IKO Innovi™ TPO Cold Storage Roofing System

Section 07 54 23
Thermoplastic Polyolefin (TPO) Membrane Roofing

This specification is not intended to substitute for specific design services provided by an architect, engineer, roof consultant, or other design professional. IKO does not perform either architecture or engineering, and it is in the building owner's interest to consult with a design professional prior to executing the specified project. The information in this document is based upon data considered to be true and accurate and is offered solely for the user's consideration, investigation and verification. The building owner will ultimately assume the entire risk as to results, quality and performance of the roofing system specified. Nothing contained herein is representative of a warranty or guarantee for which IKO Industries can be held legally responsible.

NOTE TO SPECIFIER:
In order to complete this document, items Red in color require your review and selection of text that is appropriate, and removal of text that is inappropriate to the project information and intended roofing system specific to your project. It is the sole responsibility of the Specifier to exercise appropriate care and sound professional judgment in the execution of this task.

This page may be deleted. Specification Section 07 54 23 begins on following page.

PART 1 – GENERAL

1.1 SUMMARY *[add or delete items as needed]*

A. Furnish and install an adhered thermoplastic polyolefin (TPO) membrane cold storage roofing system from a single-source manufacturer. Cold storage facilities include buildings operating under a maintained interior temperature of 50 degrees Fahrenheit (**coolers**) or below 32 degrees Fahrenheit (**freezers**).

B. The roofing applicator is responsible to dispose of roofing-related demolition debris and construction waste. Manner of disposal must comply with applicable federal, state, provincial, and local regulations.

C. Comply with the published instructions regarding material handling, storage, and installation as provided by the roofing membrane manufacturer ("Manufacturer," hereafter), at www.IKO.com/innovi.

D. Commencement of work by the Contractor shall constitute their acknowledgement that this specification may be satisfactorily executed under the project conditions, and that they have met all pre-work requirements for warranty of the completed roofing system by the Manufacturer.

E. It is the roofing applicator's responsibility to read and comply with the entire specification for this section of the project's work. Failure to properly examine this specification and all other related project documents is not cause for any modification of the Contract Sum.

1.2 RELATED SECTIONS *[add or delete items as needed]*

A. Section 06 10 00 - Rough Carpentry.

B. Section 07 22 00 – Roof and Deck Insulation.

C. Section 07 62 00 - Sheet Metal Flashing and Trim.

D. Section 07 71 00 – Roof Specialties.

E. Section 07 72 00 - Roof Accessories.

F. Section 08 62 00 - Unit Skylights.

G. Section 22 10 00 - Plumbing Piping and Roof Drains.

1.3 REFERENCES *[add or delete items as needed]*

A. Referenced Standards: These standards form part of this specification only to the extent they are referenced as specification requirements.
1. ASTM C 1177/C 1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2004.
2. CAN/ULC S-704.1 Standard for Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced; 2017.
3. ASTM C 1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2013.
4. ASTM C 1549 - Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer; 2009.
5. ASTM D 638 - Standard Test Method for Tensile Properties of Plastics; 2010.
6. ASTM D 1004 - Standard Test Method for Initial Tear Resistance of Plastic Film and Sheeting;

2009.
7. ASTM D 3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2000.
8. ASTM D6878/D6878M - Standard Specification for Thermoplastic Polyolefin Based Sheet Roofing; 2011a.
9. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2013a.
10. ASTM E 136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace At 750 Degrees C; 2012.
11. FM 1-28 - Design Wind Loads; Factory Mutual System; 2007.
12. FM 1-29 - Roof Deck Securement and Above Deck Roof Components; Factory Mutual System; 2006.
13. PS 1 - Construction and Industrial Plywood; 2009.
14. PS 20 - American Softwood Lumber Standard; 2010.
15. SPRI ES-1 - Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems; 2007. (ANSI/SPRI ES-1).

1.4 SUBMITTALS

A. Applicator Approval Verification: Submit letter or certificate from Manufacturer verifying applicator's status as an Approved Applicator to install the specified roofing system for the warranty type and term indicated elsewhere in the specification.

B. Product Data:

1. Submit Manufacturer's Product Data Sheets to show that all components of roofing system, including insulation, fasteners, plates, and all accessories necessary, comply with this specification.
2. If UL or FM data is required in this specification, submit documentation showing that the roofing system to be installed is UL-Classified or FM-approved, as applicable. Additionally, include UL or FM data for any individual roofing system items or components for which UL or FM data is available and applicable.
3. Submit Manufacturer's installation instructions. Wherever these instructions allow installation options, clearly indicate which option will be used by marking up the instructions.

