UltraPly™ TPO Metal Building Retrofit

Guide for Designers

UltraPly TPO
UltraPly TPO Platinum
UltraPly TPO InvisiWeld™
UltraPly TPO XR
UltraPly TPO SA

March 2024

NOTE: The contents of this guide are considered accurate at the time of posting. All information contained within should be validated for accuracy as it relates to specific project conditions or requirements. Specific codes, uplifts or other factors may result in changes to the information contained within this document. Validate all specific conditions with a Holcim Regional Technical Coordinator prior to its use.

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General Design Criteria

Applicability

- This document provides guidelines, instructions and various recommendations and requirements for the installation of Elevate™ TPO membranes over an existing metal building. Reference to this guide, Technical Information Sheets (TIS), and other Elevate documents is necessary to ensure that the finished roof is installed in compliance with Red Shield Warranty requirements.
- Parameters of this manual outline the minimum requirements for the Red Shield Warranty. Those systems may include UltraPly TPO, UltraPly Platinum, UltraPly TPO XR, UltraPly TPO and UltraPly TPO SA membrane systems. Reference to Elevate Application Guides, Technical Information Sheets and other published information is necessary to ensure that the completed roofing system is installed in compliance with Holcim requirements. Local codes and insurance requirements may require specific enhancements.
- Warranties of 5 – 20 years, 2" hail coverage, and wind warranties more than 55 MPH, may require special consideration or enhancement regarding fasteners, insulation, membrane gauge and securement, some of which can be found in this manual and in the Elevate Attachment Guide. If a proposed installation falls outside this specification, contact Holcim Technical Services for additional information.
- Statements in this guide are provided in good faith with the expectation that a design professional be consulted prior to any job decisions being made. Not all proposed systems may qualify for a warranty.
- Elevate roofing systems may or may not be applicable, without special consideration, if subject to local, regional, or national building code requirements or testing agency restrictions.
  - It is the building owner's or the design professional's responsibility to consult with the controlling code agency official(s) to determine the specific requirements of each project and each system.
  - Contact a Regional Technical Coordinator at 1-800-428-4511 when local codes conflict with Elevate recommendations.

> **!** Certain situations may arise where Elevate specifications and/or roofing requirements cannot be applied. It may not be possible for Holcim Solutions and Products US, LLC. to issue the desired warranty for projects that deviate from current Elevate requirements and standards, unless a written deviation request for approval has been received, reviewed, and approved by a Holcim Regional Technical Coordinator prior to application of the proposed system.

- The following conditions require special consideration and may not be warrantable. Contact a Regional Technical Coordinator for information if any of the following conditions are present:
  - Roofs that exceed the maximum slope and height limits for the roof system assembly, see Table 1.
  - Projects that require special hail or wind coverage greater than 55 mph.
  - Roofs located where localized wind phenomenon may occur, reference ASCE 7 wind maps.
  - Roofs located in down-slope, foothills of mountain ranges or escarpments.
  - Mechanically attached systems located within 5 miles (8.3 Km) of the ocean coastline or withing 1,500 (457 m) of a Great Lake shoreline.
  - Geographical areas susceptible to hurricanes.
  - Roofs subject to chemical or process byproduct discharge.
  - Roofs with non-linear slopes such as arches, domes and barrels, etc.
  - Buildings with large openings in a wall (greater than 10% of the any one wall surface) that could be left open in a storm.
  - Roofs subject to heavy or repeated traffic in an area.
  - Roofs subject to positive pressure situations such as pressurized buildings, air infiltrating decks, canopies, overhangs, airplane hangars distribution centers, etc.
  - Buildings with high interior humidity such as swimming pools.
  - Roof decks that do not provide adequate fastener pullout resistance.
- Cold storage, freezer facilities and swimming pools constitute a special condition. A designer familiar with cold storage, indoor swimming pool construction and vapor migration should be consulted in the design of the roof system and integration with the rest of the structure envelope.

> **!** The unlimited slope in the chart below only refers to the potential maximum installation slope. When using a mechanical hot air welder there are practical slope limitations. Safety is the first order to concerns with any project. Consult with the equipment manufacturer on the performance of the individual machine.

Roofing System Applicability – UltraPly TPO Single-Ply Membrane Systems			
Maximum Height - 60′ (18.29 m)		Maximum Warranty Term – 20 Years*	
System		**Thickness**	**Slope**
Platinum UltraPly TPO	Adhered	.080"	Unlimited
	Attached	.080"	Max. 4:12 (33.3%)
	Invisiweld	.080"	Max. 4:12 (33.3%)
UltraPly TPO	Adhered	Min. .045"*	Unlimited
		Min. .060"	
	Attached	Min. .060"	Max. 4:12 (33.3%)
	Invisiweld	Min. .060"	Max. 4:12 (33.3%)
UltraPly TPO SA	Self-Adhered	.060"	Unlimited
UltraPly TPO XR	Adhered	XR 100 (.045")*	Unlimited
		XR 115 (.060")	
		XR 135 (.080")	
	Attached	Min. .060"	Max. 4:12 (33.3%)
NOTE: ▪ Contact a Regional Technical Coordinator for conditions not covered in the table above. ▪ 0.045" thick UltraPly TPO and TPO XR is limited to a 15-year maximum warranty. ▪ Adhered membrane applications on retrofit projects have not been tested. Performance validation for uplift or wind speed may not be possible.			
.045"* = 1.14 mm; .060" = 1.52 mm; .080" = 2.03 mm			

Table 1: Roofing System Applicability – UltraPly TPO Single-Ply Membrane Systems

Consultation

- Holcim recommends that a design professional be involved in the design process. For additional assistance, contact a Regional Technical Coordinator for consultation with respect to any necessary deviations from current Elevate requirements and standards.
- For recommendations on any specific project, about the applicability, or appropriateness, of any material's suitability for use or use of products in conjunction with any other specific material, follow these steps:
  - Consult the Elevate website: www.HolcimElevate.com
  - Consult this manual, Elevate UltraPly TPO Application Guide, Attachment Guide, and specific Technical Information Sheets (TIS).
  - Consult with the building owner or their design professional.
  - Consult with a Regional Technical Coordinator for information.
- Statements in this guide are provided in good faith with the expectation that a design professional be consulted prior to any job decisions being made.

Design

- As a supplier of roofing systems, Holcim does not perform engineering or design functions and does not approve or make comments regarding them.
- Holcim recommends that a design professional be consulted to assure proper design, (9.e. roof system selection) installation, and conformance to building codes, insurance requirements for securing insulation and membranes.
- Refer to the Elevate Roofing Systems Attachment Gide for additional requirements for securing insulations and membrane.

! Following are just a few of the conditions that may influence that need for a design professional:

- Structural conditions that might not be sufficient to support the anticipated load of the completed roof installation.
- Structural conditions to support the dynamic loading of the roof system.
- The need to review the proposed system assembly for its applicability on specific projects.
- The requirements of building codes for the need of a thermal barrier.
- The requirements of building codes for the need of a vapor barrier.
- The requirements of building codes for the need of an air barrier.
- When considering the effect of loads on the structure/decking due to the loading/staging of materials as part of system installation. The design professional should specify the load limitations to be observed by the Licensed Elevate Applicator.

Warranty

Pre-Warranty Issuance Requirements include:

- Submit an Electronic Pre-Installation Notice (P.I.N.) along with an approved roof drawing, 14 days prior to project start and receive an acknowledgement from Holcim of acceptance or necessary enhancements to meet Holcim requirements to receive a warranty.
- The Elevate roof system must be installed by a current licensed Elevate applicator.
- Upon inspection and acceptance of the installed roof system by a Holcim Technical Representative, the warranty will be issued and dated based on the completion date of the roof installation reported by the roofing contractor.
- Holcim inspections are to confirm the installation details for the roofing system for compliance with Holcim's documents of record for warranty requirements. The inspection is not intended as an inspection for the benefit of the building owner or the design professional with respect to contract, building codes or compliance with specifications other than Holcim.

The following warranties include the Elevate brand materials and the workmanship of the licensed Elevate applicator when the system is installed according to Holcim's technical specifications.

1. Red Shield™ Warranty
   - 5 – 20 years for qualifying systems
   - Includes labor and materials to repair warranted leaks
   - Non-prorated with No Dollar Limit (NDL)
   - Includes all Elevate-branded products used in the roofing system. Excludes non-Elevate branded products and any materials not provided by Holcim. Use of non-Elevate branded products may prevent warranty issuance

2. Extended Warranty Coverage
   - A Red Shield Warranty is eligible for the following extended coverage. Contact Holcim Technical Services for limitations.
   - **Increased Wind Speed** [72 – 90 mph (116 – 144.84 km/h), depending on system criteria]
     - Adhered membrane – 72 mph maximum with approved pull test and appropriate fastening rate
     - Attached membrane – 90 mph maximum when fastened into purlins
   - **Cut and Puncture Protection (CPP)** warranty coverage is available with Elevate UltraPly TPO Membranes
     - Use of 60 mil or greater Elevate UltraPly TPO membrane system and additional cost per square foot. Please see the warranty pricing guide for current pricing
     - Use of 80 mil UltraPly TPO membrane and HailGard cover board
       NOTE: Roof walkway pad or paver is required at all roof access points
   - **Hail Coverage**
     - Up to 2" hail coverage requires a minimum 60 mil adhered Elevate UltraPly TPO membrane and an approved, adhered high density (HD) coverboard
     - Severe Hail (SH) or Very Severe Hail (VSH) requires an approved Factory Mutual assembly. Factory Mutual SH or VSH rating does not imply Red Shield Hail warranty coverage. Additional requirements may apply.
     - Elevate UltraPly TPO InvisiWeld and Mechanically Attached roofing systems do not qualify for hail coverage
     - Contact a Regional Technical Coordinator for additional information

3. Red Shield Platinum Warranty
   - Metal Building Retrofit projects do not qualify for 25-year Red Shield or 30-year Platinum Warranty coverage

4. Elevate Membrane Limited Warranty
   - 5 – 30 years
   - Provides replacement membrane for leaks caused by manufacturing defects or premature weathering
   - Limited to owner's original cost of the membrane

5. Other Elevate Warranties
   - Paint Finish Warranty for all Elevate branded metal roofing products or UNA-CLAD™ metal, including edge metal

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A Red Shield warranty cannot be issued if any of the following conditions exist:

- Non-roofing applications such as plaza deck construction, waterproofing, pond liners, etc.
- Roofing applications for single-family residences.
- Other non-approved applications.

Job Site Considerations (Cautions and Warnings)

General

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.

