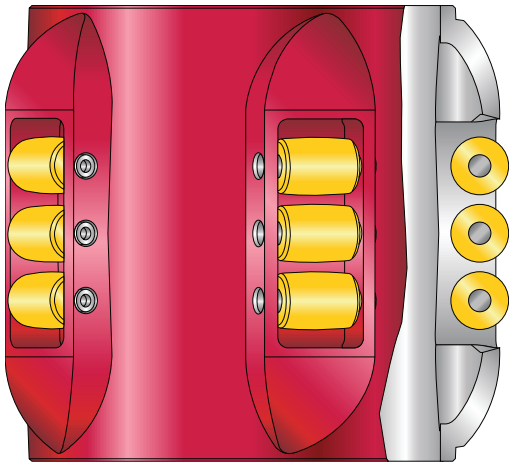
LoDRAG™

Mechanical Friction- and Wear-Reduction Centralizer System



Weatherford developed the *LoDRAG* system as a centralizer and an axial drag-friction-reduction system to perform independently of drilling or completion mud-film strength or lubricity. The small contact area of the rollers with the casing or borehole wall functions exceptionally well in under-pressured conditions, where risk of differential sticking is high.

LoDRAG tools have been used extensively to run sand-control screens into unconsolidated sandstone reservoirs, where the use of clean, non-damaging drilling and completion fluids give preference to mechanical friction reduction. Using *LoDRAG* tools in these reservoirs can reduce axial drag by up to 60 percent. The *LoDRAG* tools can reduce axial friction in cased holes by greater percentages, and are routinely used on ultra-long casing and liner strings. Use of the *LoDRAG* system has contributed to many record-length wells.

Applications

The *LoDRAG* tools provide optimal performance when:

- Casing, liner, and screens are being run into horizontal and extended-reach wells
- Centralizer wear may compromise the cement job
- Health, safety, and environmental (HSE) requirements ban the use of oil-based and pseudo-oil-based mud
- Under-pressured formations may cause differential sticking
- Run in conjunction with high-strength stop collars

Features, Advantages and Benefits

- The *LoDRAG*'s steel rollers help to avoid plowing through wellbore material that has settled on the low side of the hole, alleviating major drag problems in deviated and horizontal wells.
- Precision-machined inside diameter fits over the casing through the complete API tolerance range, providing excellent rotational performance in mud.

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Features, Advantages and Benefits (continued)

- When running casing through an open hole, the system's smaller roller-contact area reduces the risk of differential sticking and maintains standoff.
- Rollers provide superior wear resistance and remain functional throughout the life of the well and can aid in casing or tubing retrieval, reducing replacement costs.
- Unique engineering and material selection ensures that axle shear stress remains within elastic limits, preventing roller failure and the additional cost of remediation.
- The system's high-quality construction materials improve high-pressure/high-temperature capabilities, extending the life of the system.

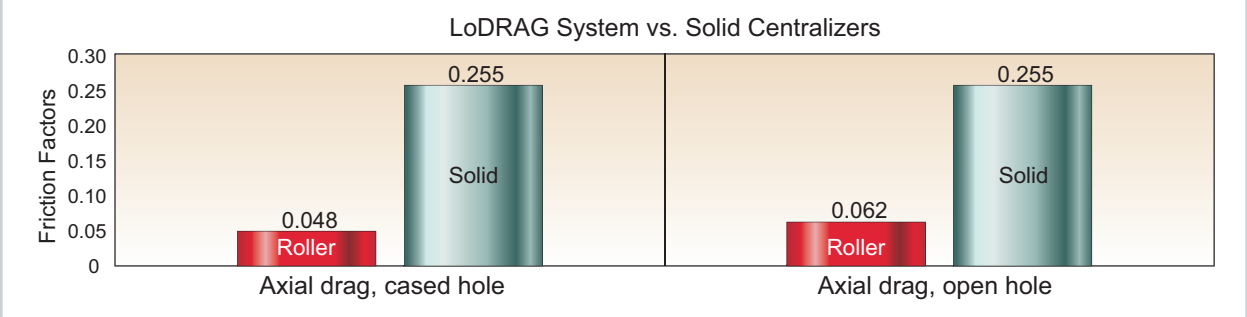
Options

Weatherford has developed an optional corrosion-resistant alloy (CRA) system for tubular applications to prevent direct, contaminating contact between the *LoDRAG* tool and CRA pipe. This optional corrosion-resistant compatibility system ensures that:

- Each centralizer and stop collar is completely coated with an isolating polyamid material or manufactured from a CRA-compatible material.
- Rollers and stop-collar set screws are made of corrosion-resistant material that is compatible with the pipe alloy. Contact your Weatherford representative for details.

Specifications

Offset Horizontal Well Performance Comparison



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Specifications (continued)

Model Number	Part Number	Tubular Size (in.)	Hole Size (in.)	Over-Roller OD (in./*mm*)	Body OD (in./*mm*)	Cross-Sectional Area (in.²/*cm²*)
RCLD 4500-5855	342459	4 1/2	6 to 6-1/2	5.855 *147.72*	5.784 *146.91*	22.86 *147.48*
RCLD 4500-8250	586463	4 1/2	8-1/2 to 9	8.250 *209.55*	7.884 *200.25*	39.55 *255.18*
RCLD 5500-7875	342460	5 1/2	8-1/8 to 8-5/8	7.875 *200.03*	7.625 *193.68*	41.10 *265.28*
RCLD 5500-8125	322581	5 1/2	8-1/2 to 9-1/4	8.130 *206.50*	7.884 *200.25*	42.80 *276.22*
RCLD 6625-8250	586472	6 5/8	8-1/2 to 9-1/4	8.250 *209.55*	8.157 *207.19*	46.20 *298.08*
RCLD 6625-8380	336106	6 5/8	8-3/8 to 9-1/2	8.380 *212.85*	8.254 *209.65*	46.90 *302.39*
RCLD 6625-9250	586478	6 5/8	9-1/2 to 10-1/4	9.250 *234.95*	9.042 *229.67*	54.90 *354.20*
RCLD 7000-9250	586492	7	9-1/2 to 10-1/4	9.250 *234.95*	9.032 *229.41*	56.90 *367.13*
RCLD 7625-9625	586497	7 5/8	9-7/8 to 10-5/8	9.625 *244.48*	9.470 *240.54*	63.50 *409.86*
RCLD 9625-12030	498578	9 5/8	12-1/2 to 13-1/4	12.026 *305.43*	11.890 *302.01*	98.90 *638.19*
RCLD 10750-12250	586451	10 3/4	12-3/4 to 13-1/2	12.250 *311.15*	12.139 *308.33*	109.30 *705.17*
RCLD 10750-16080	586452	10 3/4	16-1/2 to 17-1/4	16.080 *408.43*	15.500 *393.70*	151.42 *979.90*
RCLD 13375-17020	802253	13 3/8	17-1/2 to 18-1/2	17.020 *432.31*	16.687 *423.85*	186.30 *1,201.93*
RCLD 13625-17020	586456	13 5/8	17-1/2 to 18-1/2	17.020 *432.31*	16.680 *423.67*	188.51 *1,216.19*

Additional sizes available upon request.