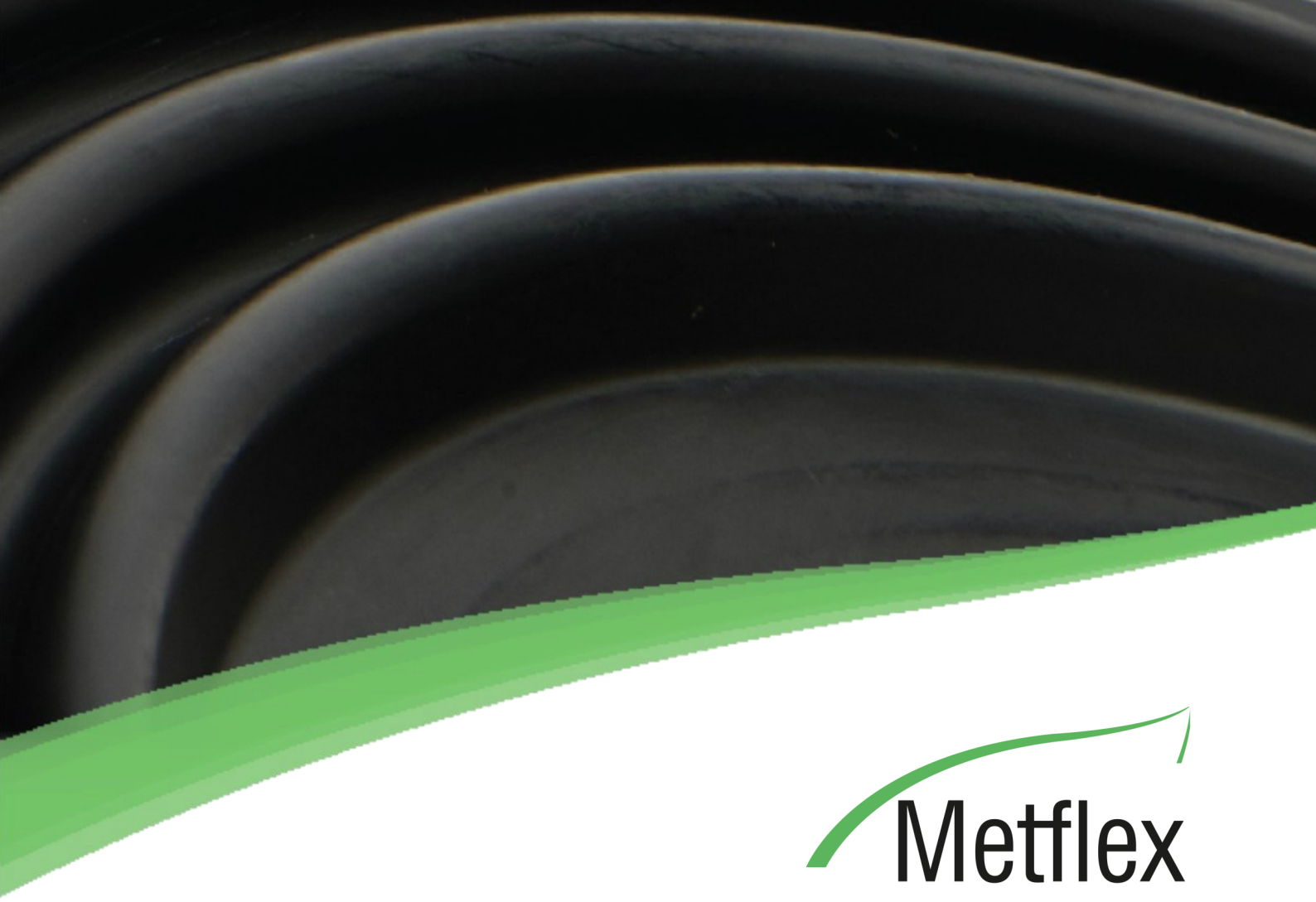
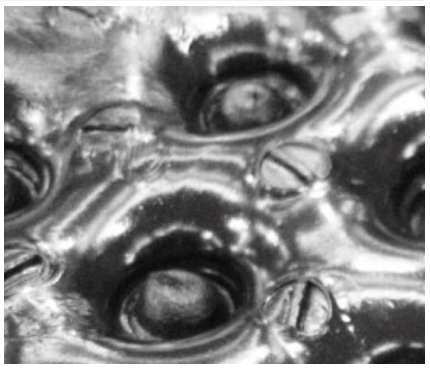


Metflex

Introduction to Rubber



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What do we mean by the word 'Rubber'?

