Well Service Packing

For Oil & Gas Fracturing Pumps

Superior Quality & Workmanship:

Parker Hannifin designs and manufactures well service packing in a wide range of materials including nitrile, HSN/HNBR, aramid fabric/HNBR composite, neoprene, fluoroelastomer, proprietary Resilon® Polyurethane, and filled PTFE blends. Our pressure rings, header rings and female adapters are designed to retrofit current plunger sizes and designs, or we can engineer a custom solution to fit your unique design.

Call Parker's application engineers for more information on our well service packing products.

Contact Information:

Parker Hannifin Corporation
Engineered Polymer Systems Division
2220 South 3600 West
Salt Lake City, UT 84119

phone 800 233 3900
eps-ccare@parker.com

www.parker.com/eps

Product Features:

- Retrofit current plunger sizes and designs
- Custom designs available
- Complete packing component assemblies available including custom machined lantern rings, spacers, etc.
- Wide range of materials including NBR, HSN/HNBR, CR, FKM, PTFE, and proprietary Resilon® Polyurethane formulations for water and water-glycol resistance (Resilon® 4301) and longer wear (Resilon® 4312)

Parker

ENGINEERING YOUR SUCCESS.

Well Service Packings are Available in a Wide Range of Proven Parker Materials

Parker manufactures well service packings in a wide variety of materials to suit specific well conditions and operating parameters, including Nitrile, Neoprene, HSN/HNBR, Fluoroelastomers, Polyurethane, filled PTFE blends and many other elastomer and plastic materials. In addition custom machined shapes (lantern rings, spacers) can be engineered to meet your total sealing system requirements.

HNBR Elastomers
N4288A80 & N4007A95: These high tensile strength, heat resistant (to 300° F) elastomers have excellent compatibility with PPM hydrogen sulfide, corrosion inhibitors, water and oil.

HNBR Composite
2080 is a specialized, proprietary aramid fabric/HNBR composite material formulated to provide long life in non-lubricated extreme environments.

Fluoroelastomer (FKM)
V4208A90: Parker offers a wide range of fluoroelastomers with varying hardness to meet the pressure and temperature requirements. V4208A90, a general purpose fluoroelastomer, has excellent compression set resistance for use in high temperatures, high pressure systems, and petroleum oils and fuels.

Polyurethane (TPU)
P4301A90 & P4312A90: Parker's proprietary high performance Resilon® Polyurethane with the best wearing properties of all the elastomers plus excellent rebound and resistance to compression set. P4301A90 is compatible with water and water-glycol.

PTFE
Parker's proprietary filled PTFE materials feature maximum wear resistance and nearly universal chemical compatibility in well service pressure ring profiles.

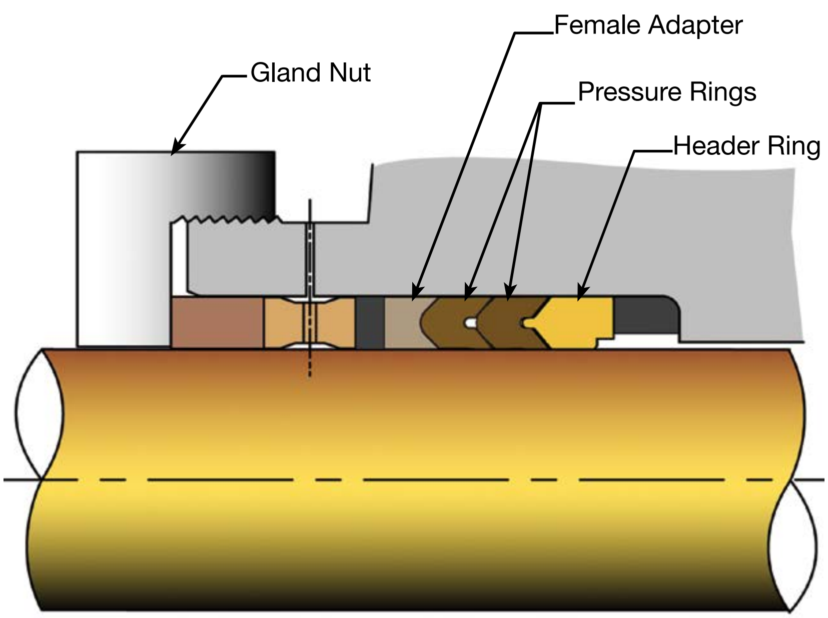
UltraCOMP™ PEEK
UltraCOMP engineered thermoplastics for female adapters, lantern rings and spacers are extrusion resistant up to 10,000 psi and +400°F.

