Why use FIS ?

I am sure you have all seen the horror story images of fenestration installation failures.

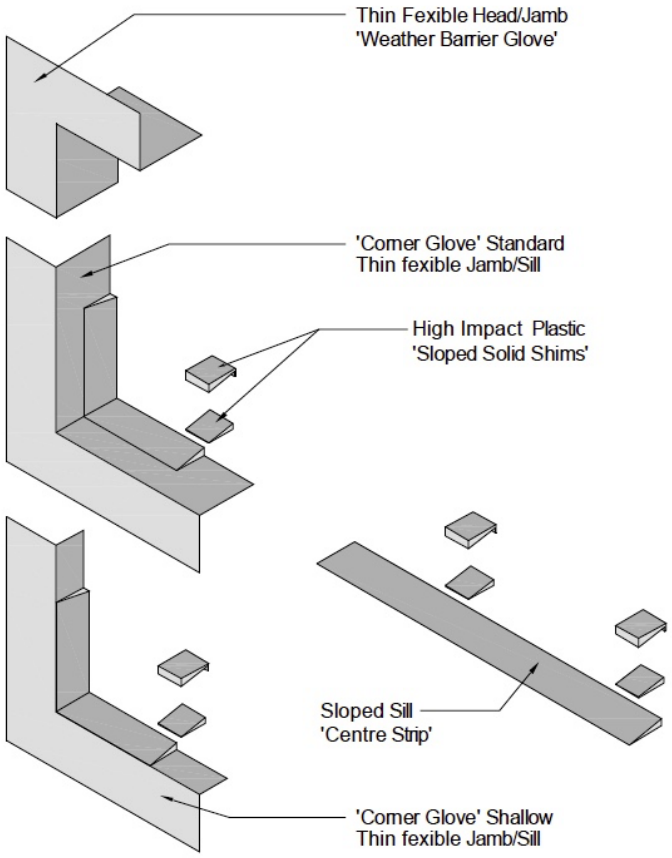
The photos above show examples of different buildings with different fenestration installation methods that failed for various reasons and are very costly to repair.

These installation failures could have been avoided by installing the **Fortress Installation Systems (FIS)** rough opening moisture protection system.

At **FIS**, we developed our **Generation I** fenestration rough opening protection system approximately 10 years ago. Since, then some minor revisions were made with the release of the **Generation II** system April 2019.

Since the release of the **Generation II** product, we have invested a significant amount of time and resources in consulting with building officials, building consultants, window manufacturers, installers, and analyzing fenestration installation failures and related issues throughout the industry.

With that data collected we found that the **FIS Generation II** system simply did not go far enough to satisfy all the identified installation issues.



In consideration of all identified issues, **FIS** is very excited to announce the release of our new **Generation III** rough opening moisture protection system, released November 2022 as seen in the image above.

Fortress Installation Systems
Div. of 2230593 Alberta Inc., Unit 450, 630-6th Avenue SW, Calgary, Alberta T2P 0S8 Ph: 1-403-703-1616
www.fortinsyst.com

Frequently Asked Questions (FAQ) & Technical Discussion

FAQ 1 **Where is Fortress Installation Systems (FIS) located?**

Head office is located in Calgary, Alberta, Canada.

USA
Supremium International Inc.
1740 Dell Range Blvd, H-198
Cheyenne, WY 82009

Canada
Supremium International Inc.
630 – 6th Ave SW
Calgary, Alberta. T2P 0S8

Ireland
LG Peerless Ltd.
Cashel Road, Dublin D2
Eay2
Kimmage, Dublin, Ireland

FAQ 2 **Where is Fortress Installation Systems (FIS) product manufactured?**

FIS product is manufactured in Atlanta, GA. Fabricated product is warehoused and shipped from the FIS distribution warehouse in Atlanta, GA, USA, and from the distribution warehouse in Calgary, AB, Canada.

Why use FIS?

The **Fortress Installation Systems (FIS)** rough opening moisture protection system Generation III will simplify the installation process, save you money and speed up installation.

FAQ 3 **Does FIS meet ASTM E2112-19C - Standard Practice for Installation of Exterior Windows, Doors and Skylight?**

FIS either meets or exceeds the requirements of ASTM E2112-19C. Refer to our document FIS Technical Review of Fortress Installation System's Fenestration Rough Opening Details. FIS is not compatible with skylights.

