



Model NERO-2 Non-Elastomeric Sliding Sleeve

Assembly & Testing Technical Information

Part Number: (Various)

Description

The NERO-2 Non-Elastomeric Sliding Sleeve is a communication device with a ported inner sleeve that can be opened or closed using a shifting tool by standard slickline or coiled tubing methods. Equalizing holes in the inner sleeve provide pressure equalization between the tubing and casing annulus as the sleeve is opened. The Sliding Sleeve is made up to and forms part of the tubing string. The NERO-2 Sliding Sleeve is a shift-DOWN-to-open tool.

The NERO-2 Non-Elastomeric Sliding Sleeve uses common machined parts that allow the shift-open direction to be changed from DOWN-to-open to UP-to-open by simply substituting different sub ends

The NERO-2 Non-Elastomeric Sliding Sleeve is designed for use in high pressure and high temperature wells to establish a means of communication between the tubing string and the casing annulus for single-tubing or multiple-tubing string completions. The NERO-2 Sliding Sleeve may be used for directing flow from the casing to the tubing in alternate or selective completions. Other applications include killing a well, spot acidizing and fracturing, or equalizing pressure between an isolated formation and the tubing string.

Features and Benefits

- Proven non-elastomeric sealing design, that is cost effective and reliable, with a long operating life.
- No o-rings or standard chevron style seals used.
- Manufactured in 4140, 9Cr, 13Cr, S13Cr and Super Duplex materials.
- GOR Selective Nipple Profile to land slickline tools. (Comparable to Halliburton's R® Landing Nipple Profile).
- Available for 10,000psi & 12,000psi maximum working pressures.

Technical Numbers and Accessory Info

- **Maximum OD:** API Coupling OD is standard, but OD can be larger, or smaller upon request.
- **Minimum ID:** Seal Bores.
- **Opening Direction:** UP
- **Drift Diameter:** 0.0010" to 0.0015" smaller than seal bore Minimum ID.
- **Shifting Tools:** Otis "B", Otis "BO", and DFAST
- **Separation Sleeve:** GXS
- **Blanking Plug:** GPX
- **Standing Valve:** GVX

Sliding Sleeves-Landing Nipples-Blanking Plugs-Shifting Tools-On/Off Tools-Completion Packers
Flow Couplings/Blast Joints-Pup Joints-Crossover Subs-Jet Pumps-Anchor Catchers-Shear Out Safety Joints-Tubing
Drains-Much Much More.

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Testing

It is important that the sealing surfaces for the non-elastomeric seals are polished to a high finish to help load the seal stack at low pressure, this is important to ensure successful testing and operation.

All NERO-2 Sliding Sleeves are pressure tested to 10,000 psi using internal seal bore seals that pressure test both the seal stacks and the seal bores.

As previously noted, NERO-2 Sliding Sleeves are shifted with Otis type "B" shifting tools, for testing purposes, a shifting tool dressed with self-releasing keys is used; shear to release keys can also be used.

Depending on the amount of squeeze applied to the V-Rings after assembling the sliding sleeve, the shifting force required to open and close the sliding sleeve may vary, therefore a steel pin is used inside the shifting tool to stop premature shearing of the pin before the sliding sleeve has been fully opened or closed.

1. After fully assembling the sliding sleeve, tighten it in a vise horizontally and shift the sliding sleeve closed-open-closed, verifying that the sliding sleeve is fully closed and open each time.
2. Insert the test plugs into either end of the sliding sleeve; you will feel the seals grab the seal bores, confirming location.
3. Fill the Sliding Sleeve with water or hydraulic fluid and apply pressure up to 500 psi.
4. Apply pressure in 1,000 psi increments, pausing every 1,000 psi for 5 seconds; up to 10,000 psi.
5. Hold at 10,000 psi for 10 minutes, ensure there are no leaks and drop in pressure, engrave the sliding sleeve with a pressure test serial number and mark the pressure test chart with the same serial number.
6. Bleed off pressure, shift the sliding sleeve open-closed to ensure functionality and tighten sliding sleeve body connections, wipe down and store.

Operating

When one or more NERO-2 Sliding Sleeves are run on the same production string, special slickline tool strings might be required to selectively open or close the Sliding Sleeve depending on which Sliding Sleeve is to be opened or closed first.

In the NERO-2 Sliding Sleeve, there is an open, equalized, and closed position. The equalized position allows differential pressure across the Sliding Sleeve to equalize prior to the final full open position and prevent the full force of the differential pressure from acting on the v-seal stacks.

