



CARLISLE'S  
**SURE-WELD®**

## G U I D E - S P E C

### Sure-Weld® Fully ADHERED ROOFING SYSTEM

February 2006

This GUIDE-SPEC is a brief outline of Carlisle's Sure-Weld Fully Adhered Roofing System requirements and is intended for use as a submittal with a bid package. Specifiers and Carlisle Authorized Roofing Applicators must comply with the "Design Criteria" and "Application" sections of Carlisle's Specifications prior to design or bid.

#### PART I GENERAL

##### 1.01 DESCRIPTION

This Sure-Weld Adhered Roofing System incorporates maximum 12' wide, white or gray or tan 45, 60, 72 or 80-mil thick scrim-reinforced Sure-Weld Thermoplastic Polyolefin (TPO) membrane. Carlisle Insulation is typically mechanically fastened to the roof deck with 1 fastener and plate every 2 square feet or secured with FAST™ 100 Adhesive or VersiGrip® Insulation Adhesive and the membrane is fully adhered to the insulation with Sure-Weld Bonding Adhesive. Adjoining sheets of membrane are overlapped approximately 2" and joined together with a minimum 1-1/2" wide hot air weld.

##### 1.02 QUALITY ASSURANCE

- A. This roofing system must be installed by a Carlisle Authorized 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 the membrane roofing system has been installed according to Carlisle's published specifications and details applicable at the time of bid.
- C. This roofing system meets Underwriters Laboratories (UL) and Factory Mutual (FM) requirements. For specific code approvals achieved with this roofing system, refer to the Sure-Weld Code Approval Guide, Factory Mutual Approval Guide or Underwriters Fire Resistance and roofing Materials and Systems Directories.

##### 1.03 SUBMITTALS

- A. To ensure compliance with Carlisle's warranty requirements, the following projects should be sent to Carlisle for review prior to installation, preferably prior to bid.
  - 1. Projects where a wind speed warranty coverage greater than 55 mph peak gust wind speed is specified.
  - 2. Projects where the building height exceeds 250'.

- 3. Air pressurized buildings, canopies and buildings with large openings where the total wall opening exceeds 10% of the total wall area where openings are located.
- 4. Cold storage buildings and freezer facilities.
- 5. Projects where the membrane is expected to come in direct contact with petroleum based products or other chemicals.

- B. Along with the project submittals (shop drawings and Request for Warranty), the roofing contractor must include pullout tests when:

- 1. HP-NTB Fastener is used with cementitious wood fiber, lightweight insulating concrete and gypsum decks.
- 2. HP or HP-X Fasteners are used into steel decks lighter than 22 gauge or oriented stand board (OSB) decks less than 5/8" thick.

- C. For all projects (prior to project inspection by Carlisle) a final shop drawing must 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. Store Sure-Weld membrane in original undisturbed plastic wrap.
- C. Job site storage temperatures in excess of 90° F may affect shelf life of curable materials (i.e., adhesives and sealants).
- D. When liquid adhesives and sealants are exposed to lower temperatures, restore to a minimum of 60° F before use.
- E. Do not store adhesive containers with opened lids due to loss of solvent which will occur from flash off.
- F. 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.

##### 1.05 JOB CONDITIONS

- A. There are no maximum slope restrictions for application of this roofing

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system. When the roof slope exceeds 5" per horizontal foot, use of an automatic welding machine may be more difficult. A hand held welder should be specified.

- B. Existing roofing material must be investigated by the specifier and all wet material must be removed.
- C. Existing phenolic insulation and sprayed-in-place urethane roofs must be removed prior to installation of this system.
- D. The use of a vapor retarder to protect insulation and reduce moisture accumulation within an insulated roofing assembly should be investigated by the specifier. Consult the latest publications by ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.) and NRCA (National Roofing Contractors Association).
- E. Coordination between trades is essential to avoid unnecessary rooftop traffic over sections of the roof and to prevent subsequent damage to the membrane system.