FAQ 4 **Does FIS meet CAN CSA A440.4:19 - Windows, Doors, and Skylight Installation?**

FIS either meets or exceeds the requirements of CAN CSA A440.4:19.
FIS is not compatible with skylights.

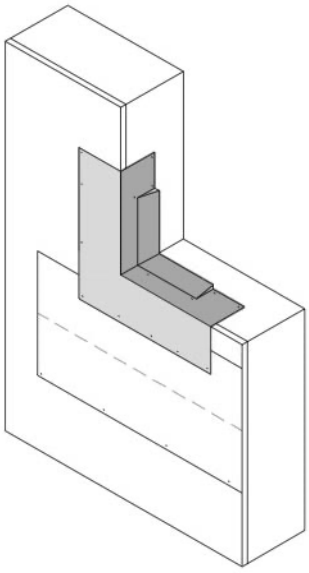
FAQ 5 **Does FIS come with a Warranty?**

Yes, the **FIS** system is fully warrantied for the life of the building with our '**Products and Completions'** Insurance policy/warranty at $10M per occurrence.

FAQ 6 Does FIS work for both windows and doors?

Yes, the **FIS** system is fully compatible with both windows and doors.

FAQ 7 How does FIS speed up the installation of rough opening moisture protection?

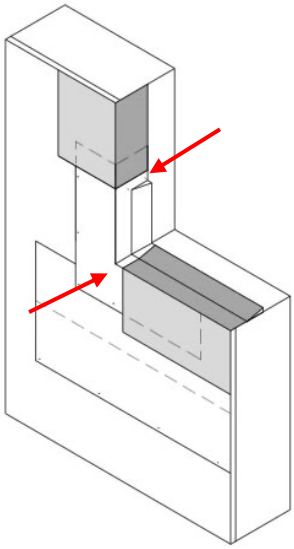


The FIS Corner Glove eliminates the need for the installation of multiple over lapping layers of sill flashing membrane as required to achieve a moisture tight sill corner.

Simply fit the FIS Corner Glove into the bottom sill corners of the rough opening and staple or nail into position and the corner is moisture tight.

The Corner Glove simplifies and speeds up the installation and requires less flashing membrane.

FAQ 8 Does FIS require flashing membranes to be accurately cut to length?



No, the FIS Corner Glove eliminates the need for accurately cutting and fitting of the flashing membranes.

As seen in the image to the left, the sill flashing membrane can be cut ½" to 1" short of the sill corner and will still maintain +4" of smooth bonding surface for the sill flashing membrane to bond down to the top side of the FIS Corner Guard for full bond adhesion.

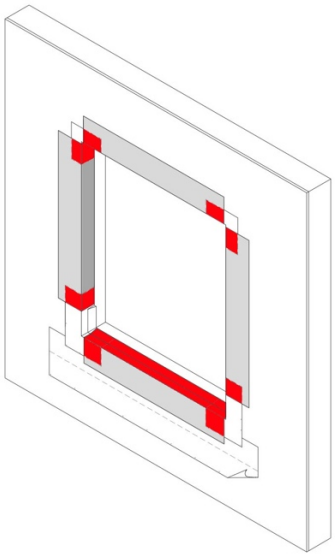
At the jamb, the jamb flashing can be cut ½" to 1" short and still maintain a 2" outwards shingled overlap onto the FIS Corner Guard.

The fact that the flashing membranes do not need to be accurately cut and carefully fit is easier and faster for the installer and speeds up the installation.

FAQ 9 Is FIS compatible with all flashing membrane materials and primers?

While most flashing membranes and primers are compatible with FIS, a bonding test of the selected flashing membrane and primer should be completed to confirm bonding and chemical compatibility.

FAQ 10 Does FIS require primer for the flashing membrane?



Proper bonding of the flashing membrane is always a concern. Primer is often not applied adequately to lock in surface particles and fill the pores of the substrate's surface to provide full bonding adhesion. This is a workmanship issue. As a result, the bond fails, and the flashing membrane releases at its ends and edges first and continues to de-bond from there.

FIS Corner Guard and FIS Centre Strip products are manufactured from plastic resulting in very smooth surfaces. Most flashing membranes bond exceptional well to FIS's smooth plastic surfaces even without the use of primers.

At this time, FIS requires all flashing membrane to be primed as per the flashing manufacturer's written requirements.

However, FIS provides for a more successful installation even if the primer was poorly installed and thin, as the ends of the flashing membrane are well bonded to the FIS components at the red corner locations (as seen in the image to the left), preventing the ends of the flashing membrane from de-bonding.

