

I. General

1.01 Description of the TPO Mechanically Attached System

The Mechanically Attached System is a TPO system whereby the membrane is mechanically fastened to the roof deck using a batten bar. The batten bar is mechanically fastened refer to fastening diagram for requirements. Seams are to be heat welded.

1.01-1

The Mechanically Attached System must be installed in strict accordance with specifications approved by International Diamond Systems, Toledo, Ohio.

1.01-2

The Mechanically Attached System must be installed using recognized safety procedures and standards for the products used. Material Safety Data Sheets will be provided as prescribed by law.

1.02 Submittals

1.02-1

A dimensional drawing of the overall roof showing penetrations, drains, perimeter details, etc. must be furnished to IDS. Flashing details as used must be done according to approved details in this manual.

1.02-2

No deviation shall be made from IDS specifications or the approved roof drawings without prior written permission of IDS.

1.02-3

When field conditions require changes, Qualified Contractors are to supply IDS with as-built construction drawings.

1.03 Material Storage an Handling

1.03-1

Keep all materials stored in their original unopened containers.

1.03-2

Keep all containers of adhesives, cleaners, and primers in areas away from sparks, open flames and excessive heat. Always use proper

protective equipment when handling hazardous materials.

1.03-3

Store all materials between 60 and 80 degrees F. Start work with adhesives, sealants and tape products at temperatures between 60 and 80 degrees F.

1.03-4

Store all adhesives, sealants and tape products in a dry area protected from water and direct sunlight. Damaged material will be replaced at the contractors expense.

1.03-5

Material installation during periods of high ambient temperatures, typically above 90°F, can result in poor installation quality due to condensation on the membrane surface, and excessively fast adhesive drying rates.

1.03-6

Material installation during periods of low ambient temperatures, typically below 30°F, can result in poor installation quality due to increased material stiffness and vulnerability to damage and excessively slow adhesive drying rates. To avoid these problems:

1. Store accessory materials in a warming box.
2. Use as soon as possible
3. Allow adhesives to properly cure
4. Adjust welder settings to insure proper welds for applicable ambient conditions.

1.04 Site Conditions

1.04-1

Do not install directly onto low melting point asphalt.

1.04-2

Do not allow waste products (petroleum, grease, oil, solvents, animal fat, etc.) or direct steam to come in contact with the IDS System. Present any exposures not typical for normal installation to IDS for assessment of impact to the roof systems total performance.

1.04-3

Do not install EPS roof insulation directly onto coal-tar roof surface.

1.04-4

Protect all material and components from direct contact with steam or heat sources in excess of 180 degrees F.

1.04-5

Splicing and bonding surfaces must be clean and dry.

1.04-6

Adhesives, sealants and primers and their fumes contain petroleum distillates and therefore are *Extremely Flammable*. Do not breathe vapors for extended periods. Avoid use near fire or other heat sources. Do not place open containers near fresh-air intake ventilators. Consult container labels and Material Safety Data Sheets for specific information.

1.04-7

Roof surface must be free of ponded water, ice and snow prior to application. The roof surface should be designed to be water-free within 48 hours after precipitation.

1.04-8

Do not apply IDS roof systems in inclement weather. High humidity at lower temperatures may cause moisture to condense and freeze. Do not apply systems when these conditions exist.

1.04-9

The minimum roof slope will be determined by the building owner or his designee. IDS recommend a minimum roof slope of 1/8 inch per horizontal foot.

1.05 Quality Assurance

1.05-1

IDS roofing materials must be applied by an approved applicator. It is the building owner's responsibility to select a qualified, approved contractor. International reserves the right to refuse approval.

1.05-2

As IDS reserves the right to revoke approval without notice, it is the building owner's responsibility to verify his qualified roofer's status.

1.05-3

If a warranty is requested, the approved applicator must certify that all IDS products have been installed according to applicable specifications and details. After certification, an IDS technical representative will visually inspect the roofing system and materials. This inspection is not certification that all conditions on the roof and all elements of the roofing system are in conformance with IDS specifications. IDS is not responsible for the products of others or conditions not discoverable by visual inspection.

1.05-4

It is the building owner's responsibility to have sufficient knowledge to interpret all specifications in this manual.

