

<b>Material</b>	<b>Advantages</b>	<b>Disadvantages</b>	<b>Ranges</b>	<b>Substitutes</b>
Nitrile (NBR)	Highly cost efficient. Good low temp. capabilities. Excellent wear resistance. Little to no swell in hydrocarbon fluids.	Poor high heat resistance Poor ozone resistance. Poor resistance to lubricants containing sulfur or EP additives, hydrocarbons or oxygenate blends (gasoline/methanol).	-40°F to +248°F -40°C to +120°C	FPM Polyacrylate PTFE
Viton® (FPM)	Excellent properties for sealing under high temperatures. Excellent fluid compatibility. Very long usage life	Poor resistance to basic fluids with pH>7. Expensive compared to other materials.	-22°F to +392°F	PTFE
Leather	Good dry running capabilities	Higher cost than Nitrile. Poor heat resistance.	-50°F to +200°F -46°C to +93°C	Nitrile FPM Polyacrylate PTFE
Polyacrylate (ACM)	Good resistance to EP lubricants. Low swelling when sealing hydrocarbon fluids. Better heat resistance than Nitrile.	Higher cost than Nitrile. Poor low temp. compatibility. Should not be used when sealing aqueous media.	-20°F to +300°F -29°C to +149°C	FPM PTFE
Silicone	Good resistance to dry heat. Excellent sealing compatibility in low temp applications.	Higher cost than Nitrile. High swell properties. Poor dry running compatibility. Poor resistance to some EP additives.	-80°F to +350°F -62°C to +176°C	FPM PTFE
Urethane	Good lubricant and ozone resistance. Good abrasion resistance. More durable than Silicone.	Substantial softening when used in applications above 250°F. Poor resistance to hot water or steam.	Please contact your Harwal representative with your specific application.	Urethane cannot be substituted.
Teflon® (PTFE)	Superior dry running compatibility. Extremely low coefficient of friction. Excellent chemical resistance. Resistant to hydrocarbon/oxygenate blends.	Poor resistance to abrasion in dry environments. Can be easily damaged during installation. High thermal expansion.	-100°F to +450°F -73°C to +232°C	PTFE cannot be substituted.