The faster, simpler, and safer solution for

GLASS BALUSTRADE

installation

Hilti HIT-Glass System

SAFETY BARRIER
glazing and glass railings

Hilti HIT-Glass System

Due to its highly aesthetic appearance and architectural capability, glass has become important as a supporting structural material. Balustrades, commonly known as handrails, are the new standard in many modern buildings.

HIT-Glass System Overview

Hilti's HIT-Glass system for glass balustrades offers a high performing solution that has been tested to industry standards and is capable of withstanding high static and impact load requirements. The system works via embedment of glass railings in U- or V-profile shoes with Hilti's HIT-HY 270. Loads are safely transferred through the glass elements via the mortar into the glass shoe. In addition to the high performing nature of the HIT-Glass system, there are many installation and maintenance advantages compared to traditional methods.

Installation Advantages of HIT-Glass

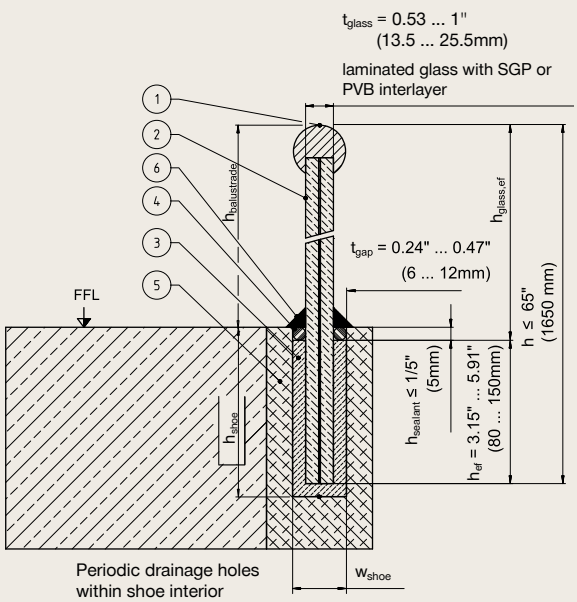
- Up to 2.5x faster glass balustrade installations when compared to traditional grouting and mechanical solutions, significantly reducing labor costs
- Installation accessories allow for safer and faster injection from the protected side of balustrade
- Allows for easier glass adjustability when compared to mechanical wedge systems in both curved and straight glass applications
- HIT-Glass installation accessories and the viscosity of the HIT-HY 270 help to prevent the mortar from running down the shoe in inclined applications (i.e. stair railings) up to 30°
- Unlike traditional grouts, HIT-HY 270 does not bond with the glass panes or metal shoe, making removing and replacing glass panes easier
- Can be used in both U- and V-profile glass shoe shapes that are compliant with the HIT-Glass System boundary conditions
- Capable of being installed in 41° F (5° C) to 104° F (40° C) environments

Installation designed to

INCREASE PRODUCTIVITY

Hilti HIT-Glass System

The HIT-Glass Method was designed to make balustrade installation faster, simpler, and safer. The biggest benefit of this method is the ability to inject HIT-HY 270 mortar from the protected side of the glass, creating a safer and more productive workflow.



① Top Rail (optional)
② Glass pane
③ Solid filler (HIT-HY 270)
④ Backer rod
⑤ Glass shoe (U-profile)
⑥ Weatherproof sealant / gasket

Description of Installation

Note: The HIT-Glass Method is the preferred method for injection of HIT-HY 270 for glass balustrade installations.