1.05-5

These specifications are in lieu of all other specifications, written or implied.

1.05-6

Building codes are above and beyond the intended purpose of these specifications. IDS cannot be responsible for adherence to local building codes. It is the responsibility of the building owner or his designee to notify IDS of local requirements.

1.06 Warranty

1.06-1

A membrane systems warranty is available for commercial and industrial buildings within the United States and Canada and applies only to the products supplied by IDS.

1.06-2

Installation subjected to conditions not typical are not warrantable.

1.06-3

IDS is not responsible for the cleanliness or the discoloration of the roofing membrane caused by conditions including, but not limited to, dirt, pollutants or biological agents. IDS is not responsible for acts of God or vandalism, etc.

1.06-4

IDS assumes no liability for internal moisture. Changes or repairs made to the roofing system without prior written authorization from IDS will void the warranty.

1.06-5

To obtain the IDS warranty, fill out the Request for Warranty form certifying the roof has been installed according to IDS specifications and that the building owner or his designee have approved all specifications.

1.06-6

The roofing contractor is responsible for workmanship for a period of two (2) years from the issue date of the warranty.

1.06-7

For more detailed information, please refer to the warranty section of this manual.

II. Products

2.01 Product Statement

2.01-1

All components of the Mechanically Attached system are to be products of IDS or accepted and approved, in writing, by IDS.

2.01-2

Products by other manufacturers are not covered by the IDS warranty. See Full System Warranty for exception.

2.02 Membrane

2.02-1

IDS TPO, .045 or .060 inches thick is available in widths of 10 feet and in lengths of 100 feet.

2.03 Insulation

2.03-1

A minimum of ½" of approved insulation board must be placed over the existing substrate. Insulation that is placed directly onto metal deck must be of proper density and thickness to support normal traffic and meet building and fire codes.

2.03-2

Install only as much insulation as can be covered and completed before the end of the day or before inclement weather.

2.03-3

Stagger insulation joints when installing multiple layers.

2.03-4

Contact IDS for specific insulation restrictions.

2.04 Fasteners

2.04-1

On-site tests should be performed by an independent laboratory to determine the actual pullout values of possible fasteners.

2.04-2

Refer to TPO Membrane Attachment tables.

Note: Only domestic steel fasteners are approved for use with IDS roofing systems. All fasteners must be tested and approved by Factory Mutual prior to approval for use by IDS. Contact IDS for complete list of approved fasteners.

2.05 Attachment Plates

2.05-1

Insulation plates and fasteners must be tested by Factory Mutual and accepted by IDS prior to project bid and installation.

2.05-2

The Mechanically Attached System must be installed using International Batten Bars supplied by IDS. No other attachment bars are acceptable.

III. Execution

3.01 Inspection and Preparation for New Construction

3.01-1

It is the building owner or his designee's responsibility to provide adequate decking for the application of the IDS roofing system.

3.01-2

The roofing contractor shall confirm the structural integrity of the existing deck and specify replacement or repair as required.

3.01-3

Fluted metal decks require an overlayment rigid enough to withstand the traffic to which the roof may be subjected.

3.01-4

New membrane substrate must be clean, dry, smooth, and free of sharp edges, loose or foreign materials. Gaps greater than ¼ inch must be filled with appropriate material.

3.01-5

Wood nailers shall be pressure treated #2 lumber or better. Wood nailers treated with asphalt or creosote are not acceptable.

3.02 Roof Deck Criteria

3.02-1

The roofing contractor shall confirm the structural integrity of the roof deck and replace or repair as required.

3.02-2

22 Gauge metal

Due to the fluted design of most metal decks, a specific effort is required to insure ¾ inch deck penetration by all fasteners. Pre-bid investigation of deck alignment, physical conditions and rib depth is recommended. Refer to chart for pull out resistance.

3.02-3

Structural concrete

Rated at 3000 psi or greater, into which at least 1 inch penetration is possible. Fasteners must penetrate the deck a minimum of 1 inch and a maximum of 1 ½ inches. Structural concrete requires the drilling of pilot holes.

Due to wide variations in “structural concrete”, only on-site trial of drill bits and fasteners can determine compatibility. Pull-out resistance of 800 pounds minimum is required.

