CARLISLE'S SURE-FLEX™

Code Approval Guide
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February 2012

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CARLISLE
Carlisle SynTec Incorporated

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-Flex 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-Weld 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.

FM Approvals

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-Flex™ (PVC) Mechanically-Fastened Roofing System
Underwriters Laboratories Approvals

Membrane Type: **.050", .060" or .080" Sure-Flex PVC Reinforced Membrane (White, Gray or Tan)**
.050", .060" or .080" Sure-Flex KEE PVC Reinforced Membrane (White)

UL Class "A"			
Deck Type	**Insulation (1)**	**Thickness**	**Maximum Slope**
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"
	Carlisle SecurShield HD or SecurShield HD Plus/Polyisocyanurate **Carlisle** SecurShield HD or SecurShield HD Plus/Polystyrene (5)	1/2"/Any	1"
	Carlisle HP Recovery Board **Carlisle** HP Recovery Board/Polyisocyanurate **Carlisle** HP Recovery Board/Polystyrene (5)	1/2" - 3" 1/2" Min./Any 1/2" Min./Any	
	APA Rated Oriented Strand Board (OSB) OSB/Polyisocyanurate OSB/Polystyrene	7/16" Min. 7/16" Min./Any 7/16" Min./Any	
	Carlisle FR Base Sheet 1S over **InsulFoam** EPS, Insultaper or R-Tech (5) (7)	Base Sheet/Any	1"
	Carlisle Insulfoam SP (5) (7)	Any	1/2"
	One Layer **Carlisle** FR Base Sheet 1S over minimum Class A Smooth BUR, mineral cap sheet or modified bitumen	Base Sheet	1/2"
Combustible (4)(6)	Dens-Deck Dens-Deck or Securock/Polyisocyanurate Dens-Deck or Securock/Polystyrene	1/4" (2)(4) 1/4"/Any (4) 1/4"/Any (4)	Unlimited
	Carlisle SecurShield	3" Min. (4)	1/2"
	Polyisocyanurate listed above over 2 layers of **Carlisle** FR Base Sheet 1S	Any/2 layers	1/2"
	Two layers **Carlisle** FR Base Sheet 1S	Two layers	1/2"

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 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.

(7) Assembly acceptable for white Sure-Flex membrane only.

Sure-Flex™ (PVC) Mechanically-Fastened Roofing System
Underwriters Laboratories Approvals

Membrane Type: .050", .060" or .080" Sure-Flex PVC Reinforced Membrane (White, Gray or Tan)
.050", .060" or .080" Sure-Flex KEE PVC Reinforced Membrane (White)

UL Class "B"			
Deck Type	**Insulation (1)**	**Thickness**	**Maximum Slope**
Combustible (2)(3)	**Carlisle** SecurShield (2)	1.9"" Min.	1/2"
	Polyisocyanurate (on Page 1) over G2 Base Sheet (4)	1-1/2" Min./ Base Sheet	1/2"
	HP Recovery Board/Polyisocyanurate over G2 Base Sheet (4)	1/2"/1" Min./ Base Sheet	1"
	HP Recovery Board/G2 Base Sheet (4)	1" Min./Base Sheet	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"
	Inverted G3 Cap Sheet	One Layer	1/2"
Existing UL Rating Retained			
Non-Combustible or **Combustible**	**Carlisle** FR Base Sheet 1S or G2 Base Sheet (4)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"

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) **Acceptable G2 base sheets** can be one of the following; Celotex Type G2 Vaporbar GB, GAF Gafglas No. 75 Base Sheet, Manville Glasbase, Owens Corning Perma Ply No. 28 or Tamko Glass Base. Carlisle FR Base Sheet 2S may also be used.

