

# SPECIFICATIONS

## Thermoplastic Roofing Membranes

**Table #1. Single-Ply Membranes**

Manufacturer	Designation	Fully Adhered	Mechanically Attached	Loose Laid	Not Recommended For Monolithic Concrete Decks*
Bond Cote Systems	Bond Cote 40 mil		X	X	X
Burke Industries	Burkeline M358 MF**		X	X	X
	Burke Elvaloy	X	X	X	
	Burkeline M560 Vac Q**			X	X
Carlisle Syntec	Hychoice**	X	X	X	
Duro-Last	Durolast 45 mil		X	X	X
	Durolast 50 mil		X	X	X
Hyload	Hyload 250			X	X
JPS Elastomerics	Hi-Tuff**	X	X	X	
	Hi-Tuff EP	X	X	X	
Republic Powdered Metals	Geoflex			X	X
Sarnafil	G476 PVC			X	X
Seal Dry	SYS 3000, 5000, 7000	X	X	X	
Seaman	Fibertite		X	X	X
Trocal	SRB-50 or 60			X	X
Tremco	Tremco HP 4510**	X	X	X	
Versico	Versiweld	X	X	X	

\*Suitable for all other standard types of decks including Metal Decks, Panel Concrete, Wood Decks, Wood Fiber, Insulated Concrete and existing systems.

\*\*Technically a thermoset material, but acts as a thermoplastic during installation.

### General

Thermoplastic water-proofing membranes are acceptable for use with Lightguard® Protected Membrane Roof Insulation (PMRI). Acceptable membranes can be found in Table #1 above.

The membrane shall be installed in accordance with one of the following specifications:

- The specifications of the membrane manufacturer and shall incorporate only those materials supplied by a single manufacturer.
- The specifications developed by the specifier must have prior written approval by T. Clear.
- The T. Clear specifications incorporated in this document.

These specifications can be extended with the application guidelines for Thermoplastic Membrane Systems by SPRI.

### Warranty

All installations of the Lightguard PMRI systems must be in accordance with current specifications approved by T. Clear, installed by a contractor approved by T. Clear and the membrane supplier, inspected by a T. Clear inspector, and will be covered by a warranty from T. Clear.

The design criteria for the Lightguard PMRI system is to apply the roofing membrane directly to the substrate. The use of insulation below the membrane is acceptable, when it is specified, but insulation below the membrane is not warranted by T. Clear. Additional Styrofoam "R" Brand insulation, meeting ASTM C-578 type V, VI or VII, can be installed above the membrane and below the Lightguard.

# Air Barrier Requirements

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Loose laid and mechanically attached thermoplastic membranes require a substrate that qualifies as an air barrier. T. Clear Technical Sheet #20 identifies the preparation required for each type of deck where an air barrier is required.

## Dew Point Control

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The optimum dew point location is in the extruded polystyrene above the waterproofing membrane. This optimum dew point location is achieved when all or most of the insulation is above the waterproofing membrane. Preferred System design places less than 1/3 of the insulation R-Value beneath the membrane. Adding insulation beneath the membrane can lower the location of the dew point to below the membrane and adversely affect the performance of the roofing system.

## Deck Condition

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The erection and design properties for performance of the deck are not the responsibility of T. Clear Corporation and should be in accordance with applicable regulatory agency requirements and industry standards. Specific approved decks are listed along with minimal requirements.

1. Poured Concrete Decks: Reinforced concrete decks shall have a minimum density of 150 lbs./cu. ft.. Structural lightweight concrete decks shall have a minimal density of 100 lbs./cu. ft.. The deck shall be smooth and have no pronounced ridges or depressions. It must be dry and unfrozen at the time of roofing. T. Clear requires that only fully adhered systems be installed over monolithic concrete decks. If tapered insulation is used to obtain slope in dead level applications, the insulation must be adhered to the concrete deck. The insulation shall be covered with a minimum 1/4" Dens-Deck Overlayment board, or a 1/2" gypsum board which is adhered to the insulation.

