

ANSI AND ISO GROUT AND MORTAR SPECIFICATIONS:

Specifications for the materials used to install and grout ceramic tile and stone have been developed according to the requirements and procedures of two standards-setting bodies: The American National Standards Institute (ANSI) and the International Organization for Standardization (ISO).

These standards were developed with differing criteria and do not correlate with each other. They can not be cross-referenced or used interchangeably. Additionally, there are materials specified in each system of standards that are not delineated in the other system. Both sets of standards are in widespread and common use in North America.

Standard specifications for how installation materials should be used are only given in the ANSI set of standards.

MATERIALS FOR SETTING CERAMIC AND STONE TILES - ANSI SPECIFICATIONS

Portland Cement Mortar:

Portland cement mortar is a mixture of portland cement and sand, roughly in proportions of 1:5 for floors, and of portland cement, sand, and lime, in proportions of 1:5:1/2 to 1:7:1 for walls.

Portland cement mortar is suitable for most surfaces and ordinary types of installation. A mortar bed, up to 2" in thickness, facilitates accurate slopes or planes in the finished tilework on floors and walls.

The mortar bed can be modified with the inclusion of a latex/redispersible polymer per the manufacturer's directions as part or all of the liquid portion of the mixture to enhance certain performance properties.

There are two equivalent methods recognized for installing ceramic and stone tiles with a portland cement mortar bed on walls, ceilings, and floors. They are: (1) the method covered by ANSI A108.1A, which requires that the tile be set on a mortar bed that is still workable, and (2) the method covered by ANSI A108.1B, which requires that the tile be set on a cured mortar bed with dry-set or latex/polymer modified portland cement mortar. Absorptive ceramic and stone tiles must be soaked before setting on a mortar bed that is still workable when using a neat portland cement bond coat.

Portland cement mortars can be: bonded to concrete floors; backed with membranes and reinforced with wire mesh or metal lath; or applied on metal lath over open studding on walls. They are structurally strong, are not affected by prolonged contact with water, and can be used to plumb and square surfaces installed by others.

Suitable backings when properly prepared are: brick or cement masonry, concrete, wood or steel stud frame, rough wood floors, plywood floors, foam insulation board, gypsum board, and gypsum plaster. The one-coat method may be used over masonry, plaster, or other solid backing that provides firm anchorage for metal lath. For glass tile installation, do not use one coat methods.

Complete installation and material specifications are contained in ANSI A108.1A, A108.1B, and A108.1C.

Dry-Set Mortar:

Dry set mortar is a mixture of portland cement with sand and additives imparting water retentivity which is used as a bond coat for setting tile.

Dry-set mortar is suitable for thin-set installations of ceramic and stone tiles over a variety of surfaces. It is used in one layer, as thin as 3/32" after tile are embedded, has excellent water and impact resistance, is water-cleanable, non-flammable, good for exterior work, and does not require soaking of tile.

Dry-set mortar is available as a factory-sanded mortar to which only water need be added. Cured dry-set mortar is not affected by prolonged contact with water, but does not form a water barrier. It is not a setting bed and is not intended to be used in truing or leveling the work of others.

Suitable backings, when properly prepared, include plumb and true masonry, concrete, gypsum board, cementitious backer units, fiber-cement underlayment, coated glass mat water-resistant gypsum backer board, cementitious coated foam backer board, cured portland cement mortar beds, brick, ceramic tile, and dimension stone. Consult membrane and setting material manufacturer for use over uncoupling membranes, waterproof membranes, and crack isolation membranes.

Complete installation and material specifications are contained in ANSI A108.5 and ANSI A118.1.

NOTE: The term "thin-set" is used to describe the method of installing tile with a bonding material usually 3/32" to 1/8" in thickness after tile is embedded. In certain geographical areas, the term thin-set may be used interchangeably for "dry-set" portland cement mortar.

Latex/Polymer Modified Portland Cement Mortar¹:

Latex/Polymer modified portland cement mortar is a mixture of portland cement, sand, and special latex/polymer additive which is used as a bond coat for setting tile.

The uses of latex/polymer modified portland cement mortar are similar to those of dry-set mortar. Latex/polymer additives for use in thin-set portland cement tile-setting mortars are designed to improve adhesion, reduce water absorption, and provide greater bond strength and resistance to shock and impact. These additives allow some latitude in time, working conditions, and temperatures. Therefore, latex/polymer modified portland cement mortar is generally required for the installation of porcelain tile.

