

## **FIRESTONE ULTRAPLY™ TPO ROOFING SYSTEMS APPLICATION GUIDE**

2.01	GENERAL.....	3
2.02	JOB SITE CONSIDERATIONS: SAFETY, CAUTIONS, AND WARNINGS.....	3
2.03	ROOF SUBSTRATE.....	4
2.04	WOOD NAILER LOCATION AND INSTALLATION.....	5
2.05	AIR OR VAPOR BARRIER INSTALLATION.....	7
2.06	BASE SHEET INSTALLATION.....	7
2.07	INSULATION INSTALLATION.....	11
2.08	MEMBRANE INSTALLATION.....	13
2.09	MEMBRANE SEAMING.....	21
2.10	MEMBRANE ATTACHMENT AT PERIMETERS FOR MAS SYSTEMS.....	24
2.11	ADDITIONAL MEMBRANE SECUREMENT AND BASE TIE-IN FLASHING.....	24
2.12	FLASHING – PENETRATIONS.....	25
2.13	FLASHING – WALLS, PARAPETS, CURBS OR SUPPORTS, ETC.....	27
2.14	MEMBRANE REPAIR.....	30
2.15	TEMPORARY CLOSURE AND TIE-IN (not warranty by Firestone).....	30
2.16	ROOF WALKWAYS.....	30
2.17	SHEET METAL WORK.....	30
2.18	CLEAN UP.....	31

## 2.01 GENERAL

THIS FIRESTONE'S TECHNICAL MANUAL PROVIDES INSTRUCTIONS FOR THE BASIC INSTALLATION OF FIRESTONE'S ULTRAPLY TPO ROOF SYSTEM. REFERENCE TO THE DESIGN GUIDE, TECHNICAL INFORMATION SHEETS (T.I.S.), AND OTHER SECTIONS OF FIRESTONE'S DESIGN, APPLICATION AND TECHNICAL DATABASE IS NECESSARY TO ENSURE THAT THE FINISHED ROOF SYSTEM IS INSTALLED IN COMPLIANCE WITH FIRESTONE REQUIREMENTS.

EXTENDED WARRANTIES, 15, 20, 25 AND 30 YEAR, AND WIND WARRANTIES IN EXCESS OF 55 MPH, MAY REQUIRE SPECIAL CONSIDERATIONS WITH REGARDS TO FASTENERS, INSULATIONS, MEMBRANE GAUGE, AND ATTACHMENT REQUIREMENTS. REFER TO THE SYSTEM DESIGN GUIDE OF FIRESTONE'S TECHNICAL DATABASE FOR SPECIFIC REQUIREMENTS AND OTHER TPO SYSTEMS: ULTRAPLY PLATINUM, REFLEXEON, REFLEXEON PLATINUM AND ULTRAPLY TPO XR.

NOTE: IF A PROPOSED APPLICATION FALLS OUTSIDE OF THIS SPECIFICATION, CONTACT FIRESTONE ROOF SYSTEM SOLUTIONS GROUP FOR ADDITIONAL INFORMATION.

## 2.02 JOB SITE CONSIDERATIONS: SAFETY, (CAUTIONS AND WARNINGS)

### A. SAFETY:

1. Comply with all applicable regulatory safety and health regulations.
2. Consult container labels, Material Safety Data Sheets (MSDS) and Technical Information Sheets (TIS) for specific safety instructions for all products used on the project.
3. Keep all adhesives, sealants and cleaning materials away from ALL ignition sources (i.e., flames, fire, sparks, etc.). Do not smoke while using these materials.
4. Care must be used when installing fasteners or other required roof related items to avoid possible conduits and other piping in and or under the deck.
5. Fumes from adhesive solvents may be drawn into the building during installation through rooftop intakes. Refer to Firestone's Technical Information Sheet "Recommended Guidelines for Application of Roofing Materials to an Occupied Building".
6. Do not use heat guns or open flames to dry adhesives and primers.

### B. CAUTIONS:

1. Store Firestone TPO membranes in the original undisturbed plastic wrap in a manner to protect it from becoming damaged. Insulation must be properly stored and protected from ignition sources, moisture and damage. Consult container labels, Material Safety Data Sheets and Technical Information Sheets for specific safety, use and storage instructions for all products used on the project.
2. Do not use oil-base or bituminous-base roof cement with any Firestone TPO membrane.
3. Store Firestone Insulations properly protected from ignition sources, moisture and damage.

### C. COLD WEATHER:

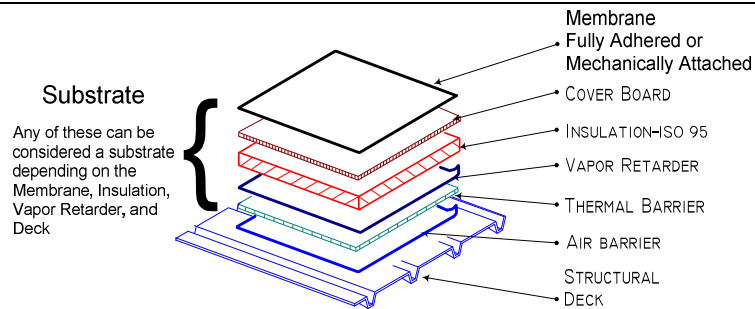
1. When the outside temperature is below 40 °F (4.4 °C), certain combinations of temperature and humidity may cause condensation on the surface of solvent-based adhesives and primers. If this condition occurs, discontinue the application. When the ambient air conditions no longer cause condensation on adhesive surfaces and the membrane is clean and dry then re-apply additional adhesive or primer and proceed.

2. The consistency of sealants, adhesives and primers will begin to thicken as the temperature drops. To minimize this, the following is recommended:
  - a) Start work with sealants, adhesives and primers that have been stored between 60 °F and 80 °F (15.5 °C and 26.7 °C). Insulated and heated boxes may be helpful.
  - b) Complete test areas to determine if conditions will cause problems such as condensation with the application of the materials.
  - c) Stop the operation or change to another warm container when material becomes too thick to properly apply.
3. When the outside temperature is below 40 F (4.4 °C), installation of the Firestone TPO System requires additional application procedures:
  - Ensure that the roof surface is dry. Moisture, even trace amounts, may cause poor adhesion, and may lead to moisture entrapment within the roofing system.
  - Use of temporary roofs should be considered when roof applications must occur in cold or potentially wet weather to permit continued interior construction or roof-top work to proceed.
4. If using Water-Based Bonding Adhesive (WBBA), temperatures and substrate must be at least 40 °F (4.4 °C) and rising for the material to be applied and perform as designed. Longer drying times should be expected for lower temperatures and higher humidity. Plan ahead for material staging.

## 2.03 ROOF SUBSTRATE PREPARATION



**It is the roofing contractor's responsibility for ensuring that the substrate is acceptable for the Firestone roof system.**



The need for any of the substrates or layers must be determined by a Design Professional. All layers shown may not apply to a given roof assembly.

**DIAGRAM 2.03-1**

### A. CORRECT SUBSTRATE DEFECTS:

1. Defects that need to be corrected before work can commence should be brought to the attention of the General Contractor or Owner in writing and addressed by them.
2. For re-roofing applications, remove existing roof system components as specified by the project designer. If components are discovered during installation that could be

detrimental to the performance of the new roof system, they should be brought to the attention of the project designer for corrective action.

3. If soundness and integrity of the existing roof system cannot be verified, good roofing practice requires a complete tear-off to the structural deck. However, recovering an existing roof system is an alternative to removing existing roof components. Non-destructive testing, in conjunction with core cuts, must be completed to determine the condition of the existing roof system and decking.
4. The building owner or project designer is responsible for assuring that all wet insulation and/or wet substrate materials are removed in a re-roofing application. The best diagnostic technique is taking and evaluating a series of roof cuts. There are three other techniques that are currently available to make this determination by indirect means. These are:
  - nuclear moisture detection
  - infrared thermography
  - electric capacitance

These techniques provide measurement of factors that can be associated with the presence of moisture, which can then be verified with the use of roof core cuts to confirm the results of the non-destructive testing.

5. In the absence of a design professional, the roofer should coordinate with the building owner to assure conditions are satisfactory to commence with the project as designed.

**B. REMOVE MOISTURE:**

1. Ponded water, snow, frost and/or ice, present in more than trace amounts must be removed from the work surface(s) prior to installing the Firestone TPO Roofing System.

