




Greene Tweed offers manufacturing solutions
for large diameter seals.

LARGE-DIAMETER O-RING SOLUTIONS



Large equipment can sometimes require elastomeric seals that exceed the size limitations of conventional compression molding presses. Our patented **Extensis®** spliced and vulcanized process or our continuously vulcanized **horseshoe molding** process offer unique solutions for various application needs. Greene Tweed has molded o-rings as large as 98 inches (2,489 mm) but **there is no maximum diameter limit.**

Extensis®

Large o-rings are sometimes spliced by bonding the cut ends of fully cured, extruded cordstock together with cyanoacrylate (Super Glue®) or other adhesive. Although this method is fast and may be suitable for short-term, static, low-pressure applications, it introduces risks to quality and performance. The chemical structure at the joints is non-homogenous and these weak points are susceptible to chemical attack from the process fluid as well as increased permeation, reduced tensile strength, compression set resistance, and low-temperature compliance. This method is especially risky for perfluoroelastomers because the adhesives generally do not offer the same temperature capability or chemical resistance. In clean applications, the compromised joint may also introduce risk of contamination from the Super Glue®.

A superior joint is produced by bonding partially cured extrudate segments with a proprietary curing agent that is compositionally like the base material. The o-ring is then post-cured, de-flashed, and buffed as required, similar to the traditional compression molding process. This Extensis® method is a popular choice for flat panel displays and semiconductor applications.



*Clean room technician inspecting joints
of an Extensis® molded o-ring*

Our RGD resistant compound Fusion™ 938 is a popular choice for Horseshoe molded o-rings in large, critical turbomachinery where asset integrity is paramount.

**Comparisons of joints using
Cyanoacrylate, Extensis®, and
Horseshoe molding techniques**

Horseshoe Molding

For high-pressure, vacuum, dynamic, or otherwise extreme application conditions, the horseshoe molding process yields the highest performance and is consistent with that of typical compression molded o-rings. With this method, uncured extrudate is continuously vulcanized along a horseshoe-shaped mold cavity. This process most closely aligns with traditional compression molding processes and produces a truly homogenous joint. This method is typically used for critical equipment where asset integrity is paramount, such as compressors used in oil & gas and power generation industries. Our rapid gas decompression (RGD) resistant compound Fusion™ 938 is a popular choice for these applications.

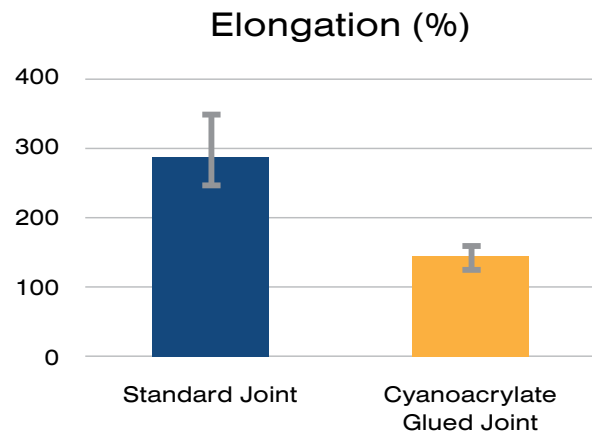
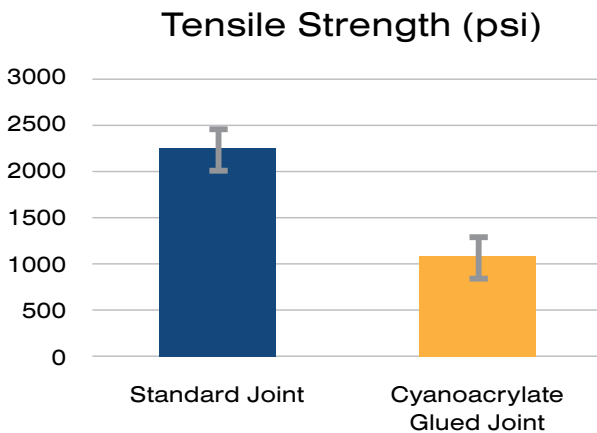
HORSESHOE

