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EVALUATION REPORT

Mule-Hide Products Co., Inc.
1195 Prince Hall Drive, Suite A
Beloit, WI 53511-5481

Evaluation Report M15060.06.09
FL12772
Date of Issuance: 06/24/2009

SCOPE:

This Evaluation Report is issued under Rule 9B-72 and the applicable rules and regulations governing the use of construction materials in the State of Florida. The documentation submitted has been reviewed by Robert Nieminen, P.E. for use of the product under the Florida Building Code. The product described herein has been designed to comply with the 2007 Florida Building Code sections noted herein.

DESCRIPTION: Mule-Hide TPO-c Single Ply Roof Systems

LABELING: Each unit shall bear labeling in accordance with the requirements the Accredited Quality Assurance Agency noted herein.

CONTINUED COMPLIANCE: This Evaluation Report is valid until such time as the named product(s) changes, the referenced Quality Assurance documentation changes, or provisions of the Code that relate to the product change. Acceptance of this Evaluation Report by the named client constitutes agreement to notify Robert Nieminen, P.E. if the product changes or the referenced Quality Assurance documentation changes. Trinity|ERD requires a complete review of this Evaluation Report relative to updated Code requirements with each Code Cycle.

ADVERTISEMENT: The Evaluation Report number preceded by the words "Trinity | ERD Evaluated" may be displayed in advertising literature. If any portion of the Evaluation Report is displayed, then it shall be done in its entirety.

INSPECTION: Upon request, a copy of this entire Evaluation Report shall be provided to the user by the manufacturer or its distributors and shall be available for inspection at the job site at the request of the Building Official.

This Evaluation Report consists of pages 1 through 4, plus a 12-page Appendix.

Prepared by:

Robert J.M. Nieminen, P.E.
 Florida Registration No. 59166, Florida DCA ANE1983



The facsimile seal appearing was authorized by Robert Nieminen, P.E. on 06/24/2009. This does not serve as an electronically signed document. Signed, sealed hardcopies have been transmitted to the Product Approval Administrator and to the named client.

CERTIFICATION OF INDEPENDENCE:

1. Exterior Research & Design, LLC. d/b/a Trinity | ERD does not have, nor does it intend to acquire or will it acquire, a financial interest in any company manufacturing or distributing products it evaluates.
2. Exterior Research & Design, LLC. d/b/a Trinity | ERD is not owned, operated or controlled by any company manufacturing or distributing products it evaluates.
3. Robert Nieminen, P.E. does not have nor will acquire, a financial interest in any company manufacturing or distributing products for which the evaluation reports are being issued.
4. Robert Nieminen, P.E. does not have, nor will acquire, a financial interest in any other entity involved in the approval process of the product.

ROOFING SYSTEMS EVALUATION:

1. SCOPE:

Product Category: Roofing
Sub-Category: Single Ply Roof Systems
Compliance Statement: Mule-Hide TPO-c Single Ply Roof Systems, as produced by Mule-Hide Products Co., Inc. have demonstrated compliance with the following sections of the Florida Building Code through testing in accordance with the following Standards. Compliance is subject to the Installation Requirements and Limitations / Conditions of Use set forth herein.

2. STANDARDS:

<u>Section</u>	<u>Property</u>	<u>Standard</u>	<u>Year</u>
1504.3.1	Wind	FM 4470	1992
TAS 110	Physical Properties	TAS 131	1995

3. REFERENCES:

<u>Entity</u>	<u>Examination</u>	<u>Reference</u>	<u>Date</u>
ACRC (TST4671)	FM4470	07-051	08/29/2007
ACRC (TST4671)	FM4470	07-059	10/15/2007
ATI (TST1588)	FM4470	01-37050.01	03/13/2000
ATI (TST1588)	Physical Properties	01-37490.01	05/26/2004
CTL (TST 1577)	TAS 114 / FM 4470	CTLA-105R	10/13/2008
CTL (TST 1577)	TAS 114 / FM 4470	CTLA-105R-1	10/13/2008
CTL (TST 1577)	TAS 114 / FM 4470	CTLA-105R-2	10/13/2008
CTL (TST 1577)	TAS 114 / FM 4470	CTLA-106R	10/16/2008
CTL (TST 1577)	TAS 114 / FM 4470	CTLA-106R-1	10/16/2008
CTL (TST 1577)	TAS 114 / FM 4470	CTLA-106R-2	10/16/2008
CTL (TST 1577)	TAS 114 / FM 4470	CTLA-106R-3	10/16/2008
CTL (TST 1577)	TAS 114 / FM 4470	CTLA-106R-4	10/16/2008
CTL (TST 1577)	TAS 117	CTLA 111R	01/13/2009
FM (TST1867)	FM4470	3Z9A1.AM	10/15/1997
FM (TST1867)	FM4470	3001522	03/26/1999
FM (TST1867)	FM4470	3003393	03/30/1999
FM (TST1867)	FM4470	3017662	06/07/2005
FM (TST1867)	FM4470	3023032	07/20/2005
FM (TST1867)	FM4470	3020845	01/25/2006
FM (TST1867)	FM4470	3022174	09/25/2006
Miami-Dade (CER 1592)	Physicals Cert / TAS 131	08-0108.09	06/26/2008
FM (QUA1860)	Quality Control	PLA 3025571	01/13/2006
FM (QUA1860)	Quality Control	RoofNav Listings	Current

4. PRODUCT DESCRIPTION:

The following roof covers are mechanically attached or fully adhered to Approved substrates using fasteners, stress plates and adhesives, as outlined in the Limitations / Conditions of Use herein.

- **Mule-Hide TPO-c** and **Mule-Hide TPO-c (FR)** membranes are nominal 45-mil (1.1mm) or 60-mil (1.5 mm) thick, polyester-scrim reinforced, thermoplastic olefin (TPO) single-ply roof membranes.
- **Mule-Hide TPO-c EXTRA** and **Mule-Hide TPO-c EXTRA (FR)** membranes are nominal 72-mil (1.8mm) or 80-mil (2.0mm) thick, polyester-scrim reinforced, thermoplastic olefin (TPO), single-ply roof membranes.
- **Mule-Hide TPO-c Fleece Back** membrane is a nominal 45-mil (1.1mm) or 60-mil (1.5 mm) thick, polyester-scrim reinforced, thermoplastic olefin (TPO) single-ply roof membrane with a polyester fleece backing.