**C. PREPARE SURFACE:**

1. Acceptable substrates to which the Firestone TPO Roofing System is installed must be properly prepared prior to roof system installation. The surface must be relatively even, clean, dry, smooth, free of sharp edges, fins, loose or foreign materials, oil, grease and other materials that may damage the roof system. Rough surfaces that could cause damage to the membrane must be overlaid with insulation or cover boards as determined by the design professional.

**D. FILL VOIDS:**

All surface voids of the immediate membrane substrate greater than 1/4" (6.35 mm) wide must be filled with insulation.

## **2.04 WOOD NAILER LOCATION AND INSTALLATION**

Wood nailers must be installed as specified by the project designer or as noted in Firestone Details and the EPDM System Design Guide. Install wood nailers as follows:

Firestone Building Products no longer requires the use of treated wood nailers. This is due to the new EPA requirements that have caused treated lumber to have more corrosive properties than the previous generation of wood treatments. See Technical Bulletin dated March 3, 2005.

**If architectural specifications require the use of treated wood nailers, the following Firestone requirements apply:**

- Refer to the Firestone Design Guide for the appropriate Firestone fastener to be used for securing membrane into wood nailers.
- Nails penetrating treated wood nailers must be hot-dipped galvanized, meeting ASTM A653, Class G185 or as currently recommended by industry associations.
- Aluminum fasteners, flashings and accessory products must not make direct contact with treated wood nailers.
- Uncoated metal and painted metal flashing and accessories, except for 300-series stainless steel, must not make direct contact with treated wood nailers.
- When in doubt of the type of treatment of the wood nailer or its compatibility with a metal component, use EPDM membrane as a separator.



Because of recent EPA regulations regarding treated wood, new treatments for lumber may be highly corrosive to fasteners. Contact the fastener manufacturer for their recommendations on fasteners if attaching nailers that have been treated with corrosive materials.

**A. WOOD NAILER GRADE:**

1. When wood nailers are used, Firestone specifications require the use of wood that is kiln-dried (Southern Pine, Douglas Fir) structural grade #2 or better, unless otherwise noted. While being stored on the roof, properly elevate and cover non-treated wood to protect from the weather and keep dry. Nailers must be properly anchored to provide secure attachment through the warranty term. Nailers are not covered by the Firestone warranty.

**B. SIZE OF NAILER**

1. Nailers shall be a minimum thickness of 2" x 4" nominal (1-1/2" (37.1mm) x 3-1/2" (89mm)) and exceed the width of any metal flange attached to it by a minimum of 1/2" (12.7mm).

**C. POSITION WOOD NAILER**

1. Total wood nailer height must match the total thickness of insulation being used and should be installed with a 1/8" (3.2 mm) gap between each length and each change of direction. When more than one nailer thickness is used end joints should be staggered a minimum of 12" from the prior layer in straight runs.

**D. SECURE WOOD NAILER**

1. Wood nailers must be firmly fastened to the deck or building. Mechanically fasten wood nailers to resist a minimum force of 200 lb/f (890 N) in any direction. Refer to attachment requirements of the roofing system as specified by the project designer if greater than 200 lb/f (890 N).

**E. TAPER WOOD NAILER**

1. The wood nailer must be tapered (if applicable) so that it will always be flush at the point of contact with the insulation (refer to Firestone Details).

**F. POURED-IN-PLACE DECKS**

1. For new construction over poured-in-place decks or fill, and all recover projects, a waterproof separator membrane shall be placed between the non-treated lumber and the deck.

**G. INSTALLATION OF WOOD NAILERS BY OTHERS**

1. Make these specifications and details available when nailers are to be installed by others. Work that compromises the integrity of the roof system may jeopardize the roof warranty.

**H. FOR ADDITIONAL INFORMATION**

1. Please consult the NRCA Special Report, "Use of Treated Wood in Roof Assemblies." This Technical Bulletin is also posted on the Firestone website at [www.Firestonebpc.com](http://www.Firestonebpc.com)

## **2.05 AIR OR VAPOR BARRIER INSTALLATION**

**A. INSTALL VAPOR RETARDER (WHEN SPECIFIED):**

Install a vapor retarder as specified by the project designer or as required by Firestone.

**B. INSTALL AIR BARRIER (WHEN SPECIFIED):**

Install an air barrier as specified by the project designer or as required by Firestone.

## **2.06 BASE SHEET INSTALLATION**

THIS SECTION IS FOR APPLICATIONS WHERE IT HAS BEEN DETERMINED THAT A BASE SHEET IS REQUIRED FOR ROOF SYSTEM INSTALLATION. REFER TO THE DESIGN SECTION OF THE DATABASE FOR SUITABLE SUBSTRATES AND THE TECHNICAL INFORMATION SHEETS FOR PRODUCT INFORMATION.

**A. GENERAL**

1. Starting at the low point of the roof, align the base sheet, unroll and allow the sheet to relax prior to attaching. After allowing relaxation to occur, adhere or attach to the substrate with appropriate materials as indicated below.
2. Roofing base ply shall never touch roofing single ply, even at roof edges, laps, tapered edge strips, and cants. Cut out fishmouths/side laps, which are not completely sealed; and patch. Fully adhered base sheets which are not fully and continuously bonded shall be replaced.

**B. HOT ASPHALT ATTACHMENT**

1. The base sheet may be attached using a solid mopping of Firestone SEBS mopping asphalt or ASTM D 312 Type III or IV hot steep asphalt.
2. The substrate must be suitable for asphalt attachment (structural concrete, base sheet, coverboard, etc.). Refer to the Design section of this manual for suitable substrates and the Technical Information Sheets for additional information on specific base sheets.
3. The asphalt shall be at the manufacturer's stated EVT at point of installation.
4. Align subsequent rolls, shingling the laps, maintaining a minimum 2" (50.8 mm) side lap

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Revision No. 1 3/2007

and minimum 6" (152.4 mm) end lap and repeat the application.

5. Firestone recommends that a half sheet be used as the first roll to ensure that the base sheet laps and the cap sheet laps are not aligned. Half sheets may be required, depending on the roof slope
6. Refer to the Design section for slope limitations.
7. Do not install any base or ply sheets in solid moppings of asphalt directly to polyiso insulation. The base sheet must be mechanically attached or spot attached using ASTM D 312 Type III or IV asphalt or Firestone SEBS Mopping Asphalt. An overlayment of Firestone FiberTop or DensDeck may be installed over the Firestone ISO 95+ polyiso insulation before the base sheet is installed.
8. Solid Mopping
  - a) Starting at the low point of the roof, align the base sheet and unroll into a solid mopping of hot asphalt.
  - b) With a stiff push broom, immediately broom the base sheet ensuring full contact.

### **C. MECHANICAL ATTACHMENT**

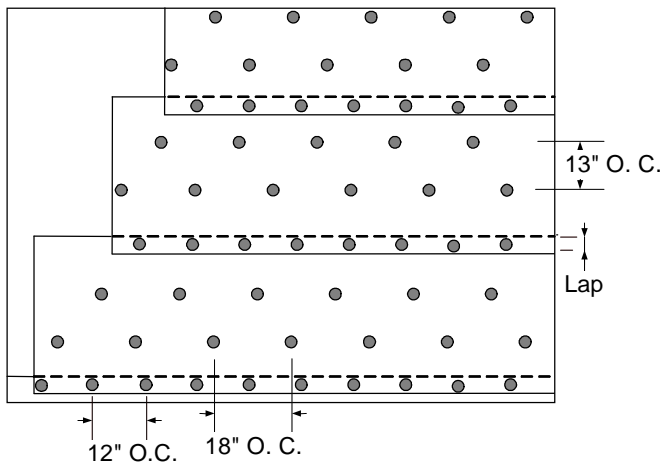
1. Starting at the low point of the roof, align the base sheet, unroll and allow the sheet to relax prior to attaching. After allowing to relax, begin attachment at one end and work towards the other end, keeping the roll tight and wrinkle free. Align subsequent rolls, shingling the laps, maintaining a minimum 3" (76.2 mm) side lap and minimum 6" (152.4 mm) end lap and repeat the application. Stagger all end laps.
2. Fasten Base Sheet Using Firestone Insulation Plates and Fasteners
  - a) Using Firestone Insulation Plates and Fasteners, base sheets may be attached through insulation into the deck, or directly to poured in place concrete, wood, gypsum, cementitious wood fiber, lightweight concrete decks, or through a smooth surfaced built-up or modified bitumen roof system. Refer to the Design Guide Section of this manual for information on fasteners for a particular deck type.
  - b) 1 meter wide (39.4") Firestone compatible base sheets and cap sheets used as base sheets. The Base sheet must be mechanically attached 12" (304.8 mm) o.c. in the side and end laps and 18" (457.2) o.c. in two staggered rows in the field of the sheet. Each row shall be 13" (330.2 mm) (approx.) in from the sides of the base sheet. See diagram 2.07-7 below.
  - c) 36" (914.4 mm) wide Firestone compatible base sheets and cap sheets used as base sheets The Base sheet must be mechanically attached 18" (457.2 mm) o.c. in the side and end laps and 36" (914.4 mm) o.c. in two staggered rows in the field of the sheet. Each row shall be 12" (304.8 mm) (approx.) in from the sides of the base sheet. See diagram 2.07-7 below.
3. Fasten Base Sheet Using Cap Nails
  - a) Using cap nails with 1" (25.4 mm) diameter steel heads, base sheets may be attached to plywood, wood plank, and oriented strand board decks. The base sheet must be mechanically attached with cap nails specified by the project designer at 9" (228.6 mm) o.c. in the side and end laps and 18" (457.2 mm) o.c. in two staggered rows in the field of the sheet. Each row shall be 12" (304.8 mm) (approx.) in from the sides of the base sheet. Cap nails cannot be used to attach insulation, attach a base sheet through an existing insulated roof, attach a base sheet over a gravel surfaced built-up