Sure-Flex™ (PVC) Mechanically-Fastened Roofing System
Factory Mutual (FM) Approvals

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

Membrane Type: .050", .060" or .080" Sure-Flex PVC Reinforced Membrane (White, Gray or Tan)
.050", .060" or .080" Sure-Flex KEE PVC Reinforced Membrane (White) (120" only)

Membrane Width	Fastener/Plate (1)	Fastener Spacing	FM Ratings over Min. 22 Gauge Grade C Steel	FM Ratings over Min. 22 Gauge Grade E Steel (2) or Structural Concrete
120"	HP-X/Piranha	6"	**1-75**	**1-75**
	HP-Xtra/Piranha Xtra	12"	**1-60**	**1-60**
	HP-X/SFS Barbed Oval	6"	**1-90**	**1-90**
81"	HP-X/Piranha	6"	**1-105** (143334-0-0)	**1-105** (143334-0-0)
		12"	**1-75** (143339-0-0)	**1-90** (143340-0-0)
	HP-Xtra/Piranha Xtra	12"	**1-90** (143337-0-0)	**1-90** (143337-0-0)
	HP-X/Piranha	18"	**1-60** (143349-0-0)	**1-60** (143349-0-0)
	HP-Xtra/Piranha Xtra	18"	**1-60** (143336-0-0)	**1-60** (143336-0-0)
40.5"	HP-X/Piranha	6"	**1-165** (143335-0-0)	**1-165** (143335-0-0)
		12"	**1-120** (143338-0-0)	**1-120** (143338-0-0)

(RoofNAV Number) for systems over Polyiso HP-H

B. FM Approvals – RhinoBond Securement Criteria

Membrane Type: .050", .060" or .080" Sure-Flex PVC Reinforced Membrane (White, Gray or Tan)
.050", .060" or .080" Sure-Flex KEE PVC Reinforced Membrane (White)

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	HP-X / RhinoBond PVC Plate	1-90	**6**	**10**	**15**
		1-105	**8**	**14**	**20**
Min. 22 Gauge Grade E Steel (2)	HP-X / RhinoBond PVC Plate	1-120	**8**	**14**	**20**

FM Approvals – RhinoBond Linear Securement					
Deck Type	Fastener	Plate	Row Spacings	Fastener Spacing in Rows	Rating
Min. 22 Gauge Grade E Steel	HP-X	RhinoBond PVC Plate	**5'**	**6"**	**1-180**
			5'	**12"**	**1-105**
Structural Steel Purlin (Metal Retrofit)	HP Purlin		**5'**	**18"**	**Jan-75**
			10'	**6"**	**1-120**
			10'	**12"**	**Jun-00**

Notes:

(1) On steel decks, Carlisle HP-X Fasteners and Piranha Plates or HP-Xtra Fasteners and Piranha Xtra 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.

(2) Testing conducted on FM approved 22 gauge Grade E steel decking meeting ASTM Designation A611 or A653 Grade 80.

C. FM Class 1 Roof Deck Construction and Insulation Approvals (3)

Membrane Type: .050", .060" or .080" Sure-Flex PVC Reinforced Membrane (White, Gray or Tan)
.050", .060" or .080" Sure-Flex KEE PVC Reinforced Membrane (White)

Deck Type	Insulation	Insulation Thickness	Maximum Slope for ASTM E-108 Class "A" Rating	
			Sure-Flex	Sure-Flex KEE
New Construction/Tearoff: Steel (Minimum 22 gauge) Structural Concrete	**Carlisle HP Recovery Board** or FM App'd High Density Wood Fiberboard	1/2" Min.	1"	2-1/2"
	Carlisle HP Recovery Board (min. 1/2"), Dens-Deck (min. 1/4") or Securock (min. 1/4") Over: FM Approved Insulation (1)	Refer to FM RoofNAV website	5" (with Dens-Deck overlay)	5" (with Dens-Deck overlay)
Retrofit (No Tearoff) (2): Structural Concrete	**Carlisle** SecurShield HD or SecurShield HD Plus Over: FM Approved Insulation (1)	1/2" / Refer to FM RoofNAV website		
	Carlisle Polyisocyanurate HP-H	1" - 12"	1"	2"
	Carlisle Insulfoam SP (1)	2" - 12"	2"	2"
Retrofit (No Tearoff) (2): Steel (Minimum 22 gauge)	**Carlisle** HP Recovery Board	1/2" - 1"		
	Carlisle SecurShield HD or SecurShield HD Plus	1/2"	1"	2-1/2"
	Carlisle Polyisocyanurate HP-H	1" Max.	1"	2"