C. Shop Drawings:

1. Submit Manufacturer's standard detail drawings as applicable to this specification and in accordance with Manufacturer's requirement for the warranty type and term indicated elsewhere in this specification.
2. Submit any details customized for this project for all relevant conditions.

D. Samples: Submit samples of each product to be used.

E. Warranty Application: Submit a copy of the Manufacturer's accepted and approved Warranty Application for this project.

F. Sample Warranty: Submit a sample of the Manufacturer's warranty of the type and term indicated elsewhere in this specification, prior to starting work.

G. Executed Warranty: Submit the Manufacturer's executed warranty for this project, upon substantial completion of the work.

1.5 QUALITY ASSURANCE

A. Applicator Qualifications: Roofing installer shall have the following:

1. Current IKO Approved Applicator status.
2. At least five years' experience in installing TPO roofing systems.
3. Capability to provide payment and performance bond to building owner. *[delete if this item does not apply to project]*

B. Pre-Installation Conference: Before commencing work, Contractor shall schedule and attend a meeting to review the proper installation of the specified roofing system and requirements to achieve the warranty.

1. Invite attendance of Architect, Roof Consultant, General Contractor, and any other parties directly influencing the quality of roofing work or affected by the performance of roofing work.

C. Cold Storage Facility Inspection: Anticipate dimensional changes in cold storage facilities due to settling, temperature fluctuations, and other factors. Conduct regular inspections to detect potential issues early, and perform preventive maintenance promptly to avert serious damage.

D. Cold Storage Installation: The cold storage roof system must be installed in compliance with cold storage details as specified by the designer and manufacturer. Ensure the design accommodates proper installation under various adverse job site conditions and select materials that are fully compatible with each other. IKO cold storage details may be found on https://www.iko.com/comm/technical-document-library/.

1.6 DELIVERY, STORAGE AND HANDLING

A. Roofing products should be delivered to the job site in Manufacturer's original containers, dry, undamaged, with seals and labels intact and legible.

B. Store materials clear of the ground and moisture, and with weather protective covering.

C. Keep combustible materials well away from sources of ignition.

1.7 WARRANTY

A. The installed roofing system must comply with all warranty procedures required by Manufacturer, including warranty application and inspection procedures.

B. Warranty: Provide warranty coverage equal to the IKO 5-year / 10-year / 15-year / 20-year / 25-year / 30-year Diamond Shield Limited Warranty, covering membrane, roof insulation, and roofing accessories.

C. Scope of Coverage:

1. Repair any leak in the roofing system caused by:
   a. Manufacturing defect.
   b. Defective workmanship used to install these materials.
   c. Ordinary wear and tear of the elements.
   d. Damage due to winds up to 55 / 72 / 80 / 90 / 100 mph.
2. Not Covered:
   a. Damage due to winds in excess of 55 / 72 / 80 / 90 / 100 mph.
   b. Damage due to hurricanes or tornadoes.

c. Hail.
d. Intentional damage.
e. Unintentional damage due to normal rooftop inspections, maintenance, or service.
f. Products not provided by the Manufacturer, unless where written approval of the Manufacturer is provided.

PART 2 – PRODUCTS

2.1 MANUFACTURER

A. Basis of Design: IKO Innovi TPO Roofing System, by IKO Industries, Inc., 6 Denny Road, Suite 200, Wilmington, DE 19809; www.IKO.com/innovi.

B. Roofing systems manufactured by others may be acceptable provided the roofing system is completely equivalent in materials and warranty conditions to the Basis of Design indicated above.

C. Substitution Procedures: See Instructions to Bidders.

2.2 TPO MEMBRANE

A. Membrane: Flexible, heat weldable sheet composed of thermoplastic polyolefin polymer, complying with ASTM D 6878, with polyester weft inserted reinforcement. Basis of Design: IKO Innovi TPO Membrane.

B. Membrane Thickness (nominal): 45 mil (1.14 mm) / 60 mil (1.52 mm) / 80 mil (2.03 mm).

C. Exposed Face Color: White / Grey / Tan

D. UL Listed and FM Approved.

E. Puncture Resistance: 265 lbf (1174 N), minimum, when tested in accordance FTM 101C Method 2031.

F. Initial Solar Reflective Index (SRI): White: 94 minimum. / Grey: 66 minimum.

G. Attachment: Fully Adhered with appropriate fasteners and plates.

H. Seams: Heat welded per Manufacturer's instructions.

I. Maximum TPO Sheet Width: 12'.

2.3 TPO ROOFING ACCESSORIES *[remove items that do not apply to project]*

A. General:

1. Accessory materials supplied or recommended by Manufacturer for intended use and compatible with Manufacturer's membrane roofing system.
2. Volatile Organic Compounds: Liquids shall meet VOC content limits of the authorities having jurisdiction.