5. LIMITATIONS:

- 5.1 This Evaluation Report is not for use in HVHZ.
- 5.2 Refer to a current Roofing Materials Directory for fire ratings of this product.
- 5.3 For steel deck installations, foam plastic insulation shall be separated from the building interior in accordance with FBC 2603.4 unless the exceptions stated in FBC 2603.4.1 or 2603.6 apply.
- 5.4 Unless otherwise noted in Appendix 1, roof decking and its attachment shall be specified and installed to meet project design criteria to the satisfaction of the AHJ.
- 5.5 For recover installations, the existing roof shall be examined in accordance with FBC 1510.
- 5.6 For mechanically attached insulation or membrane or strip-bonded insulation, the maximum design pressure for the selected assembly shall meet or exceed the Zone 1 design pressure determined in accordance with FBC Chapter 16. Zones 2 and 3 shall employ an attachment density designed by a qualified design professional to resist the elevated pressure criteria. Commonly used methods are RAS 117, RAS 137 and FM LPDS 1-29.
- 5.7 For fully-adhered insulation, the maximum design pressure for the selected assembly shall meet or exceed critical design pressure determined in accordance with FBC Chapter 16. No rational analysis is permitted for these systems.
- 5.8 For mechanically attached insulation or membrane over existing roof decks, fasteners shall be tested in the existing deck for withdrawal resistance. A qualified design professional shall review the data for comparison to the minimum requirements for the system. Testing and analysis shall be in accordance with TAS 105 or ANSI/SPRI FX-1.
- 5.9 For bonded insulation or membrane over existing substrates in a re-roof (tear off) or recover installation, the existing deck or existing roof surface shall be examined for compatibility with the adhesive to be installed. If any surface conditions exist that bring system performance into question, field uplift testing in accordance with ASTM E907, FM LPDS 1-52 or ANSI/SPRI IA-1 shall be conducted on mock-ups of the proposed new roof assembly.
- 5.10 For bonded insulation or membrane over existing substrates in a recover installation, the existing roof system shall be capable of resisting project design pressures on its own merit to the satisfaction of the AHJ, as documented through field uplift testing in accordance with ASTM E907 or FM LPDS 1-52.
- 5.11 Metal edge attachment (except gutters), shall be designed and installed for wind loads in accordance with FBC Chapter 16 and tested for resistance in accordance with ANSI/SPRI ES-1 or RAS 111, except the basic wind speed shall be determined from FBC Figure 1609.
- 5.12 All products in the roof assembly shall have quality assurance audit in accordance with the FBC and F.A.C. Rule 9B-72.

6. INSTALLATION:

- 6.1 Mule-Hide TPO-c Single Ply Roof Systems shall be installed in accordance with Mule-Hide Products Co., Inc. published installation instructions, subject to the Limitations / Conditions of Use noted herein.
- 6.2 System attachment requirements for wind load resistance are set forth in Appendix 1.
- 6.3 For mechanically fastened membrane systems (Type D) over profiled steel deck, membrane shall be installed running perpendicular to steel deck flutes.



7. BUILDING PERMIT REQUIREMENTS:

As required by the Building Official or Authority Having Jurisdiction in order to properly evaluate the installation of this product.

8. MANUFACTURING PLANTS:

Contact the noted QA agency for information on product locations covered by QA procedures.

9. QUALITY ASSURANCE ENTITY:

FM Approvals – QUA 1860
(781) 255-4783

- THE 12-PAGES THAT FOLLOW FORM PART OF THIS EVALUATION REPORT -

APPENDIX 1: ATTACHMENT REQUIREMENTS FOR WIND UPLIFT RESISTANCE

Table	Deck	Application	Type	Description	Page
1A	Wood	New, Reroof (Tear-Off), Recover	C	Mechanically Attached Insulation, Bonded Roof Cover	3
1B	Wood	New, Reroof (Tear-Off), Recover	D	Insulated, Mechanically Attached Roof Cover	3
2A	Steel or Conc.	New, Reroof (Tear-Off), Recover	B	Mech. Attached Base Insulation, Bonded Top Insulation, Bonded Roof Cover	4
2B	Steel or Conc.	New, Reroof (Tear-Off), Recover	C	Mechanically Attached Insulation, Bonded Roof Cover	5
2C	Steel or Conc.	New, Reroof (Tear-Off), Recover	D	Insulated, Mechanically Attached Roof Cover	6-8
3A	Concrete	New, Reroof (Tear-Off)	A-1	Bonded Insulation, Bonded Roof Cover	9
4A-1	LWIC over Steel	New, Reroof (Tear-Off)	F	Non-Insulated, Bonded Roof Cover	10
4A-2	LWC over Conc.	New, Reroof (Tear-Off)	F	Non-Insulated, Bonded Roof Cover	11
5A	Gypsum	Reroof (Tear-Off)	A-1	Bonded Insulation, Bonded Roof Cover	12
6A	Various	Recover	A-1	Bonded Insulation, Bonded Roof Cover	12

The following notes apply to the systems outlined herein:

1. Roof decks shall be in accordance with FBC requirements to the satisfaction of the AHJ. Wind load resistance of the roof deck shall be documented through proper codified and/or FBC Approval documentation.
2. Unless otherwise noted, fasteners and stress plates for insulation attachment shall be as follows. Fasteners shall be of sufficient length for the following engagements:
 - Wood Deck: Mule-Hide HDP Fastener with 3" Insulation Plate. Minimum ¾-inch steel penetration, engage the top flute of the steel deck
 - Steel Deck: Mule-Hide HDP Fastener with 3" Insulation Plate. Minimum ¾-inch steel penetration, engage the top flute of the steel deck.
 - Concrete Deck: Mule-Hide HDP Fastener with 3" Insulation Plate. Minimum 1-inch embedment. Fasteners installed with a pilot hole in accordance with the fastener manufacturer's published installation instructions.
3. Unless otherwise noted, insulation may be any one layer or combination of polyisocyanurate, polystyrene, wood fiberboard, perlite, DensDeck, DensDeck Prime, DensDeck DuraGuard or Securock that meets the QA requirements of F.A.C. Rule 9B-72 and is documented as meeting FBC 1505.1 and, for foam plastic, FBC 2603.4.1 or 2603.6, when installed with the roof cover.
4. Minimum 200 psi, minimum 2-inch thick lightweight insulating concrete may be substituted for rigid insulation board for System Type D (mechanically attached membrane), whereby the membrane fasteners are installed through the LWIC to engage the structural steel or concrete deck. The structural deck shall be of equal or greater configuration to the steel and concrete deck listings.
5. Preliminary insulation attachment for System Type D = Minimum four fasteners per 4 x 8 ft board or minimum two fasteners per 4 x 4 ft board.
6. Unless otherwise noted, insulation adhesive application rates are as follows. Ribbon or bead width is at the time of application; the ribbons/beads shall expand as noted in the manufacturer's published instructions:
 - OlyBond 500 (OB-500): Continuous ¾ to 1-inch wide ribbons, 12-inch o.c. using PaceCart or SpotShot application devices.
 - Polyfoam TITASET Insulation Adhesive: Continuous 2½ to 3½-inch wide ribbons, 12-inch o.c.

