Elevate PVC and PVC KEE Roofing Systems

Guide for Designers

Elevate PVC
Elevate PVC XR
Elevate PVC KEE
Elevate PVC KEE XR

August 2023

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 Regional Technical Coordinator prior to its use.

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General Design Criteria

Applicability

- Parameters of this manual outline the minimum requirements for the Elevate PVC Roofing Systems Warranty, including Elevate PVC, Elevate PVC XR, Elevate PVC KEE, Elevate PVC KEE XR, Elevate PVC KEE XRT, and Elevate PVC or PVC KEE InvisiWeld™. 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 code and insurance requirements may require specific enhancements.
- Extended warranties, 15 and 20-year, and wind warranties in excess of 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 a Regional Technical Coordinator for additional information.
- Statements in this design guide are provided in good faith with the expectation that a design professional be consulted prior to any job decisions being made.
- Elevate roof 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 800-428-4511 when local codes conflict with Holcim recommendations.

> **!** Certain situations may arise where Elevate specifications and/or roofing requirements cannot be applied. It may not be possible for Holcim to issue the desired warranty for projects that deviate from current Holcim requirements and standards, unless a written deviation request for approval has been received, reviewed, and approved by a 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 particular roof system assembly, see table 1.01-1
  - Projects that require 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 within 1500' (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.

> **!** 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 consider with any project. Consult with the equipment manufacturer on the performance of the individual machine.

Elevate PVC Membranes – Maximum Red Shield Warranty Terms[1,2]

System	Product	Slope	Maximum Height	Max. Warranty Term (Years)
Adhered	Elevate PVC .050" (1.3 mm)	Unlimited	250' (76.2 m)	15
	Elevate PVC .060" (1.5 mm)	Unlimited	250' (76.2 m)	20
	Elevate PVC .080" (2.0 mm)	Unlimited	250' (76.2 m)	20
	Elevate PVC XR .060" (1.5 mm)	Max. 4:12 (33.3%)	250' (76.2 m)	20
	Elevate PVC XR .080" (2.0 mm)	Max. 4:12 (33.3%)	250' (76.2 m)	20

NOTE:

1. Elevate PVC Water Based Bonding Adhesive is limited to 15-year maximum warranty coverage.
2. Elevate Jet Bond PVC Spray Adhesive is only approved for use with Elevate PVC (non-fleece) Membrane.

Elevate PVC Membranes – Maximum Red Shield Warranty Terms* (Continued)				
System	**Product**	**Slope**	**Maximum Height**	**Max. Warranty Term (Years)**
Mechanically Attached	Elevate PVC .050" (1.3 mm)	Max. 4:12 (33.3%)	120′ (36.6 m)	15
	Elevate PVC or PVC XR .060" (1.5 mm)	Max. 4:12 (33.3%)	120′ (36.6 m)	20
	Elevate PVC or PVC XR .080" (2.0 mm)	Max. 4:12 (33.3%)	120′ (36.6 m)	20
InvisiWeld	Elevate PVC .050" (1.3 mm)	Max. 4:12 (33.3%)	120′ (36.6 m)	15
	Elevate PVC .060" (1.5 mm)	Max. 4:12 (33.3%)	120′ (36.6 m)	20
	Elevate PVC .080" (2.0 mm)	Max. 4:12 (33.3%)	120′ (36.6 m)	20
* Includes Minimum Thickness Membranes				

Elevate PVC KEE Membranes – Maximum Red Shield Warranty Terms*				
System	**Product**	**Slope**	**Maximum Height**	**Max. Warranty Term (Years)**
Adhered	Elevate PVC KEE .050" (1.3 mm)	Unlimited	250' (76.2 m)	15
	Elevate PVC KEE .060" (1.5 mm)	Unlimited	250' (76.2 m)	20
	Elevate PVC KEE .080" (2.0 mm)	Unlimited	250' (76.2 m)	30
	Elevate PVC KEE XR .050" (1.3 mm)	Max. 4:12 (33.3%)	250' (76.2 m)	20
	Elevate PVC KEE XR .060" (1.5 mm)	Max. 4:12 (33.3%)	250' (76.2 m)	20
	Elevate PVC KEE XR .080" (2.0 mm)	Max. 4:12 (33.3%)	250' (76.2 m)	30
	Elevate PVC KEE XRT .050" (1.3 mm)	Max. 4:12 (33.3%)	250' (76.2 m)	20
	Elevate PVC KEE XRT .060" (1.5 mm)	Max. 4:12 (33.3%)	250' (76.2 m)	20
	Elevate PVC KEE XRT .080" (2.0 mm)	Max. 4:12 (33.3%)	250' (76.2 m)	30
NOTE: Water Based Bonding Adhesive is limited to 15-year maximum warranty coverage.				
Mechanically Attached	Elevate PVC KEE or PVC KEE XR .050" (1.3 mm)	Max. 4:12 (33.3%)	120′ (36.6 m)	15
	Elevate PVC KEE or PVC KEE XR .060" (1.5 mm)	Max. 4:12 (33.3%)	120′ (36.6 m)	20
	Elevate PVC KEE or PVC KEE XR .080" (2.0 mm)	Max. 4:12 (33.3%)	120′ (36.6 m)	20
InvisiWeld	Elevate PVC KEE .050" (1.3 mm)	Max. 4:12 (33.3%)	120′ (36.6 m)	15
	Elevate PVC KEE .060" (1.5 mm)	Max. 4:12 (33.3%)	120′ (36.6 m)	20
	Elevate PVC KEE .080" (2.0 mm)	Max. 4:12 (33.3%)	120′ (36.6 m)	20
* Includes Minimum Thickness Membranes				

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 Holcim Elevate Website: www.HolcimElevate.com.
  - Consult this manual, Elevate PVC Application Guides, and specific Technical Information Sheets (TIS).
  - Consult with the building owner or his design professional.
  - Consult with a Regional Technical Coordinator for information.
- Statements in this design 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, (i.e., roof system selection) installation, and conformance to building codes, insurance requirements, etc.
- Refer to the Elevate Attachment Guide for additional requirements for securing insulations and membranes.

The following are just a few of the conditions, which may influence the 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 retarder
- 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 a part of system installation. The design professional should specify the load limitations to be observed by the Elevate licensed 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 – 25 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 – 120 mph (116 – 193 km/h), depending on system criteria]
   - **Cut and Puncture Protection (CPP)** warranty coverage is available with Elevate PVC and PVC KEE Membranes.
     - Use of 60 mil or greater Elevate PVC, PVC XR, PVC KEE or PVC KEE XR membrane system and additional cost per square foot. Please see the warranty pricing guide for current pricing.
     - Use of 80 mil Elevate PVC, PVC XR, PVC KEE or PVC KEE XR 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 80 mil adhered Elevate PVC XR and PVC KEE XR 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 PVC or PVC KEE 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
   - 30 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.

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

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

A Holcim 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

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 contractor is responsible for ensuring that all components of the 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 in excess of 150 °F (66 °C) for Elevate PVC products
  - Asphalt, coal tar, oil base 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 PVC 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 (4.4 °C), installation of Elevate roof systems may require additional application precautions:
    - Adhesives and sealants should remain in an environment between 60 °F and 80 °F (15.5 °C and 26.6 °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 period, they should be returned to the heated storage area until the temperature of the material returns to 60 °F (15.5 °C). Typically, this is 24 hours
  - For additional information and guidelines, see the Elevate PVC Application Guide, Elevate Technical Services Cold Weather Bulletins, and the NRCA Roofing and Waterproofing Manual.

Asphalt Products

- See the Elevate Asphalt Design Guide and the Elevate Asphalt Application Guide for additional information. Contact between asphalt, PVC and PVC KEE membrane and/or accessories should be avoided.
- Asphalt for insulation, roofing plies, or base sheets must be Elevate SEBS Mopping Asphalt or either ASTM D 312 Type III or Type IV. Asphalt selection must be suitable for the roof slope. All asphalt must be tested in accordance with ASTM D 312 and be certified by the supplier that it meets the minimum requirements for the specific type and application. Asphalt selection must be suitable for the roof slope.
- Assure that all health and safety measures are followed when installing hot asphalt to protect the installers as well as occupants of the building. Assure compliance to all building codes and safety regulations when using hot asphalt.
- Asphalt properties may change when stored at high temperatures and/or for long periods of time. Asphalt may become harder or may experience what is known as “fallback”. Fallback is the degradation of the asphalt to the point that its physical properties (i.e., softening point) deteriorate which could then cause roof slippage. To reduce the chances for fallback, the following recommendations should be implemented:
  - Use higher softening point asphalt
  - Decrease the kettle temperature as much as possible, while maintaining the minimum application temperature
  - Use material as quickly as possible, thus reducing exposure time
  - Insulate all lines and equipment used to transport asphalt
- Asphalt primer: Asphalt primer must meet ASTM D-41.
- With the exception of SEBS, Holcim does not manufacture or supply asphalt and does not warrant products we do not sell or supply.

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.
- A better option than the use of phased construction would be 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.

!	Holcim does not recommend phased construction. Phased construction results in unprotected roof sections, 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.

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 roof 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 Retarder / Air Barrier

!	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 his 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.

!	Elevate 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 or Factory Mutual 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 within 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.

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 heat 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 perm (permeance) 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 perimeters 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 Engineering 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 defined 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-resistance 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 through 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 when specifying roof 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 list below, are examples of common vapor retarder applications.

- Elevate V-Force vapor retarder (self-adhered), applied to a flat substrate that has been primed with V-Force Primer. See the V-Force and V-Force Primer Technical Information Sheets (TIS) on the Technical Database for application information.
- Mopped Elevate Type IV M or VI Ply Sheet over a nailed Elevate MB Base Sheet
- Mechanically attached fiberglass or polyester venting base sheet with 18" (457 mm) side and end laps mopped with hot asphalt.
- Existing dry and sound un-insulated built-up roof system (all splits and blisters repaired).
- Mopped Elevate Type IV M or VI Ply Sheet over an existing dry and sound un-insulated built-up roof system. If gravel surfaced, then gravel shall be removed by power brooming, vacuuming, and spudding.
- 2 plies of Mopped Elevate Type IV M or VI Ply Sheet set in hot asphalt over an acceptable mechanically attached barrier board.
- 2 plies of Mopped Elevate Type IV M or VI Ply Sheet set in hot asphalt directly on a properly prepared structural concrete deck.
- Fully adhered Elevate SBS Base Sheet set in hot asphalt, cold adhesive, or SBS Torch Base heat fused, over an acceptable mechanically attached barrier board.
- Fully adhered Elevate SBS Base Sheet set in hot asphalt, cold adhesive, or SBS Torch Base heat fused, directly on a properly prepared structural concrete deck.
- 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 Barrier

While some Elevate roof 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 barriers systems are a component of 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 .3" (7.6 mm) 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 a number of requirements:
  - **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 be capable of resisting the imposed load or must be supported by one that can. It must be capable of resisting 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).

Sloped Roofs – Asphalt Vapor or Air Barrier Systems Attachment

The building owner or the design professional intending to specify back-nailing should consider geographic location, specific job conditions, accepted area application practices, and the type and grade of materials specified when creating an actual specification for a project.

- When the slope of the roof exceeds ½": 12" (4.2%), and hot asphalt attachment is specified, Holcim requires Elevate SBES Mopping Asphalt or Type IV asphalt be used.
- Contact a Regional Technical Coordinator for additional requirements regarding roof slopes over 3": 12" (25%).
- For roof slopes up to and including ½": 12" (4.2%), the side laps can be installed parallel or perpendicular to the slope.
- For roofs slopes greater than ½": 12" (4.2%), the membrane must run parallel to the slope and be back-nailed as follows:

Back-Nailing Requirement for Sloped Roofs

Base Sheet	Attachment	<½" (4.2%)	>½" <1" (4.2% - 8.3%)	>1"< 2" (8.3% -16.7%)	>2"< 3" (16.7% - 25%)
Any Applicable Elevate Base Sheet	Hot Asphalt or Mechanically Attached	NFR	Nailers 32' o.c.	Nailers 32' o.c.	Nailers 16' o.c.
			Full Length Sheet	Full Length Sheet	½ Length Sheet
Any Applicable Elevate Base Sheet	Heat Fused, Hot Asphalt, Mechanically Attached, or Elevate Multi-Purpose MB Cold Adhesive	NFR	NFR	NFR	Nailers 32' o.c.
					Full Length Sheet
Any Applicable Elevate Base Sheet	Self-Adhered, Heat Fused, Hot Asphalt, Mechanically Attached, or Elevate Multi-Purpose MB Cold Adhesive	NFR	NFR	NFR	Nailers 32' o.c.
					Full Length Sheet
Refer to Elevate MB-BN-1 for detailed back-nailing requirements.					

