Metal Retrofit Roofing System

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Carlisle SynTec

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Information contained in this section is intended as a guideline for specifiers and Carlisle Authorized Applicators when recovering existing metal roofs. The document focuses on design options available and lists specific requirements by which the existing substrate can be prepared. In addition to the criteria contained herein, the "Application" Section for the assembly selected may be referenced in its entirety.

PART I GENERAL

1.01 DESCRIPTION

Carlisle insulation is used to fill between standing seams (when applicable) and a suitable Carlisle underlayment or insulation is installed over the fill material to serve as a substrate beneath the Carlisle membrane.

The insulation may be mechanically fastened at the rate of of 1 fastener per 4 square feet when a **Mechanically Fastened Membrane assembly** is selected, or at the rate 1 fastener and plate every 2 square feet when an **Adhered Membrane assembly** is to be used. Appropriate Carlisle insulation fasteners and 3" insulation plates may be used.

NOTE: Carlisle FAST Adhesive, FAST Dual Cartridge or OlyBond 500BA may be used to attach insulation fill and membrane underlayment regardless of the type of membrane assembly to be utilized. On Mechanically Fastened Membrane Assemblies, the use of seam fastening plates may be substituted for the insulation plates.

A scrim-reinforced EPDM or TPO membrane is used for mechanically fastened assemblies. FleeceBACK EPDM or TPO, non-reinforced or reinforced EPDM or reinforced TPO membrane is used when an adhered membrane assembly is selected. Membrane securement shall be as follows:

A. **Mechanically Fastened Assemblies**

1. **When using Sure-Tough™ Reinforced EPDM membrane,** 9 inch wide Pressure-Sensitive RUSS is positioned along the structural purlins in the field of the roof 5 or 10 feet on center depending on project wind zone. The RUSS is attached to the purlins a maximum of 12 inches on center utilizing Sure-Seal HP Purlin Fasteners and Polymer Seam Plates. The backside of the membrane is primed and adhered to the Pressure-Sensitive RUSS and adjoining sheets are spliced together a minimum of 3 inches.

2. **When using Sure-Weld TPO Membrane,** 10 inch wide Pressure-Sensitive TPO RUSS is positioned along the structural purlins in the field of the roof 5 or 10 feet on center depending on project wind zone. The RUSS is attached to the purlins a maximum of 12 inches on center utilizing Sure-Seal HP Purlin Fasteners and Piranha Plates. The backside of the membrane is primed with TPO Membrane Primer and spliced to the Pressure-Sensitive RUSS and adjoining sheets are heat welded together a minimum 1-1/2 inch.

   Refer to the respective "Application" Section for membrane placement, splicing and hot air welding procedures.

B. **Adhered Membrane Assemblies**

1. **When using an EPDM membrane,** either Sure-Seal® or Sure-White® Non-Reinforced or Sure-Tough®

Reinforced membrane may be used. The membrane is adhered to the insulation/underlayment with 90-8-30A Bonding Adhesive and the adjoining sheets are spliced together using SecurTAPE™/Primer or the Factory-Applied SecurTAPE (FAT).

2. **When using a Sure-Weld TPO membrane,** the membrane is adhered with Sure-Weld Bonding Adhesive or Sure-Weld Low VOC Bonding Adhesive and adjoining sheets are spliced together with a minimum 1-1/2" hot air weld.

3. **When using FleeceBACK membrane, whether Sure-Seal, Sure-White or Sure-Weld,** the membrane is adhered to the insulation/underlayment with FAST Adhesive. Adjoining EPDM membranes are spliced together with SecurTAPE/Primer or Factory-Applied TAPE. Adjoining sheets of Sure-Weld membrane are heat-welded a minimum of 1-1/2".

   NOTE: Aqua Base 120 Adhesive may be used in lieu of FAST Adhesive for attachment of FleeceBACK material, using wet-lay method.

4. **Using Sure-Weld SAT TPO Membrane,** adhered using the Factory-Applied Adhesive and adjoining sheets are spliced with a minimum 1-1/2" hot air weld.

