



Transmission & Distribution

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In partnership with Amorim Cork Composites, the world's leading manufacturer of industrial cork products, Whitby and Chandler Limited has established itself as a major supplier of gaskets, seals and rubber mouldings.

Main advantages

Sealing

- Proven long term performance in T&D environments
- Products with wide load range and suitable for extreme operation temperatures
- Tolerance to extreme surface finish conditions and high out-of-flatness flanges
- Experience in designing gaskets for multiple industries and applications

Noise and Vibration Control

- Proven noise and vibration solutions working in major OEM's worldwide with:
 - Oil filled transformers/reactors and dry transformers
 - Long term performance in the field
 - Application engineering support
 - Multi-applications/Industry design experience
- Solutions include:
 - Internal vibration pads
 - External vibration pads
 - Core fixing clamp decoupling
 - Compressed layer damper (CLD) solutions
 - Isolation collars

Testing & Validation

Amorim T&D sealing materials are unique because they compress mostly within themselves thereby reducing extrusion.

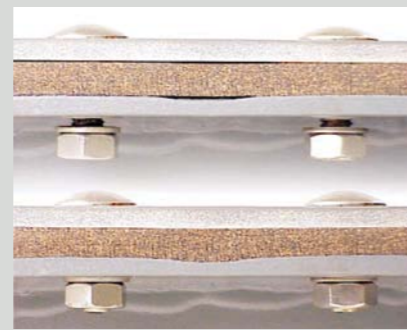
Flat cork gaskets will ensure enough surface area contact and guarantee adequate compression, even when there are flange surface imperfections such as distortion, paint or welding defects, etc. They also eliminate the need for controlled compression system designs, therefore cutting manufacturing costs.

As most flanges have a tendency to bow when placed under load, gasket conformability is critical and our T&D materials will help to provide a leak-free solution.

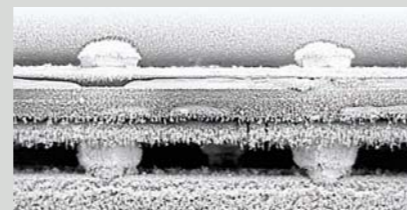
Amorim T&D materials were submitted to severe ageing cycles (over 1500 hours @ 167°C under compression and in full contact with oil) in order to show correlation with over 30 years of service life.

Application testing to reproduce extreme field temperatures like arctic conditions, with thermal cycles down to -60°C, show that Amorim T&D materials remain flexible and retain the correct amount of sealing stress in those conditions.

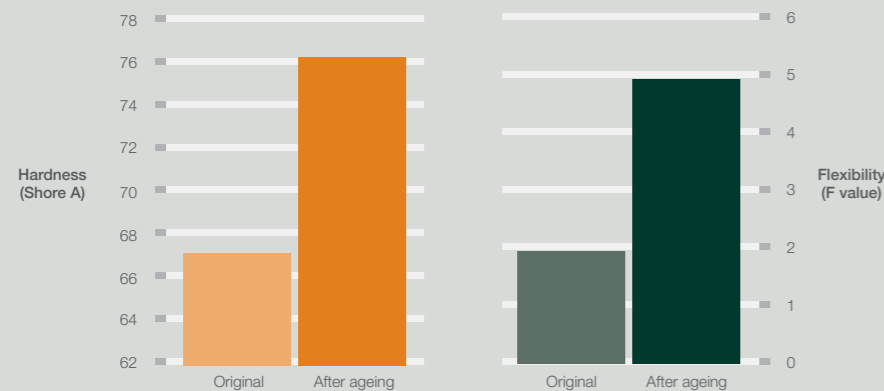
These test protocols, based on similar industry long-term validation tests, confirm that Amorim T&D materials withstand transformer service life requirements and are suitable for conditions in a range from -60°C to 125°C or higher (up to 175°C in the case of TD7000 Silicone Cork).