roof, or through a smooth surfaced un-insulated built up roof over 1/2" (12.7 mm) thick. The fasteners used to attach base sheet must be manufactured for the particular deck type and be Factory Mutual Approved. See diagram 2.07-8 below.

- b) This attachment pattern applies to all 36" (914.4 mm) and 1 meter (39.4") wide Firestone compatible base sheets and cap sheets used as base sheets.

**TABLE 2.07-6  
BASE SHEET MECHANICAL ATTACHMENT OPTIONS**

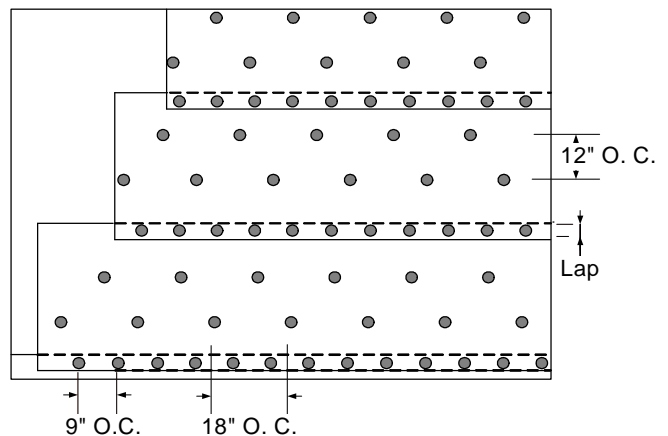
Pattern Diagram	Pattern	Notes
Diagram 2.07-7	Using Firestone insulation plates and fasteners, install two rows staggered at 18" (457.2 mm) o.c., each approximately 13" (330.2 mm) in from edge of sheet and in side laps at 12" (304.8 mm) o.c.	Contact the Firestone Roof System Solutions Group when the deck system will not provide a minimum of 300 lbf (1.3 kN) of pullout resistance per fastener.
Diagram 2.07-8	Two rows staggered at 18" (457.2 mm) o.c., each approximately 12" (304.8 mm) in from edge of sheet and in side laps at 9" (457.2 mm) o.c. Attachment pattern, plate/head size, and frequency may be different to meet code requirements.	Contact the Firestone Roof System Solutions Group when the deck system will not provide a minimum of 40 lbf (177.9 N) of pullout resistance per fastener.



Base Sheet Fastening Pattern Diagram 2.07-7

Firestone Screws and Plates

9"	228.6mm
12"	304.8mm
13"	330.2mm
18"	457.2mm



Base Sheet Fastening Pattern Diagram 2.07-8

Firestone Cap Nails or Firestone LWC Base Ply Fasteners



#### 4. Fasten Base Sheet Using Specialty Fasteners

- a) Using nail-in type fasteners and plates, base sheets may be attached to gypsum, cementitious wood fiber or lightweight insulating concrete decks. The base sheet must be mechanically attached with fasteners as specified by the project designer and the fastener manufacturer.
- b) Nail-in fasteners cannot be used to:
  - (1) Attach insulation
  - (2) Attach a base sheet through an existing insulated roof
  - (3) Attach a base sheet over a gravel surfaced built-up roof
  - (4) Attach a base sheet through a smooth surfaced built-up roof.
- c) The fasteners used to attach base sheet must be manufactured for the particular deck type and be Factory Mutual Approved.

#### D. BASE SHEET LAPS

- 1. Hot steep asphalt applied Base sheets must be lapped a minimum of 2" (50.8 mm) for side laps
- 2. Mechanically attached torch applied or automatic heat welded base sheets must be lapped a minimum of 3" (76.2 mm) for side laps
- 3. End laps must be minimum 6" (152.4 mm).
- 4. In all cases, an offset of 12" (304.8 mm) minimum must be maintained between the side and end laps of the base sheet and the cap sheet.

## 2.07 INSULATION INSTALLATION



Ballasted systems are not allowed when the membrane is installed directly over or onto a hard surface, such as Hail Guard, DensDeck, OSB or concrete. Firestone Recommends the use of CoverDeck when a coverboard is specified in a ballasted roofing system.

Ballasted systems are not allowed when the membrane is installed directly to a layer of insulation, which has been mechanically attached.

#### A. INSTALL INSULATION:

- 1. Install only as much insulation as can be covered with roofing membrane and completed before the end of the day's work or before the onset of inclement weather.
- 2. Form continuous insulation joints over deck flange. Do not cantilever insulation edges over deck ribs. Minimum bearing surface: 1 inch (25.4 mm).
- 3. When installing multiple layers of insulation, all joints between layers shall be staggered 6" minimum.

#### B. FIT INSULATION:

- 1. Neatly fit insulation to all penetrations, projections, and nailers. Insulation should be loosely fitted, with no gaps greater than 1/4" (6.4 mm) filled with acceptable insulation.

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Revision No. 1 3/2007

2. On metal decks, the edge of the board parallel with the roof deck flutes should be completely supported by the flute. The membrane should not be left unsupported over a space greater than 1/4" (6.4 mm).
3. Tapered insulation with acceptable facers for bonding must be installed around roof drains to provide proper slope for drainage as shown in Firestone Details.

### **C. ATTACH INSULATION**

#### **1. Mechanical Attachment:**

- a) Insulation must be attached using Firestone Insulation Plates and Fasteners. HailGard fasteners may be used to attach HailGard insulation without the use insulation plates.
- b) If installing on a metal deck (where allowed by specification), the edge of the board parallel with the roof deck should be completely supported and fasteners must penetrate the top flute of the deck.
- c) When installing fasteners, care should be taken to avoid penetration of conduits and other piping below or encased in the deck.
- d) For insulation attachment please refer to the Technical Information Sheets that reference the specific insulation being used. Use appropriate attachment patterns and fastening rates of that specific insulation.
- e) For specific deck penetration requirements refer to the Technical Information Sheet that references the specific fastener being used.
- f) When installing a multi-layer insulation assembly, the fastening pattern is determined by the type and thickness of the top layer of insulation and the performance criteria of the system. For MAS systems with a fully adhered perimeter shall require the perimeter insulation to use fastening pattern for a fully adhered system as determined by the top layer of insulation.
- g) Ensure that the fasteners are fully seated, but not overdriven. Use a properly adjusted clutch or depth sensing type of drill. Do not use a standard single speed drill.
- h) Multiple layers may be installed using a common fastener.

