



GUIDE - SPEC
MECHANICALLY-FASTENED ROOFING SYSTEM
December, 2004

This GUIDE-SPEC is a brief outline of Carlisle's Sure-Flex™ Mechanically-Fastened Roofing System requirements and is intended for use as a submittal with a bid package. Specifiers and the Carlisle Authorized Roofing Applicator must comply with our Sure-Flex Specification prior to design or bid.

PART I GENERAL

1.01 DESCRIPTION

The Sure-Flex™ Mechanically-Fastened Roofing System incorporates Sure-Flex Polyvinyl Chloride (PVC) membrane, available in 81" wide field sheets and 40.5" perimeter sheets. All sheets are mechanically fastened over an approved insulation/underlayment to an acceptable roof deck with the appropriate Carlisle Fasteners and Fastening Plates. The membrane is available in white, tan or gray and in thicknesses of 50-mil (100' long), 60-mil (80' long) or 80-mil (65' long). Adjoining sheets of Sure-Flex membrane are overlapped and joined together with a minimum 1-1/2 inch wide heat weld. Membrane fastening requirements are outlined in "Attachment II" in Carlisle's Sure-Flex Specification.

Notes: Projects utilizing 50- or 60-mil membrane are eligible for a maximum 10-year System Warranty or 15-year Total System Warranty. When a 20-year Total System Warranty is required, 80-mil membrane must be used.

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 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-Flex 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 forwarded to Carlisle for review prior to installation, preferably prior to bid.
 - 1. Projects with fasteners specified to exceed 12".
 - 2. 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.
 - 3. Cold storage buildings and freezer facilities.
 - 4. 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 the pullout values are less than the Sure-Flex Specification requirements.
- C. For all projects (prior to project inspection by Carlisle) a final shop drawing must be approved 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-Flex membrane on provided pallets in the 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 the 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 insulation is lightweight, it should be weighted to prevent possible wind damage.

1.05 JOB CONDITIONS

- A. This system **must not be**



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applied on projects where the **slope exceeds 18"** in one horizontal foot. 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 assembly should be investigated by the specifier. Consult the publications by ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.) and NRCA (National Roofing Contractors Association) for specific information.
- E. Coordination between trades is essential to avoid unnecessary traffic over sections of the roof and to prevent damage to the membrane roofing system.

1.06 WARRANTY

All warranties are available for commercial projects only.

- A. 10-year Membrane System or Total System Warranty is available for a charge for projects that use 50-mil, 60-mil or 80-mil membrane.
- B. A 15-year Total Roofing System Warranty is available for a charge for projects that use 50-mil, 60-mil or 80-mil membrane.

Mechanically-Fastened Roofing Systems over cementitious wood fiber or gypsum decks, upon review, may receive a maximum 15-year Total System Warranty when building height is not greater than 40' and a minimum of 3 perimeter sheets are utilized.

- C. A 20-year Total System Warranty is available for a charge for projects utilizing 80-mil thick Sure-Flex membrane and incorporating additional design enhancements as outlined in this specification.

Note: Total System Warranty projects require that only materials from among those manufactured or marketed by Carlisle be specified and used to complete the roofing system. Some of the materials included are: insulation, membrane, flashing, adhesives, sealants, fasteners and plates and termination bars. Carlisle Edgings and Copings must also be specified when metal fascia systems are to be covered by the Carlisle Warranty.

- D. Standard peak gust wind speed coverage is 55 mph (measured 10 meters above ground). Greater wind speed coverage, up to 72 mph peak gusts, is available upon request.

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-Flex white, gray or tan 50-mil (100' long), 60-mil (80' long) or 80-mil (65' long) reinforced Polyvinyl Chloride (PVC) membrane is used for this system. Field membrane sheets are 81" wide. Perimeter sheets are 40.5" wide. For physical properties of the membrane, refer to page 4. (Gray and tan colored membrane are not standard stocking items and require a lead time).

2.03 RELATED MATERIALS

Sure-Flex Non-Reinforced or Reinforced Flashing, Bonding Adhesive, Cut Edge Sealant, Water Cut-Off Mastic, PT-304 Sealant, PVC Membrane Cleaner, One-Part Pourable Sealer, Heat Weldable Walkway Pads, Pre-Molded Inside and Outside Corners, Pipe Flashings 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 Sure-Flex Specification to prepare the roof deck or the existing substrate prior to the application of the new roofing system.

3.02 ROOF DECK CRITERIA

- A. 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 defects are corrected.
- C. Acceptable decks and the applicable Carlisle Fasteners:
 1. **Steel, 22 gauge or heavier** - Carlisle HP-X Fasteners/Piranha Plates or HP-Xtra Fasteners/Piranha Xtra Plates are required with a minimum pullout of 500 pounds per fastener.
 2. **Lightweight Insulating Concrete over steel** - Carlisle HP-X Fasteners/Piranha Plates or HP-Xtra Fasteners/Piranha Xtra Plates are required with a minimum pullout of 360 pounds per fastener (into steel deck below the lightweight concrete).
 3. **Structural Concrete, rated 3,000 psi or greater** - Carlisle CD-10 or HD 14-10 Fasteners (with Piranha Plates) are required with a minimum pullout of 800 pounds per fastener.
 4. **Wood Plank or minimum 15/32 thick Plywood** - Carlisle HP-X Fasteners/Piranha Plates or HP-Xtra

Fasteners/Piranha Xtra Plates are required with a minimum pullout of 360 pounds.