Notes:

(1) On steel decks, a thermal barrier of FM approved gypsum board (Type X or Type C) is required under these insulations. For specific thermal barrier requirements, refer to the current published FM Approval Guide or contact the respective manufacturer.
(2) Existing roof must be FM Class 1 rated.
(3) Severe Hail (SH) rating applies to all FM listed assemblies

Sure-Flex™ (PVC) Adhered Roofing System
Underwriters Laboratories Approvals

Membrane Type: .050", .060" or .080" Sure-Flex PVC Reinforced Membrane (White, Gray or Tan)
.050", .060" or .080" Sure-Flex KEE PVC Reinforced Membrane (White)
Adhesive Type: Sure-Flex Bonding Adhesive, Low VOC PVC Bonding Adhesive or Aqua Base 120 Bonding Adhesive

UL Class "A"			
Deck Type	**Insulation (1)(2)**	**Thickness**	**Maximum Slope**
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	3/4"
	APA Rated Oriented Strand Board (OSB)	7/16" Min.	3"
	OSB/Polyisocyanurate	7/16" Min./Any	
	OSB/Polystyrene	7/16" Min./Any	
	Carlisle SecurShield HD or SecurShield HD Plus / Polyisocyanurate **Carlisle** SecurShield HD or SecurShield HD Plus / Polystyrene (8)	1/2" / Any	1-1/2"
	Carlisle HP Recovery Board	1/2" - 3"	
	Carlisle HP Recovery Board/Polyisocyanurate	1/2" Min/Any	
	Carlisle HP Recovery Board/Polystyrene (8)	1/2" Min/Any	
Combustible (5)(7)	**Dens-Deck Prime (6)**	1/4" Min.(6)	Unlimited
	Dens-Deck Prime/Polyisocyanurate	1/4" Min./Any	
	Dens-Deck Prime/Polystyrene	1/4" Min./Any	
	Securock	1/2" Min.	1"
	Securock/Polyisocyanurate	1/4" Min./Any	3"
	Polyiso listed above over 2 layers of **Carlisle** FR Base Sheet 1S	Any/2 layers	3/4"
	Carlisle SecurShield	3" Min.	3/4"
Structural Concrete or Approved Ltwt. Ins. Conc.	None	N/A	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, OlyBond 500 BA, Versigrip Insulation Adhesive or Type III or IV 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-Flex™ (PVC) Adhered Roofing System
Underwriters Laboratories Approvals

Membrane Type: .050", .060" or .080" Sure-Flex PVC Reinforced Membrane (White, Gray or Tan)
.050", .060" or .080" Sure-Flex KEE PVC Reinforced Membrane (White)
Adhesive Type: Sure-Flex Bonding Adhesive, Low VOC PVC Bonding Adhesive or Aqua Base 120 Bonding Adhesive

UL Class "B"			
Deck Type	**Insulation (1)(2)**	**Thickness**	**Maximum Slope**
Combustible (3)(5)	Carlisle SecurShield	1.9" Min.	3/4"
	Polyiso listed on previous page/G2 Base Sheet (4)	1-1/2" Min./ G2 Base	3/4"
	HP Recovery Board/Polyiso/G2 Base Sheet (4)	1/2" Min./ 1" Min./G2 Base	1-1/2"
	HP Recovery Board/G2 Base Sheet (4)	1" Min./G2 Base	

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, OlyBond 500 BA or 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.
(4) Acceptable G2 base sheets can be one of the following; Celotex Type G2 Vaporbar GB, GAF Gafglas No. 75 Base Sheet, Manville Glasbase, Owens Corning Perma Ply No. 28 or Tamko Glass Base.
(5) Combustible deck ratings can be used on non-combustible decks.