2. Concrete Plank Decks: The deck units shall be tightly butted to adjacent units and shall be properly attached and aligned. All side joints between planks shall be key grouted to prevent differential movement and to compensate for misalignment ( max. 1/2"). Camber differential between adjacent tees of more than 1/4" must be corrected before roofing by placing grout between adjacent members on a slope of 1"/ft. feathered out to the lower tee. Grout installation should be smooth without ridges or irregularities. The deck units shall be directly welded to adjacent units. The deck surface must be dry and unfrozen at the time of roofing. Use of key grouting, or a 12" wide modified bitumen (mopped or torched over the side and end joints between the deck units) may be used to provide an air barrier. Fully-adhered thermoplastic systems are acceptable for concrete plank decks. If a loose-laid or mechanically attached thermoplastic system is specified, a minimum 1/4" Microfoam, extruded polystyrene recovery board or equivalent is required between the deck and the membrane.

3. Poured Gypsum Concrete Decks: The deck shall be smooth, well troweled, and have no pronounced ridges or depressions. It must be

dry and unfrozen at the time of roofing. Provisions must be made in the building design for the water-based material to dry to the underside. Loose-laid or mechanically attached thermoplastic systems require a minimum 1/4" Microfoam, extruded polystyrene recovery board, a non-woven polyester sheet, a non woven polypropylene sheet or equivalent between the deck and the membrane.

4. Lightweight Insulating Concrete Decks: The deck shall be smooth, well troweled, and have no pronounced ridges or depressions. It must be dry and unfrozen at the time of roofing. Provisions must be made in the building design for the water-based material to dry to the underside. Loose-laid or mechanically attached thermoplastic systems require a minimum 1/4" Microfoam, extruded polystyrene recovery board, a non woven polyester or polypropylene sheet or equivalent between the deck and the membrane.

5. Steel Decks: The deck shall be constructed per current Steel Deck Institute (SDI), including 1) deck gauge shall be no lighter than 22 gauge, 2) side and end joints shall be adequately lapped, mechanically attached or welded with all loose and broken welds repaired prior to roofing, and 3) decking must be adequately supported at all penetrations. Gypsum board, Densdeck, extruded polystyrene, isocyanurate board or other approved underlayment shall be attached to the metal deck in accordance with required fasteners, types and patterns listed in T. Clear's UL classification for 60 psf or 90 psf., a minimum of one fastener per 4 square feet for 60 psf and a minimum of one fastener per 2 square feet for 90 psf. Thermo-plastic systems can be fully adhered to an appropriate overlayment on metal decks.

6. Wood Or Plywood Decks: The wood or plywood deck must be properly attached to supporting members and must be of sufficient thickness (minimum 15/32 plywood) to prevent excessive deflection between supporting members and to provide fire classification. Wood roof decks shall consist of well-seasoned lumber, edges of which shall be tongue and grooved, ship-lapped or splined to prevent differential flexing of the boards. Any significant voids shall be covered with sheet metal that must be hemmed on all open edges a minimum 0.5" in order to prevent damage to the membrane by sharp metal edges. Some thermoplastic systems can be fully adhered to wood or plywood decks. If a loose-laid or mechanically attached thermoplastic system is specified, a minimum 1/4 inch Microfoam, extruded polystyrene recovery board, polyester or polypropylene slip sheet, or equivalent is required between the deck and the membrane.

7. Structural Wood Fiber Decks: The structural wood fiber plank shall be set level, aligned and carefully interlocked with all joints flush and even. Voids (gaps that are 1/8 inch or greater), or thickness variations and projections that are 1/8 inches or greater between adjacent wood fiber planks shall be grouted and feathered smooth. Some thermo-plastic systems can be fully adhered to structural wood fiber decks.

8. Existing Built-Up Roof Membranes: A built-up roof with a gravel surface shall have the loose gravel removed by the use of a power broom. If the bitumen surface is less than 2 years old, a coal tar pitch

surface, or has been resurfaced within 2 years, then a slip sheet of 6 mil polyethylene will be required. A loose-laid or mechanically attached thermoplastic system is acceptable for existing BUR roofs. A minimum 1/4 inch extruded polystyrene recovery board or equivalent is required between the old and new membrane. Contact the membrane supplier or review the membrane manufacturer's data to achieve assurance that the membrane is compatible with the existing roofing material. The recover specification by T. Clear Corporation must be followed for recovering existing built-up roof systems.