EXTENSIS®

SUPER GLUE®

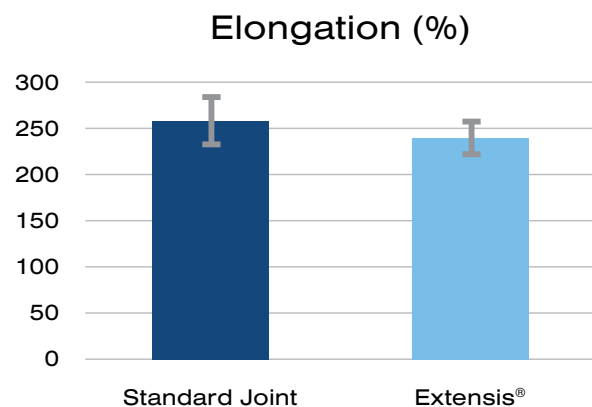
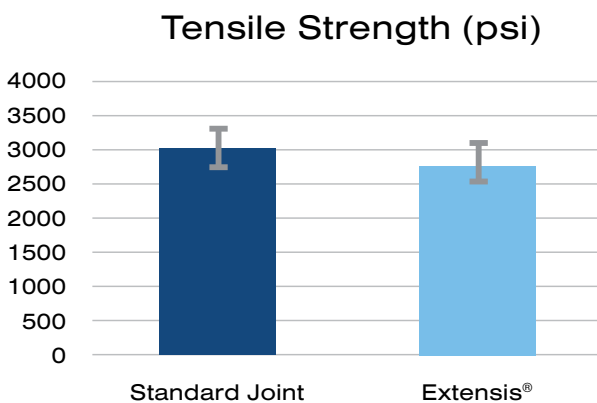
Comparisons of Horseshoe Molding and Cyanoacrylate

The following charts compare room temperature physical properties between standard compression or horseshoe molding vs. gluing with cyanoacrylate (Super Glue®). Cross-section strands 0.209 inches in NBR 173 were molded in accordance with procedures for typical compression molded o-rings and also using two segments of fully cured extrudate glued together with cyanoacrylate. The glued joint has a 50-percent reduction in physical properties. At elevated temperatures, the differences would be even greater.



Comparisons of Horseshoe Molding and Extensis®

The following charts show a comparison of room temperature physical properties between standard compression or horseshoe molding vs. Extensis®. Cross-section strands 0.209 inches in Fusion™ 707 were molded in accordance with procedures for typical compression molded o-rings and also using the Extensis® process. The Extensis® process produces joints with 80 percent of the physical properties of a standard compression molded o-ring.



Capabilities Summary

Greene Tweed offers the following capabilities. There may be limitations for other sizes and compounds. Please discuss your needs with your Greene Tweed Sales representative.

Extensis®

- Typical Lead Time: 6-12 weeks
- Min. Inner Diameter Limit: 42 inches
- Max. Inner Diameter Limit: None

Available compounds

COMPOUND	DUROMETER	TEMPERATURE	DESCRIPTION
Fusion™ 707	75a	-20°F to 428°F (-29°C to 220°C)	A blue terpolymer FKM with low metallic ion content specially developed for flat panel display CVD & dry plasma etch equipment
Chemraz® 513	80a	-22°F to 410°F (-30°C to 210°C)	A white FFKM with good physical properties and plasma resistance
Chemraz® 517	80a	-22°F to 428°F (-30°C to 220°C)	A white FFKM for pharma, biotech, and food applications with FDA compliance

Available CX: 0.275 in. | Tolerances: RMA-A4

For availability of other compounds, seal cross-sections and tolerances, please contact Greene Tweed.