When latex/polymer modified portland cement mortar is used to install ceramic and stone tiles in an area that may not thoroughly dry out in use (e.g., swimming pools and gang showers, etc.) or where initial drying is inhibited (between tile and impervious substrates), it is recommended that the completed installation be allowed to dry out thoroughly before exposure to water. This drying period can fluctuate from 14 to over 60 days depending upon the geographical location, the climatic conditions, and whether the installation is interior or exterior. Consult with manufacturer of setting materials for minimum set times before grouting tile and for set times before allowing traffic. When installing 8" x 8" or larger impervious tile over a waterproof or crack isolation membrane, or an impervious substrate, longer curing times will be required. A rapid-setting latex/polymer modified cement mortar may need to be specified for faster curing. Since latices vary considerably, the directions of the latex/polymer manufacturer must be followed explicitly.

Not all latex/polymer modified portland cement thin-sets are suitable for wet areas. Consult with manufacturer for suitability in both intermittent and submerged applications.

Complete installation and material specifications are contained in ANSI A108.5 and ANSI A118.4.

EGP (Exterior Glue Plywood) Latex Portland Cement Mortar:

EGP latex portland cement mortar is a modified portland cement dry-set mortar to which a polymer has been incorporated in latex form or in a powder form for the bonding of ceramic and stone tiles to exterior glue plywood in interior dry or limited water exposure areas only. When added in latex form, it is added as a replacement for part or all of the gauging water in accordance with the manufacturer's instructions.

Complete installation and material specifications are contained in ANSI A108.12 and ANSI A118.11.

Epoxy Mortar:

Epoxy mortar is a mortar system designed for chemical resistance employing epoxy resin and epoxy hardener portions.

Epoxy mortar is suitable for thin-set installations of ceramic and stone tiles where chemical resistance of floors, high bond strength, and high impact resistance are important considerations. High-temperature-resistant formulas are also available. Acceptable subfloors, when properly prepared, include concrete, wood and plywood, steel plate, ceramic tile, and stone tile. Application is made in one thin layer. Pot life, adhesion, water-cleanability before cure, and chemical resistance vary with manufacturer.

Complete installation and material specifications are contained in ANSI A108.6 and ANSI A118.3.

Epoxy grout is also available. See section on grouts.

Modified Epoxy Emulsion Mortar:

Modified epoxy emulsion mortar is a mortar system employing emulsified epoxy resin and hardener with portland cement and silica sand.

Modified epoxy emulsion mortars are formulated for thin-set installations of ceramic and stone tiles on floors and walls, interior and exterior. Their features include high bond strength, ease of application, little or no shrinkage, and economical epoxy application. **They are not designed for chemical resistance.**

Recommended uses include residential floors over substrates such as cementitious backer units and concrete. Where complete and firm support under the tiles is mandatory, 95% coverage is required. This material is recommended by most manufacturers as a bond coat or setting material. Some also recommend it for grouting.

Complete installation and material specifications are contained in ANSI A108.9 and ANSI A118.8. These mortars are not characterized by ISO criteria.

¹ The term "latex/polymer modified portland cement mortar," as used herein, refers to portland cement mortar modified with latex and/or redispersible polymer modifiers.

Furan Resin Mortar:

Furan resin mortar is a mortar system designed for chemical resistance consisting of furan resin and furan hardener portions.

Furan mortar is suitable for thin-set installations of ceramic tile where chemical resistance of floors is an important consideration. Acceptable subfloors, when properly prepared, include concrete, wood and plywood, steel plate, and ceramic tile. They are typically not used in the installation of stone tiles.

Complete installation and material specifications are contained in ANSI A108.8 and ANSI A118.5. These mortars are not characterized by ISO criteria.

Furan grouts are also available. See section on grouts.

Epoxy Adhesive:

Epoxy adhesive is an adhesive system employing epoxy resin and epoxy hardener portions.

Epoxy adhesive is formulated for thin-setting of tile on floors, walls, and counters. It is designed primarily for high bond strength and ease of application and not for optimum chemical resistance. However, its chemical and solvent resistance tends to be better than that of organic adhesives.

Complete installation and material specifications are contained in ANSI A108.4 and ANSI A118.3.

Spot-Bonding Epoxy:

Spot-bonding epoxy is a multi-component high-strength epoxy adhesive designed for spot-bonding. Refer to ANSI A118.3.

Organic Adhesive:

Organic adhesive is a prepared organic material for interior use only, ready to use with no further addition of liquid or powder, which cures or sets by evaporation.

Organic adhesives are suitable for thin-setting tile on floors, walls, and countertops, where surfaces are appropriate and properly prepared in accordance with adhesive manufacturers' directions.

Suitably prepared backings for dry areas include gypsum board, gypsum plaster, portland cement mortar, formed concrete, and masonry.

Suitably prepared backings for wet areas include portland cement mortar, formed concrete, and masonry.

Adhesives are applied in one thin layer with a trowel, first using the flat edge for continuous coverage and then the notched edge for uniform thickness. Where leveling or truing is required, an underlayment is used.

Adhesives eliminate soaking of tile. They are not suitable for swimming pools or exteriors. They supply some flexibility to the tile facing. Bond strength varies greatly among the numerous brands available. Solvents in some adhesives are irritating to some persons, and some adhesives are flammable.

