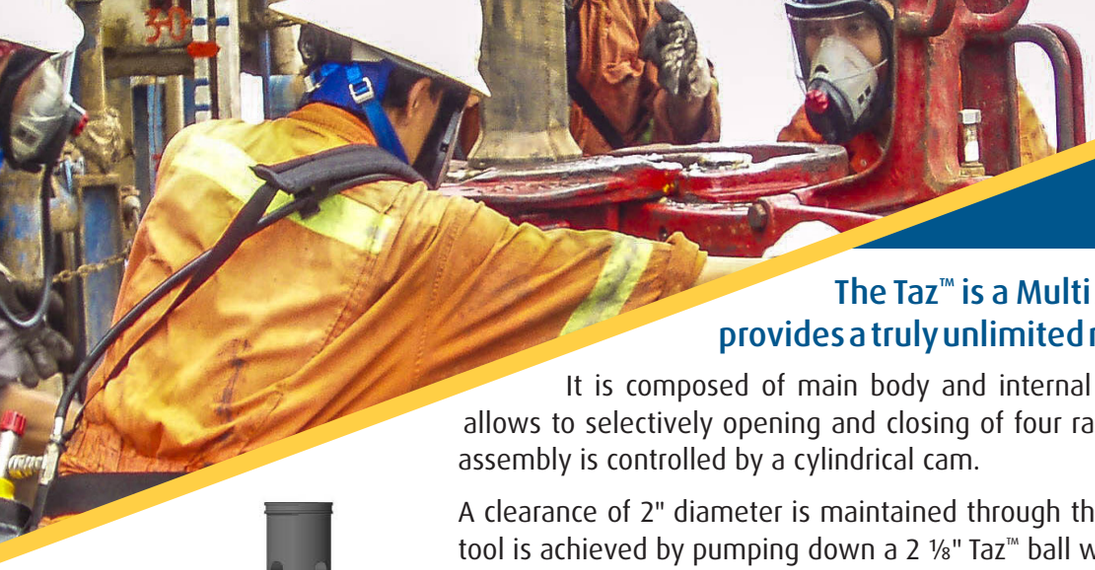

Drilling Tools

6¾" Taz™ Circulating Sub

Operating Insructions

The Taz™ is a Multi Activation Circulating Sub which provides a truly unlimited number of activations downhole.

It is composed of main body and internal mechanism. The internal mechanism allows to selectively opening and closing of four radial ports. The position of the internal assembly is controlled by a cylindrical cam.

A clearance of 2" diameter is maintained through the tool at all time.The activation of the tool is achieved by pumping down a 2 ⅛" Taz™ ball which 'disappears' upon activation.

This document describes the functioning, the assembly and the maintenance of the tool.

6 3/4" Taz™ Circulating Sub	Imperial	Metric
Top connection	API 4 1/2 IF	API 4 1/2 IF
Bottom connection	API 4 1/2 IF	API 4 1/2 IF
Connection make-up	34,840 ft/lbs	
Sh. to sh. length	56 in	1,422.4 mm
Body-outer diameter	6.75 in	171.45 mm
Body-inner diameter	4.5 in	114.3 mm
Piston-outer diameter	4.5 in	114.3 mm
Piston-inner diameter	2 in	50.8 mm
Weight	435.6 lbs	198 kgs
Tensile strength	802,000 lbs/f	363,781 kgs/f
Torsional strength	71,126 ft/lbs	96,434 N/m
Number of nozzles	4	4
Nozzle size	Up to 0.98 in	25 mm
TFA	Up to 3 sq. in	1,960 sq. mm
Taz ball size	2.125 in	53.975 mm
Maximum flow rate	1,250 GPM	4,750 l/min
Load to activate	562 lbs	2,500 N
Flow to active	150 GPM	568l/min
Max temperature	428° F	220° C

** Flow Rates calculated using Sea Water

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Receiving Taz™ at Rig Site

1. The Toolbox that comes with each Sub should contain:

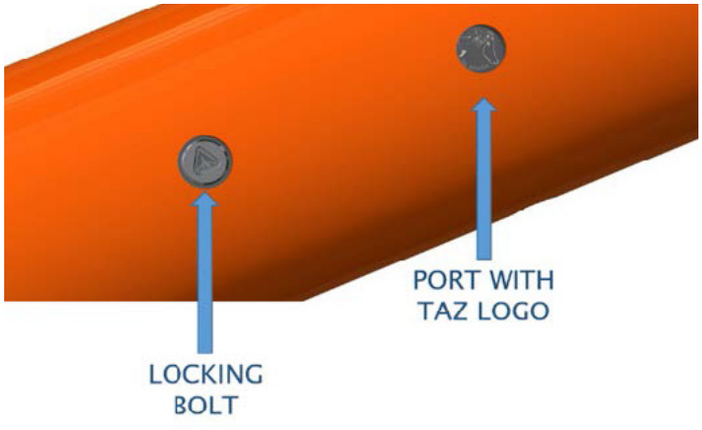
- The Operating Manual
- Special Taz™ Drift
- Taz™ Balls
- 1x Emergency Balls (Stainless Steel)

