# EMSHIELD DFR2 SYSTEM

INSTALL DATA

*DO NOT OPEN ANY PACKAGES or install this material until all members of your crew have read and understand these instructions as well as all relevant MSDS sheets. If you do not understand any part of these instructions CALL EMSEAL: 800-526-8365 or 508-836-0280*

This document does not purport to address all of the safety concerns, if any, associated with this product's use. It is the responsibility of the user of this document to establish appropriate safety and health practices and to determine the applicability of regulatory limitations prior to use. The use of a dust mask, safety goggles and gloves is recommended. Keep out of reach of children.

***IMPORTANT: This product cannot perform its intended function if not properly installed.***

## 1 Equipment & Material Storage

In addition to safety equipment required to comply with applicable Federal, state and local safety regulations, equipment to prepare and repair the joint-faces, as well as normal tools of the trade, the following are required:

**Equipment Checklist:**

- ☐ Tape measure
- ☐ Mixing paddle and heavy-duty, low-speed drill for mixing epoxy adhesive
- ☐ "Bulk" caulking gun & tips for silicone sausages provided
- ☐ Large tube-caulking gun for intumescent caulk tubes provided
- ☐ Long-bladed, serrated bread knife
- ☐ Hacksaw
- ☐ Miter box or miter block
- ☐ Spray bottle with water
- ☐ Duct Tape (2 ½ times the length of joint)
- ☐ Spatula to scrape epoxy from can
- ☐ Chemical-resistant gloves
- ☐ 2-inch wide (50mm) margin trowels for applying epoxy adhesive on the material and for spreading intumescent sealant on exposed foam face.
- ☐ Caulk knives for tooling sealant bands
- ☐ Toluene for cleaning joint-faces, trowels and mixer tools
- ☐ Clean lint-free, 100% cotton rags

**Cold Days:** Store Sealant, off the floor, inside at above 68°F (20°F). It will recover slower when cold and faster when warm.
**Very Hot Days:** Keep sealant out of direct sun when the temperature is greater than 60°F (15°C) until immediately prior to installation into joint.

## 2 Prepare & Solvent-Wipe Joint Faces

**Concrete:**

- Remove loose particles and weak concrete to ensure sound concrete substrate. Spalls, chipped edges and uneven surfaces must be repaired using suitable patching material and proper patching geometry and techniques. Joint faces must be parallel.
- Joints must have unobstructed depth greater than or equal to the full depth of the largest material supplied plus 1/2-inch (6mm).
- Remove all contaminants by sandblasting or grinding to ensure a thoroughly clean and sound substrate for the full sealant depth. ***NOTE:*** *DO NOT use a wire wheel--this will polish the substrate and cause bond-failure.*
- Dry all wet surfaces. ***NOTE:*** *Do not use flame to dry substrate--this will leave carbon on the substrate and cause bond-failure.*
- Wipe joint faces with solvent-dampened, lint-free rags to remove all concrete dust and contaminants.

**Metal:**

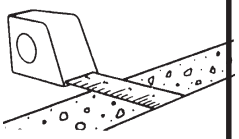
- Sandblast or grind to rough, white metal and solvent-wipe immediately prior to applying DFR2 epoxy.

**IMPORTANT: Ensure that no oxidation (rusting) occurs before the epoxy is applied.**

**Other Substrates:** Contact EMSEAL.

## 3 Measure Joint Width & Find Correct Size Material

- Measure joint width at deck surface and below to ensure joint faces are parallel.
- Material has been supplied to suit your mean temperature field-measured joint widths. Widths of material supplied are marked on each stick of material. Find correct box and open it.
- Compare width of material supplied as marked on each stick against mean joint width. Actual width of material as measured between hardboard will be slightly less than marked size because material is over-compressed for ease of installation.



***NOTE:*** *If unsure of correct material selection, consult EMSEAL.*

**IMPORTANT: Do not remove outer plastic packaging until you have read and understand the rest of these instructions as material may expand prematurely.**

## 4 Start with Universal-90 Installation

Changes in plane, either up or down, require the use of factory-fabricated Universal-90's from EMSEAL.

**Sequencing:** Install factory-fabricated transition and/or termination pieces first. Connect straight run material to in-place terminations and transitions.

***Note:*** *If installing very long runs of material, to avoid having to work at distant ends of a joint run and in order to prevent epoxy from fully curing, the final factory-fabricated Universal-90 termination can be installed as the second-to-last piece.*

Cut closing pieces 3/8-inch (10mm) longer than the opening to be joined. Compress material longitudinally to fit.

## 5 Mask Deck & Mix Epoxy Adhesive

- Using duct tape, tape off the deck on both sides of the joint.