NOTE: ½" = 13 mm; 3" = 76 mm; 1" = 25 mm; 16' = 4.9 m; 2" = 51 mm; 32' = 9.7 m; NFR = No Fastener Required at This Slope

Insulation Stops and Back-Nailing Nailing Strips

- Back-nailing nailing strips are required on all roofs with slopes greater than 16.6% (2:12).
- Insulation stops and are recommended on all roofs with slopes greater than 16.6% (2:12).
- Back-nailing nailing strips and Insulation stops shall be a minimum of 3½" (89 mm) wide and the same thickness as the roof insulation.
- Back-nailing nailing strips and Insulation stops must be attached to resist a force of 200 lbf per lineal foot (2.9 kN/m) minimum.
- Insulation stops and back-nailing nailing strips are not needed when system is applied directly to a wood deck or a similar nailable substrate.
- Contact a Regional Technical Coordinator for information regarding back-nailing requirements utilizing approved insulation less than 1" (25 mm).

Back-Nailing Modified Asphalt Base Sheets

Non-Nailable Decks and Nailable Decks with Insulation

Cut the sheet to conform to nailer spacing. Using capped nails, nail the end lap across the width of the sheet, with the first nail spaced ¾" (19 mm) from the leading edge of the sheet. The remaining nails are to be spaced approximately 3" (76 mm) on center. The nails should be staggered across the width of the nailer. Elevate fasteners and plates may be used in lieu of cap nails. Four per end lap are required.

Nailable Decks with No Insulation

Cut the sheet to conform to nailer spacing. Using capped nails or Elevate fasteners and plates, nail the end lap across the width of the sheet, with the first nail spaced ¾" (19 mm) from the leading edge of the sheet. The remaining nails are to be spaced approximately 3" (76 mm) on center. The nails should be staggered across the width of the nailer. Elevate fasteners and plates may be used in lieu of cap nails. Four per end lap are required.

Fastener Information

Cap nails must have 1" (25 mm) diameter heads with steel head only. Shank must be minimum 11-gauge (2.3 mm) annular ring or spiral shank and be FM Approved.

Back-Nailing Type IV and Type VI Fiberglass Roofing Plies

- Using capped nails or Elevate fasteners and plates, back-nail 3" (76 mm) o.c. from the back edge of each felt along the nailer ensuring that the nails are covered by a minimum of two plies of felt. The nails should be staggered across the width of the nailer.
- Cap nails must be FM Approved and have 1" (25 mm) diameter steel heads. Shank must be a minimum of 11-gauge (2.3 mm) annular ring or spiral.

Cap Nails

- Cap nails must be FM Approved and have 1" (25 mm) diameter steel heads. Shank must be a minimum of 11-gauge (2.3 mm) annular ring or spiral.
- Cap nails cannot be used to attach insulation or for 20 year or greater systems.
- Elevate insulation plates and fasteners may be used in lieu of cap nails.
- It is the roof system designer's responsibility to:
  - 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.
  - Take the appropriate steps necessary to deal with the effect of construction moisture on a new roofing system, particularly during winter, when temporary propane heat is required.

Substrate and Substrate Requirement

General

- The Elevate PVC or PVC KEE 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 roof 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
- When using asphalt to adhere insulation to a structural concrete substrate, the concrete must be primed with an ASTM D 41 asphalt primer. The primer is applied at a rate of 1½ to 2 gallons per 100 ft^2 (0.61 to 0.82 L/m^2).

Fastener Pullout / Adhesive 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 does not meet the minimum fastener pullout requirements contact a Regional Technical Coordinator for Technical Information.

Minimum Fastener Pullout Resistance for Specific Systems

System	Minimum Fastener Pullout
Fully Adhered systems with Insulation Mechanically Attached to Deck	300 lb (136.1 Kg)
Single-Ply mechanically attached and InvisiWeld	400 lb (181.4 Kg)
Base Sheet Mechanically Attached to Deck	300 lb (136.1 Kg)
Base Sheet Nailed to Deck (Cap nail or LWC Fastener)	40 lb (18.1 Kg)
Contact a Holcim Regional Technical Coordinator for Technical Information when the structural deck does not meet the minimum fastener pullout requirements.	

- See the Elevate Attachment Guide for the minimum adhesive pull test requirements for insulation adhesives.
- 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 type are those which may not provide sufficient pullout resistance:
  - Steel decks thinner than 22 ga (0.76 mm)
  - Concrete less than 2,500 psi (20,684 kPa)
  - Plywood or oriented strand board less than 7/16" (11.1 mm) thickness
  - Wood plank less than ¾" (19 mm) thickness
  - All poured or pre-cast gypsum, cementitious wood fiber and lightweight insulating concrete decks
  - Existing masonry or brick
  - 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. Test areas should include the corners, drain areas, and perimeters. The minimum number of pullout test recommended is as follows:

Recommended Number of Pull-Out Tests

Roof Size	Number of Pull-Out Tests
Less Than 10,000 ft^2 (Less Than 1,000 m^2)	6
10,000 ft^2 - 50,000 ft^2 (1,000 m^2 – 5,000 m^2)	10
50,000 ft^2 - 100,000 ft^2 (5,000 m^2 – 10,000 m^2)	20
Over 100,000 ft^2 (10,000 m^2)	1 per 5,000 ft^2 (500 m^2)

- 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

Drainage and Slope

!	Building codes may require a specific minimum slope for drainage. It is the building owner or his 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.
- Adequacy of drainage provisions, placement, sizing and/or number of drains required is the responsibility of the building owner or his 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 his design professional. Existing deck deflection or ponding water may necessitate upgrading of the drainage provisions, including relocation of existing drains, possible addition 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 roofing system. Drains should be of sufficient number, size, and located to provide satisfactory and rapid drainage of the entire roof surface (within 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" (1.6 mm) 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 the interior contents
  - It is required by many, if not all, building codes
  - Proper drainage of the roof system prevents premature deterioration of the roof 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 nailers by others:** Make these specifications and details available when others will install nailers. Work that compromises the integrity of the system may jeopardize the warranty.

> **!** Due to EPA regulations regarding treated wood, new treatments for lumber may be highly corrosive to fasteners. Contact the fastener manufacturer for their recommendations on fasteners if attaching nailers that have been treated with the more corrosive materials.
>
> Chemical 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 contact the membrane.

- 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.
- Holcim requires Wood nailers at the following locations:
  - All roof edges
  - Metal penetration pockets
  - Wood nailers must totally support all sheet metal flanges and be at least ½" (13 mm) wider to roof side
  - Refer to Elevate details for other location requirements
- 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.
- The building owner or his design professional must specify a wood nailer attachment system that will resist a minimum force of 200 lb/ft (2.9 N/m) in any direction. Elevate fasteners are required for all roofing applications. For further clarification, please refer to Factory Mutual Loss Prevention Data Sheet 1-49.

> **!** If forces at the building perimeters are greater than 200 lb/ft (2.9 N/m) due to increased wind speed 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 building owner or his design professional. Expansion joints must not restrict the flow of water. Elevate expansion joint details for thermoplastic single-ply systems are located at: PVC-E-1 through PVC-E-5. Typical consideration for selection 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 the 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, and 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 fastener be investigated should there be concerns about the structural integrity of the deck. Some of the items to be considered include:
  - How the fastener(s) might affect the deck
  - The capability of the deck 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 solution to the given deck and situation.

!	Regarding fastener selection: Holcim requires that a suitable insulation or cover board be installed over any substrate that would damage the membrane due to the additional loading of the ballast system. Ballasted Elevate PVC and PVC KEE membranes are not approved for Red Shield Warranty coverage. This includes, but is not limited to: ▪ Fasteners / plates used for insulation attachment ▪ Fasteners / plates used for existing membrane or insulation securement For re-cover or partial tear-off, HD fasteners are required for 15-year or greater warranties, except into wood decks.

Acceptable Fastener Uses

Elevate Fastener		For the attachment of:	
TIS No.	Fastener	Elevate Batten Strips	Termination Bars
		See the specific fastener TIS for detailed application data	
1001	All-Purpose Fastener*	✓	
1002	Heavy-Duty Fastener	✓	✓
1005	Concrete Drive Fastener	✓	✓
		Do not use with polymer batten strips.	
1006	Polymer Fastener	✓	
		(Special battens and plates required, not approved for in seam attachment.)	
1009	HD Plus Fastener	✓	
		Elevate Metal Batten Strips in Wide Weld mechanically attached systems.	
1011	Purlin Fastener	✓	
		▪ 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			

Acceptable Fastener Plate Uses

TIS No.	Elevate Plates	For use with: Elevate PVC and PVC KEE Systems .050" (13 mm), .060" (1.5 mm), .080″ (2 mm) PVC, PVC XR, PVC KEE, PVC KEE XR and PVC KEE XRT Membranes
1106	Insulation Fastening Plate	For attaching insulation to approved substrates as required by Elevate Specifications and Details.
1107	Polymer Fastener Insulation Plate	For attaching insulation to approved substrates as required by Elevate Specifications and Details.
1108	HD Seam Plate	For attaching Elevate PVC and PVC KEE membranes to approved substrates as required by Elevate Specifications and Details.
1109	HD Plus Seam Plate	For attaching Elevate PVC and PVC KEE membranes to approved substrates as required by Elevate Specifications and Details.
1111	InvisiWeld PVC Coated Insulation Fastening Plate	For attaching insulation and PVC and PVC KEE membrane (when induction bonded) to approved substrates. May be utilized as base tie-in and wall flashing attachment as permitted by Elevate Specifications and Details.
✓ = Acceptable		

Acceptable Elevate Batten Bar, Termination Bar and Drain Bar Uses	
Elevate Batten and Termination Bars	**For the attachment of: Elevate PVC and PVC KEE .050" (1.27 mm), .060" (1.52 mm), .080 ″ (2.03 mm) PVC, PVC XR, PVC KEE, PVC KEE XR and PVC KEE XRT Membranes**
Coiled Metal Batten Strip	For anchoring membrane at perimeter enhancement strips and wall flashings to approved substrates as required by Elevate Specifications and Details (not permitted for in-seam attachment).
Metal Batten Strip	For anchoring membrane at perimeter enhancement strips and wall flashings to approved substrates as required by Elevate Specifications and Details (not permitted for in-seam attachment.
Termination bar	For anchoring and sealing flashing terminations to approved substrates as required by Elevate Specifications and Details.
Aluminum Drain Bar	For terminating the membrane roof edge to approved substrates as required by Elevate Specifications and Details.
✓ = Acceptable	

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 owner or their design professional's responsibility to determine the condition of the deck.
	Sprayed-In-Place Polyurethane Foam (PUF) roofing systems require a COMPLETE TEAR-OFF of the polyurethane foam system.

Platinum Retrofit or Re-Cover Applications

Platinum roofing systems cannot receive a Red Shield Platinum warranty if the existing roof remains in place. A complete removal of the existing roof system, including the membrane, insulation and flashings is required.

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 his design professional.
  - The deck should provide slope to drain.
- Refer to section 1.09 D for fastening requirements for Mechanically Attached Systems should pullout values be less than 400 lbf (181.4 kg).
- Even existing concrete roof decks may contain latent amounts of moisture that may affect the insulation and the roof system. To help protect the roofing components, an Elevate Venting Base Sheet or other vapor retarder material may be installed in accordance with the manufacturer's instructions. The installation of a vapor retarder should be considered regardless of the method of attachment of the insulation or membrane attachment, hot asphalt or adhesive attachment of insulation or the membrane system.