Sure-Flex™ (PVC) Adhered Roofing System
Factory Mutual (FM) Approvals (5)

Membrane Type: .050", .060" or .080" Sure-Flex PVC Reinforced Membrane (White, Gray or Tan)
.050", .060" or .080" Sure-Flex KEE PVC Reinforced Membrane (White)
Adhesive Type: Sure-Flex Bonding Adhesive, Low VOC PVC Bonding Adhesive or Aqua Base 120 Bonding Adhesive

FM Class 1A-60 and 1A-90 Ratings Mechanically Fastened Insulation			
Deck Type	**Insulation**		**Maximum Slope**
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** Polyisocyanurate HP-H	Insulation Thickness: 1.5" –12" Insulation Fastening Requirements for Steel and Struc. Conc. Decks: Minimum Top Layer Thickness 1.5" 16 Fasteners and Plates per 4' x 8' board	1" (187575-0-0)

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

Notes:

(1) On FM approved wood decks, minimum 1/4" thick gypsum board must be installed beneath the insulation listed.
(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.
(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.
(4) Existing roof must be FM Class 1 rated.
(5) Severe Hail (SH) rating applied to all FM listed Sure-Flex fully adhered roofing assemblies.

Sure-Flex™ (PVC) Adhered Roofing System
Factory Mutual (FM) Approvals

Membrane Type: **.050", .060" or .080" Sure-Flex PVC Reinforced Membrane (White, Gray or Tan)**
.050", .060" or .080" Sure-Flex KEE PVC Reinforced Membrane (White)

Adhesive Type: **Sure-Flex Bonding Adhesive, Low VOC PVC Bonding Adhesive or Aqua Base 120 Bonding Adhesive**

FM Class 1A-90 Ratings Mechanically Fastened Insulation				
Deck Type	**Insulation**	**Insulation Thickness**	**Insulation Fast. / 4'x8' board (Steel & Conc. Only)**	**Maximum Slope**
New Construction/Tearoff: Steel (Minimum 22 gauge) Structural Concrete Wood (2) Tectum (3) Gypsum (4) (Tearoff only) **Retrofit (No Tearoff): (5)** Structural Concrete Gypsum (4)	**Carlisle** HP Recovery Board (1) **Carlisle HP Recovery Board (min. 1/2") Over:** FM Approved Insulation (1)	1/2" Min / FM Approved	16	1-1/2" (HP Recovery Board) (143328-0-0) 1-1/2" (Dens-Deck Prime) 1-1/2" (Securock)
	Carlisle Dens-Deck Prime (1/4" Min.) Over: FM Approved Insulation (1)	1/4" Min. / FM Approved		
	Carlisle Securock (1/4" Min.) Over: FM Approved Insulation (1)	1/4" Min. / FM Approved		
Retrofit (No Tearoff) (5): Steel (Minimum 22 gauge) Wood (2) Tectum (3)	**Carlisle** HP Recovery Board (No additional insulation permitted)	1/2" - 1"	16	1-1/2"
	Carlisle Polyiso HP-H	1" Max.	20	1"

(RoofNAV Number) – for selected systems

Notes:

(1) On steel decks, a thermal barrier of FM approved gypsum board (Type X or Type C) is required under extruded or expanded polystyrene insulations. For specific thermal barrier requirements, consult the respective insulation manufacturer or refer to the current published FM Approval Guide.

(2) On FM Approved wood decks, minimum 1/4" thick gypsum board must be installed beneath the insulation listed. Polystyrene insulations must incorporate 1/4" gypsum board in addition to standard thermal barrier requirements.

(3) 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 rating.

(4) Existing gypsum decks must be FM approved. Insulation fasteners must penetrate deck a minimum of 1-1/2" for Class 1-60 rating.

(5) Existing roof must be FM Class 1 rated.

Sure-Flex™ (PVC) Adhered Roofing System
Factory Mutual (FM) Approvals

Membrane Type: **.050", .060" or .080" Sure-Flex PVC Reinforced Membrane (White, Gray or Tan)**
.050", .060" or .080" Sure-Flex KEE PVC Reinforced Membrane (White)

Adhesive Type: **Sure-Flex Bonding Adhesive or Low VOC PVC Bonding Adhesive**

FM 1A-135 Direct Adhesion to OSB (Oriented Strand Board)			
Deck Type	**Insulation**	**Insulation Thickness**	**Maximum Slope**
New Construction/Tearoff Steel (Min. 22 gauge)	**OSB** (Oriented Strand Board) (1) **OSB (Min. 7/16") (1) Over**: Polyisocyanurate XPS (2)(3) FM Approved EPS (2)(3)(4)	7/16" 7/16" / FM Approved	1-1/2" (143332-0-0)
	Carlisle Polyisocyanurate HP-H (5)	2" - 12"	1" (143333-0-0)