C. Refer to the respective "Application" Section for membrane bonding and splicing procedures.

1.02 QUALITY ASSURANCE

A. This roofing system must be installed by a Carlisle Authorized Roofing Applicator in compliance with shop drawings as approved by Carlisle. There must be no deviations made without the **PRIOR WRITTEN APPROVAL** of Carlisle.

B. Upon completion of the installation, an inspection will be conducted by a Field Service Representative of Carlisle to ascertain that the roofing system has been installed according to Carlisle's specifications and details.

1.03 SUBMITTALS

A. To ensure compliance with Carlisle's minimum warranty requirements, the following projects should be forwarded to Carlisle for review:

1. Projects where wind speed warranty coverage greater than 55 MPH peak gusts is specified.

2. Projects where the building height exceeds 50 feet.

3. Projects located in ASCE 7 wind zones greater than 120 MPH.

4. Projects which incorporate purlin spacing other than 5 feet on center where a Mechanically Fastened membrane assembly is specified.

5. All air pressurized buildings, canopies and buildings with large openings where the total wall openings exceed 10% of the total wall area on which the openings are located (such as airport hangars, warehouses and large maintenance facilities).

6. Projects where the roofing membrane is expected to come in direct contact with petroleum-based products or other chemicals.

B. For all projects (prior to project inspection by Carlisle) a final shop drawing should be approved and assigned a number by Carlisle.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver materials to the job site in the original, unopened containers labeled with the manufacturer's name, brand name and installation instructions.

B. Job site storage temperatures in excess of 90°F (32°C) may affect shelf life of curable materials (i.e., uncured flashing, adhesives, sealants, Pourable Sealer and Pressure-Sensitive Products).

C. When liquid adhesives and sealants are exposed to lower temperatures, restore to a minimum of 60° F (16° C) before use.

D. Do not store adhesive containers with opened lids due to the loss of solvent that will occur from flash off.

E. Insulation and underlayment must be stored so it is kept dry and is protected from the elements. Store insulation on a skid and completely cover with a breathable material such as tarp or canvas. If the insulation is lightweight, it should be weighted to prevent possible wind damage.

F. Refer to the “Products” Section, “Application” section, Technical Data Bulletins or the Product Data Sheets for specific precautions and material storage requirements.

1.05 JOB CONDITIONS

Material Safety Data Sheets (MSDS) must be on location at all times during transportation, storage, and application of materials. The applicator shall follow all safety regulations as recommended by OSHA and other agencies having jurisdiction.

A. Refer to appropriate specification for precautionary measures to be taken for installation during windy conditions.

B. When fastening to a structural purlin, a trial fastener should be installed when purlins are heavier than 12 gauge to determine the feasibility of the HP Purlin Fastener. HP Purlin Fasteners are designed to engage purlins 18 to 12 gauge.

C. Due to the wide variety of edge conditions found in metal buildings, edge details may be submitted to Carlisle for review, preferably prior to installation.

D. Existing gutter systems should be investigated to determine if sufficient height is provided to retain water runoff from the new roof system.

E. Fiberglass insulation is not physically compatible with this roofing system and cannot be utilized over the existing metal roof (even when specified in multiple layer applications in conjunction with an acceptable underlayment).

1.06 WARRANTY

A Membrane System Warranty is available for roofing systems on commercial buildings within the United States and Canada and applies only to products manufactured or marketed by Carlisle SynTec Incorporated. The membrane system is defined as membrane, flashings, adhesives, sealants and other Carlisle brand products utilized in the installation.

A. A **5, 10 or 15 year Membrane System Warranty** is available for a charge on projects that utilize all components manufactured or marketed by Carlisle. These projects will receive maximum peak gust wind speed coverage up to 55 miles per hour. Extended wind speed coverage (greater than 55 mph) is available for a charge only upon prior review by Carlisle and at Carlisle's sole discretion.

