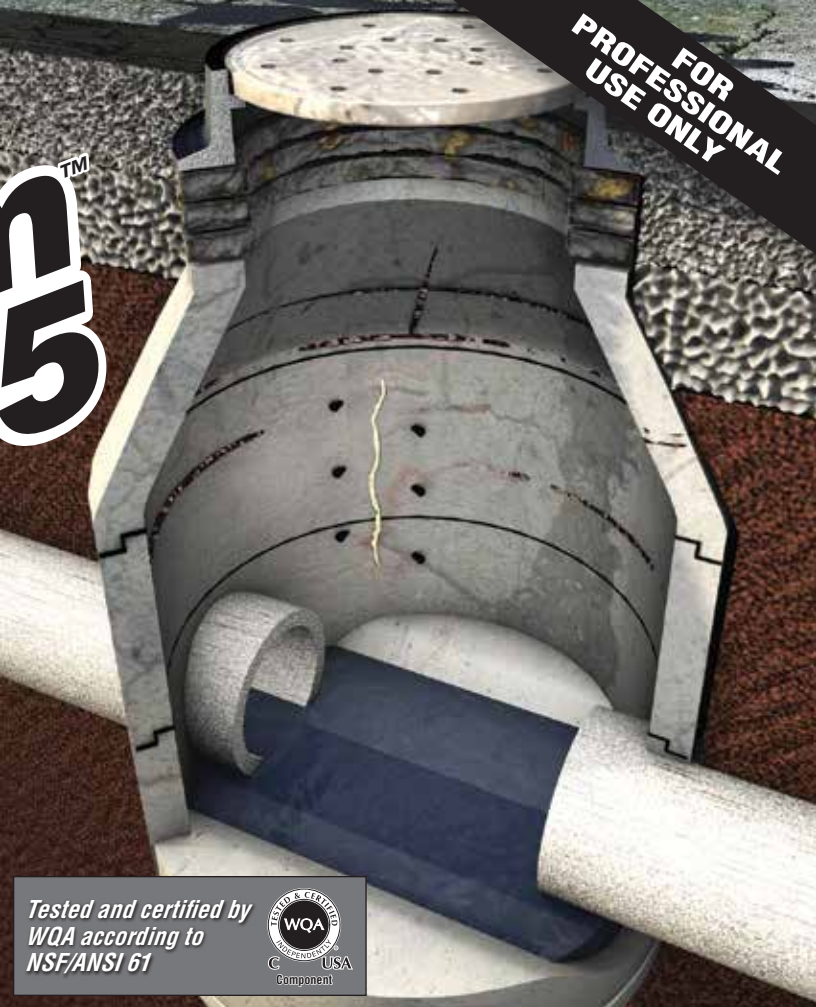




Resfoam HL 35™

Flexible, Hydrophilic Polyurethane Foam or Gel Resin



Tested and certified by WQA according to NSF/ANSI 61



DESCRIPTION

Resfoam HL 35 is a single-component, water-activated, hydrophilic polyurethane used for sealing cracks or joints in concrete structures that are subject to continuous moisture exposure.

FEATURES AND BENEFITS

- Single-component and water-activated
- Forms a flexible foam or gel with high elongation
- Certified by the Water Quality Association (WQA) for NSF/ANSI 61 projects
- 100%-solids
- Low in viscosity to penetrate deeply into fine cracks
- Expands up to 800% of its original volume
- Available in a dual-cartridge format with a 1-to-1 water ratio

INDUSTRY STANDARDS AND APPROVALS

- Certified by the WQA for contact with potable water in NSF/ANSI 61 areas

LEED v4 Points Contribution

LEED Points

Health Product Declaration (HPD)* Up to 2 points

** Using this product may help contribute to LEED certification of projects in the category shown above. Points are awarded based on contributions of all project materials.*

WHERE TO USE

Resfoam HL 35 is used for stopping water infiltration primarily in concrete, masonry and brick structures with continuous moisture exposure. Repair methods include gel encapsulation, joint sealing, curtain injection and crack sealing in the following applications:

- Manhole rehabilitation
- Municipal and utility water-treatment/containment facilities
- Mining, pedestrian and automotive tunnels
- Concrete dams, canals and powerhouses
- Foundation pit sealing
- Concrete construction joints

Consult MAPEI's Technical Services Department for installation recommendations regarding substrates and conditions not listed.

MIXING

Before product use, take appropriate safety precautions. Refer to the Safety Data Sheet for details.

- *Resfoam HL 35* can be injected as a single component when sufficient water is present. It is recommended in certain situations to inject water as a second component by means of a mixing/metering machine (see the "Application Properties" chart below).
- *Resfoam HL 35* can be injected directly into the construction joints of manholes at a 1-to-1 ratio with water.
- *Resfoam HL 35* cartridges must be shaken vigorously before use. *Resfoam HL 35* cartridges are packaged for a 1-to-1 ratio of water to the product.