- Consult container labels, material Safety Data Sheets (SDS) and Technical Information Sheets (TIS) for specific safety instructions for all products used on the project.
- Care must be taken when installing fasteners to avoid possible conduits and other piping in and under the deck. It is the responsibility of the building owner to rectify any issues with conduit, piping or other obstructions under the deck that may impede the installation of the new roofing materials.
- Fumes and adhesive solvents may be drawn into the building during installation through rooftop intakes. Refer to Elevate's Technical Information Sheets for more information.
- Store membranes in the original, undisturbed plastic wrap in a manner to protect it from becoming damaged.
- Do not use oil-based or bituminous-base roof cement with Elevate membranes.
- Insulation must be properly stored and protected from ignition sources, moisture, and damage.
- 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, re-apply additional adhesive or primer and proceed.
- The consistency of sealants, adhesives and primers will begin to thicken as the temperature drops. To minimum this, the following is recommended:
  - 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 heated boxes may be helpful.
  - Complete test areas to determine if conditions will cause problems such as condensation with the application of the material.
  - Stop the operation or change to a warmer container when material becomes too thick to properly apply or the product falls below the recommended application temperature.
  - Do not use heat guns or open flames to dry adhesives and primers.
  - No-Fold or single fold panels are easier to apply in cold weather and are recommended.
  - If using Water-Based Bonding Adhesive, temperatures must be at least 40 °F (4.4 °C) and rising for the material to apply and perform as designed. Longer drying times should be expected for lower temperatures and higher humidity conditions.

Quality Assurance

Job Site Considerations

- All safety regulations required by OSHA and other agencies having jurisdiction must be followed.
- During the construction process, the roofing contractors is responsible for ensuring that all components of Elevate roof system, including the finished areas are protected from damage, including, but not limited to:
  - Damage that may result from the continued construction process.
  - Direct contact with continuous steam or heat sources when the in-service temperature is more than 160 °F (71 °C) for UltraPly TPO products.
  - Asphalt, coal tar, oil based or plastic roof cements, and re-saturated roof products, which are not to be used in direct contact with the waterproofing components of the Elevate UltraPly TPO Roofing Systems.
  - Discharges, such as petroleum products, greases, oils (mineral and vegetable), animal fats and other byproducts, which may come in contact with the membrane.

Cold Weather Application

- When the outside temperature is below 40 °F (4 °C), installation of Elevate roofing systems may require additional application precautions:
  - Adhesives and sealants should remain in an environment between 60 °F and 80 °F ((16 °C and 27 °C) until ready for use.
  - Materials should be used within four hours of removal from a heated storage area. If materials are not used within that time, they should be returned to the heated storage area until the temperature of the material returns to 60 °F (16 °C). Typically, this is 24 hours.
- For additional information and guidelines, see Elevate Technical Information Sheets (TIS), Elevate Cold Weather Application Guidelines, Elevate UltraPly TPO Roofing Systems Application Guide, UltraPly TPO XR Roofing Systems Application Guide, UltraPly TPO InvisiWeld and InvisiWeld-S Roofing System Application Guide, UltraPly TPO SA Roofing System Application Guide and any other relevant Elevate product-specific installation instructions, and NRCA Roofing and Waterproofing Manual.

Phased Construction

- Phased Construction is defined by the NRCA as "The installation of a roof system in two or more separate time intervals." The need for temporary roofing is determined by the design professional.

!	Holcim does not recommend phased construction. Phased construction results in unprotected roof section, which can allow moisture into the base plies or trap moisture, dust, or debris between the plies of the roof system. These application defects may increase the incidence of blistering in the Elevate roof system.

- A better option than the use of phased construction is the use of a temporary roof, which allows for the delayed installation of the roof system until more suitable weather, or until other trades can complete their projects. A temporary roof can be designed and installed in the same way as a vapor retarder and can then become a vapor retarder.

Temporary Roofing

- If installation of the roof system is required during unsuitable weather, or before completion of wood blocking, curbs, penetrations, or the erection of walls, a temporary roof may need to be installed.
- If a temporary roof is needed due to construction requirements, Holcim recommends installing a modified asphalt base sheet or two fiberglass roofing plies in an appropriate adhesive over an approved substrate, to be used as the temporary roof. This temporary roof can serve to protect the interior of the building during the early stages of construction. It may then be removed or repaired, if necessary, and can be left as a vapor retarder prior to the installation of the finished Elevate roofing system.
- If roof insulation is installed under the temporary roof, the insulation shall be inspected for wet or damaged areas, so that such areas may be removed and replaced prior to installation of the Elevate Roofing system.
- When a temporary roof is specified as a vapor retarder, precaution shall be exercised in protecting the temporary roof from other construction tradesmen. Damage to the temporary roof may impair its effectiveness as a vapor retarder. If a vapor retarder is installed as a temporary roof during construction, the vapor retarder shall be examined and repaired as necessary to ensure watertight integrity prior to installation of the remainder of the roof system.
- For additional information regarding temporary roofs, refer to the NRCA's Roofing and Waterproofing Manual or contact a Regional Technical Coordinator for Technical Information.

Vapor Retarders / Air Barriers

!	The determination of the necessity and location for a vapor retarder or an air barrier is a project specific requirement, which is the responsibility of the building owner or their design professional. The proper assessment of the building, the need for, and the proper design and installation of, an air barrier and vapor retarder are critical to the long-term operation of the roofing system.
	Holcim does not review or calculate dew point analyses and therefore does not accept responsibility for damage due to recurrence rate or location of the dew point. Although not all projects require a vapor retarder, a design review should be considered for all projects.
	The inclusion of an air barrier or vapor retarder may affect the Underwriters Laboratories (UL) or Factory Mutual (FM) Approvals rating of the roof system.
	The inclusion of an air barrier or vapor retarder may affect the Elevate system requirements and consequently the Red Shield Warranty. Contact a Regional Technical Coordinator for technical information prior to application of the proposed system.

Vapor Retarder

To control moisture, a vapor retarder may be necessary to protect certain roofing components when high interior humidity is of concern. Some examples are:

- When high interior relative humidity is present.
- When vapor drive may be expected to form a dew point under the roof membrane or in the insulation. Building usages with high humidity interiors where vapor drive may occur, such as swimming pools, laundry facilities, paper mills and bottling plants.

In these types of environments, there is substantial upward vapor drive, and the potential exists for extreme amounts of moisture accumulation withing the roof assembly. If an effective vapor retarder is not included at the proper location in the roof assembly, so that the retarder is warmer than the dew point, condensation will cause damage from the moisture retained in the roof assembly. This movement is reversed in some air-conditioned buildings in humid summer conditions. This is especially true in southern states. When specified, install a vapor retarder as specified by the project designer.

Vapor retarders are installed because water vapor causes several types of roof assembly failures such as:

- Reduced R-Value since wet insulation becomes a conductor of heat rather than an insulator.
- Deterioration of the roof membrane, insulation, structural decks, and associated building components.
- Delamination of roof components from trapped moisture, which freezes and thaws, eventually evaporating under solar head with the resulting vapor pressure causing blisters and delamination.

The following is a partial listing which might influence the need for a vapor retarder:

- Building usage as related to vapor drive.
- External temperature in relation to internal temperature.
- The humidity of the interior and/or exterior air.
- Building code requirements.
- Construction generated moisture, particularly during winter when temporary propane heat is required.

A vapor retarder's effectiveness generally depends upon the following factors:

- The vapor retarder's permeance (perm) rating shall be as close to zero as possible.
- The adequacy of design of the vapor retarder membrane.
- The integrity of the vapor retarder's seals at perimeter and penetrations.
- The integrity of the vapor retarder's membrane after other tradesmen finish their projects during construction or any subsequent roof or equipment alterations.
- The vapor retarder's location within the insulated roof assembly.

Construction roof traffic shall be restricted to prevent damage to the vapor retarder. In the event damage does occur, repair the vapor retarder damage with the same roof components and quantities as specified for the vapor retarder installation.

Contact one of the four generally accepted agencies for help in determining the need for a vapor retarder. They are:

- National Roofing Contractors Association (NRCA) guidelines
- U.S. Army Corp of Engineering Cold Regions Research and Engineer Laboratory (CRREL) guidelines
- American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)
- Oak Ridge National Laboratory (ORNL)

Vapor Retarder Properties:

A vapor retarder is devised as a building envelope element that limits diffusion of moisture into an assembly. Diffusion is water vapor migration in a material. Its rate depends on two factors:

- Water vapor pressure difference across the roof assembly.
- Resistance of materials along the migration path.

Some materials have more resistance than others. Placing a high-resistant material in a roof assembly may help control moisture migration. Vapor retarders are intended to limit moisture diffusion. Therefore, the main property requirement of a vapor retarder is low water vapor permeance. Water vapor permeance is defined as:

"The time of water vapor transmission though a unit area of flat materials or construction induced by a unit vapor pressure difference between two specified surfaces, under specified temperature and humidity conditions."

Design

The roof system designer is generally responsible for the design requirements of the roof deck, vapor retarder, and rigid insulation along with the roof system. This is more important than specifying roofing systems over high humidity buildings. The need for a vapor retarder, as well as the type, placement and location of a vapor retarder should be determined by a professional architect or engineer. The listed below, are examples of common vapor retarder applications.

- Elevate V-Force™ Vapor Barrier Membrane (self-adhered) applied to an approved flat substrate that has been primed with SA Water Based Primer, SA-LVOC Primer, or SA Solvent Based Primer. See the V-Force and appropriate Primer Technical Information Sheets (TIS) on the Elevate website for application information.
- Six (6) mil polyethylene sheeting taped at laps and to penetrations and perimeters.

The roof system designer must:

- Assure that the methods of attachment of the roof system to the vapor retarder selected are compatible.
- Assure that the vapor retarder will extend continuously and evenly throughout the roof plane to provide a complete seal against the intrusion of moist air from the building interior. Integration of the wall and roof air retarder systems is essential.
- Consider the effect of construction moisture on a new roof system, particularly during winter, when temporary propane heat is required.

Air Barriers

While some Elevate roofing systems may require an air barrier to receive a Red Shield Warranty, the need for an air barrier, as well as the type, placement and location of the air barrier must be determined by a professional architect or engineer.