B. A **20 year Total System Warranty** is available for a charge for projects incorporating additional design enhancements as outlined in attachments titled "20-year Warranty Design Enhancements" found within each of the specified roof assemblies.

Note: Refer to selected assembly "Design" specification for additional warranty options and cautions.

PART 2 PRODUCTS

2.01 GENERAL

The components of Carlisle's Roofing Systems are to be products of Carlisle or accepted by Carlisle as compatible. The installation, performance or integrity of products by others, **when selected by the specifier and accepted by Carlisle**, is not the responsibility of Carlisle and is expressly disclaimed by the Carlisle Warranty.

2.02 MEMBRANE/RELATED PRODUCTS

A. **MEMBRANES**

1. For Mechanically Fastened membrane assemblies, any of the membranes listed below may be utilized.

    a. 10 foot wide, Sure-Tough™ (black) 45-mil, 60-mil or 75-mil thick reinforced EPDM (Ethylene, Propylene, Diene Terpolymer).

    b. Sure-Weld 45-mil, 60-mil, 72-mil or 80-mil thick Reinforced TPO (Thermoplastic Polyolefin) membrane available in white, grey or tan. The membrane is available in widths up to 12 feet wide.

2. For Adhered membrane assemblies, in addition to the membranes listed in Paragraph A.1 above, the following membranes may also be utilized:

    a. Sure-Seal (black) 60-mil or 90-mil thick non-reinforced EPDM membrane.

    b. Sure-White (white-on-black) 60-mil thick non-reinforced EPDM membrane.

    c. Sure-Seal/Sure-White FleeceBACK 100 or 115 membrane or Sure-Seal FleeceBACK 145 membrane (white, grey, tan).

    d. Sure-Weld FleeceBACK 100 or 115 membrane.

    e. Sure-Weld SAT TPO Membrane (white).

For membrane physical properties and other related products, refer to the appropriate "Products" Section of the Carlisle technical manual or respective Technical Data Bulletin.

B. **RELATED PRODUCTS**

1. **Carlisle EPS (Flute-Filler)** – A custom-made, high performance insulation consisting of a superior closed-cell, lightweight expanded polystyrene (EPS) that meets the requirements of ASTM C578. The product offers a long-term, stable R-Value and has excellent dimensional stability, compressive strength and water resistant

properties. It is custom-manufactured for each specific application, and is readily available in a variety of lengths, widths and shapes to meet virtually any job condition.

2. **HP Purlin Fastener:** A hex-head, threaded, self-drilling, black epoxy electro-deposition coated (E-Coat) fastener used for membrane/RUSS securement into structural purlins (12-18 gauge) in conjunction with Sure-Tough and Sure-Weld Metal Retrofit Roofing Systems.

3. **HP Polymer Seam Plate:** A 2" diameter plastic barbed fastening plate used with Carlisle HP Purlins for membrane and Pressure-Sensitive RUSS securement into the structural purlins for Sure-Tough Mechanically Fastened Roofing Systems. This plate can also be used for securement of insulation/membrane underlayment in mechanically fastened assemblies.

4. **Piranha Plates:** A 2-3/8" diameter metal barbed fastening plate used primarily for membrane securement in conjunction with HP Purlin Fasteners. The plate is also used in conjunction with appropriate fasteners for securement of insulation/membrane underlayments in mechanically fastened assemblies.

5. **9" wide Pressure-Sensitive RUSS** is utilized for perimeter membrane securement on Sure-Tough Mechanically Fastened Roofing Systems and primary securement on Metal Retrofit Roofing Systems.

6. **10" wide TPO Pressure-Sensitive RUSS:** Used as a primary securement for the TPO membrane in Mechanically Fastened TPO assemblies. A 45 mil thick reinforced TPO membrane with 3" wide and 35 mil thick cured synthetic rubber pressure-sensitive adhesive laminated along both sides. Used in conjunction with TPO Membrane Primer.

