BUILDING SCIENCE

DOWSIL™ 375 Construction & Glass Embedding application manual

North America

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Introduction

Glass as a design element in modern façade architecture plays a key role and is becoming increasingly popular to realize its aesthetically pleasant designs, with less frame, more glass and unlimited views. Glass balustrades in particular are an attractive feature of modern buildings. They can be mechanically clamped or retained using a frame. One popular way of installing glass balustrades is to embed the glass into a U-profile at the bottom of the structure. DOW has developed a high strength, flowable polyurethane-based technology, which offers a fast way of realizing safe and long-lasting glass balustrades and other construction embedding designs. It is suitable for both interior and exterior applications, easy to handle and fast to apply, whether it is on site or in factory.

This application guide introduces the Dow system for construction and glass embedding, including the different system components and the work procedure. It contains complementary information to the technical data sheet and the material safety datasheet, which are both downloadable from **dow.com**.

The Dow system for construction and glass embedding designs

The Dow system for construction and glass embedding makes use of the following components:

1. DOWSIL™ 375 Construction & Glass Embedding, a 2-component flowable and self-leveling polyurethane material
2. DOWSIL™ 791 Weatherproofing Sealant, a UV-resistant and durable top seal, well-established in high performance façade applications.

The DOWSIL™ components in this system are all compatible with each other.

Construction and glass embedding applications

DOWSIL™ 375 Construction & Glass Embedding can be used for applications where glass is embedded into a U-profile at the base of the design, to hold the pane, limit glass movement and reduce deflection, contributing to a safe and durable structure. DOWSIL™ 375 Construction & Glass Embedding can be used in conjunction with flat, curved and laminated glass. The fast cure properties allow fast handling, which enhances efficiency and productivity.

Product information

DOWSIL™ 375 Construction & Glass Embedding is a two-part polyurethane material. Part A contains the polyol while Part B, the hardener, contains the isocyanate (MDI-type). Information on the proper handling of the material is explained in the safety data sheet and in this manual. The container size takes into account the mixing ratio of 100:19 by weight (100:25 by volume). Part A is supplied in a 16 kg pail, while Part B (the hardener) is supplied in a 3 kg pail. Please note that the Part A pail as delivered is not filled to the top. When mixed, the polyol molecules react with the isocyanate, and this curing process results in a solid, hard and stiff thermoset polyurethane material. When thoroughly mixed, the product has a cream color. A few material properties are listed below. Please consult the technical datasheet for further information.

Property	Value
Before curing	
Viscosity	5000 mPa.s
Pot life	60 min.
Curing time at 20°C	7 h
After curing	
Hardness	70 shore D
Tensile strength	17 MPa (2465 psi)
Elongation at break	11%

These are typical properties, not to be construed as specifications.

DOWSIL™ 791 Silicone Weatherproofing Sealant is a one-component neutral-curing silicone sealant with a faster skinning time for general weathersealing applications.

Design of glass embedding structure

The designer of the glass embedding structure is responsible for verifying that the design complies with the local regulations and the prescriptions of any certification document that is relevant for the particular installation.

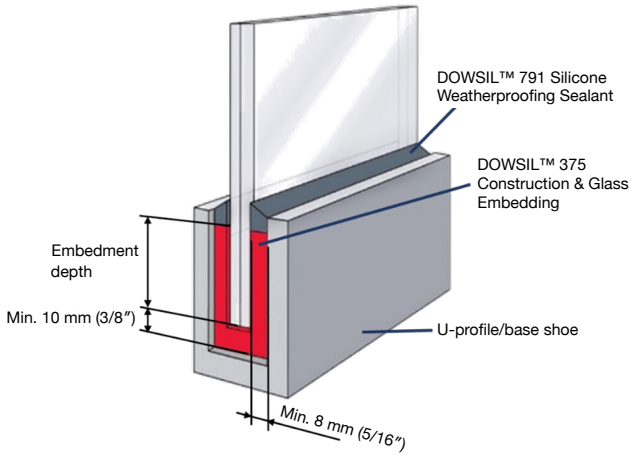

Figure 1: Schematic of a glass balustrade assembly using the Dow system for glass embedding

Different technical factors influence the design, sizing and depth of embedment of systems and assemblies that utilize DOWSIL™ 375 Construction & Glass Embedding. Users should consult and engage appropriate professional services for any design, specifications, windload requirements, materials, samples, design elements or testing of any design components, including the adequacy or completeness of embedment of systems and assemblies. Dow does not offer design or other similar professional services.

