Dailey® No-Torque (DNT®) Drilling Jar

Weatherford's *Dailey DNT* mechanical drilling jar is specifically designed to eliminate torque problems associated with hole drag in high-angle drillstrings. This double-acting mechanical jar combines the best features of the proven *Dailey* L.I. mechanical drilling jar and the *Dailey* hydraulic drilling jar. The result is a highly reliable jar for torque-related downhole problems.

The *DNT* jar features upward and downward drillstring tripping using either factory-preset triggering loads or, for specialized downhole conditions, client-specified loads. The jar is delivered operationally ready.

When drillstring sticking occurs, the jar can be activated by simply picking up or slacking off the present triggering load. After triggering, the jar can be instantly recocked by picking up or slacking off the cocking weight.

Applications

- High-angle drillstrings
- All conventional oil and gas wells
- Deviated oil and gas wells
- Geothermal

Features, Advantages and Benefits

- The *DNT* jar is not affected by drilling torque. If sticking occurs while the jar is in the hole, the preset tripping weight can be reached by simply picking up or slacking off to trigger the jar either upward or downward.
- Spring-loaded roller trigger system, proven in the *Dailey* L.I. mechanical drilling jar, has a long-standing reputation for reliability, repeatability, and ease of operation.
- One-piece involute spline mandrel design, proven in the *Dailey* hydraulic drilling jar, provides maximum torque with minimal backlash to ensure effective transfer of drillstring torque through the *DNT* jar in either direction.

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Specifications

Dimensional Data				
OD (in./*mm*)	4-3/4 *120.65*	6-1/4 *158.75*	6-1/2 *165.1*	7-3/4 *196.85*
ID (in./*mm*)	2 *50.80*	2-1/4 *57.15*	2-1/4 *57.15*	2-3/4 *69.85*
Tool joint (API)	NC-38 3-1/2 IF	NC-46, 4-1/2 XH, 4-1/2 IF	NC-46, 4-1/2 XH, 4-1/2 IF	6-5/8 Reg

Yield Values*				
Tensile (lbf/*kN*)	402,600 *1,791*	543,000 *2,415*	484,000 *2,151*	958,000 *4 ,261*
Torsional (lbf-ft/*kN•m*)	24,000 *32.5*	50,000 *67.8*	51,500 *70.2*	100,000 *135.6*

Operational Data				
Circulating pressure (psi/*bar*)	5,000 *345*			
Hydrostatic pressure (psi/*bar*)	None			
Upstroke factory settings (lbf/*kN*)	69,700 *310*	94,300 *419*	94,300 *419*	102,500 *456*
Downstroke factory settings (lbf/*kN*)	32,900 *146*	37,600 *167*	37,600 *167*	42,300 *188*
Maximum overpull, up/down (lbf/*kN*)	75,000 *334*	118,000 *524*	118,000 *524*	125,000 *556*
Approximate length, extended (ft/*m*)		33.0 *10.1*		34.5 *10.5*
Approximate weight (lb/*kg*)	1,350 *612*	2,500 *1,134*	2,760 *1,253*	4,100 *1,860*
Free-travel upstroke (in./*mm*)	8 *203*	7-1/8 *181*	7-1/8 *181*	8 *203*
Free-travel downstroke (in./*mm*)	8 *203.20*			
Total stroke (in./*mm*)	16 *406*	15-1/8 *384*	15-1/8 *384*	16 *406*
Maximum bottomhole temperature (°F/°*C*)	325° *163°*			
Pump-open area (in.^{2}/*cm*^{2})	8.9 *57.4*	12.6 *81.3*	12.6 *81.3*	18.7 *120.6*

*Tensile and torsional yield values are calculated per API RP7G, based on nominal dimensions and the published yield strength of the material used, and do not constitute a guarantee, actual or implied.

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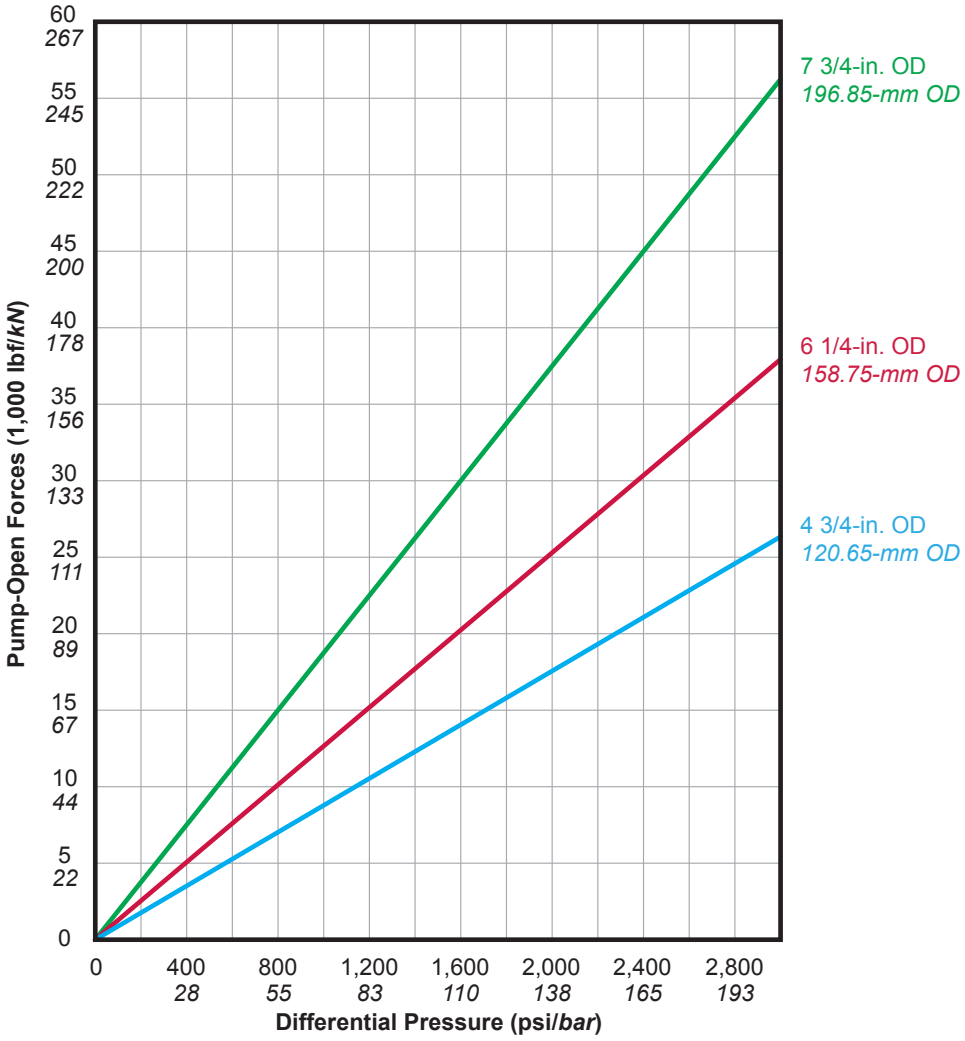
Pump-Open Force Chart