B. Reinforced Sheet Flashing: Manufacturer's scrim reinforced membrane with same thickness and color as sheet membrane. Basis of Design: IKO Innovi TPO Membrane.

C. Non-reinforced Sheet Flashing: Manufacturer's unsupported membrane flashing with same color as sheet membrane. Basis of Design: InnoviFlash TPO Unsupported Flashing.

D. Insulation Adhesive: Manufacturer's two-component Low-VOC (<5 g/L) urethane adhesive for-

mulated to adhere roofing insulation to acceptable substrates. Basis of Design: IKO Millennium Insulation Adhesive / IKO Millenium PG-1 Pump Grade Two-Part Roofing Adhesive / IKO InnoviBond DUO Dual-Tank Adhesive.

E. Membrane Adhesive: Manufacturer's solvent based, Low VOC solvent based, or water based bonding adhesive formulated to adhere membrane and flashings to acceptable substrates. Basis of Design: InnoviBond TPO Membrane Adhesive LVOC / InnoviBond TPO Membrane Adhesive / InnoviBond TPO Membrane Adhesive SPR (Sprayable).

F. Primer: One-part penetrating primer solution to enhance the adhesion of roofing membranes and flashings. Basis of Design: InnoviPrime TPO Primer / InnoviPrime TPO Primer-LVOC.

G. Slip Sheet: Manufacturer's 45-mil TPO Membrane. Basis of Design: IKO Innovi TPO Membrane.

H. Factory Formed Membrane Flashings: Manufacturer's standard corner, curb, sealant pocket, pipe boot, scupper, joint covers, cover strips, and various other TPO flashings appropriate to the warranty term indicated above. Basis of Design: InnoviFlash, InnoviBoot TPO products.

I. Metal Termination Bars: Manufacturer's standard All-Purpose (AP) or Heavy Duty (HD) predrilled stainless-steel or aluminum bars, with appropriate anchors by manufacturer. Basis of Design: InnoviFast products, appropriate to substrate and warranty.

J. Fasteners & Plates: Manufacturer's standard fasteners and plates designed for fastening Manufacturer's membrane, insulation, cover board, termination bar, batten bar to substrate. Basis of Design: InnoviFast Fasteners and Plates, as appropriate to substrate and warranty.

K. Seam Edge Treatment: Manufacturer's standard one-part polymer based edge sealant intended for sealing exposed polyester reinforcement scrim. Basis of Design: InnoviSeal TPO Cut Edge Sealant LVOC.

L. Pourable Sealer: Manufacturer's standard pourable sealant for use in sealant pockets, curb systems, and other liquid flashing applications. Basis of Design: InnoviSeal One-Part Pourable Sealant – Liquid Flashing.

M. Water Block Seal: Manufacturer's standard synthetic rubber based, non-skinning and non-curing, long term moisture barrier, intended for use with TPO membrane systems. Basis of Design: InnoviSeal Water Stop Mastic.

N. Miscellaneous Roofing Accessories: Provide Manufacturer's other accessories required for full installation. Basis of Design: products for TPO roofing systems marketed by IKO as InnoviSeal, InnoviPrime, InnoviBoot, InnoviFlash, InnoviBond, InnoviTape, as appropriate to substrate, system, and warranty.

O. TPO Coated Metal: Manufacturer's TPO coated metal to be installer-formed to terminate the roof at the perimeter of the structure, to be included in the single-source roofing system warranty. Basis of Design: InnoviEdge TPO Coated Metal.

2.4 WALKWAY PADS

A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway pads sourced from membrane roofing system manufacturer. Basis of Design: InnoviStep TPO Walkway Pad.

2.5 COVER BOARD

A. High-Density Polyisocyanurate: ASTM C 1289, Type II, Class 4, Grade 3, high-density

polyisocyanurate technology bonded in-line to mineral-surfaced, fiber glass reinforced facers. Basis of Design: IKOTherm CoverShield.

1. Compressive Strength: 80 psi min.
2. Thickness: 1/2 inch (13 mm)
3. R-value: 2.5 min.
4. Attachment: Mechanically fastened / Adhered with IKO Millennium Insulation Adhesive OR InnoviBond DUO Dual-Tank Spray Adhesive (4' x 4' boards are required for adhesive attachment) .