## 1.06 WARRANTY

All warranties are available for commercial projects only.

- A. A **5 or 10-year Membrane System Warranty**, with a wind speed coverage of up to 55 mph is available for a charge.
- B. A **10 or 15-year Total Roofing System Warranty** is available for a charge on commercial projects. Projects will receive a maximum peak gust wind speed coverage up to 55 mph unless prior review is performed by Carlisle regarding an extended wind speed coverage.

**The 15-year Warranty is not available** for projects with cementitious wood fiber or gypsum decks where existing roofing material is left in place without a tearoff.

**Note:** Due to various wind uplift coverage available, these projects must be reviewed by Carlisle prior to bid, preferably in design phase, to determine system enhancements that may be applicable.

- C. A 20-year Total System Warranty is available for a charge for projects utilizing minimum 60-mil thick Sure-Weld membrane and incorporating additional design enhancements as outlined in "Attachment IV", 20-Year Warranty Design Enhancements, in the Sure-Weld Design Criteria Specification.

## PART II PRODUCTS

### 2.01 GENERAL

The components of this roofing system 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

Sure-Weld, white or gray, reinforced 45 or 60-mil thick Thermoplastic Polyolefin (TPO) membrane is used for this roofing system. Membrane is available in widths of 12', 10' or 8' and

lengths of 100'. For membrane physical properties, refer to page 4.

### 2.03 RELATED MATERIALS

Sure-Weld Non-Reinforced or Reinforced Flashing, Bonding Adhesive, Cut Edge Sealant, EP-95 Splicing Cement, Water Cut-Off Mastic, PT-304 Sealant, Weathered Membrane Cleaner, Molded Pocket Sealant, Heat Weldable Walkway Pads, Pre-Molded Inside/Outside Corners, Pipe Flashings, Curb Wraps and Sealant Pockets.

## PART III EXECUTION

### 3.01 GENERAL

- A. 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, terminations and daily seals.
- B. Follow criteria outlined in the "Design Criteria" section to prepare the roof deck or the existing substrate prior to application of the new roofing system.

### 3.02 ROOF DECK CRITERIA

- A. The proper substrate shall be provided by the building owner. The structure shall be sufficient to withstand normal construction loads and live loads.
- B. Defects in the roof deck must be reported and documented to the specifier, general contractor and building owner for assessment. The Carlisle Authorized Applicator shall not proceed with installation unless the defects are corrected.
- C. Acceptable decks and applicable Carlisle Fasteners:
  1. **Steel, 22 gauge or heavier** - Carlisle HP or HP-X Fasteners are required; minimum pullout of 360 pounds per fastener.
  2. **Steel less than 22 gauge** - Carlisle HP or HP-X Fasteners are required; minimum pullout of 300 pounds per fastener.
  3. **Structural Concrete, rated 3,000 psi or greater** - Carlisle CD-10 or HD 14-10 Fastener are required; minimum pullout of 800 pounds per fastener.
  4. **Wood Plank or minimum 15/32" thick Plywood** - Carlisle HP or HP-X Fasteners are required; minimum pullout of 360 pounds per fastener.
  5. **Oriented Strand Board (OSB), minimum 7/16" thick** - Carlisle HP or HP-X Fasteners are required; minimum pullout of 250 pounds.
  6. **Gypsum and Cementitious Wood Fiber** - Carlisle HP-NTB Fasteners are required; minimum pullout of 300 pounds per fastener into gypsum and 225 pounds per fastener into cementitious wood fiber.

### 3.03 SUBSTRATE PREPARATION

- A. On retrofit-recover projects, cut and remove wet insulation,

as identified by the specifier, and fill all voids with new insulation so it is relatively flush with the existing surface.

- B. For all projects, substrate must be even without noticeable high spots or depressions, and must be free of accumulated water, ice or snow.
- C. Clear the substrate of debris and foreign material. Fresh bitumen based roof cement must be removed or concealed.