Typical Physical Properties*

	HNBR N4288	HNBR N4007	FKM V4208	TPU P4301	TPU P4312
Hardness, Shore	80 A	95 A	90 A	90 A	60 D
Modulus @ 100% elongation, psi	1211	2017	1549	1850	2979
Ultimate tensile strength, psi	3327	4423	2284	7188	7085
Ultimate elongation, %	260	212	142	548	554
Specific gravity	1.26	1.22	1.82	1.18	1.16
Temp range Min to Max (°F)	-20 to 300	-20 to 300	-5 to 400	-35 to 275	-65 to 275

* Values listed are typical values and should not be used as specification limits. See Section 3 of Parker's Catalog EPS 5370 for additional material properties and guidance.

Common Well Service Packing Layout



NOTE: Parts in the stack may vary based on pump model. Refer to the pump manufacturer's parts list for stack arrangement.

Part Numbering: Well Service Packing

4	2	8	8	WS	H	5	0	0	0	3	5	0	0	-	D

*Optional

1. Seal Compound
4-Digit Material Code
Example:
4288 = 80A HNBR
2080 = Aramid Fabric/HNBR
2. Well Service
3. Profile Code
4. Cross Section (x1000)
Example: .500" x 1000 = 500
5. Plunger/Rod Diameter (x1000)
Example: 3.500" x 1000 = 03500
5 digits (use leading zeros as necessary)
6. Height or Custom Call-out

Parker's well service packing is ordered utilizing a descriptive 6-step numbering system:

1. See table for standard profiles and corresponding materials. Custom materials available.
2. WS is Parker's call-out for well service packing components.
3. See table below for standard profile codes. Parker can manufacture other custom shapes and spacers.
4. Nominal cross section of the packing housing.
5. Nominal diameter of the plunger.
6. Custom stack heights and special profiles available. Call Parker for custom designs.
* Leave blank for standard parts.

Stack Heights for Pressure, Header and Female Adapters (inch)

Cross Section	Pressure Ring	Header Rings	Female Adapter
0.375	.468	.563	.250
0.500	.562	.750	.332
0.625	.656	.938	.277

Standard Well Service Profiles

Profile & Description	Profile Code	Available Materials	Material Description
 Header Ring	H	4288	80 Shore A durometer HNBR. Excellent abrasion resistance. Good compression set resistance. Good in MTBE
		4007	95 Shore A durometer HNBR. High tensile. Excellent abrasion resistance
		4208	90 Shore A durometer general purpose fluoroelastomer. Excellent compression set resistance, high temperature, high pressure capable. Good in petroleum oils & fuels
		4301	90 Shore A water-resistant, premium Resilon® polyurethane with excellent compression set resistance and rebound characteristics
		4312	60 Shore D , pressure and wear-resistant, premium Resilon® polyurethane. Excellent for extended life and high pressure operations
 Pressure Ring	V	Filled PTFE	Proprietary filled PTFE for maximum wear resistance and nearly universal chemical compatibility
		4301	90 Shore A water-resistant, premium Resilon® polyurethane with excellent compression set resistance and rebound characteristics
		4312	60 Shore D pressure and wear-resistant, premium Resilon® polyurethane. Excellent for extended life and high pressure operations
		2080	High temperature and high strength aramid fabric/HNBR composite with excellent abrasion and pressure resistance
 Female Adapter	O	4685	Non-filled UltraCOMP™ PEEK. Used for replacing brass, bronze or other metallic members in sealing systems. See Catalog EPS 5370 for material properties
		4312	60 Shore D pressure and wear-resistant, premium Resilon® polyurethane. Excellent for extended life and high pressure operations

Installation Instructions for Pump Packing Assembly

Pump Packing Removal

1. Follow all environmental regulations for cleaning and disposing of any old or existing grease and packings.
2. Follow all safety procedures for disassembly and re-assembly.
3. Remove old pump packing.
4. Check for wear, damage, metal particles.
5. Clean stuffing box and sealing surfaces.
6. Make sure pump components fit properly.

Pump Packing Installation

1. Inspect Parker's replacement seal stack to make sure it is the correct size.
2. Freely lubricate the seal stack components with oil or light grease. Do not cake grease on seals.
3. Snap header ring and vee ring together.
4. Make sure the header ring is seated into the vee ring groove.
5. Install junk ring in the fluid end/stuffing box.
6. Install lubricated header and vee into metal gland with female adapter.
7. Install lantern or spacer.
8. Hand tighten gland nut or use minimal force with spanner wrench to engage and seat packing.
9. Tighten gland nut 1/8 turn with spanner wrench. Make alignment notation markings on both gland nut and fluid end/stuffing box.
10. Back off gland nut 1/2 to one full turn in order to install plunger through header ring.
11. Oil plunger and install plunger into the packing set.
12. Tighten gland nut with spanner wrench only so far as to align marks made on gland nut and fluid end/stuffing box.