Be aware that the building code/regulations in some jurisdictions may require a railing. Refer to requirements established by the local authorities having jurisdiction where the installation occurs.

For convenient application, the space between the glass face and the inside of the U-profile should be at least 8 mm (5/16″) wide, preferably 10 mm (3/8″), and the distance between the bottom surface of the U-profile/base shoe and the edge of the laminate should be at least 10 mm (3/8″), preferably 15 mm (19/32″).

Health and safety aspects

All polyurethane materials use isocyanates. MDI isocyanates can present respiratory hazards as particulates, vapors or aerosols. It is also a skin sensitizer. It is possible to work with these materials by taking the appropriate precautions and applying the right procedures (see instructions further in this brochure).

Every person involved in the application of isocyanate-containing products should be aware and prepared (and trained where required) before work begins. This is best practice today. Dow is committed to the safety of the people who use and handle Dow's products.

DOWSIL™ 375 Construction & Glass Embedding Part B has a very low vapor pressure, which limits possible exposure to MDI by inhalation. To limit the risk, we recommend taking all precautions during storage, application and in case of spill described in the following sections of this document. The Material Safety Data Sheet of DOWSIL™ 375 Construction & Glass Embedding Part B, which accompanies any shipment of the material and is directly downloadable from the **dow.com** website, includes detailed health and safety information and should be used as a reference.

Once cured, the material is non-hazardous.

Storage and transport

Pails of DOWSIL™ 375 Construction & Glass Embedding should be stored in a dry place between 5 and 30°C (41 and 86°F) and should not be left outside exposed to rain, high relative humidity or freezing temperature.

Care should be taken during transport to avoid damage to the pails.

If, after using DOWSIL™ 375 Construction & Glass Embedding there is remaining unused DOWSIL™ 375 Construction & Glass Embedding hardener left in the pail, it should be tightly closed and stored in a covered, cool, dry location for later use. Exposure to moisture degrades the material. If the pail is damaged and no longer closes tightly, transfer the material into another container which is airtight.

Compatibility

It must be confirmed that the materials that come in contact with the system components, such as laminated glass interlayers and setting blocks, will not create incompatibilities.

Ask your Dow representative for a list of materials that have been tested and shown to be compatible with the Dow system for construction and glass embedding. If you intend to use materials which are not listed, send samples to the Dow technical service for compatibility testing.

Preparation

Prepare the working place

The area where the work will be carried out should be as dust-free as possible. Make sure that the floor is clear of any trip hazard.

Get necessary material and equipment ready

Before starting the work, it is important to get all necessary materials and equipment ready. Apart from the system materials and the glass laminates, the following items are needed:

- Masking tape
- Setting blocks
- Backer rods
- Paper wipes
- Electric drill equipped with a mixing paddle
- Safety goggles or face shield
- Respiratory mask
- Gloves that will not leave any arm/hand skin exposed
- Optional: mixing and pumping system

Prepare the glass surface

In balustrade designs where DOWSIL™ 375 Construction & Glass Embedding is typically applied, adhesion between the product and the glass should be avoided to avoid stress in the glass and to make replacement of the glass panel easier if required. This is achieved using an optional release agent, such as a silicone spray. Refer to your Dow representative for other release agent considerations.

After glass cleaning, the first step is to cover the areas of the glass just above the area that will be in direct contact with DOWSIL™ 375 Construction & Glass Embedding.

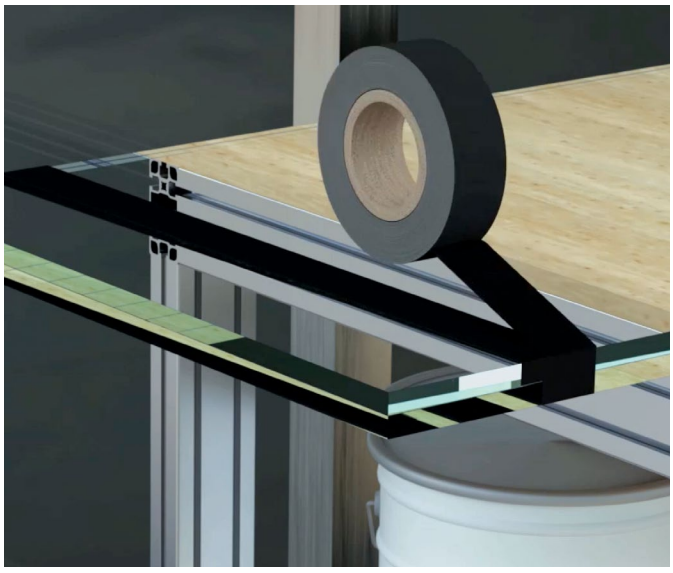

Figure 2: Apply tape to glass region that should not be exposed to release agent.

