VIASYS™ HEALTHCARE Excellence For Life CRITICAL CARE DIVISION	TS, MICROBLENDER, HI/LO FLOW	TEST STANDARD

REVISIONS

REV	ECO#	DESCRIPTION	DATE
E	59321	REVISED PER ECO	11/19/03
F	59988	REVISED PER ECO	11/10/04
G	64859	REVISED AND RE-DRAWN PER ECO	2/13/09

TITLE:	NAME:	SIGNATURE:	DATE
DRAWN BY:	Denis LaNuevo	Denis LaNuevo	2/6/09
CHECKED BY:	Jennifer Rupert	J. Rupert	2/3/09
APPROVED BY:	Denis LaNuevo	Denis LaNuevo	2/6/09
RELEASED BY:	N Lacy	Hayden W Gray HL	2/13/09

DWG SIZE NO.	DWG NO.	REV.
A	90503	G

1.0 SCOPE

This document defines a general test procedure that when used with the specific Data Recording Sheet, (DRS) for the device under test, demonstrates that (the Unit-in-test) it conforms to all product performance specifications and requirements.

2.0 BACKGROUND

In addition to capturing pertinent data, the DRS is a test matrix containing specific test parameters for the device being tested. All functional parameters stated in the Device Specification are contained in the DRS. Although there are many hardware configurations allowing for a variety of inlet and outlet adaptations, the fundamental functional components, and sub-assemblies are common among the **Bird Microblender** models. Several variations of the standard configuration are available with "Primary" outlet ports located either at the bottom or on the left side, with primary, auxiliary, and supply gas fittings customized (OEM) and with some functional variations. Functional variations are detailed on corresponding DRSs. DRSs are listed on the top level drawing and/or on the MINX network.

3.0 APPLICABLE DOCUMENTS

3.1 Applicable DRS for the device under test.

3.2 Documents 91600, 91058 and 91059

3.3 Blender Re-processing Guide, 90636

4.0 GENERAL

4.1 Prior to testing, visually inspect the blender assembly to verify its conformance to the blender assembly drawing and to aesthetic requirements.

4.2 The unit to be tested must have been previously calibrated and the "alarm/bypass" adjusted sufficient to prevent bypass leakage. Refer to Manufacturing Assembly Guides, (MAG) 91600, 91058 and 91059 for pre-calibration, calibration and checkout details.

4.3 Re-processing (includes rework and re-test) of product is explained in document 90636.

5.0 TEST SETUP AND EQUIPMENT REQUIREMENTS

5.1 EQUIPMENT/MATERIALS REQUIREMENTS

No.	Description	Min. Range/Acc'y	Suggested Mfg.	Model/ID. No.
1.	Unit-in-Test, "Microblender"			TYPE 3800
4.	oxygen analyzer	0 to 100%, ± .1%	SYBRON, "Servomex"	Mod 570A
5.	pressure gage;	0 to 100 Psi ± 1%	Ashcroft, US Gage, etc.	
6.	pressure gage;	0 to 100 Psi, ± 1%	Ashcroft, US Gage, etc.	
	flow meter; **Q1-A** (direct reading)	0 to 15 Lpm, ± 4% FS	or equiv.	
	flow meter; **Q1-B** (direct reading)	0 to 35 Lpm, ± 4% FS	or equiv.	
	flow meter; **Q1-C** (direct reading)	20-140 Lpm, ± 4% FS	Fisher & Porter or equiv.	
	flow meter; **Q2** (direct reading)	0 to 15 Lpm, ± 4% FS	Fisher & Porter or equiv.	
	"bubble jar"	N/A		
	Leak Test Fixture	N/A	N/A	A01721

