

UL Listings - TPO

"The name trusted in roofing since 1906"



**MULE-HIDE PRODUCTS, CO., INC.
UNDERWRITERS LABORATORIES (UL)
TGFU.R13850
ROOFING SYSTEMS - TPO
Revised July 2019**

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* Note: Assembly numbers shown in the following listings correspond to the UL Master Listing number for all Mule-Hide Products, Co., Inc.

Note: Assembly numbers shown in the following listings correspond to the UL Master Listing number for **Atlas Roofing Corp.

***Note: Assembly numbers shown in the following listings correspond to the UL Master Listing number for **GEORGIA-PACIFIC GYPSUM LLC**

Uniform thickness or tapered insulation may be used in the following systems provided they do not exceed the indicated incline or thickness.

Any system listed for use over a combustible deck can be installed over a non-combustible deck and achieve the same classification.

Unless otherwise indicated, on non-combustible decks, Mule-Hide Products "Poly ISO 1-NB", "Poly ISO 1-HD" or "Poly ISO 1-HD90" or "Poly ISO 1-HD-Composite" may replace, or be used in addition to, any Poly ISO 1 product or any UL Classified wood fiberboard, in any UL Classified insulated roofing system assembly and retain the classification of that assembly, though the max slope cannot exceed 1/2:12 if "Poly ISO 1- HD", "Poly ISO 1-HD-Composite" or " Poly ISO 1-HD90" is used directly below TPO membrane. Unless otherwise indicated, on combustible decks, "Poly ISO 1-NB", "Poly ISO 1-HD", "Poly ISO 1-HD-Composite", and "Poly ISO 1-HD90" may be used in addition to any Poly ISO 1 product or any UL Classified wood fiber board, in any insulated UL Classified roofing system assembly and retain the classification of that assembly, though the max slope cannot exceed 1/2:12 if "Poly ISO 1- HD", "Poly ISO 1-HD-Composite" or " Poly ISO 1-HD90" is used directly below TPO membrane.

Mule-Hide Products "Poly ISO 1-HD", "Poly ISO 1-HD-Composite" or "Poly ISO 1-HD90" (min. 1/2 in. thickness) may be used over any UL Classified polystyrene on non-combustible decks. Max incline shall be in accordance with the Classification established for the insulation/membrane roofing system, but cannot exceed 2:12.

Unless otherwise indicated, insulation is mechanically fastened to the roof deck.

Unless otherwise indicated, when referring to gypsum board in the following Certifications, the following will be referenced: minimum ¼-in. thick Georgia-Pacific Gypsum LLC "DensDeck® Roofboard", "DensDeck Prime® Roofboard", "DensDeck DuraGuard™ Roofboard" or minimum, United States Gypsum Co. "SECUROCK™ Roof Board Type FRX-G" or "SECUROCK™ Roof Board Type SGMRX" or regular gypsum board (not Certified) laid with staggered joints (minimum of 6-in. offset) measuring 0.463 in. thick minimum and weighing a minimum of 184-lbs/100-ft.2 or Georgia-Pacific Gypsum LLC "Sound Deadening" Board, measuring minimum 0.208-in. thick and weighing a minimum of 109-lbs/100-ft.2 or minimum ¼-in. thick United States Gypsum Co. "SECUROCK™ Roof Board Type FRX-G" is limited to a maximum 3:12 slope when used as a thermal barrier over a combustible deck in a system with any UL Certified insulation except polystyrene. Minimum ½-in. thick United States Gypsum Co. "SECUROCK™ Roof Board Type FRX-G" is limited to a maximum 1:12 slope when used as a thermal barrier over a combustible roof deck in a system without insulation or with any UL Certified polystyrene insulation. Minimum ¼-in. thick Georgia-Pacific Gypsum LLC "DensDeck® Roofboard", "DensDeck Prime® Roofboard", "DensDeck DuraGuard™ Roofboard" or minimum ¼-in. thick Owens Corning "Strataguard" or minimum ¼-in. thick United States Gypsum Co. "SECUROCK™ Roof Board Type FRX-G" or "SECUROCK™ Glass-Mat Roof Board Type SGMRX" or regular gypsum board may replace Carlisle Syntec Inc. "HP Recovery Board" in any

existing noncombustible deck Certification. When this is done, the resulting roofing system is acceptable for use over combustible (15/32-in. minimum) roof decks. The joints in the gypsum board are offset a minimum of 6-in. with the butt joints in the roof deck. Minimum ¼-in. United States Gypsum Co. "SECUROCK™ Roof Board Type FRX-G" is limited to a maximum 3:12 slope when used over a combustible roof deck in a system with any UL Certified insulation except polystyrene. Minimum ½-in. thick United States Gypsum Co. "SECUROCK™ Roof Board Type FRX-G" is limited to a maximum 1:12 slope when used over a combustible roof deck in a system without insulation or with any UL Certified polystyrene insulation.

Minimum ½-in. thick gypsum board or minimum ¼-in. thick Owens Corning "Strataguard" or minimum ¼-in.1 United States Gypsum Co. "SECUROCK™ Roof Board Type FRX-G" or "SECUROCK™ Glass-Mat Roof Board Type SGMRX" or minimum ¼-in. thick Georgia-Pacific Gypsum LLC "DensDeck® Roofboard", "DensDeck Prime® Roofboard", "DensDeck DuraGuard™ Roofboard" may be used in any existing noncombustible roof deck Certification. When this is done, the resulting roofing system is acceptable for use over combustible (15/32-in. minimum) roof decks. The joints in the gypsum board and overlayment board are offset a minimum of 6-in. with the butt joints in the roof deck. Minimum ¼-in. thick United States Gypsum Co. "SECUROCK™ Roof Board Type FRX-G" is limited to a maximum 3:12 slope when used as a thermal barrier over a combustible roof deck in a system with any UL Certified insulation except polystyrene. Minimum ½-in. thick United States Gypsum Co. "SECUROCK™ Roof Board Type FRX-G" is limited to a maximum 1:12 slope when used as a thermal barrier over a combustible roof deck in a system without insulation or with any UL Certified polystyrene insulation.

Unless otherwise indicated, any UL Classified wood fiber board, any oriented strand board (OSB), Mule-Hide Poly ISO 1-NB or Hunter Panels H-Shield-NB may replace "HP Recovery Board" in any of the systems mentioned below.

