



Code Approval Guide February 2012

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Carlisle SynTec, a division of Carlisle Construction Materials Incorporated CODE APPROVAL GUIDE

February 2012

INTRODUCTION

This Code Approval Guide addresses both general information pertaining to Underwriters Laboratories (UL) and FM Approvals (FM) test criteria as well as specific UL and FM code approvals achieved with Carlisle's Sure-Weld™ Adhered and Mechanically-Fastened Roofing Systems. Various independent test laboratory results along with national building code approvals are also identified in this guide. Code approvals available with Carlisle's FleeceBACK™, Hot Mopped, Sure-Flex and Sure-Seal® Roofing Systems are identified in separately published Code Approval Guides.

Code ratings are categorized by roof system type (Mechanically-Fastened, Adhered) and are separated into 2 sections; UL Approvals and FM Approvals. Underwriters Laboratories rated roof assemblies are grouped according to deck type (non-combustible or combustible) and are further categorized by the severity of fire exposure (Class A, B or C). FM Approvals approved assemblies are categorized according to deck type and the specific type of construction (new, tear-off or retrofit).

The listed assemblies contained in this guide are grouped generically based on deck classification. Specific substrate requirements for each Carlisle Roofing System can be identified in the respective Carlisle Specifications.

In the UL and FM Approvals throughout this guide, when multiple layers of insulation are referenced, the product listed first identifies the insulation directly below the membrane. For example; a listing of HP Recovery Board/Polyisocyanurate indicates the HP Recovery Board is installed directly under the membrane. A listing of Gypsum Board/Polystyrene indicates the Gypsum Board is installed directly under the membrane.

General Guidelines for Underwriters Laboratories and FM Approvals Code Compliance

These guidelines are intended to focus on the essential criteria to be followed when an Underwriters Laboratories (UL) and/or FM Approvals (FM) approved assembly is specified. Generally, the Carlisle published specifications reflect the minimum requirements necessary to obtain the applicable Carlisle warranty. **Code requirements are not specifically covered in the Carlisle specifications and are considered to be above and beyond the provisions of the Carlisle warranty.**

Individuals specifying an approved assembly or selecting various products to achieve a specific UL/FM rating must recognize the importance of ensuring proper component selection to fully comply with the most current listings published. **All materials used in the roofing system must be UL and/or FM approved and must have been tested together as part of a complete roofing assembly.**

In addition to the code approval listings in this guide, information pertaining to approved assemblies can also be obtained directly from UL and FM as follows:

1. *Underwriters Laboratories On-Line Certifications Directory (ul.com).*
2. *FM Approvals RoofNav website (roofnav.com).* FM RoofNav assembly numbers can be obtained from this website.

Underwriters Laboratories, FM Approvals and ANSI/SPRI WD-1 Clarifications/Enhancements:

A. Underwriters Laboratories

1. The criteria required to obtain **UL external fire ratings** (Class A, B or C) can be identified in this guide or can be searched for on the UL website using the UL Category Code TGFU. UL ratings approved for use on combustible decks are also acceptable on non-combustible decks.
2. For **UL internal fire ratings** (hourly constructions - P Numbers), search the UL website using the UL Category Code BXUV.

B. FM Approvals

Uplift ratings listed in this guide are for the field of the roof. Additional requirements/enhancements are required by FM in the perimeter and corner areas, for deck securement and for perimeter nailer/edge attachment. Refer to FM Property Loss Prevention Data Sheets 1-28, 1-29 and 1-49 for specific requirements. On FM insured projects, the local FM insuring agent **MUST** review and approve the proposed roofing assembly prior to installation. When FM is not the insuring entity for the building, use the **Approved American National Standard ANSI/SPRI WD-1** for design purposes.

C. APPROVED AMERICAN NATIONAL STANDARD ANSI/SPRI WD-1

The ANSI/SPRI Wind Design Standard Practice for Roofing Assemblies should be referenced when a project is not FM insured. This document was developed as a consensus National Standard and provides a methodology for designing for wind uplift resistance of roofing system assemblies. Insulation fastening patterns are included in this document. The fastening patterns are approved for use by Carlisle.

SUMMARY

Due to complexity of the code documents and the variety of information that must be reviewed, it is important to consult with Carlisle and other respective manufacturers concerning the most current available approvals.

- **Prior to project bid** - Products specified by the architect must be thoroughly investigated to determine if the specified rating can be achieved and local building codes must be consulted regarding any additional requirements.
- **Prior to installation** - Project managers should review the code requirements with field construction personnel to ensure compliance with project requirements.

Upon completion of the roofing installation, each project is inspected by a Carlisle Technical Representative to ensure compliance with Carlisle's current specification requirements for the issuance of the applicable warranty. However, this inspection is not for the purpose of verifying code compliance.

Sure-Weld™ (TPO) Mechanically-Fastened or RhinoBond Roofing Systems

Underwriters Laboratories Approvals

Membrane Type: .045” or .060” Sure-Weld Standard Reinforced Membrane (White, Gray or Tan)
.045” or .060” Sure-Weld HS Reinforced Membrane (White, Gray or Tan)
.072” or .080” Sure-Weld EXTRA Reinforced Membrane (White, Gray or Tan)
.060” or .080” Spectro-Weld Reinforced Membrane (White)

UL Class "A"				
Deck Type	Insulation (1)	Thickness	Maximum Slope	
			Sure-Weld, Sure-Weld EXTRA or Spectro-Weld	Sure-Weld HS
Non-Combustible and Combustible (For combustible decks, gypsum board must be installed beneath the insulations listed) (2)(3)(4)	Carlisle Polyisocyanurate HP-H, SecurShield,	Any	1/2"*	1-1/2"
	Carlisle SecurShield HD or SecurShield HD Plus/Polyisocyanurate	1/2"/Any		
	Carlisle SecurShield HD or SecurShield HD Plus/Polystyrene (5)			
	Insulfoam SP (5)	Any	1/2"	1/2"
	Carlisle HP Recovery Board	1/2" - 3"	1-1/2"	1-1/2"
	Carlisle HP Recovery Board/Polyisocyanurate	1/2" Min./Any		
	Carlisle HP Recovery Board/Polystyrene (5)	1/2" Min./Any		
	OSB APA rated	7/16"		
Combustible (6)	OSB APA rated/Polyisocyanurate	7/16" Min./Any		
	OSB APA rated/Polystyrene	7/16" Min./Any		
	Dens-Deck	1/4" (2)(4)	3"	Unlimited**
	Dens-Deck or Securock/Polyisocyanurate	1/4"/Any (4)	2-1/2" EXTRA	
	Dens-Deck or Securock/Polystyrene	1/4"/Any (4)		
	Carlisle Polyisocyanurate SecurShield (4)	3" Min.	1/2"	1-1/2"
	Polyisocyanurate listed above over 2 layers of Carlisle FR Base Sheet 1S	Any/2 layers	1/2"	1/2"
Approved Lightweight Insulating Concrete	Two layers Carlisle FR Base Sheet 1S	Two layers of Base Sheet	1/2"	1/2"
	Direct Application	N/A	3" 2-1/2" EXTRA	Unlimited

* - 3/4" per foot slope for SecurShield on non-combustible decks only

** - Maximum slope for Securock is 3" per foot

Notes:

- (1) When multiple insulation layers are listed (i.e., HP Recovery Board/Polyisocyanurate), the insulation listed first (HP Recovery Board) is directly under the membrane.
- (2) Securock can be used in this application; however, the minimum thickness required is 1/2".
- (3) On Retrofit/No Tearoff projects, where the existing roof is Class A rated, gypsum board may be eliminated. Existing Class B or C rated roofs will require use of gypsum board to achieve a Class A rating, otherwise, the new roofing system will retain existing UL rating.
- (4) Insulation joints (bottom layer) are to be staggered a minimum of 6" from joints in wood deck.
- (5) Assembly not permitted on combustible decks, even with gypsum board underneath.
- (6) Combustible deck ratings can be used on non-combustible decks.