5.2 SCHEMATIC, TEST SET-UP IN LIEU OF BIRD STANDARD BLENDER TEST FIXTURE:

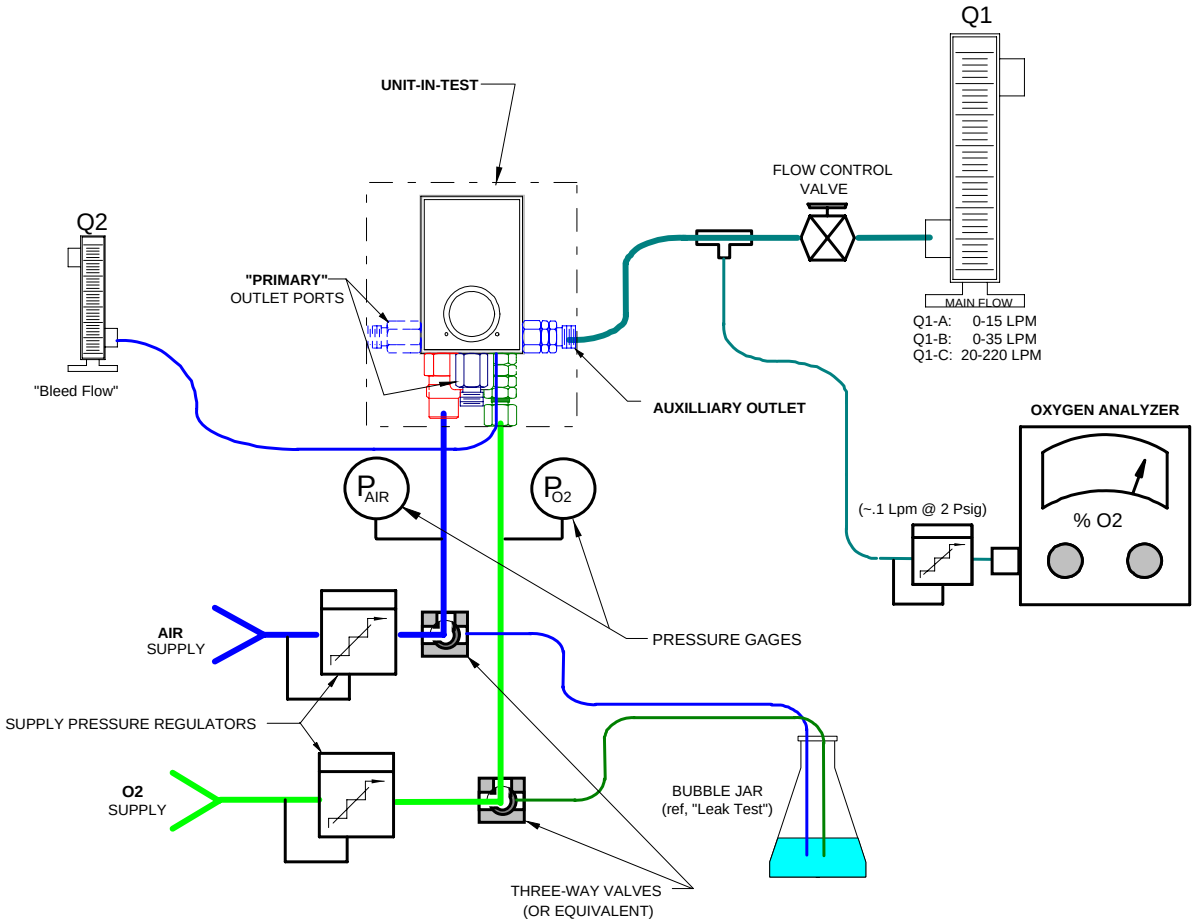

FIGURE 1

SET-UP NOTES: (Refer to Figure 1)

1. Verify calibration of the test station O_2 analyzer at 21% and 100% on a daily (minimum) basis.
2. Install the UNIT-IN-TEST in the test system per Figure 1. Note; standard units (e.g., 03800A) with a bottom located primary outlet are automatically connected at the primary when installed in the fixture.

   If the Microblender is fitted with an auxiliary outlet fitting, connect that fitting to the auxiliary outlet hose on the test station. Keep all Microblender outlets connected to the test station throughout the test unless otherwise directed.
3. Apply 50 Psig (AIR) to the air inlet and 50 Psig (O_2) to the oxygen inlet.
4. For testing Microblenders with flow meters ("UltraBlenders"), hook up the inputs to the Microblender in the normal manner to the test station. Connect the outlet being tested directly to the Oxygen Analyzer via a tubing assembly equivalent to that shown in Figure 2. Leave the opposite outlet disconnected (no hose).

   Adjust the flow to the required amount using the flow meter on the Microblender outlet being tested.

   It may be necessary to run the pump on the Oxygen Analyzer to supply it with adequate gas during the tests.

