



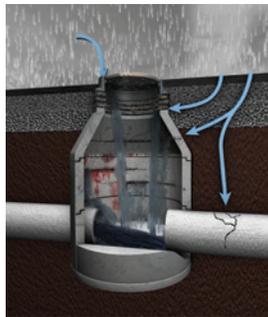
**Resfoam<sup>®</sup>**

Polyurethane products





## Manhole Rehabilitation System



Water treatment facilities across the nation are squandering energy and capacity due to the unnecessary treatment of millions of gallons of storm water that infiltrate sewage systems during every rain event. This infiltration and inflow (I&I), as it's commonly known, often penetrates through cracked sewer lines, manhole covers and damaged or poorly maintained manhole chimneys. Municipalities that properly maintain and repair manhole chimneys realize hundreds of thousands of dollars in annual savings by reducing costs associated with excess water treatment as well as with manhole chimney replacement caused by the deterioration of unprotected surfaces.



# MAPEI's **Resfoam** polyurethane products

## Water cut-off

### **Resfoam HB 45**

Flexible, hydrophobic polyurethane grout

## Soil stabilization

### **Resfoam SS 75**

Rigid, hydrophobic polyurethane grout for soil stabilization

## For use in sewers and manholes

### **Resfoam HL 35**

Flexible, hydrophilic polyurethane foam and gel resin

### **Resfoam HBA 45 and Resfoam HBA 75 (Part B)**

Accelerators for *Resfoam* hydrophobic grouts



# MAPEI's *Resfoam* polyurethane grouts

This brochure showcases sample projects involving crack repairs in dams, reservoirs and manholes; deep soil-stabilization excavations; and void-filling operations using the full spectrum of *Resfoam* polyurethane grouts.

The dynamic display of solutions presented within this brochure is a testament to MAPEI's polymer chemistry integrated into this MAPEI family of products. These solutions can be used in crack repair, soil stabilization and water stopping for concrete, brick or mortar infrastructures in the most demanding environments and conditions.

## Why use a polyurethane grout?

- A polyurethane grout will react with water and restrain water from further damage to the concrete structure.
- With epoxy and cementitious repair products, water must be diverted before the repair.
- To reduce the costs associated with treating groundwater
- To prevent regulatory action from overflows

## Advantages of polyurethane grouts

- Polyurethane grouts have good resistance to biological agents and mild acids found in sanitary sewer systems.
- Hydrophobic polyurethane grouts contain little water and are not subject to freeze/thaw expansion and contraction or to deterioration.
- Flexible hydrophobic grouts typically have the same compression/rebound properties as hydrophilic grouts.
- Hydrophobic polyurethane grouts generally are not associated with dehydration and, thus, do not shrink.
- Flexible polyurethane gels can dehydrate and may degrade if subjected to freeze/thaw cycles. However, they work well in sanitary sewer applications and below-grade applications, where wet conditions are present and freeze/thaw is generally not a possibility.
- 100%-solids and meet the requirements of NSF/ANSI Standard 61 for materials that could come in contact with potable water



# Joint sealing in water tank construction

## Stopping water leaks in cracks, joints and pipe seals – *Resfoam HB 45 and Resfoam HBA 45*

After several failed joint repairs at a water reservoir, a general contractor hired technical specialists to train his personnel in the use of special injection techniques to stop the leakage. Workers were finally able to seal off the tank's joints using *Resfoam HB 45* and *Resfoam HBA 45* with proper injection methods to create a dense, flexible foam joint seal.

### *Resfoam HB 45*

Flexible, hydrophobic polyurethane grout

*Resfoam HB 45* is a low-viscosity, flexible, hydrophobic polyurethane grout used to stop water infiltration in concrete structures. *Resfoam HB 45* is a solvent-free, MDI-based polymer system that reacts with water. Use *Resfoam HB 45* together with *Resfoam HBA 45* accelerator to adjust the reaction profile for a specific application. In a free-rise circumstance, *Resfoam HB 45* will expand up to 750% of its liquid volume. Upon application, *Resfoam HB 45* reacts to form a closed-cell polyurethane grout that will not shrink, and provides an elastomeric waterproof barrier sealing infiltration points against water intrusion. *Resfoam HB 45* is nontoxic and has good chemical resistance.

### *Resfoam HBA 45*

Accelerator for *Resfoam* hydrophobic grouts

*Resfoam HBA 45* is an accelerator for use only with specified *Resfoam* products (see corresponding Technical Data Sheets [TDSs]). *Resfoam HBA 45* may be added at a variety of ratios to accelerate the foam and gel time of *Resfoam HB 45*.

Project: Water tank repair

Products used: *Resfoam HB 45* and *Resfoam HBA 45*



## Crack and joint sealing

### Stopping water flow in sewers and manholes – *Resfoam HL 35*

When a sewer pipe separated from a manhole structure, a sewer repair contractor took advantage of the soil stabilization properties of *Resfoam SS 75* and the use of resin absorbent grout pads to stop groundwater inflow of 50 U.S. gals. (189 L) per minute. To solidify the manhole's pre-cast joints and prevent further seepage, contractors sealed the cracks with *Resfoam HL 35*.

### *Resfoam HL 35*

Flexible, hydrophilic polyurethane foam and gel resin

*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. Depending on the water-to-resin ratio, *Resfoam HL 35* will vary in consistency from a resilient rubber-like foam to a flexible gel. *Resfoam HL 35* is capable of absorbing water up to 800% of its own mass and subsequently prevents water from penetrating into a structure. This unique feature allows *Resfoam HL 35* to be used for large water-inflow applications, such as manholes or below-grade structures with active water leaks. Once cured, *Resfoam HL 35* provides a watertight, elastomeric seal that stops the penetration of water through cracks or voids.

