GE Silicones

Repair and Renovation of Metal Roofs – GE Enduris™ Coating System

The Corrosion Process

Metal oxidation (i.e., corrosion) is an electrochemical process that occurs when oxygen, water and conductive ions (such as salts and acids) create an electrochemical cell on a metal surface. The onset and development of the process depends primarily on the combined effects of temperature, salinity of fluids and the fundamental properties of the metal in question. Corrosion levels can also vary depending on climate, geographic location, setting (urban vs. industrial areas), and proximity to coastal zones. For steel, the chemical reaction associated with corrosion is iron oxide hydrate and is commonly seen as a reddish-brown deposit. On galvanized steel, corrosion often begins as a whiteish powdery deposit, at times called 'white rust' which then may develop further into the common 'red rust' most commonly associated with the word.

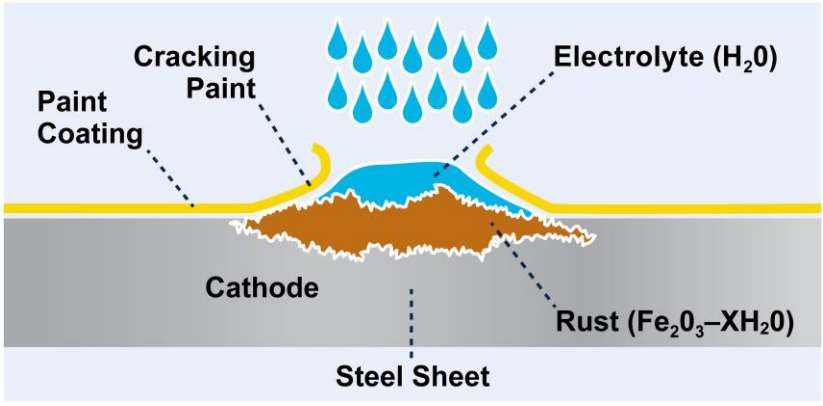

Figure 1 In order for the corrosion process to start, uncoated steel must be in contact with water and oxygen

Corrosion Impact on Metal Roofs

Corrosion (rust) of metal roofs is fact of life, affecting millions of structures worldwide. Structural instability of panels, fastener degradation, potential water infiltration, higher surface temperatures, and visual deterioration are some of the more obvious or harmful effects. Any of these, or a combination of them can effectively reduce the aesthetics, functionality, and life span of many metal roof systems.

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Metal roof panels used in the construction industry usually have a protective treatment applied at the time of manufacture which is intended to extend or lengthen the life expectancy of the product. Commonly used treatments in the roofing industry include galvanizing (zinc), aluminized, and various paint and coating types. During installation, these panels are variously sheared, cut, perforated, etc. to accommodate project-specific geometries and requirements. Once a panel has been cut or drilled the continuity of the protective treatment has been compromised and the exposed base metal is subject to weathering, initiating the corrosion process.

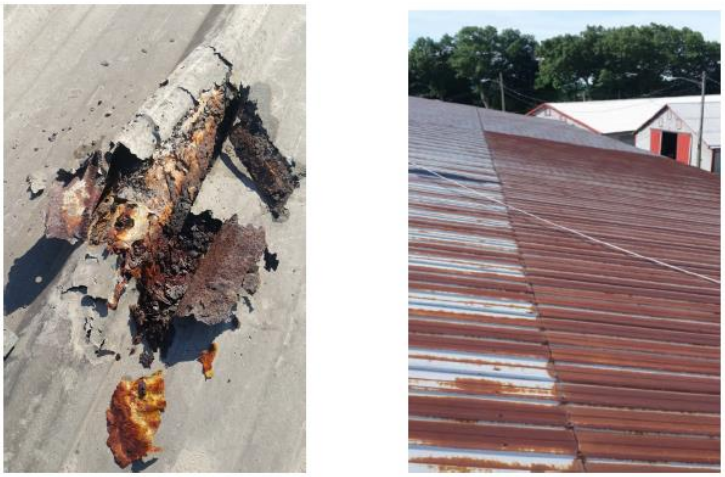

Figure 2 Corrosion can be either be Localized or Uniform

The fasteners used to secure the panels can also corrode. Rusty fasteners can become weakened, loose, or even missing. Such fasteners can compromise panel stability and can open pathways for water to penetrate the surface and reach the interior space.

Figure 3 Corroding and Loose fasteners

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Restorative Coatings

Figure 4 Silicone coated metal roof

Once a metal roof has aged into an unsightly state, a restorative coating can be an effective tool to mitigate further corrosion and to restore the overall appearance of the roof. GE Enduris™ and SilShield™ silicone coatings are flexible, long-lasting, state-of-the-art elastomeric coatings based on 50 years of silicone technology.

For a coating to be effective, strong and durable adhesion of a coating must be attained and maintained to existing aged metal surfaces and finishes. GE silicone coatings and related accessories are formulated using specific adhesion promoters and other ingredients with this benefit in mind. These systems are designed to thoroughly wet the substrate during application and to bridge gaps and cracks resulting in a strong, long-lasting continuous and impervious rubber membrane intimately adhered to the roof system.

GE Enduris™ protects superficially rusted metal surfaces, renewing the roof system and extending its life span. Deeper or flaking rust on panels may need to be removed by wire brush, sandblasting or mechanical abrasion until all scaling is removed. Review the “surface preparation” section below for additional information.