7. Tapered polyisocyanurate may be substituted for the flat stock board with the following Maximum Design Pressure (MDP) limitations:
 - OlyBond 500 (OB-500): Maximum Design Pressure -120.0 psf
 - Polyfoam TITASET Insulation Adhesive: Maximum Design Pressure -117.5 psf
8. Bonded polyisocyanurate insulation boards shall be maximum 4 x 4 ft.
9. For mechanically attached components or partially bonded insulation, the maximum design pressure for the selected assembly shall meet or exceed the Zone 1 design pressure determined in accordance with FBC Chapter 16, and Zones 2 and 3 shall employ an attachment density designed by a qualified design professional to resist the elevated pressure criteria.
10. For fully bonded assemblies, the maximum design pressure for the selected assembly shall meet or exceed critical design pressure determined in accordance with FBC Chapter 16, and no rational analysis is permitted.
11. For mechanically attached components over existing decks, fasteners shall be tested in the existing deck for withdrawal resistance. A qualified design professional shall review the data for comparison to the minimum requirements for the system. Testing shall be in accordance with TAS 105 or ANSI/SPRI FX-1.
12. For existing substrates in a bonded recover installation, the existing roof system shall be capable of resisting project design pressures on its own merit to the satisfaction of the AHJ, as documented through field uplift testing in accordance with ASTM E907, FM LPDS 1-52 or ANSI/SPRI IA-1.
13. For System Type D, steel deck applications, the roof membrane shall be run with its length perpendicular to the steel deck flutes.
14. For adhered membrane systems, side laps shall be minimum 3-inch wide sealed with min. 1.5-inch heat weld. Membrane adhesive application rates are as follows:
 - Mule-Hide TPO-c with Mule-Hide TPO-c Bonding Adhesive in a contact application at rate of 60 ft²/gal.
 - Mule-Hide TPO-c with WBBA 2000 in a contact application at rate of 120 ft²/gal.
 - Mule-Hide TPO-c Fleece Back with WBBA 2000 in a wet-lay application at a rate of 120 ft²/gal.
15. For membrane systems attached using TPO 10-inch Pressure-Sensitive RUSS, the underside of the membrane which comes in contact with the tape shall be primed with HP-250 Primer. The membrane shall be secured by placing the primed portion onto the tape portion of the TPO 10-inch Pressure-Sensitive RUSS and roll with a steel hand roller to ensure contact.
16. For bonded membrane systems, unless otherwise noted, reference to "Mule-Hide TPO-c" membrane below also includes "Mule-Hide TPO-c (FR)", "Mule-Hide TPO-c EXTRA", and "Mule-Hide TPO-c EXTRA (FR)".

TABLE 1A: WOOD DECKS - NEW CONSTRUCTION, REROOF (Tear-Off) or RECOVER SYSTEM TYPE C: MECHANICALLY ATTACHED INSULATION, BONDED ROOF COVER							
System No.	Deck (See Note 1)	Base Insulation Layer	Top Insulation Layer			Roof Cover / Adhesive	MDP (psf)
			Type	Fasteners	Attach		
W-1	Min. 19/32" plywood or wood plank at max. 24" spans attached using #8 ring shank nails spaced 6" o.c.	(Optional) One or more layers, any combination, loose laid	Min. 1.5-inch ACFoam II or ENRGY 3	See Note 2	1 per 2 ft ²	Mule-Hide TPO-c adhered in WBBA 2000 or Mule-Hide TPO-c Bonding Adhesive	-45.0

TABLE 1B: WOOD DECKS – NEW CONSTRUCTION, REROOF (Tear-Off) or RECOVER SYSTEM TYPE D: INSULATED, MECHANICALLY ATTACHED ROOF COVER										
System No.	Roof Deck	Insulation Layer		Roof Cover						MDP (psf)
		Type	Attach	Membrane	Fasteners	Fastener Spacing	Lap Width	Lap Spacing	Seam Weld	
W-2	Min. 19/32" plywood or wood plank at max. 24" spans attached using #8 ring shank nails spaced 6" o.c. in the field and #10 ring shank nails spaced 4" o.c. at the perimeter	One or more layers, any combination	Preliminarily attached	Mule-Hide TPO-c	Mule-Hide EHD Fasteners and 2.4 Seam Plates	6-inch o.c.	5.5-inch	90.5-inch o.c.	1.5-inch outside	-52.5
W-3	Min. 19/32" plywood or wood plank at max. 24" spans attached using #8 ring shank nails spaced 6" o.c. in the field and #10 ring shank nails spaced 4" o.c. at the perimeter	One or more layers, any combination	Preliminarily attached	Mule-Hide TPO-c	Mule-Hide EHD Fasteners and 2.4 Seam Plates	6-inch o.c.	5.5-inch	66.5-inch o.c.	1.5-inch outside	-67.5

TABLE 2A: STEEL or CONCRETE DECKS - NEW CONSTRUCTION, REROOF (Tear-Off) or RECOVER
SYSTEM TYPE B: MECHANICALLY ATTACHED BASE INSULATION, BONDED TOP INSULATION, BONDED ROOF COVER

