JAR DAF TESTERS ACCESSORIES

Dissolved Air Flotation (DAF)
Test Accessories Manual

JAR TESTERS
DAF ACCESSORIES

CONTENTS

1 INTRODUCTION

Congratulations on the purchase of your Platypus DAF Jar Tester.

This manual contains useful information for its operation, maintenance and technical specifications.

Please read and understand the manual before commencing jar testing. Please pass this manual on to any subsequent users.

The Platypus DAF Jar Tester is an apparatus that saturates water with compressed air to form an air/water mixture. The air saturated water is dispersed into a jar's contents after chemical coagulation/flocculation - to determine optimum operating conditions for dissolved air flotation including:

- DAF treatability
- Saturator hydrostatic operating pressure
- Float cohesion
- Chemical treatment including polymer addition for float cohesion
- Recycle rates
- Subnatant turbidity
- Design of downstream filters

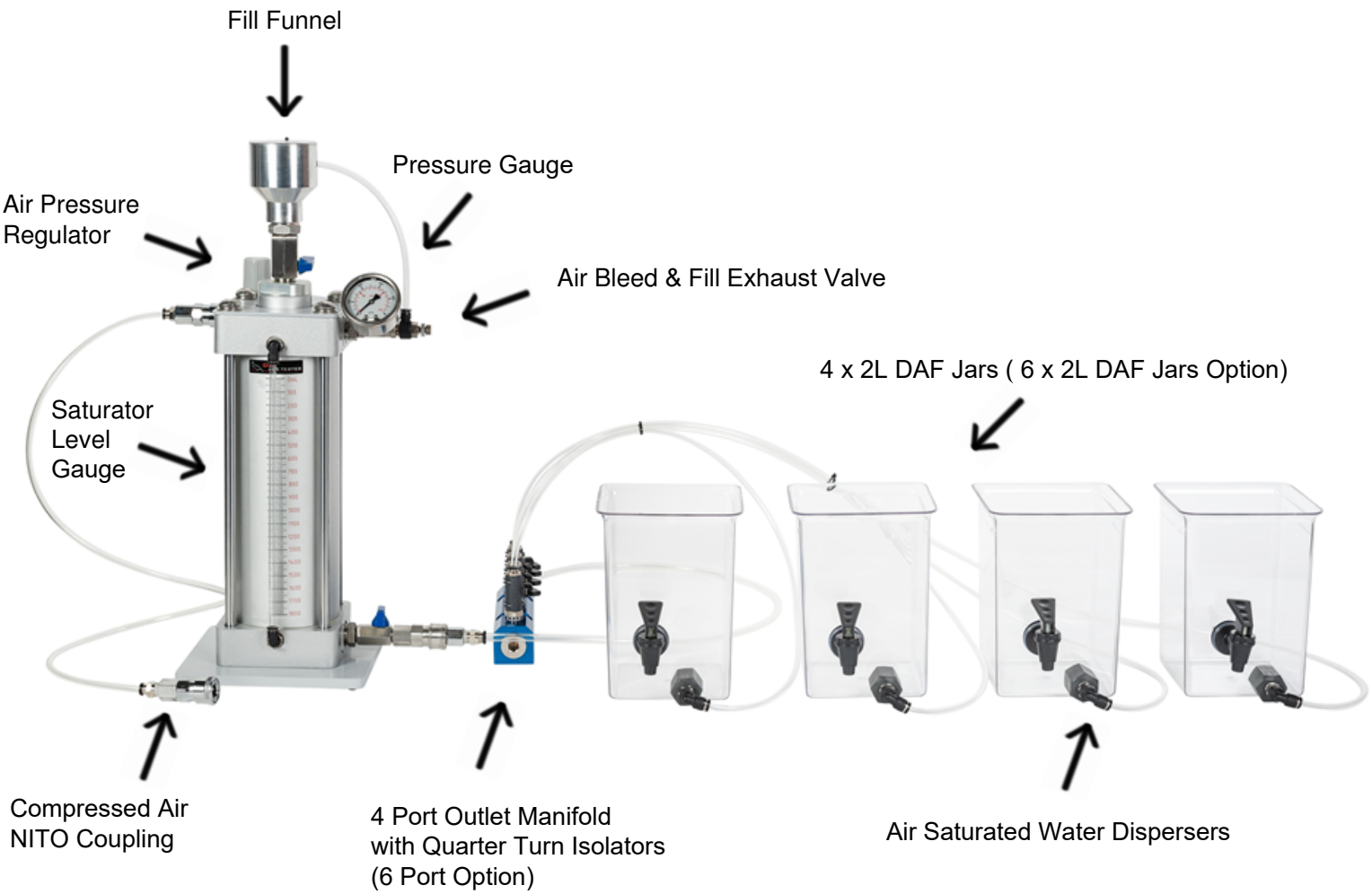
2 OPERATING CONDITIONS

To ensure a prolonged operating life the Platypus DAF Jar Tester should not be exposed to the following conditions;