Figure 5 GE Enduris allows repair of panels with superficial rust

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Application Guidelines

Part 1 - Materials:

- GE Enduris™ 3500 series high solids silicone coating (4 colors)
- GE SilPruf™, SWS or Liquid Flashing silicone sealants
- RF100 Reinforcing Fabric
- GE UltraSpan™ pre-cured silicone weatherstrip

Note: GE SilShield™ 3100 and GE Optic™ 3101 silicone elastomeric coatings offer alternatives when different colors or clear coatings are desired.

Product Handling and Storage:

- All materials should be delivered to the jobsite with their original labels intact.
- All materials should be stored as per manufacturer's instructions prior to their application. No damaged or out-of-date materials are to be used.

Part 2- Surface and Project Preparations:

The above-mentioned products should be applied in accordance with these application guidelines in conjunction with information contained in manufacturer's latest data sheets and technical literature: www.gesilicones.com.

If applying in multiple coats due to steeper pitch/slope (example 4/12 or higher) allow adequate time between each coat for the coating to cure before applying additional coat. Products may be brushed, rolled, power rolled, squeegeed or sprayed. Verify adhesion by pull test prior to project start. For spray equipment recommendations please contact Momentive Performance Materials (MPM) Technical Department.

Surface Preparation

- Prior to cleaning, inspect all panels for attachment and stability. Superficial rust is generally acceptable for coating application without removal. Deeper or flaking rust on panels may need to be removed by wire brush, sandblasting or mechanical abrasion until scaling is non-existent. Replace any panels that are determined to be compromised due to excessive rusting. Follow roof manufacturer instructions for panel replacement.

- Pressure wash existing surfaces at 2500-3500 psi. Clean water has proven sufficient for most instances. Use care to avoid excessive pressure in any single area and to avoid water intrusion into the building. As adhesion is paramount in a liquid applied coating, care should be taken such that the cleaning process including standing seam crimps, valleys, and other tight areas are thoroughly addressed.
- Some rust converting products have shown to provide for a stable and suitable substrate for these coatings and may be considered as candidates for some conditions. Performance should be verified prior to use. Contact MPM technical service for additional information.
  Example of tested product: Rust-Oleum Rust Reformer

Flashing Details and Repairs

- Seams, penetrations, fasteners and other areas of concern may need to be addressed with a 3-course application: base coat of Enduris™ Liquid Flashing (or SWS sealant or SilPruf™ sealant), RF 100 Reinforced Fabric, and a top coat of Liquid Flashing or sealant, applied at a total 60 wet mils (1.5 mm).
- Inspect all fasteners. Loose fasteners need to be tightened down. Any fasteners that cannot be retightened, or "stripped out" need to be replaced with new ones of larger diameter. Fill any gaps in laps or seams up to 3/8" (9.5 mm) with Liquid Flashing (see above). Gaps larger than 3/8" need to be 3-coursed.
- Mechanically seamed metal roofing assemblies may need to be re-crimped or 3-course reinforced.
- Primer – Primer is typically not required. If adhesion test is not conclusive contact MPM representatives.

Part 3 - Execution

- Apply Enduris 3500 (or SilShield™) at a rate of 1.5 gallons per 100 sq. ft. of surface area (0.6 L/M^2), for a total 24 wet mils (610 microns). Spraying may require back rolling. When applying or back rolling use a 1 ¼"- 1 ½" (32 – 38 mm) roller cover. Roller covers should be solvent-compatible. Applying a thin coat of mineral spirits to the roller cover may aid in ease of application. Coverage rates can be affected by surface profile, applicator, application equipment, weather, etc. Do not mix or dilute the product.
- Any incomplete details, repairs, etc. should be protected from the elements until work resumes.

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Part 4 - Clean-Up

- Most commercially available solvents including Naphta and Mineral Spirits are suitable for clean-up of tools and equipment. Clean spray equipment in accordance with manufacturer's directions.

Warranty

Metal roofs coated following this Applicator Recommendation Procedure are eligible to receive a 10 year material warranty to MPM Approved Applicators.

15 year Material Warranties require 2 gallons per 100 sq. ft. (0.8L/M^2).

20 year Material Warranties require 2.5 gallons per 100 sq. ft. (1.0L/M^2)

Labor and Material Warranties are available, some at an extra cost and also require an independent inspection. Please contact MPM for more information. The installing contractor must be approved by MPM and in good standing to offer any warranties.

Disclaimer: This application recommendation guide is for general use only. Contact MPM Technical Service for application assistance.

Figure 5 Metal roof before coating

Figure 6 Metal roof before coating

Figure 7 Fill small holes with sealant

Figure 8 Cover fastener heads as needed

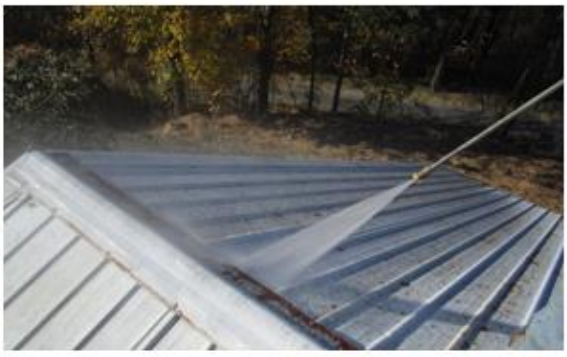

Figure 9 Power wash at ridge

Figure 10 Power wash thoroughly

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Figure 11 Panels being coated

Figure 12 Panels with and without coating

Figure 13 Coating of ridge cap

Figure 14 Roof coated with GE Enduris

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