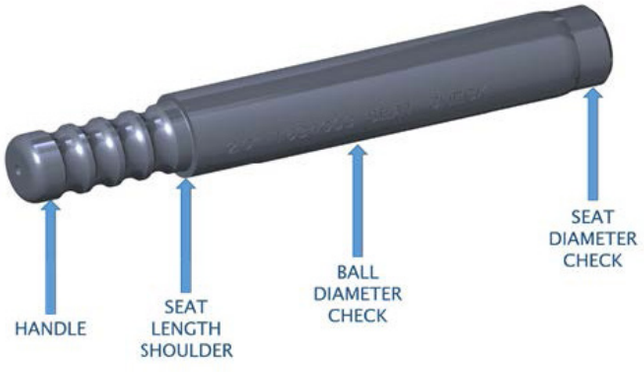
2. On receipt of Taz™ Subs at Rig site, the tools should be checked for the following:

- Confirm Taz™ Serial Number milled in Radial Groove towards the bottom of the Sub. This number should be recorded on the Run Record.
- Taz™ sub has been supplied function tested and pressure tested prior to dispatch.
- Look at the port opening to ensure you can see the Taz™ logo, if you cannot see the logo, do not run the tool, it may have moved in transit
- Use supplied Special Taz™ Drift to ensure the product is in the dormant position (through bore open, side ports closed)- see drift procedure below

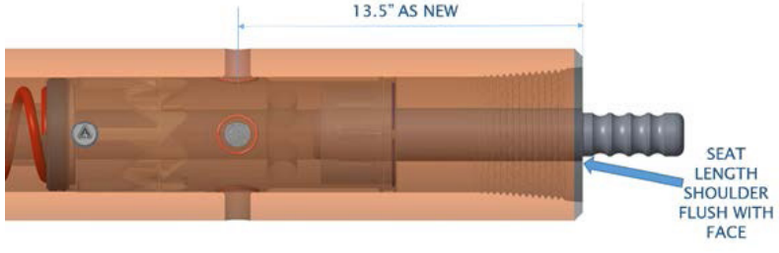
3. Using Special Taz™ Drift ensures sub is in the dormant position, seat and ball are configured as per your request

- The lower end of the drift checks to ensure the correct seat has been installed at the factory to the correct configuration of the ball supplied
- Measure the largest diameter of the drift and confirm it is the same diameter as the ball ordered and supplied
- After visually checking the Taz™ logo is visible in the port windows, using a tape measure, measure the distance from the center of the port to the face of the box





and record this on the Run Record



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Activation Procedure

1. Before dropping the ball, please take pressure references of the Stand Pipe Pressure (SPP) @ 100GPM and 150GPM and record on sheet provided.

2. Calculate the fluid displacement volume and time in the drill string to estimate when the activation ball will reach the Taz™ Sub.

3. Deploy the first ball and pump it at 150gpm and record and monitor the (SPP) and time.

4. Once the ball has reached the seat you should see a pressure spike of approx. 100%, please record this measurement and time taken for the ball to reach the seat.

5. The SPP should decrease rapidly as the ball is disappearing and activating the sub.

6. Measure and record the time taken for the SPP to stabilize at approx. 60% of the original SPP @ 150GPM (this will vary depending on the TFA of the bit compared to the TFA configuration of the TAZ™)

7. Record the new stabilized SPP @150GPM with the tool in the activated position.

8. Stop the pumps and restart again to 100GPM first and 150GPM after and measure and record the new SPP. When the tool opened, the values should be lower than the sample SPP values.

9. The TAZ™ is now in the activated position and fluid has been diverted through the ports to the annulus and will remain so until you have conducted the De-activation Procedure. Normal drilling parameters including flow rates can now be used ensuring that maximum recommended flow rates for the TAZ™ are not exceeded.

10. **NOTE: Care should be taken when pumping the TAZ™ ball down. Pumping the TAZ™ ball on seat at high flow rates or pressures may cause the activation ball to disappear prior to activating the tool and will result in you needing to drop another ball.**

    • You should rotate and reciprocating the drill string whilst activating the Taz™ sub.

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