Overview
LORD® HRC heat-reflective coating is a two-component fluoroelastomer coating developed by LORD Corporation for unrivaled protection against radiant heat, ozone and other automotive environments. This coating greatly enhances fuel and fluid resistance for a wide variety of elastomeric substrates.

Application of LORD HRC coating on the surface of an elastomeric part allows the bulk of the component to be made of less expensive, less fluid resistant material.

Preparing HRC for Spray Application
Correct mixing and spray application are critical to visual appearance and adhesion of the coated part.

1. Remove white plastic retaining ring on top of HRC A container with a pail opener (see Figure 1).
2. Remove lid with a paint can opener (see Figure 2).
3. Mix any settled material back into solution with a paint stick (see Figure 3).
4. Transfer container to an air-driven mechanical mixer. Mix HRC A coating using non-shearing mixing blades at low rpm (see Figure 4).

Figure 1 – Remove Retaining Ring

Figure 2 – Remove Lid

Figure 3 – Mix with Paint Stick

Figure 4 – Mix with Mechanical Mixer
5. While mixing HRC A coating, add HRC B curative at 2.5% by weight and mix for 10-15 minutes (see Figure 5).

6. While material is mixing, add dilution solvent (MIBK) at a starting ratio of 4:1, by weight (see Figure 6). Dilute coating to a Zahn Cup #3 viscosity of 11-15 seconds (Zahn Cup #2 viscosity of 29-39 seconds).

7. Filter coating using a 400 micron medium mesh filter before spray application (see Figure 7).

Suggested working life of mixed HRC coating is 72 hours maximum at 22-25°C (72-77°F).

Note: It is important to frequently mix the HRC during spray application to maintain acceptable part appearance, film thickness and coating performance properties.

Cleaning EPDM Substrates
Cleaning the rubber substrate requires training in the use and maintenance of cleaning equipment and alkaline cleaners. Cleaning is critical for this application to obtain acceptable adhesion of the HRC to the EPDM rubber substrate.

1. Clean the EPDM parts using warm 65°C (150°F) cleaner, not hot alkaline cleaner.

2. High agitation during cleaning is required to remove wax build-up and contaminants from the EPDM surface.

3. Thoroughly rinse parts with fresh water.

4. Dry parts prior to applying the HRC.

5. Parts should be coated within 2 weeks of cleaning.

Note: IPA or MEOH solvent wipe alone may not be a sufficient cleaning method to obtain good adhesion.

The ability to adequately clean the rubber for adhesion of the HRC greatly depends on the molding condition of the rubber part and the age of the molded part. Silicone mold release cannot be used on parts molded for HRC application; it is too difficult to remove and impedes adhesion.

Spray Application
Spray applying HRC to EPDM exhaust mounts requires training in the use and maintenance of mixing pots, dispersion blades and spray equipment.

LORD HRC is spray applied to a variety of part configurations. The ideal spray method for each configuration is best determined by the size and number of parts to be coated and the equipment available. Parts can be sprayed using either manual or automated spray systems.

LORD HRC will form cobwebs while spraying. To reduce cobwebs, move gun closer to the part, reduce atomization pressure and increase fluid volume.
Manual Spray Application

Manual spray application can be accomplished using a manual spray gun with an attached material cup (either gravity or siphon fed, see Figure 8) or pressure pots (see Figure 9). Pressure pots that include an agitator mixing lid will prevent the coating from settling during spray applications. Attaching a 400 micron fluid filter to the outlet of the pressure pot will help prevent the gun from plugging and ensure a smooth finish.

1. Ensure proper engineering controls are in place.
2. Set up spray gun as recommended by gun supplier.
3. Apply Chemlok® 459X primer.
4. Load HRC into the material cup or pressure pot. Frequently mix coating during spray application.

5. Set the atomization pressure between 1-3 bar (15-45 psi); adjust if needed.
6. Set the fluid volume control to the 0 position and open the control two full turns.
7. Check the spray pattern against test pieces such as cardboard or Leneta squares (see Figure 10).
8. Adjust the fluid volume control as needed to achieve the desired spray pattern.
9. Mount the part on a fixture device and attach Leneta squares if needed.
10. Keep the spray gun 10-15 cm (4-6 inch) away from the substrate during the coating process (see Figure 11).
11. Engage the trigger off the part and continue to spray after the gun has passed the part.
12. Use several slow and steady spray passes to build consistent dry film thickness (DFT). A DFT of 17-25 microns (0.7-1.0 mils) is recommended.
13. Visually check DFT during spraying by using an M-12 Leneta square affixed to the part. If part cannot have any voids, place Leneta square on fixturespindle as illustrated in Figure 11.
14. If desired appearance is not achieved, adjust the solvent dilution ratio and/or adjust fluid volume.

