

# Clipper® Oil Seals Materials

Catalog EPS 5350/USA

## Common Materials Used in this Product

Clipper Oil Seals are available in a wide range of materials. The following general material descriptions are for the OD material “H” and corresponding lip material “L”.

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## OD and Lip Materials

### ***H1L5 & H1L7 — Nitrile (NBR)***

Standard Nitrile is the most commonly used polymer in the rotary shaft seal industry. NBR has very good resistance to oil, fuel and alkali solutions. Nitrile offers excellent resistance to petroleum-based hydraulic fluids and is resistant to hydrocarbon solvents. Standard Nitrile has poor resistance to ozone, ketones, automotive or aircraft brake fluid, and steam or hot water. Standard Nitrile is recommended for operating in temperatures ranging from -20 to +250 °F (-29 to +121 °C) and offers good mechanical properties and abrasion resistance.

### ***H1L50 & H1L70 — Low Temp Nitrile (NBR)***

Nitrile compounds can be formulated for applications in extreme cold weather environments. These special formulations of Nitrile allow for operation at minimum temperatures ranging down to -70 °F (-57 °C), while maintaining good chemical and abrasion resistance, but the upper temperature limit is lowered to 212 °F (100 °C).

### ***H1L20 — Carboxylated Nitrile (XNBR)***

XNBR is formulated to greatly enhance tear and abrasion resistance over standard Nitrile, while maintaining similar chemical compatibility. It is used in applications where abrasive materials may collect at the point of shaft contact. XNBR is less resilient and flexible at low temperature, and offers poorer compression set resistance than standard Nitrile. Carboxylated Nitriles are recommended for operation at temperatures ranging from -30 to +250 °F (-34 to +121°C).

### ***H1L30 — Hydrogenated Nitrile (HNBR)***

Hydrogenated Nitriles offer improved abrasion resistance, excellent chemical resistance and higher operating temperatures than standard NBR. Ozone and weather resistance, as well as resistance to hot water are also increased. HNBR compounds are recommended for operating temperatures ranging from -40 to +300 °F (-40 to +149 °C).

**H1L8 — Neoprene (CR)**

Neoprene offers very good resistance to weather, ozone and natural aging as well as good flame resistance while maintaining moderate resistance to oil and gasoline. Good abrasion, flex and cracking resistance is available with the Neoprene material. Neoprene is recommended for operating temperatures ranging from -45 to +250 °F (-43 to +121 °C).

**H1L21 — Ethylene Propylene (EPDM)**

EPDM offers excellent heat, ozone and sunlight resistance. EPDM offers very good low temperature flexibility, good resistance to alkalis, acids (such as acetic), and oxygenated solvents (such as MEK). Provides improved resistance to water and steam in applications where NBR and FKM exhibit poor service life. Good replacement for FKM where solvents are a problem. It is not recommended for petroleum oil. EPDM is recommended for operating temperatures of -60 to +300 °F (-51 to +149°C).

**H5L16 — Fluoroelastomer (FKM)**

FKM provides excellent resistance to oils, fuels and hydraulic fluids at temperatures that far exceed standard Nitrile. It also has very good resistance to flame and excellent impermeability to gases and vapors. FKM is recommended for operating temperatures that range from -40 to +400 °F (-40 to +204 °C).

**Case Materials**

**H1, H3 — Neoprene/Aramid Composite**

The aramid fiber-reinforced composite shell will fit a wide range of bore tolerances and provides a rustproof gasket-type seal at the OD. The composite case also will fill slight imperfections in the bore housing, reducing machining cost. Usually combined with a Nitrile lip material.

**H5 — Fluoroelastomer/Aramid Composite**

Offers the same construction benefits mentioned above. Usually combined with a Fluoroelastomer lip material.

**Spring Materials**

Springs are available in a wide range of materials. Clipper Oil Seal designs are furnished with 302 stainless steel springs as standard. Other spring materials are available at an additional cost. **Table 5-5** shows general operating parameters for the most common spring materials.

**Table 5-5. Spring Material Parameters**

Wire Type	Maximum Service Temperature		Application
	°C	°F	
Carbon Steel	120	250	General purpose
Monel 400	230	450	Saltwater
Inconel 750	675	1250	Extreme temperature
Phosphor Bronze	95	200	Saltwater
302/304 Stainless Steel	260	500	Corrosion resistance
316 Stainless Steel	315	600	Hi-temp corrosion resistance



**Spring Type**

For lip loading, the Clipper Oil seal uses a coil wire spring (garter spring).