System No.	Deck (See Note 1)	Base Insulation Layer			Top Insulation Layer		Roof Cover / Adhesive	MDP (psf)
		Type	Fastener	Attach	Type	Attach		
SC-1	Min. 22 ga., type B, Grade 33 steel or min. 2,500 psi concrete	Min. 0.5-inch Dens Deck or Dens Deck Prime	See Note 2	1 per 2.0 ft ²	Min. 1.5-inch ACFoam II, Poly ISO 1, ENRGY 3 followed by Min. 0.25-inch DensDeck Prime	Both layers in OlyBond 500	Mule-Hide TPO-c adhered in WBBA 2000 or Mule-Hide TPO-c Bonding Adhesive	-37.5
SC-2	Min. 22 ga., type B, Grade 33 steel or min. 2,500 psi concrete	Min. 1.5-inch ACFoam II, Poly ISO 1, H-Shield CG, ENRGY 3	See Note 2	1 per 2.0 ft ²	(Optional) Additional layers	OlyBond 500	Mule-Hide TPO-c adhered in WBBA 2000 or Mule-Hide TPO-c Bonding Adhesive	-45.0
SC-3	Min. 22 ga., type B, Grade 33 steel or min. 2,500 psi concrete	Min. 1.5-inch ACFoam II, Poly ISO 1, H-Shield CG, ENRGY 3	See Note 2	1 per 2.0 ft ²	Min. 0.25-inch DensDeck, DensDeck Prime	OlyBond 500	Mule-Hide TPO-c adhered in WBBA 2000 or Mule-Hide TPO-c Bonding Adhesive	-45.0
SC-4	Min. 22 ga., type B, Grade 33 steel or min. 2,500 psi concrete	Min. 0.5-inch Dens Deck or Dens Deck Prime	See Note 2	1 per 2.0 ft ²	Min. 1.5-inch ACFoam II, Poly ISO 1, ENRGY 3	OlyBond 500	Mule-Hide TPO-c adhered in WBBA 2000 or Mule-Hide TPO-c Bonding Adhesive	-45.0
SC-5	Min. 22 ga., type B, Grade 33 steel or min. 2,500 psi concrete	Min. 2.0-inch ACFoam II, Poly ISO 1, H-Shield CG, ENRGY 3	See Note 2	1 per 4.0 ft ²	(Optional) Additional layers	OlyBond 500	Mule-Hide TPO-c adhered in WBBA 2000 or Mule-Hide TPO-c Bonding Adhesive	-45.0
SC-6	Min. 22 ga., type B, Grade 33 steel or min. 2,500 psi concrete	Min. 2.0-inch ACFoam II, Poly ISO 1, H-Shield CG, ENRGY 3	See Note 2	1 per 4.0 ft ²	Min. 0.25-inch DensDeck, DensDeck Prime	OlyBond 500	Mule-Hide TPO-c adhered in WBBA 2000 or Mule-Hide TPO-c Bonding Adhesive	-45.0

**TABLE 2B: STEEL or CONCRETE DECKS - NEW CONSTRUCTION, REROOF (Tear-Off) or RECOVER
SYSTEM TYPE C: MECHANICALLY ATTACHED INSULATION, BONDED ROOF COVER**

System No.	Deck (See Note 1)	Base Insulation Layer	Top Insulation Layer			Roof Cover / Adhesive	MDP (psf)
			Type	Fasteners	Attach		
SC-7	Min. 22 ga., type B, Grade 33 steel or min. 2,500 psi concrete	Min. 1.5" thick, one or more layers, any combination, loose laid	Min 7/16" APA or TECO rated OSB	Tru-Fast TSF Fasteners	1 per 3.2 ft ²	Mule-Hide TPO-c adhered in WBBA 2000 or Mule-Hide TPO-c Bonding Adhesive	-30.0
SC-8	Min. 22 ga., type B, Grade 33 steel or min. 2,500 psi concrete	(Optional) One or more layers, any combination, loose laid	Min. 1-inch ACFoam II or ENRGY 3	See Note 2	1 per 1.6 ft ²	Mule-Hide TPO-c adhered in WBBA 2000 or Mule-Hide TPO-c Bonding Adhesive	-37.5
SC-9	Min. 22 ga., type B, Grade 33 steel or min. 2,500 psi concrete	Min. 1.5" thick, one or more layers, any combination, loose laid	Min 7/16" APA or TECO rated OSB	Tru-Fast SIP LD Fasteners	1 per 3.2 ft ²	Mule-Hide TPO-c adhered in WBBA 2000 or Mule-Hide TPO-c Bonding Adhesive	-37.5
SC-10	Min. 22 ga., type B, Grade 33 steel or min. 2,500 psi concrete	(Optional) One or more layers, any combination, loose laid	Min. 1-inch Poly ISO 1	See Note 2	1 per 1.6 ft ²	Mule-Hide TPO-c adhered in WBBA 2000 or Mule-Hide TPO-c Bonding Adhesive	-45.0
SC-11	Min. 22 ga., type B, Grade 33 steel or min. 2,500 psi concrete	(Optional) One or more layers, any combination, loose laid	Min. 1.5-inch ACFoam II, Poly ISO 1, H-Shield CG, ENRGY 3	See Note 2	1 per 2.0 ft ²	Mule-Hide TPO-c adhered in WBBA 2000 or Mule-Hide TPO-c Bonding Adhesive	-45.0
SC-12	Min. 22 ga., type B, Grade 33 steel or min. 2,500 psi concrete	(Optional) One or more layers, any combination, loose laid	Min. 2.0-inch ACFoam II, Poly ISO 1, H-Shield CG, ENRGY 3	See Note 2	1 per 4.0 ft ²	Mule-Hide TPO-c adhered in WBBA 2000 or Mule-Hide TPO-c Bonding Adhesive	-45.0
SC-13	Min. 22 ga., type B, Grade 33 steel or min. 2,500 psi concrete	Min. 1.5" thick, one or more layers, any combination, loose laid	Min 7/16" APA or TECO rated OSB	Tru-Fast TSF Fasteners	1 per 2.67 ft ²	Mule-Hide TPO-c adhered in WBBA 2000 or Mule-Hide TPO-c Bonding Adhesive	-45.0
SC-14	Min. 22 ga., type B, Grade 33 steel or min. 2,500 psi concrete	Min. 1.5" thick, one or more layers, any combination, loose laid	Min 7/16" APA or TECO rated OSB	Tru-Fast SIP LD Fasteners	1 per 2.67 ft ²	Mule-Hide TPO-c adhered in WBBA 2000 or Mule-Hide TPO-c Bonding Adhesive	-45.0
SC-15	Min. 22 ga., type B, Grade 33 steel or min. 2,500 psi concrete	One or more layers, any combination, loose laid	Min 7/16" APA or TECO rated OSB	See Note 2	1 per 3.6 ft ²	Mule-Hide TPO-c adhered in WBBA 2000 or Mule-Hide TPO-c Bonding Adhesive	-45.0
SC-16	Min. 22 ga., type B, Grade 33 steel or min. 2,500 psi concrete	Min. 1.5" thick, one or more layers, any combination, loose laid	Min 7/16" APA or TECO rated OSB	See Note 2	1 per 1.9 ft ²	Mule-Hide TPO-c adhered in WBBA 2000	-52.5
SC-17	Min. 22 ga., type B, Grade 33 steel or min. 2,500 psi concrete	Min. 1.5" thick, one or more layers, any combination, loose laid	Min 7/16" APA or TECO rated OSB	See Note 2	1 per 1.9 ft ²	Mule-Hide TPO-c adhered in Mule-Hide TPO-c Bonding Adhesive	-75.0
SC-18	Min. 22 ga., type B, Grade 33 steel or min. 2,500 psi concrete	(Optional) One or more layers, any combination, loose laid	Min 2.0-inch ACFoam II, Poly ISO 1, H-Shield, H-Shield CG, ENRGY 3	See Note 2	1 per 1.6 ft ²	Mule-Hide TPO-c adhered in Mule-Hide TPO-c Bonding Adhesive	-75.0