B. Gypsum Board: ASTM C 1177, Heavy duty coated glass-mat facer, water-resistant gypsum substrate for fully adhered roof applications. Basis of Design: DensDeck Prime by Georgia Pacific / Securock Ultralight Coated Glass-Mat Roof Board by USG / DEXcell Roof Board by National Gypsum.

1. Thickness: 1/4 inch (6 mm) / 1/2 inch (13 mm) / 5/8 inch (16 mm).
2. Attachment: Mechanically fastened / Adhered with IKO Millennium Insulation Adhesive OR InnoviBond DUO Dual-Tank Spray Adhesive (4' x 4' boards are required for adhesive attachment).

2.6 ROOF INSULATION

A. Preformed polyisocyanurate roof insulation boards that comply with requirements and referenced standards, selected from manufacturer's standard sizes and of thicknesses indicated, in multiple layers: *[select either 1. or 2. below]*

1. Standard Glass-Reinforced Facer Polyisocyanurate Foam Insulation. Basis of Design: IKOTherm Polyisocyanurate Insulation.

    a. Compressive Strength: 20 psi / 25 psi per CAN/ULC S 704 and ASTM C 1289.
    b. Minimum Total Insulation Package R-value: [insert R Value at or above minimum required by applicable code] / R-30 [Coolers] / R-35 [Chill Coolers] / R-45 [Holding Freezers] / R-50 [Blast Freezers].
    c. Minimum board thickness: [insert thickness].
    d. Provide insulation package in multiple layers, with maximum thickness per layer: [insert thickness].
    e. Minimum Long-Term Thermal Resistance (LTTR): 5.7 per inch determined in accordance with CAN/ULC S770 at 75ºF (24ºC).
    f. Attachment: Mechanically fastened / Adhered with IKO Millennium Insulation Adhesive OR InnoviBond DUO Dual-Tank Spray Adhesive (4' x 4' boards are required for adhesive attachment).

2. Non-organic Coated Glass Facer Polyisocyanurate Foam Insulation. Basis of Design: IKOTherm III Polyisocyanurate Insulation.

    a. Compressive Strength: 20 psi / 25 psi per CAN/ULC S 704 and ASTM C 1289.
    b. Minimum Total Insulation Package R-value: [insert R Value at or above minimum required by applicable code] / R-30 [Coolers] / R-35 [Chill Coolers] / R-45 [Holding Freezers] / R-50 [Blast Freezers] .
    c. Minimum board thickness: [insert thickness].
    d. Provide insulation package in multiple layers, with maximum thickness per layer: [insert thickness].

e. Minimum Long-Term Thermal Resistance (LTTR): 5.7 per inch determined in accordance with CAN/ULC S770 at 75ºF (24ºC)
f. Attachment: Mechanically fastened / Adhered with IKO Millennium Insulation Adhesive OR InnoviBond DUO Dual-Tank Spray Adhesive (4' x 4' boards are required for adhesive attachment).

2.7 TAPERED INSULATION *[INCLUDE IF APPLICABLE TO PROJECT]*

A. Tapered Insulation: Provide factory-tapered insulation boards, saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain, per slope directions on project plans. *[select either 1. or 2. below]*

1. Standard Glass-Reinforced Facer Polyisocyanurate Foam Tapered Insulation: Basis of Design: IKOTherm Tapered Insulation.

a. Compressive Strength: 20 psi / 25 psi per CAN/ULC S 704 and ASTM C 1289.
b. Attachment: Mechanically fastened / Adhered with IKO Millennium Insulation Adhesive OR InnoviBond DUO Dual-Tank Spray Adhesive (4' x 4' boards are required for adhesive attachment).

2. Non-organic Coated Glass Facer Polyisocyanurate Foam Tapered Insulation: Basis of design: IKOTherm III Tapered Insulation.

a. Compressive Strength: 20 psi / 25 psi per CAN/ULC S 704 and ASTM C 1289
b. Attachment: Mechanically fastened / Adhered with IKO Millennium Insulation Adhesive OR InnoviBond DUO Dual-Tank Spray Adhesive (4' x 4' boards are required for adhesive attachment).

2.8 VAPOR RETARDER *[INCLUDE IF APPLICABLE TO PROJECT]*

[CLASS 1 VAPOUR RETARDERS ARE RECOMMENDED FOR USE ON COLD STORAGE BUILDINGS]

A. Polyethylene Sheet: [CAN/CGSB-51.34, Type 1], 0.15mm (6mil) / 0.25mm (10mil) thick, loose laid with sealed laps.

B. Self-Adhered SBS Vapor Retarder: [Class 1 (0.07 perm)], [ASTM D 6163, Grade S, Type I, glass-fiber-reinforced], SBS-modified asphalt sheet; sand surfaced; suitable for application method specified. Basis of Design: IKO Modified Vapour Protector MVP / IKO Modified Vapour Protector MVP Sand.