Straight or tapered insulation may be used in the following assemblies provided they do not exceed the indicated incline or thickness and carry a UL label.

Unless otherwise indicated in the systems described below, any adhesive splice may be overlaid with pressure-sensitive flashing in any TPO system.

A vapor barrier (non-UL Classified) may be used below the insulation in any of the following systems without affecting the Classification.

Unless otherwise indicated, the term "Referenced Insulations" will include the following: Atlas Roofing "ACFoam II" or "ACFoam III", Mule-Hide Poly ISO 2, Dow "Hy-Therm AP", Hunter Panels "H-Shield", "H-Shield ca", ", "H-Shieldw", "H-Shield-CG", "H-Shield CGw", "H-Shield HD", "H-Shield HD90", "H-Shield HD Composite" or "H-Shield HD Composite CG", Mule-Hide Poly ISO 1, Poly ISO 1 DWD, Poly ISO 1-HD, Poly ISO 1-HD90, Poly ISO 1-HD-Composite, Johns Manville "ENRGY- 2", or "ENRGY-3", Firestone Building Products "ISO 95+GL", "GW" or "HF", Rmax "Multi-Max", any thickness.

Any UL Classified United Solar Systems Corp Photovoltaic (Solar) Module System may be installed over any of the following UL Classified Mule-Hide roofing membrane assemblies that utilizes gypsum board, provided that the roofing membrane is applied directly over the gypsum (either adhered to, mechanically fastened over or loosely-laid over the gypsum): TPO-c, TPO-c (FR), TPO-c Extra, TPO-c Extra (FR) and TPO-c Fleece Back.

The Module system is either self-adhered directly to the roofing membrane in the field or self-adhered to an intermediate roofing material layer in the factory and then attached to the roofing membrane in the field using liquid adhesive, tape adhesive or fasteners. The Classification applies to combustible and non-combustible decks. Any UL Classified insulation, any combination, any thickness, may be installed below the gypsum. The maximum incline and Classification (Class A, B or C) shall be in accordance with the Classification established for the membrane roofing assembly, however the incline can not exceed 1-1/2:12.

Any UL Classified Mule-Hide TPO roofing system is Classified for Class 4 Impact Resistance when the following conditions are met:

1. Minimum 80 mil (nominal thickness) Mule-Hide TPO-c, TPO-c Fleece BACK (100 or 115) or TPO-c Fleece Back Plus membrane is applied over any of the following substrates: Barrier Board, Oriented Strand Board, Plywood or Slipsheet over Plywood. These substrates may be placed over insulation or additional substrate layers as specified in the roofing systems. The substrate layer(s) are attached with fasteners and minimum 2 in. metal or plastic plates.
2. Minimum 45 mil (nominal thickness) Mule-Hide TPO-c, TPO-c Fleece BACK (100 or 115) or TPO-c Fleece Back Plus membrane is applied over any combination of substrate layers, as specified in the roofing systems, and the top substrate layer is attached with adhesives or asphalt. Lower substrate layers may be attached with fasteners and plates, adhesives or asphalt.
3. Any UL Classified Mule-Hide ballasted roofing system described below is Classified for Class 4 Impact Resistance.

ALL SYSTEMS

Class A, B or C (See Note 1)

***1. **Deck:** C-15/32

Incline: See Notes 1 and 4

Insulation: — Any UL Classified, any thickness.

Barrier Board: (See Note 2) — ¼-in., ½-in. or 5/8-in. thick "DensDeck® Roofboard" or "DensDeck Prime® Roofboard" or "DensDeck Prime 2™ Roofboard" or "DensDeck DuraGuard® Roofboard" with all joints staggered a min of 6 in. from the plywood joints.

Membrane: — Any UL Classified modified bitumen system, BUR system or CPE, CSM, CSPE, EPDM, NBP, PIB, PVC, TPO or TRE membrane system suitable for use with any roof insulation.

***2. **Deck:** C-15/32

Incline: See Notes 1 and 4

Barrier Board: (See Note 3) — ¼-in., ½-in. or 5/8-in. thick "DensDeck® Roofboard," or "DensDeck Prime® Roofboard" or "DensDeck Prime 2™ Roofboard" or "DensDeck DuraGuard® Roofboard" with all joints staggered a min of 6 in. from the plywood joints.

Insulation (Optional): — Fiberglass, polyisocyanurate, perlite or wood fiber, any thickness.

Membrane: — Any UL Classified modified bitumen system, BUR system or CPE, CSM, CSPE, EPDM, NBP, PIB, PVC, TPO or TRE membrane system suitable for use with any roof insulation.

Note 1: Classification (A, B or C) and max incline will be the same as that of the Classified Roofing System (TGFU) currently limited to noncombustible deck.

Note 2: The use of the "DensDeck® Roofboard," or "DensDeck Prime® Roofboard" or (min ½ in.) "DensDeck Prime 2™ Roofboard" or "DensDeck DuraGuard® Roofboard" as a barrier board over the insulation permits the use of any Classified Roofing System (TGFU) which otherwise is limited to use over noncombustible deck.

Note 3: The use of the "DensDeck® Roofboard," or "DensDeck Prime® Roofboard" or (min ½ in.) "DensDeck Prime 2™ Roofboard" or "DensDeck DuraGuard® Roofboard" as a barrier board directly over the combustible deck permits the use of any Classified Roofing System (TGFU) which otherwise is limited to use over noncombustible deck. When used, insulation must consist of one of the types specified.

Note 4: The use of ¼ in. thick "DensDeck Prime 2™" limited to a slope of 2-1/2 in. or less.