## Deck Slope Requirements

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Roofs must be designed and constructed to drain water within 48 hours after a rain. A 1/4 inch per foot slope is recommended. "Dead level" decks using heat welded thermoplastic membranes are acceptable with a sufficient number of correctly placed drains. Where a negative slope exists, consideration may be given to increasing the thickness of the insulation over the membrane to displace the water, or appropriate tapered insulation can be added under the membrane to eliminate the negative slope condition. The drain body must be recessed into the deck so that the clamping ring is flush with or below the deck surface. Sumps are recommended. The maximum slope that will be covered by Lightguard Ballasted Roof Insulation is 2 inches per foot.

## Specification Requirements Common To All Thermoplastic Installations—Loose Laid, Mechanically Attached and Fully Adhered

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The following specifications provide the basis for the installation of the thermoplastic membrane systems, and are extended by the specifications of the manufacturer supplying the materials for the installation. The materials for the installation of the membrane system must be purchased from a single membrane manufacturer.

1. Insulation Beneath The Membrane: It is preferable not to use more insulation below the membrane than required to protect the membrane from sharp objects or uneven substrates. However, when insulation is required for slope, tapered insulation such as extruded polystyrene is recommended. The addition of insulation under the membrane may change the dew point in the system. Care must be given to the roofing system design in order to keep the dew point above the waterproofing membrane. The insulation must be secured with compatible insulation adhesive to prevent movement. Slip sheets may be required between insulation and PVC based Thermoplastic membranes. Consult membrane manufacturer or T. Clear for requirements and use.

2. Seams: All approved thermoplastic membrane specifications must use heat welded seams in the field of the roof. All flashing details shall use heat welded or solvent welded seams.

3. Placement: The membrane shall be loosely laid over the acceptable substrate (see Membrane Table #1). The membrane shall be allowed to relax a minimum 1/2 hour before final positioning and seaming. With respect to the fully adhered system, the membrane is partially removed from the substrate so that adhesive can be applied to the substrate. Cuts for penetrations and projections should be carefully executed. The membrane shall be unrolled and positioned with a minimum 3 inch overlap. Laps shall be shingled with the slope of the roof, so as not to develop buck water joints.

4. Seaming: The sheets must be seamed using a proper heat welder designated by the membrane manufacturer. The seams shall be checked for continuity and integrity and repaired immediately.

5. Termination And Securement: Positive membrane securement shall be provided at all membrane terminations. Termination bars shall be installed at the perimeter of each roof level, section, curb flashing, skylight, expansion joint, interior wall, penthouse, etc. Securement shall be provided at all angle changes. Mechanical securement at terminations shall be sealed. Pull-out strengths of the securements shall be 100 lbs/lineal foot when tested by the procedures described in the SPRI "Wind Design Guide For Ballasted Single Ply Roofing Systems".

6. Base Flashings: The longest pieces of flashing material available shall be used to minimize splices. Precoated compatible metal flashings shall be used wherever their installation is practical. Flashings shall not be applied over thru-wall flashings or weep holes. When using thermoplastic flashing material on a vertical surface, the seam between the flashing and the main roof sheet must be completed before bonding the flashing to the vertical surface. Flashing membrane shall extend a minimum 6 inches onto the main roof sheet beyond the mechanical securement. Care should be taken to ensure that the flashing does not bridge where there is a change of direction (e.g., parapet meets the roof deck). The top of the installed flashings shall be fastened under metal counter flashing, coping cap, or metal reglet. The maximum distance between fasteners shall be 8 inches O.C, applied through a continuous bar to a solid substrate.

7. Penetrations: All penetrations (pipes, supports, soil stacks, cold vents, etc.) passing through the roofing membrane shall be flashed. The flashing seal shall be made directly to the penetration passing through the roofing system. Precoated compatible metal flashings shall be used wherever their installation is practical. When bonding directly to metal, clean and prime the metal thoroughly. Apply bonding adhesive to bonding surfaces. Allow to dry to touch, fold membrane material onto the metal without wrinkling. Roll entire surface to fully mate the materials. In addition to adhesive bonding mechanical clamps shall be used to secure the top of the prefabricated flashing to the penetration. Pipe clusters and unusual shape penetrations that cannot be sealed with membrane or other prefabricated flashings shall be sealed by surrounding them with pourable sealer in a new pitch pan. Pitch pans must be maintained by the building owner. Water-shedding devices covering pipe clusters are recommended.