Then, apply the optional release agent (e.g., a silicone spray) on the area of the glass panel that will be in contact with the embedding material.

Figure 3: Spray release agent on glass

Prepare U-profile

To facilitate repairs/glass replacement, adhesion between the embedding material and the U-profiles also should be avoided. This can be achieved by applying a release agent on the U-profiles.


Figure 4: Spray release agent on the surfaces of the U-profile

When the glass embedding material is applied, the U-profile will act as a casting cavity that will receive and hold the material in its uncured, liquid state for several hours. It is therefore important that possible leakage paths are addressed. The ends of the U-profiles and the gaps between them should be blocked using tape or sealant.

Mount glass panel

A spacer material (e.g., some stacked pieces of setting blocks) should be placed at the bottom of the U-profile to allow the material to flow under the glass edge and fill up the other side of the glass panel. The distance between the glass panel edge and the bottom of the U-profile should be at least 10 mm (approx. 3/8″) and is preferably 15 mm (approx. 5/8″).


Figure 5: Place setting blocks at the bottom of the U-profile

The glass panel is then inserted in the U-profile and positioned so that it is vertical, and its edge stands on the spacer blocks on the floor of the U-profile. Use setting blocks on both sides to achieve a vertical position right in the center of the profile. The hardness of the setting blocks that will remain in place after completion of the assembly should not exceed the hardness of DOWSIL™ 375 Construction & Glass Embedding (70 shore D). Connect adjacent glass panels with F-clamps, putting some relatively soft material between the clamp and the glass to avoid local stress. Insert pieces of backer rod in the U profile between adjacent glass panels and along the edge of the last panels (extremities of the balustrade).

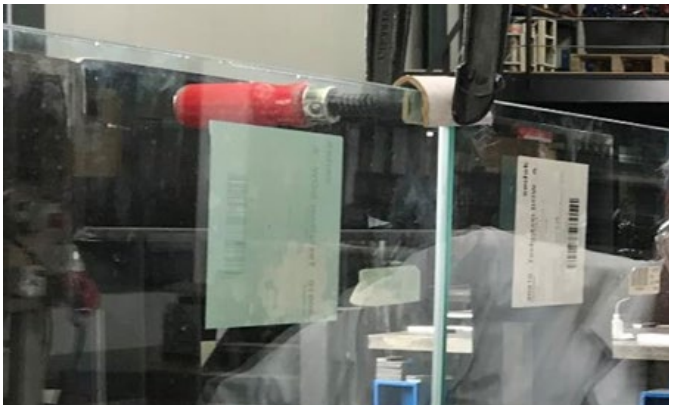
Figure 6: Connect adjacent panes using F-clamps

Use a level to check and possibly adjust the setting blocks to achieve exact positioning and plumb.


Figure 7: Block ends of U-profile and adjust position with setting blocks

Embedding material application

Start by putting on the necessary personal protection equipment (PPE):

Wear long trousers and a long-sleeved top. Make sure that no part of your body is exposed (no short trousers, no crop tops, no open footwear, etc.). Wear gloves that are sufficiently long to assure that no skin in the hand or wrist areas is exposed.

Wear a respiratory mask.

Wear safety goggles or a face shield.

The mixing steps should only take place outside or in well-ventilated spaces. The steps:

1. Stir the contents of the pail of DOWSIL™ 375 Construction & Glass Embedding Part A thoroughly with a drill equipped with a mixing paddle.

Figure 8: Mixing paddle

Figure 9: Mixing content of Part A pail

The next steps depend on the application method selected to mix and transfer the material into the U-profile. To minimize potential exposure to isocyanate, we recommend using a mixing and pumping system. Ask your Dow representative about available systems for your needs. Extra care is needed to make sure the pump is appropriate for use with this glass embedding material.

The mixing and pumping systems allow to automatically mix Part A polyol and Part B hardener in the right ratio and to directly inject the mixture in the U-profile.