Classifications

Structural decks can be classified as nailable or non-nailable (sometimes both) for purposes of mechanically attaching or nailing insulation or base sheets. Nailable decks include wood and new decks of gypsum and lightweight insulating concrete. These decks are soft enough so that the above-deck components can be secured with fasteners. Cementitious wood fiber and poured or precast structural concrete decks have been referred to as non-nailable. The term non-nailable is misleading. Holcim has fasteners that are approved for these decks. Structural decks can be classified as combustible or non-combustible for purposes of fire ratings and code requirements.

Structural Deck Classifications

Deck	Nailable or Non-nailable	Combustible or Non-combustible
Steel	Non-nailable	Non-combustible
Concrete	Both	Non-combustible
Wood	Nailable	Combustible
Cementitious Wood Fiber Decks	Both	Non-combustible
Gypsum	Nailable	Non-combustible
Light weight insulated concrete	Nailable	Non-combustible

Steel Decks

- Holcim recommends that steel decks be a minimum 22 ga (0.76 mm).
- Factory Mutual Research-Approved steel decks are currently available in 22 ga (.0295" 0.794 mm), 20 ga (.0358", 0.909 mm) and 18 ga (0.0474", 1.204 mm) thick sheets with 1.5" (38 mm) deep corrugations. The corrugations (ribs) are cold rolled in the sheets. The deck has a 6" (152 mm) module, that is, the ribs are 6" (152 mm) on center. All fastening Approvals and recommendations are based on this profile. (Approved and recommended spacing's are such that the fasteners will engage the top flange of the deck). Another common configuration is 3" (76 mm) deep deck, which usually has an 8" (203 mm) module.
- When mechanically attaching a membrane to a steel deck see section 1.09 D. for specific requirements.
- When mechanically attaching insulation, steel decks are required to have a minimum fastener pullout of 300 lb per fastener for adhered roofing systems.
- Elevate single-ply membranes may not be adhered or fastened directly to a steel deck.
- On steel decks, the edges of insulation boards running parallel with the deck are required to be supported by the top flange of the metal deck. The board should have a minimum 1½" bearing on the steel deck flange. Cantilevering insulation boards over deck flutes can result in fracturing insulation boards, reducing the support for the membrane, making it susceptible to puncture.
- All deteriorated components must be replaced, in kind.
- For retrofit of metal buildings, refer to Metal Building Recover Specifications. Direct attachment of Elevate mechanically attached or fully adhered roofing systems to metals roofs (regardless of gauge) without an acceptable cover board is strictly prohibited.

Table 1.06-2 Acceptable Fasteners for Steel Decks

Insulation	Deck Penetration
All-Purpose Fastener	¾" (19 mm) through deck *AP and #12 fasteners are approved for warranty purposes. If uplift validation is required HD fasteners may be required.
Heavy Duty Fastener	
Pre-Assembled #12 Fastener and Plate	
AP AccuTrac™ Kits (#12 Fasteners and insulation Plate)	
IsoFast™ #12 Belted Fasteners and Insulation Plates	
HD AccuTrac Kits™	
All-Purpose Stainless-Steel Fastener	
Elevate #12 Fastener	
HailGard Fastener (No Insulation Plate)	¾" (19 mm) through deck
Membrane	
Heavy Duty Fasteners and Plates	¾" (19 mm) through deck
Heavy Duty Plus Fasteners and Plates	1" (25 mm) through deck

Table 1.06-3 Acceptable Insulation Adhesives for Use Direct to Steel Decks

I.S.O. Spray™ R
I.S.O. Stick™
I.S.O. Twin Pack™
Twin Jet

NOTE:

- Deck must be clean, free of all processing oils and other contaminates.
- Bead spacing should be spaced to ensure top flute adhesion is made.
- Use only 4′ x 4′ (1.2 m x 1.2 m) insulation boards with adhesives.
- Factory Mutual (FM) does not recognize adhesion of insulation direct to steel deck.

Structural Concrete Decks

- Holcim recommends that the concrete deck be a minimum 2,500 psi (17,236 KPa).
- Refer to section 1.09 D for fastening requirements for Mechanically Attached Systems should pullout values be less than 400 lbf (181.4 kg).

- When mechanically attaching insulation, structural concrete roof decks require a minimum fastener pullout of 300 lb (1.8 kN) per fastener for adhered roofing systems.

> **!** The suitability of mechanically fastening insulation or membrane to any hollow core, pre-stressed or post-tensioned structural concrete deck assembly is the responsibility of the design professional. Special consideration needs to be given to the relationship between the deck attachment allowances and Holcim mechanical attachment requirements.

- Verify with the building owner or the owner's design professional about the suitability of mechanical fastening into pre-stressed and post-tensioned structural concrete.
- Newly poured decks must be sufficiently cured to allow adhesion to the substrate surface. Cure times vary. A roof consultant, structural engineer, or concrete industry professional should be contacted to perform moisture tests if readiness of concrete is in question.
- Pre-cast concrete panels may not always be a suitable substrate to receive insulation due to the potential for irregularities, even if the joints are grouted. It may sometimes be necessary to consider pouring a leveling layer of structural or lightweight concrete over the panels prior to roofing.
- Concrete additives can have a negative impact on the adhesion of asphaltic membranes and insulation products. The concrete supplier/installer should certify that any additives in the mix will not render the deck unsuitable for roofing application for warranted systems.
- Holcim does not accept for warranty any concrete substrates that have been sealed with chemical sealers or silicon surface treatments.

Table 1.06-4 – Single-Ply Adhesion/Attachment to Structural Concrete Roof Decks

Elevate PVC or PVC KEE	
Adhered	The Elevate PVC or PVC KEE* Membrane may be attached directly to poured-in-place structural concrete using Elevate PVC LVOC Bonding Adhesive or Elevate PVC Water Based Bonding Adhesive* (max 15-year warranty). ** Elevate PVC Water Based Bonding Adhesive is not intended for use with Elevate PVC KEE non-fleece backed membrane.*
	The Elevate PVC (non-fleece) Membrane may be adhered directly to poured-in-place structural concrete using Elevate Jet Bond PVC Spray Adhesive. The Elevate Jet Bond PVC Spray Adhesive is only approved for use with Elevate PVC (non-fleece) Membrane.
Mechanically Attached	Requires protection mat or insulation.
Elevate PVC XR or PVC KEE XR	
Adhered	The Elevate PVC XR or PVC KEE XR Membrane may be attached directly to poured-in-place structural concrete using Elevate PVC Water Based Bonding Adhesive (max 15-year warranty), I.S.O. Spray R, XR Stick or Twin Jet.

> **!** **NOTE:** When mopping direct to concrete decking, precautions must be taken to protect everything below from dripping hazards of the hot asphalt!

Table 1.06-5 – Acceptable Fasteners for Structural Concrete Decks

Insulation	Deck Penetration
Heavy Duty	1" (25 mm) min. into the structural concrete deck
HailGard Fastener (No Insulation Plate)	
Elevate Concrete Drive	1 ¼" (32 mm) min. into the structural concrete deck
Membrane	
Heavy Duty Fasteners and Plates	1" (25 mm) min. into deck
Heavy Duty Plus Fasteners and Plates	1" (25 mm) min. into deck
Concrete Drives	1 ¼" (32 mm) min. into concrete deck

Table 1.06-6 – Acceptable Insulation Adhesives for Use Direct to Structural Concrete Decks	
I.S.O. Spray R I.S.O. Stick I.S.O. Twin Pack Twin Jet	**NOTE:** ▪ Deck must be clean, free of all processing oils and other contaminates. ▪ Bead spacing should be spaced to ensure top flute adhesion is made. ▪ Use only 4′ x 4′ (1.2 m x 1.2 m) insulation boards with adhesives. ▪ Primer may be required.

Wood Decks: Plywood, OSB and Wood Plank

- Holcim recommends that plywood and OSB decks have a minimum 7/16" (10.5 mm) thickness.
- A minimum of 1" (25 mm) ISO 95+ GL / ISOGARD GL is required when installing Elevate PVC KEE (80 mil min.) systems over wood decks. (A thermal barrier may be required depending on local building codes and/or specific project requirements.)
- Adhered and mechanically attached Elevate PVC or PVC KEE single-ply systems may be installed directly to a OSB or plywood deck when:
  - The surface is structurally sound, smooth, flat, clean, dry, and free of sharp fins, loose splinters or foreign materials that may damage the membrane.
  - The deck is secured using threaded fasteners that provide a smooth profile, meeting FM 4470 and the guidelines found in "Designing Commercial Roofs to Withstand Wind Uplift Forces" document, which can be found at apawood.org. **NOTE:** Nails are not permitted.
  - Tongue and groove panels are recommended.

> ! Fire treated plywood may be used provided it has not been treated with Ammonium Phosphates.

- Refer to section 1.09 D for fastening requirements for Mechanically Attached Systems should pullout values be less than 400 lbf (181.4 kg).
- When mechanically attaching insulation to wood decks, the required fastener pullout is of 300 lb (1.8 kN) per fastener minimum for adhered roofing systems.
- When nailing a base sheet, wood decks are required to have a minimum per fastener pullout of 40 lb (0.24 kN) for cap nails.

Table 1.06-7 – Single-Ply Adhesion/Attachment to Wood Roof Decks	
Elevate PVC and PVC KEE	
Adhered	The Elevate PVC and PVC KEE* Roofing System Membrane may be adhered directly to a wood deck using Elevate PVC LVOC Bonding Adhesive or Elevate PVC Water Based Bonding Adhesive* (max 15-yr warranty). **Elevate PVC Water Based Bonding Adhesive is not intended for use with Elevate PVC KEE non-fleece backed membrane.*
	The Elevate PVC (non-fleece) Membrane may be adhered directly to a wood deck using Elevate Jet Bond PVC Spray Adhesive. The Elevate Jet Bond PVC Spray Adhesive is only approved for use with Elevate PVC (non-fleece) Membrane.
Mechanically Attached or Invisiweld and Invisiweld-S	The Elevate PVC and PVC KEE Roofing System Membrane may be mechanically attached directly to a wood deck using the appropriate Elevate fasteners and plates. **NOTE:** Invisiweld applications are not intended to be used over a non-insulated substrate. A suitable insulation board or cover board should be used when installing the system. OSB and Plywood cover boards should not be used with induction welded systems.
Elevate PVC XR and PVC KEE XR	
Adhered	The Elevate PVC XR and PVC KEE XR Membrane may be adhered directly to a wood deck using Elevate PVC Water Based Bonding Adhesive (max 15-year warranty), I.S.O. Spray R, XR Stick or Twin Jet.
Mechanically Attached	The Elevate PVC XR and PVC KEE XR Roofing System Membrane may be mechanically attached directly to a wood deck using the appropriate fasteners and plates.

Acceptable Fasteners for Approved Wood Roof Decks

Insulation	Deck Penetration
All-Purpose*	1" (25 mm) into or through deck *AP and #12 fasteners are approved for warranty purposes. If uplift validation is required HD fasteners may be required.
Heavy Duty	
Pre-Assembled #12 Fastener and Plate*	
AP AccuTrac™ Kits (#12 Fasteners and Insulation Plates)*	
IsoFast™ #12 Belted Fasteners and Insulation Plates*	
HD AccuTrac Kits™	
All-Purpose Stainless-Steel Fastener	
Heavy Duty (HD) ISOGARD™ HG / HailGard Fastener (No Insulation Plate)	
Elevate #12 Fastener	
Membrane	
All Purpose Fasteners and Plates (20-year max.)	1" (25 mm) through deck
Heavy Duty Fasteners and Plates	
IsoFast™ #15 Belted Fasteners and Plates	
All-Purpose Stainless-Steel Fastener	

Acceptable Insulation Adhesives for Approved Wood Roof Decks

I.S.O. Spray R
I.S.O. Stick
I.S.O. Twin Pack
Twin Jet

NOTE:

- The deck must be clean, free of all processing oils and other contaminates.
- Bead spacing should be spaced to ensure top flute adhesion is made.
- Use only 4′ x 4′ (1.2 m x 1.2 m) insulation boards with adhesives.

