

# *Platypus DAF Jar Tester*





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## 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 physical 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°C or above 50°C
- Prolonged periods in direct sunlight
- Cleaning with aggressive chemicals or solvents
- Corrosive fluids
- Compressed air pressure should not exceed 700kPa (102psi)



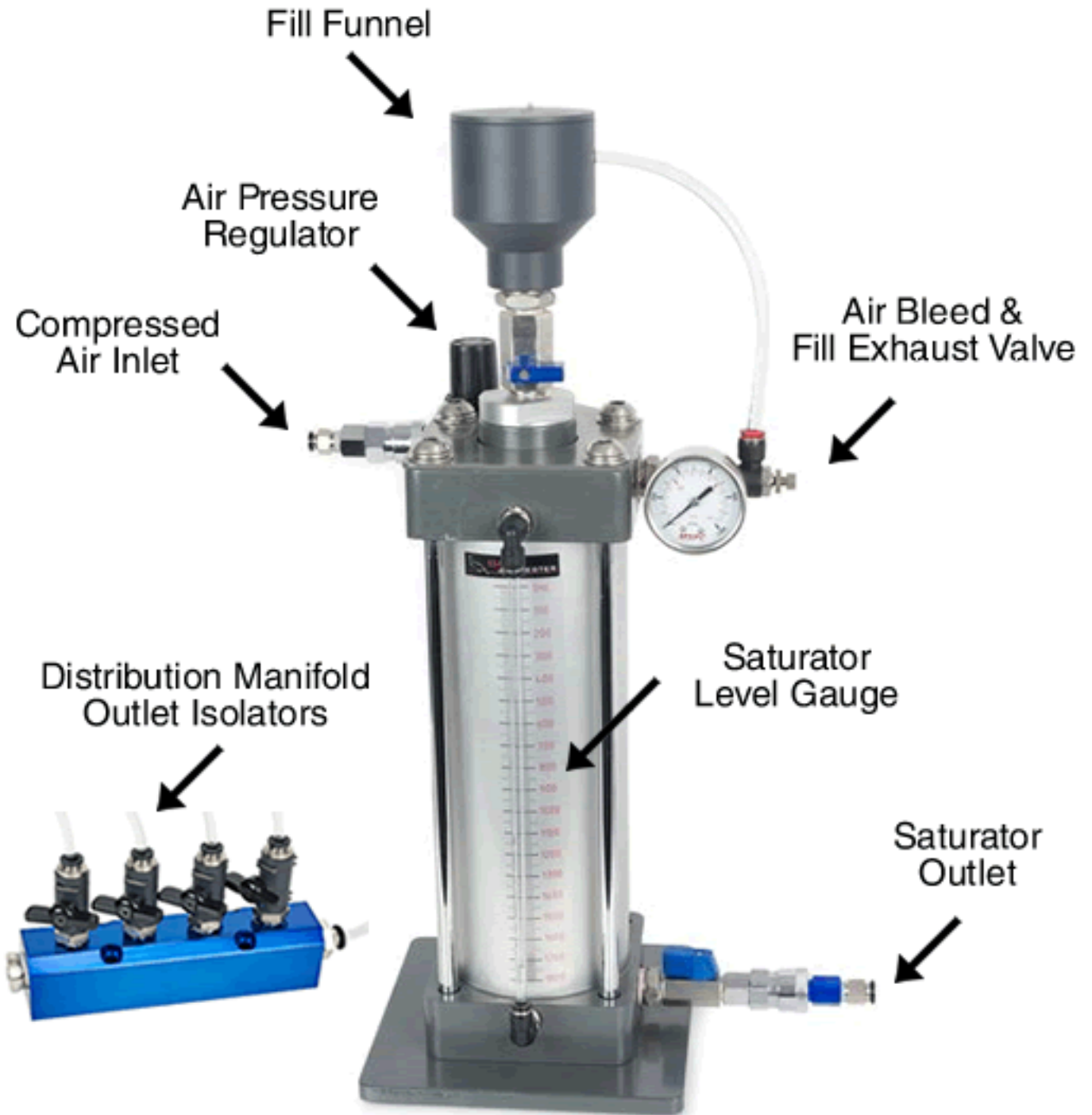


### **3 OPERATING COMPONENTS**

The main components of a Platypus DAF Jar Tester are shown in the picture below.

