ROD-KNUCKLE™ ENVIRONMENTAL BOP STUFFING BOX

Through extensive research and comprehensive field testing, Nelgar Oilfield Services Ltd. has designed a patented **Rod-Knuckle™ Environmental BOP Stuffing Box**.

The **Rod-Knuckle™** features the following advantages over other major competitors'.

Features	Benefits
Dual packing	Superior environmental protection - the top (secondary) packing provides a positive seal when the bottom (primary) packing fails.
Self-aligning knuckle	Reduce side loading on top packing - the top packing rotates with the polished rod when a misalignment exists.
Check valve	Prevent costly blowouts – specially constructed for exceptional strength, the check valve closes in the event of a polished rod failure and provides a reliable shut-off.
Optional pressure shut-down switch	Early detection of bottom packing failure – utilize control chamber pressure resulting from a bottom (primary) packing failure.
Optional lubrication systems	Prolong packing life - self contained Knuckle Buddy and Swedge lubrication systems.
Quick and easy maintenance (easiest in industry)	Reduce expenses and save time – wearable parts can be easily replaced without lifting any components of the Rod-Knuckle™ over the polished rod.
Low profile, light weight and rugged	Build to last, easy to install and maintain. **"NOT YOUR WEAK LINK"**

The **Rod-Knuckle™ Environmental BOP Stuffing Box** is tested to 10,500 psi. It withstands 42,000 lbs top load without crushing the top and bottom packing. The check valves are specially constructed for exceptional strength. Its unique **knuckle** design allows the top (secondary) packing to rotate with the polished rod when a misalignment exists. The **Rod-Knuckle™** can also be utilized as an alignment tool. It is suitable for regular, sour and high temperature services.

The **Rod-Knuckle™** is a cost effective and durable wellhead accessory designed to protect and preserve the environment. Its operation is simple and reliable.

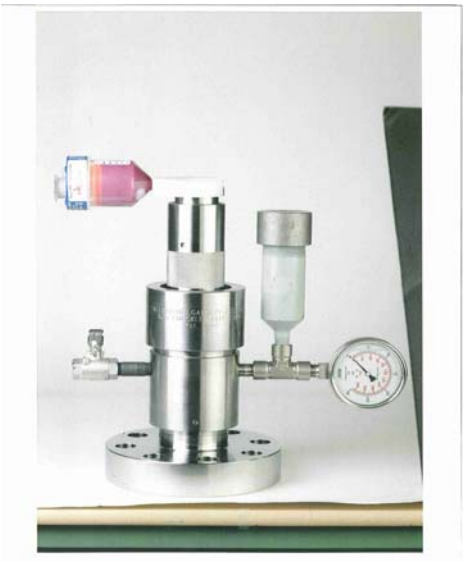
SPECIFICATIONS

Size	polished rod:	1-1/2", 1-1/4"
	flow tee connection:	2-3/8" EUE, 2-7/8" EUE, 3-1/2" EUE, 3" API line pipe
	flange connection:	R27
Pressure (psi)		3,000 (tested to 10,500 psi)
Top load (lbs)		42,000 maximum (without crushing top and bottom packing)
Operating Temperature (°F)		-50 and up
Dimensions		16.5"H x 5.5"OD
Weight		45 lbs
Material	body	4140 HTSR steel (heat treated stress relief)
	check valve	regular services – Delrin® 511P NC010 acetal resin sour services – Delrin® 511P NC010 acetal resin high temperature services – 6061-T6 aluminum (solution heat treated and artificially aged) sour high temperature services – PEEK™ polymer
	brass rings	ASTM B505-08
	packing	available for different services and applications