5. **Oriented Strand Board (OSB), minimum 7/16" thick;** The Carlisle HP-X Fasteners/Piranha Plates or HP-Xtra Fasteners/Piranha Xtra Plates are required with a minimum pullout of 300 pounds per fastener.
6. **Cementitious Wood Fiber and Gypsum** - The Carlisle HP-NTB Fastener is required with a minimum pullout of 300 pounds.

3.03 SUBSTRATE PREPARATION

- A. On retrofit-recover projects, cut and remove wet insulation, as identified by specifier, and fill all voids with new insulation so it is relatively flush with 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 applicable cautions and warnings.

A. Insulation Attachment

1. Carlisle Insulation shall be mechanically fastened to the roof deck as follows:
 - a. For HP Recovery Board, Dens-Deck or minimum 1-1/2" thick Polyisocyanurate, a minimum of 5 fasteners and plates per 4' x 8' board are required.
 - b. For Polyisocyanurate less than 1-1/2" thick or Foamular or DOW Extruded Polystyrene, any thickness, a minimum of 6 fasteners and plates per 4' x 8' board are required.
- Note:** Sure-Flex PVC membrane cannot be installed directly over extruded polystyrene insulation. A layer of HP Protective Mat must be installed over the insulation prior to installing membrane (approved with white Sure-Flex membrane only).
- c. Insulation boards 4' x 4', regardless of thickness, must be fastened at the minimum rate of 1 fastener and plate every 4 square feet.
2. Carlisle Piranha Plates, Seam Fastening Plates (2" diameter) or Insulation Fastening Plates (3" diameter) may be used with appropriate Carlisle Fastener for insulation attachment.

B. Membrane Placement, Attachment and Heat Welding

1. A minimum of two perimeter sheet shall be installed at edges of each roof level and 81" wide membrane shall be installed in the field of the roof.

2. Membrane sheets shall be mechanically fastened with the appropriate Carlisle Fastener/Fastening Plate spaced 6", 12" or 18" on center, depending on project criteria, within the membrane splice. Refer to the Sure-Flex Specification for required number of perimeter membrane sheets and fastener spacing.
3. Overlap adjacent membrane sheets approximately 5-1/2" at those locations where Fastening Plates are located (along length of the membrane) and a minimum of 2" at end roll sections (width of the membrane).
4. Heat weld the membrane sheets a minimum of 1-1/2" with an Automatic Heat Welding Machine.

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" in one horizontal foot and at all other penetrations in accordance with Carlisle's Details published with Carlisle's Specifications.

D. Membrane Flashing

Flash all walls and curbs with Sure-Flex 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 Termination Detail.

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.
 - a. Sure-Flex Heat Weldable Walkway Rolls are required when walkway pads are specified and are heat welded to the Sure-Flex Membrane.
 - b. When concrete pavers are used, they shall be loose laid and installed in conjunction with a slip sheet of reinforced membrane. Concrete pavers are not recommended when the roof slope is greater than 2" per 1 horizontal foot.
 - c. Carlisle Interlocking™ Rubber Pavers, 24" X 24" X 2", weighing approximately 6 pounds per square foot may be loose laid directly over the membrane. Installation instruction sheets are available from Carlisle.
2. **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 that pertain to the individual project to complete a bid package submittal.

Membrane Physical Properties

Physical Property	Test Method	Property of Unaged Sheet	Property After ASTM D3045 aging 56 days @ 176° F
Tolerance on Nominal Thickness, %	ASTM D 751	± 10	
Thickness over scrim, in. (mm) 50-mil & 60-mil 80-mil	ASTM D 4434 Optical Method (avg. of 3 areas)	0.016 (0.406) min. 0.025 (0.635) min.	
Breaking Strength, lbf/in. (kN/m)	ASTM D 751 (Grab Method)	200 (35) min. 300 (53) typical	90% min. retention of original breaking strength
Elongation at Break of fabric, %	D 751	15 min. 25 typical	90% min. retention of original elongation
Tearing Strength, lbf (N) 8 x 8 in. specimen	ASTM D 751 (B-Tongue Tear)	45 (200) min. 100 (445) typical	
Low Temperature Bend,	ASTM D 2136	-40 (-40) max. -50 (-46) typical	
Linear Dimensional Change (shrinkage), After 6 hours at 176° F (80° C)	ASTM D 1204	+/- 0.5 max. -0.3 typical	
Ozone resistance, 100 pphm, 168 hours	ASTM D1149	No cracks	
Resistance to water absorption After 7 days immersion 158° F (70° C) Change in mass, %	ASTM D 570	3.0 max. 2.0 typical	
Field seam strength lbf/in. (kN/m) Seam tested in peel after welding	ASTM D1876	25 (4.4) min. 60 (10.5) typical	
Water vapor permeance, Perms	ASTM E 96	0.10 max. 0.05 typical	
Puncture resistance, lbf (N) (see supplemental section for additional puncture data)	FTM 101C Method 2031	250 (1110) min. 280 (1245) typical 50-mil 320 (1423) typical 60-mil 380 (1690) typical 80-mil	
Resistance to xenon-arc weathering Xenon-Arc, 6300 kJ/m ² total radiant exposure, visual condition at 10X (ASTM D 4434 light & spray cycle)	ASTM G155 0.35 W/m ² 63 ° C 5000 hours	No cracks No crazing	
B.P.T. is black panel temperature			

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