This reduces flashing membrane repair time (as seen in the image to the left) due to poor primer application that results in de-bonded of the flashing membrane. This now must be fixed before the weather resistive barrier can be installed.

FAQ 11 Does FIS require primer on all surfaces?

FIS requires the flashing membrane primer to be used when and where required by the manufacturer's written requirements.

However, with FIS and the elimination of overlapping membranes, all required primer can be installed at one time, eliminating the need to prime and wait between layers of flashing membrane.

This is easier for the installer and speeds up the work with only 1 primer application.

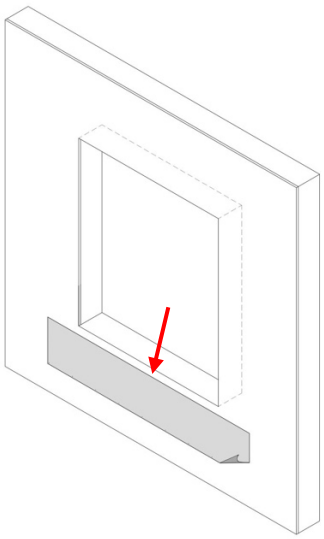
FAQ 12 Can FIS be used with primer-less flashing membranes?

If the primer-less flashing membrane is compatible as per FAQ 9, a primer-less flashing membrane can be used with FIS. If primer-less flashing membranes are used, primer is eliminated from the installation speeding up the installation time required.

This can be significant in cold weather applications.

FIS has noted that some primer-less flashing membranes do not bond as well as claimed to OSB and some other products. However, as per FAQ 10 the FIS's smooth plastic surfaces at the corners of the rough opening significantly improves the bonding at the ends of the flashing membranes reducing membrane de-bonding.

FAQ 13 **Typically, when installing multiple layers of flashing membrane to achieve moisture tightness, the build-up of layers of membrane on the exterior face of the wall sheathing develops a thickness that pushes the bottom of the window out further than the top of the window. This creates a trim finishing issue at the interior when installing windows that include jamb extensions.**
When installing windows without jambs, jamb boards need to be cut wider at the bottom or be caulked to fill the varying gap.
How does FIS help resolve this issue?



This is a real headache for interior finishers when they go to install trims around windows, as the windows are out of square with the interior wall face.

FIS recommends installing the first strip of flashing membrane with the top edge of the flashing membrane set 2" down from the sill of the rough opening. As window flanges generally only extend out a maximum of 1.5" from the window frame, this eliminates a layer of flashing membrane behind the window flange.

Using the FIS Corner Glove potentially eliminates another 1 or 2 layers of flashing membrane behind the window flange. Potentially eliminating a total of 2-3 layers of flashing membrane behind the flashing. This allows the window to fit more square in the wall assembly as the bottom has less build out.

The FIS Corner Glove is very thin and only requires a single layer of flashing membrane to be installed over top.

If the installation required the FIS Weather Barrier Glove then the installation has the same number of layers at the top of the window as at the bottom, leaving the windows square in the wall.

A square FIS installation also helps with keeping exterior trims and batons around the windows square at the exterior.

In a typical flashing membrane installation, the pushed out bottom of the window actually reverse slopes normally flat surfaces of the window unit, directing moisture back inwards towards the building. FIS helps keep the windows square in the wall assembly.

FAQ 14 Does FIS work for Packaged Terminal Air Conditioners (PTAC) units and other similar wall penetrations?

A white PTAC unit is shown in the image to the left, on the left side of the image at the red arrow. These types of PTAC installation failures are as common as window installation failures, if not more common on a percentage basis. These result in costly repairs as well.

FIS is currently working on a similar FIS rough opening moisture protection installation for in-wall Packaged Terminal Air Conditioners (PTAC) units and expect to release that by mid 2023.

FAQ 15 Are windows and doors the most common building envelope failures in the construction industry?

At FIS we have invested a significant amount of time and resources consulting with building officials, building consultants, window manufacturers, installers, and analyzing fenestration installation failures and related issues throughout the industry.

Based our findings, the most common building envelope failures are generally located around penetration through the weather resistive barrier:

- windows
- doors
- skylights
- deck and/or roof connections
- Packaged Terminal Air Conditioners (PTAC) units

FIS is a solution for 3 of the 5 most common building envelope failures.

FAQ 16 Why is the FIS Corner Glove available in a STANDARD and SHALLOW depth?

