

MAPEI's Large- and-Heavy-Tile (LHT) Mortars

Thixo Technology:
The physical science
of superior mortars





MAPEI'S THIXO TECHNOLOGY MORTARS: DEVELOPED TO SURPASS AND IMPRESS

Two standards-setting bodies – the American National Standards Institute (ANSI) and the International Organization for Standardization (ISO) – establish the requirements and procedures for large-and-heavy-tile mortars. Their standards were developed with differing criteria and do not correlate with each other, so they cannot be cross-referenced or used interchangeably. Despite having to answer to two governing bodies for standards, MAPEI's thixotropic LHT mortars go the extra mile in compliance, actually exceeding all requirements of both standards.

In addition, MAPEI's Thixo Technology mortars are formulated to align with the installation demands as specified by the Tile Council of North America. The following definition and characteristics for large-and-heavy-tile mortars appear in the Setting Materials Selection Guide of the TCNA Handbook:

DEFINITION:

- An LHT mortar is a thin-set bonding mortar for ceramic and stone tile, formulated so as to minimize slump and facilitate a thicker bond coat as compared with a bonding mortar that is not categorized as a dry-set mortar for large and heavy tile.
- It is intended to be used as a bond coat with 3/32" to 1/2" (2.5 to 12 mm) thickness after the tile is embedded.
- LHT mortars must meet the requirements of existing ANSI mortar standards or ISO mortar standards.

CHARACTERISTICS:

- Useful for setting heavy tiles generally 5 lbs. per sq. ft. (2.27 kg per 0.09 m²) or heavier as well as tiles with ungauged thicknesses
- Commonly used for setting large-format tiles, with at least one side greater than 15" (38 cm) long
- Installed with larger trowels in order to apply enough mortar to achieve mortar coverage requirements for the large, heavy tiles
- Provide thicker bond coats to achieve mortar coverage requirements if there is warpage in the tile (refer to ANSI A137.1 regarding allowable warpage for ceramic tile)

- Provide adequate mortar to eliminate voids that may occur when curvature in large tiles creates a larger space between the tile and the substrate, typically in the center of the tile
- Achieve minimum coverage requirements of 80% for interior applications and 95% for exterior
- Meet the ANSI A118.4H standard specification regarding property requirements of dry-set mortars for large and heavy tile
 - Pass the ASTM C627 Robinson Floor Test with a 1/2" (12 mm) setting bed, achieving an Extra Heavy rating
 - Pass lippage test's 28-day requirement of 1/16" (1.5 mm)

The TCNA guide also provides some important reminders regarding substrate preparation in relation to LHT mortars:

- An LHT mortar is not intended for truing or leveling substrates that are the work of others.
- When a substrate variation exceeds allowances, the limitations of an LHT mortar do not permit it to be used as a remedy.
- An LHT mortar should be used to install tile per ANSI A108.5, which is the thin-bed installation method.
- The LHT mortar (formerly "medium-bed mortar") is a product, not an installation method.
- Specifications that call for or refer to setting tile by a "medium-bed method" or "large and heavy method" do not conform to tile industry standards.
- Specifications that call for the use of a bonding mortar to level, flatten or fill substrates to create slopes or transitions between finish floor heights do not conform to tile industry norms.
- For tiles with at least one edge 15" (38 cm) in length, the maximum allowable variation is 1/8" in 10 feet (3 mm in 3.05 m) from the required plane, with no more than 1/16" (1.5 mm) variation in 24" (61 cm) when measured from the high points in the surface. And LHT mortars are not designed to correct such non-permitted variations.
- Lippage is minimized by installing over a very flat subfloor and by using the proper LHT mortar.



Contractors, business owners and installers alike are in search of products offering simplicity and versatility. The installation of large-format tile presents a unique set of challenges. The large-and-heavy-tile mortars continue to gain momentum and grow in importance to the contractor community as these mortars fill a vital application role related to nonslump and non-sag performance – while providing better working properties aligned with performance and productivity needs.

Large and heavy porcelain tiles or stone demand a setting mortar that wets out the back of the tile/stone as well as on the substrate. The mortars must offer superior bond strengths as well as the deformability to accommodate the increasing degree of expansion and contraction experienced as the tile size becomes larger and larger. To support the installer's requirements, these mortars must be easy to trowel and have extended working times for movement and placement of tile. In addition, the mortars need to meet the coverage requirements for the installation in question.