3.02-4

Cement-Wood Fiber and Gypsum

Use IDSs’ Liquid Auger Seal Screw. Pull-out resistance of 360 pound minimum required.

3.03 Execution (Retrofit)

3.03-1

All wet insulation and substrate must be removed. Depressions or holes must be filled with an appropriate material.

3.03-2

Sprayed in-place urethane foam is not an approved substrate for IDS systems.

3.03-3

When re-roofing over single-ply membranes:

A. Cut and ventilate the existing membrane to avoid moisture build up.

B. Substrate must be dry, clean, smooth, and free of sharp edges, loose and foreign material.

C. A minimum ½ inch recovery board or approved insulation is required.

3.03-4

IDS recommends consulting the S.P.R.I.’s most recently published guidelines for retrofitting existing roof systems.

3.03-5

When re-roofing over existing BUR:

A. A minimum ½ inch recovery board or approved insulation is required.

B. IDS requires all gravel surfaces be vacuumed or power broomed for removal from the substrate. This will eliminate the excess weight and avoid vertical instability of the recovery board or insulation, which could result in the attachment screw penetrating the membrane.

C. Before final application of the system the substrate must be dry, clean, smooth, and free of sharp edges, loose and foreign material.

3.04 Tear – Off

3.04-1

The roofing contractor must confirm the structural integrity of the roof deck and repair or replace as required.

3.04-2

It is the building owner or his designees responsibility to provide adequate decking for the application of IDS systems.

3.04-3

Fluted metal decks require an overlayment rigid enough to withstand the traffic to which the roof may be subjected.

3.04-4

Tear off all existing material. The substrate must be dry, clean, smooth, and free of sharp edges, loose and foreign material. Gaps greater than ¼" must be filled with appropriate material.

3.04-5

All decks must meet or exceed Factory Mutual pull-out test requirements.

3.05 Installation of the Mechanically Attached System

A. Placement

1. Place roof membrane so that wrinkles and buckles are not formed. Any wrinkles or buckles must be removed from the sheet prior to permanent securement. Roof membrane shall be mechanically fastened after it is rolled out, followed by welding to adjacent.

2. Full-width rolls shall be installed in the field of the roof.

3. Half-width rolls shall be installed in the perimeter region of the roof. Width of the roof perimeter region shall be determined in accordance with the Perimeter Half Sheet Table located on page 12.

4. Overlap roof membrane a minimum of 5" for side laps of mechanically attached systems, and a minimum of 3" for end laps. Membranes are provided with a lap line along the side laps, the inside line is for mechanically attached system overlaps (6" for TPO) and the other line is for adhered and ballasted systems overlap.

5. Install membrane so that the laps run across the roof slope lapped toward drainage points. On metal decking, install sheets perpendicular to deck direction so that fasteners will penetrate the top flanges and not the flutes, however, there will be limited areas of the roof (i.e. perimeter areas) where this is not practical. All exposed sheet corners shall be rounded a minimum of 1".

6. Overlap roof membrane a minimum of 3" for end laps of TPO membrane. End laps for fleece-back membranes are made by butting adjacent sheets and heat welding an

8" wide TPO reinforced membrane flashing strips over the joints.

B. Securement

1. Roof membrane shall be mechanically fastened in the side lap area to the roof deck with fasteners and plates of a type and spacing appropriate to the deck type and as required by the Membrane Attachment Table.

2. The metal plates must be placed within ¼" – ¾" of the membrane edge. Plates must not be placed closer than ¼" to the membrane edge.

3. Fasteners must be installed to achieve the proper embedment depth. Install fasteners vertical to the deck, without lean or tilt.

4. In the corner regions, additional fasteners will also be installed through the perimeter half-width membrane rolls to form a grid pattern, with an 8" wide reinforced membrane flashing strip heat-welded over the additional fasteners. "Corners" include both outside and inside corners that measure 75-105 angle degrees. Perimeter cap sheets may overlap one another in the corner areas.

5. Mechanically attach membrane with screws and plates to the roof deck at locations of deck angles changes in excess of 5 angle degrees (1" in 12").