* Exceeded PSAC IRP Minimum Wellhead Requirements

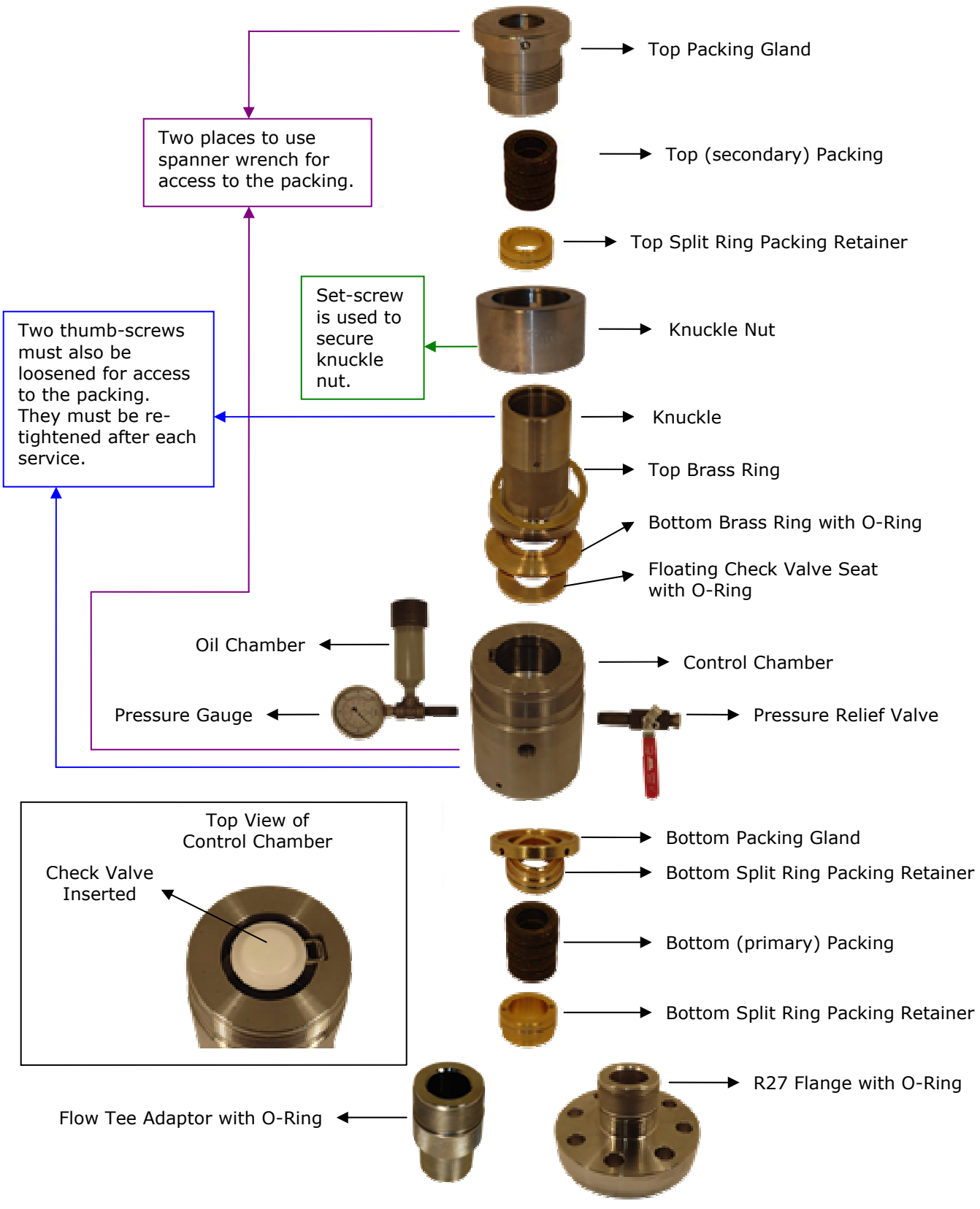
** Passed ASTM A370 Standard Test for Mechanical Testing of Steel Products

Flow Tee Connection Model



Flange Connection Model

ROD-KNUCKLE™ COMPONENTS



NELGAR™ OILFIELD SERVICES LTD.

INDUSTRY AT A GLANCE

Feature	Nelgar **Rod-Knuckle™**	Red Wing Super B7	Opal HF	Dura PCCV	Hercules PCSB	Poduction Saftty HT
Dual packing	√	√	√	√	√	X
Different packing required	X (same for both)	X	√ (2 different types)	√ (2 different types)	√ (3 different types)	N/A
Top load crushes packing	X	X	√	X	√	X
Rotating top packing and side loading relief	√	X	X	X	X	X
Integral BOP (check valve incorporated)	√ (1 piece)	√ (1 piece)	3 pieces (sold separately)	2 pieces (sold separately)	Add-on required (sold separately)	√ (1 piece)
Check valve causes damage to polished rod	X	√	√	√	√	√
Rated pressure (psi) Testing pressure (psi)	3,000 10,500	2,500 5,000	2,500 4,000	2,000 4,000	1,500 N/A	3,000 N/A
Operating temperature (°F)	-50 and up	-40 and up	-15 and up	-15 and up	-15 and up	-40 and up
Pressure shut-down switch	√	√	X	√	X	X
Lubrication systems	√	X	X	X	X	X
Easy access to check valve and change parts	√	X	X	X	X	X
Height (in)	16.5	20.4	24.5	25	33	12
Weight (lbs)	45	85	70	65	112	45
Main body material	4140 HTSR** steel	4140 steel	ductile* steel	ductile* steel	ductile* iron	4140 steel

* PSAC IRP 5.2.4 – Wellhead equipment manufactured from ductile iron is not suitable for use in western Canada when exposed to extremely low ambient temperatures.

** HTSR - heat treated stress relief