Using versatile, multi-attribute products can reduce shipping error rates, simplify inventory management and ensure that the right products get on the jobsite the first time. Now contractors can upgrade their results while minimizing their concerns, thanks to MAPEI's Thixo Technology.

Thixo Technology mortars exceed large-and-heavy-tile installation requirements with products that perform multiple functions. Their Thixo formulations allow MAPEI's LHT mortars to be used as both standard thin-set mortars and large-and-heavy-tile mortars with nonslump performance. MAPEI's *Ultraflex LFT*, *Ultraflex LHT* and *Kerabond T* meet ISO non-sag performance requirements for vertical applications. All three LHT mortars hold ridges when larger-sized trowels are used, providing maximum support and coverage, which makes these mortars excellent for plank tile installations. These application properties, designed to simplify the contractors' installation challenges with large-format tile, are supported by enriched thixotropic formulas that deliver specified bond-strength performance.

THE SCIENCE BEHIND MAPEI'S THIXO TECHNOLOGY

Rheology is the branch of physical science that deals with the flow of matter. Polymers and other rheological modifiers impact all stages of mortar use – from formulation development and stability to processing and product performance. There are four kinds of rheology profiles, but the rheology profile that is most important to cement mortars is thixotropy.

Thixotropy is the characteristic of certain fluid materials that are thick or viscous under normal conditions but that flow or become less viscous when shaken, agitated or otherwise stressed. A classic example of a thixotropic fluid is quicksand. As long as it remains undisturbed, the wet sand will be relatively thick, but putting stress on the quicksand makes it become more liquid. Thixotropic mortars have a gel-like consistency when they are stationary, but thin when they are subjected to shear stress such as troweling.

The thixotropic behavior of a cement mortar involves coalescence, dispersion and re-coalescence of the cement particles in combination with the breaking of certain chemically formed linkages between the particles. This process generates the overall performance of the cement mortar. MAPEI mortars for large/heavy tile are thixotropic materials, becoming fluid when agitated but reverting to their original structural form when at rest.

Features and Benefits of MAPEI's Thixo Technology mortars

MAPEI's Thixo Technology LHT mortars reduce time and costs of installation for contractors while providing all the benefits of the characteristics described by the TCNA Handbook. The following products enable contractors to manage multiple challenges on the jobsite.



Ultraflex™ LFT™

Premium, large-format tile mortar with polymer

- Polymer-enriched for high performance and deformability
- Non-sag formula for large-format tile and stone in wall applications
- Nonslump for large-format tile and stone in floor applications
- For thicker bond coats from 3/32" to 1/2" (2.5 to 12 mm) thick
- Smooth and creamy consistency for easy handling and application
- ISO 13007 classification C2TES1P1
- ANSI specifications A118.4HTE, A118.11 and A118.15HTE
- Approved for exterior facades
- Approved for submerged applications
- Exceptional open time
- Excellent adjustability
- Lifetime commercial/residential system warranty

	Product Code	Color	Packaging
Canada	1125000021 11350000	Gray White	Bag: 50 lbs. (22.7 kg) Bag: 50 lbs. (22.7 kg)



Ultraflex LHT®

Large-and-heavy-tile mortar with polymer

- Polymer-enriched for high performance
- Non-sag formula for large-format and heavy tile in wall applications
- Nonslump formula for large-format and heavy tile and stone in floor applications
- For thicker bond coats from 3/32" to 1/2" (2.5 to 12 mm)
- Smooth and creamy consistency for easy application
- Approved for use over plywood
- ISO 13007 classification C2TE
- ANSI specifications A118.4HTE and A118.11
- Excellent open time
- Great adjustability
- 25-year commercial system warranty

	Product Code	Color	Packaging
Canada	2183123 2183023	Gray White	Bag: 50 lbs. (22.7 kg) Bag: 50 lbs. (22.7 kg)