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Opening an NERO-2 Sliding Sleeve

Important Note: *When opening an NERO-2 Sliding Sleeve, it's recommended that there is minimal to no differential pressure across the Sliding Sleeve. Differential pressure across the Sliding Sleeve from the annulus to tubing or tubing to annulus could cause damage to the seals of the sliding sleeve.*

1. With the keys facing downward, attach the Otis "B" shifting tool to the slickline tool string. Lower the slickline tool string in the tubing until above the Sliding Sleeve. Move the slickline tool string downward until the keys engage in the Lower recess of the Inner Sleeve.
2. Jar downward until the pressure across the Sliding Sleeve starts to equalize.
3. Once the pressure across the Sliding Sleeve has equalized, continue to jar downward until the Inner Sleeve is completely shifted, fully opening the Sliding Sleeve.
4. Continue jarring downward until the inclined shoulder of the Sliding Sleeve forces the keys inward, allowing the shifting tool to pass through the sleeve.
5. Before returning the shifting tool to the surface, run it back through the Sliding Sleeve several times to ensure the Inner Sleeve is in the open position.

Closing an NERO-2 Sliding Sleeve

1. With the keys facing upward, attach the Otis "B" shifting tool to the slickline tool string. Run the slickline tool string in the tubing until below the Sliding Sleeve and then move upwards until the keys of the shifting tool lock in the Upper recess of the Inner Sleeve.
2. Jar upward until the Inner Sleeve is completely shifted, placing the Sliding Sleeve in the closed position.
3. Continue jarring upward until the inclined shoulder of the Sliding Sleeve forces the keys of the shifting tool inward, disengaging it from the recess of the Inner Sleeve, and allow the shifting tool to pass through the sliding sleeve.
4. Before returning the shifting tool to the surface, run it back through the Sliding Sleeve several times to ensure the Inner Sleeve is in the closed position.