TD1049 Conformability to extreme flange conditions



TD1310 under arctic conditions



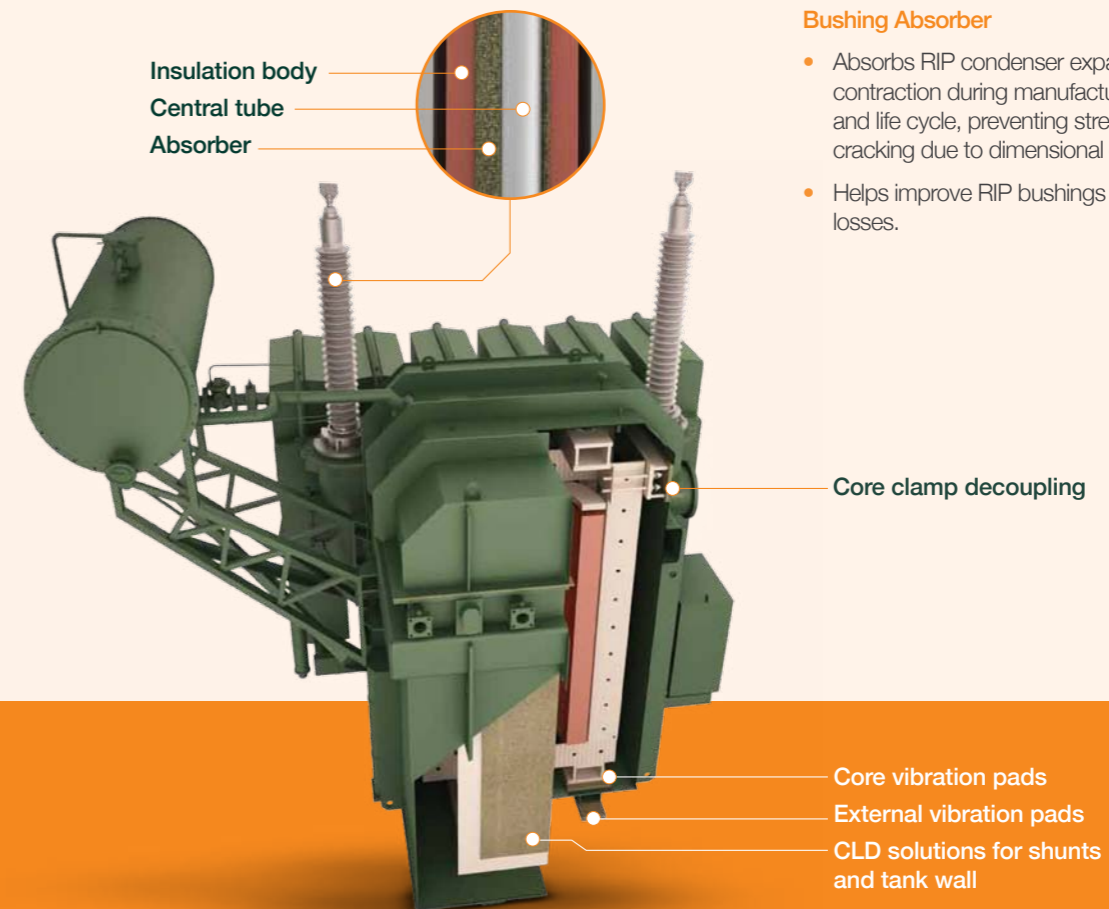
TD1120 Long Term Test Data



Noise and Vibration control 🎧

KEY REQUIREMENTS	Typical values			
	VC2100	VC5200	VC6400	VC7000
Maximum Load (MPa)	2,0	0,6	2,0	8,0
Maximum Load (psi)	290	87	290	1160
Work Load Range (MPa)	0,5 – 1,5	0,2 – 0,5	0,5 – 1,5	2,0 – 6,0
Work Load Range (psi)	72 - 217	29 - 72	72 - 217	290 - 870
Temperature Range (°C)	-40 to 125	-40 to 110	-50 to 110	-60 to 175
Temperature Range (°F)	-40 to 257	-40 to 230	-58 to 230	-76 to 347
Application	Internal vibration control (Oil contact)	External vibration control	External vibration control	External vibration control (Dry transformers)