Pump-open force is created by pressure drop across the bit. The pump pressure creates a reaction force in the tool that tries to force it open. Reduce the pump to idle before attempting to jar.

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Operation

Placing the *DNT* Jar in the String

The *DNT* jar is delivered with a mandrel clamp, which remains in place until the jar is ready for running through the rotary.

The *DNT* can be run in tension or compression. It is mandatory to run a minimum 15% safety factor in string weight between the *DNT* and the weight transition zone. Run the same size drill collar or heavy-wall drillpipe directly above and directly below the *DNT*.

Caution: Never run the jar directly between drill collars and heavyweight drillpipe or between collar strings with different ODs. Excessive stress can occur at OD-size transition points and can lead to premature tool failure. The same size collars or heavyweight drillpipe should be run directly above and directly below the jar.

Important: Avoid running the jar below reamers, stabilizers, key-seat wipers, or any other tool with an OD that exceeds that of the *DNT* jar. Doing so can restrict the jarring function.

Upstroke, downstroke, and cocking weights can vary with hole drag, and allowances must be made to compensate for this variance.

Caution: Do not use tongs to try to uncock or stretch open the *DNT* jar, and never attempt to close or open the *DNT* jar on the rig floor. Unintentional operation of the tool on the rig floor could lead to serious injury.

Caution: Never run the *DNT* in close proximity to another *DNT* or any other type of jar. Doing so can impose excessive loads during jarring operations, resulting in equipment damage. Maintain a minimum distance of 1,500 ft (500 m) between jars.

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Operation *(continued)*

Jarring Upward

Picking up on the drillstring puts the jar in the cocked position. Slacking off the drillstring until the jar's setting force is reached trips the jar. Picking up the drillstring until reaching slightly above "weight above jar" (typically indicated by free travel and a slight movement on the weight indicator) recocks the jar for jarring down.

Example: Upward Jarring Jar

	(lbf)	(kN)
Total string weight	250,000	1,112
Weight below jar	- 40,000	- 178
Weight above jar	210,000	934
Jar setting for jarring up	+ 92,000	+ 409
	302,000	1,343
Hole drag	+ 20,000	+ 89
Indicator reading to trip jar upward	322,000	1,432

Slack off from 200,000 to 190,000 lbf (890 to 845 kN) to recock the jar.

Jarring Downward

Picking up on the drillstring weight above the jar puts the tool in the cocked position. Slacking off the drillstring until jar setting is reached trips the jar. Picking up on the drillstring to slightly below the weight of the string above the jar recocks the jar. Typically, a noticeable sign, such as a bobble of the weight indicator, demonstrates that the jar has completed its free travel and is recocked.

In most cases, the downward stroke of the jar is not as noticeable as the upward stroke. In deep holes and particularly when using a small jar, downward tripping can often only be detected from the weight indicator. In fluid holes where pump pressure can affect the down-jarring results, if possible, reduce the pump to idle before attempting to cock and jar.

Example: Downward Jarring Jar

	(lbf)	(kN)
Total string weight	250,000	1,112
Weight below jar	- 40,000	- 178
Weight above jar	210,000	934
Jar setting for jarring down	- 37,000	- 165
	173,000	769
Hole drag	- 20,000	- 89
Indicator reading to trip jar downward	153,000	680

Pick up from 220,000 to 240,000 lbf (979 to 1,068 kN) to recock the jar.

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Operation (continued)

Maintaining the Jar

Take the following steps each trip out of the hole:

1. Wash the mud from around the mandrel and through the holes and slots in the upper part of the case to keep mud from hardening or setting in the body (between the mandrel and the case). Hardened mud can affect the proper operation of the jar.
2. Check all roller welds and torque pins for possible leakage. If a washout is suspected, hook up the kelly and pump through the tool.
3. If the *DNT* jar comes out of the hole in the upstroke or stretched-open position (16 in./406 mm of mandrel showing), replace the mandrel clamp to rack back. If the jar comes out of the hole in the neutral or cocked position (8 in./203 mm of mandrel showing), leave the jar cocked and rack back. (To run back in the hole, leave cocked and proceed.)