Figure 10: Injecting the mixed Part A and Part B in the U-profile

For jobs which are too small to justify buying or renting an automatic pump, the mixing and transfer can be done manually:

2. Pour the whole content of the DOWSIL™ 375 Construction & Glass Embedding Part B pail into the pail of Part A. The Part A pail will accommodate the contents of both pails. There is no need to weigh or measure.

Stir the Part A and Part B materials together at constant speed until a homogeneous mixture is obtained, for at least 90 seconds. Check if the mixture color is uniform. If not, continue mixing until uniform.

Pour the mixture by tilting the pail and guiding the liquid into the groove between the U-profile and the glass using a plate, preferably made of plastic.

Figure 11: Pour Part B hardener in Part A pail

Figure 12: Using guiding plate method to fill U-profile with glass embedding material

Although the isocyanate reacts away once mixed and its concentration has decreased, it is recommended to continue to don all PPE during the material transfer step.

Verify that the material enters the U-profile, spreads well and levels out. For narrow gaps, the flow can be eased by inserting a narrow rod in the groove and gently moving sideways and up and down.

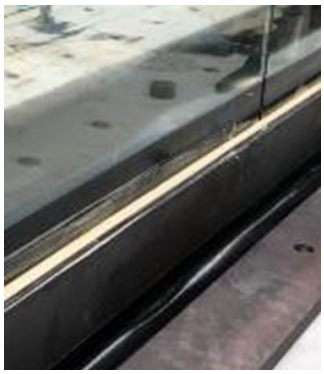

Figure 13: DOWSIL™ 375 Construction & Glass Embedding in U-profile

Continue until all gaps are filled, the glass embedding material reaches the required height and is level along the whole length of the U-profile, on both sides.

Carefully remove the protection tape.

Allow the material to cure for 7 hours.

Weatherproofing the assembly

DOWSIL™ 375 Construction & Glass Embedding should be protected from rain and UV radiation during long-term outdoor exposure. Therefore, after curing, an effective weather sealant connecting the glass just above the glass embedding material and the U-profile is required.

Clean the areas of the glass and the U-profile that will be in contact with the weather seal using isopropyl alcohol (IPA). Use the two cloths method: wipe the joint surfaces with sufficient force to remove dirt and contaminants, and then immediately wipe dry the solvent wet surface of the substrate with a separate clean, dry cloth

For the weather seal, DOWSIL™ 791 Weatherproofing Sealant is suggested. It is fully compatible with DOWSIL™ 375 Construction & Glass Embedding and is a demonstrated-successful durable option for the façade industry.

Figure 14: Cleaning the glass before applying the weather seal

Consult the Weatherproofing section of the Dow Americas Technical Manual to confirm the joint is properly designed. The weather sealant should only be applied when the glass embedding material is completely cured (i.e., at least 7 hours after the DOWSIL™ 375 Construction & Glass Embedding was mixed).

The use of a backer rod between the embedding material and the weather seal is recommended, and it is mandatory in applications where the glass length exceeds 1500 mm (5 feet) or the geometry of the cavity is such that the joint dimensions would be beyond the boundaries of Dow's guidelines for proper joint design (per the Weatherproofing section of the Dow Americas Technical Manual).

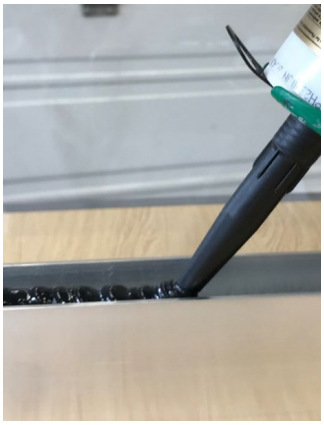

Figure 15: Applying the silicone sealant for weatherproofing

Application video

To view a video on DOWSIL™ 375 Construction & Glass Embedding, visit **dow.com** or simply scan the QR code at right.

After application

When empty, the DOWSIL™ 375 Construction & Glass Embedding hardener container will still contain a small amount of isocyanate and should be disposed of as hazardous waste per the local regulations and/or requirements.

Any leftover mixed material should be allowed to cure in the Part A pail. After cure, the material is considered non-hazardous and can be disposed of as such.

The mixing paddle should be left to drip dry to be free of most of the mixed material. A small amount of material might remain on the paddle and can be allowed to cure. It does not prevent subsequent reuse of the mixing paddle.