Sure-Weld™ (TPO) Mechanically-Fastened or RhinoBond Roofing Systems

Underwriters Laboratories Approvals

Membrane Type: .045" or .060" Sure-Weld Standard Reinforced Membrane (White, Gray or Tan)
.045" or .060" Sure-Weld HS Reinforced Membrane (White, Gray or Tan)
.072" or .080" Sure-Weld EXTRA Reinforced Membrane (White, Gray or Tan)
.060" or .080" Spectro-Weld Reinforced Membrane (White)

UL Class "B"				
Deck Type	Insulation (1)	Thickness	Maximum Slope	
			Sure-Weld, Sure-Weld EXTRA or Spectro-Weld	Sure-Weld HS
Combustible (2)(3)	Carlisle Polyisocyanurate SecurShield (2)	1.9" Min.	1/2"	1/2"
	Polyisocyanurate (on Page 1) over Carlisle FR Base Sheet 1S	1-1/2" Min./Base Sheet	1/2"	1"
	HP Recovery Board/Polyisocyanurate over Carlisle FR Base Sheet 1S	1/2"/1" Min./Base Sheet	1"	1"
	HP Recovery Board/ Carlisle FR Base Sheet 1S	1" Min./Base Sheet	1"	1"
	One Layer Carlisle FR Base Sheet 1S One Layer Carlisle FR Base Sheet 1S over minimum Class B Smooth BUR, mineral cap sheet or Modified Bitumen	One Layer of Base Sheet	1/2"	1/2"
	Inverted G3 Cap Sheet	Cap Sheet		
UL Class "C"				
Non-Combustible	Polyisocyanurate listed on Page 1	Any	Unlimited	Unlimited
Combustible	Polyisocyanurate listed on Page 1	2" Min.	Unlimited	Unlimited
Existing UL Rating Retained				
Non-Combustible or Combustible	None – Direct to min. UL Class C rated Type III or IV Smooth Asphalt BUR, Mineral Cap Sheet Modified Bitumen or approved single-ply to remain	N/A	1/2"	1/2"
	Carlisle FR Base Sheet 1S over existing min. UL Class "C" rated Type III or IV Smooth Asphalt BUR, Mineral Cap Sheet, Modified Bitumen or approved single-ply to remain	Base Sheet	1/2"	3/4"
	Max. 1" Insulfoam R-Tech or SP over minimum Class C smooth or gravel surface (gravel maintained) BUR, mineral cap sheet or Modified Bitumen	Max. 1"	1/2"	1/2"

Notes:

- (1) When multiple insulation layers are listed (i.e., HP Recovery Board/Polyiso), the insulation listed first (HP Recovery Board) is directly under the membrane.
- (2) Insulation joints (bottom layer) are to be staggered a minimum of 6" from joints in wood deck.
- (3) Combustible deck ratings can be used on non-combustible decks.
- (4) Assembly acceptable for white Sure-Weld membrane only.

Sure-Weld™ (TPO) Mechanically-Fastened or RhinoBond Roofing Systems

FM Approvals and Equivalencies

A. FM Approvals - Field Sheet Securement Criteria (1)(2)(3)

Membrane Type: .045" or .060" Sure-Weld Standard Reinforced Membrane (White, Gray or Tan)
.045" or .060" Sure-Weld HS Reinforced Membrane (White, Gray or Tan)
.072" or .080" Sure-Weld EXTRA Reinforced Membrane (White, Gray or Tan)
.060" or .080" Spectro-Weld Reinforced Membrane (White)

Membrane Width (2)	Fastener/Plate (3)	Spacing	Min. 22 Gauge Grade C Steel		Min. 22 Gauge Grade E Steel (4) or Structural Concrete		Wood Deck (7)	Min. 18 Gauge Steel
			Sure-Weld, Sure-Weld EXTRA or Spectro-Weld	Sure-Weld HS	Sure-Weld, Sure-Weld EXTRA or Spectro-Weld	Sure-Weld HS	Sure-Weld, Sure-Weld EXTRA or Spectro-Weld	Sure-Weld or Sure-Weld EXTRA
4 foot (6)	HP-X /Piranha	6"	1-165 (136102-0-0)	-	1-165 (136102-0-0)	-	-	-
		12"	1-105 (136101-0-0)	-	1-105 (136101-0-0)	-		
8 Foot	HP-X /Piranha	6"	1-105 (12442-0-0)	-	1-135 (12496-0-0)	1-120 (106202-0-0)	1-90 (231874-0-0)	-
		12"	1-60 (12135-0-0)	1-60	1-90 (12562-0-0)	1-75	1-75 (231872-0-0)	
	HP-Xtra /Piranha Xtra	12"	1-90 (143000-0-0)	1-75	1-90 (143000-0-0)	1-75 (142996-0-0)	-	
10 Foot	HP-X /Piranha	6"	1-105 (140986-0-0)	1-90	1-120 (12571-0-0)	1-75 (106197-0-0)	-	-
		9" (5)	1-75 (5)	1-60 (5)	1-90 (5)	1-90 (5)		1-90 (12807-0-0)
		12"	1-60 (140548-0-0)	-	1-75 (107470-0-0)	1-75 (106205-0-0)		-
	HP-Xtra /Piranha Xtra	6"	1-120	-	1-120	-		-
		12"	1-60	-	1-90* (12788-0-0)	-		-
12 Foot	HP-X /Piranha	6"	1-105 (140986-0-0)	-	1-120 (141052-0-0)	1-75 (106197-0-0)	-	-
		9" (5)	1-75 (5)	1-60 (5)	1-75 (5)	-		
		12"	1-60 (140548-0-0)	-	1-60 (140548-0-0)	1-60 (106201-0-0)		
	HP-Xtra /Piranha Xtra	6"	1-120 (141023-0-0)	-	1-120 (141052-0-0)	-		
		9" (5)	1-75 (5)	-	1-75 (5)	-		
		12"	1-60	-	1-60	-		

(RoofNAV Number) – for selected systems directly over Polyiso HP-H

*Max 1-75 using Spectro-Weld

Notes:

- (1) For roof deck construction (new, tearoff or retrofit), approved insulations and maximum roof slopes, refer to item C on page 5.
- (2) Refer to Carlisle Specifications for minimum requirements regarding sheet widths and fastener spacing.
- (3) On steel decks, Carlisle HP-X Fasteners and Piranha Plates or HP-Xtra Fasteners and Piranha Plates are required as identified in the above chart. On structural concrete decks, CD-10, HP Concrete Spikes or HD 14-10 Fasteners are used with Piranha Plates.
- (4) Testing conducted on FM approved 22 gauge Grade E steel decking (ASTM Designation A611 or A653 Grade 80). Refer to FM requirements for deck installation.
- (5) Formal FM approval is not available with fasteners at 9" o.c. Wind uplift resistance testing was successfully completed in accordance with FM 4470 procedures.
- (6) Ratings achieved using steel decking attached to structural purlins spaced 5' o.c.
- (7) FM Approved fire-retardant (FR) treated lumber, minimum 1.5" thick (nominal 2"), or plywood wood deck, minimum 23/32" thick (nominal 3/4") fastened to structure using FM approved fasteners and densities.

B. FM Approvals – RhinoBond Securement Criteria

Membrane Type: .045” or .060” Sure-Weld Standard Reinforced Membrane (White, Gray or Tan)
.045” or .060” Sure-Weld HS Reinforced Membrane (White, Gray or Tan)
.072” or .080” Sure-Weld EXTRA Reinforced Membrane (White, Gray or Tan)

FM Approvals – RhinoBond Grid Securement					
Deck Type	Fastener/Plate	Rating	Fasteners per 4' x 8' Board		
			Field	Perimeter	Corner
Min. 22 gauge Grade C Steel Deck	HP-X / RhinoBond TPO Plate	1-90	6 (222555-0-0)	10	15
		1-105	8 (222553-0-0)	14	20
Min. 22 gauge Grade E Steel Deck	HP-X / RhinoBond TPO Plate	1-120	8 (222375-0-0)	14	20

(RoofNAV number) over Polyiso HP-H

FM Approvals – RhinoBond Linear Securement					
Deck Type	Fastener	Plate	Row Spacings	Fastener Spacing in Rows	Rating
Min. 22 gauge Grade E Steel Deck	HP-X	RhinoBond TPO Plate	5’	12”	1-75
Structural Steel Purlin (Metal Retrofit)	HP Purlin		5’	6”	1-135
			10’	6”	1-75

C. 1-90 (90 psf) Wind Uplift Equivalency Rating

Wind uplift testing has been completed in accordance with the FM 4470 Test Procedure which was witnessed and certified by Architectural Testing, Incorporated, an industry recognized Independent Testing Laboratory. Over a 22 gauge Grade E steel roof deck, the following results were obtained using HP-X Fasteners and Piranha Plates for membrane securement. The Performance Test Report is on file and available from Carlisle.