- Air barrier systems are a component of the building envelope systems that control the movement of air into and out of buildings.
- An air barrier may consist of a single material or of two or more materials which, when installed as a system, make up an air impermeable, structurally adequate barrier.
- Air barrier systems are generally comprised of building components and materials that have an air permeability not exceeding 0.004 cfm/sf under a pressure differential of 0.3" water.
- No single component or material has the capability to provide a complete air barrier system for a building; therefore, air barrier systems include many components and materials that are interfaced with each other. Holcim recommends that the individual manufacturers of these products provide written certification that their products, when used together, meet this requirement.
- An air barrier is required for projects with large wall openings that are greater than 10% of the total wall areas that can be left open in a storm. Criteria to be determined based upon Holcim review.
- If the air barrier is to perform its intended role, it must meet several requirements including:
  - **Continuity:** The assembly must be linked together to ensure that there is no break in the air tightness of the envelope.
  - **Structural Integrity:** The air barrier must resist the imposed load or must be supported by one that can. It must resist the strongest wind load acting as either pressure or suction without rupturing or breaking away from its support. The air barrier and its support must be sufficiently rigid to resist displacement.
  - **Air Impermeability:** A major requirement of an air barrier is that it offers a high resistance to airflow.
  - **Durability:** Durability depends largely on how a material reacts to a specific environment such as moisture, temperature, ultra-violet radiation, and to the presence of other materials (incompatibility).

Substrate and Substrate Requirements

General

- Defects that need to be corrected before work can commence should be brought to the attention of the general contractor or owner in writing. All issues should be addressed prior to beginning installation of the new roofing systems.
- 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.
- Good roofing practice requires a complete tear-off to the structural deck and/or structure if soundless and integrity of the existing roof system cannot be verified. Recovering an existing roof system is an alternative to removing existing roof components. However, non-destructive testing, in conjunction with core cuts, must be completed to determine the conditions of the existing roof system and decking.
- The Elevate UltraPly TPO Roof System depends on a suitable substrate to perform its intended function of weatherproofing the building.

	It is the roofing contractor's responsibility to ensure that the substrate is acceptable for the Elevate roofing system.
!	Holcim does not approve of or recognize the results of destructive testing by others for the purposes of project close-out or to satisfy contract requirements. Any damage caused by such testing may prevent Holcim from issuing a warranty. Holcim is not responsible for costs associated with repairs or enhancements performed to the roof system as a result of testing.

- The substrate to which the Elevate roof system is installed must:
  - Be structurally sound.
  - Be dry, smooth, flat, and clean.
  - Be free of sharp fins, or foreign materials that could damage the membrane.
  - Meet the minimum requirements for the system.
- All surface voids of the immediate substrate greater than ¼" (6.35 mm) wide must be filled with insulation.
- The building owner or the building owner's designer are responsible for validating the building structure can support the proposed installed roofing system.

Fastener Pullout Requirements

- Substrates for membrane and or the insulation attachment are required to provide sufficient pullout resistance for the fasteners and the roof system.
- In the case where the structural deck or structure does not meet the minimum fastener pullout requirements contact a Regional Technical Coordinator for technical information.

Average Pullout Values in Structural Steel Purlins – Elevate Purlin Fastener	
Gauge	**Elevate Purlin Fastener Min. Pullout (lbs/Fastener)**
16	860
12	1750
1/8"	1970
NOTE: Pullout test results must be submitted to Holcim prior to project start and approval. Actual pullout values may alter the approved attachment rate.	

Table 2: Average Pullout Values in Structural Steel Purlins – Elevate Purlin Fastener

Insulation Attachment (Min. Requirements) Based on Pullout Value Mechanically Fastened Insulation Secured into Metal Roof Panel – Heavy Duty Fasteners			
Pull Out Value	**Rate of Attachment (#) per Roof Zone (1', 1, 2 or 3)**		
	Field Prime (1') / Field (1)	**Perimeter (2)**	**Corner (3)**
300 lbs. or Greater	1 per 2 sq. ft. (16)	1 per 2 sq. ft. (16)	1 per 2 sq. ft. (16)
250 to 299 lbs.	1 per 2 sq. ft. (16)	1 per 2 sq. ft. (16)	1 per 1.33 sq. ft. (24)
200 to 249 lbs.	1 per 2 sq. ft. (16)	1 per 1.33 sq. ft. (24)	1 per 1 sq. ft. (32)
NOTE: ▪ Pullout test results must be submitted to Holcim prior to project start and approval. ▪ Pullout values may alter the approved attachment rate. ▪ Fastening rates in this table are based on contributory area of a 4′ x 8′ board (32 sq. ft.)			

Table 3: Insulation Attachment (Min. Requirements) Based on Pullout Value

- Pullout Tests: Due to the variety of physical conditions that can affect pullout resistance, Holcim recommends that on-site tests be conducted by an independent testing laboratory, the manufacturer's representative, or the roofing contractor, to determine actual pullout values. The following deck types that my not provide sufficient pullout resistance:
  - 18 Gauge or less purlins
  - 24 Gauge or less metal panel
  - Any other substrate that does not have a published pullout capacity greater than the minimum required for the applicable roof system.
- The sections of the substrate where integrity is most in question should be used for testing. Tested areas should include the corners, drain areas, and perimeters. The minimum number of pullout test recommended is as follows:

Recommended Number of Pullout Tests	
Roof Size	**Number of Pull-Out Tests**
Less than 10,000 sf (Less than 1,000 m^2)	6
10,000 sf – 50,000 sf (1,000 m^2 – 5,000 m^2)	10
50,000 sf – 100,000 sf (5,000 m^2 – 10,000 m^2)	20
Over 100,000 sf (10,000 m^2)	1 per 5,000 sf (500 m^2)

Table 4: Recommended Number of Pullout Tests

- When new construction or other conditions prevent preliminary on-site pullout tests, the fastener manufacturer should supply estimated pullout values for design and bid purposes. On-site verification of the pullout capacity must be confirmed prior to system installation. (Consider requesting a unit price bid for potential increased fastening requirement.)

Moisture Considerations

- The roofing contractor is responsible for ensuring that the substrate is suitable to receive a Elevate roof system. Substrates must be properly cured to meet current industry standards before installing roofing components.
- Holcim suggests a moisture survey be conducted to determine the moisture content of any existing roof system component. All damaged and/or wet components of the existing system that would be detrimental to the new Elevate roof system must be removed and replaced in kind, prior to its installation.
- Failure to remove existing roof system components that cause damage to the new Elevate roofing system constitutes a non-warrantable condition.
- The best diagnostic technique is by taking and evaluating a series of roof cores.
- Three techniques are currently available to evaluate the roof by indirect/non-invasive means. Results of these studies must still be correlated with roof cores. These techniques provide measurements of factors that can be associated with the presence of moisture.
  - Nuclear Moisture Detection
  - Infrared Thermography

- Electric Capacitance
- These techniques provide measurement of factors that can be associated with the presence of moisture, which can be correlated to the roofing cuts to verify the results of the non-destructive testing.

Drainage and Slope

> **!** Building codes may require a specific minimum slope for drainage. It is the building owner or their design professional's responsibility to consult with the controlling code agency official(s) to determine the specific requirements of each project and each system.
>
> When interior drains are necessary, they must be installed at the low points of a sloped roof deck or insulation and maintained in a working condition.

- The NRCA and prevailing building codes recommends that a minimum roof slope of ¼" (6.4 mm) per foot be obtained to facilitate proper drainage and maximize long-term performance of the roof system. Holcim recommends following the NRCA guidelines. The minimum Holcim requirement is positive drainage.
- Ponding water is defined as a condition existing on any area of the roof where water remains more than forty-eight (48) hours after precipitation. Ponded water, snow, frost and/or ice, present must be removed from the work surface(s) prior to installing the roofing system.
- Adequacy of drainage provisions, placement, sizing and/or number of drains required is the responsibility of the building owner or their design professional. Drainage conditions should meet the requirements of applicable codes as well as standard industry recommendations.
- In re-roofing or re-cover situations, analysis of the existing drainage conditions is the responsibility of the building owner or their design professional. Existing deck deflection or ponding water may necessitate upgrading of the drainage provisions, including relocation of existing drains, possible additions of new drains, increased bar joist support, etc. Holcim does not design roof drainage systems or assume any liability for the adequacy (or lack of) roof drainage systems or facilities.
- Proper and adequate drainage of the roof surface is required to assure the long-term performance of the roof system. Drains should be sufficient number, size and located to provide satisfactory and rapid drainage of the entire roof surface (withing 24 to 48 hours of precipitation). Although a minimum roof slope of ¼" (6.4 mm) per foot is recommended, other slopes are acceptable to receive a Red Shield Warranty provided positive drainage is attained.
- Tapered ISO 95+ GL provides an effective and economical solution where substrate slope will not permit efficient drainage. When properly installed, it can extend the life of the roof assembly by eliminating problems associated with ponded water. Tapered ISO 95+ GL is available in slopes from 1/16" (1.6mm) to ½" 13 mm) per foot. Holcim provides a variety of technical support services for the installation of tapered insulation through the Holcim Tapered Engineering Design Department.
- The following are just some of the reasons why proper roof drainage is important:
  - Standing water can result in deck deflection and possible structural damage.
  - Water on the roof can promote vegetation, fungal and bacterial growth.
  - In the event of an opening in the roof membrane, standing water can significantly worsen the damage to the roof system, the building itself, and interior contents.
  - It is required by many, if not all, building codes.
  - Proper drainage of the roof system prevents premature deterioration of the membrane and roof components.

Wood Nailers

- For new construction projects, wood nailers must be kiln-dried (Southern Pine, Douglas Fir) structural grade #2 or better.
- Wood nailer by others: Make these specifications and details available when others install nailers. Work that compromises the integrity of the system may jeopardize the warranty. For re-roof projects and new construction projects where a poured-in-place deck will be used, wood nailers must be pressure treated for rot resistance, #2 or better lumber. Asphaltic or creosote-treated lumber is not acceptable. Lumber treated with other wood preservatives such as Pentachlorophenol, Copper Naphthenate or Copper 8-quinolinolate will adversely affect the membrane when in direct contact and are, therefore, unacceptable.

> **!** Due to EPA regulations regarding treated wood, new treatments for lumber may be highly corrosive to fasteners. Contact the fasteners manufacturer for their recommendations on fasteners if attaching nailers that have been treated with more corrosive materials.
>
> Chemically treating for fire resistance or other purposes (other than pressure treating for rot resistance, i.e., CCA, ACZA, CBA, ACQ or other copper treatments) may affect the performance of the Elevate membrane and accessories. Contact a Regional Technical Coordinator for technical information when using chemically treated lumber that will come in contact with the membrane.

- Holcim requires wood nailers at the following locations:
  - All roof edges
  - In between flutes
  - Metal penetration pockets
  - Pipe and other penetrations
  - Wood nailers must totally support all sheet metal flanges at least ½" (13 mm) wider to roof side.

- Gutter and scupper locations
- Refer to Elevate details for other location requirements. Under deck securement of nailers or structural support may be required.