Figure 8 – Manual Spray System with Material Cup

Figure 9 – Manual Spray System with Pressure Pot

Figure 10 – Leneta Square

Figure 11 – Correct Spray Distance
**Automated Spray Application**

Example of an automated spray line can be seen in Figure 12. Use of a chain-on-edge spray line is recommended.

1. Load parts onto the spray line. Index the parts, and use special fixtures to hold parts counter balanced to prevent wobble or sway while spinning. Line speeds depend on oven length and ability to apply the HRC to 17-25 microns (0.7-1.0 mils).

2. Spray apply Chemlok 459X primer on to room temperature parts [23-26°C (75-80°F)]. Do not dilute the primer. Spray parts until they are saturated, almost dripping. Use at least two spray guns - the first gun spraying the top of the part, and the second gun spraying the bottom of the part.

Applying primer to sulfur cured EPDM parts helps ensure good adhesion of the HRC to clean EPDM mounts. Some peroxide cured EPDMs do not require the use of a primer.

3. Dry primer for 1-2 minutes at 54-65°C (130-150°F).

4. Spray apply HRC on warm parts [38°C (100°F)]. Two spray booths with two guns and a drying stage in between can be used to apply the HRC to the specified thickness. One spray booth with four spray guns and no drying in between is also possible. To minimize cob webbing, keep the gun nozzles close to the part.

5. Use Leneta squares to ensure correct DFT has been applied (see Figure 13). Coat parts until black or white of Leneta square is no longer visible through the coating.

6. Dry HRC for 2-3 minutes at 54-65°C (130-150°F).

7. Spray apply talc or anti-blocking material to dry, warm [37°C (100°F)] HRC coated parts prior to unloading. Make sure the entire part is coated. This prevents the parts from sticking together. The talc must be removed using IPA (isopropyl alcohol) prior to crosshatch testing.

8. Dry the talc coated parts for 2-3 minutes at 54-65°C (130-150°F) or until parts are no longer wet.

Note: Another option is to dust coat parts off-line with dry talc prior to bulk packaging. This process would eliminate any potential of talc contamination of part fixtures.

---

**Figure 12 – Automated Spray System**

![Automated Spray System Diagram](image-url)
**Inspection and Testing**

Visually inspect parts for runs, sags and voids in coating. Coating must have complete coverage.

To ensure heat reflective performance properties, a target coating thickness of 19 microns (µm) is recommended. Leneta squares are stickers that can be used to determine the dry film thickness of the coating (see Figure 13).

Good adhesion of the coating to the EPDM is critical for part performance. Adhesion is tested using ASTM cross-hatch tape testing. A classification of 5B is ideal after 72-hour layover of the coated part (see Table 1).

During production line set up, adhesion can be checked once the part has cooled. A classification of 3B or 2B during set up indicates moderate adhesion. A 3B classification during set up will typically turn into a 5B classification following a 72-hour layover.

However, a 1B or 0B classification during line set up indicates something may be wrong with the process. Stop production and resolve the adhesion issue before continuing to coat parts. A classification of 1B or 0B will not turn into a 5B classification following the 72-hour layover. Inadequate cleaning and/or surface contamination are usually the cause for poor adhesion.

### Table 1 - ASTM D-3359-08, 3.2 Test Method B Crosshatch Testing w/Nichiban #405 Tape

<table>
<thead>
<tr>
<th>HRC Coating after 72-hour room temperature layover</th>
<th>ASTM Classification</th>
<th>Percent Area Removed</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Image" /></td>
<td>5B</td>
<td>0%</td>
</tr>
<tr>
<td><img src="image2.png" alt="Image" /></td>
<td>4B</td>
<td>0-5%</td>
</tr>
<tr>
<td><img src="image3.png" alt="Image" /></td>
<td>3B</td>
<td>5-15%</td>
</tr>
<tr>
<td><img src="image4.png" alt="Image" /></td>
<td>2B</td>
<td>15-35%</td>
</tr>
<tr>
<td><img src="image5.png" alt="Image" /></td>
<td>1B</td>
<td>35-65%</td>
</tr>
<tr>
<td><img src="image6.png" alt="Image" /></td>
<td>0B</td>
<td>&gt; 65%</td>
</tr>
</tbody>
</table>