C. Self-Adhered Polyethylene Vapor Retarder: [Class 1 (0.02 perm)] High Density Polyethylene (HDPE) sheet with acrylic coating bonding agent; suitable for application method specified. Basis of Design: IKO AcrylicStick SA.

D. Asphalt Primer: ASTM D 41. Basis of Design: IKO S.A.M. Adhesive. *[NOTE: No primer is required when adhering IKO AcrylicStick SA.]*

2.9 THERMAL BARRIER *[INCLUDE IF APPLICABLE TO PROJECT]*

A. Gypsum Board: ASTM C 1177, Heavy duty coated glass-mat facer, water-resistant gypsum substrate for fully adhered roof applications. Basis of Design: DensDeck by Georgia Pacific / SecuRock Gypsum-Fiber Board by USG / DEXcell Roof Board by National Gypsum.

1. Thickness: 1/2 inch (13 mm) / 5/8 inch (16 mm).
2. Attachment: Mechanically fastened / Adhered with IKO Millennium Insulation Adhesive (4' x 4' boards are required for adhesive attachment) .

2.10 WOOD NAILERS

A. Wood Nailers: Comply with requirements in Division 06 Section "Miscellaneous Rough Carpentry."

2.11 METAL ACCESSORIES *[INCLUDE IF APPLICABLE TO PROJECT]*

B. Metal Roof Edge and Fascia: Comply with requirements in Section 07 62 00 "Sheet Metal Flashing and Trim"

C. Parapet Metal Flashings and Coping: Comply with requirements in Section 07 62 00 "Sheet Metal Flashing and Trim"

PART 3 – INSTALLATION

3.1 GENERAL

A. Applicator must submit a Warranty Application to Manufacturer as notification that this project requires Manufacturer's warranty.

B. Install all components of the specified roofing system in accordance with Manufacturer's published instructions, detail drawings, and recommendations for the specified roofing system.

1. Maintain copies, in either written or electronic form, of Manufacturer's applicable instructions, detail drawings, and installation recommendations at project site for duration of installation period.
2. Where Manufacturer provides no instructions or recommendations, follow good roofing practices and industry standards.

C. Comply with applicable federal, state and local regulations.

D. Perform work using competent and properly equipped personnel.

E. Consult Manufacturer's instructions, Product Data Sheets, product labels, and Safety Data Sheets (SDS) for specific safety instructions. Always keep all adhesives, sealants, primers and cleaning materials away from all sources of ignition.

F. Temporary closures and night seals, made to ensure that moisture does not infiltrate or damage any completed section of the specified roofing system, are the responsibility of the applicator. All temporary enclosure measures must subsequently be fully completed to provide a watertight condition, including completion of flashings and terminations.

G. Install roofing membrane only when surfaces are clean, dry, smooth and free of snow or ice. Never apply roofing membrane and/or system components during inclement weather or when ambient conditions will not allow proper application. Never use sealants, primers, and adhesives when material temperature is outside the range of 60 to 80 degrees F (15 to 25 degrees C), or any ranges provided on the Manufacturer's product data sheets.

H. Consult and follow all Manufacturer recommendations for Cold Weather Installation procedures.

I. It is the applicator's responsibility to take all appropriate measures to protect adjacent construction, property, vehicles, and people from damage related to their roofing work, and to repair or restore damage caused by their roofing work, including but not limited to:

1. Protection from spills and overspray from bitumen, adhesives, sealants and coatings.

2. Protection of metal, glass, plastic, and painted surfaces within the range of wind-borne overspray.

J. Keep materials in their original containers as labeled by the Manufacturer until ready for use.

K. Protect all completed areas of work from all traffic, including traffic by other trades.

3.2 EXAMINATION

A. Verify that all decks, roofing surfaces, and substrates are sufficiently flat, rigid, able to support the weights of staged materials and installers, ready to receive work, and properly slope to drains.

B. Ensure that site conditions are properly prepared for commencing with the roofing installation.

C. Verify that roof openings and penetrations are in place and set and braced and that roof drains are securely clamped in place.

D. Verify that wood cants, blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.

E. Any unacceptable deck, site, surface, and substrate conditions should be brought to the attention of the General Contractor and Project Owner's Representative. Proceed with installation only after unsatisfactory deck or site conditions have been corrected.