### 3.04 INSTALLATION

Refer to the applicable Material Safety Data Sheets and Technical Data Bulletins for cautions and warnings.

#### A. Insulation Attachment

- 1. Carlisle Insulation shall be mechanically fastened to the roof deck at a minimum rate of 1 every 2 square feet except as follows.
  - a. When a single or top layer of **minimum 1-1/2" thick Carlisle Polyisocyanurate** Insulation is specified, Carlisle Insulation may be mechanically fastened at the minimum rate of 1 every **3.2 square feet** (10 fasteners per 4' x 8' board). Refer to Detail SWA-27D for requirements.
  - b. When a single or top layer of **minimum 2" thick Carlisle Polyisocyanurate** Insulation is specified, Carlisle Insulation may be mechanically fastened at the minimum rate of 1 every **4 square feet** (8 fasteners per 4' x 8' board). Refer to Detail SWA-27B for requirements.
- 2. When an approved oriented strand board (OSB) is specified as the membrane underlayment, it must be mechanically fastened to the roof deck with 17 fasteners per 4' x 8' board in accordance with Carlisle Detail SWA-27C.
- 3. Carlisle Insulation Fastening Plates, nominal 3" diameter, must be used with the appropriate Carlisle Fastener for insulation attachment.
- 4. When mechanical attachment of the insulation is not desired, an alternate insulation attachment method may be specified which incorporates the use of Sure-Seal FAST Adhesive, VersiGrip Adhesive or a solid mopping of hot asphalt.

#### B. Membrane Installation and Hot Air Welding

- 1. Sweep loose debris from the substrate.
- 2. Position Sure-Weld Membrane over acceptable substrate and fold membrane back so half the underside is exposed.
- 3. Apply Sure-Weld Bonding Adhesive to the exposed underside of the membrane and the corresponding substrate area with a plastic core medium nap paint roller at a coverage rate of approximately 60 square feet

per gallon per finished surface (includes coverage on both membrane and substrate).

- 4. Allow adhesive to dry until tacky and roll coated membrane into coated substrate and avoid wrinkling.
- 5. Brush down the bonded section of membrane immediately with a soft bristle push broom.
- 6. Fold back the unbonded half of the sheet and repeat the bonding procedure.
- 7. Install adjoining membrane sheets in the same manner, overlapping edges a minimum of 2" to provide for a minimum 1-1/2" hot air weld. It is recommended that all splices be shingled to avoid bucking of water.
- 8. Hot air weld the membrane sheets a minimum of 1-1/2" with an Automatic Hot Air Welding Machine.
- 9. Membrane that has been exposed to the elements for approximately 7 days must be prepared with Weathered Membrane Cleaner. Wipe the surface where Weathered Membrane Cleaner has been applied with a clean, dry HP Splice Wipe or other white rag to remove cleaner residue prior to hot air welding.

#### C. Additional Membrane Securement

The membrane must be secured at the perimeter of each roof level, roof section, expansion joint, curb, skylight, interior wall, penthouse, etc., at any angle change which exceeds 2" per horizontal foot and at all other penetrations in accordance with Carlisle's published details.

#### D. Membrane Flashing

- 1. Flash all walls and curbs with Sure-Weld reinforced membrane. Non-Reinforced membrane shall be limited to inside and outside corners, field fabricated pipe seals, scuppers and Sealant Pockets where the use of pre-molded accessories are not practical. Terminate the flashing in accordance with an appropriate Carlisle SW-9 Termination Detail.
- 2. On vertical surfaces, such as walls, curbs and pipes, Bonding Adhesive is not required when flashing height is 12" or less and membrane is terminated under a metal counterflashing (nailed). When a coping or termination bar is used for vertical terminations, Bonding Adhesive may be eliminated for flashing heights 18" or less.