SITE PREPARATION AND PRODUCT APPLICATION

Read all installation instructions thoroughly before installation. Jobsite preparation depends on the type of injection method that is selected. Three techniques of injection are described below along with the site preparation.

Activated oakum technique

The activated oakum technique is a method to help reduce or eliminate heavy water inflow in wide cracks or joints.

1. Saturate oakum rope or absorbent industrial towels in *Resfoam HL 35*, and then soak the rope or towels in water. *Resfoam HL 35* will begin reacting once dipped in water.
2. Force the saturated pieces into the leaking crack or joint. Push them deeply into the crack or joint using a blunt instrument. As *Resfoam HL 35* expands with the support of the rope or towels, water flow will be reduced, and the rope or towels should be held in place by the expansion.
3. Proceed by drilling holes and completing either an encapsulation or crack-injection repair as indicated below.

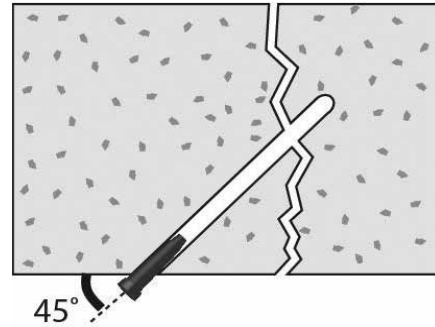
Crack injection technique

Active water leaks flowing through cracks at high volume may require the drilling of relief holes to relieve some of the water pressure. The relief holes may subsequently be repaired with *Resfoam HL 35* or hydraulic cementitious patching material.

1. Prepare the repair area by drilling holes at approximately 45-degree angles to intersect the crack or fissure at about half the depth of the concrete. Holes are typically drilled on opposing sides of the crack or fissure in an alternating (staggered) pattern. The spacing is dependent on the crack size and configuration, and typically ranges from 6" to 2 feet (15 cm to 61 cm) on wide cracks.
2. Flush all drill waste liberally from holes with water to ensure a clean, wet contact surface before installing packers and injecting material.
3. Ensure that packers are securely and firmly placed in the pre-drilled holes; once the packer is placed, install the injection tip.
4. Inject the material – either from cartridges or by utilizing a single-component pump. Pump pressure typically ranges from 250 psi to 2,500 psi.
5. If the crack or fissure is dry, inject water at low pressure to wet out the crack and ensure proper reactivity of *Resfoam HL 35*. Begin injecting *Resfoam HL 35* from the lowest packer and watch for material escaping the surface of the crack or adjacent packers. Move systematically up the packers, ensuring that *Resfoam HL 35* penetrates the entire surface area of the crack.

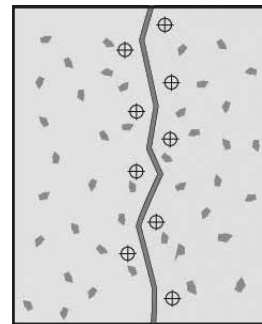
6. For maximum effectiveness, the installer should visually examine the crack or fissure to ensure complete penetration into the crack and check the consistency of the reacted material. Additional water may be needed to wet out the area before injection, or a dual-injection stream of water and *Resfoam HL 35* may be required.
7. As soon as the material has cured, excess material at the site may be removed with a scraper or by waterblasting.

Fig. 1



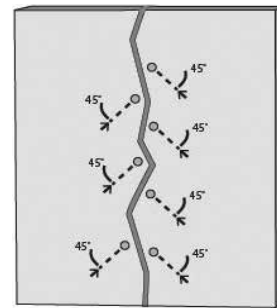
Drill holes at a 45-degree angle for penetration into the crack/fissure at half the crack's depth.

Fig. 2



Typical packer placement around a crack/fissure

Fig. 3



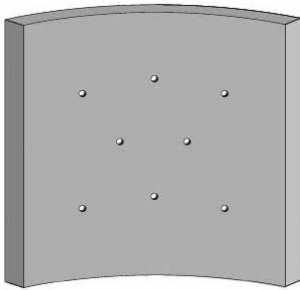
Use a hammer to ensure that packers are firmly and securely placed in the drilled holes before injection of *Resfoam HL 35*.

Gel encapsulation technique

Gel encapsulation is used for below-grade applications where the objective is to seal a leaking structure by creating a membrane on the outside surface of that structure.

