Chapter C15

High pressure washpipe packing

Revision 2 October 5, 2018

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1. Washpipe packing description

Kalsi Engineering's high pressure washpipe packing rings were developed to reduce downtime in applications up to 5,000 psi and 200 rpm. They incorporate grease inlets that increase packing life in higher pressure, higher speed applications by distributing grease to critical portions of the dynamic sealing interface during rotation. This high-performance washpipe packing is interchangeable with conventional oilfield washpipe packing, and uses the same fabric reinforced elastomer construction.

Kalsi packing is stocked in several sizes that fit washpipes used in top drives and power swivels; see the shaft seal catalog portion of our website. New sizes can be furnished, but may require a one-time tooling charge, depending on initial order quantity.

Figure 1

Kalsi high pressure washpipe packing rings

The increased performance of Kalsi Engineering's high pressure washpipe packing rings is due to patented grease inlets that provide grease to the dynamic interface during rotation (U. S. Patent 9,121,503). Not recommended for temperatures greater than 275°F (135°C).

2. Implementation

The best packing performance can be obtained when:

- Spindle runout is minimized.
- The gooseneck is well-aligned to the rotatable spindle of the top drive.
- The washpipe is pressure-balanced in the axial direction, and is designed to articulate to accommodate runout and misalignment.
- The running surface of the washpipe is tungsten carbide coated to minimize surface wear.
- The packing rings are well-greased initially, and re-greased periodically (at least every 12 hours) to flush contaminants and provide lubricant to the waves.
- The metal spacers that support the washpipe packing are well-fitted to the packing, and designed to minimize clearance with the washpipe while avoiding metal-to-metal contact with the washpipe.

For available seal sizes, visit kalsiseals.com.

Spacer design factors

Factors that must be considered when evaluating the bore diameter of the spacers include pressure-induced radial deformation of the washpipe and spacer, maximum permissible lateral misalignment between the gooseneck and the rotating spindle, maximum permissible spindle runout, the axial distance between the static washpipe seal and the spacer, the maximum permissible lateral misalignment permitted by the housing locating pilot, and the maximum possible lateral misalignment between the spacer and the bore of the stuffing box.

Spacers must be manufactured with a material having suitable strength to withstand the anticipated operating pressure. Beware that high strength copper-based alloys have a modulus of elasticity that is significantly less than steel, and therefore spacers made from such alloys will have significantly more pressure-induced radially inward deformation. Spacer length should be designed with enough axial crush to establish sealing, without grossly deforming the packing rings.

Washpipe design factors

The static and dynamic sealing surfaces of the washpipe should be identical in diameter, so that the washpipe is hydraulically force balanced in the axial direction, and therefore free to articulate to accommodate gooseneck-to-spindle misalignment, and to follow spindle runout. Avoid stepped-down washpipes, that are intended to adapt large top drives to smaller diameter packing, because such washpipes are not free to articulate.

Avoid washpipes manufactured from mild steel, such as AISI 1018, because such washpipes are not intended for high pressure, and may yield in service. Tungsten carbide coated washpipe running surfaces are preferred over chromed surfaces, because they have vastly superior wear resistance.

Avoid non-circulating break-in

Do not subject washpipe packing to normal drillstring rotary speeds in the absence of fluid circulating through the washpipe. Rotation without circulation will quickly overheat and destroy the packing.

Assembly

Hand-pack the grooves of the packing rings with grease during assembly. Grease the inside surface of the packing rings before inserting the washpipe. Clean and grease the outside of the washpipe prior to insertion of the washpipe into the packing rings. After installation of the washpipe onto the top drive, grease the assembly thoroughly before commencing rotation.

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