6. Membrane may be heat welded to coated metal flanges. Membrane must be secured to the roof deck within 6" of the base of walls and curbs, at the perimeter, and all penetrations with #15 commercial roofing fasteners and plates of a type and spacing in accordance with in-lap attachment requirements, with a 12" on center maximum spacing. Alternatively, membrane may be extended vertically 3" up walls and curbs and secured to the wall/curb substrate within 2" of the plane of the roof with #15 commercial roofing fasteners and inverted Termination Bar of type and spacing in accordance with in-lap attachment requirements, with 12" on center maximum spacing. This detail if required to be used for pressurized buildings.

7. Install fasteners so that the plate is drawn down tightly to the membrane surface. Properly installed fasteners will not allow the plate/termination bar to move (underdriving), but

will not cause wrinkling of the membrane (overdriving).

C. Field Seaming

1. Fabricate field seams using a current-generation automatic hot air welding machine and a 10,000 watt voltage-controlled generator minimum. In addition, fabricate detail seams with automated hot air welders where possible. Outdated welding equipment and inadequate/fluctuating electrical power are the most common causes of poor seam welds.

2. Equipment Settings-The correct speed and temperature settings for automatic welders are determined by preparing test welds at various settings. The welds are tested by application of pressure, causing the seam to peel apart. A satisfactory weld will fail by exposing the scrim reinforcement called a "film tearing bond." A deficient weld fails by separating between the two layers of the membrane.

3. Adjustments to Equipment Settings-Many factors will affect the settings: thicker membranes, lower air temperatures, and overcast skies will generally require a slower speed than would be required with thinner membranes, higher air temperatures, and sunny skies. The slower speed provides additional heat energy to compensate for heat-draining conditions. The test weld procedure should be conducted at the beginning of every work period (i.e. morning and afternoon) and following a significant change in weather (i.e. air temperature, wind speed, cloud cover).

4. Membrane laps shall be heat-welded together. All welds shall be continuous, without voids or partial welds. Welds shall be free of burns and scorch marks.

5. Weld width shall be a minimum 1-1/2" in width for automatic machine welding. Weld width shall be a minimum 2" in width for hand welding.

6. All cut edges of TPO reinforced membrane must be sealed with TPO Cut Edge Sealant.

D. Membrane Surface Preparation

1. Membrane must be clean of dirt and contaminants, and free from dew, rain, and other sources of moisture. Factory-fresh membrane typically will not require cleaning prior to automatic welding, provided that welding is performed immediately after placement and securement of the membrane.

2. Membrane that has been exposed for over 12 hours or has become contaminated will require additional cleaning methods.

3. Light Contamination-Membrane that has been exposed overnight up to a few days to airborne debris, foot traffic, or dew or light precipitation can usually be cleaned with a white cloth moistened with TPO Cleaner. Be sure to wait for solvents to flash off prior to welding.

4. Dirt-Based Contamination-Membrane that is dirt-encrusted will require the use of a low-residue cleaner such as Formula 409 and a mildly abrasive scrubbing pad to remove the dirt. This must be followed by cleaning with a white cloth moistened with TPO Cleaner. Be sure to wait for solvent to flash off prior to welding.

5. Exposure-Based Contamination-Membrane that is weathered/oxidized will require the use of TPO Cleaner and a mildly abrasive scrubbing pad to remove the weathered/oxidized top surface layer. This must be followed by cleaning with a white cloth moistened with TPO Cleaner. Unexposed membrane left in inventory for a year or more may need to be cleaned as instructed above. Be sure to wait for solvent to flash off prior to welding.

6. Chemical-Based Contamination-Membrane that is contaminated with bonding adhesive, asphalt, flashing cement, grease and oil, and most other contaminants usually cannot be cleaned sufficiently to allow an adequate heat weld to the membrane surface. The membrane should be removed and replaced in these situations.

3.06 Flashing Installation

A. General

1. Flash all perimeter, curb, and penetration conditions with coated metal,

membrane flashing, and flashing accessories as appropriate to the side condition.

2. All coated metal and membrane flashing corners shall be reinforced with pre-formed corners or unreinforced membrane.

3. Heat weld all flashing membranes, accessories, and coated metal together to achieve a minimum 2" wide (hand welder) weld. A minimum 1.5" will be acceptable when using robotic welders.