ALL SYSTEMS

Class A

For Combustible Decks - Class A: Incline: 1/2

1. A minimum 3 in. layer or a minimum two layers of 1.5 in. of "Poly ISO 1-DWD" or "Poly ISO 1-HD-Composite" is placed directly over a combustible deck and is covered with any UL Classified roofing membrane used in any UL Class A roofing assembly to achieve a Class A fire Classification. As an alternative, any UL Classified insulation (except expanded or extruded polystyrene), any combination, any thickness, may be used below the 3 in. minimum total thickness of "Poly ISO 1-DWD" or "Poly ISO 1-HD-Composite". The insulation may be loosely laid or attached with fasteners and plates, hot roofing asphalt or cold adhesive. A vapor barrier (non-UL classified) may also be used below the insulation. All insulation joints must be staggered a minimum of 6 in. from the deck joints or from the insulation joints directly below. The maximum incline shall be in accordance with the Classification established for the membrane/insulation roofing assembly, however the incline can not exceed 1/2:12.
2. A minimum 1.9 in. layer of "Poly ISO 1-DWD" or "Poly ISO 1-HD-Composite" is placed over a minimum 1 layer of Carlisle "FR Base Sheet 1S" or Elk "VersaShield FB-1S" over a combustible deck. The insulation is covered with any UL Classified roofing membrane used in any UL Class A roofing assembly to achieve a Class A fire Classification. As an alternative, any UL Classified insulation (except expanded or extruded polystyrene), any combination, any thickness, may be used below the 1.9 in. minimum total thickness of "Poly ISO 1-DWD" or "Poly ISO 1-HD-Composite". The insulation may be loosely laid or attached with fasteners and plates, hot roofing asphalt or cold adhesive. A vapor barrier (non-UL classified) may also be used below the insulation. All insulation joints must be staggered a minimum of 6 in. from the deck joints or from the insulation joints directly below. The maximum incline shall be in accordance with the Classification established for the membrane/insulation roofing assembly, however the incline can not exceed 1/2:12.
3. A minimum 1 in. layer of Mule-Hide Panels "Poly ISO 1-WD-Class A" is placed directly over a combustible deck and is covered with any UL Classified roofing membrane used in any UL Class A roofing assembly to achieve a Class A fire Classification. As an alternative, any UL Classified insulation (except expanded or extruded polystyrene), any combination, any thickness, may be used below the 1 in. minimum thickness of Mule-Hide Panels "Poly ISO 1-WD-Class A ". The insulation may be loosely laid or attached with fasteners and plates, hot roofing asphalt or cold adhesive. A vapor barrier (non-UL classified) may also be used below the insulation. All insulation joints must be staggered a minimum of 6 in. from the deck joints or from the insulation joints directly below. The maximum incline shall be in accordance with the Classification established for the membrane/insulation roofing assembly, however the incline can not exceed 1/2:12.

Class A – All Systems (Continued)

**** For Combustible Decks - Class A:**

4. A minimum 1 in. layer of "AC Foam IV" placed directly over a combustible deck and covered with any UL Classified roofing membrane used in any UL Class A roofing assembly to achieve a Class A fire Classification. As an alternate, any UL Classified insulation (except expanded or extruded polystyrene), any combination, any thickness, may be used above or below the 1 in. minimum total thickness of "AC Foam IV." All insulation joints must be staggered a minimum of 6 in. from the deck joints or from the insulation joints directly below. The maximum incline shall be in accordance with the Classification established for the membrane/insulation roofing assembly, however the incline cannot exceed 1:12.

ALL SYSTEMS

Class B

For Combustible Decks - Class B: Incline: 1/2

1. A minimum 1.9 in. layer of "Poly ISO 1-DWD", or a minimum 2 in. thick layer of Carlisle "Polyiso HP-WLC" or Atlas "AC Foam III" is placed directly over a combustible deck and is covered with any UL Classified roofing membrane used in any UL Class B roofing assembly to achieve a Class B fire Classification. As an alternative, any UL Classified insulation (except expanded or extruded polystyrene), any combination, any thickness, may be used below the 1.9 in. minimum thickness layer of "Poly ISO 1-DWD". The insulation may be loosely laid or attached with fasteners and plates, hot roofing asphalt or cold adhesive. A vapor barrier (non-UL classified) may also be used below the insulation. All insulation joints must be staggered a minimum of 6 in. from the deck joints or from the insulation joints directly below. The maximum incline shall be in accordance with the Classification established for the membrane/insulation roofing assembly, however the incline can not exceed 1/2:12.

CLASS A – BALLASTED

Unless otherwise indicated in the systems described below, the insulation and the membrane are laid loosely and surfaced with river bottom stone, nom 1-1/2 in. diameter, at 1000 lbs/sq min. Suitable alternates are size Nos. 1, 2, 24, 3 and 4 (as per ASTM D448), also at 1000 lbs/sq min. In addition, concrete pavers or crushed stone may be used. Pavers must weigh 1000 lbs/sq min and spaced no more than 1/8 in. apart and the crushed stone must meet the above size and weight requirements. Thermoplastic membrane may be adhered to the substrate with "Mule-Hide Thermoplastic Membrane Bonding Adhesive" at 1 gal/100 sq ft.

10. Deck: C-15/32

Incline: 2

Insulation (Optional): — Any UL Classified insulation, any thickness.

Membrane: — "Mule-Hide TPO-c", "Mule-Hide TPO-c (FR)", "Mule-Hide TPO-c Extra", "Mule-Hide TPO-c Extra (FR)" or "Mule-Hide TPO-c Fleece Back", loose laid, adhered or mechanically fastened.

Surfacing: — Stone or paver ballast applied at min 10 lb/sq/ft

12. Deck: NC

Incline: 2

Insulation: — "Poly ISO 1", "Poly ISO 2", "Poly ISO 1-WF" or "Poly ISO 1-NB", any thickness.

Membrane: — Any UL Classified, laid loosely.

Surfacing: — River Bottom Stone (3/4 - 1-1/2 in. diam), 1000 lbs/sq.

13. Deck: NC

Incline: 2

Insulation: — "Poly ISO 1", "Poly ISO 1-NB" or "Poly ISO 1-WF", any thickness.

Membrane: — Any UL Classified, laid loosely.

Surfacing: — River Bottom Stone (3/4 - 1-1/2 in. diam), 1000 lbs/sq.

CLASS A – FULLY ADHERED

1. Deck: NC

Incline: 1

Insulation: — Any UL Certified wood fiberboard; Johns Manville "ENRGY 3 Plus" (composite) insulation; cellular concrete, precast concrete with grouted joints or structural (poured-in-place) concrete.

Membrane: — "Mule-Hide TPO-c (FR)", fully adhered with "Mule-Hide TPO-c Bonding Adhesive", at 1-1/3 gal/100-ft.2.

2. Deck: NC

Incline: 1/2

Insulation: — "Poly ISO 1" or "Poly ISO 2" or Atlas Roofing Corp. "ACFoam II", "ACFoam III" or Dow "Hy-Therm AP" or Hunter Panels "H-Shield" or Johns Manville "ENRGY-3" or Firestone Building Products "ISO 95+GL", "GW" or "HF" or Rmax Operating LLC "Multi-Max-3", any combination, any thickness.

