# Nuclear Glovebox Window Gaskets: Comparing Fabrication Methods

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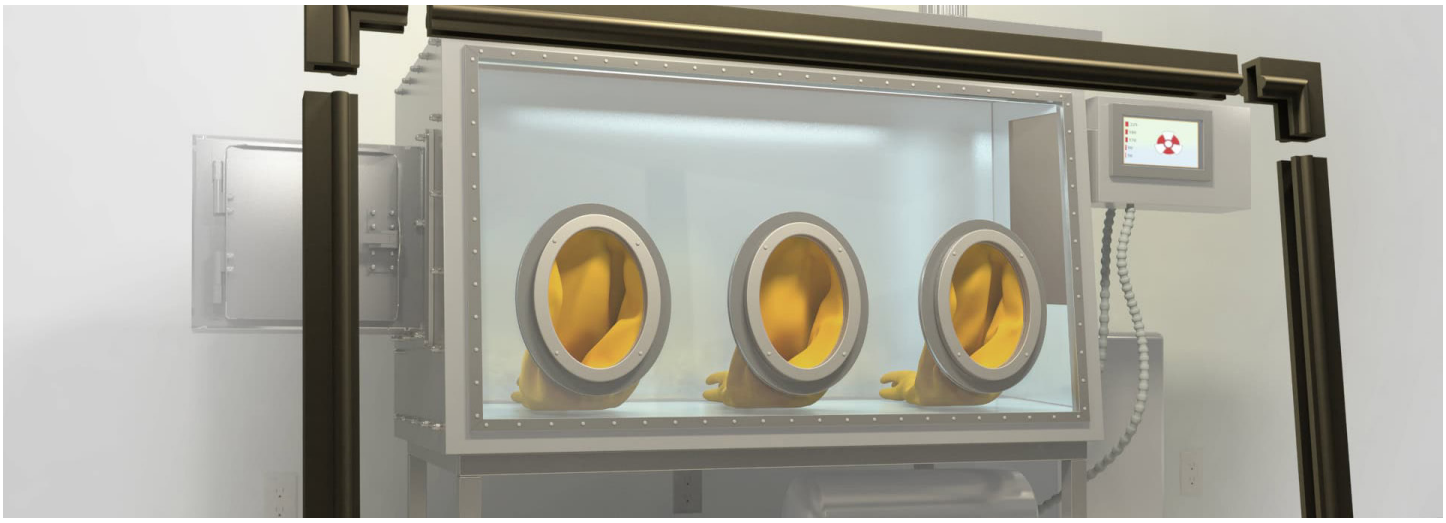

Nuclear gloveboxes are sealed, negative-pressure enclosures that are equipped with built-in gloves so that personnel can safely handle radioactive materials. These specialized containers often feature inert atmospheres and filtration to prevent the release of hazardous particles. They also have windows made of leaded glass or plastic for clear, shielded, airtight viewing.

Channel-style gaskets for glovebox windows have a groove or slot that fits over the window's edge. Often, they're made of neoprene or Viton™. These gaskets can be molded in one piece or assembled from extruded profiles that are cut and bonded together. For fabricators, understanding the strengths and limitations of various techniques is essential for sealing success.

Fully molded gaskets don't have joints, which eliminates potential leak paths. The tooling can be expensive, however, and molding is overkill in terms of the fit-and-function that's required. By contrast, cutting extruded lengths to size and joining them together is practical and cost-effective. There are different ways to produce cut lengths but consider the advantages of water jet cutting.

To promote reliable bonding, extruded profiles must be cut cleanly and accurately. Water jet cutting eliminates tooling costs and makes quick, clean cuts that won't put pressure on and deform the rubber profile. That's essential for high-quality joints, regardless of the bonding method that's then used: PE film splicing, vulcanization, cold bonding, or molded corners.

PE film splicing (hot splicing) uses heat, pressure, and a thin polyethylene film to create strong, consistent joints. An infrared heat source activates the splice, and the ends are pressed together under controlled pressure. The advantages include fast cycle-times for higher volumes. PE film splicing is ideal for large or complex gasket shapes, but it's limited to EPDM rubber.

Vulcanization also uses heat and pressure, but uncured rubber made of the same material as the extrusion is applied to the cut ends. Vulcanization can't match the precision and appearance of PE film splicing, but it's suitable for lower volume production and works with not only neoprene and Viton™, but also EPDM.

Cold bonding is an adhesive based process. Because it doesn't require heat, tooling, or specialized equipment, it's the lowest cost option. However, because cold bonding is manual, consistency can vary. Plus, the adhesive joints aren't as durable as hot spliced or vulcanized ones. That can result in premature gasket failure and untimely field repairs.

Molded corners offer a hybrid solution. Window gaskets are still made from cut lengths, but the corners are molded instead of spliced, vulcanized, or glued. This approach combines durability with leak resistance while avoiding the higher cost of fully molded gaskets. For nuclear glovebox windows, molded corners are strong where it matters most and an emerging solution in a growing industry.