Cementitious Wood Fiber Decks

- Mechanically Attached Membrane Systems are not approved into Cementitious Wood Fiber Decks.
- When mechanically attaching insulation, cementitious wood fiber decks are required to have a fastener pullout of 300 lb (1.8 kN) for each fastener for adhered roofing systems.
- Holcim recommends that cementitious wood fiber deck have a minimum 2" (51 mm) thickness.
- Elevate PVC and PVC KEE Membranes cannot be installed directly to a cementitious wood fiber deck. The membrane must be adhered to an acceptable Elevate insulation or cover board.

Acceptable Fasteners for Cementitious Wood Fiber Decks

Insulation	Deck Penetration
Polymer Fasteners and Plates	1½" (38 mm) into deck
Membrane	
Not Approved	

Acceptable Insulation Adhesives for Attachment to Cementitious Wood Fiber Decks

I.S.O. Spray R
I.S.O. Stick
I.S.O. Twin Pack
Twin Jet

NOTE:

- Deck must be clean, free of all processing oils and other contaminates.
- Bead spacing should be spaced to ensure top flute adhesion is made.
- Use only 4′ x 4′ (1.2 m x 1.2 m) insulation boards with adhesives.

Gypsum Roof Decks

- Holcim recommends that the gypsum roof deck have a minimum 2" (51 mm) thickness.
- Mechanically Attached Membrane Systems are not approved into Gypsum Decks.
- When attaching insulation to a gypsum roof deck, a fastener pullout of 300 lb (1.8 kN) per Elevate Polymer Fastener is required for adhered roofing systems.
- When mechanically attaching a base sheet to a gypsum roof deck, a fastener pullout of 40 lb (.24 kN) per Elevate LWC Base Sheet Fastener is required.
- Elevate PVC and PVC KEE Membranes cannot be installed directly to a gypsum roof deck. The membrane must be adhered to an acceptable Elevate insulation or cover board.

Acceptable Fasteners for Cementitious Gypsum Roof Decks	
Insulation	**Deck Penetration**
Polymer Fasteners and Plates	1½" (38 mm) into deck
Membrane	
Not Approved	
Base Sheet Attachment	
1.2" (30.5 mm) and 1.7" (43 mm) LWC Base Sheet Fastener	

Acceptable Insulation Adhesives for Attachment Direct to Gypsum Decks

I.S.O. Spray R
I.S.O. Stick
I.S.O. Twin Pack
Twin Jet

NOTE:

- Deck must be clean, free of all processing oils and other contaminates.
- Bead spacing should be spaced to ensure top flute adhesion is made.
- Use only 4′ x 4′ (1.2 m x 1.2 m) insulation boards with adhesives.

Lightweight Insulating Concrete Roof Decks

! Holcim suggests a vapor retarder be considered over any Lightweight Concrete roof deck, especially over Lightweight Concrete with Aggregate. However, where not specifically required in the chart below, the determination of the necessity and placement of a vapor retarder is project-specific and rests with the building owner or their design professional.

- Holcim recommends that lightweight insulating concrete have a minimum 2" (51 mm) thickness.
- Refer to section 1.09 D for fastening requirements for Mechanically Attached Systems should pullout values be less than 400 lbf (181.4 kg). All mechanically attached membrane systems must attach into or through a structural concrete deck or steel form pan.
- When mechanically attaching insulation through lightweight insulating concrete, into a structural deck, a fastener pullout of 300 lb (1.8 kN) per fastener is required for adhered roofing systems.
- When mechanically attaching a base sheet to lightweight insulating concrete using Elevate 1.7" LWC Base Ply fasteners, a fastener pullout of 40 lb (.24 kN) per fastener is required.
- A properly prepared, existing, dry, and sound, un-insulated built-up roof system (all splits and blisters repaired) can function as a vapor retarder in a warranted Red Shield system but will not be included within Red Shield warranty coverage.

Single-Ply Adhesion/Attachment to Lightweight Insulating Concrete Roof Decks		
New System with Insulation		**New System without Insulation**
Elevate PVC and PVC KEE		
Adhered	Insulation and Vapor Retarder Required	Not allowed
Mechanically Attached	Insulation and Vapor Retarder Required	A vapor retarder is not required, provided that the deck is clean, smooth, dry, and free of sharp edges, fins, loose or foreign materials, oil, grease, and other materials that may damage the membrane.
Elevate PVC XR and PVC KEE XR		
Adhered	Insulation and Vapor Retarder Required	Cellular Lightweight Concrete: Elevate PVC XR membrane may be adhered directly to a Cellular Lightweight Insulating Concrete Roof Deck Elevate PVC Water based Bonding Adhesive (max 15-year warranty), I.S.O. Spray R, XR Stick or Twin Jet. A positive adhesion test is required. A vapor retarder is not required, provided that the deck is clean, smooth, dry, free of sharp edges, fins, loose or foreign materials, oil, grease, and other materials that may damage the membrane
Adhered with Hot Asphalt	Insulation and Vapor Retarder Required	Not allowed
Mechanically Attached	Insulation and Vapor Retarder Required	A vapor retarder is not required, provided that the deck is clean, smooth, dry, and free of sharp edges, fins, loose or foreign materials, oil, grease, and other materials that may damage the membrane.

Acceptable Fasteners for Lightweight Insulation Concrete Roof Decks	
Acceptable Fastener	**Minimum Penetration**
Acceptable Fasteners into Steel Pan	
Elevate Heavy Duty (HD's) Elevate HailGard	¾" (19 mm) Minimum penetration of fastener through steel pan
Acceptable Fasteners into Structural Concrete Substrate	
Elevate Heavy Duty (HD's) Elevate HailGard	1" (25 mm) into concrete deck
Elevate Concrete Drives	1 ¼" (32 mm) into concrete deck
Acceptable Fasteners for attaching Base Sheet to Light Weight Insulating Concrete	
Elevate 1.7" (43 mm) LWC Base Ply Fastener	Full

Special Considerations for Partial Tear Off and Retrofit/Recover Applications

! **30 YEAR SYSTEMS REQUIRE COMPLETE TEAR OFF (min. 80 mil PVC KEE or PVC KEE XR)**

! 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 insulation, and installing a new membrane roofing system over the new insulation.
- A **Retrofit** or **Recover** 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 Holcim Regional Technical Coordinator for Technical Information or assistance.**
- Confirm the structural integrity of the existing deck and specify repair or replacement as required.
- Existing roof components 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	
Deck	**Special Considerations**
Steel Decks and Nailable Decks (Wood Plank, Plywood, OSB, Gypsum, Cement Wood Fiber, Poured in Place Concrete Decks)	The attachment of the existing system may not be sufficient if the existing insulation is not mechanically fastened or not fastened correctly, or if the existing system contains fasteners that may be corroded. It is strongly recommended that the existing roof system be mechanically attached to the structural deck according to local code, Insurance and Holcim requirements, and prior to installing the new insulation.
Non-Nailable Decks (Poured in Place Concrete Decks, Pre-cast Concrete Decks, Post-Tension Concrete Decks, Hollow Core)	If the existing insulation or membrane is not adequately adhered to the deck, it is strongly recommended that the existing roof system be removed to the deck.

! The suitability of mechanically fastening insulation or membrane to any hollow core, pre-stressed or post-tensioned structural concrete deck assembly is the responsibility of the design professional. Special consideration needs to be given to the relationship between the deck attachment allowances and Holcim mechanical attachment requirements.

All recover or retrofit systems using adhesives for insulation attachment require a pull test to verify adhesion. Refer to the Elevate Attachment Guide for adhesion pull test requirements for Elevate insulation adhesives.

When using fasteners, verify that the substrate has sufficient fastener pullout resistance to meet system requirements.

Partial Tear Off

> ! 30 YEAR SYSTEMS REQUIRE COMPLETE TEAR OFF (min. 80 mil PVC KEE or PVC KEE XR)

- **Partial Tear Off and Recover** is the removal of the existing membrane, installing a new layer of insulation over the existing in place insulation and a new membrane over the new insulation.
- The existing insulation 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 are not included in the Red Shield warranty.

Retrofit/Recover Applications

> ! 30 YEAR SYSTEMS REQUIRE COMPLETE TEAR OFF (min. 80 mil PVC KEE or PVC KEE XR)

Existing Smooth Surface Built-Up or Modified Bitumen Roofs

- Elevate PVC XR or PVC KEE XR membrane may be adhered to a properly prepared smooth surface BUR or modified bitumen roof. The existing smooth surface BUR or modified bitumen roof must not have been coated or re-saturated.
- New insulation or cover board required, except when installing a Elevate PVC XR or PVC KEE XR membrane system.
- All damaged or wet components must be removed and replaced, in kind, prior to installing the new roof system. Existing roof components are not included in the Red Shield warranty.

Mineral Surfaced Modified Bitumen

- Elevate PVC XR or PVC KEE XR membrane may be adhered to a properly prepared granulated modified bitumen roof.
- Insulation, cover board, or protection mat required, except when installing a Elevate PVC XR or PVC KEE XR membrane system.
- All damaged or wet components must be removed and replaced, in kind, prior to installing the new roof system.
- Existing roof components are not included in the Red Shield warranty.

Asphalt Built Up and Modified Roofs with Flood Coat and Gravel

- New insulation or cover board is required. Use of 4' x 4' (1.2 m x 1.2 m) boards is recommended.
- All damaged or wet components must be removed and replaced, in kind, prior to installing the new roof system.
- Existing roof components are not included in the Red Shield warranty.
- The removal of loose gravel may be required to meet local building code requirements or for structural consideration. If loose gravel is removed, some method of leveling may be required to provide a suitable substrate for new insulation.

Coal Tar Built-Up Roofs

- New insulation or cover board is required.
- All damaged or wet components must be removed and replaced, in kind, prior to installing the new roof system.
- Flow of existing coal tar into the building may occur when new fasteners penetrate an existing coal tar pitch membrane and substrate.

> ! Flow of existing coal tar into the building may occur when new fasteners penetrate an existing coal tar pitch membrane and substrate.

- The removal of loose gravel may be required to meet local building code requirements or for structural consideration. If loose gravel is removed, some method of leveling may be required to provide a suitable substrate for the insulation.
- Existing roof components are not included in the Red Shield warranty.

Existing Single-Ply System

- New insulation or cover board is required.
- Recover 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 kind, prior to installing the new roof system.
- Existing roof components are not included in the Red Shield warranty.

Preparation of Existing Gravel, Smooth, and Granule Surfaced Asphalt Membrane

!	30 YEAR SYSTEMS REQUIRE COMPLETE TEAR OFF (min. 80 mil PVC KEE or PVC KEE XR)

- Verify that the attachment of the existing roof system is acceptable. If existing insulation is not mechanically fastened, contains fasteners that may be corroded or loose, or the attachment may not be sufficient, consideration should be given to re-attaching the roof system prior to installing the new insulation.
- When adhering insulation to a gravel surfaced roof, all loose gravel or granules must be removed by vacuuming and/or, power brooming. After all loose gravel has been removed; spud the remaining gravel smooth to provide a level bonding surface.
- If adhering the insulation or cover board with asphalt, prime the surface using an ASTM D 41 asphalt primer.
- The existing assembly should be re-secured as necessary to meet local code and insurance or design wind uplift requirements.

!	Sprayed In-Place polyurethane foam (PUF) roofing systems require a **COMPLETE TEAR-OFF** of the Sprayed In-Place polyurethane foam system.
	Existing roofs over Phenolic Insulation require a **COMPLETE TEAR-OFF** of the entire roof system to the structural deck. When Phenolic insulation is removed, a visual inspection of the deck condition and other components is required; all deteriorated components must be replaced as necessary.

Base Sheet

General

- Depending on the base sheet and the substrate, base sheets may be attached with fasteners, hot asphalt, or heat fusing as required by the specifications.
- The Elevate modified base sheets and base plies must be installed so that all laps shed water.
- Where the slope exceeds ½" (13 mm) in 12" (305 mm), (4.2%) and hot asphalt is required, Holcim recommends that Elevate SEBS Mopping Asphalt or Type IV asphalt be used. See also table 1.03-1 for attachment of asphalt membranes on slopes.
- Holcim does not manufacture or supply Type III or Type IV asphalt and does not warrant the performance of products not supplied by Holcim.