F. Confirm that the specifications and detail drawings provided in the project documents are not in conflict with the roofing manufacturer's recommendations, instructions, and requirements for the type and term of warranty specified.

G. Examine underside of roof deck when installing mechanical fasteners, to avoid accidental damage to existing services.

3.3 PREPARATION

A. Take appropriate measures to ensure that fumes from adhesive solvents are not drawn into the building through air intakes.

B. Prior to proceeding, prepare roof surface so that it is clean, dry, and smooth, and free of sharp edges, fins, roughened surfaces, loose or foreign materials, oil, grease and other materials that may damage the membrane.

C. Fill all surface voids in the immediate substrate that are greater than 1/4 inch (6 mm) wide with cut strips of IKOTherm or IKOTherm III insulation.

D. Seal, grout, or tape deck joints, where needed, to prevent bitumen seepage into building.

3.4 VAPOR BARRIER INSTALLATION (SELF-ADHERED) *[retain section only if included in PART 2]*

A. Remove all wrapping tape and labels from the roll before beginning. Do not remove the release film at this time. The sheet must be unrolled and aligned before installation.

B. Begin installation at the low point of the roof. Use chalk lines where necessary to ensure proper alignment. Note: If a drain is the lowest point, start here with the edge of the sheet bisecting the centerline of the drain.

C. All metal, wood, and concrete surfaces that come into contact with self-adhered vapor retarders must first be primed with Manufacturer's appropriate primer, and be permitted to dry before

applying the vapour retarder.

D. For self-adhered vapor retarders on steel or plywood decks, prime with IKO S.A.M. Adhesive and allow them to dry as per Manufacturer's recommendations. Note: Priming of steel and plywood decks is only required when the primary board layer above is not mechanically attached to the decking.

E. Align vapor retarder sheets over male flutes on steel decks. While aligned, remove the release film from the backside of the vapor retarder and press the vapor retarder into full contact with male flutes. Press areas in contact with the decking to ensure a full bond. The membrane shall be rolled after installation with a 75 – 100 lbs. roller to ensure adhesion.

F. Align successive sheets of vapor retarder with the first. All laps shall be primed with Manufacturer's appropriate primer. Always join laps over a male flute. Overlap sides by three inches (3") (75 mm) minimum. End laps shall be six inches (6") (150 mm) minimum, and stagger end laps from each other by a minimum of twenty-four inches (24") (610 mm). End laps spanning the female flutes may require support. Cut the appropriate pieces of insulation and place them within the flute so that a level continuous surface supports the end lap.

G. For self-adhered vapour retarders on all other suitable substrates, use a similar installation method as detailed above for steel decks.

3.5 INSULATION AND COVER BOARD INSTALLATION

A. Install insulation with attachment method(s) specified in PART 2.

B. Install only as much insulation as can be covered with the completed roofing system before the end of each day's work or prior to arrival of inclement weather. Do not unwrap insulation until immediately prior to installation.

C. Ensure that the insulation boards are laid over a minimum 1 inch (26 mm) bearing surface.

D. Install roof insulation in courses parallel to roof edges.

E. Stagger insulation boards in all directions a minimum 300mm (12") to produce horizontal overlaps at joints. Butt joints tightly together.

F. Install insulation boards a minimum of 1" (25mm) away from all upturns, penetrations and projections, to allow for the installation of spray foam insulation within the gap.

[For mechanical attachment of insulation, include the below]

G. Mechanical Fastening: Use appropriate fasteners and insulation plates. Engage fasteners through insulation into deck to depth and in pattern required by Manufacturer (see www.IKO.com/innovi for pattern requirements), or by Factory Mutual for the FM Class specified in PART 2, and whichever is more stringent.

H. Avoid penetration of conduits and other piping below or encased in the deck.

I. Fasteners should be fully seated, and must not be over driven. Use a properly adjusted clutch or depth-sensing drill. If a fastener must be removed after installation, do not reinstall fastener into the same hole.

[For adhesive attachment of insulation, include the below]

J. Adhesive Attachment: Use appropriate insulation adhesive. Follow Manufacturer's requirements for bead spacing and/or spray pattern at www.IKO.com/innovi. Weight insulation

boards during adhesive set-up period by using full buckets of adhesive or other material to ensure full contact of the adhesive to the boards.

3.6 SINGLE-PLY MEMBRANE INSTALLATION

A. Install fully adhered membrane and flashings in accordance with ASTM D 4434 and Manufacturer's written instructions.

B. Ensure insulation panel surface is clean, flat and free from dirt, debris or sharp objects that might be detrimental to performance of membrane.

