CUSTOM PURE-FUSION™ LININGS

HIGH QUALITY COMPONENTS

HIGH PURITY TECHNOLOGIES
Pfaudler is a global Group offering a wide range of corrosion-resistant technologies, systems and related services for the chemical, pharmaceutical and food industries.

Edlon, Interseal, Montz, Mavag, Normag and Pfaudler are our Branded Product Lines. These product lines are specialized and perfectly integrated to meet the most complex Client needs. We are in the position to offer a complete turn-key package for each of the critical aspects of chemical and pharmaceutical processing.

Technologies and process systems of our Group are installed in more than 100 countries and across six continents. Unique expertise and skills, manufacturing capabilities, targeted investments in strategic markets, innovation and competitiveness allow the Pfaudler group to be a landmark in the industry.

Around the world our Customers rely on the quality and performance of our supply to obtain efficient, reliable, profitable and safe chemical process systems.

Our network organization is designed to:
• strengthen our local presence alongside Customers and markets;
• accelerate decision-making processes through a less-centralized management;
• improve Pfaudler’s ability to attract new talent at the local level.

Edlon is the expert in polymer and fluoropolymer materials with special focus on High Purity Fluid Management, Corrosion Protection, Roll Cover and Release Applications.
Edlon’s Custom linings are fabricated from virgin fluoropolymer films for use in a variety of process equipment in severe chemical services up to 230°C. The liners are fabricated using Edlon Inc.’s proprietary fusion welding technology.

Custom linings are available in PTFE, PFA, and FEP in thicknesses ranging from 1.5mm to 4.75mm.

Edlon will provide technical assistance to determine which fluoropolymer film and thickness combination is best for your specific application. Linings are fabricated to fit inside metal and fiberglass structures including:

- Columns
- Heat exchanger shells
- Pressure vessels
- High-purity day tanks
- Storage tanks
- Vessel covers

**Liner Fabrication:**

Liners are engineered for optimum performance at your operating conditions.

- Fusion-welded construction provides smooth, indiscernible seams with tensile and elongation properties equal to those of the film itself.
- Various thermoforming techniques are used to make dished heads and other complex shapes.
- Fluoropolymer films laminated to knit glass fabric can be bonded to steel for use in agitated or vacuum services.
- Glass-backed film can be over-laid with fiberglass reinforced plastic (FRP). This "dual laminate" construction is light weight, allows complex configurations and resists exterior corrosion.
- Liners can be fabricated to fit inside solid plastic tanks.

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Edlon, Inc. utilises a proprietary seaming technique wherever possible in all of our products called fusion welding. The ability to offer 100% fusion welded seams in many of our products is unequaled by our competition. Edlon fusion welds exhibit tensile and elongation properties that equal those of the virgin fluoropolymer films. Edlon’s fusion welds allow for natural flex and strain, eliminating stress risers and minimizing the chance for stress cracking.

Advantages of Pure-Fusion™ Welding
- Proprietary Pure-Fusion seaming technology results in stronger, safer, more durable seams than hot gas air welds or rotomolded liners
- Pure-Fusion seams exhibit a superior surface finish that is flatter, smoother and cleaner than hot gas air welds or rotomolded liners and results in superior tensile and elongation properties

Edlon not only fusion welds liner sheets together, but also utilizes this technique to install nozzles into liners. Edlon’s fusion-welded nozzle seams enable us to offer low stress nozzle designs to eliminate some of the most common failure modes, such as vapor permeation through a weak air weld. Fusion welded nozzle seams significantly reduce stress risers and the risk of stress-cracking that is normally associated with air welds in these critical areas.

Edlon’s Proprietary Fusion Welding Technology: Ensures flat, smooth, high-strength indiscernible seam. Pure-Fusion™ seams are produced in a clean room environment and all Pure-Fusion liners are formed from unpigmented resin sparktested at 20,000 volts.

Benefits
- Eliminates industry-standard air weld or cap strips susceptible to stress-cracking and other failure modes.
- Fusion welded seams are flat, smooth, indiscernible, and virtually invisible.
- Offers a huge advantage to the high purity and semiconductor industry
- No step or crevice between liner sheets for metal ion contamination, bacterial growth, or other impurities to collect and to affect your process and eventually cause it to fail.
Technical Data – Comparison between conventional air welds. and Edlon® Pure-Fusion™

Various Conventional Air welds and Edlon’s Pure-Fusion™ samples were tested as per ASTM D638 specification using 3mm thick virgin PFA film. Data were compared with the virgin film.

Other test parameters include:
- Test Speed = 2 in/min; Gauge Length = 1.3 in;
- Load Cell = 562.03; Cell Class = 0.5;
- Temperature = 21°C; Internal Extensometer.

Pure-Fusion™ seams are completely automated which prevents seam variances to minimize contamination and bacteria entrapment.

Pure-Fusion™ seams exhibit a superior surface finish that is flatter, smoother and cleaner than hot gas air welds or rotomolded liners and results in superior tensile and elongation properties.

### PFA Weld Strength - Test Results

<table>
<thead>
<tr>
<th>Sample</th>
<th>Tensile Strength (psi)</th>
<th>Avg.</th>
<th>% vs Virgin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Virgin Film</td>
<td>4381 4505 3041 3267 4210</td>
<td>3880</td>
<td>100</td>
</tr>
<tr>
<td>V groove Air Weld and Cap</td>
<td>2149 2120 2076 1981 2049</td>
<td>2551</td>
<td>66</td>
</tr>
<tr>
<td>Secure &amp; Pure™ Pure-Fusion™ Seam</td>
<td>4872 4717 4494 3890 4661</td>
<td>4527</td>
<td>100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sample</th>
<th>Elongation to Break (%)</th>
<th>Avg.</th>
<th>% vs Virgin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Virgin Film</td>
<td>557 577 391 430 543</td>
<td>500</td>
<td>100</td>
</tr>
<tr>
<td>V groove Air Weld and Cap</td>
<td>134 132 92 42 104</td>
<td>101</td>
<td>20</td>
</tr>
<tr>
<td>Secure &amp; Pure™ Pure-Fusion™ Seam</td>
<td>596 577 562 488 578</td>
<td>560</td>
<td>100</td>
</tr>
</tbody>
</table>

Sample Rotomoulded PFA Liner

10x Magnification

Surface Roughness (µ in) vs. Sample Length (µ in)
RA 116 µ in

Edlon’s Secure & Pure™ Pure-Fusion PFA Liner

10x Magnification

Surface Roughness (µ in) vs. Sample Length (µ in)
RA 2 µ in
Pure-Fusion™
LowStress™ Loose Linings

Edlon Pure-Fusion™ LowStress™ developed for high stress-cracking resistance at high temperatures

Conventional Air-welded liners include typical highly stressed areas in liners which make them vulnerable to stress cracking in hydrogen halide service at operating temperatures higher than 100°C.

Edlon® provides its Pure-Fusion™ welded loose liners in a LowStress™ design in order to overcome the issue of high temperature stress cracking. This significantly prolongs the lifetime of the liner under high thermal loading and highly aggressive environments. In our design, the loose liner will be fabricated to line the full face on each of the body flanges and to line the raised face on all other nozzles.

Pure-Fusion™ and LowStress™ design of loose liner ensure significantly longer service lifetime in high temperature and corrosive applications.
EDLON is part of the Pfaudler Group.

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