**TABLE 2C: STEEL or CONCRETE DECKS – NEW CONSTRUCTION, REROOF (Tear-Off) or RECOVER
SYSTEM TYPE D: INSULATED, MECHANICALLY ATTACHED ROOF COVER**

System No.	Roof Deck	Insulation Layer		Roof Cover						MDP (psf)
		Type	Attach	Membrane	Fasteners	Fastener Spacing	Lap Width	Lap Spacing	Seam Weld	
SC-19	Min. 22 ga., type B, Grade 80 steel or min. 2,500 psi concrete	One or more layers, any combination	Preliminarily attached	Mule-Hide TPO-c or TPO-c EXTRA	Mule-Hide EHD Fastener and 2.4" Seam Plate	18-inch o.c.	5.5-inch	66.5-inch o.c.	1.5-inch outside	-30.0
SC-20	Min. 22 ga., type B, Grade 33 steel or min. 2,500 psi concrete	One or more layers, any combination	Preliminarily attached	Mule-Hide TPO-c or TPO-c EXTRA	Mule-Hide EHD Plus Fasteners and 2.4" Plus Seam Plates	18-inch o.c.	5.5-inch	66.5-inch o.c.	1.5-inch outside	-30.0
SC-21	Min. 22 ga., type B, Grade 33 steel or min. 2,500 psi concrete	One or more layers, any combination	Preliminarily attached	Mule-Hide TPO-c or TPO-c EXTRA	Mule-Hide EHD Fastener and 2.4" Seam Plate	12-inch o.c.	5.5-inch	138.5-inch o.c.	1.5-inch outside	-30.0
SC-22	Min. 22 ga., type B, Grade 33 steel or min. 2,500 psi concrete	One or more layers, any combination	Preliminarily attached	Mule-Hide TPO-c or TPO-c EXTRA	Mule-Hide EHD Fastener and 2.4" Seam Plate	12-inch o.c.	5.5-inch	91-inch o.c.	1.5-inch outside	-30.0
SC-23	Min. 22 ga., type B, Grade 33 steel or min. 2,500 psi concrete	One or more layers, any combination	Preliminarily attached	Mule-Hide TPO-c (FR) or TPO-c EXTRA (FR)	Mule-Hide EHD Fastener and 2.4" Seam Plate	12-inch o.c.	5.5-inch	139-inch o.c.	1.5-inch outside	-30.0
SC-24	Min. 22 ga., type B, Grade 80 steel or min. 2,500 psi concrete	One or more layers, any combination	Preliminarily attached	Mule-Hide TPO-c or TPO-c EXTRA	Mule-Hide EHD Fastener and 2.4" Seam Plate	12-inch o.c.	5.5-inch	115-inch o.c.	1.5-inch outside	-37.5
SC-25	Min. 22 ga., type B, Grade 80 steel or min. 2,500 psi concrete	One or more layers, any combination	Preliminarily attached	Mule-Hide TPO-c (FR) or TPO-c EXTRA (FR)	Mule-Hide EHD Fastener and 2.4" Seam Plate	6-inch o.c.	5.5-inch	139-inch o.c.	1.5-inch outside	-37.5
SC-26	Min. 22 ga., type B, Grade 80 steel or min. 2,500 psi concrete	One or more layers, any combination	Preliminarily attached	Mule-Hide TPO-c (FR) or TPO-c EXTRA (FR)	Mule-Hide EHD Plus Fasteners and 2.4" Plus Seam Plates	12-inch o.c.	5.5-inch	115-inch o.c.	1.5-inch outside	-37.5
SC-27	Min. 22 ga., type B, Grade 33 steel or min. 2,500 psi concrete	One or more layers, any combination	Preliminarily attached	Mule-Hide TPO-c (FR) or TPO-c EXTRA (FR)	Mule-Hide EHD Plus Fasteners and 2.4" Plus Seam Plates	12-inch o.c.	5.5-inch	91-inch o.c.	1.5-inch outside	-37.5
SC-28	Min. 22 ga., type B, Grade 80 steel or min. 2,500 psi concrete	One or more layers, any combination	Preliminarily attached	Mule-Hide TPO-c or TPO-c EXTRA	Mule-Hide EHD Plus Fasteners and 2.4" Plus Seam Plates	12-inch o.c.	5.5-inch	115-inch o.c.	1.5-inch outside	-45.0

**TABLE 2C: STEEL or CONCRETE DECKS – NEW CONSTRUCTION, REROOF (Tear-Off) or RECOVER
SYSTEM TYPE D: INSULATED, MECHANICALLY ATTACHED ROOF COVER**