Project: Manhole repair

Product used: *Resfoam HL 35*



## Crack and joint sealing

### Stopping water leaks in cracks, joints and pipe seals – *Resfoam HB 45*

The general contractor for a dam's expansion project relied upon technical supervision to train his workforce in the appropriate methods for successfully injecting *Resfoam HB 45* into large, concrete, hydro-dam structures. MAPEI's *Resfoam* formulation was used extensively to seal leaking cracks and construction joints.

### *Resfoam HB 45*

Flexible, hydrophobic polyurethane grout

*Resfoam HB 45* is a low-viscosity, flexible, hydrophobic polyurethane grout used to stop water infiltration in concrete structures. *Resfoam HB 45* is a solvent-free, MDI-based polymer system that reacts with water. Use *Resfoam HB 45* together with *Resfoam HBA 45* accelerator to adjust the reaction profile for a specific application. In a free-rise circumstance, *Resfoam HB 45* will expand up to 750% of its liquid volume. Upon application, *Resfoam HB 45* reacts to form a closed-cell polyurethane grout that will not shrink, and provides an elastomeric waterproof barrier sealing infiltration points against water intrusion. *Resfoam HB 45* is nontoxic and has good chemical resistance.

Project: Brilliant Dam repair

Product used: *Resfoam HB 45*



## Crack and joint sealing

### Stopping water leaks in cracks, joints and pipe seals – *Resfoam HB 45* and *Resfoam HBA 45*

The intake tower in a new dam at a state park was designed with double waterstops and walls more than 5 feet (1.52 m) thick. Yet, trouble arose as the reservoir was filling when water bypassed the waterstops through various shrinkage cracks. At a depth of more than 30 feet (9.14 m) below the reservoir water level, the general contractor overcame the problem by using special injection equipment and deep-drilling techniques to pre-flush the shrinkage cracks and inject the powerful water cut-off system – *Resfoam HB 45* and *Resfoam HBA 45*.

### *Resfoam HB 45*

Flexible, hydrophobic polyurethane grout

*Resfoam HB 45* is a low-viscosity, flexible, hydrophobic polyurethane grout used to stop water infiltration in concrete structures. *Resfoam HB 45* is a solvent-free, MDI-based polymer system that reacts with water. Use *Resfoam HB 45* together with *Resfoam HBA 45* accelerator to adjust the reaction profile for a specific application. In a free-rise circumstance, *Resfoam HB 45* will expand up to 750% of its liquid volume. Upon application, *Resfoam HB 45* reacts to form a closed-cell polyurethane grout that will not shrink, and provides an elastomeric waterproof barrier sealing infiltration points against water intrusion. *Resfoam HB 45* is nontoxic and has good chemical resistance.

### *Resfoam HBA 45*

Accelerator for *Resfoam* hydrophobic grouts

*Resfoam HBA 45* is an accelerator for use only with specified *Resfoam* products (see corresponding TDSs). *Resfoam HBA 45* may be added at a variety of ratios to accelerate the foam and gel time of *Resfoam HB 45*.

Project: Lake Fort Smith intake tower

Products used: *Resfoam HB 45* and *Resfoam HBA 45*



## Soil stabilization at an excavation

### Preventing erosion and stabilizing soil – *Resfoam SS 75* and *Resfoam HBA 75*

Facility managers at a manufacturing plant sought to construct new equipment foundations in close proximity to existing operating machinery. The construction would require deep excavation below the water table and through unconsolidated sand and gravel. To stabilize the soil perimeter prior to excavation, the general contractor chose to systematically inject *Resfoam SS 75* and *Resfoam HBA 75* through vertical sleeve pipes that were strategically placed around the planned excavation site.

### *Resfoam SS 75*

Rigid, hydrophobic polyurethane grout for soil stabilization

*Resfoam SS 75* is a low-viscosity, hydrophobic polyurethane used for soil stabilization in a variety of water-bearing soils. The low viscosity of *Resfoam SS 75* provides for effective penetration of the earth, adding structure and stabilization by encapsulating the granules and subsequently forming a rock-like mass. By application, *Resfoam SS 75* cures rapidly to a rigid closed cell, effectively stopping water seepage and waterproofing the soil. *Resfoam SS 75* utilizes *Resfoam HBA 75* catalyst, which provides a variable reaction time.

### *Resfoam HBA 75*

Accelerator for *Resfoam* hydrophobic grouts

*Resfoam HBA 75* is an accelerator for use only with specified *Resfoam* products (see corresponding TDSs). *Resfoam HBA 75* may be added at a variety of ratios to accelerate the foam and gel time of *Resfoam SS 75*.

Project: Soil stabilization

Products used: *Resfoam SS 75* and *Resfoam HBA 75*



## Sealing caisson wall leaks

### Stopping water seepage into deep foundation excavations – *Resfoam SS 75*

Deep-excavation contractors frequently encounter subsurface water and soil inflow conditions when dealing with caisson walls and cable tieback anchors. On a major condominium construction site, the excavation contractor used *Resfoam SS 75* to plug wall defects, preventing groundwater and quicksand from entering the excavation area.

### *Resfoam SS 75*

Rigid, hydrophobic polyurethane grout for soil stabilization

*Resfoam SS 75* is a low-viscosity, hydrophobic polyurethane used for soil stabilization in a variety of water-bearing soils. The low viscosity of *Resfoam SS 75* provides for effective penetration of the earth, adding structure and stabilization by encapsulating the granules and subsequently forming a rock-like mass. By application, *Resfoam SS 75* cures rapidly to a rigid closed cell, effectively stopping water seepage and waterproofing the soil. *Resfoam SS 75* utilizes *Resfoam HBA 75* catalyst, which provides a variable reaction time.

Project: Caisson walls

Product used: *Resfoam SS 75*



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