Membrane Type: .045” or .060” Sure-Weld Standard Reinforced Membrane (white, gray or tan)

90 psf Uplift Resistance (1-90 Equivalency on 12' x 24' Table)				
Deck Type	Field Membrane Width	Fastener Spacing	Insulation Type and Thickness	Insulation Fastening
Min. 22 gauge	10' (See notes 1 and 3 above)	12"	Per Carlisle Specification	Per Carlisle Specification

Sure-Weld™ (TPO) Mechanically-Fastened or RhinoBond Roofing Systems

FM Approvals

D. FM Class 1 Roof Deck Construction and Insulation Approvals (1)

Membrane Type: .045" or .060" Sure-Weld Standard Reinforced Membrane (White, Gray or Tan)
 .045" or .060" Sure-Weld HS Reinforced Membrane (White, Gray or Tan)
 .072" or .080" Sure-Weld EXTRA Reinforced Membrane (White, Gray or Tan)
 .060" or .080" Spectro-Weld Reinforced Membrane (White)

Deck Type	Insulation (2)	Insulation Thickness	Maximum Slope for ASTM E-108 Class "A" Rating	
			Sure-Weld, Sure-Weld EXTRA or Spectro-Weld	Sure-Weld HS
New Construction/Tearoff: Steel (Minimum 22 gauge) Structural Concrete Wood (5) Retrofit (No Tearoff) (4): Structural Concrete	Carlisle HP Recovery Board Carlisle HP Recovery Board (min. 1/2"), Dens-Deck (min. 1/4") or Securock (min. 1/4") Over: FM Approved Insulation (3)	1/2" Min.	1-1/2" (with Fiberboard or Securock overlay) 5" (with Dens-Deck overlay and Sure-Weld Standard) 3" (with Dens-Deck overlay and Sure-Weld EXTRA)	2" (with Fiberboard or Securock overlay) 5" (with Dens-Deck overlay)
	Carlisle Polyisocyanurate HP-H or SecurShield	1.5" - 12"	1/2"	1-1/2"
	Carlisle SecurShield HD or SecurShield HD Plus Over: FM Approved Insulation (3)	1/2" / Refer to FM RoofNAV website		
	Carlisle HP Recovery Board	1/2" - 1"	1-1/2"	2"
Retrofit (No Tearoff) (4): Steel (Minimum 22 gauge)	Carlisle Polyisocyanurate HP-H or SecurShield	1" Max.	1/2"	1-1/2"
	Carlisle SecurShield HD or SecurShield HD Plus	1/2"		

Notes:

- (1) **The fastener spacing for membrane securement** is dependant on the deck type, desired wind uplift rating and the Carlisle Fastening Plate and Fastener utilized **as identified on page 3**.
- (2) Insulation shall be fastened in accordance with Carlisle Specifications.
- (3) On steel decks, a thermal barrier of FM approved gypsum board is required under expanded or extruded polystyrene. For specific thermal barrier requirements, refer to FM's RoofNAV web-site.
- (4) Existing roof must be FM Class 1 rated.
- (5) FM Approved fire-retardant (FR) treated lumber, minimum 1.5" thick (nominal 2"), or plywood wood deck, minimum 23/32" thick (nominal 3/4"). A thermal barrier of FM approved gypsum board is required under all insulations. For specific thermal barrier requirements, refer to FM's RoofNAV web-site.

SURE-WELD METAL RETROFIT ROOFING SYSTEM

UNDERWRITERS LABORATORIES (UL) APPROVALS

The UL ratings achieved with the Metal Retrofit Roofing System are identical to the approvals listed for the Sure-Weld Mechanically-Fastened Roofing System over non-combustible decks depending on the membrane selected. These ratings are listed on pages 1 and 2.

FM APPROVALS

As referenced in FM Approvals Loss Prevention Data Sheet 1-31, the method of recovering an existing metal roof system with a single-ply mechanically fastened roofing system where the membrane is secured through the existing metal roof directly to the structural purlins is recognized as an appropriate recovery system when installed per the recommendations of FM.

As a standard FM Approvals requirement, additional membrane and insulation securement is necessary in the corner and/or perimeter areas as outlined in FM Property Loss Prevention Data Sheets 1-28, 1-29 and 1-31. These bulletins should be reviewed in their entirety for specific requirements concerning insulation types, fastening enhancements and other items that may be necessary.

Sure-Weld™ (TPO) Adhered Roofing System

Underwriters Laboratories Approvals

Membrane Type: .045" or .060" Sure-Weld Standard Reinforced Membrane (White, Gray or Tan)
.045" or .060" Sure-Weld HS Reinforced Membrane (White, Gray or Tan)
.072" or .080" Sure-Weld EXTRA Reinforced Membrane (White, Gray or Tan)
.060" or .080" Spectro-Weld Reinforced Membrane (White)

UL Class "A"						
Deck Type	Insulation (1)(2)	Thickness	Bonding Adhesive	Maximum Slope		
				Sure-Weld or Spectro-Weld	Sure-Weld HS	Sure-Weld EXTRA
Non-Combustible and Combustible (For combustible decks, gypsum board must be installed beneath the insulations listed) (3)(4)(5)	Carlisle Polyiso HP-H, SecurShield	Any	Sure-Weld Bonding Adhesive (SW) or Low VOC Bonding Adhesive (LV)	1/4"	1/2"	1/4"
	Carlisle SecurShield HD, SecurShield HD Plus/Polyiso	1/2" / Any	Aqua Base 120 (AQ 120)	3/8"	1/2"	3/8"
	Carlisle SecurShield HD, SecurShield HD Plus / Polystyrene (8)					
	APA Rated Oriented Strand Board (OSB)/Polyiso	7/16"/Any	SW/LV	1-1/2"	1"	1/4" (3/4" for Class B)
	OSB/Polystyrene	7/16"/Any				
Combustible (5)(7)	Carlisle HP Recovery Board	1/2" - 3"	SW/LV	1-1/2"	1"	1/4"
	Carlisle HP Recovery Board/Polyiso	1/2"				
	Carlisle HP Recovery Board/Polystyrene (8)	Min/Any	AQ 120	1/2"	1"	1/2"
		1/2"				
		Min/Any				
Combustible (5)(7)	Dens-Deck Prime (6)	1/4" (6)	SW/LV	3"	Unlimited*	2-1/2"
	Dens-Deck Prime or Securock/Polyiso	1/4"/Any	AQ 120	1"	1" (3" for Class B)	1"
	Dens-Deck Prime or Securock/Polystyrene	1/4"/Any				
	Carlisle Polyiso SecurShield (5)	3" Min.	SW/LV	1/4"	1/2"	1/4"
			AQ 120	3/8"	1/2"	3/8"
Structural Concrete or Approved Ltwt. Ins. Conc.	N/A	N/A	SW/LV	3"	Unlimited	2"
			AQ 120	1"	1" (3" for Class B)	1"

* - Maximum slope with Securock is 3" per foot on combustible deck.

Notes:

- (1) When multiple insulation layers are listed (i.e., HP Recovery Board/Polyisocyanurate), the insulation listed first (HP Recovery Board) is directly under the membrane.
- (2) Insulation may be mechanically fastened, attached with FAST Adhesive, Type III or IV asphalt or UL approved cold adhesive.
- (3) Minimum 1/2" thick gypsum board can be a classified or unclassified material with a minimum weight of 1.84 pounds per square foot. 1/4" thick Carlisle/Georgia Pacific Dens-Deck or Georgia Pacific Sound Deadening Board with a minimum weight of 1.09 pounds per square foot may be substituted for 1/2" thick gypsum board.
- (4) On **Retrofit/No Tearoff projects**, where the **existing roof is Class A** rated, the **gypsum board may be eliminated**. Existing Class B or C rated roofs will require the use of gypsum board to achieve a Class A rating, otherwise, the new roofing system will retain existing UL rating.
- (5) Insulation joints (bottom layer) are to be staggered a minimum of 6" from joints in wood deck.
- (6) Dens-Deck Prime cannot be installed directly over an existing roofing membrane.
- (7) Combustible deck ratings can be used on non-combustible decks.
- (8) Assembly not permitted on combustible decks, even with gypsum board underneath.