Allowable Base Sheet Attachments

Substrate to Which Base Sheet or Base Ply Will Be Attached	Attachment Method		
	Mechanically Attached	Heat Weld	Hot Asphalt
Decks			
Structural Concrete	✓	✓	✓
Plywood or Oriented Strand Board	✓		
Wood Planking	✓		
Poured or Pre-Cast Gypsum	✓		
Cementitious Wood Fiber	✓		
Lightweight insulating concrete Decks and Fills (See Section 1.06 I for additional requirements)	✓		
Recover			
Existing Smooth Surface Built-Up or Modified Bitumen Roofs		✓	✓
Asphalt Gravel Surfaced Built-Up Roofs			✓
Mineral Surface Built-Up or Modified Bitumen Roofs		✓	✓
New Insulation / Cover Board			
ISOGARD HD	✓		
STRUCTODEK HD Wood Fiber Board	✓		✓
HailGard / ISOGARD HG	✓		
DensDeck Products	✓	✓	✓
SECUROCK	✓	✓	✓
NOTE: Reference must be made to other sections of the Single Ply Design Guide, the Asphalt Design Guide, Detail Drawings, and Technical Information Sheets (TIS) for additional and/or specific requirements.			
✓ = Acceptable			

Allowable Fasteners – Base Sheet Attachment

TIS	Fastener	Deck Type						
		Steel	Structural Concrete	Plywood/OSB/ Wood Plank	Cementitious Wood Fiber	Gypsum	LWC/Steel Pan	LWC/Concrete
1001	All-Purpose Fastener	✓	-	✓	-	-	-	-
1002	Heavy Duty Fastener	✓	✓	✓	-	-	✓[1]	✓[1]
1003	Pre-Assembled #12 Fastener and Plate	✓	-	✓	-	-	-	-
1005	Concrete Drive Fastener	-	✓	-	-	-	-	✓[1]
1006	Polymer Fastener	-	-	-	✓	✓	-	-
1012	LWC Base-Ply Fasteners	-	-	-	-	✓	✓	✓
1014	IsoFast™ #15 Belted Fasteners and Membrane Plates	✓	-	✓	-	-	✓[1]	-
1017	All-Purpose Stainless-Steel Fastener	✓	-	✓	-	-	-	-
1020	Two Piece Impact Nail	-	-	-	✓	✓	✓	✓

NOTE:
1. Must penetrate steel pan or structural concrete.

! Roofing plies or base sheets cannot be fully mopped to polyiso insulation. A suitable overlay must be used to separate the polyiso insulation from the fully adhered, hot asphalt applied, ply.
The following are overlays over polyiso that are generally acceptable when attaching any ply sheet with hot asphalt:
- A compatible cover board
- Approved Dens Deck product
- A base sheet mechanically attached through the polyiso insulation into the structural deck

Insulation

General

- Insulation must provide a suitable substrate for the proposed roof system as well as insulating the building.
- Insulation thickness requirements may vary for code compliance. Contact the local code or insurance official before contacting a Regional Technical Coordinator for Technical Information.
- Refer to Insulation or Cover Board Technical Information Sheet (TIS) for specific spanning capabilities.
- Refer to the Elevate Attachment Guide for adhesion pull test requirements for Elevate insulation adhesives.

! Only Elevate brand insulation can be included in the Red Shield warranty.

Attachment

- Insulation may be installed by various methods including fasteners, adhesives, and asphalt. It is acceptable to combine fastener and adhesive attachment methods in multi-layer applications.
- Tapered insulation below the 1" (25 mm) minimum thickness must be fastened at a rate of one (1) fastener and plate per two (2) ft^2 (0.22 m). If possible, install the tapered insulation first, covered by the 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 fastener length depending on standards used.

! Ballasted systems are not allowed when the membrane is installed directly onto a hard surface, such as DensDeck, SECUROCK, OSB, Gypsum, ISOGARD HD or concrete.

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

Insulation/Cover Board Attachment Options by Deck and Recover/Retrofit

Substrate to Which Insulation / Cover Board Will Be Attached or Adhered	Attachment Method				
	Mechanically Attached	I.S.O. SPRAY R	Twin Jet	I.S.O. Twin Pack or I.S.O. Stick	Hot Asphalt
		Adhesive attachment may require a primer and an adhesive pull test. See the Elevate Attachment Guide and Product Technical Information Sheets.			
Decks					
Steel	✓	✓	✓	✓	N/A
Structural Concrete	✓	✓	✓	✓	✓
Plywood or Oriented Strand Board	✓	✓	✓	✓	N/A
Wood Planking	✓	✓	✓	✓	N/A
Poured or Pre-Cast Gypsum	✓	✓	✓	✓	N/A
Cementitious Wood Fiber	✓	✓	✓	✓	N/A
Lightweight Insulating Concrete Decks (See Section 1.06 H for additional requirements)	✓	✓	✓	✓	N/A
Recover/Retrofit (Excluding Platinum Systems)					
Existing Smooth Surface Built-Up Roof or Modified Bitumen Roofs	✓	✓	✓	✓	
Coal Tar Built-Up Roofs	N/A	N/A	N/A	✓	N/A
Asphalt Gravel Surfaced Built-Up Roof	✓	✓	✓	✓	
Mineral Surface Built-Up Roof or Modified Bitumen Roof	✓	✓	✓	✓	
Vapor Barrier					
V-Force Vapor Barrier Membrane	✓	✓	✓	✓	N/A
Sprayed Urethane Roof (PUF) – Complete Tear-Off Required					
Existing Roof with Phenolic Insulation	Complete tear-off required. When Phenolic insulation is removed, a visual inspection of the deck condition and other components is required, and all deteriorated components must be replaced as necessary.				

NOTE:

- Holcim recommends mechanically attaching a Cover board over existing insulation. The responsibility of identifying and removing damaged or wet insulation is that of the contractor.
- Refer to the Elevate Attachment Guide for adhesion pull test requirements for insulation adhesives.

✓ = Acceptable N/A = Not Applicable

Multiple Layers of Insulation

- Where overall insulation thickness is 2" (51 mm) or greater, Holcim recommends installing 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.

Insulation/Cover Board Attachment to Insulation Options by Insulation Type				
Base Layer of Insulation to Which Insulation / Cover Board Will Be Adhered	**Insulation / Cover Board to Insulation Attachment Method**			
	I.S.O. SPRAY R	**Twin Jet**	**I.S.O. Twin Pack and I.S.O. Stick**	**Hot Asphalt**
ISO 95+ GL / ISOGARD GL	✓	✓	✓	✓
Resista / ISOGARD CG	✓	✓	✓	✓*
ISOGARD HD	✓	✓	✓	✓*
STRUCTODEK HD Wood Fiberboard	✓	✓	✓	✓
DensDeck	✓	✓	✓	✓
DensDeck Prime	✓	✓	✓	✓
SECUROCK Gypsum-Fiber	✓	✓	✓	✓
Perlite Insulation	N/A	N/A	N/A	✓
Asphalt Base Sheet	✓	✓	✓ with primer	✓
V-Force Vapor Barrier Membrane	✓	✓	✓	N/A
DensDeck StormX Prime	✓	✓	✓	N/A
NOTE: ▪ Holcim recommends mechanically attaching a Cover board over existing insulation. The responsibility of identifying and removing damaged or wet insulation is that of the contractor. ▪ Refer to the Elevate Attachment Guide for adhesion pull test requirements for insulation adhesives.				
*** Board to board attachment acceptable but membrane to board securement with hot asphalt not approved.**				
✓ = Acceptable N/A = Not Applicable				

Mechanical Attachment of Insulation and Cover Board to Approved Substrates

- Insulation must be fastened with appropriate Elevate fasteners and insulation plates.
- Elevate All Purpose (AP) Fasteners, Elevate AP AccuTrac Kits, Elevate ISOFast#12 Belted Fasteners and Insulation Plates, and Elevate Pre-Assembled #12 Fasteners and plates are not acceptable for use on any warranties greater than 20 years for new construction, re-cover, or partial tear off applications into steel decking.
- Insulation must be installed in accordance with the fastening rate and pattern for the applicable system, as shown in Elevate attachment specifications.
- 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).
- Elevate's published reduced fastening rates for ISO 95+ GL / ISOGARD GL insulation, under selected conditions, will not affect the products' performance. However, the reduced fastening rate may allow insulation board movement that may result in interior building noise.

Allowable Fasteners – Insulation Attachment

TIS	Fastener	Deck Type						
		Steel	Structural Concrete	Plywood/OSB/ Wood Plank	Cementitious Wood Fiber	Gypsum	LWC/Steel Pan	LWC/Concrete
1001	All-Purpose Fastener	✓	-	✓	-	-	-	-
1002	Heavy Duty Fastener	✓	✓	✓	-	-	✓[1]	✓[1]
1003	Pre-Assembled #12 Fastener and Plate	✓	-	✓	-	-	-	-
1005	Concrete Drive Fastener	-	✓	-	-	-	-	✓[1]
1006	Polymer Fastener	-	-	-	✓	✓	-	-
1007	AP AccuTrac™ Kits (#12 Fasteners and insulation Plate)	✓	-	✓	-	-	-	-
1013	IsoFast™ #12 Belted Fasteners and Insulation Plates	✓	-	✓	-	-	-	-
1016	HD AccuTrac Kits™	✓	-	✓	-	-	-	-
1017	All-Purpose Stainless-Steel Fastener	✓	-	✓	-	-	-	-
1019	Heavy Duty (HD) ISOGARD™ HG / HailGard™ Fastener	✓	✓	✓	-	-	-	-
1026	Elevate #12 Fastener	✓	-	✓	-	-	-	-

NOTE:

1. Must penetrate steel pan or structural concrete.
2. Contact an Elevate Regional Technical Coordinator for special conditions not covered above.

Insulation Attachment Fastener – Warranty Coverage

TIS	Fastener	Warranty Coverage by Deck Type						
		Steel	Structural Concrete	Plywood/OSB/ Wood Plank	Cementitious Wood Fiber	Gypsum	LWC/Steel Pan	LWC/Concrete
1001	All-Purpose Fastener	20	-	20	-	-	-	-
1002	Heavy Duty Fastener	30	30	30	-	-	30	30
1003	Pre-Assembled #12 Fastener and Plate[1]	20	-	20	-	-	-	-
1005	Concrete Drive Fastener	-	30	-	-	-	-	30
1006	Polymer Fastener	-	-	-	30	30	-	-
1007	AP AccuTrac™ Kits (#12 Fasteners and insulation Plate)	20	-	20	-	-	-	-
1013	IsoFast™ #12 Belted Fasteners and Insulation Plates	20	-	20	-	-	-	-
1016	HD AccuTrac Kits™	20	-	20	-	-	-	-
1017	All-Purpose Stainless-Steel Fastener	20	-	20	-	-	-	-
1019	Heavy Duty (HD) ISOGARD™ HG / HailGard™ Fastener	30	30	30	-	-	-	-
1026	Elevate #12 Fastener	20	-	20	-	-	-	-

NOTE: Contact an Elevate Regional Technical Coordinator for special conditions not covered above.

Minimum Number of Fasteners and Plates Per Insulation Board

- Refer to Elevate Attachment Guide for the required patterns for proper placement of approved fasteners and plates for insulation on Elevate minimum roofing systems specifications. These fastening patterns apply to the following flat or tapered insulations. The most common fastener density and pattern requirements are shown on this Technical Information Sheet. For non-standard fastener densities, contact a Regional Technical Coordinator for information.
- Certain specifications and job conditions may call for increased densities of fasteners in the perimeters and corners of roofs.