Garter spring benefits:

- Provides a more uniform load to sealing lip
- Heat treated — stress relieved
- Constant load with minimum load variations
- Able to adjust the spring in the field to increase load

Two types of spring connections are used:

1. Threaded type is used on most solid seals.
2. Hook and eye type are used on splits seals because they are easier for the end user to connect during installation.

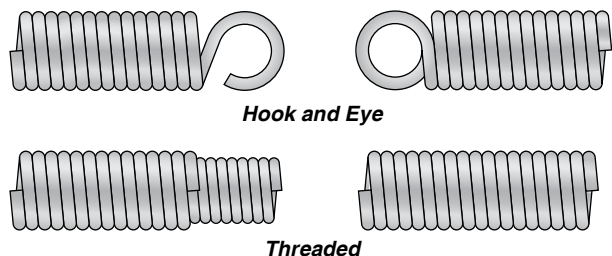


Table 5-6. Clipper Oil Seal Standard Material

Matl. Code Case/Lip	Material Description	Abrasion Resistance	Min. Temp	Cont. Temp	Peak Temp
H1L5	Nitrile (75 Duro NBR) <b>Standard NBR offering.</b> The NBR lip material has very good resistance to oil and gasoline. Superior resistance to petroleum based hydraulic fluids. Good resistance to hydrocarbon solvents. Very good resistance to alkalis and solvents. Poor resistance to oxygenated solvents.	Very Good	-20 °F -29 °C	212 °F 100 °C	250 °F 121 °C
H1L7	Nitrile (85 Duro NBR) The L7 lip material has a lower minimum temperature capability than the L5 material.	Very Good	-30 °F -34 °C	212 °F 100 °C	250 °F 121 °C
H1L20	Carboxylated Nitrile (83 Duro XNBR) The XNBR lip material is generally tougher and more resistant to tear and abrasion than standard NBR.	Outstanding	-30 °F -34 °C	212 °F 100 °C	250 °F 121 °C
H1L30	Hydrogenated Nitrile (75 Duro HNBR) The HNBR lip material offers improved abrasion resistance, chemical resistance, higher operating temperature and better ozone resistance than standard NBR.	Outstanding	-40 °F -40 °C	250 °F 121 °C	300 °F 149 °C
ALLL5	Nitrile (75 Duro NBR) Homogenous NBR material without aramid fiber OD provides a very pliable seal that can be stretched over flanges or other obstructions on the shaft. A cover plate is recommended to keep the seal retained in the housing bore.	Very Good	-20 °F -29 °C	212 °F 100 °C	250 °F 121 °C
H1L50	Arctic Nitrile (85 Duro Low Temp NBR) Low temperature Nitrile lip material allows for lower minimum temperatures while providing good chemical and abrasion resistance.	Very Good	-50 °F -46 °C	200 °F 93 °C	212 °F 100 °C
H1L70	Alaska Nitrile (75 Duro Low Temp NBR) Same characteristics as L50, but softer with lower minimum temperature range.	Very Good	-70 °F -57 °C	200 °F 93 °C	212 °F 100 °C
H5L16	Fluoroelastomer (90 Duro FKM) FKM lip material offers outstanding resistance to high heat. Excellent resistance to oil, gasoline, petroleum hydraulic fluids and hydrocarbon solvents. Very good impermeability to gases and vapors. Very good resistance to flame, weather, oxygen, ozone and sunlight. Very little resistance to oxygenated solvents. Poor tear resistance.	Good	-40 °F -40 °C	325 °F 163 °C	400 °F 204 °C
H5L89	Fluoroelastomer (90 Duro FKM) Improved steam resistance.	Good	-40 °F -40 °C	325 °F 163 °C	400 °F 204 °C
N/P	PTFE bonded to NBR lip — PTFE layer provides improved dry running capability, chemical resistance, and reduces torque consumption.	Very Good	-20 °F -29 °C	212 °F 100 °C	250 °F 121 °C
F/P	PTFE bonded to FKM lip	Very Good	40 °F -40 °C	325 °F 163 °C	400 °F 204 °C
H1L21	Ethylene Propylene (75 Duro EPDM) Excellent heat, ozone and sunlight resistance. Very good low temperature flexibility, good resistance to alkalis, acids (such as acetic) and oxygenated solvents (such as MEK). Provides improved resistance to water and steam in applications where NBR and FKM exhibit poor service life. Good replacement for FKM where solvents are a problem. Not recommended for petroleum oil.	Very Good	-60 °F -51 °C	250 °F 121 °C	300 °F 149 °C