- The wood nailer may be omitted when all metal flanges on roof curbs are less than 12" (305 mm) on a side or when placed on and secured directly to the deck. Under deck blocking may be required for proper support.
- The building owner or their design professional must specify a wood nailer attachment system that will meet the required building codes. Red Shield Warranty requirements call for nailers to resist a minimum force of 200 lb/ft (2.9 N/m) in any direction. The nailers should be installed per all required building codes. Elevate fasteners are required for all roofing applications. For further clarification, please refer to Factory Mutual Loss Prevention Data Sheet 1-49.
- The nailer assembly consists of two or more layers and matches the height of the new insulation system being installed. Refer to attachment requirements as specified by the project designer. See below for minimum fastening recommendations for warranty:
  Top Layer: Top layer of the wood nailer is fastened with Elevate Purlin Fasteners through the bottom layer into the structural purlin below. Fasteners spaced at a maximum of 16" on center and a maximum of 3" from the end of each nailer segment. Allow for a 1/8" (3.2 mm) gap between each segment.
  Bottom Layer: Where the first layer is installed between and sits flush with the ribs of the panel, it must be mechanically attached directly into the structural purlins. Elevate Purlin Fasteners spaced at a maximum of 3" from each nailer segment and a maximum of 16" on center in the field of the nailer is required. Minimum of 2 fasteners per nailer segment. Allow for a 1/8" (3.2 mm) gap between each segment.
- On corrugated metal roofs, appropriate compressible filler must be used under the perimeter wood nailers to minimize air infiltration.
- Adjustments or custom cutting of nailer may be required around irregular flute shapes or lower profile panels.
- If metal roof overhang is too much to allow proper installation of nailers then consult with the designer on reducing the overhang length to accommodate standard nailer sizes. The goal is to keep the nailer flush with the roof edge and the purlin to allow for proper securement.
- When installation of wood nailers by others exists make these specifications and details available. Work that compromises the integrity of the system may jeopardize the warranty for the entire project. It is the responsibility of the installer, building owner and their designer to validate all nailers are installed properly to meet building code requirements.

> **!** If forces at the building perimeter are greater than 200 lb/ft (2.9 N/m) due to increased wind speeds as dictated by code requirements and calculated using either ASCE-7 or ANSI/SPRI ES-1, then the securement of the nailers must also be increased to accommodate the calculated loads.

Expansion Joints

The determination of the necessity and location for expansion joints is a project specific requirement, which is the responsibility of the building owner or their design professional. Expansion joints must not restrict the flow of water. Elevate expansion joint details can be located on the Elevate website (www.HolcimElevate.com) or by contacting a Regional Technical Coordinator. Typical consideration for selections criteria may include one or more of the following:

- Where expansion, contraction or deflection joints are provided in the building structural system.
- Roof expansion joints must be located to accommodate movements caused by building structural movement.
- Where structural framing elements such as joists, rafters, purlins, or steel decking change direction.
- Deck material changes (e.g., from steel to concrete deck). Where different types of roof decks such as concrete and steel abut each other.
- Where additions are connected to existing buildings.
- At junctions where interior heating conditions change such as a heated space abutting an unheated space.
- Where movement between vertical walls and roof deck is anticipated.
- Roof areas greater than 200′ (61 m) on any direction.
- Coordination and sequencing of expansion joint closure systems and their continuity, compatibility and function of seal is the responsibility of the design team.
  NOTE: The conditions above may not be all inclusive. Other conditions may exist in which expansion joints should be considered as determined by a design professional.

Fasteners

General

Refer to the Technical Information Sheet (TIS) that references the specific fastener being used for the deck penetration requirements of that fastener. All Fasteners must be suitable for the existing deck type.

- Roofing systems rely on the attachment of the components to the deck substrate to perform its basic functions. Wind creates uplift forces on the roof: therefore, the overall holding power of the fasteners is critical. Holcim recommends that the use of any fasteners be investigated should there be concerns about the structural integrity of the deck or structure. Some of the items to be considered include:

- How the fastener(s) might affect the deck or structure.
- The capability of the deck or structure to hold the fasteners and roof system in place in a wind related event.

▪ The structural integrity of the deck may have been weakened over time; thus, the choice of fastener and roof attachment methods and frequency should be considered in determining the best solutions to the given deck and situation.

!	Regarding fastener selection with appropriate and validated pull-out results: For new installation or complete tear-off, Elevate Heavy Duty (HD) Fasteners or Elevate Purlin Fasteners and corresponding plates may be used for up to 20-year Red Shield Warranty for mechanical attachment of the single-ply membrane into the structural purlins.

Allowable Fasteners and Substrate Configurations

Elevate Fastener (TIS)	Adhered Membrane System	Mechanically Attached Membrane System				Metal Panel	Structural Purlin
	Insulation Attachment	Insulation Attachment	Batten Strips	Seam Plates	R.M.A.		
Heavy Duty Fasteners (TIS 1002)	✓	✓				✓	
All-Purpose Fasteners[3] (TIS 1001)	✓[4]	✓				✓	
Elevate #12 Fastener[3] (TIS 1026)	✓[4]	✓				✓	
Purlin Fastener[1,2] (TIS 1011)			✓	✓	✓		✓
✓ = Acceptable for use							

NOTE:
1. May require pre-drilling of purlin.
2. Purlin fastener must penetrate through the purlin a minimum of 1 ½" (38 mm).
3. All-Purpose and Elevate #12 Fastener not approved for use with InvisiWeld Plates or seam attachment of membrane.
4. Limited to 20-Year, 55 mph warranty coverage.

Table 5: Allowable Fasteners and Substrate Configurations

Acceptable Fastener Uses

Elevate Fastener (TIS)	Roofing Insulation (w/ Insulation Plate)	Elevate Batten Strips	Seam Plates	Termination Bars	Other Accessories
	See the specific fastener TIS for details application data.				
Heavy Duty Fasteners (TIS 1002)	✓			✓	✓
Purlin Fastener[1] (TIS 1011)		✓	✓		
	▪ Membrane and QuickSeam R.M.A Strip to 12 – 18-gauge structural steel purlin. ▪ The Elevate Purlin Fastener can be used in conjunction with Elevate 2" Metal Plates, Elevate V-Plates, or batten strips.				
✓ = Acceptable for use					

NOTE:
1. May require pre-drilling of purlin.

Table 6: Acceptable Fastener Uses

Acceptable Fastener Plate Uses

Mechanically Attached Membranes	
Elevate Plates (TIS)	For the attachment of: UltraPly .045", .060", .080", and TPO XR Membranes
Elevate InvisiWeld and InvisiWeld-S TPO Fastening Plate (TIS 1111)	For attaching insulation and membrane (when induction bonded) to approved substrates as required by Elevate specifications and details.
Elevate Heavy Duty Seam Plate (TIS 1102)	For attaching Elevate TPO membranes to approved substrates for enhancements and details as needed by Elevate specifications and details.
Insulation Attachment	
Insulation Fastening Plate (TIS 1106)	For attaching insulation to approved substrates as required by Elevate specifications and details.

Table 7: Acceptable Fastener Plates Uses

Acceptable Elevate Batten Bar, Termination Bar and Drain Bar Uses			
Batten and Termination Bars	For the attachment of: UltraPly .045", .060", .080", and TPO XR Membranes		
	Wide Weld Seam	Perimeter Enhancement with Cover Strip	Note:
Coiled Metal Batten Strip	✓	✓	For anchoring membrane to approve substrates as required by Elevate specifications and details.[1]
Metal Batten Strip	✓	✓	For anchoring membrane to approve substrates as required by Elevate specifications and details.[1]
Polymer Batten Strip		✓ QuickSeam Cover Strip Only	For anchoring membrane (with acceptable cover strip) to approved substrates, as required by Elevate specifications and details. Base Tie-ins only.[1]
Termination Bar			For anchoring and sealing flashing terminations to approved substrates as required by Elevate specifications and details.[2]
Aluminum Drain Bar			For terminating the membrane roof edge to approved substates as required by Elevate specifications and details.[2]
✓ = Acceptable for use			

NOTE:
1. Using this method may require additional structure enhancements, added purlins or under deck blocking for proper securement. The designer should validate if required.
2. Additional enhancements to walls, parapets or substrate may be required to accommodate this method of termination.

Table 8: Acceptable Elevate Batten Bar, Termination Bar and Drain Bar Uses

Decks

!	If present, it is required that Phenolic foam insulation be removed. Once removed, a visual inspection of the deck condition and other components is required; all deteriorated components must be replaced as necessary.
	It is the building owners or their design professional's responsibility to determine the condition of the deck.
	Sprayed-In-Place Polyurethane Foam (PUF) roofing system require a COMPLETE TEAR-OFF of the polyurethane foam system.

Platinum Retrofit or Re-Cover Applications

Metal Building Retrofit projects do not qualify for 25 or 30 year Red Shield Platinum Warranties.

General

- Structural roof decks should be properly designed and constructed to provide sufficient strength to support the anticipated dead and live loads along with the loads anticipated due to the construction traffic without excessive deflection or movement.
- Roof replacement usually involves more complexity than new construction roofing. Such contingencies as: rusted or deteriorated decks, rotted wood components, rooftop equipment that cannot be moved or shut down, and numerous other conditions are often encountered.
  - All holes, deformations, depressions, etc., must be reinforced and/or smoothed prior to the roof application.
  - Determination and acceptance of a deck for re-roofing is the responsibility of the building owner or their design professional.
  - The deck should provide slope to drain, gutter or scupper locations.
- Refer to section 1.09 D for fastening requirements for Mechanically Attached Systems should pullout values be less than 400 lbs (181.4 kg).

Classification

- Structural decks can be classified as combustible or non-combustible for the purposes of fire ratings and code requirements.
  - In most cases a metal building panel would qualify as a non-combustible deck classification.
  - The building owner should validate this information with their local code authorities, insurance agency and designers.
  - Special consideration may be required when interior fire ratings are required.

Existing Standing Seam – Attached membrane into Purlin

- The existing standing seam panels and structural purlins must be in suitable condition to accommodate installation of the new roofing system.
- Panels and structural purlins must meet the minimum pullout requirements for warranty.
- Purlins may be spaced at a maximum of 10' (3.05 m) on center. Often purlins are 5' 1.52 m) on center.