- Operation with ambient temperatures below 0℃ or above 50℃
- Prolonged periods in direct sunlight
- Cleaning with alkaline based cleaning fluids
- Corrosive fluids
- Compressed air pressure should not exceed 700kPa (102psi)

3 OPERATING COMPONENTS

DAF Saturator main components:



4 OPERATING INSTRUCTIONS

4.1 DAF Saturator Preparation

Suggested procedure:

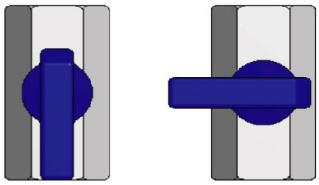
1) Remove the saturator from the packaging and visually inspect saturator unit for any obvious damage or disconnected hoses. Reconnect any dislodged hose.

   DO NOT use the unit if mechanical damage is apparent.

2) Connect the Saturator outlet and manifold to Jars tubing. Check that the manifold outlet valves are all shut.

3) Open the water fill valve.

   DO NOT undertake this step if the Saturator pressure is above 0kPa



4) Fill the Saturator with clean water to the 0mL mark on the level indicator.

   Pour the water in as a steady stream - aim at the centre of the fill funnel.
   Avoid filling rates that result in the funnel accumulating water. (lengthens filling time)
   Fully open the air bleed valve to quicken the filling process (by releasing displaced air).
   Fill the saturator with clean/filtered water.

5) Close:
   - the water fill valve;
   - the air bleed valve;
   - manifold outlet valves remain closed.

6) Connect the compressed air line to the compressed air inlet. Air pressure must not exceed 700kPa (102 psi).

7) Admit compressed air to the air regulator (valve at the compressed air source) Adjust the air pressure to the desired test pressure at the air pressure regulator.

   The regulator is adjusted by lifting the regulator knob till a click is heard or an orange band is visible - then rotate the knob in respect to the “+” and “–” designation on top.
   A typical starting point for saturator air pressure is 600kPa (87Psi). This can be adjusted up or down as the saturator is brought up to the required pressure

Various operating pressures may be assessed by comparing resultant flotation performance, observing;

- *Milkiness/Whitewater of the float*
- *Float cohesion/stability*
- *Subnatant turbidity*

DO NOT open the water fill valve when the Saturator is pressurised

8) Once the pressure gauge is displaying a static reading, open the air bleed valve to commence saturation.

   Caution: do not open the bleed valve to the extent bleed air volumes exceed the compressed air supply capacity resulting in loss of saturator pressure.

   Open the air bleed valve one to two turns (from closed) then further open as required to hasten the saturation process.

   On opening the air bleed valve - air is diffused (at the base), then percolates through the saturator contents.

   Some diffused air transfers into solution.

   Excess air vents through the bleed valve to the fill funnel.

   Air diffusion should continue for approximately 90-120 seconds to achieve full saturation.

   This period may need to be extended when the Saturator is operated at lower pressures.

   The Saturator is ready to commence a DAF jar test subject to 4.2.

4.2 Saturator outlet/distribution system preparation, priming and air purging

To minimise the volume of unsaturated water and large bubbles of air entering the jars at a DAF test start, firstly, prepare the system **before** a coagulation/flocculation Jar Testing is underway:

- Cut manifold to Jars and Saturator outlet tubing to minimum lengths - to suit individual test bench arrangement circumstances;
- Reconnect the distribution system with manifold outlet valves shut;
- Half fill Jars with tap water;
- Prepare the Saturator per 4.1 above;
- Purge each Jar inlet system by opening the manifold outlet valves enough to admit white water to the Jars, close the manifold outlet valves after each purge;
- Close the Saturator outlet valve; – capture saturated water between the Saturator and the manifold.

Top-up/refill the saturator with clean/filtered water - proceed per 4.1 above.

Empty the Jars.

4.3 DAF Jar Test

1) To successfully manage manifold and tubing priming it is recommended that all jars are positioned at the Platypus Jar Tester stations with tubing attached. This requires raw water for Jar Testing to be **added with the Jars in position** - rather than disconnecting tubing to fetch raw water remotely from the Jar Tester.

