Which Rubber Materials Have the Best Ozone Resistance?

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Ozone cracking is one of the most common causes of premature rubber failure in outdoor and industrial applications. Even at low concentrations, ozone attacks the polymer chains in many rubber materials, which can cause surface cracking, splitting, and eventual part failure. Selecting an ozone-resistant elastomer from the start is the most reliable way to prevent it.

EPDM, Silicone, Butyl, Neoprene, CSM, HNBR, and FKM/Viton™ all offer strong ozone resistance, but the right choice depends on your application's total performance requirements.

Ozone Resistance Level Per Elastomer

Elastomer	Material Description	Ozone Resistance
EPDM Rubber	EPDM is a high-performance synthetic rubber and a terpolymer of Ethylene, Propylene, and Diene Monomer. It is known for its excellent ozone resistance and weather resistance while remaining cost effective.	Outstanding
Silicone Rubber	Silicone is a high-performance synthetic rubber, and it is a combination of silicon, carbon, hydrogen, oxygen, and other molecules. It has excellent chemical resistance and is great for applications involving extreme high & low temperatures.	Outstanding
FKM/ Viton™ Rubber	FKM/ Viton™ is a synthetic fluoroelastomer rubber made in the 1950s for high-performance applications. Also known as Viton™, this material has become one of the top choices for sealing solutions in extreme environments, especially in aerospace applications.	Outstanding

Butyl Rubber	Butyl is a synthetic copolymer rubber of both isobutylene and isoprene. It is known for its air impermeability, excellent ozone resistance and abrasion resistance.	Excellent
Neoprene Rubber	Neoprene is a synthetic rubber, also called polychloroprene, as it is the polymerized form of the organic compound, chloroprene. Usually employed as a general purpose rubber, it has good ozone resistance, exceptional tensile strength and exhibits resistance to alkalis and acids.	Good
CSM Rubber	CSM, Chlorosulphonated Polyethylene, is a synthetic rubber that not only exhibits excellent ozone resistance, but it also possesses strong weather and sunlight resistance.	Excellent
HNBR Rubber	HNBR is the hydrogenated form of Nitrile Butadiene Rubber, which has excellent chemical and impact resistance. Hydrogenating the Nitrile rubber helps to improve the rubber's overall properties, specifically ozone and temperature resistances, while retaining the key benefits of NBR.	Excellent

Need help selecting an ozone-resistant compound for your application?

WARCO regularly produces EPDM, Silicone rubber, Butyl, Neoprene, CSM, HNBR, and FKM/Viton™ materials that require strong ozone resistance. To see if we have a material for your application, feel free to reach out to our technical sales team at sales@warco.com or 714-532-3355. Established in 1910, WARCO's vast legacy of rubber manufacturing experience is at your disposal.

WARCO uniquely manufacturers materials in a wide variety of forms including ozone resistant rubber tubing, rubber rolls, rubber sheets, extruded rubber profiles, and custom molded rubber parts.

Frequently Asked Questions

1. **What is ozone cracking?**
   Ozone cracking is the cracking, splitting, or surface degradation that occurs when rubber is exposed to ozone gas. Ozone molecules chemically attack the double bonds in a rubber's polymer chain, causing fine cracks that typically run perpendicular to the direction of stress on the part's surface.

2. **How is ozone resistance tested?**
   Ozone resistance is typically tested by placing a rubber sample inside an ozone chamber at a controlled concentration and temperature for a defined period, then inspecting it for degradation. ASTM D2000 has an established test method under ASTM D1149, called out by the C-suffix designation, which a manufacturer can employ to judge the rubber's ozone resistance.

3. **Which rubber materials have poor ozone resistance?**

While WARCO regularly formulates materials to exhibit wide variety of characteristics, Natural Rubber, Nitrile, and SBR are not typically recommended for applications requiring strong Ozone Resistance.

4. **Is ozone resistance the same as weather resistance?**
   While related, ozone and weather resistance are not the same. Ozone resistance typically refers to a compound's ability to resist the chemical cracking caused by atmospheric ozone, while weather resistance covers a broader range of outdoor exposures including UV radiation, moisture, and a varying range of temperatures. Weather resistant rubber is generally also ozone resistant, but ozone resistance alone may not guarantee performance in weathering applications.

5. **What causes ozone cracking to get worse?**
   Once ozone cracking starts, it tends to get worse on its own. External factors such as heat, UV exposure, or elevated ozone levels can make the weak points spread faster.