**TABLE 2.07-9  
CHART OF INSULATION ATTACHMENT OPTIONS (MECHANICAL ATTACHMENT)**

Structural Deck To Which Insulation/ Cover Board Will Be Mechanically Attached	Attachment Method						Minimum penetration of fastener into/ through deck
	Firestone All Purpose (AP) and Plates	Firestone Heavy Duty (HD) and Plates	Firestone Polymer Fasteners and Plates	Firestone Concrete Drives and Plates	Firestone Belted Fastener and Plates	Firestone HailGard	
Steel	✓	✓	N/A	N/A	✓	✓	¾" (19mm) through deck
Structural Concrete	N/A	✓	N/A	✓	N/A	✓	HeavyDuty(HD) or HailGard 1" (25.4mm) into deck
							Concrete Drives 1¼" (31.7mm) into deck
Plywood or OSB	✓	✓	N/A	N/A	✓	✓	1" (25.4mm) into or through deck
Wood Plank	✓	✓	N/A	N/A	✓	✓	1" (25.4mm) into or through deck
Gypsum	N/A	N/A	✓	N/A	N/A	N/A	1½" (38.1mm) into deck.
Cementitious Wood Fiber	N/A	N/A	✓	N/A	N/A	N/A	1½" (38.1mm) into deck.
Lightweight insulating concrete over steel deck	N/A	✓	N/A	N/A	N/A	✓	Heavy Duty (HD) or HailGard ¾" (19mm) through steel pan
Lightweight insulating concrete over concrete deck	N/A	✓	N/A	✓	N/A	✓	Heavy Duty (HD) or HailGard 1" (25.4mm) into the structural concrete deck.
							Concrete Drives 1¼" (31.7mm) into the structural concrete deck.
✓ = Acceptable for use                      N/A = Not Applicable							

**2. Asphalt Attachment:**

- a)** The substrate may require priming or a base sheet prior to installing the insulation. Refer to the Design Guide for specific information.
- b)** The insulation should be no larger than 4' X 4' (1.2 m X 1.2 m) panels.
- c)** Insulation may be attached using a solid mopping of Firestone SEBS Asphalt (as required by warranty terms) or ASTM D 312 Type III or Type IV asphalt.
- d)** The asphalt shall be at the manufacturer's stated EVT less ~ 25 deg F at the point of installation. Enough asphalt must be installed (approximately 25-30# /100 sq. ft (1.2 -1.4 k/sq. m)) to ensure that complete adhesion is achieved.
- e)** It is necessary to "walk" boards in to ensure complete adhesion to the substrate.
- f)** Additional layers of insulation may be installed in the same fashion.

3. Adhesive Attachment:

- a) Insulation may be attached using I.S.O. Twin Pack, I.S.O. Fix or I.S.O. SPRAY S.
- b) Apply the adhesive in strict accordance with the instructions provided with the product and the Technical Information Sheets that are a part of this Technical Database.
- c) It may be necessary to prime the substrate prior to installing the insulation adhesive with a prescribed primer.
- d) If installing on a metal deck (where allowed by specification), the edge of the board parallel with the roof deck flutes must be completely supported.
- e) The insulation or coverboard shall be no larger than 4' X 4' (1.2 m X 1.2 m).
- f) It is necessary to "walk" boards in and weight, i.e. a full 5 gal pail (~40+ lbs (18.2 kg)) at each corner, to ensure complete adhesion to the foam and substrate.

**TABLE 2.07-10**  
**INSULATION / COVER BOARD ATTACHMENT OPTIONS BY DECK AND RECOVER / RETROFIT**

Substrate To Which Insulation / Cover Board Will Be Attached or Adhered	Mechanically Attached	Attachment Method			
		I.S.O. TwinPack	I.S.O. SPRAY S	I.S.O. Fix	Hot Asphalt
Adhesive attachment may require an adhesive pull test. See the <a href="#">Firestone Attachment Guide</a>					
<b>DECKS</b>					
Steel	✓	✓	✓	✓	N/A
Structural Concrete	✓	✓	✓	✓	✓
Plywood Or Oriented Strand Board	✓	✓	✓	✓	N/A
Wood Planking	✓	✓	✓	✓	N/A
Poured Or Pre-Cast Gypsum	✓	✓	✓	✓	N/A
Cementitious Wood Fiber	✓	✓	✓	✓	N/A
Lightweight Insulating Concrete Decks (See <a href="#">Section 1.06 H</a> for additional requirements)	✓	N/A	N/A	N/A	N/A
<b>Cellular</b> Lightweight Insulating Concrete Decks (See <a href="#">Section 1.06 H</a> for possible additional requirements)	✓	N/A	N/A	N/A	N/A
<b>RECOVER/RETROFIT</b>					
Existing Smooth Surface Built-Up Roof Or Modified Bitumen Roofs	N/A	✓	✓	✓	✓
Coal Tar Built-Up Roofs	N/A	N/A	✓	✓	✓
Asphalt Gravel Surfaced Built-Up Roof	N/A	N/A	✓	N/A	✓
Mineral Surface Built-Up Roof Or Modified Bitumen Roof	N/A	✓	✓	✓	✓
Firestone recommends mechanically attaching a Cover board over existing insulation. The responsibility of identifying and removal of damaged or wet insulation is that of the contractor.					
Sprayed Urethane Roof (PUF)	Complete tear-off required				
Existing Roof with Phenolic Insulation	Complete tear-off required When Phenolic insulation is removed, a visual inspection of the deck condition and other components is required, all deteriorated components must be replaced as necessary				
Refer to the <a href="#">Firestone Attachment Guide</a> for adhesion pull test requirements for I.S.O. Twin Pack, I.S.O. SPRAY S, and I.S.O. Fix					
✓ = Acceptable for use		<b>N/A = Not Applicable</b>			

**TABLE 2.07-11  
INSULATION / COVER BOARD ATTACHMENT TO INSULATION OPTIONS BY INSULATION TYPE**

Base Layer of Insulation To Which Insulation / Cover Board Will Be Adhered	Insulation / Cover Board to Insulation Attachment Method			
	I.S.O. Twin Pack	I.S.O. SPRAY S	I.S.O. Fix	Hot Asphalt
Insulation				
Iso 95+GL	✓	✓	✓	✓
Fibertop	✓	✓	✓	✓
CoverDeck	✓	✓	✓	✓
Dens-Deck (4' x 4')	✓	✓	✓	✓
Dens-Deck Prime (4' x 4')	✓	✓	✓	✓
Dens-Deck Dura-Board (4' x 4')	✓	✓	✓	✓
Perlite Insulation	N/A	N/A	N/A	✓
Asphalt or MB Base Sheet	✓	✓	✓	✓
Firestone recommends mechanically attaching a Cover board over existing insulation. The responsibility of identifying and removal of damaged or wet insulation is that of the contractor.				
Refer to the <a href="#">Firestone Attachment Guide</a> for adhesion pull test requirements for I.S.O. Twin Pack, I.S.O. SPRAY S, and I.S.O. Fix				
✓ = Acceptable for use N/A = Not Applicable				

## 2.08 MEMBRANE INSTALLATION

This section contains information for Firestone standard UltraPly TPO membrane systems. Read all of the information to ensure that it is the correct system and application.

**TPO Membrane installations may require the use of a QuickSeam Reinforced Perimeter Fastening strip (QSRPF) requiring coordination with the many substrates at perimeters and layout and installation of the membrane system in a logical sequence. This process should be addressed early in the roofing process.**



**NOTE, this detail is for systems up to 15 years.**

**The additional securement details for the membrane (base tie-in) will occur at all locations where the membrane goes through an angle change greater than 1" (25.4 mm) in 12" (305 mm) (i.e., roof edges, curbs, interior walls, etc.) and other areas as details indicate. See additional information in details.**

### A. FULLY ADHERED SYSTEM:

#### 1. Membrane Placement:

- a) Place membrane panel, starting at the low side of the roof, unroll over the acceptable substrate and allow to relax for a minimum of 30 minutes before attaching or splicing.
- b) The Firestone TPO Adhered System shall be installed so that the seams shed or run parallel to the flow of water.