Membrane: — "Mule-Hide TPO-c (FR)", fully adhered with "Mule-Hide TPO-c Bonding Adhesive", at 1-1/3 gal/100-ft.2.

3. Deck: C-15/32

Incline: Unlimited

Insulation (Optional): — Any UL Certified, any combination, any thickness.

Barrier Board: — Minimum ½-in. gypsum board or minimum ¼-in. thick Georgia-Pacific Gypsum LLC "DensDeck® Roofboard", "DensDeck Prime® Roofboard", "DensDeck DuraGuard™ Roofboard".

Membrane: — "Mule-Hide TPO-c (FR)", fully adhered with "Mule-Hide TPO-c Bonding Adhesive" at 1-1/3 gal/100-ft.2.

4. Deck: C-15/32

Incline: See Note

Slip Sheet: — Two layers GAF "VersaShield Underlayment" or "VersaShield FB-2S".

Insulation: — Any UL Certified (except EPS), any combination, any thickness.

Membrane: — "Mule-Hide TPO-c", "Mule-Hide TPO-c (FR)", "Mule-Hide TPO-c Extra", "Mule-Hide TPO-c Extra (FR)" or "Mule-Hide TPO-c Fleece Back".

Note: Maximum incline shall be in accordance with Certification established for the insulation/membrane roofing system, but cannot exceed 2:12.

5. Deck: C-15/32

Incline: See Note

Slip Sheet: — One layer Atlas Roofing Corp. "FR-10" or "FR-50" or GAF "VersaShield Underlayment" or "VersaShield FB-2S".

Insulation: — Atlas Roofing "ACFoam III", minimum 1.5-in. thick with joints staggered minimum 6-in. from the deck joints.

Membrane: — "Mule-Hide TPO-c", "Mule-Hide TPO-c (FR)", "Mule-Hide TPO-c Extra", "Mule-Hide TPO-c Extra (FR)" or "Mule-Hide TPO-c Fleece Back".

Note: Maximum incline shall be in accordance with Certification established for the insulation/membrane roofing system.

CLASS B – FULLY ADHERED

1. Deck: NC

Incline: 3/4

Insulation: — Any UL Certified wood fiberboard; Johns Manville "ENRGY 3 Plus" (composite) insulation; cellular concrete, precast concrete with grouted joints or structural (poured-in-place) concrete.

Membrane: — "72 mil Mule-Hide TPO-c Extra" or "80 mil Mule-Hide TPO-c Extra", fully adhered with "Mule-Hide TPO-c Bonding Adhesive", at 1-1/3 gal/sq.

2. Deck: NC

Incline: 3

Insulation (Optional): — Any UL Certified, any combination, any thickness.

Barrier Board: — ½-in. min gypsum board or minimum ¼-in. thick Georgia-Pacific Gypsum LLC "DensDeck® Roofboard", "DensDeck Prime® Roofboard", "DensDeck DuraGuard™ Roofboard".

Membrane: — "Mule-Hide TPO-c (FR)" or "Mule-Hide TPO-c Extra (FR)", fully adhered with "WBBA 2000" bonding adhesive, at 120-ft²/gal.

3. Deck: C-15/32

Incline: 3

Insulation (Optional): — Any UL Certified, any combination, any thickness.

Barrier Board: — ½-in. min gypsum board or minimum ¼-in. thick Georgia-Pacific Gypsum LLC "DensDeck® Roofboard", "DensDeck Prime® Roofboard", "DensDeck DuraGuard™ Roofboard".

Membrane: — "Mule-Hide TPO-c (FR)" or "Mule-Hide TPO-c Extra (FR)", fully adhered with "WBBA 2000" bonding adhesive, at 120-ft²/gal.

4. Deck: NC

Incline: 3

Membrane: — "Mule-Hide TPO-c Fleece Back 100 or 115" (TPO), fully adhered with "Mule-Hide SP-100-LT" adhesive, 100-ft²/gal.

CLASS C – FULLY ADHERED

- 1. Deck: NC** Incline: 1/2
Insulation: — "Poly ISO 2" or Atlas Roofing Corp. "ACFoam II" or wood fiber or glass fiber or perlite, any thickness.
Membrane: — "Mule-Hide TPO", 45-60 mil, fully adhered with Ashland "PILOBOND 2825", 60-ft²/gal.
- 2. Deck: C-7/16-in.** "Mule-Hide FR Deck Panel C" or Barrier Technology Corp. "Blazeguard C" Incline: 2
Membrane: — Any UL Certified fully adhered TPO membrane. Maximum incline is determined by the existing membrane Certification but cannot exceed 2:12.
- 3. Deck: C-15/32** Incline: 1
Insulation: — Johns Manville "ENRGY 3 Plus" (composite) insulation or any UL Certified wood fiberboard, ½-in. thick minimum.
Membrane: — "Mule-Hide TPO-c", "Mule-Hide TPO-c (FR)", "Mule-Hide TPO-c Extra", "Mule-Hide TPO-c Extra (FR)" or "Mule-Hide TPO-c Fleece Back".
- 4. Deck: NC** Incline: Unlimited
Insulation: — "Poly ISO 2" or Atlas Roofing "ACFoam II", "ACFoam III" or Dow "Hy-Therm AP" or Hunter Panels "H-Shield" or Johns Manville "ENRGY-3" or Firestone Building Products Co. LLC "ISO 95+GL", "GW" or "HF" or Rmax Operating LLC "Multi-Max-3", any combination, any thickness.
Membrane: — "Mule-Hide TPO-c", "Mule-Hide TPO-c Extra", "Mule-Hide TPO-c (FR)", or "Mule-Hide TPO-c Extra (FR)", 45 to 80 mil thickness, adhered with "Mule-Hide TPO-c Bonding Adhesive".
- 5. Deck: C-15/32** Incline: Unlimited
Insulation: — "Poly ISO 1", "Poly ISO 2" or Atlas Roofing "ACFoam II", "ACFoam III" or Dow "Hy-Therm AP" or Hunter Panels "H-Shield" or Johns Manville "ENRGY-3", Firestone Building Products Co. LLC "ISO 95+GL", "GW" or "HF" or Rmax Operating LLC "Multi-Max-3", any combination, minimum 2" thickness.
Membrane: — "Mule-Hide TPO-c", "Mule-Hide TPO-c Extra", "Mule-Hide TPO-c (FR)", or "Mule-Hide TPO-c Extra (FR)", 45 to 80 mil thick, adhered with "Mule-Hide TPO-c Bonding Adhesive".
- 6. Deck: C-15/32** Incline: 1
Insulation: — UL Certified wood fiberboard, ½-in. thick minimum.
Membrane: — "SA-TPO", 45-60 mil.
- 7. Deck: NC** Incline: Unlimited
Insulation: — "Poly ISO 1", "Poly ISO 1 DWD", "Poly ISO 2" or Atlas Roofing "ACFoam II", "ACFoam III" or , Dow "Hy-Therm AP" or Hunter Panels "H-Shield", "H-Shield-DWD" or Johns Manville "ENRGY- 2", "ENRGY-3" or Firestone Building Products Co. LLC "ISO 95+ GL", "GW" or "HF", Rmax "Multi-Max", any thickness.
Membrane: — "SA-TPO", 45-60 mil.