Any protective foil or tape soiled with mixed material can be left out for 7 hours so that the DOWSIL™ 375 Construction & Glass Embedding is fully cured, after which it can be disposed of as non-hazardous waste.

Although the intended use of the material does not involve any cleaning or a dissolving step, one can consider keeping a cleaning product ready for use in the event of splashes. Apply some cleaning product on a paper wipe (or cloth) and wipe the splash with it.

Remove any splash soon after it occurs. Once cured, the material will adhere very well to many materials and can be best removed mechanically.

Procedure to follow in case of spill

For polyurethane-based chemical products, some precautions need to be taken to be ready in case of a spill.

A spill kit suitable for polyurethane materials and appropriate personal protection equipment, including masks and gloves, should be kept ready for use close to the storage area or work area.

Special precautions should be taken in case of spill of DOWSIL™ 375 Construction & Glass Embedding Part B, as this contains an isocyanate, which – as all isocyanates are – is a hazardous material. First, isolate the area and keep unnecessary and unprotected personnel from entering the area. Ventilate the area of the leak or spill. Put on protective clothes and personal protection equipment, including gloves, mask, and safety goggles or face shield. Absorb the spilled liquid using the absorbent material in the spill kit. Collect everything in a metal or plastic container. The container should not be airtight (use, for instance, a ventilated cap). Wash the spill site with large quantities of water. Neutralize the surface by adding a suitable decontaminant. Consult the instructions in the safety data sheet for more details.

Certification

Balustrade assemblies made with DOWSIL™ 375 Construction & Glass Embedding have passed pendulum tests according to DIN 18008-4 at an independent test institute. Contact Dow or you Dow representative to receive a copy of the certification document.

Quality control logbook

Dow recommends that the applicator keeps a logbook with all relevant information on glass embedding jobs (see template at the end of this document). There should be a new entry in the logbook every time a new day of work starts and when there is a change in material lot number.

Testing for DOWSIL™ 375 Construction & Glass Embedding simply requires checking that the material has cured properly. The hardness after full cure should be measured using a shore D durometer on a flat test piece of at least 4 cm x 4 cm (approx. 1.5″ x 1.5″) area and at least 6 mm (approx. 1/4″) thickness. The testing for the weather seal is the same as for any other weatherproofing job (see Dow's Weatherproofing Manual).

Warranty

Dow offers a 1-year product warranty on request on DOWSIL™ 375 Construction and Glass Embedding.

Learn more about DOWSIL™ 375 Construction & Glass Embedding

For product properties, technical content and other information about DOWSIL™ 375 Construction & Glass Embedding, visit the **dow.com** Product Finder or simply scan the QR code at right.

Important information about this guide: Please read carefully

Users of this application guide acknowledge and agree that Dow is not offering architectural, engineering or other professional services, and Dow assumes no responsibility for – and users of this application guide are not relying on Dow for – any design, specifications, windload requirements, materials, samples, design elements or testing of any design components, including the adequacy or completeness of the same, supplied or used by any warranty recipients or users of Dow products or services. Dow will only warrant products as set forth in a separate executed Dow warranty. This application guide is offered to suggest how Dow products may be incorporated into a project. Design decisions are the responsibility of the designer of record.

Glass embedding quality control log

Company name:
Project name and location:
Pump type:

Date	Time	Name of applicator	Temperature and weather conditions	DOWSIL™ 375 Construction & Glass Embedding Hardener lot number	DOWSIL™ 375 Construction & Glass Embedding Polyol lot number	Uniform mixture color (y/n)?	Material scale D hardness after 7h	Type, brand and model of release agent	Type of glass and U-profile

Weatherproofing quality control log

Company name:

Project name and location:

Date	Time	Name of applicator	Temperature and weather conditions	DOWSIL™ R-40 Universal Cleaner lot number	DOWSIL™ 791 Weatherproofing Sealant lot number	Backer rod type (if used)	Skin-over time	Type of glass and U-profile	Peel adhesion test result

For more information

Learn more about Dow's full range of DOWSIL™ brand products for high-performance buildings. Rely on our materials innovation, application experience, broad technical services, and global supply capabilities with local support. Learn more at **dow.com/buildingscience**.

Dow has sales offices, manufacturing sites and science and technology laboratories around the globe. Find local contact information at **dow.com/contactus**.

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