Minimum Number of Fasteners and Plates per Insulation Board

System		Insulation	Insulation Thickness	Number of Fasteners per 4' x 4' Board	Number of Fasteners per 4' x 8' Board
Adhered Systems	**Elevate PVC / PVC KEE / PVC XR / PVC KEE XR**	ISO 95+ GL / ISOGARD GL	.5" - 1.4"	8	16
			1.5" – 1.9"	6	12
			2" or greater	4	8
		ISOGARD HD	0.5"	6	12
		HailGard / ISOGARD HG	1.5" – 1.9"	6	12
			2" or greater	4	8
		STRUCTODEK HD Fiberboard (max 15-year)	.5"	8	16
		SECUROCK Gypsum-Fiber	¼"	5	10
			½"	4	8
			⅝"	4	8
		DensDeck Prime	¼"	6	12
			½"	5	8
			⅝"	4	8
		DensDeck StormX Prime	⅝"	4	8

NOTE: Uplift requirements for the project may require increased fastening rates than those listed above. The rates listed in these tables are for warranty purposes only. Contact a Regional Technical Coordinator for rates related to special warranty terms or conditions.
¼" = 6.4 mm; ½" = 13 mm; ⅝" = 16 mm; 1" = 25 mm; 1.4" = 35.6 mm; 1.5" = 38.1 mm; 1.9" = 48.2 mm; 2" = 51 mm

Minimum Number of Fasteners and Plates per Insulation Board

System		Insulation	Insulation Thickness	Number of Fasteners per 4' x 4' Board	Number of Fasteners per 4' x 8' Board
Mechanically Fastened Membrane Systems	**Elevate PVC / PVC KEE / PVC XR / PVC KEE XR** New Construction **Not** over a BUR, Modified, or Adhered Single-Ply System	All Elevate Approved Insulations	All Approved Thicknesses	4	5
	Elevate PVC / PVC KEE / PVC XR / PVC KEE XR New Construction with an Air barrier or a recover over existing loose laid or Mechanically Attached Single-Ply System	ISO 95+ GL / ISOGARD GL	.5" - 1.4"	8	16
			1.5" – 1.9"	6	12
			2" or greater	4	8
		ISOGARD HD	½"	6	12
		STRUCTODEK HD Fiberboard (max 15-year)	.5"	8	16
		HailGard / ISOGARD HG	1.5" – 1.9"	6	12
		DensDeck	¼"	8	16
			½"	6	12
			⅝"	4	8
		DensDeck Prime	¼"	8	16
			½"	6	12
			⅝"	4	8
		DensDeck StormX Prime	⅝"	4	8
		SECUROCK Gypsum-Fiber	¼"	8	16
			½"	6	12
			⅝"	4	8

NOTE: Uplift requirements for the project may require increased fastening rates than those listed above. The rates listed in these tables are for warranty purposes only. Contact a Regional Technical Coordinator for rates related to special warranty terms or conditions.
¼" = 6.4 mm; ½" = 13 mm; ⅝" = 16 mm; 1" = 25 mm; 1.4" = 35.6 mm; 1.5" = 38.1 mm; 1.9" = 48.2 mm; 2" = 51 mm

Minimum Fastener Pullout Resistance for Specific Systems	
System	**Minimum Fastener Pullout**
Fully Adhered systems with Insulation Mechanically Attached to Deck	300 lb (136.1 Kg)
Single-Ply Mechanically Attached.	400 lb (181.4 Kg)
Base Sheet Mechanically Attached to Deck	300 lb (136.1 Kg)
Base Sheet Nailed to Deck (Cap nail or Elevate LWC Fastener)	40 lb (18.1 Kg)
NOTE: In the case where the structural deck does not meet the minimum fastener pullout requirements contact a Holcim Regional Technical Coordinator.	

Asphalt Attachment of Insulation / Cover Board to Substrate

- The proposed insulation or cover board must be compatible with the roof substrate, the proposed bitumen and the requirements of the Elevate roof system.
- Hot steep asphalt (ASTM D 312 Type III or Type IV) may be used to attach insulation beneath a ballasted, fully adhered or mechanically attached roof system.
- When using hot asphalt for attachment:
  - The insulation must be no larger than 4' X 4' (1.2 m X 1.2 m)
  - Stagger all insulation joints from adjoining boards and subsequent layers by 6" (153 mm)
- Assure that all health and safety measures are followed when installing hot asphalt to protect the installers as well as occupants of the building.
- Expanded or extruded polystyrene insulation cannot be attached or adhered to with hot asphalt.

Approved Substrates for use with Asphalt Attachment of Insulation/Cover Board		
Approved base sheets that have been attached in accordance with Holcim requirements		✓
Approved base plies that have been adhered in accordance with Holcim requirements		✓
Compatible insulations	ISO 95+ GL / ISOGARD GL	✓
Compatible Cover Boards	Approved DensDeck and SECUROCK Products (DensDeck must be primed with ASTM D 41)	✓
Poured-in-Place or pre-cast structural concrete decks that has been primed with ASTM D 41 primer		✓
Existing properly prepared asphalt membrane roofing systems.	Uncoated smooth or granular surfaced BUR	✓
	Granule surfaced SBS modified asphalt roofing systems	✓
	Gravel surface Built-Up roofing systems	✓
✓ = Acceptable		

Adhesive Attachment of Insulation / Cover Board to Substrate

- Ensure that all safety measures are followed when installing insulation adhesives to protect the installer as well as the occupants of the building.
- Elevate insulation adhesives must be applied in accordance with the installation instructions and Technical Information Sheets (TIS).
- Elevate I.S.O. Twin Pack, Elevate I.S.O. Stick, Elevate Twin Jet, and Elevate I.S.O. SPRAY R Adhesive:
  - The insulation must be no larger than 4' X 4' (1.2 m X 1.2 m)
  - Stagger all insulation joints from adjoining and adjacent boards and adjacent layers, 6" (153 mm) minimum.
- Refer to the Elevate Roofing Systems Adhered Insulation Layout Guide at the end of this section for adhesion pull test requirements for Elevate I.S.O. Twin Pack, Elevate I.S.O. Stick, I.S.O. SPRAY R and Elevate Twin Jet.
- Existing decks containing residual asphalt must be cleaned and scraped as smooth as possible.
- Existing decks shall be smooth, flat, clean, dry, free of sharp fins, or foreign materials.

Allowable Adhesive Attachment of Insulation / Cover Board to Structural Deck

Structural Deck to Which Insulation or Cover Board Will Be Adhered	Twin Jet			I.S.O. SPRAY R			I.S.O. Twin Pack I.S.O.Stick		
	Acceptable	Pull Test Required	Not Acceptable	Acceptable	Pull Test Required	Not Acceptable	Acceptable	Pull Test Required	Not Acceptable
Steel [1]	✓			✓				✓	
New Structural Concrete [2]	✓			✓			✓		
Existing Structural Concrete [3]		✓		✓				✓	
Plywood, OSB, Wood Planking	✓			✓			✓		
Cementitious Wood Fiber		✓		✓			✓		
Poured or Pre-Cast Gypsum		✓			✓			✓	
Cellular Lightweight Insulating Concrete (Celcore or Elastizell) [4]		✓			✓			✓	
Lightweight Insulating Concrete Decks (See Section 1.06 H for additional requirements) [4]					✓			✓	
✓ = Acceptable									

NOTE:

1. New steel decks require cleaning to remove processing oils.
2. New poured decks must have a minimum 28-day drying/curing time and be dry from “weather”.
3. Existing concrete containing residual asphalt must be cleaned and scraped smooth as possible
4. New poured decks must have a minimum 28-day drying/curing time and be dry from “weather”.

Allowable Adhesive Attachment of Insulation/Cover Board to Base Layer of Insulation

New Base Layer of Insulation or Asphalt Base Sheet To Which Insulation or Cover Board Will Be Adhered	Twin Jet			I.S.O. SPRAY R			I.S.O. Twin Pack I.S.O.Stick		
	Acceptable	Pull Test Required	Not Acceptable	Acceptable	Pull Test Required	Not Acceptable	Acceptable	Pull Test Required	Not Acceptable
ISO 95+ GL / ISOGARD GL, Resista / ISOGARD CG	✓			✓			✓		
ISOGARD HD	✓			✓			✓		
STRUCTODEK HD Fiberboard	✓			✓			✓		
HailGard / ISOGARD HG			✓			✓			✓
DensDeck Products and SECUROCK Gypsum-Fiber	✓			✓			✓		
Perlite Insulation			✓			✓			✓
V-Force Vapor Barrier Membrane	✓			✓			✓		
Approved Elevate Asphalt Base Sheets		✓		✓			✓		
✓ = Acceptable									

NOTE:

1. Maximum 4' x 4' (1.2 m x 1.2 m) boards only unless noted otherwise.
2. Maximum 4′ x 8′ (1.2 m x 2.4 m), codes may require 4′ x 4′ (1.2 m x 1.2 m)

Allowable Adhesive Attachment of Insulation/Cover Board to Retrofit/Recover										
Recover / Retrofit to Which Insulation or Cover Board Will Be Adhered	Twin Jet			I.S.O. SPRAY R			I.S.O. Twin Pack I.S.O.Stick			NOTE
	Acceptable	Pull Test Required	Not Acceptable	Acceptable	Pull Test Required	Not Acceptable	Acceptable	Pull Test Required	Not Acceptable	
Smooth Surface BUR		✓		✓				✓		Primer may be required.
Existing Asphalt Roofs Gravel Surfaced BUR Mineral Surface BUR Mineral Surface Modified		✓		✓				✓		All interruptions in the existing roof membrane must be re-sealed to prevent air infiltration. Primer may be required.
Coal Tar Pitch BUR			✓			✓		✓		Aged and oxidized. Primer may be required.
Existing Single-Ply Systems			✓			✓			✓	Primer may be required.
✓ = Acceptable										

Application Rate

- Elevate Twin Pack Adhesive is generally installed in ½" (13 mm) beads spaced 12" (305 mm) o.c. Application rates will increase as job requirements become more demanding.
- Primer may be required, depending on the substrate.

Criteria for Field Testing Elevate I.S.O. Twin Pack and I.S.O. Stick Adhesive for Adhesion to Deck Substrate

1. Prepare an area large enough to allow a 4' x 4' (1.2 m x 1.2 m) insulation board to be laid in place. Follow manufacturer's guidelines for surface preparation and list of acceptable substrates or contact a Regional Technical Coordinator for Technical Information.
2. Secure the board to the substrate with adhesive per recommended application rates and methods: 12" (305 mm) o.c., ½" (13 mm) to ¾" (19 mm) bead, weighted for 5 minutes minimum).
3. Allow the adhesive a minimum of 60 minutes to cure. This period should be sufficient in almost any temperature to indicate the adhesion values required for the test.
4. After the adhesive has been allowed to cure, pull up on the adhered board by placing a hand under the corner or end of the board in the same direction as the ribbons. Make sure that the board is lifted by hand. Using tools to scrape the board may disbond the adhesive from the deck. This will not show whether the adhesive is performing under uplift considerations. (If a tool is used, it should be used to pry or pop the board up).
5. Observe the insulation and deck. The desired result is a delamination of the surface or board facer with adhesive and facer residue remaining on the deck or the board breaks apart remaining adhered to the deck at the ribbons. If the board is lifted and the adhesive pulls/peels off the deck or decking are pulled up with the board, this is considered an unacceptable substrate.

Roof Membrane

Membrane Securement Options for Elevate PVC and PVC KEE 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.
- 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.