Sure-Weld™ (TPO) Adhered Roofing System Underwriters Laboratories Approvals

Membrane Type: .045" or .060" Sure-Weld Standard Reinforced Membrane (White, Gray or Tan)
 .045" or .060" Sure-Weld HS Reinforced Membrane (White, Gray or Tan)
 .072" or .080" Sure-Weld EXTRA Reinforced Membrane (White, Gray or Tan)
 .060" or .080" Spectro-Weld Reinforced Membrane (White)

UL Class "B"					
Deck Type	Insulation (1)(2)	Thickness	Maximum Slope		
			Sure-Weld or Spectro-Weld	Sure-Weld HS	Sure-Weld EXTRA
Combustible (3)(4)	Carlisle Polyisocyanurate SecurShield (3)	1.9" Min.	1/4"	1/2"	1/4"
	Polyiso listed on previous page (6)/FR Base Sheet 1S	1-1/2" Min./ Base Sheet	1/4"	1/2"	1/4"
	HP Recovery Board/Polyiso/FR Base Sheet 1S	1/2" Min./ 1" Min./Base Sheet	1-1/2"	1"	3/4"
	HP Recovery Board/FR Base Sheet 1S	1" Min./Base Sheet			
UL Class "C"					
Non-Combustible	Polyiso listed on previous page	Any	Unlimited	Unlimited	Unlimited
Combustible	Polyiso listed on previous page	2" Min.	Unlimited	Unlimited	Unlimited

Notes:

- (1) When multiple insulation layers are listed (i.e., HP Recovery Board/Polyisocyanurate), the insulation listed first (HP Recovery Board) is directly under the membrane.
- (2) Insulation may be mechanically fastened, attached with FAST Adhesive, Type III or IV asphalt or UL approved cold adhesive.
- (3) Insulation joints (bottom layer) are to be staggered a minimum of 6" from joints in wood deck.
Combustible deck ratings can be used on non-combustible decks.

Sure-Weld™ (TPO) Adhered Roofing System

FM Approvals

Membrane Type: .045" or .060" Sure-Weld Standard Reinforced Membrane (White, Gray or Tan)
 .045" or .060" Sure-Weld HS Reinforced Membrane (White, Gray or Tan)
 .072" or .080" Sure-Weld EXTRA Reinforced Membrane (White, Gray or Tan)
 .060" or .080" Spectro-Weld Reinforced Membrane (White)

FM Class 1A-60 and 1A-90 Ratings Mechanically Fastened Insulation						
Deck Type	Insulation		Bonding Adhesive	Maximum Slope		
				Sure-Weld or Spectro-Weld	Sure-Weld EXTRA	Sure-Weld HS
New Construction/Tearoff: Steel (Min. 22 gauge) Structural Concrete Wood (1) Tectum (2) Gypsum (Tearoff only) (3) Retrofit (No Tearoff) (4) Structural Concrete Gypsum (3)	Carlisle Polyiso HP-H, Securshield	Insulation Thickness: 1.5"-12" Insulation Fastening Requirements for Steel and Struc. Conc. Decks:	Sure-Weld Bonding Adhesive / Low VOC Bonding Adhesive	1/2" (13222-0-0)	1/4" (13259-0-0)	1" (93453-0-0)
		Minimum Top Layer Thickness 2" 8 fasteners and Plates per 4' x 8' board Minimum Top Layer Thickness 1.5" 10 fasteners and Plates per 4' x 8' board	Aqua-Base 120	3/4" (145761-0-0)	3/4" (145761-0-0)	3/4" (145761-0-0)

(RoofNAV Number) – for selected systems using 2" thick minimum top layer

Notes:

- (1) FM approved wood decks, a gypsum board must be installed beneath the insulation listed. 16 fasteners per board required for all membranes.
- (2) FM approved Tectum decks must be minimum 2" thick. Insulation fasteners must penetrate the deck a minimum of 1-1/2" for Class 1-60 and 2" for Class 1-90. 16 fasteners per board required for all membranes.
- (3) Existing gypsum decks must be FM approved. Insulation fasteners must penetrate the deck a minimum of 1-1/2" for Class 1-60 and 1-90. 16 fasteners per board required for all membranes.
- (4) Existing roof must be FM Class 1 rated.

Sure-Weld™ (TPO) Adhered Roofing System FM Approvals

Membrane Type: .045" or .060" Sure-Weld Standard Reinforced Membrane (White, Gray or Tan)
.045" or .060" Sure-Weld HS Reinforced Membrane (White, Gray or Tan)
.072" or .080" Sure-Weld EXTRA Reinforced Membrane (White, Gray or Tan)
.060" or .080" Spectro-Weld Reinforced Membrane (White)

FM Class 1A-60 and 1A-90 Ratings Mechanically Fastened Cover Board						
Deck Type	Insulation	Insulation Thickness	Insul. Fast. / 4'x8' board (Steel & Conc. Only)	Maximum Slope		
				Sure-Weld or Spectro-Weld	Sure-Weld EXTRA	Sure-Weld HS
New Construction/Tearoff: Steel (Min. 22 gauge) Structural Concrete Wood (2) Retrofit (No Tearoff): (5) Structural Concrete	Carlisle SecurShield HD Plus or HP Recovery Board (min. 1/2") Over: FM Approved Insulation (1)	1/2" Min	16	Sure-Weld Bonding Adhesive / Low VOC Bonding Adhesive (SW/LV) 1-1/2"	(SW/LV) 3/4"	(SW/LV) 1-1/2"
	Carlisle Securock	1/4" Min.	1/4"-12 (1-75)	Aqua-Base 120 (AQ120) 1"	(AQ120) 1"	(AQ120) 1"
	Carlisle Securock (Min. 1/4") Over: FM Approved Insulations (2)	See FM RoofNAV	1/2"-10			
	Carlisle Dens-Deck Prime (4)	1/4" Min.	1/4"-12	(SW/LV) 1-1/2" (92102-0-0)	(SW/LV) 3/4"	(SW/LV) 3-1/2"
	Carlisle Dens-Deck Prime (4) (1/4" Min.) Over: FM Approved Insulation (1)	See FM RoofNAV	1/2"-12	(AQ120) 1" (95279-0-0)	(AQ120) 1"	(AQ120) 3"
	Carlisle Dens-Deck Prime (4) (1/4" Min.) Over: FM Approved Insulation (1)	See FM RoofNAV	5/8"-8			
Retrofit (No Tearoff) (3): Steel (Min. 22 gauge) Wood (2)	Carlisle HP Recovery Board (No additional insulation permitted)	1/2" - 1"	16	(SW/LV) 1-1/2" (AQ120) 1"	(SW/LV) 3/4" (AQ120) 1"	(SW/LV) 1-1/2" (AQ120) 1"
	Carlisle Polyiso HP-H	1" Max.	20	(SW/LV) 1/2" (AQ120) 3/4"	(SW/LV) 1/4" (AQ120) 3/4"	(SW/LV) 1" (AQ120) 3/4"

(RoofNAV Number) – for selected systems using 1/4" thick Dens-Deck Prime top layer

Notes:

- On steel decks, a thermal barrier of FM approved gypsum board is required under expanded or extruded polystyrene insulation. For specific thermal barrier requirements, consult the respective insulation manufacturer or refer to the current published FM Approval Guide.
- On FM Approved wood decks, a gypsum board must be installed beneath the insulation listed. Polystyrene insulations must incorporate 1/4" gypsum board in addition to standard thermal barrier requirements. 16 fasteners per board required for all membranes.
- Existing roof must be FM Class 1 rated.
- OMG 3" Galvalume Plates and OMG #12 Standard fasteners must be used to utilize the reduced fastening patterns for Dens-Deck Prime. These products can be purchased through Carlisle to be included in the warranty.