DO NOT use a hammer and drift to tighten packing. This will knock plunger out of alignment. No further adjustment is needed.

LUBRICATION. An adequate lubrication system providing a minimum of 60 drops per minute should be maintained in order to minimize friction build-up.

Adjusting the Installed Packing

Packing should be checked periodically, approximately every 8 hours, and adjusted a minimum of 1/8 turn to 1/4 maximum turn if leakage occurs. Check packing lubricating system for satisfactory operation before each job. Check gland nut to ensure it is fully engaged with the packing and has not backed off.

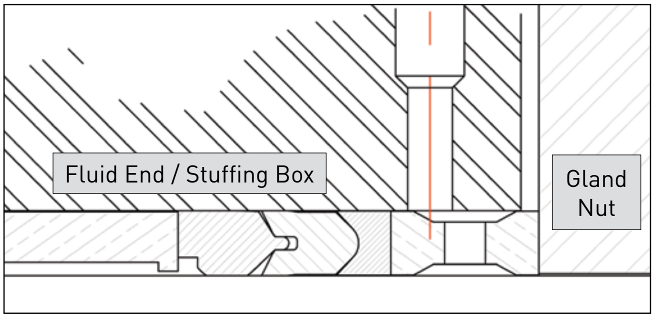


Figure 1: Installed seals snapshot.

Care should be taken not to over-tighten the gland nut as doing so may cause seal failure due to friction and heat build up. FEA results (shown in Figures 2 and 3 below) suggest that a minimum 1/8 turn to 1/4 maximum turn of the nut is sufficient to create a reasonable sealing force against the shaft without incurring excessive friction.

SAFETY WARNING: DO NOT ATTEMPT PACKING ADJUSTMENT WITH PUMP RUNNING.

Use "Equation 1" to determine torque value of adjustment if using appropriate torque wrench.

$$T = \frac{f * d_m}{2}\left(\frac{l + \pi * \mu * d_m}{\pi * d_m - \mu * l}\right)$$

Equation 1

Where f is the axial force due to compression of the seals (from the FEA), d_m is the mean diameter of the nut, l is the distance the nut travels with one complete rotation, and μ is the coefficient of friction between the threads.

As an example, assuming a coefficient of friction of $\mu = 0.1$ and a mean diameter of $d_m = 8.5$ in, the resulting torque would be 134 ft*lb for a ¼ turn of the nut ($f = 3{,}600$ lbf). This calculation is left to the customer who can plug in more accurate values for μ and d_m.

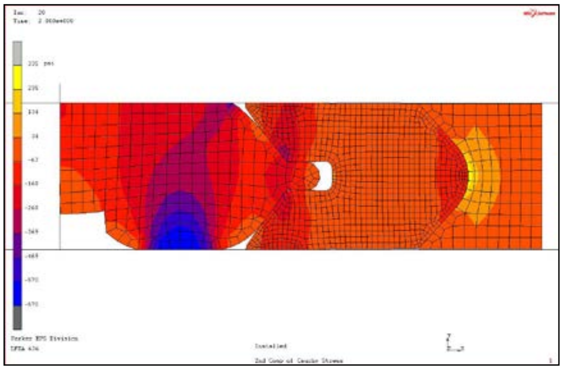


Figure 2: FEA results — installed in the gland

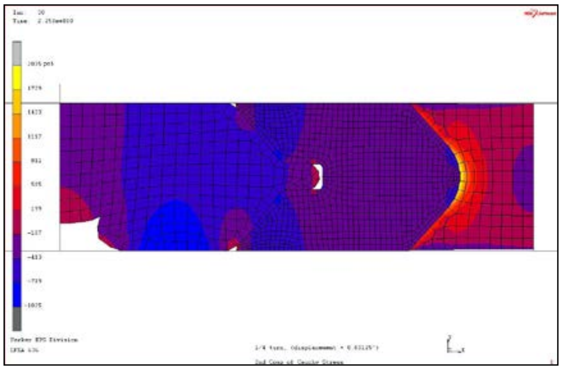


Figure 3: FEA results — one-quarter (1/4) turn of the gland nut