(RoofNAV Number) – for selected systems

FM 1A-120 Mechanically Fastened Insulation			
Deck Type	**Insulation (5)**	**Insulation Thickness**	**Maximum Slope**
New Construction/Tearoff Steel (Min. 22 gauge)	**Carlisle** Securock (Min. ½") over: FM Approved Insulation (2)	Min. 1/2" / FM Approved	1-1/2" (240390-0-0)

FM 1A-225 Mechanically Fastened Insulation (Low VOC PVC Bonding Adhesive)			
Deck Type	**Insulation (6)**	**Insulation Thickness**	**Maximum Slope**
New Construction/Tearoff Steel (Min. 22 gauge)	**Carlisle** Polyiso SecurShield	2" – 12"	1"
	Carlisle Securock / Polyiso	1/2" Min. / 1.5"-12"	1-1/2"

Notes:

(1) OSB (oriented strand board) shall be APA rated. Provide minimum 1/8" gaps between OSB boards.
For FM 1-135 rating, OSB shall be fastened with 17 Carlisle Fasteners/Insulation Plates per 4' x 8' board.

(2) On steel decks, a thermal barrier of FM approved gypsum board (Type X or Type C) is required under extruded or expanded polystyrene. For specific thermal barrier requirements, consult the respective insulation manufacturer or refer to the current published FM Approval Guide.

(3) 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.

(4) EPS Insulation must be supplied by FM approved AFM, ARCO, BASF or Huntsman bead manufacturers.

(5) Insulation is secured with 20 Carlisle Fasteners/Insulation Plates per 4' x 8' board.

(6) Insulation is secured with 32 Carlisle Fasteners/Insulation Plates per 4' x 8' board.

Sure-Flex™ (PVC) Adhered Roofing System
Factory Mutual (FM) Approvals

Membrane Type: .050", .060" or .080" Sure-Flex PVC Reinforced Membrane (White, Gray or Tan)
.050", .060" or .080" Sure-Flex KEE PVC Reinforced Membrane (White)
Adhesive Type: Sure-Flex Bonding Adhesive or Low VOC PVC Bonding Adhesive

FM Ratings Insulation Attachment to Structural Concrete with FAST Adhesive				
Deck Type	**Insulation (1)**	**Uplift Rating**	**Insulation Thickness**	**Maximum Slope**
New Construction/ Tearoff: Structural Concrete	**Carlisle** Polyiso HP-H	1-450	1.5"-12"	1"
	Carlisle Dens-Deck Prime over Polyiso	1-660	1/4" Min/See above	1-1/2" (171082-0-0)
	Carlisle Dens-Deck Prime over Extruded Polystyrene (2)		1/4" Min/FM Approved	
	Carlisle HP Recovery Board over: Polyisocyanurate	1-360	1/2"/FM Approved	1-1/2"
	EPS (3)		1/2"/FM Approved	
	Carlisle Dens-Deck Prime over EPS (3)	1-645	Min. 1/4"/FM Approved	
	Carlisle Polyisocyanurate HP-H/OSB Composite (4)	1-360	1.9" - 4"	1-1/2"

(RoofNAV Number) – for selected systems

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**
New Construction/ Tearoff: Structural Concrete	Polyisocyanurate set in FAST Adhesive over Carlisle 725 TR Vapor Retarder	1"
	1/2" HP Recovery Board over Polyisocyanurate set in FAST Adhesive over Carlisle 725 TR Vapor Retarder	1-1/2"

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) With FAST Adhesive, extruded polystyrene must be Owens Corning Foamular, Dow Styrofoam or Pactiv GreenGuard (unfaced). OlyBond 500 BA is approved with Thermapink 25.

(3) When using FAST Adhesive, EPS must be FM approved and manufactured from BASF, Huntsman or Nova Beads. With OlyBond 500 BA, insulation must be FM approved, minimum 2" thick Western Insulfoam or Western EPS.