C. Beginning at the low point of roof, unroll the TPO membrane over the substrate without stretching it, and allow the membrane to relax at least 30 minutes before installing. Increase the relax time in colder weather. Inspect the membrane for any damage and remove any damaged or creased sections.

D. Always position all membrane panels and flashing materials so that they will shed water.

E. Install TPO membrane without wrinkles and gaps (“fishmouths”) in the seams. Perform test welds of the membrane seams at the start of each work day and at any time the hot air welder has been shut off. Heat weld all membrane seams in accordance with the Manufacturer's instructions and details.

F. Fully adhere the TPO membrane to substrate using Manufacturer's bonding adhesive, in accordance with published application rate and procedures. Note: Membrane adhesive should never be applied in the seam area; immediately clean any adhesive from these areas completely.

G. Roll with a weighted roller, or broom with a stiff broom with heavy pressure to ensure complete bonding between adhesive and membrane.

H. Edge Securement: Secure membrane with appropriate fasteners at all locations where membrane terminates or goes through an angle change greater than 1 in 12 inches (1:12”), using mechanically fastened reinforced perimeter fastening strips, plates, or metal edging as indicated or as recommended by Manufacturer.

1. Exceptions: Round pipe penetrations less than 18 inches (460 mm) in diameter and square penetrations less than 4 inches (200 mm) square.
2. Ensure anchorage of the TPO membrane at the roof edges using ES-1 rated edge metal or other edge metal products accepted by Manufacturer.

3.7 FLASHING AND ACCESSORIES INSTALLATION FOR COLD STORAGE SYSTEMS

A. Install flashings, including laps, splices, joints, bonding, adhesion, and attachment, in accordance with Manufacturer's recommendations, instructions, and details for Cold Storage Systems.

B. Metal Accessories: Install edge metal, including TPO Coated Metal, drip edges, gutters, gravel stops, and copings in locations indicated on the drawings, with horizontal leg of edge member over membrane and flashing over metal onto membrane.

1. Follow Manufacturer's instructions, recommendations, and detail drawings.
2. Fill the void between the roof insulation and wood nailers with spray foam insulation prior to installation of perimeter edge metal systems.
3. Remove any protective surface film immediately before installation.
4. Install water block sealant under edge metal per Manufacturer’s instructions.
5. Flash using Manufacturer's recommended flashing product per Manufacturer’s detail draw-

ings corresponding with the type and term of warranty specified, unless otherwise indicated.

6. Install flashing material to cover the edge metal products per Manufacturer's instructions and detail drawings. Apply additional flashing material wherever needed to meet the Manufacturer's requirements.
7. Install an additional piece of self-adhesive flashing membrane over edge metal laps to the top of the metal piece; apply appropriate TPO sealant at all intersections of flashing sections.
8. When the roof slope is greater than 1:12, apply appropriate TPO sealant along the back edge of the flashing.

C. Scuppers: Set in appropriate TPO sealant and secure to structure; flash as recommended by Manufacturer.

D. Roofing Expansion Joints: Install as shown on drawings and as recommended by Manufacturer.

1. Seal all voids at the inside the expansion joint with spray foam insulation, as specified by the roof system designer or Manufacturer.

E. Flashing at Walls, Curbs, and Other Vertical and Sloped Surfaces: Install Manufacturer's TPO flashing at all walls, curbs, parapets, curbs, skylights, and other vertical and sloped surfaces that the roofing membrane abuts to; extend flashing minimum 8 inches (200 mm) high above membrane surface.

1. Seal all voids at the base of all roof upturns and roof edges with spray foam insulation, as specified by the roof system designer or Manufacturer.
2. Where a vapour barrier membrane is installed in the roof system:
   a. Extend the vapour barrier membrane up the roof penetration, to terminate a minimum of 2" (50mm) above the finished roof surface, to tie-in with the TPO flashing membrane. Confirm with the roof membrane Manufacturer that the vapour barrier membrane is chemically compatible with the TPO membrane.
   b. Ensure the spray foam insulation is continuous between the vapour barrier membrane and TPO membrane, to maintain continuity of the air-vapour barrier layer.
3. For Steel Decks: Fill the deck flutes with spray foam insulation for a minimum of two (2) flutes or 12" (305 mm) away from the roof perimeter and upturns.
4. For Insulated Metal Panel Upturns: Cut along the interior face of the insulated metal panel to create a thermal break, at the height specified by the roof system designer / Manufacturer.
5. Complete the splice on the horizontal before adhering flashing to the vertical surface.
6. Provide termination directly to the vertical substrate as shown on Manufacturer's detail drawings.

