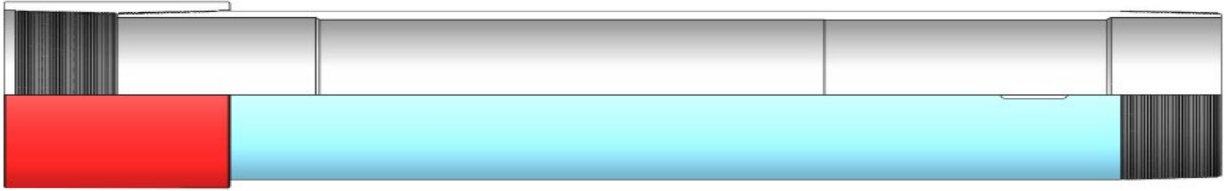


# Polished Bore Receptacle



Optimal production rates in heavy oil wells are being achieved using new technically advanced completion tools and production systems. Some of these advanced systems may involve steam injection or solvent injection into the formations. The most instrumental advance of these are the introduction of heat (steam) to lower the viscosity of the heavy oil and allow it to be pumped to surface. The introduction of heat to the downhole components of a completed wellbore will affect the normal functioning of the material characteristics of this equipment. The largest effect of heat to this equipment is the expansion and contraction of materials (steel, rubber) causing dimensional changes. These changes result in equipment malfunctions and equipment failures down hole.

One of the most common failures of down hole equipment, due to heat expansion and contraction, is to casing liner hangers and packer type seals. As the production liner (i.e. flow control devices) expands due to heat, the liner has a tendency to grow upwards. The top of this production liner is held in place by a casing hanger, which is located at the bottom of the intermediate cemented casing of the well. As the liner grows (under a head of steam), the elements (rubber seals) of the liner hangers fail and cause steam bypass at the heel of the well, effecting the uniform steam distribution being delivered to the formation.

By placing a Polished Bore Receptacle (PBR) directly above the upper float equipment in the intermediate casing string, a properly designed casing liner hanger (Flow Control Hanger [FCH]) can be positioned inside this PBR to allow production casing movement without having a steam breach past the FCH. The PBR is designed and manufactured with a tight tolerance honed inside diameter to match to the FCH's outside diameter of its steel seals. The PBR is equipped with a "no-go" located at the bottom of the receptacle. This smallest honed inside diameter "no-go" of the PBR will not allow the FCH to pass through the PBR and aids in the FCH installment.

A specific gas nitrating process is applied to the PBR during manufacturing, which creates a hardened and non-corrosion finish to the ID of the PBR. This process is impregnated into the PBR material and does not affect diameter tolerances or separate during thermal material movements. The hardness allows for drilling tools to pass or rotate through the PBR without damaging the ID sealing surface during drilling of the horizontal section below it.

## APPLICATION

- To be used in conjunction with casing liner hangers (specifically the FCH).
- Vertical and horizontal thermal wells where thermal material movements are anticipated.

## FEATURES

- Hardened and non-corrosive finish.
- Allows for thermal movement of liners and liner hangers of up to 5m movements.
- Same casing characteristics and threads as the mating intermediate casing.
- "No-go" feature for safe and easy casing hanger installation.

## BENEFITS

- Continuous seal of the casing liner hanger under extreme pressures and temperatures, while under movements.
- Ability to design steam calculations to deliver even steam distribution without having to consider seal failures and steam losses.

Canadian Patent No. 2,761,516

US Patent No. 9,200,498 B2

Mexican Patent No. 337356

GCC Patent No. 0007247

Argentina Patent No. AR08906B1



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