- c) Placement of additional rolls of membrane shall provide for sufficient overlaps for seaming of membranes, see standard lap splice details for robotic and hand welding.
  - d) Sheets cut along one side shall have the cut edge installed as the underside sheet at all seams.
2. Fold the Membrane Back:
    - a) After making sure the sheet is placed in its final position allowing for the proper lap width per Firestone details and specifications, fold it back evenly onto itself without wrinkles to expose the underside mating surface of the sheet.
  3. Remove any debris or dirt:
    - a) Sweep the mating surfaces with a stiff broom to remove any debris or dirt that may have accumulated. If required wash membrane with Splice Wash SW-100 and allow to dry.
  4. Apply the Bonding Adhesive:



**Stop Bonding Adhesive Short of membrane Seam Area**

**Care must be taken not to apply bonding adhesive over an area that is to be later hot air spliced to another sheet or flashing. All bonding adhesive must be completely removed from the seam area.**

- a) Apply bonding adhesive with either a 9" (228 mm) wide solvent-resistant paint roller or a commercial-grade adhesive sprayer. Adhesive must be applied in a relatively uniform thickness to both surfaces at approximately the same time. If adhesive is spray-applied, it must be back-rolled with a solvent-resistant paint roller to assure proper contact and uniform coverage. Refer to Firestone Technical Information Sheets and container labels for specific application instructions.
5. Apply Bonding Adhesive at Specified Coverage Rate:
    - a) Refer to the container label and Technical Information Sheet for specific application requirements and coverage rates.
  6. Test Bonding Adhesive for Readiness (Touch-Push Test):
    - a) Allow the bonding adhesive to flash-off. Touch the adhesive surface in several places with a clean, dry finger to be certain that the adhesive does not stick or string. As you are touching the adhesive, push forward on the adhesive at an angle to ensure that the adhesive is ready throughout its thickness. If either motion exposes wet or stringy adhesive when the finger is lifted, the adhesive is not ready for mating. Flash-off time will vary depending on ambient conditions of temperature, wind and humidity.
  7. Bond the Membrane to the Substrate:
    - a) Starting at the fold, roll the previously coated portion of the membrane into the coated substrate slowly and evenly to prevent wrinkles.
  8. Broom the Membrane:
    - a) To assure proper contact, compress the bonded half of the membrane to the substrate with a stiff push broom.
  9. Repeat Procedure to Complete the Membrane Installation:
    - a) Fold the non adhered half of the membrane back onto itself, and repeat the procedure.

10. Splice the Lap:

- a) If membrane has been open for more than 12 hours or become contaminated, wash mating surfaces with Splice Wash SW-100 and allow to dry.
- b) Splice the laps with hot air welding as specified and refer to UT-LS details

**B. MECHANICALLY ATTACHED SYSTEM**



**Firestone recommends that when installing mechanically attached membranes over steel decks, the field attachment should run perpendicular to the deck panels. If a project is Factory Mutual insured or specified, per FM 1-29 for Global Loss Prevention Data Sheets, attachment must run perpendicular.**

1. Plates and Fasteners

a) Membrane Placement: Perimeter Sheets

- (1) Place membrane panel, unroll over the acceptable substrate and allow to relax for a minimum of 30 minutes before attaching or splicing. The Firestone UltraPly TPO Mechanically Attached Roofing Systems are installed starting at the low point of the roof using up to four sheets, determined by job requirements, that are half the width of the field panels. Ensure proper sheet overlap allowances for system roof edge details and seams, consult Firestone UltraPly TPO Lap and edge or base tie-in details.
- (2) The Firestone TPO System shall be installed so that the seams shed or run parallel to the flow of water.
- (3) Placement of additional rolls of membrane shall provide for overlapping the sides of the adjoining sheets 6" (152.4 mm) as marked on the top side of the membrane and overlapping the ends of adjoining sheets a minimum of 3" (76.2 mm). sufficient overlaps for seaming of membranes, see standard lap splice details for robotic and hand welding.
- (4) Note: Orient Firestone UltraPly TPO panels such that the exposed (cut) edges of the membrane are used as the bottom panel in splices whenever possible. If cut edges are exposed on the weather side, they must be sealed with Firestone UltraPly TPO Cut Edge Sealant after welding.

b) Fold the Membrane Back:

- (1) After making sure the sheet is placed in its final position allowing for the proper lap width per Firestone details and specifications, fold it back evenly onto itself without wrinkles to expose the underside mating surface of the sheet.


c) Remove any debris or dirt:

- (1) Sweep surfaces with a stiff broom to remove any debris or dirt that may have accumulated.

- d) Install First Perimeter Panel:**
    - (1)** The inside edge of the half sheet(s) is attached using Firestone HD-Reel-Fast collated Seam Plates or loose bulk or HD+ Seam Plates AP, HD or HD+ Fasteners as required a minimum of 2" (50.4mm) from membrane edge.
    - (2)** Install each fastener so that it is properly engaged in the deck and the head is flush within the countersunk portion of the Seam Plate.
    - (3)** The first field side sheet is then heat welded to the perimeter half-sheet side and one end seam and fastened along the opposite edge. Continue this procedure for all perimeter sheets. If the slope changes direction, begin working at the lower edge of the adjoining side of the roof up the slope until reaching previous work.
    - (4)** A half sheet is installed over a ridgeline and welded to the two panels. Refer to Firestone details. Seal all cut edges
  - e) Position First Field Panel:**
    - (1)** Roll out the first field panel and position the panel along the laying line of the perimeter panel that has been attached. Heat weld the lap in accordance with Firestone details.
    - (2)** Layout Firestone Seam Plate and fasteners, as required in the Wind Design Section of this manual and lap splice details.
  - f) Install Fasteners:**
    - (1)** Install each fastener so that it is properly engaged in the deck and the head is flush within the countersunk portion of the Seam Plate.
  - g) Position Subsequent Field Panels:**
    - (1)** Roll out and position subsequent field membrane sheets in the same manner, overlapping the sides of the adjoining sheets 6" (152.4 mm) as marked on the top side of the membrane and overlapping the ends of adjoining sheets a minimum of 3" (76.2 mm). Heat weld lap to previously anchored panel prior to fastening in place.
  - h) Splice the Lap:**
    - (1)** If membrane has been open for more than 12 hours or become contaminated with dirt, debris, moisture, wash seam surfaces at least 6" wide with Splice Wash SW-100 and allow to dry.
    - (2)** Splice the laps with hot air weld as specified and refer to UT-LS details
- 2. Battens Strips - WIDE WELD SYSTEMS ONLY**
- a) Membrane Placement: Perimeter Sheets**
    - (1)** Place membrane panel, unroll over the acceptable substrate and allow to relax, all membrane panels, for a minimum of 30 minutes before attaching or splicing. The Firestone UltraPly TPO Mechanically Attached Roofing Systems are installed starting at the low point of the roof using up to four sheets, determined by job requirements, which are half the width of the field panels. Ensure proper sheet overlap allowances for system roof edge details and seams, consult Firestone UltraPly TPO Lap and edge or base tie-in details.



- (2) The Firestone TPO System shall be installed so that the seams shed or run parallel to the flow of water.
  - (3) Placement of additional rolls of membrane shall provide for overlapping the sides of the adjoining sheets 6" (152.4 mm) as marked on the top side of the membrane and overlapping the ends of adjoining sheets a minimum of 3" (76.2 mm). Sufficient overlaps for seaming of membranes, see standard lap splice details for robotic and hand welding.
  - (4) Note: Orient Firestone UltraPly TPO panels such that the exposed (cut) edges of the membrane are used as the bottom panel in splices whenever possible. If cut edges are exposed on the weather side, they must be sealed with Firestone UltraPly TPO Cut Edge Sealant after welding.
- b) Fold the Membrane Back:
    - (1) After making sure the sheet is placed in its final position allowing for the proper lap width per Firestone details and specifications, fold it back evenly onto itself without wrinkles to expose the underside mating surface of the sheet.
  - c) Remove any debris or dirt:
    - (1) Sweep surfaces with a stiff broom to remove any debris or dirt that may have accumulated.
  - d) Install First Perimeter Panel:
    - (1) The inside edge of the half sheet(s) is attached using appropriate Firestone Batten Strip and Fasteners as required 2" (50.4mm) from membrane edge.



**When batten strips must be field cut, round the cut end. Assure that all burrs created by cutting are removed.**

**Where field drilling of metal battens is necessary, use a 1/4" (6.35 mm) diameter drill bit.**

**Install 2" (50.4mm) field cut membrane circle patches centered under the ends of batten strips and end fastener.**

**(2) Secure Batten Strips - WIDE WELD SYSTEM ONLY**

Place the Firestone fastener starting 1" (25.4 mm) in from the end of the Firestone Batten Strip, then every 12" (305 mm) o.c. (unless a more frequent fastener spacing is required per wind/application design guide) using the pre-punched holes in the battens.

**(3) Start Fastening the Firestone Batten Strip from one end only:**

When fastening Batten Strips, start at one end and work towards the other. Install each fastener so that it is properly engaged in the deck and the head is flush with the batten strip surface. Use caution not to overdrive the fastener as this will cause the batten strip to buckle between the fasteners.