F. Roof Drains:

1. Seal all voids around the roof drain with spray foam insulation, as specified by the roof system designer or Manufacturer.
2. Taper insulation around drains to promote water flow to drainage. Use tapered insulation whenever possible to improve slope to drains (slope not to exceed Manufacturer's or designer's recommendations).
3. Position membrane over substrate, then cut a hole for roof drain to allow for 0.5" to 0.75" (12 to 19 mm) of membrane to extend inside clamping ring past drain bolts.
4. Make round holes in membrane to align with clamping bolts; do not cut membrane back to

bolt holes.

5. Apply a minimum one-half of a full tube of water stop mastic on top of the drain bowl where clamping ring seats below the membrane.
6. Connect the roof drain clamping ring and clamping bolts; tighten all clamping bolts in order to achieve constant compression.

G. Flashings at Penetrations: All penetrations through the membrane must be completely flashed and sealed directly to the penetration, in accordance with Manufacturer's written instructions.

1. Seal all voids around roof penetrations with spray foam insulation, as specified by the roof system designer or Manufacturer.
2. Where a vapour barrier membrane is installed in the roof system:
   a. Extend the vapour barrier membrane up the roof penetration, to terminate a minimum of 2" (50mm) above or across the finished roof surface, to tie-in with the TPO flashing membrane. Confirm with the roof membrane Manufacturer that the vapour barrier membrane is chemically compatible with the TPO membrane.
   b. Ensure the spray foam insulation is continuous between the vapour barrier membrane and TPO membrane, to maintain continuity of the air-vapour barrier layer.
3. Pipes, Round or Square Supports, and similar penetrations: Flash with specified pre-molded TPO pipe flashings wherever practical; otherwise use specified self-curing flashing, if allowed for warranty type and term.
4. Hot Pipes: Any penetrations with an in-service temperature more than 160º F (71.1º C) must be flashed in a manner that fully protects the TPO membrane from the heat source. In all such cases, an intermediate "cool sleeve" must be installed around the hot pipe, and the flashing must seal only to the cool sleeve.
5. Pipe Clusters and Unusual Shaped Penetrations: Provide penetration sealant pocket at least 2 inches (50 mm) deep, with at least 1 inch (25 mm) clearance from penetration. Fill the penetration pocket with sealant, as recommended be Manufacturer, sloped to shed water.
6. Structural Steel Tubing: If corner radii are greater than 1/4 inch (6 mm) and longest side of tube does not exceed 12 inches (305 mm), flash as for pipes; otherwise, provide a standard curb with flashing.
7. Flexible and Moving Penetrations: Provide weathertight gooseneck set in sealant and secured to deck, flashed as recommended by Manufacturer.

3.8 WALKWAY PADS

A. Install walkway pads at all access points to the roof, around rooftop equipment that may require maintenance, and wherever indicated on the project drawings and documents.

B. Unroll walkway pad and allow the pad to relax prior to installation.

C. Install walkway pad in maximum 10' (3 m) long sections. Leave minimum 1.0" (26 mm) space between each section to allow for proper drainage. Place each section of walkway pad so that it does not result in ponding water.

D. Avoid applying the walkway pad over any TPO membrane seams.

E. Fully heat weld the perimeter of each section of walkway pad to the TPO membrane, leaving one or two 1.0" (26 mm) gaps in the weld at the low (downslope) side of the pad to allow for moisture to escape.

3.9 FIELD QUALITY CONTROL

A. Inspections by Manufacturer: Provide for an inspection of the roofing system for warranty purposes by an IKO Field Service Technician; Technician will issue a punch list indicating any items which must be corrected prior to issuance of Manufacturer's warranty.

B. Roofing applicator will perform all corrections necessary for issuance of warranty.

3.10 CLEANING

A. Clean all contaminants generated by roofing work from building and surrounding areas, including any bitumen, adhesives, sealants, and coatings.

B. Repair or replace building components and finished surfaces damaged or defaced due to the work of this section; comply with recommendations of manufacturers of non-roofing components and surfaces.

C. Remove all leftover materials, trash, debris, equipment from project site and surrounding areas.

3.11 ONGOING CONSTRUCTION TRAFFIC AFTER ROOFING INSTALLATION

A. Where construction traffic must continue over finished TPO membrane, provide durable protection, and replace or repair any damaged roofing to original condition.

END OF SECTION