- Prior to project installation, a test fastener should be installed into purlins greater than 12 gauge. This test is used to determine if the Elevate Purlin Fasteners can properly be installed into the purlins. Elevate Purlin Fasteners are designed to be used with 16 gauge (3816") structural steel purlins in conjunction with Elevate Heavy Duty Seam Plates, Elevate V-Plates, Elevate Invisiweld or InvisiWeld-S Plates and Elevate Batten Strips. Elevate QuickSeam™ R.M.A. Strips may be required in some applications.
- Use caution to not over or under drive the fastener.
- Flute fill shall be installed between the metal panel ribs and be of a minimum height to match the height of the ribs.
- New insulation and/or cover board must be installed over the existing roof and flute fill to meet Holcim requirements and pre-secured using Elevate Heavy-Duty Elevate and Elevate Insulation Plates. Pullout values may alter the required rate of attachment. Contact a Regional Technical Coordinator prior to the start of the project.
- Fastening rates and installation methods may vary based on warranty requirements, project conditions and other factors. Validate requirements with a Regional Technical Coordinator prior to start of the project.

Existing Standing Seam – Adhered Membrane with Insulation Attached into Panel

> **!** Though Holcim may approve projects with adhered membranes over existing metal panel systems, these systems have not been tested in a lab condition. Performance requirements including uplift may not be validated if required.

- The existing standing seam panels and structural purlins must be in suitable condition to accommodate installation of the new roofing system.
- Panels and structural purlins must meet the minimum pullout requirements for warranty.
- Purlins may be spaced at a maximum of 10' (3.05 m) on center. Often purlins are 5' 1.52 m) on center.
- Prior to the start of the project and the installation of the insulation, pullout tests into the existing panels should be conducted and documented by a third party. Elevate Heavy-Duty Fasteners and Elevate Insulation Plates may be used to attach the insulation to the existing metal panel. Pullout values may alter the required rate of attachment. Contact a Regional Technical Coordinator prior to the start of the project.
- Use caution not to over or under drive the fastener.
- Flute fill shall be installed between the metal panel ribs and be a minimum height to match the height of the ribs.
- Fastening rates may vary based on warranty requirements, project conditions and other factors. Validate requirements with a Regional Technical Coordinator prior to start of the project.
- Approved membrane in conjunction with approved membrane adhesives or self-adhering membrane may be applied to the properly installed insulation/cover board.
- Fastening rates and installation methods may vary based on warranty requirements, project conditions and other factors. Validate requirements with a Regional Technical Coordinator prior to start of the project.

Special Considerations for Partial Tear Off and Retrofit/Re-Cover Applications

> **!** If present, it is required that phenolic foam insulation be removed. Once removed, a visual inspection of the deck condition and other components is required; all deteriorated components must be replaced as necessary. It is the building owner or their design professional's responsibility to determine the condition of the deck.

- A **Partial Tear Off** is the removal of the existing roofing membrane, installing a new layer of insulation over the existing in-place, and installing a new membrane roofing system over the new insulation.
- A **Retrofit** or **Re-Cover** is the installation of a new membrane roofing system (including insulation) over an existing roofing membrane.
- The effect of existing moisture on the performance of the new system may be significant depending upon the roofing components selected. Therefore, a moisture survey should be conducted to determine the moisture content of the existing roof system components. All components of the existing system that would be detrimental to the new Elevate roof system must be removed and replaced in kind prior to installation.
- Limitations in flashing heights may be encountered. Existing building features (e.g., door or window locations, weep holes, and through-wall flashings) may not allow sufficient clearance to provide proper termination above the potential water level, additional insulation, or other details. Detailed consideration of these conditions is critical to the integrity of the roofing system. Contact a Regional Technical Coordinator for technical information or assistance.
- Confirm the structural integrity of the existing deck/structure and specify repair or replacement as required.
- Existing roof components, failure related to existing panels or structure are not included in the Red Shield warranty.
- Verify that the attachment of the existing roof system is acceptable for the specific new Elevate roof system.

Special Considerations for Partial Tear Off and Retrofit/Recover Applications
Purlin
▪ It is the responsibility of the building owner or their design professional to verify the building meets/exceeds the requirements of the structural loading and change from existing roofing system to the new system. ▪ The attachment of the existing system may not be sufficient if the existing purlin is not fastened correctly, or if the existing system contains corroded materials. It is strongly recommended that the existing roof panels be mechanically attached to the structural purlins in accordance with local codes, insurance, and designer requirements prior to the installation of the new system. ▪ Holcim is not responsible for the design of the building structure, panel system nor the structural design or attachment. ▪ The designer should determine if existing vents, edging and wall transitions should be closed off prior to installation of the new roofing system.
Panels
▪ It is the responsibility of the building owner or their design professional to verify the metal panels meet/exceed the requirements of the structural loading and change from existing roofing system to the new system. ▪ The designer should determine if the existing meal roof panels are sufficient for installation of the new roofing system. ▪ Conditions of the existing system may not allow for installation of a new roofing system without removal or replacement of existing materials.
General
▪ Pullout values, existing panel or structure conditions may not qualify the project for an adhered membrane application. Purlin attachment may the only option for some projects. ▪ Not all projects may qualify for a Red Shield warranty.

Table 9: Special Considerations for Partial Tear Off and Retrofit / Recover Applications

!	The suitability of mechanically fastening insulation or membrane into a profiled metal panel as used on a metal building is the responsibility of the design professional. Special consideration needs to be given to the relationship between the panel attachment, structure attachment and the proposed roofing system being installed.
	When using fasteners, verify that the substrate has sufficient fastener pullout resistance to meet system requirements.

Partial Tear Off

- Partial Tear Off and Re-Cover is the removal of the existing roofing panels, installing of new panels, new polyisocyanurate flute fill insulation, new insulation or cover board substrate and new single-ply membrane.
- The existing insulation, if present, must be suitable for use as a component of the new roof system. The existing insulation must be:
  - Dry and free of trapped moisture.
  - Re-secured as necessary to meet Holcim, local code, or other specified wind uplift requirements.
  - An acceptable substrate for the new insulation and the new membrane.
- If existing insulation is to remain, all damaged or wet components must be removed and replaced, in kind, prior to installing the new roof system.
- Existing roof components, failure related to existing panels or structure are not included in the Red Shield Warranty.

Retrofit/Re-Cover Applications

- The installation of new polyisocyanurate flute fill insulation, new insulation or cover board substrate and new single-ply membrane is required.
- Re-Cover over single-ply roofing systems require that all existing base tie-ins be removed or cut prior to the new roof installation.
- All damaged or wet components must be removed and replaced, in kin, prior to installing the new roof system.
- Existing roof components, failure related to existing panels or structure are not included in the Red Shield Warranty.

Insulation System

General

- Insulation must provide a suitable substrate for the proposed roof system as well as insulating the building.
  - 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.
- Insulation thickness requirements may vary for code compliance. Contact the local code or insurance official before contacting a Regional Technical Coordinator for technical information.

- Fill voids between standing seam panels. This material should consist of polyisocyanurate, or other insulation approved for use by local code authorities.
  - Areas between standing seams must be filled with polyisocyanurate to create a solid substrate. This insulation should be flush with the top of the panel seams to support the insulation layers above.
- Refer to insulation or cover board technical information sheet (TIS) for specific spanning capabilities.
- Neatly fit insulation to all penetrations, projections, and nailers. Insulation should be loosely fitted, with gaps greater than ¼" (6.3 mm) filled with acceptable insulation. Under no circumstances should the membrane be left unsupported over a space greater than ¼" (6.3 mm). Tapered insulation with acceptable facers for bonding must be installed around roof drains so as to provide proper slope for drainage as shown in Elevate Details.
- Stagger insulation joints when installing multiple layers of insulation. All joints between layers should be staggered but is not required for the issuance of a Red Shield Warranty.
- Refer to the Elevate Attachment Guide and this document for pull test requirements.

> ! Only Elevate branded insulation or those sold by Holcim can be included in the Red Shield Warranty.

Attachment

- Insulation may be installed using approved Elevate fasteners and plates only. Fastener pull out values must be provided prior to project installation and approval.
- Tapered insulation below the 1" (25 mm) minimum thickness must be fastened at a rate of one (1) fastener and plate per (2) ft^2 (0.22 m). If possible, install the tapered insulation first, covered by flat stock.
- Refer to specific Elevate Technical Information Sheets (TIS) for installation and fastening requirements.
- When a composite of two insulation layers is installed, the fastening pattern required for the top board thickness must be used. A common fastener may be used to install multilayer applications. Some restrictions apply to fasteners length depending on standards used.

Multiple Layers of Insulation

- Where overall insulation thickness is 2" (51 mm) or greater, Holcim recommends installation the insulation in two (2) or more layers.
- Insulation may be installed in one or multiple layer applications for the Red Shield warranty. If installed in multiple layers, the joints of each succeeding and adjoining layer should be staggered from the joints of previous layers by a minimum of 6" (152.4 mm) in each direction.
- When a composite of two insulation layers is installed, the fastening pattern required is dependent on the top board type and thickness. A common fastener may be used to simultaneously fasten all layers to the structural deck.

Mechanical Attachment of Insulation and Cover Board to Approved Substrates

- Insulation must be fastened with appropriate Elevate fasteners and insulation plates.
- Insulation must be installed in accordance with the fastening rate and pattern for the applicable system.
- Fastening rates and patterns may vary for code or regulatory compliance. Contact a local code or insurance official before contacting a Regional Technical Coordinator for technical information.
- When a composite of two insulation layers is installed, the fastening pattern required is dependent on the top board type and thickness. A common fastener may be used to simultaneously fasten all layers to the structural deck.
- In areas where tapered insulation thickness is below the 1" (25 mm) minimum thickness, insulation must be fastened at a rate of one (1) fastener and plate per two (2) ft^2 (0.22 m^2).
- When sufficient pullout values are documented and provided attachment rates may be evaluated for insulation and membrane securement.

Minimum Rate of Attachment for Insulation Boards

- Refer to Elevate technical documents or tested assemblies for the required patterns for proper placement of approved fasteners and plates for insulation. Default to the more conservative fastening rates. For non-standard fastener densities, contact a Regional Technical Coordinator for information.
- Certain specifications, performance requirements, code requirements and job conditions may call for increased densities of fasteners in the perimeters and corners of roof.

Fastening Rates for Insulation – Attached Membrane	
Insulation	**Rate of Attachment**
Flute Fill	Loose Laid
Insulation and/or Cover Board	Min. 5 Elevate Heavy Duty Fasteners and Insulation Plates per Board
NOTE: Fastener pullout values may impact this attachment rate. Please contact a Regional Technical Coordinator when pullout values do not meet warranty requirements. Rates may increase when an air retarder is present.	

Table 10: Fastening Rates for Insulation – Attached Membrane

Fastening Rates for Insulation – Adhered Membrane	
Insulation	**Rate of Attachment**
Flute Fill	Loose Laid
Insulation and/or Cover Board	Min. 16 Elevate Heavy Duty Fasteners and Insulation Plates per Board
NOTE: Fastener pullout values may impact this attachment rate. Please contact a Regional Technical Coordinator when pullout values do not meet warranty requirements. Rates may increase when an air retarder is present.	