4. All cut edges of reinforced TPO membrane must be sealed with TPO Cut Edge Sealant.

5. When using bonding adhesive, be sure to use adhesive specific to membrane type.

6. Minimum flashing height is 8".

B. Coated Metal Flashing

1. Coated metal flashing allows much of the metal-work used in typical roofing specifications to benefit from the security of heat-welded membrane seaming, with a corresponding reduction in required metalwork maintenance during the life of the roofing system.

2. Coated metal shall be formed in accordance with construction details and SMACNA guidelines.

3. Coated metal sections used for roof edging, base flashing, and coping shall be butted together with a ¼" gap to allow for expansion and contraction. Heat weld a 6" wide unreinforced membrane strip to both sides of the joint, with approximately 1" on either side of the joint left unwelded to allow for expansion and contraction. 2" wide aluminum tape can be installed over the joint as a bond-breaker, to prevent welding in this area.

4. Coated metal used for sealant pans and scupper inserts, and corners of roof edging, base flashing and coping shall be overlapped or provided with separate metal pieces to create a continuous flange condition, and pop-riveted securely. Heat weld a 6" wide reinforced membrane flashing strip over all seams that will

not be sealed during subsequent flashing installation.

5. Coated metal base flashings must be provided with min. 4" wide flanges nailed to wood nailers. Coated metal base flashings must be formed with a 1" cant.

6. Provide a ½" hem for all exposed metal edges to provide corrosion protection and edge reinforcement for improved durability.

7. In addition, provide a ½" hem all metal flange edges whenever possible to prevent wearing of the roofing and flashing membranes at the flange edge.

8. Coated metal flashings are nailed to treated wood nailers or otherwise mechanically attached to the roof deck, or to the wall or curb substrate, in accordance with construction detail requirements.

9. When installing coated metal on walls or curbs that completely cover the existing flashing, the flashing does not need to be removed provided that it is in good condition and tightly adhered.

C. Adhered Reinforced Membrane Flashings – Smooth Surface.

1. The thickness of the flashing membrane shall be the same as the thickness of the roofing membrane.

2. When using IDS TPO adhesive or Spray Max 420, use any one of the following substrates: polyisocyanurate insulation (w/o foil facer), Dens Deck Prime, cured structural concrete absent of curing and sealing compound, untreated OSB, untreated CDX plywood, Type X gypsum board, and dry, sound masonry absent of curing or sealing compounds.

3. Apply two applications of Spray Max 420 to both membrane and substrate.

4. Apply the adhesive only when the outside temperature is above 40°F. Recommended minimum application temperature is 50°F to allow easier adhesive application.

5. The membrane flashing shall be carefully positioned prior to application to avoid wrinkles and buckles.

6. When installing fleece back membranes to a vertical surface, the material should be fixed at the top of the sheet upon placement to avoid slippage. Top attachment should be installed immediately after the flashing for best results.

7. All laps in smooth-reinforced flashing membrane shall be heat welded in accordance with heat welding guidelines.

8. Porous substrates may require double application of adhesive.

9. For extended warranty lengths, separate counterflashing or cap flashing is required; exposed termination bars are not acceptable.

D. Loose Reinforced Membrane Flashing

1. For extended warranty lengths, separate counterflashing or cap flashing is required; exposed termination bars are not acceptable.

2. Carefully position the smooth reinforced flashing membrane prior to application to avoid wrinkles and buckles.

3. All laps in smooth reinforced flashing membrane shall be heat welded in accordance with heat welding guidelines.

4. Maximum flashing height is 18" unless incremental attachment is used.

E. Unreinforced Membrane Flashing

1. Unreinforced membrane is used as field-fabricated penetration/reinforcement flashing only where pre-formed corners and pipe boots cannot be properly installed.

2. Penetration flashings constructed of unreinforced membrane is typically installed in two sections, a vertical piece that extends up the penetration, and a horizontal piece that extends onto the roofing membrane. The two pieces are overlapped and heat-welded together.

3. The unreinforced vertical membrane flashing may be adhered to the penetration

surface. Apply two coats of Spray Max 420 or IDS TPO adhesive to both the penetration surface and the underside of the flashing membrane.