Sure-Flex™ (PVC) Adhered Roofing System
Factory Mutual (FM) Approvals

Membrane Type: .050", .060" or .080" Sure-Flex PVC Reinforced Membrane (White, Gray or Tan)
.050", .060" or .080" Sure-Flex KEE PVC Reinforced Membrane (White)
Adhesive Type: Sure-Flex Bonding Adhesive, Low VOC PVC Bonding Adheisve or Aqua Base 120 Bonding Adhesive

Insulation Attachment to Structural Concrete with OlyBond 500 BA				
Deck Type	**Insulation**	**Uplift Rating**	**Insulation Thickness**	**Maximum Slope**
New Construction/ Tearoff: Structural Concrete	**Carlisle** Polyiso HP-H	1-240	1.5"-12"	1"
	Carlisle Dens-Deck Prime over Polyiso	1-300	1/4" Min/See above	1-1/2"
	Carlisle Dens-Deck Prime over Extruded Polystyrene (4)	1-555	1/4" Min/FM Approved	
	Carlisle HP Recovery Board over: Polyisocyanurate	1-240	1/2"/FM Approved	1-1/2"
	EPS (5)		1/2"/FM Approved	
	Carlisle Dens-Deck Prime over EPS (5)	1-300	Min. 1/4"/FM Approved	
	Carlisle Polyisocyanurate HP-H/OSB Composite	1-240	1.9" - 4"	1-1/2"

FM Class 1A-90 Ratings Insulation Attachment to Tectum with FAST Adhesive or OlyBond 500 BA (1)			
Deck Type (2)	**Insulation**	**Insulation Thickness**	**Maximum Slope**
New Construction/ Tearoff: Tectum (2" min. deck thickness) Gypsum(6)	**Carlisle** Polyiso HP-H	1.5" - 12"	1"
	Carlisle HP Recovery Board	1/2" Min.	1-1/2"
	Carlisle HP Recovery Board over Polyiso	1/2" Min/ See above	
	Dens-Deck Prime over Polyiso	1/4" Min/ See Above	1-1/2"

Notes:

(1) Bead spacing for OlyBond 500 BA shall be a maximum of 12" on center in the field of the roof. Additional beads of 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.

(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.

(3) 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.

(4) With FAST Adhesive, extruded polystyrene must be Owens Corning Foamular, Dow Styrofoam or Pactiv GreenGuard (unfaced). OlyBond 500 BA is approved with Thermapink 25.

(5) When using FAST Adhesive, EPS must be FM approved and manufactured from BASF, Huntsman or Nova Beads. With OlyBond 500 BA, insulation must be FM approved, minimum 2" thick Western Insulfoam or Western EPS.

(6) Existing Gypsum deck must be FM Approved.

Sure-Flex™ (PVC) Adhered Roofing System
Factory Mutual (FM) Approvals

Membrane Type: .050", .060" or .080" Sure-Flex PVC Reinforced Membrane (White, Gray or Tan)
.050", .060" or .080" Sure-Flex KEE PVC Reinforced Membrane (White)
Adhesive Type: Sure-Flex Bonding Adhesive, Low VOC PVC Bonding Adhesive or Aqua Base 120 Bonding Adhesive

FM Class 1A-90 Ratings Base Layer Insulation Mechanically Fastened; Top Layer of Insulation Attached with FAST Adhesive or OlyBond 500 BA (1)		
Deck Type	**Insulation**	**Maximum Slope**
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 or FM Approved Polyiso secured over base layer with FAST Adhesive or OlyBond 500 BA Insulation Adhesive	1-1/2" with top layer of HP Recovery Board, OSB or Dens-Deck Prime 1" with top layer of Polyiso

Notes:

(1) FAST Adhesive or OlyBond 500 BA Insulation Adhesive shall be applied in accordance with Carlisle Specifications. Bead spacing for OlyBond 500 BA Insulation Adhesive is a maximum of 12" o.c. in the field of the roof. Additional beads of adhesive are required at perimeters and corners as identified in this guide. Bead spacing shall not exceed 6" o.c. at perimeter areas and 4" o.c. at corners.

