

Figure 1.3 Rubber Compound Specifications—To Be Regarded Only As A Guide

Commercial name	Natural rubber	Perbunan Acrylonitrile butadiene rubber	Hydrogenated NBR	Neoprene Chloroprene rubber	Acrylic rubber	Butyl rubber	Hypalon Chloro-sulphonated polyethylene
	Characterised by flexibility, strength and low temperature resistance as well as excellent physical properties. Ideal for bonded rubber/metal products. Not suitable for petrol, grease, oil and ozone.	Highly resistant to abrasion and tearing, particularly resistant to ageing. Particularly recommended for crude oil products, high temperatures, heating and lubricating oils, petrol and paraffin oil.	High resistance to heat, ozone and oil, good mechanical properties at high temperatures, excellent resistance to wear and tear.	All-purpose synthetic rubber, flame resistant, resistant to abrasion, very robust, good dielectric strength, particularly recommended for exposure to ozone and weathering.	Good resistance to high temperatures and mineral oils, high resistance to oxygen and ozone, unfavourable low temperature properties.	Very slightly permeable to air, steam and other gases, good resistance to heat, oxygen, ozone and many chemicals and solvents, good electrical properties (isolating), good resistance to abrasion and tear propagation.	Fast to light, colour-fast, flame-resistant, good dielectric strength, particularly recommended for exposure to sunlight, ozone, weather and oxidising chemicals. However, it has a very low tensile strength.
<b>International designation</b>	NR	NBR	HNBR	CR	ACM	IIR	CSM
Hardness available	25 - 95 Shore A	25 - 95 Shore A	40 - 90 Shore A	30 - 90 Shore A	50 - 80 Shore A	40 - 85 Shore A	50 - 95 Shore A
Temperature resistance	-40°C to 80°C	-40°C to 140°C	-40°C to 175°C	-30°C to 120°C	-35°C to 175°C	-40°C to 130°C	-40°C to 120°C
Short-time peak temp	100°C	160°C	200°C	150°C	200°C	150°C	175°C
Tensile Strength (Nmm <sup>2</sup> )	25	25	30	25	16	17	18
Tensile elongation (%)	800	500	150 to 600	450	up to 350	400 to 800	300
<b>Properties</b>							
Abrasion	good	very good	very good	good	moderate	good	moderate
Resistance to flex cracking	good	moderate	very good	very good	moderate	moderate	good
Elongation/Tensile strength	excellent	good	very good	good	good	good	good
Flexibility	excellent	good	good	good	low	slight	good
Notch strength / strength of structure	excellent	good	good	good	-	good	good
Resistance to light	bad	bad	good	very good	good	very good	excellent
Resistance to oxidising	moderate	moderate	good	good	very good	very good	excellent
Resistance to ozone	moderate	moderate	good	very good	very good	very good	excellent
Resistance to wear/tear	very good	very good	good	very good	good	good	good
Weathering effect	good	moderate	good	very good	very good	very good	excellent
<b>Resistance to</b>							
Alkali	good	good	good	very good	not suitable	very good	very good
Petrol	not suitable	excellent	good	moderate	not suitable	not suitable	moderate
Benzole	not suitable	bad	moderate	not suitable	not suitable	not suitable	not suitable
Foodstuffs	suitable	suitable	not suitable	suitable	not suitable	suitable	suitable
Solvents, aliphatic	not suitable	very good	very good	moderate	bad	not suitable	moderate
Solvents, aromatic	not suitable	conditional	conditional	moderate	bad	not suitable	moderate
Solvents, halogen	not suitable	bad	conditional	bad	bad	not suitable	moderate
Oils and greases	not suitable	excellent	very good	good	very good	not suitable	good
Acids	conditional	conditional	conditional	good	not suitable	very good	very good
Water	good	good	very good	very good	good	good	good