#### E. Other Related Work

- 1. **Walkways** are required for all traffic concentration points (i.e., roof hatches, access doors, rooftop ladders, etc.), regardless of traffic frequency. Walkways are also required if regular maintenance (once a month or more) is necessary to service rooftop equipment. Walkways are considered a maintenance item and are excluded from the Carlisle Warranty.
- 2. Sure-Weld Heat Weldable Walkway Rolls are required when walkway pads are specified and are heat welded to the Sure-Weld Membrane. When concrete pavers are

used, they shall be loose laid and installed in conjunction with a slip sheet of reinforced membrane or two layers of HP Protective Mat. Concrete pavers are not recommended when the roof slope is greater than 2" per horizontal foot.

Carlisle Interlocking Pavers™, 24" X 24" X 2", weighing approximately 6 pounds per square foot, may be interlocked and loose laid directly over the membrane. Installation instruction sheets are available from Carlisle.

3. **Copings, counterflashing and other metal work**, not supplied by Carlisle, shall be fastened to prevent metal from pulling free or buckling and sealed to prevent moisture from entering the roofing system or building.

**Attach copies of the applicable Carlisle Details which pertain to the individual project to complete a bid package submittal.**

## Membrane Physical Properties

Property (Metric-SI Units)	Test Method	Property of Unaged Sheet	Property After Aging (1)
Tolerance on Nominal Thickness, %	ASTM D 751	±10	±10
Thickness Over Scrim, min, in. (mm)	ASTM D 4637 Optical Method	0.015 (0.381) Min. 0.018 (0.457) Typ.	
Solar Reflectance (albedo X 100), %	ASTM E 903	White - 80 Typ. Gray - 25 Typ.	
Breaking Strength, min, lbf (kN)	ASTM D 751 Grab Method	225 (1.0) Min. 340 (1.5) Typ.	225 (1.0) Min 340 (1.5) Typ.
Elongation at Break of Fabric, min, %	ASTM D 751	25 Typ.	25 Typ.
Tearing Strength, min, lbf (N) 8" by 8" specimen	ASTM D 751 B Tongue Tear	55 (245) Min. 130 (578) Typ.	55 (245) Min. 130 (578) Typ.
Brittleness Point, max, °F (°C)	ASTM D 2137	-40 (-40) Min. -50 (-46) Typ.	
Linear Dimensional Change (shrinkage), %	ASTM D 1204		+/- 1.0 Max. -0.5 Typ.
Ozone Resistance* Condition after exposure to 100 pphm Ozone in air for 168 hours @ 104°F (40°C) Specimen wrapped around 3 in. mandrel	ASTM D 1149	No Cracks	No Cracks
Resistance to Water Absorption* After 7 days immersion @ 158°F (70°C) Change in mass, max, %	ASTM D 471		4.0 Max. 2.0 Typ.
Resistance to microbial surface growth, rating (1 is very poor, 10 is no growth)	ASTM D 3274 2 yr. S. Florida		9 - 10 Typ.
Field seam strength, lbf/in. (kN/m) Seam tested in peel	ASTM D1876	40 (7.0) Min. 60 (10.5) Typ.	
Water vapor permeance, Perms	ASTM E 96	0.10 Max. 0.05 Typ.	
Puncture resistance, lbf (N)	FTM 101C Method 2031	250 (1110) Min. 300 (1330) Typ.	250 (1110) Min. 300 (1330) Typ.
Resistance to xenon-arc Weathering <sup>2</sup> Xenon-Arc, 5040 kJ/m <sup>2</sup> total radiant exposure visual condition at 10X	ASTM G 26 0.70 W/m <sup>2</sup> 90°C B.P.T.		No Cracks No loss of breaking or tearing strength
(1) Aging conditions are 28 days at 240° F (116° C) equivalent to 400 days at 176° F (80° C) for breaking strength, elongation, tearing strength, linear dimensional change, ozone and puncture resistance.			
(2) Approximately equivalent to 8000 hours exposure at 158°F (70°C) black panel temperature.			12/98

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