Sure-Weld™ (TPO) Adhered Roofing System

FM Approvals

Membrane Type: .045" or .060" Sure-Weld Standard Reinforced Membrane (White, Gray or Tan)
 .045" or .060" Sure-Weld HS Reinforced Membrane (White, Gray or Tan)
 .072" or .080" Sure-Weld EXTRA Reinforced Membrane (White, Gray or Tan)
 .060" or .080" Spectro-Weld Reinforced Membrane (White)

FM 1A-150(1)(2) and FM 1A-90 Ratings Direct Adhesion to OSB (Oriented Strand Board) FM 1A-105 over OSB with Aqua-Base 120					
Deck Type (1)(2)	Insulation	Insulation Thickness	Maximum Slope		
			Sure-Weld or Spectro-Weld	Sure-Weld EXTRA	Sure-Weld HS
New Construction/Tearoff Steel (Min. 22 gauge) Structural Concrete	OSB (Oriented Strand Board) (3)(4)	7/16" Min.	1-1/2" (13335-0-0)	3/4" (13341-0-0)	1-1/2" (13335-0-0)
	OSB (Min. 7/16") (3) Over: FM Approved Insulation (3)	See FM RoofNAV			

(RoofNAV Number) for 1-150 systems

FM 1A-150 Rating Insulation Mechanically Attached					
Deck Type (1)(2)	Insulation (5) (6)	Insulation Thickness	Maximum Slope		
			Sure-Weld or Spectro-Weld	Sure-Weld EXTRA	Sure-Weld HS
New Construction/Tearoff Steel (Min. 22 gauge) Structural Concrete	Carlisle Polyiso HP-H/SecurShield	2" – 12"	1/2" (135476-0-0)	1/4" (135474-0-0)	1" (135477-0-0)
	Carlisle Securock / Polyiso	1/2" Min. / See Page 9	1-1/2" (269993-0-0)	3/4" (269994-0-0)	3-1/2" (269996-0-0)

(RoofNAV Number) for selected systems

FM 1A-225 Rating Insulation Mechanically Attached					
Deck Type (7)	Insulation (6)(8)	Insulation Thickness	Maximum Slope		
			Sure-Weld or Spectro-Weld	Sure-Weld EXTRA	Sure-Weld HS
New Construction/Tearoff Steel (Min. 22 gauge) Structural Concrete	Carlisle Polyiso SecurShield	2" – 12"	1/2" (245513-0-0)	1/4" (245509-0-0)	1" (245516-0-0)
	Carlisle Securock / Polyiso	1/2" Min. / See Page 9	1-1/2" (239271-0-0)	3/4" (239272-0-0)	3-1/2" (269952-0-0)

(RoofNAV Number) for selected systems

Notes:

- (1) **For FM 1-150 rating**, testing was conducted on FM approved 22 gauge Grade C steel roof deck.
- (2) OSB (oriented strand board) shall be APA rated. Provide minimum 1/8" gaps between OSB boards.
For FM 1-150 rating, OSB shall be fastened with 17 Carlisle Fasteners/Insulation Plates per 4' x 8' board in the field of the roof.
- (3) On steel decks, a thermal barrier of FM approved gypsum board is required under expanded or extruded polystyrene insulations. For specific thermal barrier requirements, consult the respective insulation manufacturer or refer to the current published FM Approval Guide.
- (4) Care must be exercised during Bonding Adhesive application since 1/8" gaps are required between OSB Boards and solvent from adhesive will degrade polystyrene products.
- (5) Insulation fastened with 20 HP fasteners and Sure-Seal insulation plates per board in the field of the roof
- (6) Top layer must be 2" thick
- (7) Testing was conducted on FM approved 22 gauge Grade C steel roof deck attached per 1-29 Loss Prevention Data Bulletin corner requirements. FM 1-240 rating is available over FM approved 22 gauge Grade E steel roof deck
- (8) Insulation fastened with 32 HP fasteners and Sure-Seal insulation plates per board

Sure-Weld™ (TPO) Adhered Roofing System FM Approvals

Membrane Type: .045" or .060" Sure-Weld Standard Reinforced Membrane (White, Gray or Tan)
.045" or .060" Sure-Weld HS Reinforced Membrane (White, Gray or Tan)
.072" or .080" Sure-Weld EXTRA Reinforced Membrane (White, Gray or Tan)
.060" or .080" Spectro-Weld Reinforced Membrane (White)

FM Ratings Direct Application Over Lightweight Insulating Concrete					
Deck Type	Insulation	Uplift Rating	Maximum Slope		
			Sure-Weld or Spectro-Weld	Sure-Weld EXTRA	Sure-Weld HS
New FM Approved Celcore Lightweight Insulating Concrete poured over Steel Decking (1)	None – Direct Application	1-135	1-1/2"	3/4"	1-1/2"
New FM Approved Elastizell Lightweight Insulating Concrete poured over Steel Decking		1-90			
New FM Approved Celcore Lightweight Insulating Concrete poured over Struc. Conc. Decking		1-270			
New FM Approved Elastizell Lightweight Insulating Concrete poured over Struc. Conc. Decking		1-180			

FM Ratings Insulation Attachment to Poured Gypsum with FAST 100 LV Adhesive (Full Coverage)						
Deck Type	Insulation	Uplift Rating	Insulation Thickness	Maximum Slope		
				Sure-Weld or Spectra-Weld	Sure-Weld Xtra	Sure-Weld HS
Retrofit / Tearoff: Gypsum (2)	Carlisle Polyiso HP-H	1-90	1.5"-12"	1/2"	1/4"	1"
	Carlisle Dens-Deck Prime or Securock / Polyiso		Min. 1/4"/See above	1-1/2"	3/4"	3-1/2"
	Carlisle HP Recovery Board		1/2"			
	Carlisle HP Recovery Board/Polyiso		1/2"/See above			

Notes:

- (1) Testing conducted on minimum 22 gauge FM approved Grade C steel decking fastened to the purlins spaced 5' o.c. For decks secured to purlins spaced 6' o.c., the maximum uplift rating is 1-120.
- (2) Existing Gypsum deck must be FM Approved.

Sure-Weld™ (TPO) Adhered Roofing System

FM Approvals

Membrane Type: .045" or .060" Sure-Weld Standard Reinforced Membrane (White, Gray or Tan)
.045" or .060" Sure-Weld HS Reinforced Membrane (White, Gray or Tan)
.072" or .080" Sure-Weld EXTRA Reinforced Membrane (White, Gray or Tan)
.060" or .080" Spectro-Weld Reinforced Membrane (White)

FM Ratings (3)						
Insulation Attachment to Structural Concrete with Flexible FAST or FAST 100 LV Adhesive						
Deck Type	Insulation (1)	Insulation Thickness	Uplift Rating	Maximum Slope		
				Sure-Weld or Spectro-Weld	Sure-Weld EXTRA	Sure-Weld HS
New Construction/ Tearoff: Structural Concrete	Carlisle Polyiso HP-H SecurShield (5)	1.5"-12"	1-705	Sure Weld Bonding Adhesive (SW) or Low VOC Bonding Adhesive (LV) 1/2" (66512-0-0)	(SW/LV) 1/4" (68669-0-0)	(SW/LV) 1"
			1-180	Aqua Base 120 (AQ 120) 3/4" (141213-0-0)	(AQ 120) 3/4" (141213-0-0)	(AQ 120) 3/4" (141213-0-0)
	Carlisle Dens-Deck Prime/ Polyiso Extruded Polystyrene (2) EPS (4)	1/4" Min./ (See RoofNAV)	1-465	(SW/LV) 1-1/2" (161393-0-0)	(SW/LV) 3/4" (161394-0-0)	(SW/LV) 3-1/2" (163213-0-0)
				(AQ 120) 1"	(AQ 120) 1"	(AQ 120) 3"
	OSB (Oriented Strand Board)/Polyiso	7/16"/See Above	1-645	(SW/LV) 1-1/2" (161384-0-0)	(SW/LV) 3/4"	(SW/LV) 1-1/2"
	Carlisle Securock/Polyiso	1/4" Min./See Above				
	Carlisle HP Recovery Board /EPS (4)	1/2"/FM Approved	1-645	(AQ 120) 1"	(AQ 120) 1"	(AQ 120) 1"
	Carlisle HP Recovery Board Carlisle HP Recovery Board over Polyiso (5)	1/2" Min. 1/2" Min./See above				
	Carlisle Polyiso HP-H/ OSB Composite	1.9" – 4"	1-375			

(RoofNAV Number) for selected systems

Notes:

- (1) Carlisle 725 TR Vapor Retarder may be used beneath any of the insulations listed above and maintain the rating. Prior to installing Carlisle 725 TR Vapor retarder, apply CCW 702-LV or Cav-Grip Primer as outlined in Carlisle's most current Specifications.
- (2) Extruded Polystyrene must be Owens Corning Foamular or Dow Styrofoam.
- (3) A maximum FM 1-195 for Sure-Weld Standard/EXTRA and maximum 1-240 for Sure-Weld HS uplift using Aqua Base 120.
- (4) EPS must be FM approved and manufactured from BASF, Huntsman or Nova Beads.
- (5) Limited to 1-480 uplift when using SecurShield