**(4) Lap Field Runs of Firestone Batten Strips:**

Use a common fastener to anchor overlapping Firestone Batten Strips using a common hole.

**e) Do Not Lap Corners and "T" Joints:**

Do not overlap the Firestone Batten Strips at corners or "T" joints. Keep battens from the edge of intersecting splices as shown in Firestone Details

**f) Splice the Lap:**

**(1)** If membrane has been open for more than 12 hours or become contaminated with dirt, debris, moisture, wash seam surfaces at least 6" wide with Splice Wash SW-100 and allow drying.

**(2)** Splice the laps as specified and refer to UT-LS details.

**C. BALLASTED SYSTEM**



**Ballasted systems are not allowed when the membrane is installed directly over or onto a hard surface, such as Hail Guard, DensDeck, OSB or concrete.**

**Ballasted systems are not allowed when the membrane is installed directly to a layer of insulation, which has been mechanically attached.**

**Adhesive attachment of insulation is acceptable for Ballasted systems, if required.**

1. Place Membrane and Allow to relax:
  - a) Place membrane panel, without stretching, over the acceptable substrate and allow to relax for a minimum of 30 minutes before splicing or attaching. The UltraPly TPO Ballasted System must be installed so that the splices shed or follow the flow of water.
2. Move Membrane to its Final Position:
  - A) Move the membrane panel to its final position allowing for a minimum 4" (102 mm) field seam onto adjacent panels and sufficient membrane for proper membrane terminations.
3. Splice the Lap:
  - a) If membrane has been open for more than 12 hours or become contaminated with dirt, debris, moisture, wash seam surfaces at least 6" wide with Splice Wash SW-100 and allow to dry.
  - b) Splice the laps with hot air welder as specified and refer to UT-LS details
4. Ballast Installation:
  - A) Firestone Ballast Paver System
    - (1)** Install all Firestone Ballast Paver System Accessories as required in proper sequence for Paver system performance and membrane protection.
    - (2)** Place Firestone Ballast Paver system in accordance with Firestone Ballast Paver Installation Guide for the appropriate system requirement as determined by the design professional.

**B) Stone Ballast**

- (1) Spread Ballast: The ballast shall be spread over the completed Firestone System at the rate specified by the project designer but never less than 10 lb (4.5 kg)/sq. ft. using ASTM #4 stone. Refer to the System Design Guide of this manual for ballast type and size requirements. Ballast must be spread over the membrane using soft rubber tired ballast buggies. Spread ballast around penetrations by hand.
- (2) Protect Membrane and Insulation at Ballast Loading Areas: At staging areas where ballast is loaded, protect the membrane and underlying insulation using insulation and/or plywood over an additional layer of Firestone protective, sacrificial, membrane. Remove and replace all materials damaged from ballasting operation.
- (3) Distribute ballast Around Walkway Pads: Any ballast displaced by a walkway should be distributed around the pad, to maintain the specified average ballast rate.
- (4) Do not place a walkway and pads within 10' (3.04 m) of a roof edge. If walkway is needed around mechanical equipment use appropriate pavers.

## **2.09 MEMBRANE SEAMING**

**A. CLEAN THE LAP SPLICE AREA:**

1. Using a clean white cotton rag dampened with Firestone SW-100 (Splice Wash), thoroughly clean an area on both sheets at least 6 inches (15.24 cm) wide if seam area has become contaminated with dirt, debris, moisture, etc. Membrane left exposed for more than 12 hours must be cleaned prior to any welding activity.

**B. HOT AIR WELD LAP SPLICES:**

1. Horizontal field splices:
  - a) Wherever possible, all field splices on the horizontal surface (including flashing) should be completed using an automatic heat welder that has been designed for hot air welding of thermoplastic membranes. (Refer to the welding equipment requirements in the Technical Information Sheets for minimum requirements. For specifics, consult the welder manufacturer's data sheets).
2. Seam width requirements:
  - a) Seams made with the automatic welder must be a minimum of 1-1/2" (38.1 mm) wide.
  - b) Seams made with hand welders must be a minimum of 2" (50.8 mm) wide. Use silicone hand rollers to assure proper mating of surfaces as hand heat welding proceeds.
  - c) Wide Weld seams require Firestone Wide Weld kit for the Varimat welder. It is a Kit system that includes all the hardware to adapt the existing welder to the special 4-1/2" (114.3mm) wide nozzle and guides. Consult TIS for additional information.
3. Vertical field splices:
  - a) Hand held welders can only be used on vertical welds or where an automatic welder is not practical or cannot be used.

### **C. EQUIPMENT AND TEST SPLICE REQUIREMENTS:**

1. The air intake, temperature and speed of the machine must be adjusted to provide proper seam strength.
2. An ample power supply must be provided to all heat welding equipment. A generator, which is dedicated to the heat welding equipment, must be used on all installations. Refer to the welding and generator equipment requirements in the Technical Information Section of this manual for minimum requirements. For specifics, consult the welder manufacturer's data sheets.
3. When weather conditions vary, adjustments to the welding machine must be made. It is recommended that this be done using spare material before beginning the finished product sheet. In addition, there must be destructive tests performed daily and at the beginning and every time there is an interruption in the welding process ( i.e. power failure, welder shut down, job site conditions change and after lunch). There should be periodic checks (including at the start of each day) to verify good peel strength.
4. Varimat Settings:
  - a) Standard Setup
    - (1) The air intake, temperature and speed of the machine must be adjusted to provide proper seam strength. An ample power supply must be provided to all heat welding equipment. A generator, which is dedicated to the heat welding equipment, must be used on all installations. Refer to the welding and generator equipment requirements located in the Firestone UltraPly TPO manual. When weather conditions vary, adjustments to the welding machine must be made. It is recommended that sample welds are created by using spare material before beginning the finished production sheet. In addition, there must be destructive tests performed daily at the beginning of each days work and every time there is an interruption in the welding process (i.e. Power failure, welder shut down, job site conditions change and after lunch). There should be periodic checks (including at the start of each day) to verify good peel strength.
    - (2) Typical Equipment Settings: (Ambient temperatures between 20° F - 90° F)  
Temperature: 1148° F Air Flow: 80%, Speed: 8.5 feet/min \* Increasing speed beyond recommended rates will decrease the integrity of the weld.
5. Seam inspection:
  - a) Probe all completed welds using a slotted screwdriver or dull cotter pin puller type tool to verify seam integrity daily. Do not probe welds until they have had time to cool. Any welds found to be insufficiently welded need to be repaired on a daily basis.
6. T-Joint Patches:
  - a) T-joint patches must be installed at all intersections of field seams if membrane thicker than .045" (1.14 mm) is used. Refer to Lap Splice Detail Section of this manual or the Technical Database.
7. Cut Edge Sealing
  - a) Ensure that all edge areas are clean and dry. Clean with Splice Wash SW-100 to remove any contamination.
  - b) All cut edges with scrim exposed must be sealed with Firestone UltraPly TPO Cut Edge Sealant.



**NOTE: SOLVENT WELDING IS NOT ACCEPTABLE**

## 2.10 MEMBRANE ATTACHMENT AT PERIMETERS FOR MAS SYSTEMS

Perimeters may be adhered or mechanically attached. When mechanically attaching a perimeter, the batten layout must be as specified in the Firestone Wind Design Guide as a minimum, or as required by the designer or local building codes. Should a fully adhered perimeter be chosen, the area of the adhered perimeter is the same as if the perimeter were mechanically attached.

### A. ADHERED PERIMETER:

- a) Place membrane panel, unroll over the acceptable substrate and allow relaxing for a minimum of 30 minutes before attaching or splicing.
  - b) The Firestone TPO Adhered System shall be installed so that the seams shed or run parallel to the flow of water.
  - c) Placement of additional rolls of membrane shall provide for sufficient overlaps for seaming of membranes, see standard lap splice details for robotic and hand welding.
  - d) Sheets cut along one side shall have the cut edge installed as the underside sheet at all seams.
2. Fold the Membrane Back:
    - a) After making sure the sheet is placed in its final position allowing for the proper lap width per Firestone details and specifications, fold it back evenly onto itself without wrinkles to expose the underside mating surface of the sheet.
  3. Remove any debris or dirt:
    - a) Sweep the mating surfaces with a stiff broom to remove any debris or dirt that may have accumulated. If required wash membrane with Splice Wash SW-100 and allow to dry.
  4. Apply the Bonding Adhesive:
    - a) Apply bonding adhesive with either a 9" (228 mm) wide solvent-resistant paint roller or a commercial-grade adhesive sprayer. Adhesive must be applied in a relatively uniform thickness to both surfaces at approximately the same time. If adhesive is spray-applied, it must be back-rolled with a solvent-resistant paint roller to assure proper contact and uniform coverage. Refer to Firestone Technical Information Sheets and container labels for specific application instructions.
  5. Apply Bonding Adhesive at Specified Coverage Rate:
    - a) Refer to the container label and Technical Information Sheet for specific application requirements and coverage rates.