Horseshoe

- Typical Lead Time: 6-12 weeks
- Min. Inner Diameter Limit: 28 inches
- Max. Inner Diameter Limit: None

Available compounds

COMPOUND	DUROMETER	TEMPERATURE	DESCRIPTION
NBR 173	75a	-30°F to 300°F (-34°C to 149°C)	An NBR with high temperature capabilities
HNBR 207	70a	-40°F to 350°F (-40°C to 177°C)	A general purpose HNBR
HNBR 209	90a	-30°F to 300°F (-34°C to 149°C)	A general purpose HNBR
XNBR 984	90a	-20°F to 225°F (-29°C to 107°C)	A carboxylated NBR
EPM 952	80a	-65°F to 302°F (-54°C to 150°C)	A general-purpose EP
Fluoraz® 797	80a	23°F to 450°F (-5°C to 232°C)	An FEPM compound based on the renowned Aflas® polymer
Fluoraz® 799	90a	20°F to 450°F (-7°C to 232°C)	An FEPM compound based on the renowned Aflas® polymer
Fusion™ 731*	75a	-22°F to 450°F (-30°C to 232°C)	A general purpose FKM
Fusion™ 772**	75a	-40°F to 450°F (-40°C to 232°C)	An AMS7287 compliant terpolymer FKM with low temperature capabilities

Horseshoe

CONTINUED

- Typical Lead Time: 6-12 weeks
- Min. Inner Diameter Limit: 28 inches
- Max. Inner Diameter Limit: None

COMPOUND	DUROMETER	TEMPERATURE	DESCRIPTION
Fusion™ 927**	90a	-20°F to 450°F (-29°C to 232°C)	A general purpose FKM
Fusion™ 935	90a	-35°F to 450°F (-37°C to 232°C)	A terpolymer FKM widely used in oil & gas applications with good resistance to rapid gas decompression
Fusion™ 938	90a	-35°F to 450°F (-37°C to 232°C)	A terpolymer FKM certified to ISO 23936/NORSOK M-710 for rapid gas decompression resistance
Chemraz® 513	80a	-22°F to 428°F (-30°C to 220°C)	A white FFKM with good physical properties and plasma resistance
Chemraz® 517	80a	-22°F to 428°F (-30°C to 220°C)	A white FFKM for pharma, biotech, and food applications with FDA compliance
Chemraz® 526***	95a	-4°F to 482°F (-20°C to 250°C)	Developed for excellent resistance to extrusion and RGD
Chemraz® 551	80a	10°F to 600°F (-12°C to 316°C)	An ultraclean FFKM for aqueous processing and chemical/DI water distribution systems
Chemraz® 555	80a	10°F to 600°F (-12°C to 316°C)	An FFKM with improved high temperature performance and steam resistance
Chemraz® 570	70a	-22°F to 410°F (-30°C to 210°C)	A cream colored FFKM recommended for a wide variety of wet processing applications where stringent seal reliability and contamination control are required
Chemraz® 605	80a	-4°F to 500°F (-20°C to 260°C)	A general purpose FFKM with higher temperature capabilities than Chemraz® 505
Chemraz® E38	80a	-22°F to 428°F (-30°C to 220°C)	An ultraclean FFKM that performs well in oxygen plasma & reactive oxygen

Available CX: 0.197, 0.210, 0.224, 0.250, 0.275, 0.315 in. | Tolerances: RMA-A4

***Note:** 731 CX is limited to ≤0.210 in.

****Note:** 772 and 927 CX is limited to ≤.275 in.

*****Note:** 526 CX is limited to ≤.275 in. and Inner Diameter is limited to ≥ 37 in.

For availability of other compounds, seal cross-sections and tolerances, please contact Greene Tweed.

Greene Tweed performs extensive dimensional and visual inspection for large o-rings using standard measurement tools, best-in-class optical non-contact measurement systems and ISO 3601-3 criteria. Upon customer request, additional quality assurance criteria can be accommodated, such as 100-percent inspection or ISO 10423 destructive testing for high magnification crack verification. **Greene Tweed's commitment to quality ensures a seal you can rely on. Contact Greene Tweed to learn more.**



Contact Greene Tweed to learn more about how we engineer material and design to solve your critical sealing needs.

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