Table 11: Fastening Rates for Insulation – Adhered Membrane

Roof Membrane

Membrane Securement Options for Single-Ply Membrane Systems

The following outlines the various securement options for individual system types. Compliance with all installation criteria is required to issue a Red Shield Warranty. Additional attachment requirements may be necessary to comply with design criteria, insurance requirements or local building code. Review the Elevate UltraPly TPO Design Guide, UltraPly Invisiweld Design Guide and corresponding application guides, details, and other technical information for specific installation methods.

NOTE: An air barrier is required for projects with large wall openings that are greater than 10% of any one wall area that could be left open in a storm. Criteria for enhancements to be determined based upon Holcim's review. Contact a Regional Technical Coordinator for Technical Information.

- See the Elevate Attachment Guide for additional membrane and insulation securement requirements.
- Due to the nature of mechanically attached roofing systems, some fluttering or billowing of the membrane can be expected and may produce sound under certain conditions.
- Appropriate Elevate Seam Plates, Batten Strips (R.M.A. only) and appropriate fasteners must be used with Elevate Fasteners to secure the Elevate Mechanically Attached System membrane.
- Where the purlins or deck do not provide the minimum required fastener pullout resistance additional fastening or alternate installation methods may be required. This may result in the project not being warrantable.
- Consult with local building code, insurance officials and design professionals to determine if more stringent securements are required.
- The methods outlined below are options that may be used to achieve a Red Shield Warranty. Not all systems may qualify for a Red Shield Warranty. It is important to review the project conditions and proposed system with a Holcim Representative prior to starting a project.
- Fastening spacing and methods in this guide assumes that the panel/structure is dry and free of any deterioration. Holcim recommends that pullout testing be completed and documented by a third party on all metal building retrofit projects.
- Splice Elevate UltraPly TPO membrane by heat welding the side and end laps with a hot air welder. Refer to the UltraPly TPO Application Guide for additional welding information.
- If reinforced TPO membrane thickness is greater than .045" (1.14 mm), T-joint patches must be installed at all reinforced membrane seam intersections. For specific instructions, refer to the Elevate UltraPly TPO Roofing System Application Guide and Elevate UltraPly TPO Lap Splice Details.
- Refer to Elevate details and application specifications for specific requirements.
- See Detail UT-IW-4 (≤ 60' height or less), Metal Building Retrofit and Attachment Guide for more details. Contact a Regional Technical Coordinator for buildings over 60' in height.
  NOTE: Perimeter area is defined as the outer boundary of the roof. If the roof is broken into different levels, each roof area shall be treated as an individual roof with its outer boundary considered a perimeter. Each side of the ridge is considered a perimeter area when the slope is ≥ 1.5:12. Contact the designer of record for validation. Typically, internal expansion joints and firewalls are not considered to be full perimeters. Refer to Factory Mutuals Data Sheet 1-28 for more information.
- Fastening enhancements based on warranty requirements. Factory Mutual LPDS 1-31 Section 3.4.4.1 may call for alternate enhancements. Consult FM LPDS 1-31 for more information.

Approved Immediate Substates for TPO Membranes Up to 20-Year Warranties				
New Insulation or Cover Board	UltraPly TPO or Platinum TPO		UltraPly TPO SA	UltraPly TPO XR
	Adhered	Attached	Adhered	Adhered
ISO 95+ GL / ISOGARD GL	✓	✓	✓	✓
Resista / ISOGARD GL	✓	✓	✓	✓
ISOGARD HD	✓	✓	✓	✓
HailGard / ISOGARD HG	✓	✓	✓	✓
DensDeck / DensDeck Prime	✓	✓	✓	✓
DensDeck StormX Prime Board	✓	✓	✓	✓
Securock Gypsum-Fiber	✓	✓	✓	✓
Securock Glass-Mat	N/A	✓	N/A	N/A
Structodek HD Fiberboard (Maximum 15 Year Warranty)	✓	✓	✓	✓
✓ = Approved; N/A = Not an approved attachment method for this membrane.				

Table 12: Approved Immediate Substrates for TPO Membranes Up to 20-Year Warranties

Available Adhesives for UltraPly TPO Membranes	
Adhered Single-Ply Membrane	Approved Adhesives
UltraPly TPO UltraPly TPO Platinum	Jet Bond Spray Adhesive Single-Ply LVOC Bonding Adhesive-1168 Single-Ply LVOC Bonding Adhesive UltraPly Bonding Adhesive Water Based Bonding Adhesive – P (15-year max.) XR Bonding Adhesive
UltraPly TPO XR (Horizontal Substrates)	I.S.O. Spray™ R Adhesive Jet Bond Spray Adhesive Twin Jet XR Bonding Adhesive XR Stick™
UltraPly TPO SA	**Not Applicable** The self-adhering adhesive is pre-applied to the bottom side of the membrane.
NOTE: Validate compatible substrate with all adhesives listed above.	

Table 13: Available Adhesives for UltraPly TPO Membranes

Plate Bonded Mechanically Attached System – Purlin

- Use appropriate Elevate Purlin Fastener and Elevate Invisiweld or Invisiweld-S Plates.
- Pre-Drilling of the purlins may be required.
- Take care not to under or over drive the purlin fasteners.
- Insulation attached using Elevate Heavy Duty Fasteners and Elevate Insulation Plates.

Plate and Fastener In-Seam Mechanically Attached System – Purlin

- Use appropriate Elevate Purlin Fasteners and Elevate Heavy Duty Seam Plates for securement of membrane directly into the purlin.
- Pre-Drilling of the purlins may be required.
- Take care not to under or over drive the purlin fasteners.
- Pre-Securement of insulation using Elevate Heavy Duty Fasteners and Elevate Insulation Plates.

R.M.A. with Plates and Fastener Mechanically Attached System – Purlin

- Lay out UltraPly QuickSeam R.M.A. Strip along each purlin and use appropriate Elevate Purlin Fasteners and Elevate Heavy Duty Seam Plates.
- Pre-Drilling of the purlins may be required.
- Take care not to under or over drive the purlin fasteners.
- Pre-Securement of the insulation using Elevate Heavy Duty Fasteners and Elevate Insulation Plates.
- UltraPly TPO membrane once primed will adhere to the adhesive portions of the R.M.A Strip.

R.M.A. with Batten Strip Mechanically Attached System – Purlin

- Lay out UltraPly QuickSeam R.M.A. Strip along each purlin and use appropriate Elevate Purlin Fasteners and Elevate Metal Batten Strip.
- Pre-Drilling of the purlins may be required.
- Take care not to under or over drive the purlin fasteners.
- Pre-Securement of the insulation using Elevate Heavy Duty Fasteners and Elevate Insulation Plates.
- UltraPly TPO membrane once primed will adhere to the adhesive portions of the R.M.A. Strip.

Adhered Membrane with Attached Insulation

- Pullout values must meet Holcim minimum requirements. Results lower than the minimum requirements may call for increased and/or modified fastening or may cause the project to be non-warrantable.
- Polyisocyanurate flute fill required.
- Insulation and/or cover board shall be laid out to achieve proper support of the boards and be offset where required.
- Insulation to be fastened directly into the metal building panel with Elevate Heavy Duty Fasteners and Elevate insulation Plates and shall penetrate through the panel a minimum of ¾".
- UltraPly TPO Membrane to be adhered using appropriate Elevate membrane adhesive.
  - UltraPly TPO SA membrane is an acceptable membrane in this application.

Flashings

Edge Metal Requirements

Elevate metal must be used and installed per Elevate details and standards for warranty inclusion. ES-1 certified metal and details are required for increased wind speed warranties over 80 mph. Contractors participating in the Holcim ES-1 Metal Cleat Program may receive up to 90 mph coverage for qualifying products. To meet Holcim's technical specifications, all edge metal, metal copings and edge systems whether field fabricated, shop fabricated, or factory formed should be designed in compliance with the International Building Code (IBC) and be tested/installed in accordance with ANSI/SPRI/FM4435/ES-1 standard and requirements. Reference the table below and the Attachment and Supplemental Increased Wind Speed Guide for more available warranty terms and wind speed coverage options.

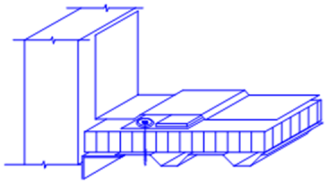
Elevate Edge Metal and Flashing Warranty Breakdown*		
Material	**Included in Red Shield**	**Warranty and Terms**
Non-Elevate Metal	N/A	None
Non-Elevate Factory Formed	No	None
Elevate Metal (Flat/Coil)	N/A	Product Finish Warranty Up to 35 Years Must be purchased from Holcim. (Non-Licensed Applicators)
Elevate Metal – Field Fabricated	Yes	Max. 20-Years, 80 mph Installed per current Elevate details/guidelines. (No increased wind speeds when installed per non-Elevate guidelines.)
Elevate Metal – Shop Fabricated (ES-1 Metal Cleat Program)	Yes	Max. 20-Years, up to 90 mph Installed per current Elevate details/guidelines. Factory Cleat required (ANSI/SPRI ES-1).
Factory Formed – Other Suppliers (Using Elevate Metal)	Yes	Max. 20-Years, 90 mph Elevate metal purchased direct from approved factory fabricator.
Elevate Branded Metal – Factory Formed	Yes	Max. 30-Years, up to 120 mph Factory formed Elevate Metal and accessories, installed per current details/guidelines. Elevate branded and purchased from Elevate.
*See warranty sample for specific coverage.		

Table 14: Elevate Edge Metal and Flashing Warranty Breakdown

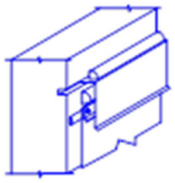
Design Considerations

- Many factors affect the performance of the flashing system. Extended warranties may require special flashing applications and details. Design drawings for several common applications are available from the Elevate website (www.HolcimElevate.com). Contact a Regional Technical Coordinator for Technical Information.
- Flashing is a roofing element used to prevent water from penetrating the exterior surface of a roof or to intercept and lead water of fit. Flashings divert the water to the roof membrane. The roof membrane then carries it to the roof drain system. Typically, a flashing intercepts water flowing down parapets, down wall or higher adjacent construction and down roof penetrations. There are four typical locations where a flashing is needed.
  - Terminations
  - Junctions
  - Projections
  - Joints
- In any flashing detail, there are up to three different flashing components:
  - Base Flashing
  - Counter Flashing
  - Cap Flashing

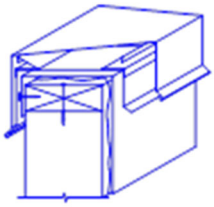
Base Flashing:
An extension of the roofing material or a different material that is bonded to the roof to form a waterproof joint. It extends upward along the vertical surface to divert water onto the membrane. The base flashing should reach a higher level than that reached by water on the roof. In some situations, water may have to be temporarily stored on the roof. This may occur during heavy rainfalls, where the drain size is inadequate, where local building regulations require controlled flow drains, or where ice and snow restrict drainage.