Applications

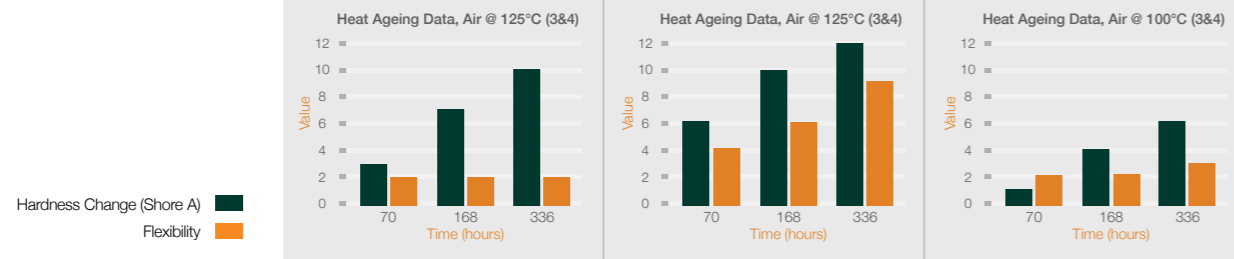


Bushing Absorber

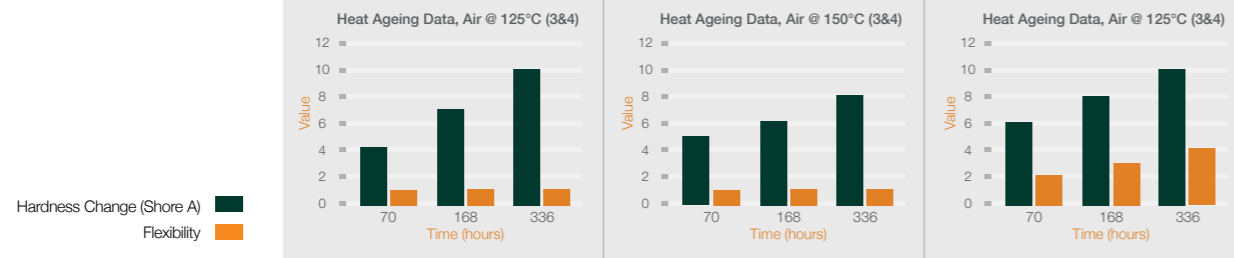
- Absorbs RIP condenser expansion contraction during manufacturing and life cycle, preventing stress and cracking due to dimensional change
- Helps improve RIP bushings electrical losses.

Comparison chart – Cork TD products

Material	TD1120	TD1049	TD1310
Polymer	NBR	NBR	NBR
Temperature range	-40°C to 125°C (-40°F to 257°F)	-30°C to 125°C (-4°F to 257°F)	-50°C to 110°C (-58°F to 230°F)
Stress range	2.5 to 15 MPa (360 to 2175 psi)	5.5 to 20 MPa (800 to 2900 psi)	3 to 20 MPa (435 to 2900 psi)
Compressive strength	Exceeds 70 MPa (10,000 psi)	Exceeds 70 MPa (10,000 psi)	Exceeds 70 MPa (10,000 psi)
Density (KG/M ³)	850	950	1040
Hardness (Shore A)	65	75	70
Tensile strength (MPa)	2,0	3,0	2,5
Elongation (%)	90	50	100
Volume resistivity p (Ω cm)	-	-	-
Fluid contact - Mineral oil	Suitable	Suitable	Suitable
Fluid contact - Natural ester oil	Suitable	Suitable	Suitable
Fluid contact - Silicone oil	Suitable	Suitable	Suitable
SF ⁶ gas	Acceptable	Acceptable	Acceptable



Material	TD3510	TD7000	TD7110
Polymer	EPDM	VMQ	NBR/ECO
Temperature range	-60°C to 130°C (-76°F to 266°F)	-60°C to 175°C (-76°F to 347°F)	-35°C to 135°C (-31°F to 275°F)
Stress range	3 to 12 MPa (435 to 1740 psi)	2.6 to 12 MPa (377 to 1740 psi)	4 to 20 MPa (580 to 2900 psi)
Compressive strength	Exceeds 70 MPa (10,000 psi)	Exceeds 70 MPa (10,000 psi)	Exceeds 70 MPa (10,000 psi)
Density (KG/M ³)	1000	1100	1100
Hardness (Shore A)	65	70	75
Tensile strength (MPa)	2,5	3,0	4,5
Elongation (%)	230	100	35
Volume resistivity p (Ω cm)	1,84 x 10 ⁸	-	-
Fluid contact - Mineral oil	Unsuitable	Suitable	Suitable
Fluid contact - Natural ester oil	Unsuitable	Suitable	Suitable
Fluid contact - Silicone oil	Unsuitable	Unsuitable	Suitable
SF ⁶ gas	Suitable	Unsuitable	Unsuitable