8. Drains: Existing flashing, asphalt or other material shall be removed providing a clean, smooth surface on all materials between the clamping ring and the drain base in preparation for sealant and membrane. Drain ring should be located at or below deck surface. The use of tapered insulation may be necessary to assure water draining. The seal between the membrane and the drain base shall be provided by sealant under constant, even compression from the drain ring. Cracked roof drain bowls and roof drains using lead -packing, oakum, or coal tar sealant, shall be replaced with new roof drains.

9. Gravel Stops: The deck membrane shall be installed over the perimeter by properly securing it to a treated wood nailer on the outside fascia of the building. The membrane shall extend below and be sealed to the outside of the wood nailer using a termination bar and under membrane sealant. Care must be taken to insure that an air barrier is installed according to Technical Note #20 from T. Clear Corporation to prevent billowing of the membrane.

10. Water Cut-Offs: Measures must be taken to ensure that water does not flow beneath the completed sections of the new roofing system. Water cut-offs shall be provided on a daily basis and at the onset of inclement weather. Water cut-offs shall be removed before the resumption of work.

## Attachment Of Membranes

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Loose Laid: The membrane will not be attached in the field of the roof. The substrate, if any, between the membrane and the structural deck will not be mechanically attached unless it is required to meet air barrier requirements, as noted in T. Clear Tech Note #20.

Mechanically Attached: The substrate for mechanically attached membranes must be attached to the deck using types of fasteners and patterns to meet the minimum requirements identified in Factory Mutual's Approval Guide for 1-60 or higher as required by the specification. The membrane shall be attached using plate, bar anchor, or batten in seam systems, as selected in the designer specifications for the requirements of 60 psf or greater, as specified. Through-membrane penetrating fastener systems, and plate-bonded systems are not approved by T. Clear. Air barriers, as described in T. Clear Tech Note #20 must be included.

Fully Adhered: Over the properly installed and/or prepared compatible substrate, fresh, properly stored compatible adhesive designed for the membrane being installed shall be applied at the required rate for the substrate in smooth, even coatings without voids, globs, puddles, or similar irregularities. The coated substrate shall be allowed to completely dry before positioning the membrane. The membrane shall be unrolled and positioned with proper overlap, without stretching or stressing the membrane during placement. Once in place, one half of the sheet shall be turned back and coated with

adhesive. When the adhesive has dried sufficiently to produce strings when touched with a dry finger, roll out the coated membrane onto the previously coated substrate, avoiding wrinkles. The bonded half of the sheet shall be pressed down with a weighted foam-covered lawn roller. The remaining half of the sheet shall then be folded back, coated, and rolled using the same bonding procedure. Adjoining sheets shall be installed in the same manner. Minimum overlap shall be 3 inches. Laps shall be heat-welded and shingled so as not to develop buck water joints with respect to the slope of the roof.

Adhered with hot steep asphalt (Felt Backed Membranes Only): For polyester felt backed thermoplastic materials, asphalt may be used as the adhesive provided the substrate is compatible with the asphalt. Asphalt shall be evenly applied according to the membrane manufacturer's specifications. The membrane is unrolled onto the asphalt-coated surface within a time interval to permit the felt backing portion of the membrane to embed in the fluid asphalt coating. The succeeding rolls shall be applied in similar manner with the unbacked edge overlapping the preceding roll, shingled with the slope of the roof. The sheet shall be pressed down with a roller to ensure that the membrane is embedded in the asphalt.

## Lightguard Installation

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Slip sheets may be required between insulation and PVC based Thermoplastic membranes. Consult membrane manufacturer or T. Clear for requirements and use. To complete Lightguard PMRI systems, see:

1. Lightguard installation, wind design, and securement specifications (LIDS 1995)
2. Lightguard flashing details (LFD 1995)

## Fire Classification Information For Lightguard Roof Assemblies

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1. All Lightguard assemblies are considered as ballasted systems with respect to Factory Mutual. Refer to the current F.M. Data Sheet 1-29.
2. All Lightguard roof assemblies are rated Class A (Fire From Without). See T. Clear current listings.
3. For more information on the hourly rated constructions (Fire From Within), see the T. Clear current listings from the UL Directory.



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