7. **Sure-Weld Coated Metal :** A 24 gauge, galvanized steel sheet coated with a layer of non-reinforced Sure-Weld Flashing. The sheet is cut to the appropriate width and used to fabricate metal drip edges or other roof perimeter edging profiles. Sure-Weld Membrane may be heat welded directly to the coated metal. Available in white, gray or tan. Refer to detail SW-X for ANSI/SPRI ES-1 configuration compliance.

C. For membrane physical properties and other related products, refer to the appropriate "Products" Section of the Carlisle technical manual or respective Technical Data Bulletin.

PART 3 EXECUTION

3.01 GENERAL

In addition to the criteria contained herein, the "Application" Section for the specified roof assembly should be referenced in its entirety.

When feasible, begin the application at the highest point of the highest roof level and work to the lowest point to prevent moisture infiltration and to minimize construction traffic on completed sections. This will include completion of all flashings and terminations.

3.02 EXISTING METAL ROOF CRITERIA

A. Defects in the existing metal roof deck or purlin system must be reported and documented to the specifier, general contractor and building owner for assessment. The Carlisle Authorized Roofing Applicator shall not proceed unless the defects are corrected.

B. The following chart identifies the minimum pullout values for **Mechanically Fastened assemblies,** which must be achieved with both the Sure-Seal HP Purlin Fastener, which is required for RUSS/membrane securement, and the Sure-Seal HP or HP-X Fastener, which is required for additional membrane securement around penetrations (i.e., vent pipes) and is recommended for insulation securement:

Purlins		Metal Roofs	
Gauges	**HP PURLIN FASTENER Min. Pullouts (lbs./fastener)**	**Gauges**	**HP or HP-X FASTENER Min. Pullouts (lbs./fastener)**
12	1,000	24	300
14	1,000	26	200
16	800	28 *****	150
18	600		

***** Pullouts must be submitted to Carlisle when an Adhered Assembly is to be selected.

Withdrawal resistance tests are strongly suggested to determine the suitability of the existing metal roof and structural purlins for the application of this roofing system.

C. For Adhered Roofing assemblies a minimum 300 lb pull-out value must be achieved with HP, HP-X, ASAP and InsulFast fasteners.

3.03 SUBSTRATE PREPARATION

A. Clear the substrate of debris and foreign material.

B. Wood nailers are required at all roof edges where metal edging and gutter systems are specified and must be flush with the top of the specified membrane underlayment.

When treated lumber is specified, it is recommended that only lumber that has been pressure treated with salt preservatives be specified. Lumber treated with other wood preservatives such as, Creosote, Pentachlorophenol, Copper Naphthenate, Copper 8-quinolinolate, will adversely affect the membrane when in direct contact and are, therefore, **unacceptable**.

C. On standing seam metal roofs, two layers of wood nailers are required with the first layer installed between the raised standing seams, flush with the top surface of the seams. These nailers must be mechanically fastened directly to the structural purlins with Sure-Seal HP Purlin Fasteners spaced a maximum of 16 inches on center. Sections of wood nailers installed between standing seams must have a minimum of 2 fasteners positioned approximately 3 inches from each end of the nailer (spaced no more than 16 inches apart).

The top layer of wood nailers is then fastened to the bottom layer of wood nailers with Sure-Seal HP or HP-X Fasteners spaced a maximum of 16 inches on center with all fasteners penetrating the bottom layer of wood nailers a minimum of 1 inch.

Note: In lieu of Sure-Seal Fasteners, galvanized or coated nails may be used to secure the top nailer when positioned 12 inches on center. The nails shall be sufficient in length to penetrate the bottom nailer a minimum of 1-1/4 inch.

D. On corrugated metal roofs, batt insulation or other compressible filler must be used beneath perimeter wood nailers to minimize infiltration of air beneath this roofing system.

E. On flat seam metal roofs, the underside of the wood nailer should be notched at the flat seam areas to achieve a smooth, stable base.