One supplier – multiple solutions

Sealing

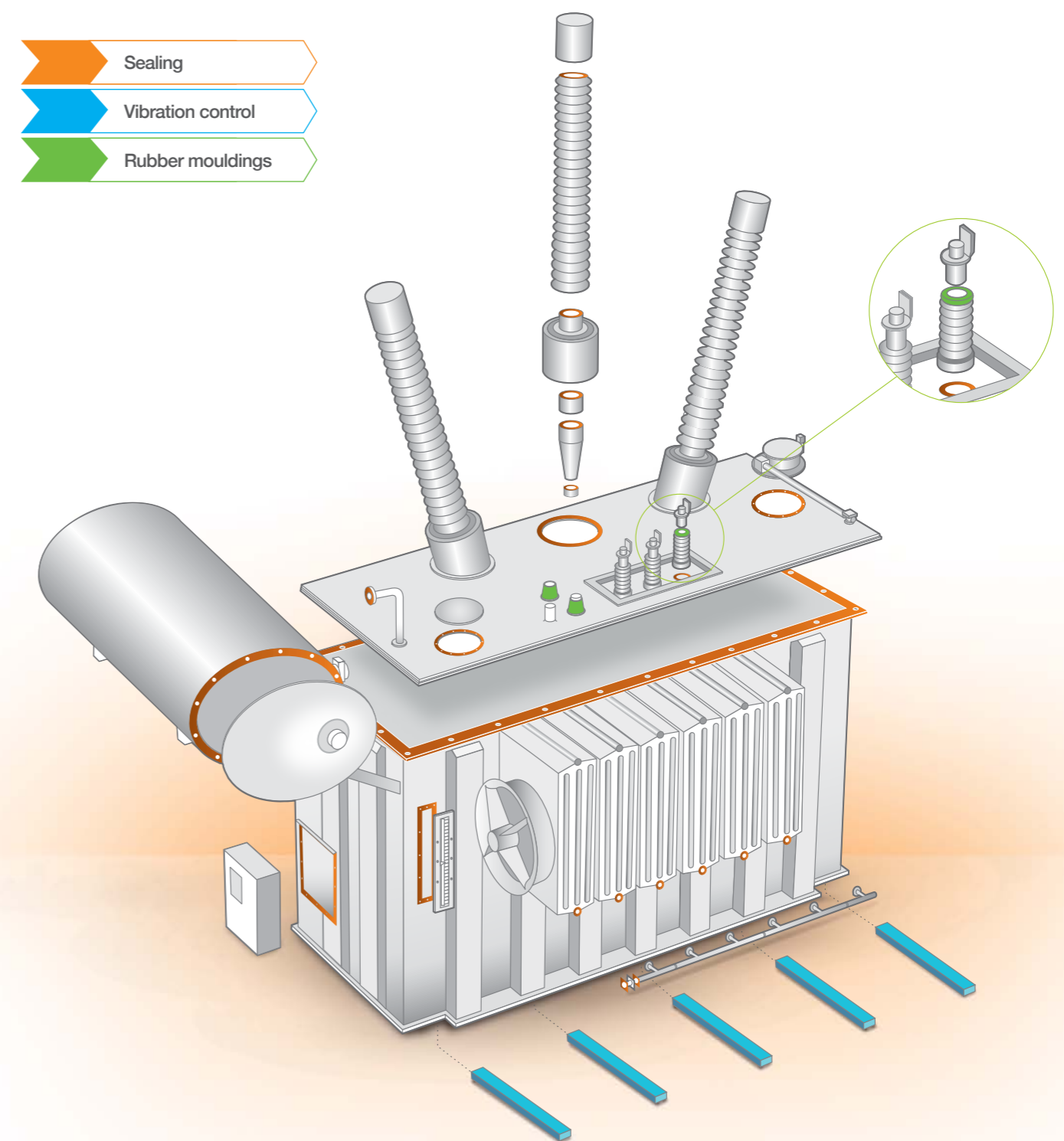
- Proven long term performance in the field
- Products with wide load range and suitable for extreme operation temperatures
- Tolerance to extreme surface finish conditions and high out-of-flatness flanges
- Experience in designing gaskets for multiple industries and applications

Vibration control

- Proven noise and vibration solutions working in major OEM's around the world
- Internal pads for distribution transformers
- External pads for power transformers
- Extensive product testing and application engineering support

Rubber mouldings

- Wide range of rubber compounds designed for use in the industry
- Certified formulations available
- Mouldings, extrusions and press-cut products
- Technical support and material testing facilities



Materials specification

To complement our range of cork materials we have a comprehensive portfolio of rubber sheeting and compounds at our disposal, which enables us to offer press-cut, moulded and extruded products.

The most common polymer in T&D is nitrile (NBR) because of its excellent oil-resisting characteristics, but others such as hydrogenated nitrile (HNBR), neoprene (CR) and Viton* (FKM/FPM) are extensively used.

As with silicone cork for low-temperature applications, we have fluorosilicone rubber (FVMQ) with a temperature range of -60°C to 170°C and good oil resistance.

