

OPERATING MANUAL

DOUBLE ACTING DRILLING INTENSIFIER HYDRAULIC TYPE

Size : 6.50"

Series : 478

Reviewed And Approved By: Signature: _____ Initials: _____ Date: _____

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HYDRAULIC TYPE**

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A drilling jar intensifier installed in the drill string will aid jarring operations under difficult drilling conditions.

To jar up under normal drilling conditions, tension is applied to the jar causing the drill pipe to stretch. When the jar releases, the drill pipe contracts, accelerating the drill collars and/or heavy weight drill pipe above the jar upward. At the end of its free stroke, the jar stops suddenly, converting the kinetic energy of the rapidly moving mass into an intense impact force.

To jar down, the drill string is lowered, applying a compressive force on the jar. When the jar releases, the drill string accelerates downward, creating an intense jarring force when it stops suddenly at the end of the jar's free stroke.

In directional or crooked holes, wall drag can retard the acceleration of the drill collars or heavyweight drillpipe above the jar. In shallow holes, drillpipe stretch may not be sufficient to effectively accelerate the drill collars / heavyweight drill pipe. Under these conditions, the resulting impact would be reduced.

The Odfjell Technology Double Acting Hydraulic Drilling Jar Intensifier compensates for the negative effects of wall drag, or insufficient drillpipe stretch, by using compressible fluid to store the energy applied in tension or compression. When the jar releases, this stored energy will accelerate the drill collars above the jar, intensifying the impact force at the stuck point.

The Intensifier allows full circulation to be maintained during jarring operations and is not affected by hydrostatic wellbore pressures. Wellbore temperature DOES affect the spring force and stroke available and the tool must be correctly prepared at a service center if high temperatures are expected down hole.

The standard configuration is for temperatures up to 300°F (150°C). Higher temperatures will damage the seals. With the special high temperature seal kit installed, the intensifier is suited to temperatures up to 500°F (260°C). At lower temperatures the spring force is reduced substantially and the high temperature configuration should be avoided in lower temperature holes.

All components are manufactured on computer controlled machine tools and from high strength/low alloy steels to enhance accuracy and durability.

2. OPERATION

2.1. GENERAL

The National Oilwell Double Acting Hydraulic Drilling Jar Intensifier should be installed in the drill string with the mandrel end up. Prior to make up, a suitable thread compound meeting A.P.I. Spec. 7, 40th Ed. Appendix "G" should be applied to the end connections.

Protect the mandrel sealing surface from possible damage during handling or storage. Never apply tongs, slips, chains or slings to this area.

Rig tongs should be applied immediately adjacent to the top and bottom connections to avoid applying torque to the jar body connections. All body connections are torqued to specification at the service center. Avoid breaking these connections at the rig.

There are no special operating procedures required when utilizing an intensifier. Jarring operations should be conducted in accordance with the recommended operating procedures for the drilling jar.

The Hydraulic Intensifier may have substantial freeplay at room temperature. This is normal and results from the fact that the compressible oil in the hydraulic chamber expands with temperature downhole. As the oil expands it fills the chamber and makes full spring force available when downhole. While installing the tool into the bottom hole assembly, care should be taken when weight is applied.

2.2. PLACEMENT

The following guidelines should be used to determine the location of the intensifier in the drill string:

- The intensifier must be located above the jar.
- To avoid becoming stuck above the intensifier and jar, the drill string above should not exceed the intensifier and jar diameter.
- Avoid locating the intensifier directly above BHA components of larger diameters.
- A minimum of three drill collars or the equivalent weight in heavy weight drill pipe should be placed between the jar and the intensifier to provide sufficient mass for jarring.
- The buoyed weight placed between the jar and the intensifier should not exceed 40% of the load to fully extend the intensifier at operating temperature.