FIS is available in both

- a ‘standard’ depth for windows with jamb extensions, and
- a ‘shallow’ depth for window without jamb extensions.
- a ‘door’ depth for inswing doors as the door is set back at the inner face of the wall.

FAQ 16 Why is the FIS sill sloped?

The sloped surface of the sill provides positive slope to the exterior of the building to assist in rough opening drainage. And, at the same time works as a ‘stopper’ to prevent the low expansion spray foam from expanding into and onto the sill’s drainage plane and block drainage pathways, or trap and wick moisture. If spray foam insulation, batt insulation or other porous insulation is installed on top of and in contact with a sill’s drainage plane surface, that material will wick moisture and loose thermal value.

Low expansion foam is not 100% closed cell and will wick moisture if in contact with moisture on the sill's drainage plane for an extended period. The FIS sloped cavity allows the spray foam to extend further into the perimeter cavity below the drainage plane surface at the corners and sill, for increased thermal value and prevents wet insulation.

FAQ 17 Why does the FIS Corner Guard sloped portion extend up the jamb?

One reason is so that the FIS Corner Glove is universal left/right. The other more important reason is to function as a spray foam insulation 'stopper' to prevent the spray foam from expanding out into the bottom corner of the window's perimeter cavity where the foam will wick moisture or block drainage. If spray foam insulation, batt insulation or other porous insulation is installed on top of and in contact with a sill's drainage plane surface, that material will wick moisture and loose thermal value.

Low expansion foam is not 100% closed cell and will wick moisture if in contact with moisture on the sill's drainage plane for an extended period. The FIS tappered cavity allows the spray foam to extend further into the perimeter cavity below the drainage plane surface at the corners and sill, for increased thermal value and prevents wet insulation.

FAQ 18 Why doesn't FIS extend back to the inside face of the wall stud?

For fenestration that does not have a jamb extension, installing the FIS Shallow Corner Glove stops the moisture protection within the perimeter cavity of the fenestration unit, below the fenestration's leakage point and dew point, to collect any moisture and direct it to a location outboard of the weather resistive barrier. This allows for interior jamb finishing to be completed without the obstruction of moisture protection materials.

For fenestration that has a jamb extension, installing the FIS Standard Corner Glove stops the moisture protection within the perimeter cavity of the fenestration unit, below the fenestration's leakage point and dew point, to collect any moisture and direct it to a location outboard of the weather resistive barrier. With the deeper perimeter cavity the dew point moved further into the warm side of wall assembly, so the deeper Standard Corner Glove collects any condensation and direct it to a location outboard of the weather resistive barrier.

FAQ 19 Does FIS recommend foaming perimeter cavity?

FIS recommends applying low expansion spray foam insulation in the perimeter cavity for all fenestration installations as the bottom sill flange is not sealed to allow for drainage of the rough opening, increased air infiltration or leakage can occur behind the sill flange. Spray foam seals against air infiltration and/or air leakage.

FAQ 20 Does FIS comply with my Construction Insurance's requirements?

Yes, in fact most construction insurance companies are requesting more and more installation 'systems' complete with Warranty, as opposed to pieced together assemblies from multiple manufacturer's assembled on site. FIS provides corner gloves, flashing tapes and perimeter cavity spray foam insulation as a 'system' with the FIS warranty.

FAQ 21 Do I really need a sill flashing within the rough opening of the fenestration opening?

In review of ASTM E2112-19C Standard Practice for Installation of Exterior Windows, Doors and Skylights we see the following statement on page 1.

> A particularly noticeable behavior that indicates deficiencies in installation is rainwater leakage. Rainwater leakage has been the leading reason for dissatisfaction of building owners with performance of fenestration installations. For this reason, this practice places greater emphasis on preventing or limiting rainwater leakage than on any other single performance characteristic.
> This practice emphasizes that the water-shedding surfaces of fenestration units must be adequately integrated with adjacent water-shedding surfaces of the building envelope.

And from ASTM E2112-19C we see the following statement on page 18.

> 5.16.3 Use *of Pan Flashings*—This practice recommends that pan flashings be used under all windows and doors, except where wall construction details incorporating fenestration drainage systems are provided by the building designer, or where wall construction details are specifically provided by fenestration manufacturers' installation instructions. Where used, pan flashings shall be integrated with the wall's water resistive barrier in shingle-lap fashion.

Therefore, if your Country/State requires window and door installations to comply with ASTM E2112-19C you are required to install some type of pan flashing or sill flashing at the sill of the rough opening.