Sure-Weld™ (TPO) Adhered Roofing System FM Approvals

Membrane Type: .045" or .060" Sure-Weld Standard Reinforced Membrane (White, Gray or Tan)
.045" or .060" Sure-Weld HS Reinforced Membrane (White, Gray or Tan)
.072" or .080" Sure-Weld EXTRA Reinforced Membrane (White, Gray or Tan)
.060" or .080" Spectro-Weld Reinforced Membrane (White)

FM Class 1A-150 Ratings (1) Insulation Attachment to Tectum with FAST 100 LV Adhesive					
Deck Type (1)	Insulation	Insulation Thickness	Maximum Slope		
			Sure-Weld or Spectro-Weld	Sure-Weld EXTRA	Sure-Weld HS
New Construction/ Tearoff: Tectum (2" min. deck thickness)	Carlisle Polyiso HP-H SecurShield	1.5"-12"	Sure-Weld Bonding Adhesive or Low VOC Bonding Adhesive (SW/LV) 1/2" Aqua Base 120 (AQ 120) 3/4"	(SW/LV) 1/4" (AQ 120) 3/4"	(SW/LV) 1" (AQ 120) 3/4"
	Carlisle HP Recovery Board	1/2" Min.			
	Carlisle HP Recovery Boardover Polyiso	1/2" Min/ See above	(SW/LV) 1-1/2" (AQ 120) 1"	(SW/LV) 3/4" (AQ 120) 1"	(SW/LV) 1-1/2" (AQ 120) 1"
	Carlisle Securock over Polyiso	1/4" Min/ See Above			
	Carlisle Dens-Deck Prime over Polyiso	1/4" Min/ See Above	(SW/LV) 1-1/2" (AQ 120) 1"	(SW/LV) 3/4" (AQ 120) 1"	(SW/LV) 3-1/2" (AQ 120) 3"

Notes:

1. FM approved minimum 2" thick by 31" wide Tectum deck secured to minimum 1/4" thick steel supports spaced a maximum of 3' on center with two Construction Fasteners, Inc. 2" diameter metal plates and #14 Dekfast Fasteners per panel per support. Screws are driven into 7/32" diameter pilot holes and are spaced 7-1/2" from panel edges. Additional deck fastening required at perimeters and corners per FM Loss Prevention Data Sheet 1-28.

FM Class 1A-465 Rating Utilizing Carlisle 725 TR Vapor Retarder/ 702 LV or Cav-Grip Primer Insulation Attachment to Structural Concrete with FAST 100 LV Adhesive Full Coverage					
Deck Type	Insulation	Maximum Slope			
		FR .045", .060" or .090"	Sure-Tough	Sure-Tough FR	Sure-White .060"
New Construction/ Tearoff: Structural Concrete	Polyisocyanurate set in FAST Adhesive over Carlisle 725 TR Vapor Retarder	1/2"	1/2"	1/2"	1/2"
	1/2" HP Recovery Board over Polyisocyanurate set in FAST Adhesive over Carlisle 725 TR Vapor Retarder	1-1/2"	3/4"	3-1/2"	1-1/2"

Sure-Weld™ (TPO) Adhered Roofing System

FM Approvals

Membrane Type: .045" or .060" Sure-Weld Standard Reinforced Membrane (White, Gray or Tan)
 .045" or .060" Sure-Weld HS Reinforced Membrane (White, Gray or Tan)
 .072" or .080" Sure-Weld EXTRA Reinforced Membrane (White, Gray or Tan)
 .060" or .080" Spectro-Weld Reinforced Membrane (White)

FM Class 1A-90 Ratings Base Layer Insulation Mechanically Fastened; Top Layer of Insulation Attached with Flexible FAST or FAST 100 LV Adhesive Full Coverage or Extruded 12" o.c.(1)				
Deck Type	Insulation	Maximum Slope		
		Sure-Weld or Spectro-Weld	Sure-Weld EXTRA	Sure-Weld HS
New Construction or Tearoff: Steel (Min. 22 gauge) Wood (2) Tectum (3) Gypsum (4) (Tearoff Only)	Base layer of 1/2" thick Dens-Deck/Dens-Deck Prime (5) or FM approved Polyisocyanurate insulation mechanically fastened to the deck per standard FM Class 1-90 requirements (including enhancements at perimeters and corners). Top Layer of minimum 1/2" thick Carlisle HP Recovery Board, 1/4" thick Dens-Deck Prime, 1/4" thick Securock, minimum 7/16" thick OSB or FM Approved Polyiso (from this Guide) adhered over base layer with FAST Adhesive	1-1/2" with top layer of HP Recovery Board, OSB, Dens-Deck or Securock using Sure-Weld Bonding Adhesive or Low VOC Bonding Adhesive (SW/LV)	3/4" with top layer of HP Recovery Board, OSB, Dens-Deck or Securock using (SW/LV)	1-1/2" with top layer of HP Recovery Board, Securock, OSB or 3-1/2" with top layer of Dens-Deck using (SW/LV)
		1" with top layer of HP Recovery Board, OSB, Dens-Deck or Securock using Aqua-Base 120	1" with top layer of HP Recovery Board, OSB, Dens-Deck or Securock using Aqua-Base 120	1" with top layer of HP Recovery Board, Securock, OSB or 3" with top layer of Dens-Deck using Aqua-Base 120
		1/4" with top layer of Polyiso using (SW/LV)	1/2" with top layer of Polyiso using (SW/LV)	1-1/2" with top layer of Polyiso using (SW/LV)
		3/4" with top layer of Polyiso using Aqua-Base 120	3/4" with top layer of Polyiso using Aqua-Base 120	3/4" with top layer of Polyiso using Aqua-Base 120

Notes:

- (1) FAST Adhesive shall be applied in accordance with Carlisle Specifications.
- (2) On FM approved wood decks, a gypsum board must be installed beneath the insulation listed.
- (3) FM approved Tectum decks must be minimum 2" thick. Insulation fasteners must penetrate the deck a minimum 1-1/2" for FM 1-60 ratings.
- (4) Existing gypsum decks must be FM approved. Insulation fasteners must penetrate the deck a minimum of 1-1/2".
- (5) 1/2" Dens-Deck or Dens-Deck Prime must be fastened to the deck at 1 per 2 square feet (enhancements required at perimeter and corner areas).

Sure-Weld™ (TPO) Adhered Roofing System

FM Approvals

Membrane Type: .045" or .060" Sure-Weld Standard Reinforced Membrane (White, Gray or Tan)
 .045" or .060" Sure-Weld HS Reinforced Membrane (White, Gray or Tan)
 .072" or .080" Sure-Weld EXTRA Reinforced Membrane (White, Gray or Tan)
 .060" or .080" Spectro-Weld Reinforced Membrane (White)

FM Class 1A-300 Rating Insulation Attachment with Hot Asphalt (1)(2)					
Deck Type	Insulation	Insulation Thickness	Maximum Slope		
			Sure-Weld or Spectro-Weld	Sure-Weld EXTRA	Sure-Weld HS
New Construction/ Tearoff: Structural Concrete	Carlisle Polyiso HP-H	1.5"-12"	Sure-Weld Bonding Adhesive/Low VOC Bonding Adhesive (SW/LV) 1/2" Aqua Base 120 3/4"	(SW/LV) 1/4" Aqua Base 120 3/4"	(SW/LV) 2" Aqua Base 120 3/4"
	Carlisle HP Recovery Board Carlisle HP Recovery Board / Polyiso	1/2" Min. 1/2" Min/ See above	(SW/LV) 1-1/2" Aqua Base 120 1"	(SW/LV) 3/4" Aqua Base 120 1"	(SW/LV) 1-1/2" Aqua Base 120 1"
	Carlisle Securock / Polyiso	1/2" Min./See Above			
	Carlisle Dens-Deck Prime / Polyiso	1/2" Min/See Above	(SW/LV) 1-1/2" Aqua Base 120 1"	(SW/LV) 3/4" Aqua Base 120 1"	(SW/LV) 3-1/2" Aqua Base 120 3"

Notes:

- (1) Hot asphalt must be Type III or IV applied at a temperature within 25° F of EVT at the rate of 20-25 pounds per square.
- (2) A maximum FM 1-195 for Sure-Weld Standard/EXTRA and a maximum 1-240 for Sure-Weld HS uplift using Aqua Base 120.