2) Perform a flocculation jar test using the 2L DAF Jar. This jar that incorporates the DAF dispersion nozzle and sample tap.

   The DAF jar may typically be filled to 2L prior to standard jar testing.

3) When the flocculation jar test is complete and the DAF saturator has been prepared, decant enough fluid from the jar using the sample tap. The volume decanted should equal or exceed the volume of air saturated water to be transferred during the DAF jar test.

   Suggestion: decant into a measuring cylinder to measure volume accurately.

4) To commence the transfer of saturated solution into the 2L DAF jar(s), open the saturated water outlet valve. Do not partially open the valve as this will impact on the performance of the test.

   The compressor should remain running; the air compressor's air receiver volume then offsets saturator outflow volumes to maintain pressure at the saturator.

   Fully open the quarter turn manifold outlet valves for the jars under test.

   Larger bubbles may initially be expelled to the jars at the commencement of the transfer.

   This is minimised by the priming procedure so minimising the small volumes of "dead water" remaining in the manifold-to-jar tubing.

   Air saturated water introduced to the DAF jar(s) should be white and cloudy.

   Flocs particles should begin to float to the top and form a float layer at the surface some seconds after the respective transfer is complete/manifold outlet valve closed.

   When using the distribution manifold with multiple jars a slight variance in level between the jars might be observed. If a significant difference is observed in a particular jar, refer to section 6 Maintenance for flow controller cleaning.

5) The volume of air saturated water transferred can be observed at the Saturator level indicator scale.

   Once the subnatant has cleared, draw a sample for assessment.

6) The saturator can be used to test more jars containing pre-flocculated water given enough volume or water in the saturator for multiple tests.

4.4 Refilling the Saturator

In the event the saturator must be refilled, follow the steps outlined in the DAF Saturator Preparation steps in section 1. Open the bleed valve to hasten the filling process.

4.5 Calculating Recycle Rate

The recycle rate of the test can be calculated by utilising some of the measurements taken during the DAF jar test.

$$Recycle\ Rate\ \mathbf{[\%]} = \frac{V_{SW}}{V_J - V_D + V_{SW}} \times 100$$

V_{SW} = Volume of saturated water transferred (per jar – this is the total volume transferred as shown on the sight glass divided by the number of jars tested) [mL]
V_J = Volume of test within 2L DAF Jar [mL] *this is 2000mL if filled to the line on the jar*
V_D = Volume of jar decanted

Example

Flocculation jar test performed with 2L of sample, 250mL of the sample was decanted prior to the DAF jar test. During the DAF jar test 180mL of air saturated water was transferred.

$$Recycle\ Rate\mathbf{[\%]} = \frac{180}{2000 - 250 + 180} \times 100$$

$$Recycle\ Rate\ \mathbf{[\%]} = 9.3\%$$

5 PREPARING THE SATURATOR FOR STORAGE

When all testing is complete the saturator should be stored empty and depressurised. This is achieved by the following;

1) Close the compressed air inlet valve and disconnect the compressed air line and any connected jars.

2) Wait till the pressure gauge reads 0 kPa, if the pressure does not drop, slowly open the air bleed valve till the pressure falls to 0 kPa.

   Remove the water fill funnel cap and open the water fill valve. Invert the saturator to completely drain it. Drying of the saturator internals by air flushing is recommended.

3) Replace the water fill funnel cap and close the water fill valve.

4) The Platypus DAF saturator is ready for storage.

6 MAINTENANCE

- Keep the unit clean and dry when not in use. Ensure that all equipment is drained when not in use.

- Carry out routine visual checks only.

- The orifice in the flow controller attached to the 2L DAF Jar is very small. If any foreign bodies have been introduced into the saturator during filling they may become lodged in the flow controller. To clean the orifice, remove the elbow from the flow controller on the 2L DAF Jar and flush with clean water using a syringe. Ensure the foreign body has been removed prior to reassembly.

7 SUPPLEMENTARY JAR TESTING PARAMETERS

The operating parameters tested during a DAF Jar Tester should be recorded for future comparison and to optimise full scale plant operating conditions. Below are some suggested parameters to supplement existing jar testing records

- Saturator pressure
- Volume of air saturated water transferred
- Recycle rate %
- Qualitative assessment of dispersion in jar
- Qualitative assessment of floated floc particles
- Subnatant turbidity
- Subnatant pH
- Subnatant colour
- Subnatant aluminium residual
- Oxidation of soluble metals
- Algae removal effectiveness

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