**Figure 13 – DFT on Leneta Squares**

- Specification is from 17µm to 25µm
- Target is 19 µm
## Troubleshooting

<table>
<thead>
<tr>
<th>Problem</th>
<th>Cause</th>
<th>Solution</th>
<th>Additional Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cobwebbing</td>
<td>Coating not diluted</td>
<td>Dilute with MIBK or MEK</td>
<td>10-30% by weight</td>
</tr>
<tr>
<td></td>
<td>Parts to far from gun</td>
<td>Move the gun closer to part</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Air pressure not correct</td>
<td>Decrease or increase the air pressure</td>
<td>Too much air pressure causes the coating to dry as it leaves the fluid tip</td>
</tr>
<tr>
<td>Poor Coating Adhesion</td>
<td>Coating too thick</td>
<td>Reduce fluid volume</td>
<td>Use M-12 Leneta spray squares, micrometers or microscope to verify DFT</td>
</tr>
<tr>
<td></td>
<td>Insufficient substrate</td>
<td>Ensure correct combination of cleaning</td>
<td>Cleaning is key to successful bonding</td>
</tr>
<tr>
<td></td>
<td>cleaning</td>
<td>solution and application</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No primer</td>
<td>Apply primer</td>
<td>Primer will maximize adhesion between coating and substrate in most cases</td>
</tr>
<tr>
<td></td>
<td>Thin primer layer</td>
<td>Increase primer fluid volume or slow the</td>
<td>A good wet heavy coat is the rule of thumb to achieve correct DFT</td>
</tr>
<tr>
<td></td>
<td>application rate</td>
<td>application</td>
<td></td>
</tr>
<tr>
<td>Runs/Drips Present</td>
<td>Coating too thick</td>
<td>Reduce fluid volume and increase the</td>
<td>Multiple passes typically offer better appearance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>number of passes used with the spray</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Primer too thick</td>
<td>Reduce primer fluid volume</td>
<td>Heavy application of primer can show through coating layer</td>
</tr>
<tr>
<td>Coating Bubbling</td>
<td>Solvent entrapment</td>
<td>Reduce fluid volume and use multiple</td>
<td>Use M-12 Leneta spray squares to verify DFT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>passes to build film</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Particles in coating layer</td>
<td>Filter coating through 400 micron filter</td>
<td>Ensure proper mixing and filtering to avoid particles on coating film</td>
</tr>
<tr>
<td>Problem</td>
<td>Cause</td>
<td>Solution</td>
<td>Additional Information</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>------------------------------------------------</td>
<td>---------------------------------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>Fish Eyes in Coating Layer</td>
<td>Compressor oil in compressed air supply</td>
<td>Empty/clean oil and water extractor on supply air or add one to the system</td>
<td>Clean air is essential to deliver clean products</td>
</tr>
<tr>
<td>Contaminates on substrate prior to primer/coating step</td>
<td>Ensure parts are thoroughly cleaned and allow minimal layover prior to coating</td>
<td>Clean parts ensure ideal appearance and maximum adhesion</td>
<td></td>
</tr>
</tbody>
</table>
Values stated in this application guide represent typical values. Information provided herein is based upon tests believed to be reliable. In as much as LORD Corporation has no control over the manner in which others may use this information, it does not guarantee the results to be obtained. In addition, LORD Corporation does not guarantee the performance of the product obtained from the use of this information, including but not limited to any product end-user. Nor does the company make any express or implied warranty of merchantability or fitness for a particular purpose concerning the effects or results of such use.

LORD, Chemlok and “Ask Us How” are trademarks of LORD Corporation or one of its subsidiaries.

LORD provides valuable expertise in adhesives and coatings, vibration and motion control, and magnetically responsive technologies. Our people work in collaboration with our customers to help them increase the value of their products. Innovative and responsive in an ever-changing marketplace, we are focused on providing solutions for our customers worldwide ... Ask Us How.