In this Rubber Technology series we define it as 'a material that can be stretched or compressed and when the force is removed, will return quickly to its original shape' without permanent deformation.

The main chemical building blocks of rubber are elastomers, or "elastic polymers." These are large chainlike molecules, which when cured (vulcanized) form chemical crosslinks between the polymer chains. The ability of the chains to stretch and spring back is a measure of the rubber's elasticity and resilience under load. The first common elastomer was Polyisoprene, from which natural rubber is made.

In general, rubber materials are characterised by their low modulus of elasticity. They are resistant to water, alkalis and weak acids. Rubber is also a good electrical insulator, and can be used as a bonding agent.

Types of Rubber

There are two types of rubber: natural and synthetic. Natural rubber is produced from the latex (milky juice) of the Hevea Brasiliensis tree. It is, therefore, a renewable resource unlike synthetic rubber, which is manufactured from petrochemicals.

Natural Rubber

Natural rubber is harvested as latex – a natural source of isoprene, called caoutchouc or India rubber – which is dried out for commercial processing. This dried out form of natural rubber is the chemical Polyisoprene. Although it has some elasticity, Polyisoprene is normally mixed with chemicals and vulcanized to produce the finished product. Natural rubber is both elastic and viscous making it an ideal polymer for dynamic and static engineering applications.

Natural rubber properties include:

Ease of processing
Excellent dynamic performance with a low hysteresis loss
Limited high temperature resistance (max. +70C)
Good low temperature properties (-50C)
Ability to bond strongly with metal parts
High resistance to tear and abrasion, can be self-healing
Poor resistance to sunlight, oxygen, ozone, solvents and oils.

Natural rubber has the following advantages over synthetic rubber:

Good dynamic performance
Low level of damping
Excellent resistance to heat buildup during flexing
Greater resistance to tearing when hot.

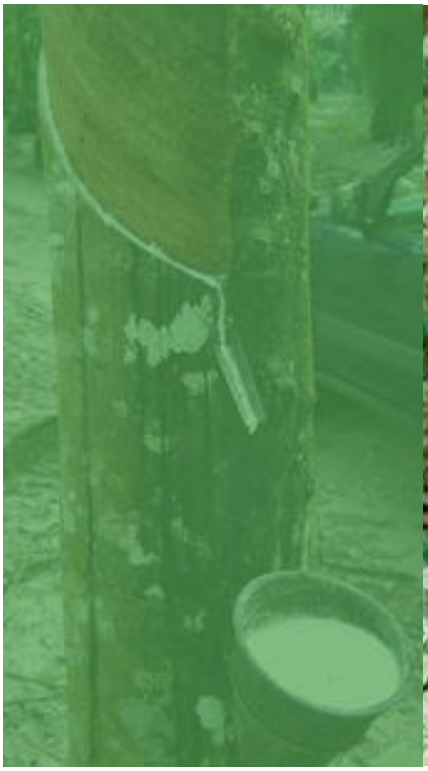
Despite the availability of specialist synthetic rubbers, natural rubber retains a 30 -40% market share, and performs well in many applications such as:

Rubber gaskets, seals and rolls
Electrical components
Hose and tubing
Vibration isolators
Shock mounts
Drive couplings.

Synthetic rubber

Synthetic rubber is manufactured from oil by-products using either solution or emulsion polymerisation techniques. Applying polymer chemistry techniques allow greater opportunities for customisation of mechanical properties and increased resistance to temperature, chemicals and solvents, than is possible with natural rubber.

The properties of synthetic rubber are far wider than those of natural rubber. There are over 20 different classes of synthetic rubber giving a far wider choice of rubbers to meet the desired mechanical properties, and temperature and chemical resistance, required for a specific application.



The major classes of synthetic rubber are:

Styrene-butadiene copolymer (SBR)
Nitrile elastomers (poly (butadiene-acrylonitrile) NBR rubbers / HNBR
Butyl rubbers (IIR)
Neoprene (polychloroprene) (CR)
Ethylene-propylene rubbers (EPDM)
Urethane elastomers (EU)
Silicone rubbers VMQ)
Fluoroelastomer (FKM)
Fluorosilicone (FVMQ).

Synthetic rubber can have the following advantages over natural rubber:

More resistant to oil, certain chemicals and oxygen
Better aging and weathering resistance
Resilience over a wider temperature range.

If you would like further information on rubber, it's properties or the products manufactured by Metflex please contact us on 01254 884 171.

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