FIS, Architects, and Building Envelope Engineers all recommend a pan flashing or sill flashing within the rough opening due to several reasons.

The quality of the windows is a big factor. Various windows are manufactured to entry-level, mid-grade, and high-end quality.

FIS has seen windows fail immediately after installation, or as early as 12-15 year after installation, while other windows last 25-35 years. Some windows only have a 20 year life expectancy.

If a window fails immediately after installation or within the manufacturer's and/or installer's warranty period, having an FIS system installed will direct any ingress moisture out of the rough opening to a location outboard of the building's weather resistive barrier complete with the FIS Warranty. Without FIS, any moisture caused deterioration due to fenestration failure within the building's warranty period must be repaired at the expense of the window manufacturer and/or installer and is costly to repair.

FIS saves money for the manufacturer and/or installer by eliminating ingress moisture failures and resulting damages within and around the rough opening. In do so, FIS also protects the manufacturer's and/or installer's reputation for their windows and/or their installations.

We also known that windows do not last for ever, or maybe only have a 20 year life expectancy. Some windows fail within 12-15 years and as 12-15 years is past the building's warranty period, it is also past the installer's warranty period and might be past the window manufacturer's warranty period, leaving the homeowner to pay for costly ingress moisture damage repairs.

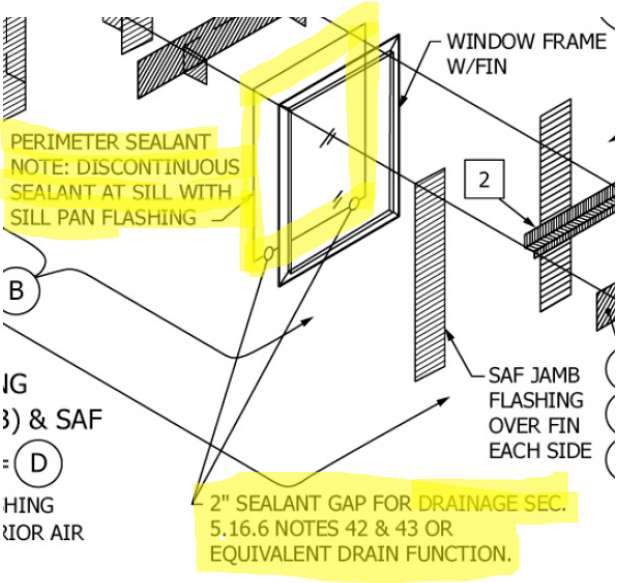
FIS, Architects, and Building Envelope Engineers, and ALL homeowners do not feel this is acceptable. This can be very harmful to both the window manufacturer's and/or installer's reputation.

So, FIS is not just for today protecting the manufacturer's and/or installer's warranty period. FIS is also for tomorrow for long term protection for the homeowner from aging/failing windows, and for long term protection of the window manufacturer's and installer's reputation.

FAQ 22 Can I seal the Weather Resistive Barrier/Air Barrier to the fenestration unit on all side for the Air Barrier seal?

To answer this question, we need to review the ASTM E2112-19C and FAQ 20.

FAQ 20 discusses why installing sill flashing is required by ASTM E2112-19C and its advantages.



The image to the left is clipped from the ASTM E2112-19C document, page 92.

The sealant 'bedding joint' requirements have been highlighted in yellow.

The ASTM E2112-19C requires a minimum of 2" gaps in the sealant across the bottom sill of the window for moisture drainage from the rough opening.

Refer to Section 5.16.6 from ASTM E2112-19C as seen below in Blue.

> 5.16.6 Pan Flashing Seal Discontinuity—Where pan flashing is used, care must be taken to ensure a drainage path between the window and the sill pan. Therefore, the bead of sealant on the mounting flange at the sill must have at least 2 gaps at least 2 in. (50 mm) wide to permit drainage from the sill pan to the exterior or the drainage plane. The gaps in the bead of sealant must be no more than 4 ft (See Fig. 6) apart, such that additional gaps are required for windows/doors wider than four feet wide.

All pan flashings and sill flashing installations require some type of drainage pathway out of the rough opening sill as required by ASTM E2112-19C. So, sealing the air barrier to the fenestration across the bottom sill of the fenestration does not comply with ASTM E2112-19C.

While these 2" gaps in the sealant provide drainage pathways, they also create holes in the Air Barrier that allow air to pass through these drainage gaps into the window's perimeter cavity. With 25 windows in a house and 2 sealant gaps per window, that is 50 leaking air gaps when running blower door test and throughout the building's life long HVAC operation.