(2) On FM approved wood decks, minimum 1/4" thick 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 perimeters and corners).

Sure-Flex™ (PVC) Adhered Roofing System
Factory Mutual (FM) Approvals

Membrane Type: .050", .060" or .080" Sure-Flex PVC Reinforced Membrane (White, Gray or Tan)
.050", .060" or .080" Sure-Flex KEE PVC Reinforced Membrane (White)
Adhesive Type: Sure-Flex Bonding Adhesive or Low VOC PVC Bonding Adhesive

FM Class 1A-300 Rating - Insulation Attachment with Hot Asphalt			
Deck Type (1)	**Insulation**	**Insulation Thickness**	**Maximum Slope**
New Construction/ Tearoff: Structural Concrete	**Carlisle** Polyiso HP-H	1.4" - 12"	1"
	Carlisle HP Recovery Board	1/2" Min.	1-1/2"
	Carlisle HP Recovery Board over Polyiso	1/2" Min/ See above	
	Dens-Deck Prime over Polyiso	1/4" Min/ See Above	

FM Class 1A-90 Rating - Insulation Attachment with Hot Asphalt		
Deck Type	**Insulation**	**Maximum Slope**
New Construction/ Tearoff: Steel (Min. 22 gauge) Wood (2) Tectum (3)	**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).	1-1/2" with top layer of HP Recovery Board or Dens-Deck Prime
Gypsum (4) (Tearoff Only)	**Top Layer** of minimum 1/2" thick Carlisle HP Recovery Board, minimum 1/4" Dens-Deck Prime or FM Approved Polyisocyanurate (listed above) secured over base layer with hot asphalt	1" with top layer of Polyiso

FM Ratings Direct Application Over Lightweight Insulating Concrete			
Deck Type	**Insulation**	**Uplift Rating**	**Maximum Slope**
New FM Approved **Celcore** Lightweight Insulating Concrete poured over **Steel** Decking (5)	None – Direct Application	1-135	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	

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) On FM approved wood decks, minimum 1/4" thick 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 be FM approved. Insulation fasteners must penetrate the deck a minimum of 1-1/2".
(5) Testing conducted on minimum 22 gauge FM approved Grade C steel decking fastened to purlins spaced 5' o.c.. For decks secured to purlins spaced 6' o.c., the maximum uplift rating is 1-120.

Sure-Flex™ (PVC) Adhered Roofing System
Factory Mutual (FM) Approvals

Membrane Type: .050", .060" or .080" Sure-Flex PVC Reinforced Membrane (White, Gray or Tan)
.050", .060" or .080" Sure-Flex KEE PVC Reinforced Membrane (White)
Adhesive Type: Sure-Flex Bonding Adhesive, Low VOC PVC Bonding Adheisve or Aqua Base 120 Bonding Adhesive

FM Uplift Ratings "Extruded" FAST Adhesive for Insulation Attachment			
Deck Type	**Insulation Type**	**Thickness**	**FM Rating (1)**
Structural Concrete (new or tear-off)	Min. 1/4" Securock/Dens-Deck Prime or Min. 7/16" OSB over: Dow, Owens Corning or Pactive Extruded Polystyrene FM approved EPS	FM approved	**1-480 (XPS)** **1-315 (EPS)**
	Carlisle Polyiso HP-H Min. 1/4" **Securock/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**
	Optional: Carlisle 725 TR Vapor Barrier (with 702 LV or Cav-Grip Primer) adhered to Dens-Deck Prime	FM approved	**1-90**
Minimum 22 gauge, FM approved Steel (new or tear-off)	**Base layer** of 1/2" Dens-Deck Prime 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 702 LV or 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.

CITY BUILDING CODE APPROVALS

Dade County (South Florida) Approvals

Expire August 17, 2011

Deck Type	Acceptance #
Wood	06-0216.13
Steel	06-0216.10
Structural Concrete	06-0216.09
Cementitious Wood Fiber	06-0216.12
Gypsum	06-0216.07
Recover	06-0216.11

Carlisle SynTec, a division of Carlisle Construction Materials Incorporated, P. O. Box 7000, Carlisle, PA 17013
(800)-4SYNTEC (800-479-6832)