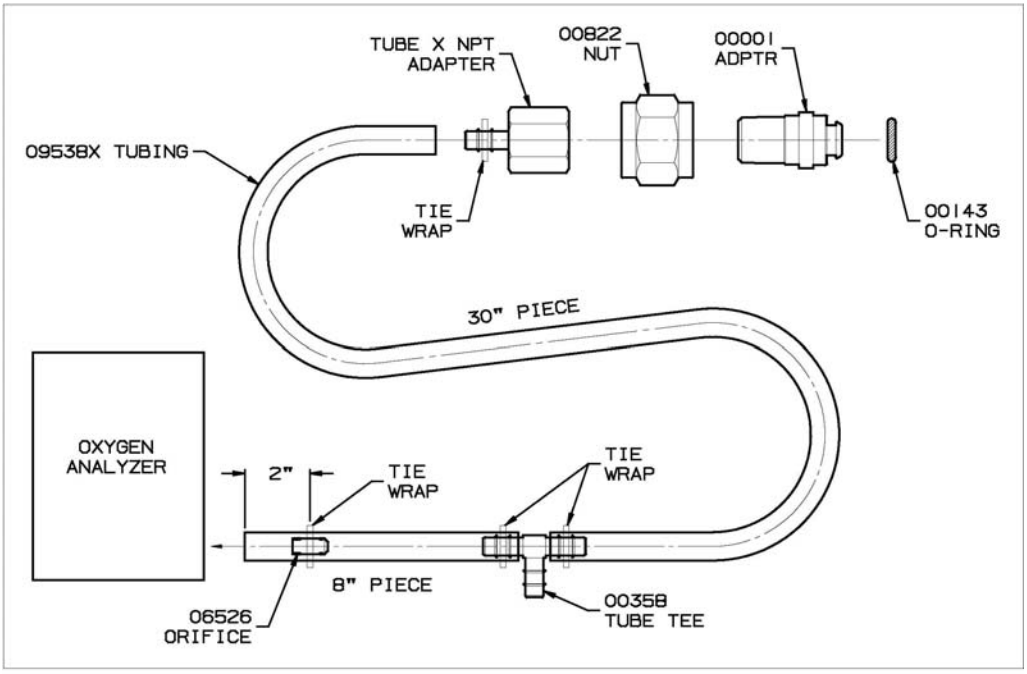

Figure 2
Outlet Tubing Assy. for UltraBlenders

6.0 PERFORMANCE TEST - PROCEDURE AND REQUIREMENTS

After installing the UNIT-IN-TEST in the test fixture, connect outlets as directed on DRS with flow directed to appropriate flow meter.

6.1 BLEED FLOW

STEP 1:

a. Install the bleed flow measurement adapter over the bleed outlet.

b. Read and record the indicated bleed flow on flow meter **Q2**, then remove the measurement apparatus.

Requirement: Refer to DRS of device being tested.

6.2 CALIBRATION CHECK: **Refer to Appendix A, Pre-Cal and Calibration Troubleshooting Guide, for calibration troubleshooting information.**

*Redirect the flow from auxiliary to primary port and direct flow to flow meter **Q1-**B. Adjust the flow control valve until the flow rate stated on DRS is obtained.*

STEP 2: Left end-point

a. Adjust the blender control knob to the left end-stop (21%) and allow the oxygen analyzer to stabilize (≈10 sec).

b. Read the test analyzer and record the indicated oxygen percentage.

Requirement: The O_2 Analyzer displays the range indicated on the DRS.

STEP 3: Right end-point

a. Adjust the blender control knob to the right end-stop (100%) and allow the oxygen analyzer to stabilize.

b. Read and record the indicated oxygen percentage.

Requirement: The O_2 Analyzer displays the range indicated on the DRS.

6.3 SET-POINT ACCURACY (Both gas supply pressures @ 50 Psig)

STEP 4: 30% Graduation

a. Adjust the blender control knob to the center of the 30% graduation mark and allow the oxygen analyzer to stabilize.

b. Read and record the indicated oxygen percentage on the analyzer.

Requirement: The O_2 Analyzer displays the range indicated on the DRS.

STEP 5: 90% Graduation

a. Adjust the blender control knob to the center of the 90% graduation mark and allow the oxygen analyzer to stabilize.

b. Read and record the indicated oxygen percentage on the analyzer.

Requirement: The O_2 Analyzer displays the range indicated on the DRS.

STEP 6: 60% Graduation

a. Adjust the blender control knob to the center of the 60% graduation mark and allow the oxygen analyzer to stabilize.

b. Read and record the indicated oxygen percentage on the analyzer.

Requirement: The O_2 Analyzer displays the range indicated on the DRS.