Sure-Weld™ (TPO) Adhered Roofing System

FM Approvals

Membrane Type: .045" or .060" Sure-Weld Standard Reinforced Membrane (White, Gray or Tan)
.045" or .060" Sure-Weld HS Reinforced Membrane (White, Gray or Tan)
.072" or .080" Sure-Weld EXTRA Reinforced Membrane (White, Gray or Tan)
.060" or .080" Spectro-Weld Reinforced Membrane (White)

FM Class 1A-90 Ratings				
Insulation Attachment with Hot Asphalt (1)				
Deck Type (2)	Insulation	Maximum Slope		
		Sure-Weld or Spectro-Weld	Sure-Weld EXTRA	Sure-Weld HS
New Construction/ Tearoff: Steel (Min. 22 gauge) Wood (3) Tectum (4) Gypsum (5) (Tearoff Only)	Base layer of FM approved Polyisocyanurate insulation (minimum thickness listed above) mechanically fastened to the deck per standard FM Class 1-90 requirements (including enhancements at perimeters and corners). Top Layer of minimum 1/2" thick Carlisle HP Recovery Board, Dens-Deck Prime or FM Approved Polyisocyanurate (listed above) secured over base layer with hot asphalt	1-1/2" with top layer of HP Recovery Board or 1/2" of Dens-Deck Prime using Sure-Weld Bonding Adhesive/Low VOC Bonding Adhesive (SW/LV)	3/4" with top layer of HP Recovery Board or 1/2" Dens-Deck Prime using (SW/LV)	1-1/2" with top layer of HP Recovery Board or 3-1/2" Dens-Deck Prime using (SW/LV)
		1" with top layer of HP Recovery Board or 1/2" Dens-Deck Prime using Aqua-Base 120	1" with top layer of HP Recovery Board or 1" Dens-Deck Prime using Aqua-Base 120	1" with top layer of HP Recovery Board or 3" with Dens-Deck Prime using Aqua-Base 120
		1/4" with top layer of Polyiso using (SW/LV)	1/2" with top layer of Polyiso using (SW/LV)	1-1/2" with top layer of Polyiso using (SW/LV)
		3/4" with top layer of Polyiso using Aqua-Base 120	3/4" with top layer of Polyiso using Aqua-Base 120	3/4" with top layer of Polyiso using Aqua-Base 120

Notes:

- (1) Hot asphalt must be Type III or IV applied at a temperature within 25° F of EVT at the rate of 20-25 pounds per square.
- (2) Specific information concerning structural deck requirements (brand names, span capacity, securement criteria, etc.) must be referenced in the current FM Approval Guide and FM Loss Prevention Data Sheet 1-29.
- (3) On FM approved wood decks, a gypsum board must be installed beneath the insulations listed.
- (4) FM approved Tectum decks must be minimum 2" thick. Fasteners must penetrate the deck a minimum 2".
- (5) Existing gypsum decks must be FM approved. Insulation fasteners must penetrate the deck a minimum of 1-1/2".

Sure-Weld™ (TPO) Adhered Roofing System FM Approvals

FM Ratings (3) Insulation Attachment to Structural Concrete with One Step Insulation Adhesive (1)(2)						
Deck Type	Insulation	Insulation Thickness	Uplift Rating	Maximum Slope		
				Sure-Weld or Spectro-Weld	Sure-Weld EXTRA	Sure-Weld HS
New Construction/ Tearoff: Structural Concrete	Carlisle Polyiso HP-H	1.5"-12"	1-465	Sure-Weld Bonding Adhesive/Low VOC Bonding Adhesive (SW/LV) 1/2"	(SW/LV) 1/4"	(SW/LV) 1"
				Aqua Base 120 3/4"	Aqua Base 120 3/4"	Aqua Base 120 3/4"
	Carlisle Dens-Deck Prime / Polyiso	Min. 1/4"/ See above	1-465	(SW/LV) 1-1/2"	(SW/LV) 3/4"	(SW/LV) 1-1/2"
	Carlisle Securock/Polyiso	Min. 1/4"/ See Above		Aqua Base 120	Aqua Base 120	Aqua Base 120
	Carlisle HP Recovery Board Carlisle HP Recovery Board over Polyiso	1/2" Min. 1/2" Min./See above	1-255	1"	1"	1" (4)

FM Class 1A-90 Ratings Insulation Attachment to Poured Gypsum with One Step Insulation Adhesive (1)(2)					
Deck Type	Insulation	Insulation Thickness	Maximum Slope		
			Sure-Weld or Spectro-Weld	Sure-Weld EXTRA	Sure-Weld HS*
Retrofit (Tearoff): Gypsum (5)	Carlisle HP Recovery Board	1/2" Min.	(SW/LV)	(SW/LV)	(SW/LV)
	Carlisle HP Recovery Board over Polyiso	1/2" Min./See above	1-1/2"	3/4"	1-1/2"
	Carlisle Dens-Deck Prime over Polyiso	1/4" Min./See above	Aqua Base 120	Aqua Base 120	Aqua Base 120
	Carlisle Securock over Polyiso	1/4" Min./See above	1"	1"	1" (4)

Notes:

- One Step Insulation Adhesive is applied in continuous 1/2" – 3/4" wide beads spaced a maximum of 12" on center to the substrate in the field of the roof. Insulation is placed over adhesive and walked into place.
- Additional beads of One Step Insulation Adhesive are required at perimeters and corners. Bead spacing shall not exceed 6" on center at perimeter areas. Contact Carlisle for specific requirements.
- A maximum FM 1-195 for Sure-Weld Standard/EXTRA and a maximum 1-240 for Sure-Weld HS uplift using Aqua Base 120.
- A maximum slope of 3" is available when using Dens-Deck Prime
- Existing gypsum decks must be FM approved.

Sure-Weld™ (TPO) Adhered Roofing System

FM Approvals

FM Ratings (5)						
Insulation Attachment to Structural Concrete with OlyBond 500 BA Insulation Adhesive (1)(2)						
Deck Type	Insulation	Insulation Thickness	Uplift Rating	Maximum Slope		
				Sure-Weld or Spectro-Weld	Sure-Weld EXTRA	Sure-Weld HS
New Construction/ Tearoff: Structural Concrete	Carlisle Polyiso HP-H	1.5"-12"	1-240	Sure-Weld Bonding Adhesive/Low VOC Bonding Adhesive (SW/LV) 1/2" Aqua Base 120 3/4"	(SW/LV) 1/4" (94858-0-0) Aqua Base 120 3/4"	(SW/LV) 1" Aqua Base 120 3/4"
	Carlisle HP Recovery Board	1/2"		(SW/LV) 1-1/2" Aqua Base 120 1"	(SW/LV) 3/4" Aqua Base 120 1"	(SW/LV) 1-1/2" Aqua Base 120 1"
	Min 1/2" Carlisle HP Recovery Board over: Polyisocyanurate Extruded Polystyrene (3) EPS (4)	See above FM Approved FM Approved				
	Carlisle Securock over: Polyisocyanurate Extruded Polystyrene (3) EPS (4)	Min. 1/4"/ See above FM Approved FM Approved				
	Carlisle Dens-Deck Prime over Polyiso/EPS (4)	Min. 1/4"/ See above	1-300	(SW/LV) 1-1/2" (167234-0-0) Aqua Base 120 1"	(SW/LV) 3/4" Aqua Base 120 1"	(SW/LV) 3-1/2" Aqua Base 120 3"
	Carlisle Dens-Deck Prime over Polyiso	Min. 1/4"/ See above				
	Carlisle Dens-Deck Prime /Extruded Polystyrene (3)	Min. 1/4"/FM Approved				

(RoofNAV number) for selected systems

Notes:

- OlyBond 500 BA Insulation Adhesive is applied in continuous 3/4" wide beads spaced a maximum of 12" on center to the substrate in the field of the roof. Insulation is placed into adhesive after it is allowed to rise and string prior to walking and rolling the board into place. Reference Carlisle's Technical Data Bulletin (TDB) for installation requirements.
- Additional beads of OlyBond 500 BA Insulation Adhesive are required at perimeters and corners as identified in this guide. Bead spacing shall not exceed 6" on center at perimeter areas and 4" on center at corners.
- Extruded Polystyrene must be Owens Corning Foamular 250 (minimum 1" thick).
- EPS must be FM approved and manufactured from Western Insulfoam or Western EPS (Min. 2" thick).
- A maximum FM 1-195 for Sure-Weld Standard/EXTRA and a maximum 1-240 for Sure-Weld HS uplift using Aqua Base 120.