Counter Flashing
Counter Flashing is used, in some situations, to carry water onto the base flashing and the membrane. This may be the case where a wall rises above a roof surface. The counter flashing covers the vertical termination of the base flashing. It provides protection for the base flashing and may serve to shed water. Where required, the counter Flashing is secured to the parapet or wall cladding.



Cap Flashing
Cap flashings are horizontal coverings for parapets and expansion joints. Cap flashing should be sloped toward the roof and secured to allow differential movement. Failure to provide for adequate flashing height at the design stage may result in serious problems that cannot be corrected subsequently.



- Limitations in flashing heights may be encountered. Existing building features (i.e., door or window locations, weep holes, through-wall flashings, etc.) may not allow sufficient clearance to provide proper termination above the potential water level, additional insulation, or other details. Detailed consideration of these conditions is critical to the integrity of the roofing system. Contact a Regional Technical Coordinator for assistance.
- Remove all loose existing flashings.
- All penetrations passing through the membrane must be flashed.
- All penetrations passing through the vapor barrier and/or air barrier must be flashed and terminated or tied in correctly. Consult with the air/vapor barrier designer to validate these detail requirements.

Wall/Curb Flashing materials and Requirements

- The following chart lists the flashing requirements for Elevate Single-Ply systems.
- Refer to the Elevate UltraPly TPO Application Guide, Technical Information Sheets, and detail drawings for additional information.
- All membrane base tie-ins must be attached to substrates which provide a minimum of 200 lbf (89 kN) force in any direction.

Wall/Curb Flashing Materials (Up to 20 Year Warranty)	
Membrane and Detail	**Detail Description**
UltraPly TPO	
All Flashings	Curbs, walls, and expansion joints must be anchored with appropriate base tie-in detail, using UltraPly QuickSeam Reinforced Perimeter Fastening (RPF) Strip or HD Seam Plates (see current details for alternate base tie-in details). Curbs and walls must be flashed using a minimum of 0.045" UltraPly TPO Membrane, TPO SA or UltraPly TPO 18" Curb Flashing. Flashings may be sealed with welded details or QuickSeam products (see UltraBlend details) where acceptable and may include UltraPly TPO Coated Metal.
Roof Edges	Elevate AnchorGard or EdgeGard Fascia, Drain Bar Systems, Elevate Coping Systems, Una-Edge System or UltraPly TPO Coated Metal. QuickSeam details may be used.
Parapets	Elevate Coping System
UltraPly TPO XR	
All Flashings	Curbs, walls, and expansion joints must be anchored with appropriate base tie-in detail using foam adhesive (XR Stick, Twin Jet, Jet Bond, or I.S.O. Spray R) with UltraPly TPO XR membrane, or HD Seam Plates and HD Fasteners with TPO membrane. Curbs and walls must be flashed using minimum 0.045" UltraPly TPO membrane, TPO SA or UltraPly TPO 18" Curb Flashing.
Roof Edges	Elevate AnchorGard or EdgeGard Fascia, Drain Bar Systems, Elevate Coping Systems, UNA-Edge Systems or UltraPly TPO Coated Metal. See XR specific details for additional information.
Parapets	Elevate Coping System
UltraPly TPO SA	
All Flashings	Curbs, walls, and expansion joints must be anchored with appropriate base tie-in detail, using UltraPly QuickSeam Reinforced Perimeter Fastening (RPF) Strip or TPO seam plates (see current details for alternate base tie-in details). Curbs and walls must be flashing using minimum 0.045" UltraPly TPO Membrane, TPO SA or UltraPly TPO 18" Curb Flashing. Flashings may be sealed with welded details or QuickSeam products (see UltraBlend details) where acceptable and may include UltraPly TPO Coated Metal.
Roof Edges	Elevate AnchorGard or EdgeGard Fascia, Drain Bar Systems, Elevate Coping Systems, UNA-Edge System or UltraPly TPO Coated Metal. QuickSeam details may be used.
Parapets	Elevate Coping System
UltraPly TPO Invisiweld	
All Flashings	Curbs, walls, and expansion joints must be anchored with appropriate base tie-in detail, using UltraPly QuickSeam Reinforced Perimeter Fastening (RPF) Strip, TPO seam plates or InvisiWeld plates (see current details for alternate base tie-in details). Curbs and walls must be flashed using minimum 0.045" UltraPly TPO Membrane, TPO SA or UltraPly TPO 18" Curb Flashing. Flashings may be sealed with welded details or QuickSeam products (see UltraBlend details) where acceptable and may include UltraPly TPO Coated Metal.
Roof Edges	Elevate AnchorGard or EdgeGard Fascia, Drain Bar systems, Elevate Coping System, UNA-Edge System or UltraPly TPO Coated Metal. QuickSeam Details may be used.
Parapets	Elevate Coping System

Table 15: Wall / Curb Flashing Materials (Up to 20 Year Warranties)

Penetrations (Pipes, Conduits, Etc.)

> **!** Penetrations shall be placed to maintain a minimum distance away from obstructions (walls, curbs, etc.) to allow for proper installation of flashing details. Minimum 12" (304.8 mm) of clearance is required for penetrations when located near obstructions and/or details (base tie-in, flashing, etc.). Liquid flashing may be used as an alternative to standard flashings if the membrane and system application allows.

Pipe Flashings:

- Wherever possible, all round rigid penetrations ranging in size from 1 ½" (38.1 mm) outside diameter to 8" (203 mm) outside diameter should be flashed with Elevate Pre-Molded Pipe Flashings. If it is not possible to fit an UltraPly TPO Pre-Molded Flashing on the pipe due to site conditions, the pipe should be covered with a field-fabricated flashing in accordance with Elevate Details. Elevate QuickSeam accessories may be utilized for up to a 20-year warranty (see UltraBlend details for additional information).

Flexible Penetrations (electrical and braided cables, etc.):

- Flexible penetrations or conduits may not be flashed with pre-molded, field-fabricated flashings or penetration pockets. Flexible penetrations must be installed through a rigid gooseneck, a sheet metal enclosure or other isolating structure.

Penetration Pockets

1. The following types of penetrations require the installation of penetration pocket detail:
   - Rigid pipes with an outside diameter less than 1" (25 mm) and up to 4" (102 mm)
   - Clusters of pipes
   - Unusual shapes, e.g., structural beams, channels, or angles
2. A minimum clearance of 1" (25 mm) between penetrations and on all sides of the penetration pocket, is required to assure adequate allowance of Elevate pourable sealer around each penetration.
3. Secure penetration pockets and flash per Elevate Details.
4. Fill penetration pockets with Elevate 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 penetration.

Curbs and Terminations

- All flashing terminations above the field of the roof membrane (except penetration pockets and Pre-Molded Elevate accessories) should provide a minimum design height of at least 8" (203 mm). Elevate
- There are situations where minimum design height cannot be met. In these situations, minimum flashing height should be no lower than the potential water level that could be reached because of a deluging rain. Wherever a vertical termination height is 5" (127 mm) or less, an Elevate Termination Bar detail that is subsequently counter flashed, is required. Do not flash over existing through-wall flashings, weep holes or scuppers.
- Termination must be made directly to a sound, watertight, rigid, vertical substrate. For retrofit conditions, existing loose flashing materials must be removed, or overlaid with ⅝" (16 mm) exterior grade plywood. Termination bars are not to be installed into gypsum or wood substrates.
- When using a surface-mounted termination, (i.e., termination bar or surface-mounted counterflashing) ensure a consistent seal along the wall interface. The wall surface above the termination must be waterproof.
- Gypsum board, used as a substate for flashings, must be moisture resistant exterior grade with laminated fiberglass facers and recommended for this application by the gypsum board manufacturer. Base tie-ins must be made into the deck because gypsum does not provide the required minimum fasteners pullout resistance of 200 lbf (0.9 kN).
- Uneven substrates such as stucco, cobblestone, textured masonry, or corrugated metal panels, etc. are not suitable to receive flashings. Such surfaces must be prepared to provide an acceptable substrate by attaching minimum ⅝" (16 mm) exterior grade or pressure treated plywood. Attach as required for structural integrity.
- DensGlass® Gold is not an acceptable substrate for any Elevate membrane wall flashing system.

Scuppers

- Provide and install a new welded watertight sleeve.
- Set welded watertight scupper in Water Block Sealant and secure scupper to the structure.
- Flash in accordance with Elevate details.

Expansion Joints

Install where specified by the project designer. Install expansion joints in accordance with Elevate Details. Custom expansion joint details may be reviewed for approval by a Regional Technical Coordinator. Expansion joints are not covered under the Red Shield Warranty.

Sheet Metal Work

- Coping, gravel stops, drain bars, counter flashings etc., must be supplied by Holcim. If Holcim is not able to supply a given sheet metal product or design, it must be installed per current Elevate details but will not be included as part of the Red Shield Warranty.
- The installed membrane roofing system must be made watertight before sheet metal application.
- It is the owner's responsibility to maintain non- Elevate sheet metal in a watertight condition.
- Make these specifications available to the sheet metal fabricator/contractor.
- Attachment:
  - Counter flashings, copings, and other perimeter or penetration metal work must be properly fastened and sealed by the roofing contractor or others.
  - All sheet metal work not supplied by Holcim should be fabricated and installed in accordance with the most stringent requirements from one of the following organizations, the Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA), the national Roofing Contractors Association (NRCA), ANSI/SPRI or Dade County.

!	Some specific roofing details in Elevate's Technical Specifications may exceed SMACNA recommendations. For such details, follow Elevate requirements.
	Refer to ANSI/SPRI ES-1 for information on enhanced wind design for metal edge treatments and performance criteria.
	Extended wind speed warranties require enhanced edge details. Contact a Regional Technical Coordinator for technical information.