Class C – Fully Adhered (Continued)

8. Deck: C-15/32 Incline: Unlimited
Insulation: — "Poly ISO 1", "Poly ISO 1 DWD", "Poly ISO 2" or Atlas Roofing Corp. "ACFoam II", "ACFoam III" or Dow "Hy-Therm AP" or Hunter Panels "H-Shield", "H-Shield-DWD", or Johns Manville "ENRGY- 2", "ENRGY-3" or Firestone Building Products Co. LLC "ISO 95+ GL", "GW", "HF" or Rmax Operating LLC "Multi-Max", minimum 2-in. thick.
Membrane: — "SA-TPO", 45-60 mil.

9. Deck: NC Incline: See Note
Insulation (Optional): — Any UL Certified insulation, any thickness.
Barrier Board: — "Mule-Hide FR Deck Panel C" or Barrier Technology Corp. "Blazeguard C", 7/16 in. min."
Membrane: — Any UL Certified Mule-Hide fully adhered EPDM, PVC, TPO or self-adhered modified bitumen cap sheet.

Note: Maximum incline is determined by the existing membrane/adhesive Certification.

10. Deck: C-15/32 Incline: Unlimited
Insulation: — See "Referenced Insulations", any combination, minimum 2-in. thick.
Membrane: — "Mule-Hide TPO-c Fleece Back 100 or 115" (TPO) adhered with "Mule-Hide WBBA 2000 bonding adhesive".

11. Deck: NC Incline: 4-1/2
Insulation: — Rmax Operating LLC "Multi-Max-3", any thickness. Membrane: — — "Mule-Hide TPO-c", "Mule-Hide TPO-c Extra", "Mule-Hide TPO-c (FR)", or "Mule-Hide TPO-c Extra (FR)", 45 to 80 mil thickness, adhered with "Mule-Hide TPO-c Bonding Adhesive".

12. Deck: C-15/32 Incline: 4-1/2
Insulation: — Rmax Operating LLC "Multi-Max-3", minimum 2" thick. Membrane: — "Mule-Hide TPO-c", "Mule-Hide TPO-c Extra", "Mule-Hide TPO-c (FR)", or "Mule-Hide TPO-c Extra (FR)", 45 to 80 mil thick, adhered with "Mule-Hide TPO-c Bonding Adhesive".

13. Deck: NC Incline: 4-1/2
Insulation: — Rmax "Multi-Max", any thickness. Membrane: — "SA-TPO", 45-60 mil.

14. Deck: C-15/32 Incline: 4-1/2
Insulation: — Rmax Operating LLC "Multi-Max", minimum 2-in. thick. Membrane: — "SA-TPO", 45-60 mil. Insulation (Optional): — UL Classified polyisocyanurate, 1 in. thick, minimum. Barrier Board (Optional): — Minimum 1/4-in. thick Georgia-Pacific Gypsum LLC "DensDeck® Roofboard", "DensDeck Prime® Roofboard", "DensDeck DuraGuard™ Roofboard" minimum 1/4-in. or United States Gypsum Co. SECUROCK. Membrane: — Any UL Classified Mule-Hide EPDM or TPO membrane, mechanically attached or fully adhered for use as a Class C Roofing System with or without optional use of Insulation and/or Barrier Board.

Note: Maximum incline is determined by the existing membrane roof covering Classification, but cannot exceed 1/2:12.

Class C – Fully Adhered (Continued)

Class C

1. **Deck:** "PyroXL", min. 15/32-in Fire-Retardant-Treated Plywood (Building Unit)

Incline: See Note

Membrane: — Any UL Classified fully adhered EPDM, PVC, TPO or self-adhered modified bitumen cap sheet.

Note: Maximum incline is determined by the membrane.

CLASS A – MECHANICALLY FASTENED

****24. Deck: C-15/32**

Incline: 3/4, See Note

Slipsheet: — Two layers Atlas "FR-10," mechanically fastened

Insulation (Optional): — Any UL Classified, any thickness (except EPS and HDFB).

Membrane: — Any UL Classified PVC, CPE, CSM, CSPE, EPDM, NBP, PIB, TPO, EIP or TRE membrane. (Note: Membrane must be currently Classified for use over the insulation used. Actual incline is determined by the maximum existing membrane/insulation Classification incline.)

1. Deck: NC

Incline: 1/2

Insulation: — "Poly ISO 2" or "Atlas Roofing "ACFoam II", "ACFoam III" or Dow "Hy-Therm AP" or Hunter Panels "H-Shield" or Johns Manville "ENRGY-3" or Firestone Building Products Co. LLC "ISO 95+GL", "GW" or "HF" or Rmax Operating LLC "Multi-Max-3", any combination, any thickness.

Membrane: — "Mule-Hide TPO-c".

2. Deck: NC

Incline: 1-1/2

Insulation: — Any UL Certified wood fiberboard; Johns Manville "ENRGY 3 Plus" (composite) insulation; cellular concrete, precast concrete with grouted joints or structural (poured-in-place) concrete.

Membrane: — "Mule-Hide TPO-c".

3. Deck: NC

Incline: 1-1/2

Insulation: — "Poly ISO 1", "Poly ISO 2" or Atlas Roofing Corp. "ACFoam II", "ACFoam III" or Dow "Hy-Therm AP" or Hunter Panels "H-Shield" or Johns Manville "ENRGY-3", Firestone Building Products Co. LLC "ISO 95+GL", "GW" or "HF" or Rmax Operating LLC "Multi-Max-3", any combination, any thickness.

