**Fluorocarbon rubber compound (DMS-FS-80)**

Elastomers are elastic materials that recover to almost their original shape after complete release of the applied force. They are insoluble and infusible, that is, they can swell only in solvents e.g. MEK, benzene and decomposes when heated far beyond the service temperature. These unique properties occur because the macromolecules chains of elastomers are cross-linked by chemical bonds. These cross-links prevent the long chain molecules from slipping past each other on the application of force and from dissolving in solvents or melting by heating.

Elastomers are divided into various types based on the basic polymer from which they are made. Further, within each elastomer type, the individual elastomers vary in the properties owing to types and quantities of fillers and additives that they contain. Besides this, the properties of elastomer may be enhanced or diminished through compounding up to some extent. During selection of materials for sealing application, it has to be ensured that seals must maintain a sealing pre-stresses force against contact surface for extended years, ranging from years to decades. Specifically, at subzero temperature, the rubber will become brittle and tend to release the stresses applied during installation of seals. Seals can fail by two modes under low temperature environment: (a) the seal material will harden when the specific low temperature limit is reached and resist deformation to pressure causing leak paths (b) the seal will undergo a compression set, so when heated above the low temperature, this allows for leak.

Fluorosilicone elastomer which is designated as FMQ and FVMQ according to ISO 1629, has the most useful properties of regular silicone elastomers plus improved fluid resistance, but more restricted to high temperature limit whereas for aerospace and automation applications, the low temperature performance can be a primary factor in the selection of fluorosilicone elastomer. The brittleness temperature of fluorosilicone elastomer is about to -70oC and maximum service temperature is still above 200oC. Fluorosilicone rubber can be made by the condensation reaction of methyl-trifluoropropyl siloxane which gives a polysiloxane with fluoropropyl side group on a silicon-oxygen polymer backbone. Chemical structure fluorosilicone elastomer is in shown in fig. 1. This elastomer is resistant to mineral oils and greases, silicone oils, synthetic lubricants, ATF, brake fluids, water, alcohol. Gasoline and phosphate esters may be suitable depending on grade; swell can be up to 20%. Even after exposure of fluorosilicone elastomer for 1000 hours to high-test motor fuels or methanol containing fuels, the tensile strength of the vulcanizates has retained about 80 to 90% of its original value. Swelling resistance of fluorosilicone is less than silicone elastomer.