6. Test Bonding Adhesive for Readiness (Touch-Push Test).
7. Allow the bonding adhesive to flash-off. Touch the adhesive surface, on both membrane and substrate, with a clean, dry finger to be certain that the adhesive does not stick or string. Flash-off time will vary depending on ambient conditions. As you are touching the adhesive, push forward on the adhesive at an angle to ensure that the adhesive is ready throughout its thickness. If either motion exposes wet or stringy adhesive when the finger is lifted, the adhesive is not ready for mating. Test several areas on the section to be installed to confirm it is ready.
8. Bond the Membrane to the Substrate:
9. Starting at the fold, roll the previously coated portion of the membrane into the coated substrate slowly and evenly to minimize wrinkles.
10. Broom the Membrane: To assure proper contact, compress the bonded half of the membrane to the substrate with a stiff push broom.
11. Repeat Procedure to Complete the Membrane panel Installation:  
Fold the un-adhered half of the membrane back onto itself, and repeat the procedure.
12. Terminate the Membrane at the Perimeter:  
After the perimeter sheets are adhered to the substrate, they must be terminated along the roof edge using appropriate Firestone roof edge detail or base tie-in which is included as part of this specification.
13. Install Perimeter Isolation Batten Strip:  
Install Firestone batten strips continuously along the inside edge of the adhered perimeter sheet per Firestone details.
14. Splice the Lap and do detail work:
  - a) If membrane has been open for more than 12 hours or become contaminated with dirt, debris, moisture, wash seam surfaces at least 6" wide with Splice Wash SW-100 and allow drying.
  - b) Splice the laps with hot air as specified and refer to UT-LS details

## **2.11 ADDITIONAL MEMBRANE SECUREMENT AND BASE TIE-IN FLASHING**

### **A. PROVIDE MEMBRANE SECUREMENT:**

Secure the membrane at all locations where the membrane goes through an angle change greater than 1" (25.4 mm) in 12" (304.8 mm)(i.e., roof edges, curbs, interior walls, etc.).

1. Mechanically fasten Firestone HD Seam Plates for TPO membrane with Firestone Fasteners either horizontally into the deck or vertically into the wall. in accordance with Firestone Base Tie-In Details (typically 12" (304.8 mm) o.c. for standard applications).
2. Refer to the Firestone System Design Guide or Firestone Technical Information Sheets of this manual to determine the applicable fastener and the associated penetration requirements for the specific substrate conditions.

## **B. USING COATED METAL:**

1. Fasten Firestone UltraPly TPO Coated Metal into Wood Nailers as shown in Firestone Details.
2. The Firestone coated metal must be completely supported by wood nailers in accordance with Firestone Details.
3. Heat weld membrane to Firestone UltraPly TPO Coated Metal flashing.
4. Seams made with an automatic welder must be a minimum of 1-1/2" (38.1 mm) wide. Seams made with hand welders must be a minimum of 2" (51 mm) wide.

## **C. ULTRAPLY TPO**

Install Firestone Reinforced EPDM Perimeter Fastening Strip (RPF):

1. Install the Firestone RPF Strip in accordance with this specification, the Firestone Technical Information Sheets, and applicable Firestone Details that are a part of this manual.
2. Apply TPO QuickPrime Plus to Splice Area: Stir the Firestone TPO QuickPrime Plus thoroughly before and during use. Dip the Firestone QuickScrubber or Firestone QuickScrubber Plus into the bucket of Firestone TPO QuickPrime Plus, keeping the Firestone QuickScrubber or Firestone QuickScrubber Plus flat. Apply the Firestone TPO QuickPrime Plus using long back and forth type strokes with pressure along the length of the splicing area.
3. Apply Firestone TPO QuickPrime Plus to the surface of the Firestone TPO Membrane in the area to be mated with the Firestone RPF Strip and allow the Firestone TPO QuickPrime Plus to flash-off. Change the scrub pad every 200' (61 m) or when the pad will no longer hold the proper amount of Firestone TPO QuickPrime Plus. Additional scrubbing is required at areas that may have become contaminated.

## **2.12 FLASHINGS - PENETRATIONS**

### **A. GENERAL:**

1. Remove all loose existing flashing (i.e. metal, bituminous materials, mastic, etc.).
2. Flash all penetrations passing through the membrane.
3. The flashing seal must be made directly to the penetration.

### **B. PIPES, ROUND SUPPORTS, STRUCTURAL STEEL TUBING, ETC.:**

1. Flash penetrations with Firestone TPO Pre-Molded Pipe Flashings wherever possible. Do not cut or patch TPO Pre-Molded Pipe Flashings to assist in their installation.
2. Flash penetrations using FormFlash when the use of Pre-Molded TPO Pipe Flashings is not possible.
3. Refer to Firestone's Technical Information Sheet for minimum and maximum pipe diameters that can be successfully flashed with Pre-Molded TPO Pipe Flashings.
4. Structural Steel Tubing: Use a field-fabricated pipe flashing detail when the corner radius is greater than 1/4" (6.35 mm) and the longest side of the tube does not exceed 4" (101.6 mm). When the tube exceeds 4" (101.6 mm), use a standard curb detail including base-tie in and suitable termination.

### **C. ROOF DRAINS:**

1. New or Reused installation specifications of cast iron drain. For all other drain types contact Firestone Roofing Systems Solutions Group.
  - a) Remove existing clamping ring. Remove any broken clamping hardware and replace.
  - b) Remove all existing flashing (including lead flashing), roofing materials and cement from the existing drain in preparation for membrane and Water Block Seal.
  - c) Provide a clean even finish on the mating surfaces between the clamping ring and the drain bowl.
  - d) Install tapered insulation with suitable bonding surfaces around the drain to provide a smooth transition from the roof surface to the drain. Slope into drain cannot be greater than 4" in 12" (101.6 mm in 305 mm) for standard membrane and 1" in 12" (25.4 mm in 305 mm) for reinforced membrane.
  - e) Position the membrane and cut a hole for the roof drain allowing a 1/2" (12.7 mm) to 3/4" (19.1 mm) of membrane inside the clamping ring. Make round holes in the membrane to align with clamping bolts (a paper punch may be used). Do not cut the membrane back to the bolt holes.
  - f) Install Firestone Water Block Seal on the clamping ring seat flange below the membrane. Use a minimum of one half of a 10 oz. (295 cc) tube for a 10" (254 mm) drain.
  - g) Install the roof drain clamping ring and all clamping bolts. Tighten the clamping bolts to achieve constant compression

### **D. INSERT DRAINS**

1. Firestone 3" & 4" Insert Drains are intended for installation when existing drains are deteriorated and not suitable for reuse. For other conditions outside of these, contact Firestone Roofing Systems Solutions Group.
  - a) Remove existing clamping ring. Remove any broken clamping hardware and replace.
  - b) Remove all existing flashing (including lead flashing), roofing materials and cement from the existing drain in preparation for installation of the Firestone Insert Drain.
  - c) Install Firestone Insert drain, securing to a solid substrate in accordance with instructions, wood blocking may be required, in preparation to receive the roof membrane.
  - d) Install Firestone Water Block Seal on the clamping ring seat flange below the membrane. Use a minimum of one half of a 10 oz. (295 cc) tube for a 10" (254 mm) strainer basket/clamping ring.
  - e) Install Firestone roof membrane as prescribed and secure with strainer basket and bolt assembly.

### **E. PIPE CLUSTERS AND UNUSUAL SHAPED PENETRATIONS:**

1. Fabricate penetration pockets to allow a minimum clearance of 1" (25.4 mm) between the penetration(s) and all sides.
2. Secure penetration pockets and flash per Firestone Details.



3. Fill penetration pockets with Firestone Pourable Sealer and mound to shed water. Pourable Sealer must be a minimum of 2" (51 mm) deep and 1" (25.4 mm) thick around the penetrations.