The glass panes are embedded in HIT-HY 270 mortar from the base to the top of the shoe profile in periodic locations along the length of the glass in the form of U- or V-shaped* pucks. HIT-Glass installation accessories are used to install HIT-HY 270 for maximum jobsite productivity and safety. During the application, the following must be observed:

- Each pane of glass must have a minimum number of 3 injection sites, or pucks. The pucks must be spaced at no more than 18” (457mm) center-to-center down the length of each glass pane in the shoe. Each puck is 2.36” (60mm) wide, which is the width of the Nozzle HIT-RE 60-Glass mixer attachment used for injection.
- Hilti Insert HIT-Glass EP 9.5 foam or Insert HIT-Glass EP 13 foam rolls are continuous profiles of material in two thickness options that are used to cut positioning aids to the length required according to the Instructions for Use (IFU). The positioning aids are placed on either side of each puck location, and the adhesive strip allows them to stay in place while inserting the pane into the shoe. The interior of the shoe is cleaned to ensure a smooth surface to avoid damaging the positioning aids.
- Hilti HIT-HY 270 mortar is injected from one side of the glass at each puck location, as the positioning aids create a gap that allows the mortar to pass below the glass pane and up the other side of the shoe.
- The mortar is injected to fill from the bottom to the top of the shoe. Best practice is to allow for a 1/5” (5mm) maximum under fill from the top of the shoe to allow for structural sealant or gasket to be installed.
- Because the mortar does not bond to the glass pane or the shoe, the installer must take measures to ensure that uplift of the glass panes will not occur in all installations, and that sliding of the glass panes will not occur in vertically inclined installations.
- If a damaged glass pane needs to be replaced, the installer should remove and replace both the damaged glass pane and the existing mortar pucks. The new glass pane and HIT-HY 270 pucks are to be installed according to this method.
- To be in compliance with the HIT-Glass Method:
  1. The gap between the shoe and the glass pane (t_{gap}) shall be 1/4” - 1/2” (6 – 12mm) on all sides
  2. The effective height of the mortar puck (h_{ef}) shall be 3.15” – 5.91” (80 – 150mm)
  3. The glass pane height (h) shall be 65” or less (1.65m or less)
  4. The glass pane thickness (t_{glass}) shall be 1/2” – 1” (13.52 – 25.52mm).

If the balustrade geometries fall outside of the above parameters, please contact Hilti for an additional engineering assessment.

* For V-profile shoes, the gap between the shoe and the glass will vary. Please verify that all gap dimensions comply with Insert HIT-Glass EP 9.5 foam or Insert HIT-Glass EP 13 foam according to the IFU.

INSTRUCTIONS FOR USE (IFU)

PROFIS Engineering:

GLASS BALUSTRADE MODULE

For straight and level balustrade designs that will be installed according to the Hilti HIT-Glass Method, the new PROFIS Engineering Glass Balustrade module allows the user to create HIT-Glass Design Reports, providing peace of mind that specifications will be installed correctly.

Design assistance for straight and level balustrades

Enter design inputs

The Glass Balustrade module allows the user to enter the following design inputs:

- Service temperature range
- Glass balustrade parameters:
  - Glass pane height, length, and thickness
  - Glass shoe interior height and width
  - Total number of glass panes
- Service wind load (for outdoor designs)

Required live loads for handrails and guards found in Section 1607.9 of the International Building Code (IBC) are automatically considered within the module calculations.

Specification calculations

The module then calculates the number of required mortar pucks per glass pane according to the specific needs of the application. The module assumes rectangular U-shaped geometry for the shoe when calculating mortar resistance requirements.

Create Design Reports

The HIT-Glass Design Report provides a full summary of:

- Design assumptions and remarks
- Design inputs
- Description of mortar resistance calculation steps
- Design output results
- Bill of Materials for HIT-HY 270 mortar and HIT-Glass installation accessories
- HIT-Glass System IFU

For curved and/or inclined glass balustrades, please refer to the AskHilti article for further information

Check out the new glass balustrade module

RELIABLE and TESTED

Hilti HIT-Glass System

Hilti has been a reliable partner in glass handrail construction for many years and has experience in a wide variety of large-scale projects.

HIT-HY 270's high level of compressive strength and outstanding ductility properties translate into a secure load transfer to the glass shoe without any tension peaks.