6.4 FLOW STABILITY

Without changing the blender control knob, redirect outlet flow from the Primary to the Auxiliary port. Adjust flow meter **Q1-B** to **0 (zero)**. Set the flowmeter **Q1-A** to DRS value.

STEP 7: Stability at 60%

a. Adjust flow meter Q1-A (0-15 Lpm) to obtain stated DRS flow from the auxiliary outlet.

b. Allow the oxygen analyzer to stabilize (≈ 20 sec.), then read and record the indicated oxygen percentage.

Requirement: The O_2 Analyzer displays the DRS value.

STEP 8: 30% Check-point

a. Adjust the blender control knob to the center of the 30% graduation mark and allow the oxygen analyzer to stabilize.

b. Read and record the indicated oxygen percentage on the analyzer.

Requirement: The O_2 Analyzer displays the range indicated on the DRS.

STEP 9: 90% Check-point

a. Adjust the blender control knob to the center of the 90% graduation mark and allow the oxygen analyzer to stabilize.

b. Read and record the indicated oxygen percentage on the analyzer.

Requirement: The O_2 Analyzer displays the range indicated on the DRS.

6.5 PRESSURE STABILITY

STEP 10: 60% Set-point

a. Direct the flow from the Primary port to flowmeter Q1-B. Set flow meter Q1-A to **0 (zero)**. Adjust (Q1-B) flow meter to DRS value. Set the blender control knob to the center of the 60% graduation and allow the analyzer to stabilize.

b. Read and record the indicated oxygen percentage on the analyzer.

Requirement: The O_2 Analyzer displays the range indicated on the DRS.

STEP 11: PRESSURE IMBALANCE - $P_{AIR} > P_{O2}$

a. Adjust the **Air** supply pressure regulator to stated DRS value.

b. Allow the oxygen analyzer to stabilize, then read and record the indicated oxygen percentage.

Requirement: The O_2 Analyzer displays the range indicated on the DRS.

STEP 12: PRESSURE IMBALANCE - $P_{AIR} < P_{O2}$

a. Adjust the **Air** pressure regulator to stated DRS value.

b. Allow the oxygen analyzer to stabilize, then read and record the indicated oxygen percentage.

Requirement: The O_2 Analyzer displays the range indicated on the DRS.

6.6 ALARM/BYPASS OPERATION

STEP 13: "Low AIR" Alarm Actuation

a. Gradually reduce Air supply pressure until the blender alarm sounds.

b. Record the air pressure at which point the alarm sounds.

Requirement: With O2 at DRS stated value, the alarm must sound when Air pressure drops to the value indicated on the DRS.

STEP 14: "Low AIR" Alarm Reset

a. Gradually increase Air supply pressure until the blender alarm stops.

b. Observe and record the air pressure at which point the alarm stops.

Requirement: The alarm resets at or before Air supply pressure indicated on the DRS.

c. Re-adjust the Air supply pressure to DRS stated value.

STEP 15: "Low O2" Alarm Actuation

a. Gradually reduce Oxygen supply pressure until the blender alarm sounds.

b. Record the O_2 pressure at which point the alarm sounds.

Requirement: With Air set a DRS value, the alarm must sound when O2 pressure drops to DRS stated value.

STEP 16: "Low O2" Alarm Reset

a. Gradually increase Oxygen supply pressure until the blender alarm stops.

b. Observe and record the O2 pressure at which point the alarm stops.

Requirement: The alarm resets at or before Air supply pressure reaches DRS stated value.

c. Re-adjust the Oxygen supply regulator to DRS stated value.

6.7 FLOW CAPACITY

Notes:

1. If the test station being used to conduct this test is not equipped with a 20 to 220 Lpm flow meter, the UIT must be relocated to a station with a flow meter of this capacity in order to conduct the following tests.
2. The following tests (Steps 17 through 22) may be conducted with **air** only applied to both gas inlets.

STEP 17: Auxiliary Outlet - Unrestricted Flow (with both Gas Supplies @ DRS stated value).

a. Turn off gas supplies to both the Air and O_2 inlets. Connect a hose from the Auxiliary outlet directly to the flow meter (ref., Q1-C).

b. Turn both gas supplies back on, then observe and record the flow rate at flow meter **Q1-C**.

Requirement: The flow rate from the Auxiliary outlet must be within the value stated on the DRS.

c. Turn off gas supplies to both the Air and O_2 inlets. Disconnect the hose from the Auxiliary outlet and reconnect to the Primary outlet.