4. The penetration is finished with Water Cut-Off between the pipe and the membrane, install clamping band, and caulk.

F. Roof Edging

1. Roof edge flashing is applicable for both gravel stop/drip edge conditions as well as exterior edges of parapet walls.

2. Flash roof edges with membrane-coated metal flanged edging with minimum 3" wide flange nailed 4" on center to wood nailers, and heat weld roof membrane to metal flanges.

3. Coated metal roof edging must be provided with a continuous metal hook strip to secure the lower fascia edge if the fascia width is 4" or greater. The continuous hook strip must be secured to the building a minimum of 12" on center.

4. Alternatively, flash roof edges with a 2-piece snap-on fascia system, adhering roof membrane to metal cant with Spray Max 420 and face nailing the membrane 8" on center prior to installing the snap-on fascia.

5. Galvanized metal edging may be flashed using TPO Cover Strip after priming both the metal and the TPO membrane for warranty lengths up to 15 years. Allow approximately 2" of tape to cover the metal edge with the remaining 3" of tape onto the TPO membrane. All T-joints and tape overlaps shall be covered with T-joint covers. Caulk all corners, tape overlaps and T-joints per published standard details. Caulk the back edge of the tape with caulking when slope exceeds 1" in 12".

6. Flash roof edge scuppers with a scupper insert of coated metal that is mechanically attached to the roof edge and integrated as part of the metal edging.

G. Parapet and Building Walls

1. Flash walls with loose-applied membrane flashing, membrane flashing applied to the wall substrate with Spray Max 420, or with

coated metal flashing fastened with fasteners 12" on center to wood nailers.

2. Secure membrane flashing at the top edge with a termination bar. Water Cut-Off shall be applied between the wall surface and membrane flashing underneath all termination bars. Exposed termination bars shall be mechanically fastened 6" on center; termination bars that are counterflashed shall be fastened 12" on center.

3. Roof membrane must be mechanically attached along the base of walls that are flashed with membrane flashing with screws and plates/termination bar at a fastener spacing in accordance with in-lap attachment requirements, with a 12" on center maximum spacing.

4. Metal counterflashings may be optional with fully adhered membrane wall flashings depending on guarantee duration. All termination bars must be sealed with caulking.

5. Flash wall scuppers with a scupper insert of coated metal that is mechanically attached to the wall and integrated as part of the wall flashing. Refer to scupper section for other detail options.

6. Maximum flashing height without intermediate fastening:

- *18" – Loose-Applied Flashing
- * 54" – Adhered Flashing

7. Metal cap flashings shall be provided with a continuous clip fastened 12" o.c.

H. Round and Square Tube Penetrations.

1. Flash penetrations with pre-formed vent boots provided that the penetrations are accessible from the top. Otherwise, field-fabricated flashing with two-piece field fabricated flashings of unreinforced membrane.

2. All flashings require the installation of a stainless steel draw band around the top of the flashing. Seal the top edge with Water Cut-Off and add draw band with caulking.

3. Roof membrane must be mechanically attached at the base of each penetration with screws and plates a maximum of 12" on center,

with a minimum of four fasteners per penetration.

I. Irregularly-Shaped Penetrations.

1. Flash irregularly shaped penetrations with flanged sealant pans formed of coated metal, secured to the deck through the roof membrane with screws 6" on center, a minimum of two per side.

2. Strip in metal flanges and the vertical pop riveted seam with 8" wide membrane flashing strips heat welded to both the roof membrane and the metal flanges.

3. Fill sealant pans with 2-part Pourable Sealant. Fill sealant pans with non-shrink quick-set grout, and top off sealant pans with a 2" minimum thickness of 2-part Pourable Sealant.

J. Curbs and Ducts

1. Flash curbs and ducts with loose-applied membrane flashing, membrane flashing applied to the curb substrate with Spray Max 420 or with coated metal flashing fastened 4" on center to wood nailers.