System No.	Roof Deck	Insulation Layer		Roof Cover						MDP (psf)
		Type	Attach	Membrane	Fasteners	Fastener Spacing	Lap Width	Lap Spacing	Seam Weld	
SC-29	Min. 18 ga., type B, Grade 33 steel or min. 2,500 psi concrete	One or more layers, any combination	Preliminarily attached	Mule-Hide TPO-c or TPO-c EXTRA	Mule-Hide EHD Plus Fasteners and 2.4" Seam Plates	12-inch o.c.	5.5-inch	115-inch o.c.	1.5-inch outside	-45.0
SC-30	Min. 22 ga., type B, Grade 33 steel or min. 2,500 psi concrete	One or more layers, any combination	Preliminarily attached	Mule-Hide TPO-c or TPO-c EXTRA	Mule-Hide EHD Plus Fasteners and 2.4" Plus Seam Plates	12-inch o.c.	5.5-inch	91-inch o.c.	1.5-inch outside	-45.0
SC-31	Min. 22 ga., type B, Grade 80 steel or min. 2,500 psi concrete	One or more layers, any combination	Preliminarily attached	Mule-Hide TPO-c or TPO-c EXTRA	Mule-Hide EHD Fastener and 2.4" Seam Plate	12-inch o.c.	5.5-inch	91-inch o.c.	1.5-inch outside	-45.0
SC-32	Min. 22 ga., type B, Grade 33 steel or min. 2,500 psi concrete	One or more layers, any combination	Preliminarily attached	Mule-Hide TPO-c or TPO-c EXTRA	Mule-Hide EHD Fastener and 2.4" Seam Plate	6-inch o.c.	5.5-inch	115-inch o.c.	1.5-inch outside	-45.0
SC-33	Min. 22 ga., type B, Grade 33 steel or min. 2,500 psi concrete	One or more layers, any combination	Preliminarily attached	Mule-Hide TPO-c or TPO-c EXTRA	Mule-Hide EHD Fastener and 2.4" Seam Plate	12-inch o.c.	5.5-inch	114.5-inch o.c.	1.5-inch outside	-45.0
SC-34	Min. 22 ga., type B, Grade 33 steel or min. 2,500 psi concrete	One or more layers, any combination	Preliminarily attached	Mule-Hide TPO-c or TPO-c EXTRA	Mule-Hide EHD Fastener and 2.4" Seam Plate	6-inch o.c.	5.5-inch	91-inch o.c.	1.5-inch outside	-52.5
SC-35	Min. 22 ga., type B, Grade 33 steel or min. 2,500 psi concrete	One or more layers, any combination	Preliminarily attached	Mule-Hide TPO-c or TPO-c EXTRA	Mule-Hide EHD Fastener and 2.4" Seam Plate	6-inch o.c.	5.5-inch	138.5-inch o.c.	1.5-inch outside	-52.5
SC-36	Min. 22 ga., type B, Grade 33 steel or min. 2,500 psi concrete	One or more layers, any combination	Preliminarily attached	Mule-Hide TPO-c or TPO-c EXTRA	Mule-Hide EHD Fastener and 2.4" Seam Plate	12-inch o.c.	5.5-inch	42.5-inch o.c.	1.5-inch outside	-52.5
SC-37	Min. 22 ga., type B, Grade 33 steel or min. 2,500 psi concrete	One or more layers, any combination	Preliminarily attached	Mule-Hide TPO-c or TPO-c EXTRA	Mule-Hide EHD Fastener and 2.4" Seam Plate	12-inch o.c.	5.5-inch	54.5-inch o.c.	1.5-inch outside	-60.0
SC-38	Min. 22 ga., type B, Grade 33 steel or min. 2,500 psi concrete	One or more layers, any combination	Preliminarily attached	Mule-Hide TPO-c or TPO-c EXTRA	Mule-Hide EHD Fasteners and 2.4" Seam Plates	6-inch o.c.	5.5-inch	138.5-inch o.c.	1.5-inch outside	-60.0

**TABLE 2C: STEEL or CONCRETE DECKS – NEW CONSTRUCTION, REROOF (Tear-Off) or RECOVER
SYSTEM TYPE D: INSULATED, MECHANICALLY ATTACHED ROOF COVER**

System No.	Roof Deck	Insulation Layer		Roof Cover						MDP (psf)
		Type	Attach	Membrane	Fasteners	Fastener Spacing	Lap Width	Lap Spacing	Seam Weld	
SC-39	Min. 22 ga., type B, Grade 80 steel or min. 2,500 psi concrete	One or more layers, any combination	Preliminarily attached	Mule-Hide TPO-c or TPO-c EXTRA	Mule-Hide EHD Fastener and 2.4" Seam Plate	6-inch o.c.	5.5-inch	138.5-inch o.c.	1.5-inch outside	-60.0
SC-40	Min. 22 ga., type B, Grade 80 steel or min. 2,500 psi concrete	One or more layers, any combination	Preliminarily attached	Mule-Hide TPO-c or TPO-c EXTRA	Mule-Hide EHD Fastener and 2.4" Seam Plate	6-inch o.c.	5.5-inch	115-inch o.c.	1.5-inch outside	-60.0
SC-41	Min. 22 ga., type B, Grade 80 steel or min. 2,500 psi concrete	One or more layers, any combination	Preliminarily attached	Mule-Hide TPO-c (FR) or TPO-c EXTRA (FR)	Mule-Hide EHD Fastener and 2.4" Seam Plate	6-inch o.c.	5.5-inch	91-inch o.c.	1.5-inch outside	-60.0
SC-42	Min. 22 ga., type B, Grade 80 steel or min. 2,500 psi concrete	One or more layers, any combination	Preliminarily attached	Mule-Hide TPO-c or TPO-c EXTRA	TPO 10-inch Pressure-Sensitive RUSS strips are applied over the insulation with Mule-Hide EHD Fastener and 2.4" Seam Plates	6-inch o.c.	-	120-inch o.c.	-	-60.0
SC-43	Min. 22 ga., type B, Grade 80 steel or min. 2,500 psi concrete	One or more layers, any combination	Preliminarily attached	Mule-Hide TPO-c or TPO-c EXTRA	TPO 10-inch Pressure-Sensitive RUSS strips are applied over the insulation with Mule-Hide EHD Fastener and 2.4" Seam Plates	12-inch o.c.	-	5-inch o.c.	-	-60.0
SC-44	Min. 22 ga., type B, Grade 33 steel or min. 2,500 psi concrete	One or more layers, any combination	Preliminarily attached	Mule-Hide TPO-c or TPO-c EXTRA	Mule-Hide EHD Fastener and 2.4" Seam Plate	6-inch o.c.	5.5-inch	90.5-inch o.c.	1.5-inch outside	-67.5
SC-45	Min. 22 ga., type B, Grade 33 steel or min. 2,500 psi concrete	One or more layers, any combination	Preliminarily attached	Mule-Hide TPO-c or TPO-c EXTRA	Mule-Hide EHD Fastener and 2.4" Seam Plate	6-inch o.c.	5.5-inch	42.5-inch o.c.	1.5-inch outside	-82.5

**TABLE 3A: CONCRETE DECKS – NEW CONSTRUCTION or REROOF (Tear-Off)
SYSTEM TYPE A-1: BONDED INSULATION, BONDED ROOF COVER**

