in the mask.
d. Put the mask in the correct position in its box (red harness inflation control-plates up and markings in view).
e. Adjust the regulator to the center.
f. Close the left flap door. Make sure that you can see the OXY ON flag.
g. Close the right door. Do not pinch the flexible hose.
h. Push the PRESS TO TEST AND RESET control slide. The OXY ON flag goes out of view.
i. Release the PRESS TO TEST AND RESET control slide.

17. On the panel 211VU:
    a. Release the OXYGEN/CREW SUPPLY pushbutton switch (the OFF legend comes on).
18. De-energize the aircraft electrical circuits
19. Close the access door 811.
20. Remove the access platform.

5.3 OPERATIONAL TEST OF THE NEW CRC OXYGEN SUPPLIES

5.3.1 OBJECTIVE

- Demonstrate that the continuity of the electrical installation for the new oxygen supplies inside the CRC is correct and when the "MASK MAN ON" pushbutton switch is pressed:
  - Oxygen mask are released (included the CRC masks)
  - Emergency announcement is broadcasted (included inside CRC)

5.3.2 PROCEDURE

Since the installation of the two (2) new oxygen containers (inside the CRC) does not affect the control and indicating of the passenger oxygen subsystem, deployment of the masks will be tested with the "MASK MAN ON" pushbutton. This test also covers the automatically deployment when there is a loss of cabin pressurization.

WARNINGS:

- KEEP ALL HYDROCARBONS (FUELS, LUBRICANTS, ETC.) AWAY FROM ALL SOURCES OF OXYGEN. OXYGEN BECOMES EXPLOSIVE WHEN IT TOUCHES HYDROCARBONS.
- CLEAN THE TOOLS AND MAKE SURE YOUR HANDS ARE CLEAN TO PREVENT CONTAMINATION OF THE OXYGEN SYSTEM.

1. Energize the aircraft electrical circuits
2. Get access to the avionics compartment and to the applicable 5000VE-series panel. Then make sure that these circuit breakers are closed in the panel 742VU:
   a. PAX OXY CTL: 4WR, 3WR, 2WR , 1WR
   b. PAX OXY ACTUATION: 5WR , 6WR , 7WR , 8WR , 9WR , 10WR , 11WR , 12WR.
3. On all of the emergency oxygen containers along the cabin (toilets and CRC included), pull out the doorstops with your fingers and turn them 90 degrees to the TEST position.
4. On the overhead panel 211VU:
   a. Lift the switch guard and push the MASK MAN ON pushbutton switch.
   b. Check all along the cabin, the doors of all emergency oxygen containers open in all areas of the cabin, specially the two (2) new CRC's oxygen containers.
   c. On the overhead panel 211VU, the SYS ON light comes on.
   d. Check that on the passenger address system (specially the CRC's passenger addresses), the emergency announcement starts. Note that the emergency announcement stops automatically when the pre-recorded announcement is completed.
5. On the maintenance panel 285VU:
   a. After 15 seconds push the TMR RESET pushbutton switch.
   b. On the overhead panel 211VU, the SYS ON light goes off.
   c. On the maintenance panel 285VU, the ON light on the TMR RESET pushbutton switch comes on for a short time and goes off again.
6. On the overhead panel 211VU:
   a. Make sure that the switch guard is in position over the MASK MAN ON pushbutton switch.
7. In the cabin:

a. Close all the doors of the emergency oxygen containers.

8. Make sure that the latches engage correctly.
9. Turn all the doorstops to the normal position and release them. Note that spring tension retracts the doorstops when they are in the normal position.
10. Remove the access platform.
11. De-energize the aircraft electrical circuits.