FIS installation methods AW, BW, CW and DW all turn a flashing membrane into the rough opening and seal the returned flashing membrane at the head, jambs and sill to the fenestration unit with spray foam completing a total Air Barrier seal, at the same time allowing for drainage from the rough opening sill.

FIS installation methods A, B, C and D are intended for moisture shed only, and are not intended for an Air Barrier tie in, as there is no Air Barrier materials returning into the rough opening at the head and jambs of the rough opening to seal to the fenestration unit. The Air Barrier control issues is that there is no control of air movement through the studs and drywall gaps in the perimeter cavity. Spray foaming the cavity can help reduce air leakage, but places insulation on top of the sill's drainage plane. Refer to FAQ 16.

FAQ 23 There are other fenestration rough opening protection systems on the market. How is FIS better than these other systems?

The plastic/metal rigid type tray systems are design to be mounted on the sill framing. If the framing is out of square (tilted inwards) the sill tray will result in a reverse slope to the interior directing any moisture to the interior side of the wall assembly. So, the sill tray must be shimmed up. This creates a cavity below the shim tray for condensation to develop and must be sealed and insulated to prevent condensation. Otherwise, the sim space creates a hollow cavity through the full depth of the perimeter cavity at the sill tray.

The plastic/metal tray systems are turned up at the interior side making it difficult if not impossible to insulate the perimeter cavity at the sill.

If insulation is installed between the sill tray and the fenestration unit, the insulation will wick moisture as the insulation is in contact with the sill tray's moisture shedding surface.

With the FIS Corner Glove Standard Depth the sloped surface directs moisture outwards, and may pool a little on the outer 1-5/8" of the sill perimeter cavity, but maintains dry perimeter cavity insulation, and maintains the thermal value of the insulation, and any moisture sitting on the sill will eventually dry to the exterior.

With the FIS Corner Glove Shallow Depth there is positive drainage slope right out to the face of wall sheathing, maintaining dry insulation, maintaining the thermal value of the insulation, and all moisture will quickly drain from this rough opening.

The plastic/metal sill tray systems generally have a short down turned flange at the exterior sill. This requires the wall face flashing membrane to extend up to the bottom of the rough opening. This adds a layer of membrane behind the window flange. The plastic/metal sill trays require a bedding joint of sealant to be applied to the face of the wall where the flange will press into and seal. This sealant bead adds more thickness behind the window flange. Then the thickness of the plastic/metal sill tray. This installation sets the window out of square within the wall assembly. Refer to FAQ 13.

The plastic/metal sill tray systems add no value in improving and simplifying the Weather Resistive Barrier (WRB) installation where the WRB functions as the Air Barrier (AB).

The plastic/metal sill tray systems rely on a bead of sealant or cement to bond their components together. Building movement could damage those thing bond. FIS has long over lapping, shingled in the outwards direction flashing membranes bonded down over significantly larger areas and are flexible to resist damage by any building movement.

FIS includes the FIS Weather Barrier Glove for a complete Weather Resistive Barrier (WRB) and Air Barrier (AB) tie in.

The plastic/metal sill tray systems show a 2 or 3 step system. The FIS Installation Manual shows all the steps to construct an ASTM E2112-19C and/or CAN CSA A440.4:19 compliant installations. The plastic/metal sill tray systems must follow similar steps to be complaint but leave you to figure that all out.

FIS provides you with the knowledge and all the details for total compliance.

The plastic/metal sill tray system do not have a system warranty. FIS has a system warranty. Refer to FAQ 5

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Our system carries a limited lifetime warranty that is based on the life of the building or structure, it is fully transferable whether you are involved in the construction or are the 3rd-5th owner you are under warranty as long as the system is installed as per our instructions. You will carry no liability for leaks in the pan area that infiltrate your buildings wall assembly. Such leaks can be responsible for mold and rot causing structural damages forcing additional costs on the homeowner for future upkeep.

FORTRESS INSTALLATION SYSTEMS

USA
Supremium International Inc.
1740 Dell Range Blvd, H-198
Cheyenne, WY 82009

Canada
Supremium International Inc.
630 – 6th Ave SW
Calgary, Alberta. T2P 0S8

Ireland
LG Peerless Ltd.
Cashel Road, Dublin D2
Eay2
Kimmage, Dublin, Ireland

www.fortinsyst.com