System No.	Roof Deck	Base Insulation Layer		Top Insulation Layer		Roof Cover		MDP (psf)
		Type	Attach	Type	Attach	Membrane	Application	
C-1.	Min. 2,500 psi concrete	Min. 1.5-inch ACFoam II, H-Shield, ENRGY 3 or Poly ISO 1	OlyBond 500	(Optional) Additional layers of base insulation	OlyBond 500	Mule-Hide TPO-c	WBBA 2000	-127.5
C-2.	Min. 2,500 psi concrete	(Optional) Min. 1.5-inch ACFoam II, H-Shield, ENRGY 3 or Poly ISO 1	OlyBond 500	Min. ¼-inch DensDeck or DensDeck Prime	OlyBond 500	Mule-Hide TPO-c	WBBA 2000	-127.5
C-3.	Min. 2,500 psi concrete	Min. 1.5-inch ACFoam II, H-Shield, ENRGY 3 or Poly ISO 1	OlyBond 500	(Optional) Additional layers of base insulation	OlyBond 500	Mule-Hide TPO-c	Mule-Hide TPO-c Bonding Adhesive	-150.0
C-4.	Min. 2,500 psi concrete	(Optional) Min. 1.5-inch ACFoam II, H-Shield, ENRGY 3 or Poly ISO 1	OlyBond 500	Min. ¼-inch DensDeck or DensDeck Prime	OlyBond 500	Mule-Hide TPO-c	Mule-Hide TPO-c Bonding Adhesive	-150.0
C-5.	Min. 2,500 psi concrete	Min. 1.5-inch ACFoam II, H-Shield, ENRGY 3 or Poly ISO 1	TITESET	(Optional) Additional layers of base insulation	TITESET	Mule-Hide TPO-c	WBBA 2000	-127.5
C-6.	Min. 2,500 psi concrete	(Optional) Min. 1.5-inch ACFoam II, H-Shield, ENRGY 3 or Poly ISO 1	TITESET	Min. ¼-inch DensDeck or DensDeck Prime	TITESET	Mule-Hide TPO-c	WBBA 2000	-127.5
C-7.	Min. 2,500 psi concrete	Min. 1.5-inch ACFoam II, H-Shield, ENRGY 3 or Poly ISO 1	TITESET	(Optional) Additional layers of base insulation	TITESET	Mule-Hide TPO-c	Mule-Hide TPO-c Bonding Adhesive	-232.5
C-8.	Min. 2,500 psi concrete	(Optional) Min. 1.5-inch ACFoam II, H-Shield, ENRGY 3 or Poly ISO 1	TITESET	Min. ¼-inch DensDeck or DensDeck Prime	TITESET	Mule-Hide TPO-c	Mule-Hide TPO-c Bonding Adhesive	-232.5

**TABLE 4A-1: LIGHTWEIGHT CONCRETE OVER STEEL DECK - NEW CONSTRUCTION OR RE-ROOF (TEAR OFF)
SYSTEM TYPE F: NON-INSULATED, BONDED ROOF COVER**

System No.	Deck (See Note 1)				Roof Cover		Max. DP (psf)	
	Struct. Deck	LWIC	Surface Treatment	Supplemental Attachment		Type		Attach
				Fasteners	Density			
LWC-1	Min. 22 ga., Type B, Grade 33 vented steel at max. 6 ft spans attached with ½" dia. puddle welds with weld-washers spaced 6" o.c.	Min. 36 pcf wet cast density, min. 200 psi, min. 2-inch thick Celcore MF Cellular Concrete (cast with or without min. 1" EPS holey board). <i>See Note A.</i>	None	None	N/A	Mule-Hide TPO-c	WBBA 2000 or Mule-Hide TPO-c Bonding Adhesive	-60.0
LWC-2	Min. 22 ga., Type B, Grade 33 vented steel at max. 6 ft spans attached with ½" dia. puddle welds with weld-washers spaced 6" o.c.	Min. 36 pcf wet cast density, min. 200 psi, min. 2-inch thick Celcore MF Cellular Concrete (cast with or without min. 1" EPS holey board). <i>See Note A.</i>	None	None	N/A	Mule-Hide TPO-c Fleece Back	WBBA 2000	-60.0
LWC-3	Min. 22 ga., Type B, Grade 33 vented steel at max. 6 ft spans attached with ½" dia. puddle welds with weld-washers spaced 6" o.c.	Min. 36 pcf wet cast density, min. 200 psi, min. 2-inch thick Celcore MF Cellular Concrete (cast with or without min. 1" EPS holey board). <i>See Note A.</i>	None	Mule-Hide HDP Fastener with 3" Insulation Plate	1 per 9 ft ²	Mule-Hide TPO-c	WBBA 2000 or Mule-Hide TPO-c Bonding Adhesive	-67.5
LWC-4	Min. 22 ga., Type B, Grade 33 vented steel at max. 6 ft spans attached with ½" dia. puddle welds with weld-washers spaced 6" o.c.	Min. 36 pcf wet cast density, min. 200 psi, min. 2-inch thick Celcore MF Cellular Concrete (cast with or without min. 1" EPS holey board). <i>See Note A.</i>	None	Mule-Hide HDP Fastener with 3" Insulation Plate	1 per 9 ft ²	Mule-Hide TPO-c Fleece Back	WBBA 2000	-67.5
LWC-5	Min. 22 ga., Type B, Grade 33 vented steel at max. 6 ft spans attached with ½" dia. puddle welds with weld-washers spaced 6" o.c.	Min. 36 pcf wet cast density, min. 200 psi, min. 2-inch thick Celcore MF Cellular Concrete (cast with or without min. 1" EPS holey board). <i>See Note A.</i>	None	Mule-Hide HDP Fastener with 3" Insulation Plate	1 per 1 ft ²	Mule-Hide TPO-c	WBBA 2000 or Mule-Hide TPO-c Bonding Adhesive	-120.0
LWC-6	Min. 22 ga., Type B, Grade 33 vented steel at max. 6 ft spans attached with ½" dia. puddle welds with weld-washers spaced 6" o.c.	Min. 36 pcf wet cast density, min. 200 psi, min. 2-inch thick Celcore MF Cellular Concrete (cast with or without min. 1" EPS holey board). <i>See Note A.</i>	None	Mule-Hide HDP Fastener with 3" Insulation Plate	1 per 1 ft ²	Mule-Hide TPO-c Fleece Back	WBBA 2000	-120.0

Note A.) If the LWIC to be used on the project is not Celcore MF, or if the LWIC is existing in a re-roof (tear-off) condition, compressive strength and fastener withdrawal resistance testing shall be conducted. Compressive strength testing shall be in accordance with ASTM C495 (for new pour) or ASTM C109 (for existing) and shall yield a minimum 200 psi result. Field withdrawal resistance testing in accordance with TAS 105 and shall yield a MCRF of 55 lbf with an ES Product FM-90 Base Sheet Fastener. If question exists as to the adhesion to the LWIC surface, field testing in accordance with FM LPDS 1-29 or ASTM E907 is recommended. All testing shall be performed by an accredited testing agency acceptable to the AHJ.

