3G SHIELDING SPECIALTIES

Vulcanized O-Ring Design

Technical Document

3G designs and manufactures standard and custom EMI shielding products for electronic devices of all kinds. We are an engineering oriented enterprise focused on serving global clientele with application specific solutions from prototype to high volume production.

Background Info:
For applications requiring an EMI & Environmental seal, Conductive Elastomers are the most commonly used solution.

As with standard environmental gaskets, an o-ring seated inside a groove is the preferred method to achieve a reliable EMI & Environmental seal. Due to the tooling cost and lead time required to mold custom sized o-rings, the quickest and most cost effective approach is to cut extruded material to length and bond it into an O-ring. Bonding cut ends is traditionally accomplished using an adhesive such as silicone RTV or cyanoacrylate (super glue). While both methods provide bonds they suffer significant downsides.

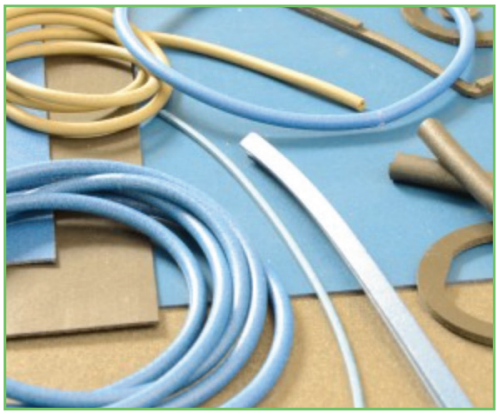
Both RTV and cyanoacrylate create an electrically dead spot. In addition, cyanoacrylate becomes hard and brittle after curing which results in non-uniform compression of the gasket and potential failure of the bond.

To overcome these concerns and provide a robust drop in solution, 3G has developed a proprietary vulcanizing process using heat, pressure and the same material used to manufacture the cord stock to create a continuous o-ring. The end result is an almost seamless bond matching the physical and electrical properties of the base material.

Design Considerations:
The O-Ring design process starts by selecting the required cross section from our datasheet. Recommended groove sizes are listed for each profile. The centerline length of the groove should be noted as it will be required to calculate the final O-Ring size.

For solid profiles, the inner radius of the groove at the corners should be equal or greater to 1.5X the material's Cross Section Diameter. For applications sensitive to compression forces hollow profiles can be utilized. For hollow profiles, the inner radius of the groove at the corners should be equal to or greater than 2X the material's Cross Section Diameter.

When determining the O-Ring size we recommend that the centerline length value be reduced by 0.5-5% (depending on cross section size, gasket size, material and designer preference). Our sales engineers can make application specific recommendations for deduction percentages. This new value is referred to as the Cut Length which is the centerline length of the O-Ring. The Inner Diameter can now easily be obtained using the below equation. For O-ring drawings, the Inner Diameter and the Cross Section Diameter are the most common dimensions used to specify the part.

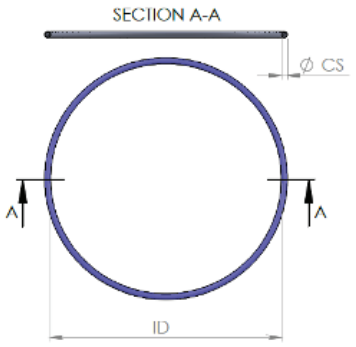


ID = Inside Diameter

CL = Cut Length

CS = Cross Section Diameter

ID = CL / π - CS



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