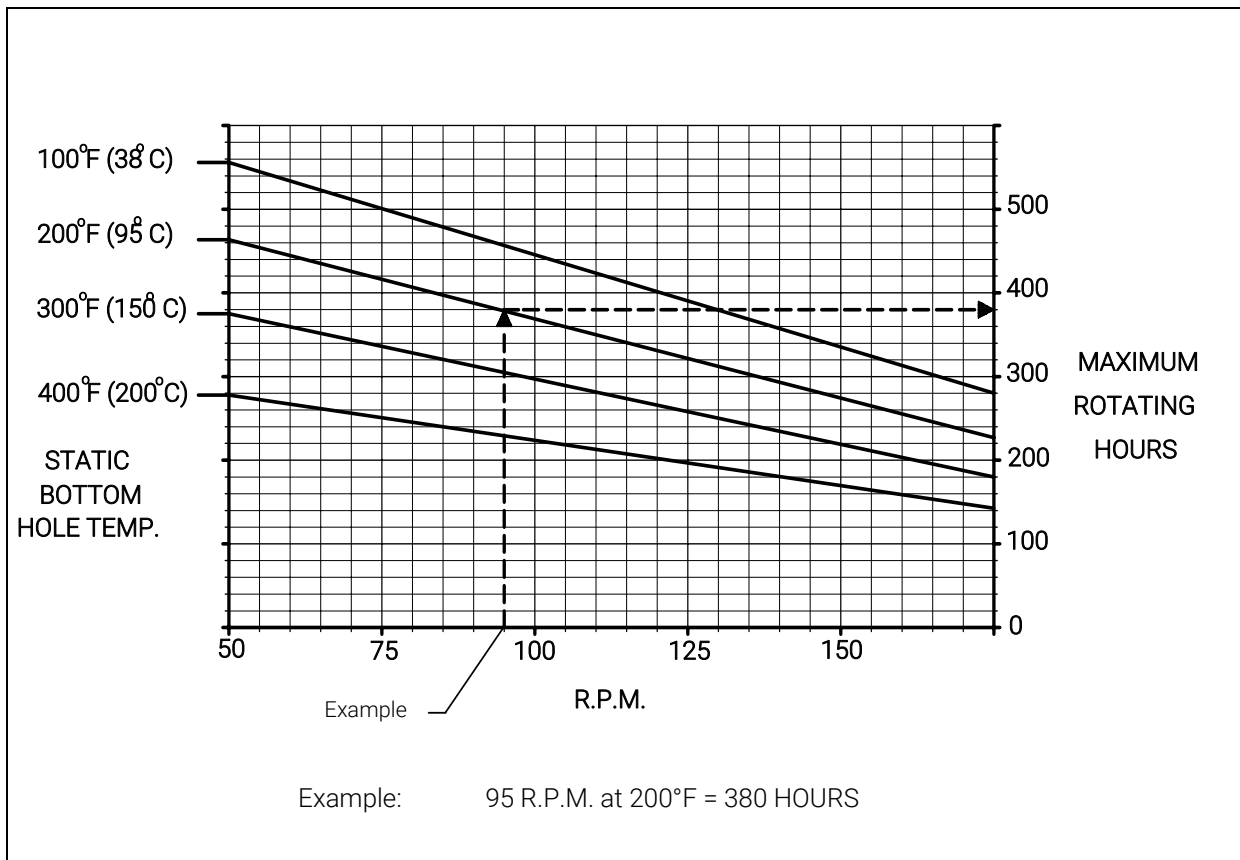
2.3 FIELD INSPECTION

On each round trip the Intensifier should be visually inspected for any indication of damage, excessive wear, or leakage. When the jar is first removed from the hole, a small quantity of fluid may be noticed draining from the balancing ports. This condition is normal and does not indicate a problem.

2.4. MAXIMUM ROTATING HOURS

The chart shown below indicates the maximum recommended rotating hours between shop servicings. This chart takes into consideration the rotating speed and static bottom hole temperature, assuming that the intensifier has only been used for short periods of light jarring totaling less than two hours. The intensifier should be serviced as soon as possible, following any continuous heavy jarring.

Chart 2 - 1
Maximum Rotating Hours



3. MAINTENANCE AND STORAGE

New tools are shipped painted. The threaded ends are chemplated with iron-phosphate and coated with rust preventative coating. Thread protectors are installed to eliminate mechanical damage. The rust preventative coating must be removed using petroleum base solvent and a stiff bristle brush before the jar is installed into the drill string.