**TABLE 4A-2: LIGHTWEIGHT CONCRETE OVER STRUCTURAL CONCRETE – NEW CONSTRUCTION
SYSTEM TYPE F: BONDED INSULATION, BONDED ROOF COVER**

System No.	Deck		Roof Cover		MDP (psf)
	Roof Deck	LWC	Membrane	Application	
LWC-7	Min. 2,500 psi concrete	Min. 250 psi, Min. 2" thick, Elastizell Range II LWIC	Mule-Hide TPO-c	WBBA 2000	-67.5
LWC-8	Min. 2,500 psi concrete	Min. 250 psi, Min. 2" thick, Elastizell Range II LWIC	Mule-Hide TPO-c Fleece Back	WBBA 2000	-90.0
LWC-9	Min. 2,500 psi concrete	Min. 250 psi, Min. 2" thick, Elastizell Range II LWIC	Mule-Hide TPO-c	Mule-Hide TPO-c Bonding Adhesive	-90.0
LWC-10	Min. 2,500 psi concrete	Min. 300 psi, Min. 2" thick, Celcore Cellular Concrete	Mule-Hide TPO-c	WBBA 2000	-82.5
LWC-11	Min. 2,500 psi concrete	Min. 300 psi, Min. 2" thick, Celcore Cellular Concrete	Mule-Hide TPO-c Fleece Back	WBBA 2000	-135.0
LWC-12	Min. 2,500 psi concrete	Min. 300 psi, Min. 2" thick, Celcore Cellular Concrete	Mule-Hide TPO-c	Mule-Hide TPO-c Bonding Adhesive	-135.0
LWC-13	Min. 2,500 psi concrete	Min. 36 pcf wet cast density, min. 200 psi, min. 2-inch thick Celcore MF Cellular Concrete (cast with or without min. 1" EPS holey board). <i>See Note A.</i>	Mule-Hide TPO-c	WBBA 2000	-217.5
LWC-14	Min. 2,500 psi concrete	Min. 36 pcf wet cast density, min. 200 psi, min. 2-inch thick Celcore MF Cellular Concrete (cast with or without min. 1" EPS holey board). <i>See Note A.</i>	Mule-Hide TPO-c	Mule-Hide TPO-c Bonding Adhesive	-480.0
LWC-15	Min. 2,500 psi concrete	Min. 36 pcf wet cast density, min. 200 psi, min. 2-inch thick Celcore MF Cellular Concrete (cast with or without min. 1" EPS holey board). <i>See Note A.</i>	Mule-Hide TPO-c Fleece Back	WBBA 2000	-525.0

Note A.) If the LWC to be used on the project is not Celcore MF, or if the LWC is existing in a re-roof (tear-off) condition, compressive strength and fastener withdrawal resistance testing shall be conducted. Compressive strength testing shall be in accordance with ASTM C495 (for new pour) or ASTM C109 (for existing) and shall yield a minimum 200 psi result. Field withdrawal resistance testing in accordance with TAS 105 and shall yield a MCRF of 55 lbf with an ES Product FM-90 Base Sheet Fastener. If question exists as to the adhesion to the LWC surface, field testing in accordance with FM LPDS 1-29 or ASTM E907 is recommended. All testing shall be performed by an accredited testing agency acceptable to the AHJ.

TABLE 5A: GYPSUM DECKS – REROOF (Tear-Off) SYSTEM TYPE A-1: BONDED INSULATION, BONDED ROOF COVER								
System No.	Roof Deck	Base Insulation Layer		Top Insulation Layer		Roof Cover		MDP (psf)
		Type	Attachment	Type	Attachment	Type	Application	
G-1.	Existing sound gypsum or gypsum plank	Min. 1.5-inch ACFoam II, H-Shield, ENRGY 3 or Poly ISO 1	TITASET	(Optional) Additional layers of base insulation	TITASET	Mule-Hide TPO-c	WBBA 2000	-127.5
G-2.	Existing sound gypsum or gypsum plank	(Optional) Min. 1.5-inch ACFoam II, H-Shield, ENRGY 3 or Poly ISO 1	TITASET	Min. ¼-inch DensDeck or DensDeck Prime	TITASET	Mule-Hide TPO-c	WBBA 2000	-127.5
G-3.	Existing sound gypsum or gypsum plank	Min. 1.5-inch ACFoam II, H-Shield, ENRGY 3 or Poly ISO 1	TITASET	(Optional) Additional layers of base insulation	TITASET	Mule-Hide TPO-c	Mule-Hide TPO-c Bonding Adhesive	-232.5
G-4.	Existing sound gypsum or gypsum plank	(Optional) Min. 1.5-inch ACFoam II, H-Shield, ENRGY 3 or Poly ISO 1	TITASET	Min. ¼-inch DensDeck or DensDeck Prime	TITASET	Mule-Hide TPO-c	Mule-Hide TPO-c Bonding Adhesive	-232.5

TABLE 6A: RECOVER APPLICATIONS SYSTEM TYPE A-1: BONDED INSULATION, BONDED ROOF COVER								
System No.	Substrate (See Note 12)	Base Insulation Layer		Top Insulation Layer		Roof Cover		MDP (psf)
		Type	Attachment	Type	Attachment	Type	Application	
R-1	Existing asphaltic BUR or mineral surface cap sheet	Min. 1.5-inch ACFoam II, H-Shield, ENRGY 3 or Poly ISO 1	OlyBond 500	(Optional) Additional layers of base insulation	OlyBond 500	Mule-Hide TPO-c	WBBA 2000 or Mule-Hide TPO-c Bonding Adhesive	-120.0
R-2	Existing asphaltic BUR or mineral surface cap sheet	(Optional) Min. 1.5-inch ACFoam II, H-Shield, ENRGY 3 or Poly ISO 1	OlyBond 500	Min. ¼-inch DensDeck or DensDeck Prime	OlyBond 500	Mule-Hide TPO-c	WBBA 2000 or Mule-Hide TPO-c Bonding Adhesive	-120.0
R-3	Existing asphaltic BUR or mineral surface cap sheet	Min. 1.5-inch ACFoam II, H-Shield, ENRGY 3 or Poly ISO 1	TITASET	(Optional) Additional layers of base insulation	TITASET	Mule-Hide TPO-c	WBBA 2000	-127.5
R-4	Existing asphaltic BUR or mineral surface cap sheet	(Optional) Min. 1.5-inch ACFoam II, H-Shield, ENRGY 3 or Poly ISO 1	TITASET	Min. ¼-inch DensDeck or DensDeck Prime	TITASET	Mule-Hide TPO-c	WBBA 2000	-127.5
R-5	Existing asphaltic BUR or mineral surface cap sheet	Min. 1.5-inch ACFoam II, H-Shield, ENRGY 3 or Poly ISO 1	TITASET	(Optional) Additional layers of base insulation	TITASET	Mule-Hide TPO-c	Mule-Hide TPO-c Bonding Adhesive	-232.5
R-6	Existing asphaltic BUR or mineral surface cap sheet	(Optional) Min. 1.5-inch ACFoam II, H-Shield, ENRGY 3 or Poly ISO 1	TITASET	Min. ¼-inch DensDeck or DensDeck Prime	TITASET	Mule-Hide TPO-c	Mule-Hide TPO-c Bonding Adhesive	-232.5