



Fluorosilicones for Environmental Sealing and EMI Shielding

By Dominic J. Testo, Specialty Silicone Products

Fluorosilicones combine the high and low temperature resistance of silicones with the fuel and oil resistance of fluorocarbons. They can also be filled with metallic particles to provide EMI shielding and electrical conductivity. Some fluorosilicones meet military and aerospace standards. Others are used in automotive or industrial applications. Here's what else gasket fabricators need to know.

What Are Fluorosilicones?

Fluorosilicones are silicone-based elastomers that contain fluorine additions for improved oil and fuel resistance. Like other silicone compounds, they exhibit excellent stability over a wide range of temperatures, typically from -60° C to +200° C.

Fluorosilicones are also known to withstand exposure to ultraviolet (UV) light, ozone, and chlorinated and aromatic hydrocarbons. They provide good compression set and resilience, but may lack abrasion resistance. Typically, fluorosilicones are fabricated into products for static sealing rather than dynamic sealing.

Fluorosilicone Applications

Because of their material properties, fluorosilicone compounds are required for some military and aerospace applications. Examples include the seals, gaskets, and O-rings used on military aircraft where there's exposure to jet fuel and temperature extremes.

Fluorosilicones are known to be used in industrial applications, such as door seals, production machinery and O-rings for hydraulic equipment. With their fuel and solvent

resistance, temperature stability, and resistance to low and high temperatures, fluorosilicones are also a popular choice for automotive gaskets.

Some fluorosilicones are used in conductive shielding gaskets. These elastomers are filled with metal or metal-coated particles that conduct electricity and resist electromagnetic interference (EMI). They're commonly used with military and aerospace electronics, and with other demanding applications.

Fluorosilicones for Environmental Sealing (MIL-R-25988B and SAE AMS 3326)

Fluorosilicones for environmental sealing in military and aerospace applications may need to meet MIL-R-25988B and SAE AMS 3326 requirements.

- MIL-R-25988B is a U.S. military specification (MIL-SPEC) that covers oil- and fuel-resistant fluorosilicone sheets, strips, molded parts, and extruded shapes for aeronautical and aerospace applications.
- SAE AMS 3326 (AMS-3326) is an SAE International specification for fluorosilicones that meet the fuel resistant requirements outlined in the Aerospace Material Specification (AMS). The AMS is instrumental in evaluating materials, components, and devices that are used primarily in the aerospace and aircraft industries.

For engineers, buyers, and gasket fabricators, it's important to understand that MIL-R-25988B divides compliant

fluorosilicones into two classes: Type 1 for O-Rings, and Type 2 for molded parts, sheets, strips, and extruded shapes. Within each Type, there are two different Classes.

- Class 1 compounds are for general-purpose use.
- Class 2 materials are higher-strength elastomers.

Specialty Silicone Products supplies AMS silicones and MIL-R-25988B Type 2 materials in Classes 1 and 2.

Fluorosilicones for Environmental Sealing and EMI Shielding (M83528 Type D)

Fluorosilicones for environmental sealing and EMI shielding are also available. For industrial applications, these elastomers contain conductive nickel-graphite particles or very conductive silver-glass particles. Both types of fillers are less expensive than pure silver or other silver-coated products.

For military applications, silver-aluminum fluorosilicones can meet the requirements of MIL-DTL-83528, Type D for conductive elastomeric shielding gaskets. M83528, as this MIL-SPEC is better known, consists of lettered sections (Types A through M) that establish minimum levels of plane wave shielding effectiveness at 10 GHz over a continuous-use temperature range.

Some military contracts require M83528 Type D gaskets that are made from Qualified Product List (QPL) materials. The U.S. Department of Defense (DoD) manages the QPL program, which is designed to ensure performance, quality, and reliability in mission-critical military electronics.

Achieving a QPL listing is a demanding process, and not all fluorosilicone suppliers can meet DoD requirements. Specialty Silicone Products supplies two QPL listed materials, including a fluorosilicone that meets M83528 Type D requirements.

Conclusion

Fluorosilicones are elastomers that combine the material properties of silicones with fuel and oil resistance. Compounds that are filled with metallic particles provide EMI shielding and electrical conductivity. They're available in different durometers, too.

SSP supplies military and aerospace fluorosilicones that meet MIL-R-25988B and SAE AMS 3326 requirements, along with a full-line of industrial fluorosilicones. SSP also supplies a QPL listed material that meets M83528 Type D requirements.

All of SSP's fluorosilicones for sealing and shielding support cost-effective fabrication. In addition to standard 15-inch wide rolls, SSP can manufacture rolls as narrow as 2-inches wide. Standard roll thicknesses range from .020" to .125".

Technical questions?



TECHTEAM™

TechTeam's industry experts provide **free, personalized answers** to your toughest converting challenges.

Visit www.gasketfab.com and click on Members Only to submit a question.

CONVERTING CHALLENGES?

Do you have a diecutting, diemaking or gasket fabricating challenge that's making you scratch your head? TechTeam can help, and using TechTeam is easy!

Visit www.gasketfab.com and click on Members Only to submit a question. TechTeam will quickly and confidentially provide unbiased, expert support to save you time, money and materials.

LFP technologies

Put 40+ years of experience to work for you:

Cylinder Head Gaskets: Technologies and Design
Sealing Technology: I.C. Engines, failure analysis
Product Development: from Inception to Production
Process and Design Improvement

Lawrence F. Pyle
626 Martin Lane
Deerfield, IL 60015-3633

Phone: (847) 215-4783
e-mail: lfpotech@gmail.com