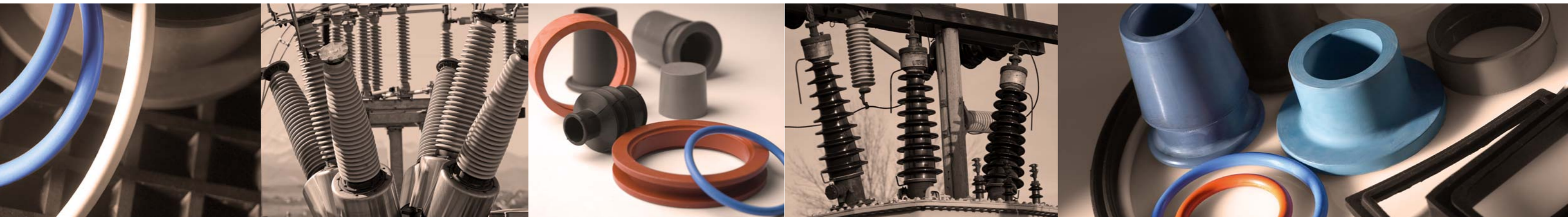
Material	Designation	Temp. Range °C	Positive Characteristics	Negative Characteristics
Neoprene Chloroprene rubber	CR	-35 to +95	Flame retardant. Resistant to some chemicals, oil, water. Very good ozone resistance.	Only medium resistance to tearing and will not withstand continuous use with fuels.
Neoprene BS2752 Chloroprene rubber	CR	-35 to +95	Greater oil resistance due to higher neoprene content.	
Nitrile Acrylonitrile-butadiene rubber	NBR	-30 to +120	Resistant to mineral oils, hydrocarbon fuels, water and a wide range of chemicals.	Poor resistance to sunlight.
Nitrile BS2751 Acrylonitrile-butadiene rubber	NBR	-30 to +120	Greater oil resistance due to higher nitrile content.	
Hydrogenated Nitrile	HNBR	-30 to +150	Will withstand thermal oxidation well. Particularly good in hot water and steam applications.	Not designed for use in applications requiring flame-retardant properties.
Butyl Isobutene-isoprene rubber	IIR	-25 to +125	Very low gas and moisture permeability. Excellent ozone and weathering resistance.	Not suitable for use with solvents and mineral oils.
Hypalon *	CSM	-25 to +130	Resistant to general oils, fluids, ozone and weathering.	Not resistant to fuels.
EPDM Ethylene Propylene Diene Monomer	EPDM	-50 to +130	Good abrasion and weathering resistance.	Not resistant to mineral oils and hydrocarbon fuels.
Silicone	VMQ	-60 to +200	Good electrical insulation properties. Excellent resistance to animal and vegetable oils and ozone.	Not suitable for applications which require high tensile strength, or resistance to fuels or abrasion.
Fluorosilicone	FVMQ	-60 to +170	Similar to silicone but greater oil resistance. Excellent weathering and ageing properties.	Poor tensile strength and resistance to abrasion.
Viton * Fluoroelastomer	FKM/FPM	-20 to +210	Excellent resistance to mineral oils, fuels, water and most chemicals except ketone solvents. Good flame resistance and very low gas permeability.	Poor abrasion resistance.

* Dupont Trademark

Product specification

Our BS2751 nitrile and our fluorosilicones have been tested by M&I Materials Ltd. (manufacturer of MIDEL 7131 transformer oil) and confirmed to be compatible.

WCL 6738		WCL 6020		WCL 6678 (Premium)	
Material:	Nitrile BS2751	Material:	Fluorosilicone	Material:	Fluorosilicone
Colour:	Black	Colour:	Blue	Colour:	Blue
Hardness (IRHD):	66°/75°	Hardness (IRHD):	65°/75°	Hardness (IRHD):	65°/75°
Specific gravity (g/cm ³):	1.119-1.25	Specific gravity (g/cm ³):	1.48	Specific gravity (g/cm ³):	1.60
Tensile strength (MPa):	12.5 min	Tensile strength (MPa):	7.2	Tensile strength (MPa):	7.5 Min
Elongation at break (%):	250 min	Elongation at break (%):	290 nominal	Elongation at break (%):	245 Min
Compression set (%) (24 hours at 70°C):	20 max	Compression set (%) (22 hours at 175°C):	25	Compression set (%) (22 hours at 175°C):	16 Max
Temperature range:	-20°C +130°C Intermittent 100°C constant	Temperature range:	-60°C +170°C	Temperature range:	-60°C +170°C
Aged fuel b (22 hours at 40°C)		Tear strength N/mm:		Tear strength N/mm:	
Volume change (%):	-0/+25 max	24		17	
Air aged (168 hours 70°C)					
Hardness change (IRHD):	-0/+10				
Tensile change (%):	-10 max				
Elongation at break change (%):	-35 max				
Low temperature stiffness:	-20°C				





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Made in the
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Manufacturers of Gaskets,
Seals and Rubber Mouldings