2. Secure membrane flashings at the top edge with a termination bar. Water Cut-Off shall be applied between the curb/duct surface and membrane flashing underneath all termination bars. Exposed termination bars shall be mechanically fastened 6" on center; termination bars that are counterflashed shall be fastened 12" on center. If wood is present at the top of the curb, install ring shanks 12" on center. This can be used in lieu of the bar if nailed on the top or preferably the back side of the wood.

3. Roof membrane must be mechanically attached along the base of curbs and ducts that are flashed with membrane flashing with screws and plates/termination bar at 12" on center.

4. All coated metal curb flashings and loose membrane flashings must be provided with separate metal counterflashings, metal coping, or flashed with equipment flanges.

5. Metal counterflashings may be optional with fully adhered membrane curb and duct flashings depending on guarantee duration. All termination bars must be sealed with caulking.

K. Expansion Joints

1. Install prefabricated expansion joint covers at all flat type and raised cant/curb type expansion joint conditions. All metal nailing strips must either be nailed to wood nailers, cants or curbs, or secured to walls with screws or expansion anchors appropriate to substrate type.

2. Roof membrane must be mechanically attached along the base of raised cant/curb expansion joints with screws, and plates a minimum 12" on center.

3. Expansion joint bellows must be twice the width of the expansion joint opening to allow for proper expansion/contraction.

4. Metal nailing strip must be set in Water Cut-Off and secured with fasteners and neoprene washers fastened 6" o.c.

5. Alternately, expansion joints may be field fabricated.

L. Roof Drains

1. Roof drains must be fitted with compression clamping rings and strainer baskets. Both original-type cast iron and aluminum drains, as well as retrofit-type cast aluminum and molded plastic drains, are acceptable.

2. Roof drains must be provided with a min. 36"x36" sumped area. Slope of tapered insulation within the sumped area shall not exceed 4" in 12".

3. Extend the roofing membrane over the drain opening. Locate the drain and cut a hole in the roofing membrane directly over the drain opening. Provide a ½" of membrane flap extending past the drain flange into the drain opening. Punch holes through the roofing membrane at drain bolt locations.

4. For cast iron and aluminum drains, the roofing membrane must be set in a full bed of Water Cut-Off on the drain flange prior to securement with the compression clamping ring. Typical Water Cut-Off application rate is one 10.5 oz. cartridge per drain.

5. For fleece-backed roof membrane application, the fleece-backed membrane is cut just short of the drain flange. A separate smooth reinforced membrane drain flashing sheet is heat welded to the roofing membrane and set into the drain above in a full bed of Water Cut-Off and secured as above.

6. Lap seams shall not be located within the sump area. Where lap seams will be located within the sump area, a separate smooth reinforced membrane drain flashing a minimum of 12" larger than the sump area must be installed. The membrane flashing shall be heat welded to the roof membrane. Alternately, if the seam does not run under the clamping ring, it can be covered with a 6" wide reinforced membrane strip heat welded to the membrane.

7. Tighten the drain compression clamping ring in place.

M. Scuppers

1. Coated metal roof edge scuppers must be provided with a min. 4" wide flange nailed to wood nailers, with hemmed edges and secured with continuous clips in accordance with the gravel stop assembly.

2. Coated metal wall scuppers must be provided with 4" wide flanges, with additional corner pieces pop-riveted to the flanges to create a continuous flange. All flange corners must be rounded.

3. Install wall scuppers over the roof and flashing membrane and secure to the roof deck/wall with fasteners 6" on center, a minimum of 2 fasteners per side.

4. All corners must be reinforced with TPO Universal Corners or field fabricated from unreinforced materials.

5. Strip in scupper with flashing membrane target sheet.

6. Alternately, a wall scupper box may be field flashed using unreinforced flashing membrane heat welded to membrane on the wall face and roof deck and terminated on the outside wall face and roof deck and terminated on the outside wall face with a termination bar, water cut-off, and caulk.

N. Heater Stacks

1. Field-fabricated two-piece membrane flashings of unreinforced flashing are typically installed at heater stacks.

2. Heat stacks must be equipped with either cone-shaped or vertical tube-type flashings sleeves so that the membrane flashing is not adhered directly to the heater stack.

3. Mechanically attach the roof membrane to the structural deck with screws and plates around the penetration base prior to flashing installation. Fasteners shall be installed 12" on center or a minimum of 4 per penetration.