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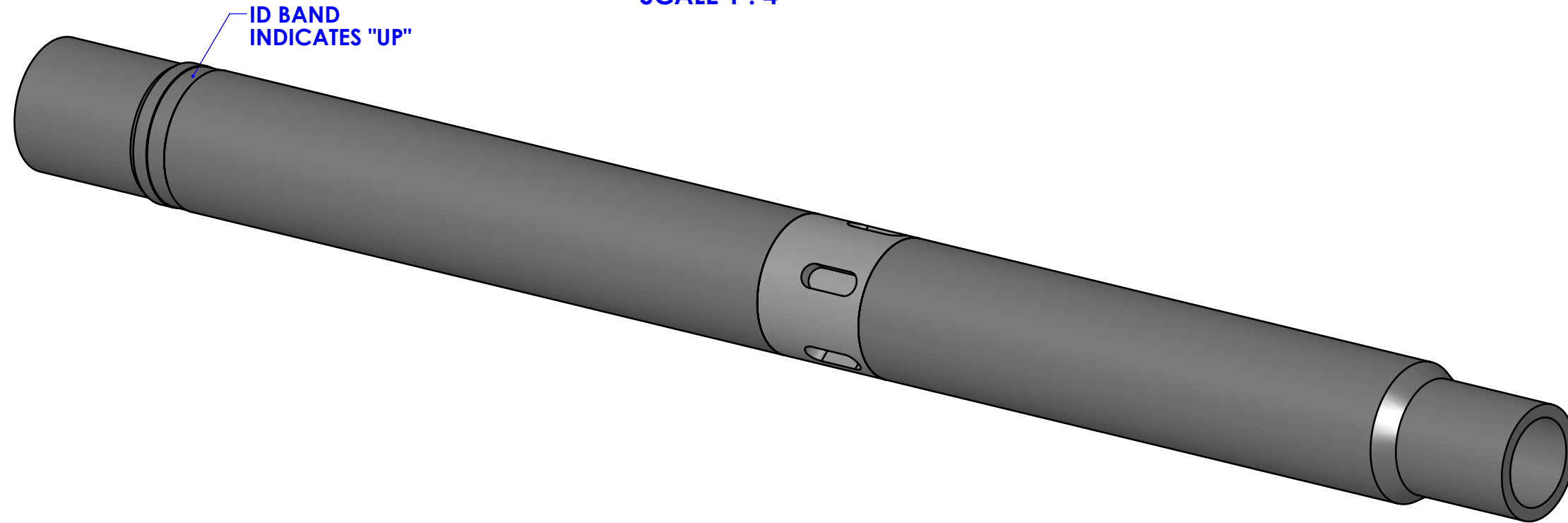
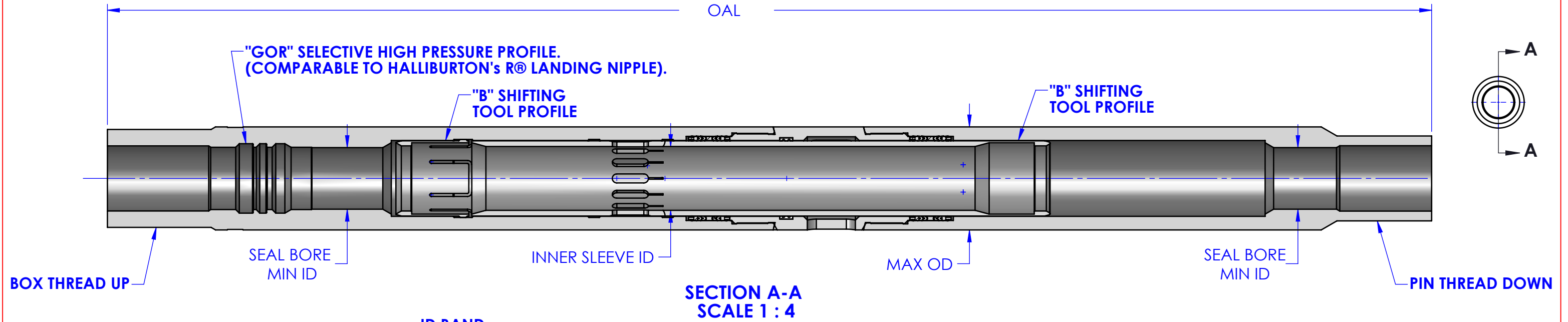
Giant Oil Tools Ltd., Model NERO-2 Sliding Sleeve										
*Seal Bore ID		Flow Area (Ports)		Flow Area (Min ID)		Max OD		Standard Thread Box x Pin	Shifting Tool	**Max Working Pressure (psi)
in.	mm.	IN ²	CM ²	IN ²	CM ²	in.	mm.			
1.710	43.43	4.73	30.516	2.295	14.806	3.063	77.80	2-3/8" EUE	1.710 "B"	10,000
1.781	45.23			2.489	16.058				1.781 "B"	
1.875	47.62			2.759	17.799				1.875 "B"	
2.125	53.97	6.16	39.741	3.544	22.864	3.750	95.25	2-7/8" EUE	2.125 "B"	
2.188	55.57			3.758	24.245				2.312 "B"	
2.312	58.26			4.199	27.09					
2.562	65.07	6.389	41.219	5.156	33.264	4.500	114.30	3-1/2" EUE	2.562 "B"	
2.750	69.30			5.940	38.322				2.750 "B"	
2.813	71.45			6.211	40.070				2.812 "B"	
3.437	87.29	14.280	92.128	9.273	59.825	5.500	139.70	4-1/2" EUE	3.312 "B"	
3.688	93.67			10.677	68.883				3.688 "B"	
3.813	96.85			11.413	73.632				3.813 "B"	
4.562	115.87	21.140	136.38	16.337	105.40	6.975	172.60	5-1/2" LTC	4.562 "B"	

*Seal Bore ID is also the Minimum ID of the Sliding Sleeve.

**High Pressure 12,000 psi options available.

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SHIFT-DOWN-TO-OPEN
SHIFTING TOOL: B or DFAST

MATERIAL	UNLESS OTHERWISE SPECIFIED	GIANT OIL TOOLS	DRAWN	DATE
HEAT TREATMENT	TOLERANCES .X = ± 0.030 .XX = ± 0.015 .XXX = ± 0.005 FRACTIONS = ± 1/64 ANGLES = ± 1/2° INSIDE CORNERS 0.015 R. MAX. ALL THREAD ENTRY AND EXIT ANGLES TO BE 45° OFF AXIS OF THREAD REMOVE ALL BURRS AND SHARP CORNERS ALL THREADS—RIGHT HAND		APPROVED	DATE
COATING	N/A	DWG NO.	-	
UPPER END ← LOWER END → (H) = IDENTIFICATION	SURFACE FINISH 125 ✓	DESCRIPTION	NERO-2 NON ELASTOMERIC SLIDING SLEEVE	
UNITS INCHES	PROJECT -	SCALE	SHT. OF	PART REV.
CONFIDENTIAL AND TRADE SECRET. DO NOT DISCLOSE, USE OR REPRODUCE WITHOUT WRITTEN APPROVAL FROM G.O.T.	PROJECT -	NTS	1 1	A
			DWG REV.	MASS
			-	- LB