Note: The existing metal roof may be trimmed at metal edge and gutter locations to minimize the dimension between the edge purlin support and the edge of the metal roof. This will allow standard size nailers

(2" x 6") to be fastened to the edge purlin flush with the roof edge.

3.04 INSTALLATION

a. Insulation Placement and Attachment

1. Membrane underlayment must be butted together with no gaps greater than 1/4 inch. Gaps greater than 1/4 inch are not acceptable.

2. On standing seam metal roofs, insulation must be installed in multiple layers. The first layer of insulation is used as a fill between standing seams, relatively flush with the top surface of the seams. A second layer of insulation is placed over the first layer and the standing seams to serve as the membrane underlayment.

3. When mechanical fasteners are specified for insulation securement, the bottom layer (fill boards) can be loose laid with the top layer (membrane underlayment) mechanically fastened to the metal roof at the rate of 1 fastener per 4 square feet for Mechanically Fastened Systems and 1 fastener per 2 square feet for Adhered Systems.

   CAUTIONS: Reduced fastening patterns used under conventional adhered systems in conjunction with 22 gauge metal decks are not applicable for recovering of metal roofs. The minimum fastening of insulation boards shall not be less than 1 fastener per 2 square feet.

4. Metal roofs 28 gauge or lighter may require an enhanced fastening pattern for insulation used as underlayment for Adhered Systems. Pullouts using HP-X Fasteners and Plates should be submitted for Carlisle's review.

5. When insulation is to be attached with Sure-Seal FAST Adhesive, FAST Dual Cartridge or OlyBond Adhesive, both the bottom and top layers must be adhered in accordance with installation procedures outlined in the FleeceBACK "Application" Specification.

   Note: Two-part urethane adhesives may not be compatible with certain types of metal roof coatings. If existing, Carlisle should be contacted for verification. Mechanical fasteners may be specified in lieu of the adhesive providing the minimum pullouts can be met.

6. Acceptable Sure-Seal insulations can be found in the respective "Design" Section of the Carlisle Adhered, Mechanically Fastened and FleeceBACK Specifications.

b. **Membrane Installation**

1. **Sure-Tough or Sure-Weld Mechanically Fastened Roofing Systems**

a. Securement for this roofing system is accomplished by splicing the membrane to the Pressure-Sensitive RUSS (9 inch wide for EPDM, 10 inch wide for TPO) that is positioned along the structural purlins and spaced 5 feet or 10 feet on center depending on project wind zone. The RUSS is attached to the purlins a maximum of 12 inches on center utilizing Sure-Seal HP Purlin Fasteners and Polymer Seam Plates (EPDM) or Piranha Plates (TPO). Refer to Details MR/SS5.1 (EPDM) and MR/SW5.1 (TPO).

b. Securement of the membrane at the perimeter roof areas shall be achieved by attaching the membrane to the RUSS positioned along the first purlin from the roof edge/eave (perpendicular to the roof slope). Along the rake edges, membrane securement is achieved with RUSS positioned along all purlins for a distance of no less than 5 feet. Refer to Details MR/SS5.2 (EPDM) or MR/SW5.2 (TPO) for required fastening density according to project wind zone.

c. When using Pressure-Sensitive RUSS, appropriate membrane primer must be applied to the membrane in accordance with standard procedures.

d. Install consecutive membrane sheets allowing a minimum overlap onto the adjacent membrane sheets following respective membrane application requirements.

e. For additional information pertaining to membrane splicing, refer to the "Application" Section of the Sure-Tough or Sure-Weld Reinforced Mechanically Fastened Roofing System.

2. **Sure-Seal/Sure-White, Sure-Tough, Sure-Weld, Sure-Weld SAT or FleeceBACK Adhered Roofing Systems**

For installation procedures on Adhered Roofing Systems, refer to the respective "Application" Specification.

c. **Other Related Work**

Refer to appropriate "Application" Section of the respective Roofing System for additional membrane securement, membrane flashing and other related clean up work.

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Installation Details

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Sure-Seal EPDM

Sure-Weld TPO