- If a metal flashing product by others is submitted via a deviation request for inclusion in the warranty coverage, the following are minimum requirements for consideration:
  - The sheet metal work must be shop or factory formed or extruded.
  - Minimum requirements regarding sheet metal work material are 24 ga (0.61 mm) G-90 Kynar pre-finished steel or 0.040" (1 mm) aluminum (mill finished, pre-finished or anodized).
  - A deviation request for inclusion of sheet metal work in warranty coverage must accompany the PIN for submitted by the installing contractor.
  - The deviation request must include shop drawings of the sheet metal work to be included and a roof plan showing the installed location and linear dimension for each profile.
  - Should the deviation request be granted, the installing contractor will be responsible to Holcim Solutions and Products US, LLC. for a period of two-years from the date of Holcim's inspection and acceptance under their installer's agreement.
- Metal work not in conformance with Elevate specifications and details or which compromises the integrity of the roof system may jeopardize issuance of the warranty for the entire project. Holcim does not warranty the performance of products Holcim does not supply.

Walkways

Locations

Walkways help protect the membrane from damage due to necessary rooftop service traffic.

- Walkway systems on warranted Red Shield roofs are required at all access points (ladders, hatches, doorways, etc.) and are recommended for use:
  - On roof areas that are subject to foot traffic more frequently than once a month.
  - Around all serviceable rooftop units.
- It is the responsibility of the building owner to maintain walkway systems.
- Traffic related roof damage is not covered by the Red Shield Warranty. In areas of extreme traffic, contact a Regional Technical Coordinator for options to enhance the roof system to prevent or mitigate damage to roofing components.

Walkway Material

- For Elevate UltraPly TPO Roofing Systems, approved walkways are to be utilized in the areas indicated above. Walkways are to be installed in accordance with the instructions provided in the Technical Information Sheet or Applications Guide for each product.
- Walkways may be constructed using Elevate UltraPly TPO Walkway Pads, X-Tred Walkway Pads, EcoWhite QuickSeam Walkway Pads (see UltraBlend Specification) or approved pavers (with sacrificial membrane layer).
- Concrete pavers, with an additional layer of membrane installed beneath the paver for protection, may be substituted for walkway pads on adhered systems. Consult details and guides for additional information.
- Special Requirements for mechanically attached systems: Pavers and loose walkway pads are not approved for use on mechanically attached membrane systems.
- Contact a Regional Technical Coordinator for information regarding other materials designated as a walking surface.

Warranty

General

- Consult the Single-Ply Design Guide opening section 1.01 – General Design Criteria – Initial Design Considerations and Warranty Requirements.
- Metal Building Retrofit projects may qualify for a maximum 20-Year Red Shield Warranty.
- Extended wind speed coverage, membrane attached direct into purlins, is limited to a maximum 90 mph. Special installation requirements may be required. Holcim representative to validate system and installation requirements prior to extended wind speed coverage approval.
- Documented third party pullout values must be provided for the following to apply and for projects to qualify.
- For new construction, partial tear-off or re-cover, Elevate Heavy Duty, Elevate Purlin and appropriate Elevate plates may be used for mechanical attachment of the membrane into the structural purlins of the metal building. Elevate Heavy Duty Fasteners and Insulation plates may be used for insulation and cover board attachment into the panels of the metal building.
- Tie-Ins to other roofing systems are not warranted by Holcim.
- Failure of a flashing or termination to an intermediate element (e.g., metal panel, insulation, surface treatment, etc.), which itself could fail and admit moisture beneath the membrane is beyond the limits of the Red Shield Warranty.

- Failure of the existing metal building panels, connections to the existing structure or the structure itself are not included in the Red Shield Warranty.
- Upon Holcim's inspection and acceptance of the installed roof system, the requested warranty can be issued. Holcim's inspection is not intended as an inspection for the benefit of the owner or design professional with respect to contract, building codes or compliance with specifications other than Holcim's. Warranted Red Shield roofing systems are to be installed only on commercial, industrial, institutional, or multi-family commercial housing structures in the United States and Canada. Issuance of a warranty for projects outside the US and Canada must be submitted to a Regional Technical Coordinator for consideration prior to bidding. Individual residential construction does not qualify for a Red Shield Warranty. Only Holcim supplied components are eligible to be covered as part of the Red Shield Warranty.

Maximum Warranty Terms for UltraPly TPO Systems

Thickness	Membrane	5-15 Years	20 Years
.080" (2.0 mm)	UltraPly TPO Platinum	Yes	Yes
.060" (1.52 mm)	UltraPly TPO	Yes	Yes
.045" (1.14 mm)	UltraPly TPO	Yes	Yes (Except InvisiWeld)
.060" (1.52 mm)	UltraPly TPO SA	Yes	Yes
.080" (2.0 mm)	UltraPly TPO XR 135	Yes	Yes
.060" (1.52 mm)	UltraPly TPO XR 115	Yes	Yes
.045" (1.14 mm)	UltraPly TPO XR 100	Yes	Yes

Table 16: Maximum Warranty Terms for UltraPly TPO Systems

- It is the owner's responsibility to expose the membrane if warranty service is required when access is impaired. Such impairment includes, but is not limited to:
  - Design features, such as window washer systems, which require the installation of traffic surface units more than 80 lb (36.3 kg) per unit.
  - Any equipment, ornamentation, building service units and other roof top surfacing materials that are not defined as part of the membrane assembly.
  - Intricately placed or multicolored ballast configurations.
  - Individual pavers utilized as ballast, which weight more than 80 lb (36.3 kg) per unit, unless otherwise required by Holcim for wind uplift resistance.
  - Interlocking paver systems that utilize mechanical clips, strapping, adhesive, etc.
  - Rooftop equipment that does not provide Holcim with reasonable access to the membrane.
  - Severely ponded water, snow, ice, and other unrelated materials.

The charts below are only a summary of general warranty coverage. Contact a Holcim representative for full scope of warranty requirements and approval.

The following table shows the types and minimum thickness of Elevate insulation acceptable for use as an immediate substrate for Elevate roofing membranes in Red Shield Warranties. Other approved insulations may be allowed below the immediate substrate insulation.

Chart of Acceptable Insulations and Attachments for UltraPly TPO Membranes
Maximum 20 Year Red Shield Warranties over Metal Building Retrofit

Insulation	Minimum Thickness	System		
		MAS	InvisWeld	Adhered
ISO 95+ GL / ISOGARD GL (Flat)	1" (25 mm)	✓	✓	N/A
Resista / ISOGARD CG (Flat)	1" (25 mm)	✓	✓	N/A
ISOGARD HD Composite	1.5" (38 mm)	✓	✓	N/A
HailGard / ISOGARD HG	1.5" (38 mm)	✓	✓	N/A
Structodek HD	½" (13 mm) – 15 Year Max.	✓	✓	N/A
ISOGARD HD	½" (13 mm)	✓	✓	N/A
DensDeck Products	¼" (6 mm)	✓	✓	N/A
Securock Gypsum-Fiber	¼" (6 mm)	✓	✓	N/A

NOTE: Flute fill required to fill spaces below full board installations above.
✓ = Approved; N/A = Not an approved attachment method for this insulation.

Table 17: Chart of Acceptable Insulations and Attachments for UltraPly TPO Membranes

Elevate UltraPly TPO System / Membrane / Flashing Options by Warranty Term		
Warranty Term	**Acceptable Roof System / Membrane(s) / Application**	**Acceptable Flashing Option(s)**
5, 10, 15 Year Red Shield	▪ 45, 60 or 80 mil UltraPly TPO ▪ UltraPly TPO SA ▪ 45, 60 or 80 mil UltraPly TPO XR ▪ Invisiweld (60 mil or 80 mil)	▪ 45, 60 or 80 mil Ultraply TPO ▪ TPO Coated Metal ▪ UltraPly TPO SA
20 Year Red Shield	▪ 60 or 80 mil UltraPly TPO ▪ UltraPly TPO SA ▪ 60 or 80 mil UltraPly TPO XR ▪ Invisiweld (60 mil or 80 mil)	▪ 60 or 80 mil Ultraply TPO ▪ TPO Coated Metal ▪ UltraPly TPO SA

Table 18: Elevate UltraPly TPO Systems / Membrane / Flashing Options by Warranty Term

Elevate UltraPly TPO Warranty Summary Eligible to Licensed Elevate Applicators Only		
Warranty Name	**Specification**	**Coverage**
Up to 2" Hail	Min. 60 mil UltraPly TPO Membrane Adhered to approved adhered cover board	Repair leaks in roof system caused by Holcim supplied materials or workmanship used to install them, plus damage by hail up to 2" (50.8 mm) in diameter. Warranty term maximum 20 Years.
Cut and Puncture	Elevate Platinum membrane adhered to approved substrate board	Repair leaks in roof system caused by Holcim supplied materials or the workmanship used to install them, plus damage by cut or puncture. No dollar limit to repair warranted leaks. Warranty term maximum 20 Years.
Wind Speed up to 90 mph	Min. 60 mil UltraPly TPO membrane, adhered or attached over approved substrate board	Repair leaks in roof system caused by Holcim supplied materials or workmanship used to install them, plus leaks caused by wind speeds at 90 mph or less. No dollar limit to repair warranted leaks. Warranty term maximum 20 Year.
Red Shield Limited 5, 10, 15 or 20 Year Warranty	See Elevate specifications for the term requested	Repair leaks in the roofing system caused by Holcim supplied materials or the workmanship to install them. No dollar limit to repair warranted leaks.
Membrane-Only Warranty	See Elevate specifications for the term requested	Limited warranty providing replacement membrane sufficient to repair leaks in the Elevate Roofing Membrane which leaks because of normal exposure to weather or manufacturing defects in the membrane.
NOTE: See Warranty Pricing Guide for pricing information.		

Table 19: Elevate UltraPly TPO Warranty Summary

Elevate UltraPly TPO Membrane Only Warranty Summary					
Membrane	**Thickness (mil)**	**Max Term (Years)**	**MAS**	**InvisWeld**	**Adhered**
UltraPly TPO	45	15	✓	✓	✓
	60	20	✓	✓	✓
UltraPly TPO Platinum	80	20	✓	✓	✓
UltraPly TPO SA	60	20	N/A	N/A	✓
UltraPly TPO XR	100	15	✓	N/A	✓
	115	20	✓	N/A	✓
	135	20	✓	N/A	✓
✓ = Approved; N/A = Not an approved attachment method for this membrane.					

Table 20: Elevate UltraPly TPO Membrane Only Warranty Summary

This guide is meant to highlight Elevate products and specifications provided by Holcim Solutions & Products US, LLC and is subject to change without notice. Holcim takes responsibility for furnishing quality materials which meet published Elevate product specifications or other technical documents, subject to normal roof manufacturing tolerances. Neither Holcim nor its representatives practice architecture. Holcim Solutions & Products US, LLC offers no opinion on and expressly disclaims any responsibility for the soundness of any structure. Holcim accepts no liability for structural failure or resultant damages. Consult a competent structural engineer prior to installation if the structural soundness or structural ability to properly support a planned installation is in question. No Holcim representative is authorized to vary this disclaimer.