Figure 1.4 Rubber Compound Specifications—To Be Regarded Only As A Guide

Commercial name	Epichlorohydrin rubber	APTK EPDM Ethylene-propylenediene rubber	Fluorinated rubber	Polyboron rubber	Polyurethane Polyurethane	Silicone Silicone rubber	SBR Styrenebutadiene rubber
	Low gas permeability, very good low temperature properties, good resistance to mineral oils, ozone and high temperatures.	Versatile in use, very good flexibility, resistant to abrasion, resistant to wear and tear, resistant to ozone and weather, resistant to low temperatures. Can be used to protect against washing and spraying agents, excellent for profile cords not usable in conjunction with petrol, solvents and mineral oils.	Hexafluoropropylene vinylidene fluoride copolymer. Resistant to extreme temperatures even over 200°C. Very good mechanical properties and high resistance to tearing even at high temperatures. Excellent for exposure to sunlight, ozone and weather. Not recommended for use in conjunction with esters and ketones.	High mechanical strength, medium resistance to oil, good resistance to ozone. Flexibility and damping properties can be varied as required, excellent resistance to water, slight permanent set.	Excellent resistance to wear and tear, best flexibility with high shore hardness of all the elastomers, good resistance to oil, not resistant to hydrolysis.	Resistant to high temperatures, odourless and tasteless, non-toxic, can be sterilised in accordance with foodstuffs regulations. Resistant to sea water and corrosive salt solutions, not to be used in conjunction with steam, concentrated acids and alkali, swells strongly under the effect of aromatic solvents.	Similar to natural rubber, resistant to abrasion, rubbing in, good resistance to high temperatures and cracking, resistance to extreme low temperatures, not resistant to petrol, benzene, greases and oils.
International designation	ECO	EPDM/EPM	FPM	PNR	PUR	MVQ/SI	SBR
Hardness available	50 - 90 Shore A	30 - 90 Shore A	65 - 90 Shore A	10 - 80 Shore A	55 - 98 Shore A	40 - 80 Shore A	35 - 95 Shore A
Temperature resistance	-40°C to 130°C	-40°C to 150°C	-30°C to 225°C	-40°C to 80°C	-30°C to 80°C	-70°C to 180°C	-30°C to 110°C
Short-time peak temp	150°C	180°C	350°C	100°C	100°C	225°C	150°C
Tensile Strength (N/mm <sup>2</sup> )	17	20	20	17	30	8	25
Tensile elongation (%)	150 to 500	450	400	300 to 700	800	250	450
<b>Properties</b>							
Abrasion	moderate	good	moderate	good	excellent	moderate	very good
Resistance to flex cracking	good	very good	good	moderate	-	bad	good
Elongation/Tensile strength	good	good	good	good	excellent	bad	good
Flexibility	moderate	good	moderate	as required	good	good	good
Notch strength / strength of structure	good	moderate	almost good	moderate	excellent	moderate	good
Resistance to light	good	excellent	excellent	good	good	excellent	moderate
Resistance to oxidising	good	excellent	excellent	good	good	very good	moderate
Resistance to ozone	very good	excellent	excellent	good	good	excellent	moderate
Resistance to wear/tear	-	good	almost good	good	excellent	bad	very good
Weathering effect	good	excellent	excellent	good	moderate	excellent	good
<b>Resistance to</b>							
Alkali	bad	excellent	very good	moderate	not suitable	not suitable	good
Petrol	good	not suitable	excellent	not suitable	very good	not suitable	not suitable
Benzole	good	not suitable	good	not suitable	not suitable	not suitable	not suitable
Foodstuffs	not suitable	suitable	not suitable	not suitable	not suitable	excellent	suitable
Solvents, aliphatic	good	bad	very good	not suitable	very good	not suitable	not suitable
Solvents, aromatic	good	not suitable	good	not suitable	moderate	not suitable	not suitable
Solvents, halogen	not suitable	not suitable	good	not suitable	bad	not suitable	not suitable
Oils and greases	very good	bad	good	conditional	very good	good	not suitable
Acids	moderate	very good	very good	moderate	not suitable	not suitable	conditional
Water	moderate	very good	good	excellent	not suitable	good	very good