Membrane: — "Mule-Hide TPO-c (FR)".

4. Deck: NC

Incline: 1-1/2

Insulation: — Any UL Certified wood fiberboard; Johns Manville "ENRGY 3 Plus" (composite) insulation; cellular concrete, precast concrete with grouted joints or structural (poured-in-place) concrete.

Membrane: — "Mule-Hide TPO-c (FR)".

5. Deck: NC

Incline: 3

Insulation (Optional): — Any UL Certified, any combination, any thickness.

Barrier Board: — Minimum ½-in. thick gypsum wallboard or minimum ¼-in. thick Georgia-Pacific Gypsum LLC "DensDeck® Roofboard", "DensDeck Prime® Roofboard", "DensDeck DuraGuard™ Roofboard".

Membrane: — "Mule-Hide TPO-c".

6. Deck: C-15/32

Incline: See Note

Slip Sheet: — Two layers "VersaShield Underlayment" or "VersaShield FB-2S".

Insulation: — Any UL Certified (except EPS), any combination, any thickness.

Membrane: — "Mule-Hide TPO-c", "Mule-Hide TPO-c (FR)", "Mule-Hide TPO-c Extra", "Mule-Hide TPO-c Extra (FR)" or "Mule-Hide TPO-c Fleece Back".

Note: Maximum incline shall be in accordance with Certification established for the insulation/membrane roofing system, but cannot exceed 2:12.

Class A – Mechanically Attached (Continued)

- 7. Deck:** C-15/32 Incline: Unlimited
Insulation (Optional): — Any UL Certified, any combination, any thickness.
Barrier Board: — Minimum ½-in. thick gypsum board or minimum ¼-in. thick Georgia-Pacific Gypsum LLC "DensDeck® Roofboard", "DensDeck Prime® Roofboard", "DensDeck DuraGuard™ Roofboard" with staggered joints (6 in. offset).
Membrane: — "Mule-Hide TPO-c (FR)".
- 8. Deck:** C-15/32 Incline: See Note
Slip Sheet: — One layer Atlas Roofing Corp. "FR-10" or "FR-50" or GAF "VersaShield Underlayment" or "VersaShield FB-2S".
Insulation: — Atlas Roofing "ACFoam III", 1.5-in. thick with joints staggered minimum 6-in. from the deck joints.
Membrane: — "Mule-Hide TPO-c", "Mule-Hide TPO-c (FR)", "Mule-Hide TPO-c Extra", "Mule-Hide TPO-c Extra (FR)" or "Mule-Hide TPO-c Fleece Back".
Note: Maximum incline shall be in accordance with Certification established for the insulation/membrane roofing system.
- 9. Deck:** C-15/32 Incline: ½
Slip Sheet: — Two plies Atlas Roofing Corp. "FR-50".
Membrane: — "Mule-Hide TPO-c", "Mule-Hide TPO-c (FR)", "Mule-Hide TPO-c Extra", "Mule-Hide TPO-c Extra (FR)" or "Mule-Hide TPO-c Fleece Back".
- 10. Deck:** C-15/32 Incline: See Note
Slip Sheet: — Two layers Atlas Roofing Corp. "FR 50" or GAF "VersaShield Underlayment" or VersaShield FB-2S".
Membrane: — "Mule-Hide TPO-c", "Mule-Hide TPO-c (FR)", "Mule-Hide TPO-c Extra", "Mule-Hide TPO-c Extra (FR)" or "Mule-Hide TPO-c Fleece Back".
Note: Maximum incline shall be in accordance with Certification established for the membrane roofing system applied over fiberboard or gypsum, but cannot exceed 1½:12.
- 11. Deck:** C-15/32 Incline: 2-1/2
Insulation (Optional): — Any UL Certified, any combination, any thickness.
Barrier Board: — Minimum ½-in. thick gypsum board.
Membrane: — "72 mil Mule-Hide TPO-c Extra" or "80 mil Mule-Hide TPO-c Extra".
- 12. Deck:** NC Incline: 1-1/2
Insulation: — Any UL Certified wood fiberboard; Johns Manville "ENRGY 3 Plus" (composite) insulation; cellular concrete, precast concrete with grouted joists or structural (poured-in-place) concrete.
Membrane: — "72 mil Mule-Hide TPO-c Extra" or "80 mil Mule-Hide TPO-c Extra".
- 13. Deck:** NC Incline: ½
Insulation: — "Poly ISO 1", "Poly ISO 2" or Atlas Roofing "ACFoam II", "ACFoam III" or Dow "Hy-Therm AP" or Hunter Panels "H-Shield" or Johns Manville "ENRGY-3", Firestone Building Products Co. LLC "ISO 95+GL", "GW" or "HF" or Rmax Operating LLC "Multi-Max-3", any combination, any thickness.
Membrane: — "72 mil Mule-Hide TPO-c Extra" or "80 mil Mule-Hide TPO-c Extra".

Class A – Mechanically Attached (Continued)

14. Deck: NC Incline: ½
Insulation: — "Poly ISO 2" or Atlas Roofing Corp. "ACFoam II", "ACFoam III" or Dow "Hy-Therm AP" or Hunter Panels "H-Shield" or Johns Manville "ENRGY-3" or Firestone Building Products Co. LLC "ISO 95+GL", "GW" or "HF" or Rmax Operating LLC "Multi-Max-3", any combination, any thickness.
Membrane: — "Mule-Hide TPO-c Fleece Back 100 or 115" (TPO).

15. Deck: NC Incline: 1-1/2
Insulation (Optional): — Any UL Certified, any thickness.
Insulation: — Any UL Certified wood fiberboard; Johns Manville "ENRGY 3 Plus" (composite) insulation.
Membrane: — "Mule-Hide TPO-c Fleece Back 100 or 115" (TPO).

16. Deck: NC Incline: 3
Insulation: — Any UL Certified, any thickness.
Barrier Board: — Minimum ¼-in. thick Georgia-Pacific Gypsum LLC "DensDeck® Roofboard", "DensDeck Prime® Roofboard", "DensDeck DuraGuard™ Roofboard" or ½-in. thick gypsum wallboard.
Membrane: — "Mule-Hide TPO-c Fleece Back 100 or 115" (TPO).