Kerabond® T

Premium, large-and-heavy-tile and thin-set mortar

- Non-sag, nonslump formula for tile/stone in wall and floor applications when mixed with water
- For tile and stone on floors and walls
- Ideal for most substrates, tile and stone when mixed with *Keralastic*®
- ISO 13007: Classification CIT mixed with water
- ANSI: Exceeds ANSI A118.1HT requirements mixed with water
- ISO 13007: Classification C2ES2P2 mixed with *Keralastic*
- ANSI: Meets or exceeds ANSI A118.4HE, A118.11 and A118.15HE requirements mixed with *Keralastic*
- Lifetime commercial/residential system warranty when mixed with *Keralastic*

	Product Code	Color	Packaging
Canada	1015221 1025221	Gray White	Bag: 50 lbs. (22.7 kg) Bag: 50 lbs. (22.7 kg)

Characteristics of MAPEI's Thixo Technology Large-and-Heavy-Tile Mortars

Mortars for Large and Heavy Tile and Stone	<i>Ultraflex LFT</i>	<i>Ultraflex LHT</i>	<i>Kerabond T</i>
Quality level	Premium	Professional	Standard
ANSI spec (industry standards)	A118.4HTE, A118.11, A118.15HTE	A118.4HTE, A118.11	ANSI A118.1HT mixed with water; ANSI A118.4HE, A118.11 and A118.15HE mixed with <i>Keralastic</i> *
ISO 13007 deformability (movement, deflection)	S1	Not rated	S2 with <i>Keralastic</i> *
ISO 13007 plywood rating	P1	Not rated	P2 with <i>Keralastic</i> *
ISO 13007 T rating (slip resistance testing)	Yes	Yes	Yes with water
ISO 13007 E rating (extended open time)	Yes	Yes	Yes with <i>Keralastic</i> *
Polymer content	High level of unique polymer	Mid level	(Unmodified)
Properties	For coats up to 1/2" (12 mm) in embedded thickness	For coats up to 1/2" (12 mm) in embedded thickness	For coats up to 1/2" (12 mm) in embedded thickness
Approved tile	Large-and-heavy-format tile and stone	Large-and-heavy-format tile and stone	Large-and-heavy-format tile and stone
Easy Glide Technology™ (smooth and creamy troweling)	Yes	Yes	No
Wall applications	Yes	Yes	Yes
Floor applications	Yes	Yes	Yes
Non-sag properties	Yes	Yes	Yes
Nonslump properties	Yes	Yes	Yes
Exterior commercial facades up to 2 stories	Yes	No	No
Interior/exterior submerged applications	Yes	No	No
Open time	30 to 35 minutes	30 minutes	20 to 30 minutes
Pot life	4 hours	> 2 hours	> 2 hours
Shear bond strength	Superior	Excellent	Good with water; ultimate with <i>Keralastic</i> *
Wall tile	570 to 780 psi (3.93 to 5.38 MPa)	400 to 550 psi (2.76 to 3.79 MPa)	300 to 380 psi (2.07 to 2.62 MPa) with water, 450 to 600 psi (3.10 to 4.14 MPa) with <i>Keralastic</i>
Porcelain tile	> 400 psi (2.76 MPa)	225 to 350 psi (1.55 to 2.41 MPa)	200 to 280 psi (1.38 to 1.93 MPa) with water, 400 to 600 psi (2.76 to 4.14 MPa) with <i>Keralastic</i>
Quarry tile to quarry tile	310 to 450 psi (2.14 to 3.10 MPa)	300 to 425 psi (2.07 to 2.93 MPa)	250 to 350 psi (1.72 to 2.41 MPa) with water, 500 to 700 psi (3.45 to 4.83 MPa) with <i>Keralastic</i>
Quarry tile to plywood	170 to 310 psi (1.17 to 2.14 MPa)	150 to 175 psi (1.03 to 1.21 MPa)	250 to 400 psi (1.72 to 2.76 MPa) with <i>Keralastic</i>
Time before grouting	8 to 16 hours for walls, 24 hours for floors	8 to 16 hours for walls, 24 hours for floors	24 to 48 hours

**Keralastic* is an acrylic latex admixture used to enhance the performance of *Kerabond T*. This admixture enhances bond strength, flexural strength, elongation and freeze/thaw durability.



MAPEI Canada

MAPEI Inc.

2900 Francis Hughes
Laval, Québec
H7L 3J5

Technical Services

1-800-361-9309

Customer Service

1-800-42-MAPEI (1-800-426-2734)

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