**Mix Epoxy**

- EMSEAL epoxy adhesive may be used in the 41°F (5°C) to 95°F (35°C) temperature range.
- Using a trowel, transfer the entire contents of Part B (hardener) into the contents of Part A (base) .
- Mix the material thoroughly with a drill and mixing paddle. Scrape the walls and bottom of the container to ensure uniform and complete mixing.
- Always mix component B (hardener) into component A (base). Ensure that a uniform gray color with no black or white streaks is obtained.

**IMPORTANT: DO NOT thin the epoxy.**

- **Precaution:** Wear chemical-resistant gloves and/or barrier hand cream when handling liquid sealant or epoxy. Remove promptly from skin with a commercial hand cleaner before eating or smoking. Avoid inhaling vapors.

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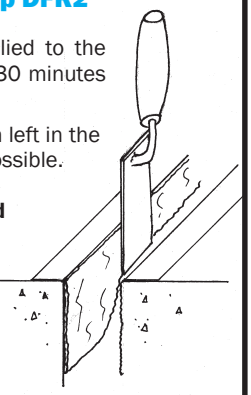
## 6 Apply Epoxy to Substrate, Unwrap DFR2

Ensure that the mixed epoxy adhesive is applied to the substrate before the pot life has expired (10 - 30 minutes depending on the ambient temperature).

**WARNING:** Epoxy will harden more quickly when left in the pot. Apply it onto the joint face as soon as possible.

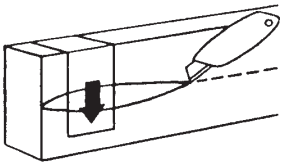


**IMPORTANT: The epoxy must still be uncured when installing DFR2 foam into the joint-gap.**

If the epoxy cures before installing the DFR2 foam then reapply new epoxy. If work is interrupted for more than 2 hours after initial cure then grind the old epoxy and apply new wet epoxy.

**IMPORTANT: While one or more workers are applying epoxy to the joint faces, others must prepare the DFR2 foam. The DFR2 foam is kept under compression by plastic wrapping and hardboard on both sides.**

- Slit the plastic packing by cutting on the hardboard and remove hardboard and inner release liner. DO NOT cut along the silicone bellows face or the red intumescent bellows face.

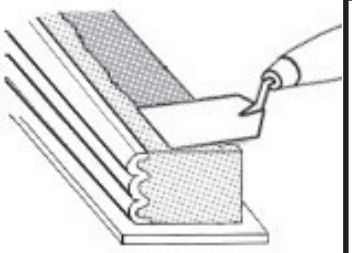


**IMPORTANT: Work quickly and deliberately after cutting the shrink-wrap to avoid material expanding beyond a usable size**.

## 7 Wipe Release Agent off Silicone Facing and Apply Epoxy to Sides of DFR2 Foam

- For packaging and production reasons, the silicone facing is coated in the factory with a release agent.
- Prior to installation, this agent must be wiped off in order for the injected sealant bands described in Step 10 to adhere to the silicone facing and to avoid contamination of the substrate at this point.
- Lightly, quickly and thoroughly wipe the cured silicone facing with a lint-free rag made damp with water to remove the release agent.
- Using a margin trowel, work a very fine skim coat of epoxy adhesive into the cells of the bottom two-thirds of both sides of the DFR2 foam.
- DO NOT apply epoxy on the underside of the material.
- DO NOT apply epoxy on the ends or miters of material.

***TIP:*** *Use the hardboard packaging as a flat, clean working surface.*



- **Clean Up:** Remove epoxy and silicone sealant from equipment before it cures using MEK**, Toluene**, or Xylene**. These solvents are not effective after the expoxy or silicone has cured. Cured material may be removed by cutting it away with sharp tools, sandpapering or softening with chlorinated solvents**.
  ***(Solvents mentioned or referred to are toxic and flammable. Observe solvent manufacturer's precautions and refer to Material Safety Data Sheets as well as local and federal requirements for same handling and use).*

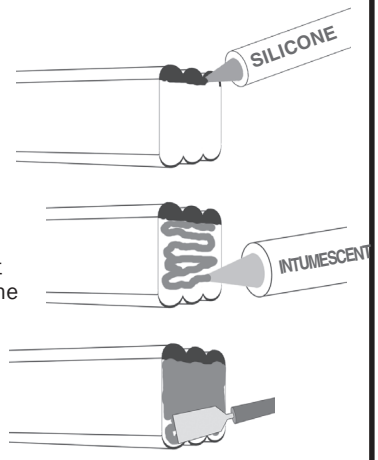
## 8 Install First DFR2 Foam Length into Joint & Apply Silicone to Bellows Face

- **Identify the traffic (top) and fire (bottom) side of the foam and install in the correct direction.** The top will have only a smooth silicone bellows. The bottom will always have a layer of a rough red intumescent bellows coating.