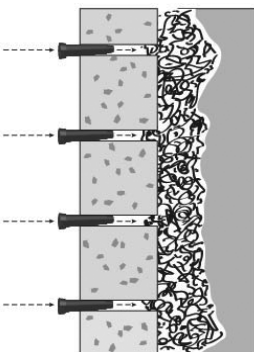
1. Drill holes in a suitable pattern from the inside of the structure all the way through the structure – to allow injection to take place from the inside. The pattern and spacing of holes may vary depending on each repair project. A common drill pattern is shown in Figure 4.
2. Install packers in each hole and begin injection of material (at the desired water ratio) in one corner. Inject the material – either from cartridges or by utilizing a single-component pump. Pump pressure ranges from 250 psi to 2,500 psi.
3. Continue injecting in one packer until *Resfoam HL 35* penetrates the surrounding drill holes (open packers). Subsequently move to adjoining packers to maintain a “wet edge” of material, moving across the back side of the structure. Move back to the initial packers and repeat. Visual inspection of injection material penetrating the surrounding drill holes or packers will determine the consistency of the reacted material.
4. For maximum effectiveness in completely filling voids, apply a sufficient amount of *Resfoam HL 35* to produce a satisfactory ratio of water to product. Excess material at the site may be removed with a scraper or by waterblasting as soon as the material has cured.

Fig. 4



Typical hole pattern for gel encapsulation or curtain injection

Fig. 5



Typical gel encapsulation or curtain injection application: Inject material from the inside, through the structure, to create an encapsulating gel around the structure.

CLEANUP

- Once *Resfoam HL 35* has cured, excess material may be removed by a scraper or putty knife and disposed of. Packers may be broken off by chisel, hammer or grinder, and the concrete surface may be refinished as required.
- Flush injection equipment with *Resfoam PF* pump flush agent.
- Clean skin with soap and water.
- Clean up *Resfoam PF* with water on exposed surfaces before the material hardens; once the material cures, mechanical removal will be required.

STORAGE

Resfoam HL 35 is moisture-activated, and open containers of material should be used quickly to avoid moisture contamination. If a container needs to be resealed, it should be blanketed with nitrogen or dry air (at less than -40°F [-40°C] dew point) to minimize water exposure. Store unopened cartridges in an environment between 60°F and 110°F (16°C to 43°C). Refer to the Safety Data Sheet (SDS) for further information.

LIMITATIONS

- Cool temperatures increase viscosity and will slow reaction times.
- Environments with low pH (less than 3) may have a negative impact on foaming properties.

**Resfoam[™]
HL 35**

Product Performance Properties

Laboratory Tests	Results
Specific gravity – ASTM D891	68.67 lbs. per cu. ft. (1,1 g per cm ³)
Viscosity at 77°F (25°C) – ASTM D1638	800 to 900 cps
Solids content	100%
VOCs (Rule #1168 of California's SCAQMD)	9.6 g per L

Application Properties*

	Ratio of Water to Resfoam HL 35			
	1:1	3:1	5:1	8:1
Gel time (seconds)	110	100	90	100
Tensile strength – ASTM D638	> 400 psi (2,76 MPa)	> 230 psi (1,59 MPa)	> 150 psi (1,03 MPa)	> 145 psi (1 MPa)
Elongation – ASTM D638	> 450%	> 1,100%	> 1,250%	> 1,250%
Die-C tear – ASTM D624	49 Pli (875,14 kg/m)	51.7 Pli (923,36 kg/m)	43.1 Pli (769,77 kg/m)	43.3 Pli (773,34 kg/m)
Physical form	Resilient foam	Resilient foam	Expansive gel	Expansive gel

* This chart indicates the typical physical properties at a range of water-to-product ratios. These values were generated while simulating a field application where Resfoam HL 35 was applied beneath.

How Temperature Impacts Product Viscosity

Temperature	Viscosity
50°F (10°C)	1,960 centipoises
68°F (20°C)	1,020 centipoises
77°F (25°C)	850 centipoises
86°F (30°C)	750 centipoises
104°F (40°C)	390 centipoises

How Temperature Impacts Product Reaction Time

Temperature	Ratio of Water to Resfoam HL 35		
	1:1	5:1	10:1
70°F (21°C)	110 seconds	90 seconds	110 seconds
80°F (26°C)	85 seconds	65 seconds	70 seconds
90°F (32°C)	65 seconds	55 seconds	60 seconds

Shelf Life and Product Characteristics (before curing)

Shelf life	1 year when stored in original, unopened packaging at 73°F (23°C)
Color	Light brown

CSI Division Classifications

Dampproofing and Waterproofing	07 10 00
Concrete Accessories	03 15 00

Packaging

Size
Pail: 5 U.S. gals. (18,9 L)
Dual cartridge: 22 U.S. oz. (651 mL)

Approximate Coverage* per dual cartridge

Yield
A typical dual cartridge will fill a volume of 302 cu. in. (4.95 L), or a 3/16" (4.5 mm) crack in an 8" (20 cm) thick by 8-ft. (2.44-m) high wall.

** Coverage shown is for estimating purposes only. Actual jobsite coverage may vary according to substrate conditions and placement techniques.*

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Refer to the SDS for specific data related to health and safety as well as product handling.

LEGAL NOTICE

The contents of this Technical Data Sheet ("TDS") may be copied into another project-related document, but the resulting document shall not supplement or replace requirements per the TDS in effect at the time of the MAPEI product installation. For the most up-to-date TDS and warranty information, please visit our website at

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Before using, the user must determine the suitability of our products for the intended use,

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