STEP 18: Primary Outlet - Unrestricted Flow (with both Gas Supplies @ DRS stated value).

a. Turn both gas supplies back on.

b. Observe and record the flow rate at flowmeter **Q1-C**.

Requirement: The flow rate from the Primary outlet must be within DRS stated value.

c. Turn off gas supplies to both the Air and O_2 inlets.

STEP 19: Bypass Flow, Loss of Air Supply

Shut off the gas supply to Air inlet. Turn the O_2 gas supply on. Verify it is set at the DRS stated value. Record the flow rate at flow meter **Q1**.

Requirement: With **only** the Oxygen supply pressure set at DRS stated value; the flow rate from the Primary outlet must be within the stated DRS value.

STEP 20: Bypass Flow, Loss of O2 Supply

a. Return the Air supply pressure to stated DRS value. During bypass Flow test the outlet flow must be restricted to ~ 80LPM for P/N 11329.

b. Shut off the gas supply to Oxygen inlet. Observe and record the flow rate at flow meter Q1.

Requirement: With **only** the Air supply pressure at stated DRS value, the flow rate from the Primary outlet must be within the DRS stated value.

6.8 REVERSE FLOW CHECKING

STEP 21: Reverse Flow, Air to Oxygen

a. Reduce both gas supply pressures to **0 (zero)** Psig by adjusting the regulators.

b. Adjust the toggle valve on the oxygen supply line to direct any reverse flow to the "bubble" jar.

c. Gradually increase the air supply pressure to DRS stated value. Observe the bubble jar and count the bubbles (if any) for **30** seconds. Record the results of the count. Note, worst case leak may occur at some point before reaching DRS stated value.

Requirement: 1 bubble or less in a **30** sec. period.

STEP 22: Reverse Flow, Oxygen to Air

a. Reduce the Air supply pressure to **0 (zero)** Psig and adjust the toggle valve on the air supply line to direct any reverse flow to the "bubble" jar.

b. Adjust the toggle valve on the oxygen supply side to reopen the supply line.

c. Gradually increase the oxygen supply pressure to DRS stated value. Observe the bubble jar and count the bubbles (if any) for **30** seconds. Record the results of the count.

Requirement: 1 bubble or less in a **30** sec. period.

6.9 LEAK TEST

Note: The leak test must be performed after all adjustments are done (after calibration process) and should be recorded on the applicable DRS.

a. Unless the auxiliary output port (near Muffler) receives a no-bleed fitting, plug this port with P/N 20151 cap and P/N 00193 O-ring for the leak test. Install the appropriate fitting (s) after the leak is complete.

b. Attach air and oxygen fitting of the blender to the leak test fixture to perform the leak test.

c. Open the ball valve of the leak test fixture and adjust the pressure to 50.0 ± .1 psi.

d. Close the ball valve and observe the pressure for two minutes

e. Follow the appropriate action:

- If the pressure drop was no more than two psi in two minutes (one psi per minutes) proceed with any remaining testing.
- If the pressured drop was more than two psi in two minutes, use “snoop” to locate the leak and repair the blender according. Then verify the repair(s) by repeating the above leak test.

APPENDIX A

PRE-CAL & CALIBRATION TROUBLESHOOTING GUIDE

I. Blender Accuracy Performance Check

Perform the following routine when end-stop accuracies are in specification but 30's / 60's or 90's are out.

1. Offset blender supply pressures to 40/50 psig or as stated on DRS.
2. Begin at left end stop with primary flow set 14-15 lpm maximum.
3. Select 30%. If the FIO2 is out of tolerance increase the flow to 40-50 lpm. Note the difference in FIO2 when flow is increased.
4. Repeat step 3 (always start at 14-15 lpm flow) selecting 60% or 90% respectively. Note the difference in FIO2 when flow is increased.
5. Significant changes in FIO2 accuracies (changes by 1.0-2.0% O_2 concentration) when flows are increased indicate front or rear balance blocks are not functioning normally.
6. Begin by inverting front balance block and retesting steps 2-5. The rear set of balance blocks may also be inverted to determine their contribution to the overall performance. Also front may be interchanged with rear and the test repeated.
7. By substituting an alternate balance block and retesting, a further determination can be made. Front seat/stem or rear seat/poppet replacements should be made only when end-stop accuracies cannot be attained, or when 03892 and front/rear seat interact resulting in multiple performance problems.