The operator should become familiar with each of the components prior to operating the DAF test accessories.





**Platypus DAF Saturator**



## 4 OPERATING INSTRUCTIONS

### 4.1 DAF Saturator Preparation

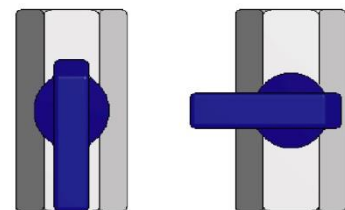
Prior to, or during, a standard flocculation jar test, the DAF saturator must be prepared for the DAF jar test. The following procedure is used to prepare the DAF saturator.

- 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 OPERATE IF THE UNIT IS DAMAGED

- 2) Connect the Saturator outlet and manifold to Jars tubing. Ensure manifold outlet valves are shut.
- 3) Open the air bleed valve (Counter clock wise to open) and water fill valve.

**Warning: If the saturator has just been used wait till the pressure falls to 0kPa prior to completing this step.**



OPEN

CLOSED

- 4) Fill the Saturator with clean water to the 0mL mark on the level indicator. Pour the water in slowly with a steady stream aimed at the centre of the funnel.

Avoid filling rates that result in the funnel accumulating water; this will lengthen the filling time. The bleed valve fully open quickens the filling process. (displaced air release route).

*Note: Only fill the saturator with clean/filtered water that does not contain solids.*

- 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. The compressed air pressure must not exceed 700kPa (102 psi).
- 7) Admit compressed air to pressurise the saturator. (valve at the compressed at source)

Adjust the saturator pressure using the air pressure regulator. The saturator pressure can be viewed on the pressure gauge. The regulator is adjusted by lifting the regulator knob till a click is heard or the orange band is visible, then rotate the knob in respect to the “+” and “-” designation on top.

*Hint: A good 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. A saturator pressure below 400kPa (58 psi) may result in inconsistent performance. The operating pressure should be assessed by comparing the performance of flotation at various saturator operating pressures, eg 500, 600, 700 kPa, and observing;*



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

### **WHEN THE SATURATOR IS PRESSURISED DO NOT OPEN THE WATER FILL VALVE**

- 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.*

The air bleed valve should be opened approximately one to two turns from the fully closed position then further opened if required to hasten the saturation process.

Once the air bleed valve is opened, air percolates through an internal diffuser (at the base), through the saturator contents.

Some diffused air transfers into solution. Excess air will vent 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 can be kept in this state for as long as the compressed air source will allow.

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 Test:

- 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 sufficient to admit white water to the Jars.

Top-up/refill the saturator with clean/filtered water and 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 is the 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 sufficient 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.

*Hint: decant into a beaker or measuring cylinder so that the decanted volume can be measured 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.

Some larger bubbles will be initially expelled from the tube at the commencement of the transfer. This is normal but minimised by the above mentioned priming procedure and the minimising of dead water volumes in manifold to jar tubing.

The air saturated water being expelled into the 2L DAF jar(s) should be white and cloudy. The floc particles from the flocculation jar test should begin to float to the top and form a float layer at the surface.

When using the distribution manifold with multiple jars it is normal to observe a slight variance in level between the jars. If a large difference in a particular jar is experienced refer to section 6 Maintenance for flow controller cleaning.

- 5) The volume of air saturated water transferred can be viewed on the level indicator on the saturator.
- 6) When the desired volume has been transferred, close the saturated water outlet valve.
- 7) The micro bubble cloudiness within the 2L DAF jar will rise to the top and begin to clear.

Once the supernatant has cleared draw a sample for assessment.

- 8) The saturator can be used to test more jars containing pre-flocculated water providing there remains sufficient volume of water in the saturator.



#### 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.

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

$V_{SW}$  = 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.

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

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

## 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