17. Deck: C-15/32 Incline: See Note
Slip Sheet: — Two layers GAF "VersaShield Underlayment" or "VersaShield FB-2S".
Insulation: — Any UL Certified (except EPS), any combination, any thickness.
Membrane: — "Mule-Hide TPO-c", "Mule-Hide TPO-c (FR)", "Mule-Hide TPO-c Extra", "Mule-Hide TPO-c Extra (FR)" or "Mule-Hide TPO-c Fleece Back".

Note: Maximum incline shall be in accordance with Certification established for the insulation/membrane roofing system, but cannot exceed 2:12.

18. Deck: NC Incline: 1
Insulation: — Any UL Certified expanded or extruded polystyrene, any combination, any thickness.
Slip Sheet: — One layer Atlas Roofing Corp. "FR-10" or "FR-50" or GAF "VersaShield Underlayment" or "VersaShield FB-2S".
Membrane: — "Mule-Hide TPO-c", "Mule-Hide TPO-c (FR)", "Mule-Hide TPO-c Extra", "Mule-Hide TPO-c Extra (FR)" or "Mule-Hide TPO-c Fleece Back".

19. Deck: C-15/32 Incline: See Note
Slip Sheet: — Three layers GAF "VersaShield FB-1S".
Insulation: — Any UL Certified (except EPS), any combination, any thickness.
Membrane: — "Mule-Hide TPO-c", "Mule-Hide TPO-c (FR)", "Mule-Hide TPO-c Extra", "Mule-Hide TPO-c Extra (FR)" or "Mule-Hide TPO-c Fleece Back".

Note: Maximum incline shall be in accordance with Certification established for the insulation/membrane roofing system, but cannot exceed 2:12.

Class B – Mechanically Attached (Continued)

5. **Deck:** C-15/32 Incline: 1/2
Slip Sheet: — One ply Atlas Roofing Corp. "FR-50".
Membrane: — "Mule-Hide TPO-c (FR)".

CLASS C – MECHANICALLY FASTENED

1. **Deck:** C-15/32 Incline: 1
Insulation: — Johns Manville "ENRGY 3 Plus" (composite) insulation or any UL Certified wood fiberboard, ½-in. thick minimum.
Membrane: — Mule-Hide TPO-c", "Mule-Hide TPO-c (FR)", "Mule-Hide TPO-c Extra", "Mule-Hide TPO-c Extra (FR)" or "Mule-Hide TPO-c Fleece Back".
2. **Deck:** NC Incline: Unlimited
Insulation: — "Poly ISO 1", "Poly ISO 2" or Atlas Roofing Corp. "ACFoam II", "ACFoam III" or Dow "Hy-Therm AP" or Hunter Panels "H-Shield" or Johns Manville "ENRGY-3" or Firestone Building Products Co. LLC "ISO 95+GL", "GW" or "HF" or Rmax Operating LLC "Multi-Max-3", any combination, any thickness.
Membrane: — "Mule-Hide TPO-c", "Mule-Hide TPO-c Extra", "Mule-Hide TPO-c (FR)", or "Mule-Hide TPO-c Extra (FR)", 45 to 80 mil thickness.
3. **Deck:** C-15/32 Incline: Unlimited
Insulation: — "Poly ISO 1", "Poly ISO 2" or Atlas Roofing Corp. Corp. "ACFoam II", "ACFoam III" or Dow "Hy-Therm AP" or Hunter Panels "H-Shield" or Johns Manville "ENRGY-3" or Firestone Building Products Co. LLC "ISO 95+GL", "GW" or "HF" or Rmax Operating LLC "Multi-Max-3", any combination, minimum 2" thickness.
Membrane: — "Mule-Hide TPO-c", "Mule-Hide TPO-c Extra", "Mule-Hide TPO-c (FR)", or "Mule-Hide TPO-c Extra (FR)", 45 to 80 mil thickness.
4. **Deck:** NC Incline: 4-1/2
Insulation: — Rmax Operating LLC "Multi-Max-3", any thickness. Membrane: — "Mule-Hide TPO-c", "Mule-Hide TPO-c Extra", "Mule-Hide TPO-c (FR)", or "Mule-Hide TPO-c Extra (FR)", 45 to 80 mil thickness.
5. **Deck:** C-15/32 Incline: 4-1/2
Insulation: — Rmax Operating LLC "Multi-Max-3", minimum 2" thickness. Membrane: — "Mule-Hide TPO-c", "Mule-Hide TPO-c Extra", "Mule-Hide TPO-c (FR)", or "Mule-Hide TPO-c Extra (FR)", 45 to 80 mil thickness.

MAINTENANCE AND REPAIR SYSTEMS

The insulation and membrane are fastened to the deck with metal screws and discs. The membrane laps are hot air welded.

CLASS A, B, AND C

7. **Deck:** C-15/32

Incline: 1/2

Existing Roof System: — Class A, B or C roofing system, to retain the existing Classification, is covered with:

Slip Sheet: — One or more layers of the following - Lydall "Manniglas 1200" mat, 15 mil, Atlas Roofing "FR-10" or "FR 50", Elk "Versashield" or Type G2 base sheet, laid loosely.

Membrane: — "Mule-Hide TPO-c", "Mule-Hide TPO-c Extra", or "Sure-Flex PVC", mechanically fastened.

8. **Deck:** C-15/32

Incline: 3/4

Existing Roof System: — Class A, B or C roofing system, to retain the existing Classification, is covered with:

Slip Sheet: — One or more layers of the following - Lydall "Manniglas 1200" mat, 15 mil, Atlas Roofing "FR-10" or "FR 50", Elk "Versashield" or Type G2 base sheet, laid loosely.

Membrane: — "Mule-Hide TPO-c (FR)", mechanically fastened.

9. **Deck:** C-15/32 or NC

Incline: 1

Existing Roof System: — Class A, B or C roofing, gravel to be maintained on gravel built-up system, to retain the existing Classification, is cover with:

Insulation: — Owens Corning Specialty & Foam Products "Durapink", 1 in. max.

Membrane: — "Mule-Hide TPO-c", "Mule-Hide TPO-c (FR)", "Mule-Hide TPO-c Extra", "Mule-Hide TPO-c Extra (FR)" or "Mule-Hide TPO-c Fleece Back", mechanically fastened.

10. **Deck:** C-15/32

Incline: See Note

Existing Roof System: — Class A, B or C roofing system, to retain the existing Classification, is covered with:

Slip Sheet (Optional): — One or more layers Atlas Roofing "FR 50", Elk "VersaShield Underlayment" or "VersaShield FB-2S".