4. All stack flashings must be secured at their top edge by a stainless steel clamping band over water cut-off and sealed with caulking.

5. Field-fabricated membrane flashings may be adhered to the flashing sleeve with Spray Max 420 or IDS TPO bonding adhesive.

O. Wood Support Blocking

1. Wood support blocking, typically 4"x4", typically installed under light-duty or temporary roof-mounted equipment, such as electrical conduit, gas lines, condensation and drain lines.

2. Install wood support blocking over a protective layer of TPO membrane or walkway pad.

P. Satellite Dish Support Bases

1. Install satellite dish support bases over a protective layer of walkway pad.

Q. Lightning Suppression Clips

1. Alternatively, secure lighting suppression clips to the roof surface by means of 2" wide TPO flashing membrane strips heat welded to the roof membrane.

3.07 Traffic Protection

A. Walkway rolls must be installed at all roof access locations including ladders, hatchways, stairs and doors. Install walkway rolls at other designated locations including roof-

mounted equipment work locations and areas of repeated rooftop traffic.

B. Walkway rolls must be spaced 2" allow for drainage between the pads.

C. Heat weld walkway rolls to the roof membrane surface continuously around the walkway pad perimeter.

D. TPO walkway rolls may also be installed with TPO primer and seam tape. First, roll or brush the TPO primer on the back of the TPO pad along the edges and down the membrane where the pad will be installed. Install tape to the back of the pad where cleaned (edges and middle) and roll in with a silicone hand roller. Remove the release paper and install the taped pads directly onto the roof membrane. Secure the pads by rolling into place.

3.08 Temporary Closures

A. The roofing installation must be made watertight at the end of each day's activity to prevent water infiltration into the completed roofing system installation.

B. Complete all flashings and terminations as the roofing installation progresses.

C. At the edge of the completed roofing system installation, extend the roofing membrane a minimum of 6" beyond the edge. Seal the roofing membrane to the surrounding deck or substrate surface with hot asphalt or foam sealant.

D. Remove all temporary night seal materials prior to continuing with the roof installation and dispose of properly.

3.09 Field Quality Control

A. Inspect completed roof section on a daily basis. It is the contractor's responsibility to probe all heat-welded seams and perform an adequate number of seam cuts to ascertain seam consistency.

B. Immediately correct all defects, irregularities, and deficiencies identified during inspections.

C. Remedial work shall be performed with like materials and in a manner consistent with

the balance of the roofing installation so as to minimize the number of repair patches.

D. Excessive patchwork will require replacement of the entire affected membrane section, from lap to lap.

3.10 Cleaning

A. Remove Spray Max 420, bituminous markings and other contaminants from finished surfaces. In areas where finished surfaces are soiled by asphalt or any other source of soiling caused by work of this or other sections, consult manufacturer of surfaces for cleaning advice and conform to those instructions.

B. Cut out and remove any sheet membrane contaminated with solvent-based adhesive, bituminous markings, and other contaminants from finished surface. Repair sheet damage by first cleaning the area with an all-purpose cleaner, then rinse off soapy residue. Reactivate membrane using the appropriate cleaner, wiping with a damp (not saturated) rag. Complete repair by installing a patch of like material to specific system requirements.

3.11 Maintenance

A. Upon completion of the roofing system, provisions should be made to establish a semi-yearly inspection and maintenance program in accordance with standard good roofing practice guarantee requirements.

B. Repair cuts, punctures and other membrane damage by cleaning membrane followed by heat welding a membrane repair patch of sufficient size to extend a minimum of 2" beyond the damaged area. If heat welding to the top surface of the existing membrane is ineffective, the patch must be heat welded to the underside of the existing sheet after proper preparation.

C. Any damage to adhered membrane areas or at locations of mechanical attachment shall be repaired so that the repaired area remains fully adhered or mechanically attached.

Building Width	Building Height	Number of IDS TPO 60" Half Sheets
<200'	0-34	1
	35-100'	2
	>100'	Formula: Install half sheets throughout the perimeter and corner region. The width of this region is defined as the least of the following two measurements: 0.1 x building width or 0.4 x building height NOTE: the Minimum width is 4'
≥200	any height	