Approved Immediate Substrates for Elevate PVC and PVC KEE Membranes – Max 20-Year Warranty

New Elevate Insulation or Approved Elevate Base Sheet to Which Membrane Can Be Applied	Elevate PVC and PVC KEE		Elevate PVC XR and PVC KEE XR (Horizontal Substrates)	
	Adhered	Mechanically Attached	PVC Water Based Bonding Adhesive (max 15-year warranty)	I.S.O. Spray R XR Stick Twin Jet
ISO 95+ GL / ISOGARD GL, Resista / ISOGARD CG	✓	✓	✓	✓
ISOGARD HD	✓	✓	✓	✓
STRUCTODEK HD Fiberboard (Maximum 15 Year Warranty)	✓	✓	✓	✓
HailGard / ISOGARD HG	✓	✓	✓	✓
DensDeck Products and SECUROCK Gypsum-Fiber	✓	✓	✓	✓
DensDeck StormX Prime Roof Board	✓	✓	✓	✓
SECUROCK Glass-Mat		✓		
Perlite Insulation				
EPS/XPS Insulation				
Fiberglass Insulation				
Approved Elevate Asphalt Base Sheet	✓		✓	✓
✓ = Acceptable				

Approved Immediate Substrates for Elevate PVC and PVC KEE Membranes – Max 20-Year Warranty

Structural Deck to Which Membrane Can Be Directly Applied	Elevate PVC and PVC KEE		Elevate PVC XR and PVC KEE XR (Horizontal Substrates)	
	Adhered	Mechanically Attached	PVC Water Based Bonding Adhesive (15-year max)	I.S.O. Spray R XR Stick Twin Jet
Structural Concrete	✓	✓	✓	✓
Plywood or Oriented Strand Board	✓	✓	✓	✓
Wood Planking	✓	✓	✓	✓
Poured or Pre-Cast Gypsum				✓
Cementitious Wood Fiber				
Lightweight Insulating Concrete Decks (See Section 1.06 H for additional requirements)		✓	✓	✓
✓ = Acceptable				

Approved Immediate Substrate for Elevate PVC and PVC KEE Membranes – Max 15-Year Warranty

Properly Prepared Recover / Retrofit Substrate to Which Membrane Will Be Directly Applied	Elevate PVC and PVC KEE		Elevate PVC XR and PVC KEE XR (Horizontal Substrates)		
	PVC LVOC Bonding Adhesive/Jet Bond PVC Spray Adhesive	Mechanically Attached	PVC Water Based Bonding Adhesive (max 15-year warranty)	XR Stick I.S.O. Spray R Twin Jet	Mechanically Attached
Smooth Surface Built-Up or Modified Bitumen (Maximum 15-Year Warranty)	N/A	Protection mat required	N/A	✓	✓
Mineral Surface Built-Up or Modified Bitumen (Maximum 15-Year warranty)	N/A	Protection mat required	N/A	✓	✓
✓ = Acceptable					

Acceptable Adhesives for Elevate PVC and PVC KEE Membranes

Adhered Single-Ply System	PVC Water Based Bonding Adhesive (max 15-year warranty)	PVC LVOC Bonding Adhesive	Jet Bond PVC Spray Adhesive	I.S.O. Spray R	XR Stick	Twin Jet
Elevate PVC Membrane	✓	✓	✓	N/A	N/A	N/A
Elevate PVC KEE Membrane	N/A	✓	N/A	N/A	N/A	N/A
Elevate PVC XR Membrane (Horizontal Substrates)	✓	N/A	N/A	✓	✓	✓
Elevate PVC KEE XR Membrane (Horizontal Substrates)	✓	N/A	N/A	✓	✓	✓

✓ = Acceptable

Allowable Fasteners – Membrane Attachment

TIS	Fastener	Deck Type						
		Steel	Structural Concrete	Plywood/OSB/ Wood Plank	Cementitious Wood Fiber	Gypsum	LWC/Steel Pan	LWC/Concrete
1001	All-Purpose Fastener	-	-	✓	-	-	-	-
1002	Heavy Duty Fastener	✓	✓	✓	-	-	✓[1]	✓[1]
1005	Concrete Drive Fastener	-	✓	-	-	-	-	✓[1]
1009	Heavy Duty Plus Fastener	✓	-	-	-	-	-	-
1011	Purlin Fasteners Black E-Coated	16-gauge Structural Steel Purlins						
1014	IsoFast™ #15 Belted Fasteners and Membrane Plates	✓	-	✓	-	-	✓[1]	-
1017	All-Purpose Stainless-Steel Fastener	-	-	✓	-	-	-	-

NOTE:
1. Must penetrate steel pan or structural concrete.
2. Contact an Elevate Regional Technical Coordinator for special conditions not covered above.

Membrane Attachment Fastener – Warranty Coverage

TIS	Fastener	Deck Type						
		Steel	Structural Concrete	Plywood/OSB/ Wood Plank	Cementitious Wood Fiber	Gypsum	LWC/Steel Pan	LWC/Concrete
1001	All-Purpose Fastener	-	-	20	-	-	-	-
1002	Heavy Duty Fastener	30	30	30	-	-	30	30
1005	Concrete Drive Fastener	-	30	-	-	-	-	30
1009	Heavy Duty Plus Fastener	30	-	-	-	-	-	-
1011	Purlin Fasteners Black E-Coated	20 (16-gauge Structural Steel Purlins)						
1017	All-Purpose Stainless-Steel Fastener	-	-	20	-	-	-	-

NOTE: Contact an Elevate Regional Technical Coordinator for special conditions not covered above.

Mechanically Attached Systems

Within Elevate Specifications, reference is made to Elevate Mechanically Attached Systems. Mechanically Attached PVC and PVC KEE Roofing Systems include:

- Elevate PVC or PVC KEE Mechanically Anchored System – using appropriate Elevate Fasteners and HD Seam Plates
- Elevate PVC or PVC KEE InvisiWeld System – using appropriate Elevate Fasteners and PVC InvisiWeld Plates
- Elevate PVC XR or PVC KEE XR Mechanically Anchored System – using appropriate Elevate Fasteners and HD Seam Plates

> ! Holcim recommends that when installing mechanically attached membranes over steel decks, the field attachment should run perpendicular the deck panels.

General

- See the Elevate Attachment Guide for specific membrane layout 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 or Batten Strips (Wide Weld Systems only) must be used with Elevate Fasteners to secure the Elevate Mechanically Attached System membrane.
- Where the deck will not provide a minimum fastener pullout resistance of 400 lb (1.8 kN), Holcim has designed a system of alternate fastener spacing to be used based on fastener pullout capacity (see Table 1.09-6).
- Consult with local building code and insurance officials or design professionals to determine if more stringent securements are required. Below is the minimum attachment requirement to receive a Red Shield Warranty.

Fastener Pullout Values and Spacing

Min. Pullout Value	Fastener Spacing for Field	Fastener Spacing for Perimeter
400 lbf (1.8 kN) or greater	12" (305 mm) o.c	12" (305 mm) o.c.
300 lbf to 399 lbf (1.3 kN to 1.8kN)	9" (229 mm) o.c.	6" (152 mm) o.c.
200 lbf to 299 lbf (0.9 kN to 1.3 kN)	6" (152 mm) o.c.	6" (152 mm) o.c.
less than 200 lbf (0.9 kN)	This system is not applicable	

- The fastener spacing in the above tables assumes that decking is dry and free of any deterioration. Holcim recommends that pullout testing be completed by the Elevate Licensed Applicator on all re-roof projects, regardless of deck type to confirm pullout resistance.
- For decks other than those listed above, contact a Regional Technical Coordinator for Technical Information.
- Perimeter Attachment Selection:
  - Roof perimeter areas must be attached in accordance with the Elevate Attachment Guide.
  - As an alternate to mechanical attachment, the perimeter area may be fully adhered.
  - The adhered perimeter area must cover the same area as if the perimeters were mechanically attached, as indicated in the Elevate Attachment Guide.
  - The adhered perimeter area must be prepared in accordance with the substrate and insulation requirements of the Elevate Adhered roof system.
  - The adhered perimeter area must be isolated from the mechanically attached field of the roof by a continuous row of Elevate Fasteners and Seam Plates.

> ! For retrofit of metal buildings, refer to the Metal Building Recover Guide. Direct attachment of Elevate Mechanically Attached Roofing Systems to metal roofs (regardless of gauge) is strictly prohibited.

Membrane Lap Splicing (Elevate PVC Membrane)

- Splice Elevate PVC and PVC KEE membranes by heat welding the side and end laps with a hot air welder. Refer to the Elevate PVC and PVC KEE Application Guide for additional welding information.
- If reinforced PVC or PVC KEE membrane thickness is greater than .050" (1.27 mm), T-joint patches must be installed at all reinforced membrane seam intersections. For specific instructions, refer to the Elevate PVC and PVC KEE Roofing Systems Application Guide and Elevate PVC/PVC KEE Lap Splice Details.
- Refer to Elevate details and application specifications for specific requirements.

Membrane Lap Splicing (Elevate PVC XR and PVC KEE XR Membrane)

- Splice Elevate PVC XR and PVC KEE membrane side laps by heat welding with a hot air welder. Refer to the Elevate PVC and PVC KEE Application Guide for additional welding information. In the absence of a selvage edge follow end lap splicing procedure noted in step #2 below.

- End laps are to be completed by butting the PVC XR or PVC KEE XR membrane sheets together and hot air welding an 8" (203 mm) wide strip of Elevate PVC or PVC KEE membrane to complete the end lap splice.
- If reinforced PVC or PVC KEE membrane thickness is greater than .050" (1.14 mm), T-joint patches must be installed at all reinforced membrane seam intersections. For specific instructions, refer to the Elevate PVC and PVC KEE Roofing Systems Application Guide and Elevate PVC/PVC KEE Lap Splice Details.

Flashings

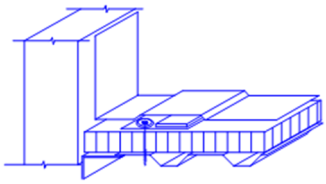
Elevate metal must be used and installed per Elevate details and standards for warranty inclusion. ES-1 certified metal and details are required for increased wind speed warranties over 80 mph. Contractors participating in the Holcim ES-1 Metal Cleat Program may receive up to 90 mph coverage for qualifying 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.		

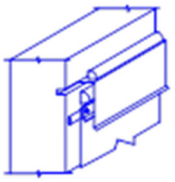
Design Considerations

- 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 Holcim Elevate Technical Database Web Site. Contact a Regional Technical Coordinator for Technical Information.
- A flashing is a roofing element used to prevent water from penetrating the exterior surface of a roof or to intercept and lead water off it. Flashings divert the water to the roof membrane. The roof membrane then carries it to the roof drainage system. Typically, a flashing intercepts water flowing down parapets, down walls of 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

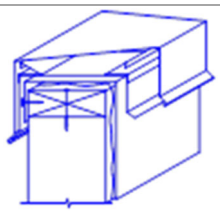
Base Flashing
An extension of the roofing membrane or a different material that is bonded to the roof to form a waterproof joint. It extends upward along the vertical surface to divert water onto the membrane. The base flashing should reach a higher level than that reached by water on the roof. In some 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.