**F. HOT PIPES:**

Protect the UltraPly TPO components from direct contact with steam or heat sources when the in-service temperature is in excess of 160 °F (71°C). In all such cases flash to an intermediate "cool" sleeve.

**G. FLEXIBLE PENETRATIONS**

Provide a weathertight gooseneck set in Water Block Seal and secured to the deck. Flash in accordance with Firestone Details.

**H. SCUPPERS:**

1. Scuppers shall refer to all primary and overflow devices for roof drainage.
2. Install Firestone welded watertight sleeve and flashing assembly.
3. Set welded watertight scupper in Water Block Seal and secure scupper to the structure.
4. Flash in accordance with Firestone Details.

**I. EXPANSION JOINTS:**

Install where specified by the project designer. Install expansion joints in accordance with Firestone details.

1. Install Firestone Expansion Joints details on all roof and wall (base flashing and parapet assembly areas) per Firestone Expansion Joint details, where specified by the design professional.
2. Expansion Joint assemblies shall be sized as needed to provide for all known, anticipated or specified movements per specifications.

## **2.13 FLASHINGS – WALLS, PARAPETS, CURBS OR SUPPORTS, ETC.**

1. General:

Using the largest pieces of QuickSeam Curb Flashing or UltraPly TPO membrane practical, flash all walls, parapets, curbs, etc., to the height as specified by the project designer.

**2. Evaluate Substrate:**

The following substrates require an overlayment of 5/8" (15.9 mm) exterior grade or "Wolmanized" plywood mechanically fastened in accordance with project designer's requirements.

- a) Interior Gypsum board
- b) Stucco
- c) Cobblestone
- d) Textured masonry
- e) Corrugated metal panels
- f) Other uneven substrates
- g) All loose existing flashing must be removed.

**3. Install Additional Membrane Securement at Curbs, Penetrations, Walls, etc.:**

Refer to 2.13 of this specification.

**4. Provide Termination:**

Provide termination directly to the vertical substrate as shown in Firestone Details.

**5. Provide Intermediate Attachment:**

Intermediate attachment of membrane is required at 36" (914 mm) intervals in accordance with Firestone Details unless:

- a) The wall surface is smooth, without noticeable high spots or depressions (i.e., plywood, poured or precast concrete, or hollow core block or masonry walls where joints are flush with masonry surface),  
AND
- b) The termination is either a Termination Bar or membrane that has been installed underneath a coping to the outside edge of the wall.

**J. FLASHING – FASCIA, COPING, GUTTERS, GRAVEL STOPS, AND ACCESSORIES**

**1. Install Firestone Roof edge metals: Fascia, Coping, Gutters, and accessories:**

- a) Prepare substrate as required by product installation instructions.
- b) Install Firestone metals per installation instructions in longest sections possible:
- c) Install all related accessories per Firestone details.

**2. Flash Gravel Stops or Roof Edge Metals by others shall be installed using Firestone TPO QuickSeam Flashing. This is only a 15 year detail:**

- a) When using Firestone TPO QuickSeam Flashing:
  - (1) Stir the Firestone TPO QuickPrime Plus thoroughly before and during use. Dip the Firestone QuickScrubber or Firestone QuickScrubber Plus into the bucket of Firestone TPO QuickPrime Plus, keeping the Firestone QuickScrubber or Firestone QuickScrubber Plus flat. Apply the Firestone TPO QuickPrime Plus using long back and forth type strokes with pressure along the length of the splicing area.

(2) Apply Firestone TPO QuickPrime Plus to the surface of the Firestone TPO Membrane in the area to be mated with the Firestone TPO QuickSeam Flashing and allow the Firestone TPO QuickPrime Plus to flash-off. Change the scrub pad every 200' (61 m) or when the pad will no longer hold the proper amount of Firestone TPO QuickPrime Plus. Additional scrubbing is required at areas that may have become contaminated.

b) When using Coated Metal

(1) Use UltraPly TPO Coated Metal for TPO membrane. Install the coated metal and flash as outlined in Firestone Details.

**K. OPTIMAL APPLICATION:**

1. The optimal use of TPO QuickSeam Flashing is where a 3" (76 mm) edge metal flange is being used. This will provide the minimum 2" (51 mm) seam to the UltraPly Membrane, with the remaining 3" (76 mm) of the material completely covering the metal flange.
2. If a flange wider than 3" (76 mm) is used, the joints of the sheet metal edge must be flashed using QuickSeam Flashing and TPO QuickPrime, after the primary flashing is complete. In addition, it is recommended that 3" (76 mm) TPO QuickSeam Splice Tape be placed in the sheet metal laps to help seal the metal edge.



**UltraPly TPO QuickSeam Flashing should be warmed and rolled to conform into any step-offs it covers.**

**L. SPECIAL CONSIDERATIONS FOR COPPER EDGING:**

Copper may be weathered or coated with an anti-tarnish lacquer which makes adhesion difficult. Therefore, cleaning techniques must be used to prepare the copper surface to receive the TPO QuickSeam Flashing. Firestone requires that the copper be scrubbed with acetone or lacquer thinner, using clean cotton cloths. Cleaning before installation is recommended, however, cleaning can take place after metal is attached if care is taken not to allow the solvents to come into contact with the membrane. After the cleaner dries, apply TPO QuickPrime and TPO QuickSeam Flashing per Firestone Specifications.

**M. EQUIPMENT SUPPORT SYSTEMS:**

Installation of the Firestone Red Shield Pipe Support System is designed to take the loads of the roof top equipment and preserve the integrity of the roofing system.

1. Layout material per job details.
2. Clean roof membrane, move ballast if needed.
3. If required for the roof system, fully adhere or mechanically attach isolation pads by securing through the roof per Firestone guidelines.
4. Install and secure bases on pads.
5. Place support assembly on bases and adjust as needed for proper elevation and slopes to support equipment.

## 2.14 MEMBRANE REPAIR

1. Repair a puncture in the Firestone UltraPly TPO Membrane with like material. The repair must extend a minimum of 2" (50.8 mm) beyond the boundary of the affected area in all directions. Round all corners of the repair piece. Example: A pinhole will require a minimum 4" x 4" (101.6 mm x 101.6 mm) patch.
  - a) Clean the Membrane:
  - b) When repairing Firestone UltraPly TPO Membrane that has been in service for some time, it is necessary to remove accumulated field dirt. Proper membrane preparation is made by scrubbing the membrane with a scrub brush and warm soapy water, and then rinsing with clear water and drying with clean cotton cloths. (For membrane with a significant accumulation of dirt, cleaning with acetone and a clean cotton cloth may be required). Firestone SW-100 may then be used.

## 2.15 TEMPORARY CLOSURE AND TIE-INS (NOT WARRANTED BY FIRESTONE)

Temporary closures and tie-ins which assure that moisture does not damage any completed section of the new roofing system are the responsibility of the licensed applicator. Completion of flashings, terminations and temporary closures is required to provide a watertight condition.

## 2.16 ROOF WALKWAYS

### A. LAY OUT FIRESTONE ULTRAPLY ECO WALKWAY PADS:

Install walkway pads in locations as specified by the project designer and in accordance with the System Design Guide Section of this Manual. Layout Firestone UltraPly Eco Walkway Pads so that the flat surface is over the completed UltraPly Membrane, spacing each pad a minimum of 1" (25.4 mm) and a maximum of 3" (76 mm) from each other to allow for drainage.

### B. ATTACH FIRESTONE FIRESTONE TPO WALKWAY PADS TO THE MEMBRANE:

1. Clean the Membrane:

Clean the membrane using Firestone Splice Wash SW-100.
2. Place Firestone Eco Walkway Pad and hot air weld the perimeter in place.

## 2.17 SHEET METAL WORK

For specific installation instructions or requirements of Firestone Sheet Metal, refer to the System Design Guide and Technical Information Section of this manual. For sheet metal work not supplied by Firestone, refer to fabrication and installation requirements specified by the project designer, as well as industry standards.

## **2.18 CLEAN UP**

If required by the specifier to ensure the aesthetics of the Firestone UltraPly membrane, (i.e., hand prints, footprints, general traffic grime, industrial pollutants and environmental dirt), the membrane may be cleaned by scrubbing with soapy (non-abrasive soap) water and rinsing the area completely with clean water. Firestone Splice Wash (SW-100) can also be used sparingly to clean the membrane.

**END OF SECTION**