  ***Note:*** *In some cases if specified by the architect, there may also be a layer of smooth silicone covering the red intumescent on the bottom side.*

**IMPORTANT: Always install DFR2 sticks with the red intumescent side facing down into the gap.**

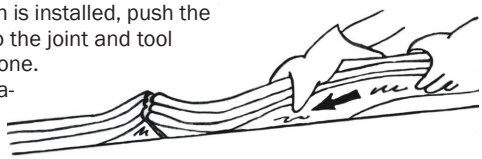
- Immediately after coating foam with epoxy, install the foam into the joint. Ensure that epoxy on the joint face has not cured.
- When installed, the DFR2 must be recessed so that the top of the bellows is flush or slightly below the deck surface.
- Note: When material is correctly expanded for a snug fit it will support its own weight in the joint.
- Feed material into joint, starting from one end. The material should fit snugly and must be eased into the joint with steady, firm pressure.
- Leave the end to be joined to the next length sticking slightly proud of the joint.
- Repeat step #7 for each new stick.
- On the end of the next stick, using a bulk gun and the sausages of silicone provided, apply the liquid silicone to the exposed face of the silicone bellows.
- Using a large caulk gun and the tube of intumescent sealant provided, apply the intumescent sealant to the exposed face of the intumescent bellows and to the exposed face of the foam.
- Use a caulk knife or margin trowel to spread the intumescent sealant over the face of the foam to an even 1/16th-inch (2mm) thickness.




**IMPORTANT: All sticks of DFR2 foam MUST have a coating of intumescent on the faces of all joins. This ensures that joins do not compromise the fire barrier.**

## 9 Install Next Length. Repeat.

- Work in one direction towards the previously installed length or end of joint. Do not stretch material.
- Leave the end to be joined to the previous length sticking proud of the joint--push the joining faces together.
- **Push Hard** on the stick to compress joins firmly together. Ensure there are no voids at joins.
- Once the full length is installed, push the protruding join into the joint and tool off the excess silicone.
- During low temperature installation, provide as much ambient heat as possible around installed DFR2 foam to accelerate recovery.



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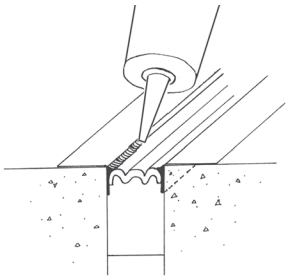
## 10 Inject Silicone Sealant Bands at Substrates & Tool Excess Silicone

- Wipe any excess epoxy from top of material using a clean rag.
- Before the epoxy cures, force the tip of the silicone caulk gun between the substrate and the DFR2 foam. Inject a 3/4-inch (20mm) deep silicone sealant band between the foam, cured silicone facing and the joint-face.
- Tool the freshly applied silicone firmly to blend with the substrates and cured silicone facing, and to ensure a proper bond and seamless appearance.



- Where DFR2 foam meets at butt joins, tool the excess silicone that squeezes out from the top and between the bellows. **IMPORTANT: Silicone left between the wrinkles of the bellows could constrain movement – using a caulk knife, remove excess sealant and blend what remains into the bellows.**
- ***Note:*** *Silicone sealant band is only applied to the weather side of the DFR2 foam.*

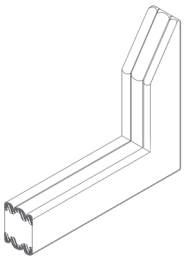
## 11 Transitions, Ends, and Special Conditions

**Sequencing:** Install factory-fabricated transition and/or termination pieces first. Connect straight run material to in-place terminations and transitions. Apply the joining silicone and intumescent sealant coating to the butt end of the next adjoining straight length before inserting it into the joint (see step #8). Bring the join firmly against the butt end of the already installed Universal-90 and push the straight run stick towards this join throughout the process of installing it.

***Note:*** *If installing very long runs of material, to avoid having to work at distant ends of a joint run and in order to prevent epoxy from fully curing, the final factory-fabricated Universal-90 termination can be installed as the second-to-last piece.*

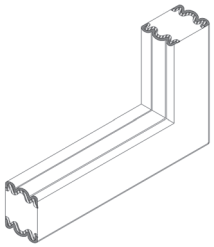
Cut closing pieces 3/8-inch (10mm) longer than the opening to be joined. Compress material longitudinally to fit.