Wall/Curb Flashing Materials and Requirements

- The following chart lists the flashing requirements for Elevate Single-Ply systems.
- Refer to the Elevate PVC and PVC KEE Application Guide and PVC/PVC KEE detail drawings sections 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 and Requirements

Membrane	Detail	Detail Description
Elevate PVC and PVC KEE	All Flashings	Curbs, walls, and expansion joints must be anchored with appropriate base tie-in detail using HD Seam Plates and approved fasteners. Curbs and wall must be flashed using minimum 0.050" Elevate PVC or PVC KEE membrane. Flashings must be sealed with heat welded details. Details may include Elevate PVC Coated Metal.
	Roof Edges	Elevate Factory Formed Edge Metal System, Drain Bar systems, or UltraPly TPO Coated Metal. QuickSeam details may be used. **NOTE:** See Attachment Guide and Supplemental Increased Wind Speed Warranty Guide for more information.
	Parapets	Elevate Coping System
Elevate PVC XR and PVC KEE XR	All Flashings	Anchor membrane at the base of curbs, walls and expansion joints with appropriate base tie-in details using foam adhesive (XR Stick, Twin Jet, or I.S.O. Spray R) with Elevate PVC XR or PVC KEE XR membrane, or HD Seam Plates and HD Fasteners. Standard PVC or PVC KEE membrane required for all vertical flashings. Details may include Elevate PVC Coated Metal.
	Roof Edges	Elevate Factory Formed Edge Metal System, Drain Bar systems, or UltraPly TPO Coated Metal. QuickSeam details may be used. **NOTE:** See Attachment Guide and Supplemental Increased Wind Speed Warranty Guide for more information. See PVC XR Specific details for additional information.
	Parapets	Elevate Coping System

Wall/Curb Flashing Materials and Requirements (Continued)		
Membrane	**Detail**	**Detail Description**
Elevate PVC XRT	All Flashings	Anchor membrane at the base of curbs, walls and expansion joints with appropriate base tie-in details using HD Seam Plates and HD Fasteners. Standard PVC or PVC KEE membrane required for all vertical flashings. Details may include Elevate PVC Coated Metal.
	Roof Edges	Elevate Factory Formed Edge Metal System, Drain Bar systems, or Elevate PVC Coated Metal. **NOTE:** See Attachment Guide and Supplemental Increased Wind Speed Warranty Guide for more information. See PVC KEE XRT Specific details for additional information.
	Parapets	Elevate Coping System
Elevate PVC and PVC KEE InvisiWeld	All Flashings	Curbs, walls, and expansion joints must be anchored with appropriate base tie-in details, using HD Seam Plates or PVC Invisiweld Plates. See current PVC Invisiweld details for available base tie-in options. Curbs and wall must be flashed using minimum 0.050" Elevate PVC or PVC KEE membrane. Flashings must be sealed with welded details and may include Elevate PVC Coated Metal.
	Roof Edges	Elevate Factory Formed Edge Metal System, Drain Bar systems, or UltraPly TPO Coated Metal. QuickSeam details may be used. **NOTE:** See Attachment Guide and Supplemental Increased Wind Speed Warranty Guide for more information.
	Parapets	Elevate Coping System

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 6" (152.4 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 pipe penetrations ranging in size from 1" (25 mm) outside diameter to 4 1/2" (114 mm) outside diameter should be flashed with pre-molded Elevate PVC Universal Pipe Flashings or Elevate PVC Reinforced Split Pipe Boots. If it is not possible to fit a PVC pre-manufactured flashing onto the pipe due to site conditions, the pipe should be covered with a PVC or PVC KEE field-fabricated flashing in accordance with Elevate Details.

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

The following types of penetrations require the installation of a 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

A minimum clearance of 1" (25 mm) between penetrations and on all sides of the penetration pocket, is required to assure adequate allowance for Elevate Pourable Sealer around each 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).
- 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, a 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 counter-flashing) ensure a consistent seal along the wall interface. The wall surface above the termination must be waterproof.
- Gypsum board, used as a substrate 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 fastener 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.

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.
- See Elevate Attachment Guide and Supplemental Increased Wind Speed Warranty Attachment Guide for information on edge metal requirements and wind speed coverage.
- 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 form 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 warrant the performance of products Holcim does not supply.
- Elevate PVC and PVC KEE may require the specific use of PVC coated metal.
- Elevate PVC XR and PVC KEE XR membrane may require special consideration, see XR specific details or contact a Regional Technical Coordinator for Technical Information.

Walkways

Locations

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

- Walkway systems on warranted Holcim 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 per 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 Re 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 PVC and PVC KEE 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 Application Guide for each product.
- Walkways may be constructed using Elevate PVC Walkway Pads, Elevate PVC X-Tread Walkway Pads, or Elevate 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 PVC and PVC KEE systems with adhered insulation or cover board. Consult details and guides for additional information.
- Contact a Regional Technical Coordinator for information regarding other materials designated as a walking surface.

Warranty

! THESE CHARTS ARE ONLY A SUMMARY OF GENERAL WARRANTY COVERAGE

General

- Consult this Single Ply Design Guide opening section: 1.01 - General Design Criteria - Initial Design Considerations and Warranty requirements.
- For new construction or complete tear-off, Elevate AP, HD (or Polymer Fasteners and Polymer Fastener Plates when appropriate) may be used for mechanical attachment of insulation to the appropriate deck.
- For new construction or complete tear-off, Elevate AP Fasteners and Plates are approved for insulation attachment on warranties up to 20 years on adhered or mechanically attached systems into Steel or Wood decks only. Pull tests should be conducted on re-roof/re-cover conditions. When uplift performance validation is required Elevate Heavy-Duty Fasteners and Plates may be required. When increased wind speed or special warranty considerations are requested Heavy-Duty Fasteners and plates or other upgraded installation guidelines may be required.
- All Purpose (AP) Fasteners and Plates are approved for in seam attachment on Wood Decks only. When uplift performance validation is required Elevate Heavy-Duty Fasteners and Plates may be required. When increased wind speed or special warranty considerations are requested Heavy-Duty Fasteners and plates or other upgraded installation guidelines may be required.
- For re-cover or partial tear off, Elevate HD fasteners are required for 15 or 20-year warranties, except into wood decks. When uplift performance validation is required Elevate Heavy-Duty Fasteners and Plates may be required. When increased wind speed or special warranty considerations are requested Heavy-Duty Fasteners and plates or other upgraded installation guidelines may be required.
- 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.
- 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 Holcim 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 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 Term for Elevate PVC and PVC KEE Systems*

Thickness	Membrane	5-15 Years	20 Years	25 - 30 Years
.080" (2.0 mm)	Elevate PVC	YES	YES	NO
.060" (1.52 mm)	Elevate PVC	YES	YES	NO
.050" (1.27 mm)	Elevate PVC	YES	NO	NO
.080" (2.0 mm)	Elevate PVC KEE	YES	YES	YES (Adhered)
.060" (1.52 mm)	Elevate PVC KEE	YES	YES	NO
.050" (1.27 mm)	Elevate PVC KEE	YES	NO	NO
.080" (2.0 mm)	Elevate PVC XR	YES	YES	NO
.060" (1.52 mm)	Elevate PVC XR	YES	YES	NO
.080" (2.0 mm)	Elevate PVC KEE XRT	YES (Adhered)	YES (Adhered)	YES (Adhered)
.060" (1.52 mm)	Elevate PVC KEE XRT	YES (Adhered)	YES (Adhered)	NO
.050" (1.27 mm)	Elevate PVC KEE XRT	YES (Adhered)	NO	NO

*This includes the PVC, PVC KEE, PVC XR and PVC KEE XR Minimum Thickness PVC Sheets

- 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 weigh 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 following table shows the types and minimum thicknesses 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.

Acceptable Insulations for Red Shield Warranties – PVC and PVC KEE Systems

System	Elevate ISOGARD GL / ISO 95+ GL (Flat or Tapered)	Elevate Composite	Elevate ISOGARD HG / HailGard	STRUCTODEK HD Fiberboard (Max 15-year warranty)	ISOGARD HD	DensDeck Products	SECUROCK Gypsum-Fiber
Minimum insulation thickness as an immediate substrate for Elevate PVC Roofing Systems	1" (25 mm)	1.5" (38 mm)	1.5" (38 mm)	½" or 1" (13 or 125 mm)	½" (13 mm)	¼" (6 mm)	¼" (6 mm)

PVC or PVC KEE System / Membrane / Flashing Options by Warranty Term*

Warranty Term	Acceptable Roof System/Membrane(s)	Acceptable Flashing Options(s)
5, 10, or 15 YEAR RED SHIELD	▪ 50, 60 or 80 mil Elevate PVC or PVC KEE ▪ 50, 60 or 80 mil Elevate PVC XR or PVC KEE XR ▪ Elevate PVC InvisiWeld	▪ 50, 60 or 80 mil Elevate PVC or PVC KEE ▪ Coated Metal ▪ Elevate PVC InvisiWeld
20 YEAR RED SHIELD	▪ 60 or 80 mil Elevate PVC or PVC KEE ▪ 60 or 80 mil Elevate PVC XR or PVC KEE XR ▪ 60 or 80 mil Elevate PVC InvisiWeld	▪ 60 or 80 mil Elevate PVC or PVC KEE ▪ Coated Metal ▪ Elevate PVC InvisiWeld
25 – 30 YEAR RED SHIELD**	▪ 80 mil Elevate PVC KEE ▪ 80 mil Elevate PVC KEE XR	▪ 80 mil Elevate PVC KEE ▪ Coated Metal

*This includes the PVC, PVC KEE, PVC XR and PVC KEE XR Minimum Thickness PVC Sheets
**25 – 30 Year Red Shield Warranty only approved for 80 mil PVC KEE or PVC KEE XR

Elevate PVC and PVC KEE Warranty Summary* Eligibility for Licensed Applicators

Warranty Name	Specification	Coverage
Red Shield Warranty 5, 10, 15 or 20 Years	Holcim specifications for the term requested.	Repair leaks in the roofing system caused by Elevate branded materials or the workmanship used to install them. No dollar limit to Elevate expenditures to honor the warranty.
Red Shield or Red Shield Platinum Warranty 25 or 30 Year Warranty*	Elevate Specifications for the term requested. ***80 mil PVC KEE, PVC KEE XR or PVC KEE XRT Membrane adhered only**	Repair leaks in the roofing system caused by Elevate branded materials or the workmanship used to install them. No dollar limit to Elevate expenditures to honor the warranty.
Cut and Puncture – Red Shield and Red Shield Platinum	Elevate PVC or PVC KEE (80 mil. minimum) adhered to ISOGARD GL/ISOGARD CG insulation.	Repair leaks in the roof system caused by Elevate branded materials or the workmanship used to install them, plus damage by cut or puncture. No dollar limit to repair warranted leaks.

Elevate PVC and PVC KEE Warranty Summary* Eligibility for Licensed Applicators (Continued)		
Warranty Name	**Specification**	**Coverage**
Red Shield Warranty – up to 2" Hail	Elevate PVC XR, PVC KEE XR or PVC KEE XRT (80 mil. minimum) adhered to high density (HD) cover board.	Repair leaks in the roof system caused by Elevate branded materials or workmanship used to install them, plus damage caused by up to 2" hail. No dollar limit to repair warranted leaks.
Red Shield **W** – **W**ind **90 mph maximum**	Elevate PVC or PVC KEE (60 mil. minimum) adhered or attached to appropriate substrate.	Repair leaks in roof system caused by Elevate branded materials or workmanship used to install them, plus damage caused by winds up to 90 mph. No dollar limit to repair warranted leaks.
Red Shield **PW** – **P**uncture and **W**ind	Elevate PVC or PVC KEE (80 mil. minimum) adhered or attached to appropriate substrate.	Repair leaks in the roof system caused by Elevate branded materials or workmanship used to install them, plus damage caused by cut or puncture and winds up to 90 mph. No dollar limit to repair warranted leaks.
Red Shield **PWH** – **P**uncture, **H**ail and **W**ind	Elevate PVC KEE XR or PVC KEE XRT (80 mil. minimum) adhered to HailGard/ISOGARD HG Insulation.	Repair leaks in the roof system caused by Elevate branded materials or workmanship used to install them, plus damage caused by cuts or puncture, winds up to 90 mph or hail. No dollar limit to repair warranted leaks.
***NOTE:** See Warranty Pricing Guide for pricing information. ISOGARD HG Composite Insulation is required for PHW. Hail Coverage, Cut & Puncture protection, and extended wind speed coverage for other immediate substrates are priced separately.		

Elevate PVC and PVC KEE Membrane Only Warranty Summary						
Membrane	**Thickness (mil)**	**Max. Term (Years)**	**Ballasted**	**MAS**	**Adhered**	**Invisiweld**
Elevate PVC*	50	15	N/A	✓	✓	✓
	60	20	15	✓	✓	✓
	80	20	15	✓	✓	✓
Elevate PVC XR	115	20	15	✓	✓	N/A
	135	20	15	✓	✓	N/A
Elevate PVC KEE*	50	20	N/A	✓	✓	✓
	60	20	✓	✓	✓	✓
	80	30	‡	✓	✓	✓
Elevate PVC KEE XR*	105	20	N/A	✓	✓	N/A
	115	20	✓	✓	✓	N/A
	135	30	‡	✓	✓	N/A
Elevate PVC KEE XRT	50	20	N/A	N/A	✓	N/A
	60	20	N/A	N/A	✓	N/A
	80	30	N/A	N/A	✓	N/A
* Includes standard and minimum thickness membranes.						
‡ Ballasted applications limited to 20 years maximum except where indicated.						
N/A = Not an approved attachment method for this membrane.						