

# ODFJELL RENTAL – BHA RUNNING PROCEDURE

## “BOULDER BUSTER” TWO-STAGE HOLE OPENER

Field & Well:

Hole Opener:

17 ½" x 26" x 36" ORS "Boulder Buster" Two-Stage Hole Opener

Type Size:

Nozzle Cutters:

36"	4 x Jets	
26"	3 x Jets	
Bit:	TBN	
Flow Split:	Approx. 55/45 bit/hole opener	

Bit:

Manuf.:

IACD Code:

Nozzle Size:

**Note: Primary bit will be preassembled to the hole opener onshore.**

## CUSTOMERS PREPARATIONS

### Safety and information meeting

Prior to start the BHA running operation a safety and information meeting is to be held with all personnel involved. Major safety topics are; lifting operations, correct communication, squeeze injuries and proper handovers during crew change.

When the Hole Opener is lifted into the rig floor, the driller supervises the operation. It is recommended using ropes to guide the lift.

**Note: The weight for assembled HO and Bit is about 7 tons**

All equipment to be visually checked for possible damage prior to RIH.

BHA must be as vertical as possible in well - no movement of rig after spud.

## BOULDERS

**Keep WOB and RPM as low as possible while drilling boulders.**

If encountering boulders, the hole opener can deflect and build inclination. Use time to drill through boulders (to avoid building inclination) Use low WOB and low RPM, and ream as required. If hole angle deviates from vertical >1 degree just below template; attempt to straighten the hole by reaming. Do not increase the flow rate as this will increase the risk of wash outs.

## RUNNING BHA

The objective is to drill the 17-1/2" x 26" x 36" top hole, with less than 1 deg. Inclination.

- Bit is made up to Hole opener prior to shipment.
- The Hole opener is painted yellow for easy observation by ROV.
- Pick up and run 36" BHA through rotary.
- Keep BHA centered while lowering through rotary.
- Take care when lowering BHA through the template stack. Align drill string as near vertical as possible.
- Record depth corrected for tide when the bit enters the guide.
- Break circulation and start drilling BHA into seabed as per Operators procedure, but notice BHA parameters/limitations below.

### Recommended BHA parameters:

Parameters:	OWS Hole Opener
Flow Rate:	1800-7000 l/min
Rotation:	25-120 RPM
WOB:	4-10 ton pr. Cutter

- Start drilling carefully to avoid crating effects.
- The first 10-15 m is normally soft, unconsolidated formation. Control flow rate according to operators procedure (use low LPM the first 15 m to avoid washouts). Below 15 m increase flow rate as per operators procedure/BHA parameters. Consider to increase pumps up to normal flow and drill string rotations up to 70 RPM when the bit is 15 m (or more) below seabed.
- Limit WOB to max 2-3 tons for the first 10-20 m.
- Check inclination, to ensure first 25 - 30 m is below 1° inclination.
- If hole angle deviates from vertical >1 degree just below template; attempt to straighten the hole by reaming. Remember low flow rate during this kind of operation!

## TD

Check template inclination reading prior to POOH.

At TD (drilling is completed), Follow operators procedure, but record as a minimum inclination and ROP for drilling the well.

## Pull out of hole

**Note: If Batch Drilling, visually check BHA for damage (on rig or with ROV) before RIH on the next well.**

- POOH with BHA
- To prevent any dropped objects on drill floor, please check the area between cutters and tool body for rocks and pebbles.
- When Tool is OOH, visually check Tool & cutter for damage.
- After last well, lay down assembly and pack for shipment
- Please Provide OWS with a BHA performance report; trm@ows.no

## ODFJELL RENTAL SERVICES AS

### 17-1/2" x 26" x 36" SPEC SHEET & RUNNING PROCEDURE

#### CUTTERS ON HOLEOPENER:

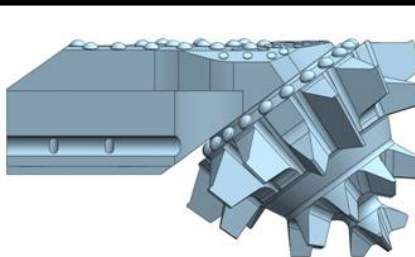
#### SPECIFICATIONS - LEG ASSEMBLY

Cutter Type/ IADC	Milled Tooth/ 1-1-5 to 2-3-5	TCI/ 4-1-5 to 5-3-5
Inner Shape	Teeth Interrupted/ Hardfaced	Tungsten Carbide Chisel
Gauge Insert Shape	Tungsten Carbide Dome	Tungsten Carbide Dome
Max Face Contact Length/Cutter	8.75" (222mm)	8.75" (222mm)
Bearing Type	Sealed- Roller/Ball/Friction	Sealed – Roller/Ball/Friction
Weight	66kg/ 146lbs	74kg/ 163lbs
Formations	Soft to Medium	Medium to Hard
Operating Weights	4 to 10 ton pr. cutter	4 to 10 ton pr. cutter

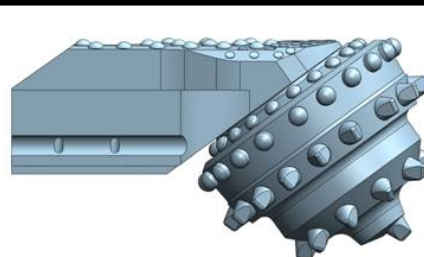
#### ENGINEERING FEATURES

* Pressure Compensator
* Shirt Tail Protection
* Self Sharpening Teeth (on the M10 cutters)
* Side Locking Safety Dowels
* Stainless Cir Clips to M24 high tensile socket head cap screws
* 32mm Locating Dowels From Cutter to Hole Opener Body

#### 10" Mill Tooth Cutters - M10 Specifications



#### 10" TCI Cutters - T25 Specifications



## SPECIFICATION SHEET

### Equipment

## ORS BOULDER BUSTER 26" x 36" TWO STAGE HOLE OPENER

### SPECIFICATION

Pilot hole diameter	17 ½"
Pilot hole upset length	19"
Hole Opener Diameter 1 <sup>st</sup> Stage	26"
Hole Opener Diameter 2 <sup>nd</sup> Stage	36"
1 <sup>st</sup> Stage upset length	18"
2 <sup>nd</sup> Stage upset length	28"
Cutter Quantity 1 <sup>st</sup> Stage	3 EA
Cutter Quantity 2 <sup>nd</sup> Stage	4 EA
Fish Neck Length (Approx. New)	72"
Bottom Hole Length	33"
Fishing neck diameter	9 ½"
ID	3"
Overall Length (Approx. New)	199.3"
Thread type top	7 ⅝" Reg. Box
Thread type bottom	7 ⅝" Reg. Box
Number of nozzles	7 EA
Weight	5835 KG
Cutter Type	Milled Tooth/TCI
Bearing Type	Sealed Roller
Gauge Insert Shape	Dome

### RECOMMENDED DRILLING PARAMETERS

Maximum Flow Rate	7000 LPM
Minimum Flow Rate	1800 LPM
Rotary Speed	25 – 120 RPM
Weight on Hole Opener	4 to 10 ton pr. cutter