### UNIVERSAL-90 TERMINATIONS

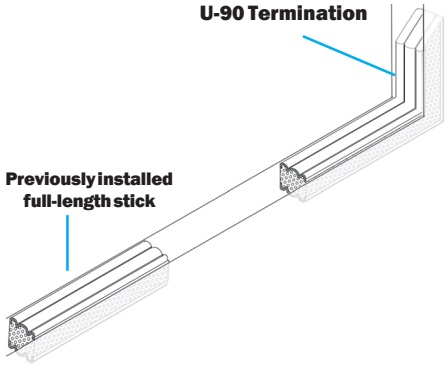


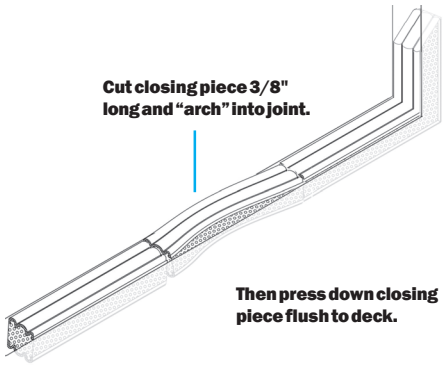
Runs need to be terminated with a factory-fabricated Universal-90. Prepare gap and foam sides with epoxy adhesive in same manner as DFR2 sticks. Unlike straight-run lengths, BOTH sides of Universal-90's are fire-resistant so there is no top or bottom. They can be turned over to be used either as an upturn or a downturn. Install factory-fabricated transition and/or termination pieces first. Connect straight run material to in-place terminations and transitions (see step #8). Cut closing pieces 3/8-inch (10mm) longer than the opening to be joined. Compress material longitudinally to fit. The factory-sealed end acts as the termination and points up or down to best block or direct water flow.

### UNIVERSAL-90 TRANSITIONS



Universal-90's can be used to make changes in plane such as at curbs, treads and risers, or other such changes in slab thickness. Universal-90's may also be used to transition to another product for sealing vertical-plane wall joints, but will lose the fire rating at the vertical ascent/descent. The Universal-90 acts as a fire barrier through the change in direction maintaining the fire rating through the 90-degree change in plane. The two adjoining faces in rise must be coated in the same way as all other joins—with a layer of silicone across the outer face of the silicone bellows and a coating of intumescent on the rest of the foam face (see step #8).

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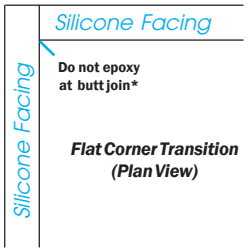
## 11 *Transitions, Ends, and Special Conditions (cont.)*

### FLAT CORNERS:

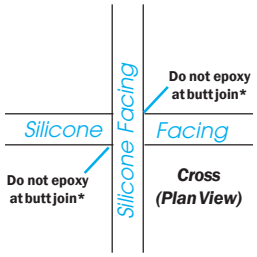
- Work towards the corner so that the last two pieces to install will join at the corner.
- Cut each piece to be joined 3/8-inch (10 mm) longer than needed.
- Install one piece so that it runs through the intersecting joint-gap. Firmly push and compress the extra length so that a tight fit in the corner is achieved.
- Coat the butt ends of the intersecting material with silicone and liquid intumescent sealant provided as shown in Step 8. Firmly butt intersecting pieces into sides of already placed material.
  ***IMPORTANT: Be sure that there is no epoxy on the sides or faces of foam at a butt join.**
- Using a caulk knife, remove any excess sealant and blend the liquid silicone into the bellows to preserve the bellow shape.
  ***NOTE:*** *The extra length will make it a tight fit—this results in a compression fit.*
- Inject a bead of liquid silicone where the silicone faces join and where the silicone faces meet the substrate.



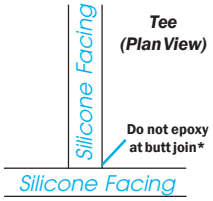
*Flat Corner Transition (Plan View)*

### CROSSES AND TEES:

- Run one piece of material across the intersection. Coat the butt ends of the intersecting material with silicone and liquid intumescent sealant provided as shown in Step 8. Firmly butt intersecting pieces into sides of already placed material.
- Using a caulk knife, remove any excess sealant and blend the liquid silicone into the bellows to preserve the bellow shape.



*Cross (Plan View)*

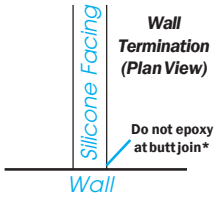


*Tee (Plan View)*

### TERMINATIONS AT WALLS:

When the run ends at a fireproof wall, with no outlet to turn up or down, coat the butt end of the stick at the wall intersection with silicone and liquid intumescent sealant provided as shown in Step 8.

- Install this last stick before the adjoining stick so that after the finished installation it will receive pressure forcing it into the wall.
- Using a caulk knife, remove any excess sealant and blend the liquid silicone into the bellows to preserve the bellow shape.



*Wall Termination (Plan View)*

### SILICONE-COAT ANY EXPOSED FOAM ENDS:

**IMPORTANT: Any stick of DFR2 which finishes with an open end, not terminating into another stick or structural termination, must be lightly coated on the exposed foam end using the liquid silicone sealant provided. This is critical to ensure that the fire-retardant impregnated foam is sealed.**

### NOTES:

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