Membrane: — "Mule-Hide TPO-c", "Mule-Hide TPO-c (FR)", "Mule-Hide TPO-c Extra", "Mule-Hide TPO-c Extra (FR)" or "Mule-Hide TPO-c Fleece Back".

Note: Max incline shall be in accordance with Classification established for the existing roofing system, but can not exceed 1-1/2:12.

12. **Deck:** C-15/32 or NC

Incline: See Note

Existing Roof System: — Any Class A, B or C roofing system, to retain the existing Classification, is covered with:

Insulation: — Hunter Panels "Poly ISO 1-HD" or " Poly ISO 1-HD90".

Membrane: — Any UL Classified membrane.

Max incline shall be in accordance with Classification established for insulation/membrane roofing system, but cannot exceed 2:12. TPO membranes are limited to a 1/2:12. max. slope.

Maintenance and Repair – Class A, B & C (Continued)

13. **Deck:** C-15/32 or NC

Incline: See Note

Existing Roof System: — Any Class A, B or C roofing system, to retain the existing Classification, is covered with:

Insulation: — Hunter Panels " Poly ISO 1-HD-Composite ".

Membrane: — Any UL Classified membrane.

Note: Max incline shall be in accordance with Classification established for insulation/membrane roofing system, but cannot exceed 2:12. TPO membranes are limited to a 1/2:12. max. slope.

MAINTENANCE AND REPAIR SYSTEMS - CLASS A

17. **Deck:** NC **Incline:** ¼
Existing Roof System: — Class A, B or C roofing (gravel may be removed from gravel built-up system).
Insulation: — Tenneco "AMOCOR®-PB6, PB6W, PG38 or PG39", mechanically fastened.
Slip Sheet: — One layer Atlas Roofing"FR 10" or FR 50", or Elk "VersaShield Underlayment" or "VersaShield FB-2S".
Membrane: — "Mule-Hide TPO-c (FR)", mechanically fastened.
18. **Deck:** C-15/32 **Incline:** 1/2
Existing Roof System: — Class A, B or C roofing system, to retain the existing Classification, is covered with:
Slip Sheet: — Two or more layers Atlas Roofing "FR-50", Elk "VersaShield Underlayment" or "VersaShield FB-2S".
Membrane: — "Mule-Hide TPO-c", "Mule-Hide TPO-c (FR)", "Mule-Hide TPO-c Extra", "Mule-Hide TPO-c Extra (FR)" or "Mule-Hide TPO-c Fleece Back", mechanically fastened.
19. **Deck:** NC **Incline:** 1/2
Existing Roof System: — Class A, B or C BUR or modified bitumen roofing system gravel may be removed, covered with:
Insulation (Optional): — Atlas Roofing "ACFoam II" or "ACFoam III", Dow "Hy-Therm AP", Hunter Panels "H-Shield", Johns Manville "ENRGY-3", Firestone Building Products "ISO 95+GL", "GW" or "HF", Rmax Inc. "Multi-Max-3", any combination, any thickness.
Insulation (Optional): — Any UL Classified wood fiberboard; Johns Manville "ENRGY 3 Plus" (composite) insulation.
Membrane: — "Mule-Hide TPO-c Fleece Back 100" (TPO) or "Mule-Hide TPO-c Fleece Back 115 " (TPO), mechanically attached or fully adhered with "Mule-Hide SP-100 Adhesive".
21. **Deck:** NC **Incline:** See Note
Existing Roof System: — Class A, B or C roofing system (gravel may be removed from gravel built-up or ballasted single-ply system).
Insulation: — A minimum 3 in. layer or minimum two layers of "Poly ISO 1-DWD".
Membrane: — Any UL Classified roofing membrane.
- Note: The maximum incline shall be in accordance with the Class A Classification established for the membrane/insulation roofing assembly, however the incline can not exceed 1/2:12.
22. **Deck:** C-15/32 **Incline:** See Note
Existing Roof System: — Class A, B or C roofing system (gravel may be removed from gravel built-up or ballasted single-ply system).
Insulation: — A minimum 3 in. layer or minimum two layers of "Poly ISO 1-DWD".
Membrane: — Any UL Classified roofing membrane.
- Note: The maximum incline shall be in accordance with the Class A Classification established for the membrane/insulation roofing assembly, however the incline can not exceed 1/2:12.

MAINTENANCE AND REPAIR SYSTEMS - CLASS B

5. **Deck:** C-15/32

Incline: 1/2

Existing Roof System: — Class B mineral or smooth surfaced built-up or modified roofing system, to retain the existing Classification, is covered with:

Membrane: — "Mule-Hide TPO-c", "Mule-Hide TPO-c (FR)", "Mule-Hide TPO-c Extra", "Mule-Hide TPO-c Extra (FR)" or "Mule-Hide TPO-c Fleece Back", mechanically fastened.

6. **Deck:** NC

Incline: See Note

Existing Roof System: — Class A, B or C roofing system (gravel may be removed from gravel built-up or ballasted single-ply system).

Insulation: — A minimum 1.9 in. layer of "Poly ISO 1-DWD".

Membrane: — Any UL Classified roofing membrane.

Note: The maximum incline shall be in accordance with the Class A Classification established for the membrane/insulation roofing assembly, however the incline can not exceed 1/2:12.

7. **Deck:** C-15/32

Incline: See Note

Existing Roof System: — Class A, B or C roofing system (gravel may be removed from gravel built-up or ballasted single-ply system).

Insulation: — A minimum 1.9 in. layer of "Poly ISO 1-DWD".

Membrane: — Any UL Classified roofing membrane.

Note: The maximum incline shall be in accordance with the Class A Classification established for the membrane/insulation roofing assembly, however the incline can not exceed 1/2:12.

MAINTENANCE AND REPAIR SYSTEMS - CLASS B AND C

1. **Deck:** C-15/32

Incline: 1/2

Existing Roof System: — Class B or C roofing system, to retain the existing Classification, is covered with:

Slip Sheet: — One or more layers Atlas Roofing "FR-50", Elk "VersaShield Underlayment" or "VersaShield FB-2S".

Membrane: — "Mule-Hide TPO-c", "Mule-Hide TPO-c (FR)", "Mule-Hide TPO-c Extra", "Mule-Hide TPO-c Extra (FR)" or "Mule-Hide TPO-c Fleece Back", mechanically fastened.