When the jar is to be laid down the following should be done:

1. Flush all drilling fluid from the bore and from the balancing chamber with fresh water
2. Wash external surfaces of the tool
3. Apply thread compound and protectors to the end connections.

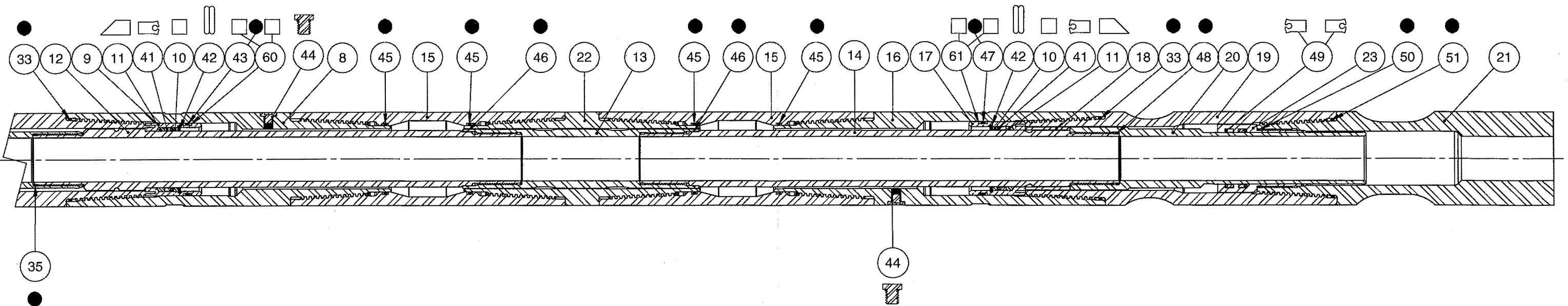
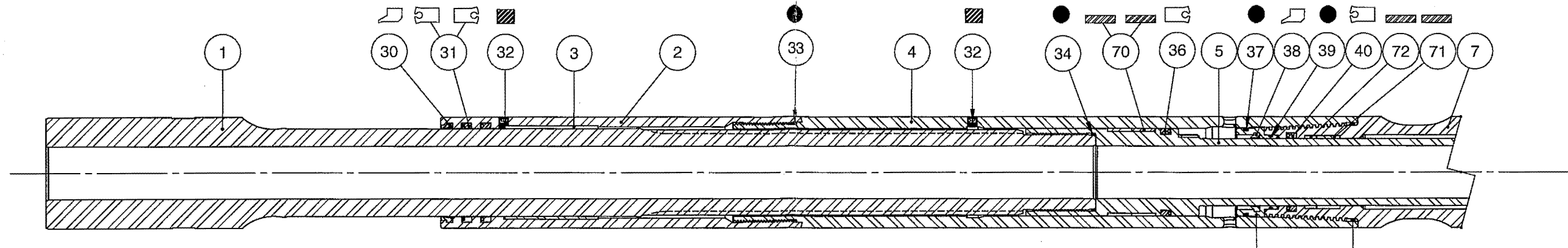
Tools stored horizontally should be rotated to a new position occasionally to prevent seals from setting and resultant fluid leakage.

4. SPECIFICATIONS

DOUBLE ACTING = £&t ~ Š Yž DRILLING JAR INTENSIFIERS

TOOL O.D. (+API Drill Collar Tolerance)	inches (mm)	4.75 (121)
SERIES		4501
MAX. RECOMMENDED HOLE DIA. (Hole Openers Not Recommended)	inches (mm)	7 7/8" (200)
TOOL I.D.	inches (mm)	2.25 (57)
LENGTH (NEUTRAL POSITION)	ft (m)	27.68 (8.436)
WEIGHT	lbs (kg)	1,020 (450)
STROKE UP	inches (mm)	12 (305)
STROKE DOWN	inches (mm)	12 (305)
AXIAL LOAD TO FULLY EXTEND (At 300°F)	lbs (kN)	90,000 (40 000)
AXIL LOAD TO FULLY COMPRESS	lbs (kN)	75,000 (33 360)
MAXIMUM TENSILE LOAD	lbs (kN)	540,000 (240 200)
PUMP OPEN AREA	Inches ² (cm ²)	5.41 (34.9)
MAXIMUM TORSIONAL LOAD (TO YIELD BODY CONNECTIONS)	lb-ft (N-m)	18 600 (25 220)

Specifications subject to change without notice.