Sure-Weld™ (TPO) Adhered Roofing System

FM Approvals

FM Class 1A-90 Ratings Base Layer Insulation Mechanically Fastened; Top Layer of Insulation Attached with OlyBond 500 BA Insulation Adhesive (1)				
Deck Type	Insulation	Maximum Slope		
		Sure-Weld or Spectro-Weld	Sure-Weld EXTRA	Sure-Weld HS
New Construction or Tearoff: Steel (Min. 22 gauge) Wood (2) Tectum (3) Gypsum (4) (Tearoff Only)	Base layer of 1/2" thick Dens-Deck Prime or Securock (5) or FM approved Polyiso insulation mechanically fastened to the deck per standard FM Class 1-90 requirements (including enhancements at perimeters and corners).	Sure-Weld Bonding Adhesive/Low VOC Bonding Adhesive (SW/LV) 1-1/2" with top layer of HP Recovery Board, Dens-Deck Prime or Securock	(SW/LV) 3/4" with top layer of HP Recovery Board, Dens-Deck Prime or Securock	(SW/LV) 1-1/2" with top layer of HP Recovery Board, Securock or 3.5" Dens-Deck Prime
		Aqua Base 120 1" with top layer of HP Recovery Board, Dens-Deck Prime or Securock	Aqua Base 120 1" with top layer of HP Recovery Board, Dens-Deck Prime or Securock	Aqua Base 120 1" with top layer of HP Recovery Board, Securock or 3" with Dens-Deck Prime
	Top Layer of minimum 1/2" thick Carlisle HP Recovery Board, 1/4" thick Dens-Deck Prime, 1/4" thick Securock or FM Approved Polyiso (See Page 19) secured over base layer with OlyBond 500 BA Adhesive	(SW/LV) 1/2" with top layer of Polyiso	(SW/LV) 1/4" with top layer of Polyiso	(SW/LV) 1" with top layer of Polyiso
		Aqua Base 120 3/4" with top layer of Polyiso	Aqua Base 120 3/4" with top layer of Polyiso	Aqua Base 120 3/4" with top layer of Polyiso

Notes:

- (1) OlyBond 500 BA Adhesive shall be applied in accordance with Carlisle Specifications.
- (2) On FM approved wood decks, a gypsum board must be installed beneath the insulations listed.
- (3) FM approved Tectum decks must be minimum 2" thick. Fasteners must penetrate the deck a minimum 2".
- (4) Existing gypsum decks must .FM approved. Insulation fasteners must penetrate the deck a minimum of 1-1/2".
- (5) 1/2" thick Dens-Deck, Dens-Deck Prime or Securock must be fastened to the deck at 1 per 2 square feet.

Sure-Weld™ (TPO) Adhered Roofing System

FM Approvals

FM Class 1A-90 Rating Insulation Attachment to Tectum/Gypsum with OlyBond 500 BA Insulation Adhesive (1)					
Deck Type (2)	Insulation	Insulation Thickness	Maximum Slope		
			Sure-Weld or Spectro-Weld	Sure-Weld EXTRA	Sure-Weld HS
New Construction/ Tearoff: Tectum (2" min. deck thickness) Tearoff: Gypsum (4)	Carlisle Polyiso HP-H	1.5"-12"	Sure-Weld Bonding Adhesive/Low VOC Bonding Adhesive (SW/LV) 1/2" Aqua Base 120 3/4"	(SW/LV) 1/4" Aqua Base 120 3/4"	(SW/LV) 1" Aqua Base 120 3/4"
	Carlisle HP Recovery Board Min. 1/2" Carlisle HP Recovery Board, Min. 1/4" Carlisle Dens-Deck Prime or Min. 1/4" Carlisle Securock Over: Polyisocyanurate Extruded Polystyrene(3) Expanded Polystyrene(5)	1/2" Min. See Above FM Approved FM Approved	(SW/LV) 1-1/2" Aqua Base 120 1"	(SW/LV) 3/4" Aqua Base 120 1"	(SW/LV) 1-1/2" with HP Recovery Board, Securock or 3-1/2" with Dens-Deck Prime Aqua Base 120 1-1/2" with HP Rec. Board, Securock or 3" with Dens-Deck Prime

Notes:

- (1) OlyBond 500 BA Insulation Adhesive is applied in continuous 1/2" wide beads spaced a maximum of 12" on center to the substrate in the field of the roof. Insulation is placed into adhesive after it is allowed to rise and string prior to walking and rolling the board into place. Reference Carlisle's Technical Data Bulletin (TDB) for installation requirements.
- (2) FM approved minimum 2" thick by 31" wide Tectum deck secured to minimum 1/4" thick steel supports spaced a maximum of 3' on center with two Construction Fasteners, Inc. 2" diameter metal plates and #14 Dekfast Fasteners per panel per support. Screws are driven into 7/32" diameter pilot holes and are spaced 7-1/2" from panel edges. Additional deck fastening required at perimeters and corners per FM Loss Prevention Data Sheet 1-28.
- (3) Extruded Polystyrene must be Owens Corning Foamular (Min. 2" thick).
- (4) Existing gypsum deck must be FM approved.
- (5) EPS must be FM approved and manufactured from Western Insulfaom or Western EPS (Min. 2" thick).

Sure-Weld™ (TPO) Adhered Roofing System

FM Approvals

FM Uplift Ratings “Extruded” Flexible FAST or FAST 100 LV Adhesive for Insulation Attachment			
Deck Type	Insulation Type	Thickness	FM Rating (1)(2)
Structural Concrete (new or tear-off)	Min. 1/4" Dens-Deck/Dens-Deck Prime, Securock or Min. 7/16" OSB over: Dow, Owens Corning or Pactive Extruded Polystyrene FM approved EPS	FM approved FM approved	1-495 1-315
	Carlisle Polyiso HP-H Min. 1/4" Dens-Deck/Dens-Deck Prime or Min. 7/16" OSB over: Polyiso insulation listed above	For Polyiso, Min. 1.5" (all individual layers); Max. 12" (all layers combined)	1-480
	1/2" Carlisle HP Recovery Board over: Polyiso insulation listed above Dow, Owens Corning or Pactive Extruded Polystyrene FM approved EPS	See above FM approved FM approved	1-315
Minimum 22 gauge, FM approved Steel (new or tear-off)	Base layer of 1/2" Dens-Deck Prime or 1/2" Securock mechanically fastened to the deck at the minimum rate of 1 per 2 square feet in the field of the roof (added fasteners at perimeter/corner areas per FM) Optional: Carlisle 725 TR Vapor Barrier (with Cav-Grip Primer) adhered to Dens-Deck Prime Top layer of minimum 1.5" Carlisle Polyiso set in FAST Adhesive	For Polyiso, Min. 1.5" (all individual layers); Max. 12" (all layers combined)	1-105

Notes:

1. FAST Adhesive extruded spacing shall not exceed 12" on center in the field of the roof.
2. For concrete decks, where a FM rating of 1-150 or less is specified, FM does not require additional extrusions of adhesive at perimeters and corners. However, Carlisle requires extrusion spacing 6" on center along roof perimeters based on building height. Refer to the applicable Technical Data Bulletin or contact Carlisle for specific requirements.

NATIONAL, STATE & CITY BUILDING CODE APPROVALS

Authority	Approval	Approved Systems
ICC - International Code Council	Report ESR 1463	"A" and "MF"
SBCCI	These Code Bodies merged to form ICC as of March 2003 Refer to ICC approval	-
BOCA		-
NES – National Evaluation Service, Inc.		"A" and "MF"
ICBO		"A" and "MF"

Dade County (South Florida) Approvals

Expire August 31, 2013

Deck Type	Acceptance #
Lightweight Concrete	08-0414.09
Wood	09-1027.08
Steel	09-1027.07
Structural Concrete	10-0322.03
Cementitious Wood Fiber	10-0322.01
Gypsum	10-0322.02
Recover	10-0428.05

Other Approvals

(Using Sure-Weld Standard or EXTRA Reinforced Membrane)

- Sure-Weld White and Tan TPO Membranes** exceed the requirements for the **U.S.E.P.A. ENERGY STAR® Program** for reflective roofing materials.
- Sure-Weld TPO Membranes** conform to requirements of the **U.S.E.P.A. Toxic Leachate Test** (40 CFR part 136) performed by an independent analytical laboratory.

Carlisle SynTec, a division of Carlisle Construction Materials Incorporated, P. O. Box 7000, Carlisle, PA 17013
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