

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. |
| International designation | 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 ²) | 25 | 25 | 30 | 25 | 16 | 17 | 18 |
| Tensile elongation (%) | 800 | 500 | 150 to 600 | 450 | up to 350 | 400 to 800 | 300 |
| Properties | | | | | | | |
| 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 |
| Resistance to | | | | | | | |
| 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 | | APTK | | | Polyurethane | Silicone | SBR |
|--|---|--|--|--|--|---|--|
| | Epichlorohydrin rubber | EPDM Ethylene-propylenediene rubber | Fluorinated rubber | Polyboron rubber | Polyurethane | Silicone rubber | 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 ²) | 17 | 20 | 20 | 17 | 30 | 8 | 25 |
| Tensile elongation (%) | 150 to 500 | 450 | 400 | 300 to 700 | 800 | 250 | 450 |
| Properties | | | | | | | |
| 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 |
| Resistance to | | | | | | | |
| 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 |