TOLERANCES UNLESS OTHERWISE SPECIFIED FRACTIONS ±1/16 X ±.060 X.X ±.030 X.XX ±.015 X.XXX ±.005 X.XXXX ±.0005 ANGLES ±1/2°		DEBURR & BREAK ALL SHARP EDGES .01 x 45 MAXIMUM								CUSTOMER: Odfjell Technology			
MACHINED SURFACES 125 ✓		NOTICE THIS DRAWING/DOCUMENT IS THE CONFIDENTIAL PROPERTY OF ODFJELL TECHNOLOGY-VECTOR AND SHALL NOT BE REPRODUCED OR UTILIZED IN ANY WAY WITHOUT THE EXPRESS WRITTEN CONSENT OF ODFJELL TECHNOLOGY.				TITLE: 4 3/4" DA HYDRAULIC INTENSIFIER		PRODUCT:		DWG No: 4501-B-8			
				DATE	REV:	REVISION:	BY:	APPR:	DRAWN BY: JRP	APPR. BY:	APPR. DATE:	SCALE: NTS	REV A

4. SPECIFICATIONS

DOUBLE ACTING DRILLING JAR INTENSIFIERS

TOOL O.D. (+API Drill Collar Tolerance)	inches (mm)	6.50 (165)
SERIES		478
MAX. RECOMMENDED HOLE DIA. (Hole Openers Not Recommended)	inches (mm)	12 ¼" (311)
TOOL I.D.	inches (mm)	2.75 (70)
LENGTH (NEUTRAL POSITION)	ft (m)	27 (8.2)
WEIGHT	lbs (kg)	2,000 (900)
STROKE UP	inches (mm)	12 (305)
STROKE DOWN	inches (mm)	12 (305)
AXIAL LOAD TO FULLY EXTEND (At 300°F)	lbs (kN)	180,000 (800)
AXIL LOAD TO FULLY COMPRESS	lbs (kN)	100,000 (440)
MAXIMUM TENSILE LOAD	lbs (kN)	865,000 (3 850)
PUMP OPEN AREA	Inches ² (cm ²)	11.04 (71)
MAXIMUM TORSIONAL LOAD (TO YIELD BODY CONNECTIONS)	lb-ft (N-m)	41,000 (56 000)

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* Up to 300°F (150°C) or, With High Temperature seal kit: Up to 500°F (260°C) in a very well circulated hole.

4. SPECIFICATIONS

DOUBLE ACTING HYDRAULIC DRILLING JAR INTENSIFIERS

TOOL O.D. (+API Drill Collar Tolerance)	inches (mm)	8.00 (203)
SERIES		4507
MAX. RECOMMENDED HOLE DIA. (Hole Openers Not Recommended)	inches (mm)	17½" (445)
TOOL I.D.	inches (mm)	3.06 (78)
LENGTH (NEUTRAL POSITION)	ft (m)	28.0 (8.5)
WEIGHT	lbs (kg)	3,270 (1 480)
STROKE UP	inches (mm)	12 (305)
STROKE DOWN	inches (mm)	12 (305)
AXIAL LOAD TO FULLY EXTEND (At 300°F)	lbs (kN)	300,000 (133 400)
AXIL LOAD TO FULLY COMPRESS	lbs (kN)	125,000 (55 600)
MAXIMUM TENSILE LOAD	lbs (kN)	1,250,000 (556 000)
PUMP OPEN AREA	Inches ² (cm ²)	15.9 (103)
MAXIMUM TORSIONAL LOAD (TO YIELD BODY CONNECTIONS)	lb-ft (N-m)	82,000 (111 000)

Specifications subject to change without notice.