Tested for Durability and Compatibility	Reference*
Tested for durability • 50 lb perpendicular impact load on a 1 square-ft area in the top center of the glass • 200 lb concentrated load on the top center of the glass • Combined uniformed load of 50 lbf and a wind load of 371 lbf on the glass • Dynamic load changes of 10,000 cycles at 737 lb-ft	Test Report Number: 2019-3901 Test Report Number: 19L468 Test Report Number: WG079
Interlayer compatibility • Compatible with PVB and SGP interlayered laminated glass	Test Report: 19/0007

*Test reports available upon request

Material Advantages of HIT-Glass

Compatibility

- Compatibility with EPDM films (ethylene propylene diene monomer rubber) in the case of seals
- Compatibility with silicone caulking compounds
- Compatibility with stainless steel and aluminum surfaces

Maximum application flexibility

- Mortar has a high compressive strength
- Minimal planning work required
- Can be used in U- or V-profile glass shoes
- Compensation for different internal glass shoes widths
- Load distribution by means of embedding

Capable of withstanding environmental conditions

- UV resistance
- Temperature resistance from -4° F (-20° C) to 176° F (80° C)
- Water resistance
- Resistant to cleaning agents

TESTING

Hilti HIT-Glass System

Testing standards

Durability Testing of the HIT-HY 270 was carried out in accordance with:

- 2021 International Building Code (IBC) Section 1607.9
- ASTM E935-13: Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings
- ASTM E2353-21: Standard Test Methods for Performance of Glazing in Permanent Railing System, Guards, and Balustrade.
- DIN 18008-4 Appendix A: Requirements for Safety Barriers with Glass

Explanation of testing

Each test was conducted with the purpose of confirming the durability of mortar. The following tests were conducted:

- Impact Testing: Ability of the mortar to hold during a sudden loading event.
- Continuous Load Testing: Ability of the mortar to maintain its hold after cycling back and forth 10,000 times.

Material properties of the Hilti HIT-Glass System

Curing time	30 minutes at 69° F (21° C)	See HIT-HY 270
Mortar's maximum compressive strength (average value)	9,427 psi (65 N/mm²)	Determined in accordance with ISO 604
Measured value of the mortar's long-term compressive strength (application range up to 140° F (60° C)	4,496 psi (31 N/mm²)	Evaluation of "HIT-HY 270 in glass constructions"
Measured value of the mortar's short-term compressive strength (application range from 140° F (60° C) to 176° F (80° C))	3,336 psi (23 N/mm²)	Evaluation of "HIT-HY 270 in glass constructions"
Modulus of elasticity	246,564 psi (1,700 N/mm²)	in accordance with DIN 53452
Shrinkage behavior during the curing process	< 3%	Evaluation of "HIT-HY 270 in glass constructions"
Viscosity of sprayed mortar (at 23° C / 72° F guide; 20 RPM)	70 – 90 Pas	EN 12092
Shore D hardness	82	EN ISO 868
Thermal expansion coefficient (effect on glass tension)	0.0034% per K	Evaluation of "HIT-HY 270 in glass constructions"

SYSTEM COMPONENTS

Hilti HIT-Glass System

Description	Key	Item no.
Mortar, 11.1 oz. (330 ml) or Mortar, 16.9 oz. (500 ml)	①	2194247 or 2194248
Nozzle HIT-RE 60-Glass	②	2433316
Insert HIT-Glass EP 9.5 foam or Insert HIT-Glass EP 13 foam	③ or ④	2433317 or 2433318
Manual Dispenser HDM 500 or Cordless Dispenser HDE 500-22 and Battery pack B 22-55 Li-ion Nuron	⑤ or ⑥ and ⑦	2101993 or 2250850 and 2251348
Foil Cartridge for 11.1 oz. and 16.9 oz. HIT-CB	⑧	2007057

Hilti, Inc.
1-800-879-8000 | en español 1-800-879-5000
www.hilti.com

Hilti (Canada) Corporation
1-800-363-4458
www.hilti.ca

DBS • 09/24