Adherence to ANSI A136.1 is the minimum criterion for selecting an organic adhesive. Complete installation specifications are contained in ANSI A108.4. Organic adhesives are not recommended in areas exposed to temperatures exceeding 140°F. Some backing materials may require lower temperatures.

MATERIALS FOR GROUTING CERAMIC AND STONE TILES - ANSI SPECIFICATIONS

Introduction:

Grouting materials for ceramic and stone tiles are available in many forms to meet the requirements of the different kinds of tile and types of exposures. Portland cement is the base for most grouts and is modified to provide specific qualities such as whiteness, mildew resistance, uniformity, hardness, flexibility, and water retentivity. Complete installation and material specifications are contained in ANSI A108.10, A118.6, and A118.7. Non-cement based grouts such as epoxies, furans, and silicone rubber offer properties not possible with cement grouts. However, special skills on the part of the tile setter are required. *These materials can be appreciably greater in cost than cement-based grouts.*

Sand-Portland Cement Grout:

An on-the-job mixture of 1 part portland cement to 1 part fine graded clean sand (ASTM C144) is used for joints up to 1/8-inch wide; 1:2 for joints up to 1/2-inch wide; and 1:3 for joints over 1/2-inch wide. Up to 1/5 part lime may be added.

Sand-portland cement grout can be used with ceramic mosaic tiles, quarry tiles, pressed floor tiles, porcelain tiles, some glass

tiles, and stone tiles on floors and walls. Damp curing is necessary. On stone tiles and glass tiles, check to make sure the surface will not be scratched by the sand in the grout.

Standard Cement Grout:

Standard Unsanded Cement Grout: A factory prepared mixture of cement and additive that provide water retentivity, meant for joints 1/8" in width or less.

Standard Sanded Cement Grout: A factory prepared mixture of cement, graded sand, and other ingredients to produce a water-resistant, dense, uniformly colored material, meant for joints of 1/8" in width or greater.

Grouts in this category are suitable for grouting walls and floors subject to ordinary use. On stone and glass tiles, check to make sure the surface will not be scratched by sand in the grout. Some glass tile manufacturers require unsanded grout to prevent scratching on smooth glass tile surfaces.

Polymer Modified Tile Grout:

Polymer Modified Unsanded Tile Grout: A factory prepared mixture of cement and other ingredients, including a redispersible latex/polymer powder (to which only water is added at the jobsite) or a liquid latex admixture. When added in a latex form, it is added as a replacement for part or all of the mixing water. These grouts are designed for installation in joints 1/8" wide or less.

Polymer Modified Sanded Tile Grout: A factory prepared mixture of cement, sand, and other ingredients, including a redispersible latex/polymer powder (to which only water is added at the jobsite) or a liquid latex admixture. When added in a latex form it is added as a replacement for part or all of the mixing water. These grouts are designed for installation in joints 1/8" wide or greater. The maximum allowable joint width is designated by the grout manufacturer.

Grouts in this category provide improved characteristics such as increased color stability, stain resistance, bond strengths, flexural strengths, and lower water absorption to resist frost damage. On stone and glass tiles, check to make sure the stone surface will not be scratched by sand in the grout.

Epoxy Grout:

Epoxy grout is a grout system employing epoxy resin and hardener portions, often containing coarse silica filler, especially formulated for industrial and commercial installations where chemical resistance is of paramount importance. High temperature, chemical-resistant formulas are also available.

These grouts also provide high bond strength, impact resistance, and stain resistance. They impart structural qualities to the tile when used both as a mortar and grout, especially over wood subfloors. Their use involves extra costs and special installation skills when compared to portland cement grouts.

Architects should select the type of epoxy grout applicable to the specified exposure. Average joint width less than 1/4" with tile thicker than 1/2" may not allow full penetration of epoxy during grouting operation. Consult epoxy manufacturer. Complete installation and material specifications are contained in ANSI A108.6 and ANSI A118.3.

Furan Resin Grout:

Furan resin grout is a grout system consisting of furan resin and hardener portions.

Furan grout is used in industrial and commercial areas requiring chemical resistance. Use of this grout involves extra costs, including waxed tile surface and special installation skills, when compared to portland cement grouts. Architects should select the type of furan grout applicable to the specified chemical and temperature exposure. This grout is not used with stone tiles.

Complete installation and material specifications are contained in ANSI A108.8 and ANSI A118.5.

ISO INSTALLATION MATERIAL SPECIFICATIONS:

ISO installation material standards for mortars, adhesives, and grouts are more fully described in the following standards:

13007-1 Ceramic tiles - Grouts and adhesives - Part 1: Terms, definitions and specifications for adhesives

13007-2 Ceramic Tiles - Grouts and adhesives - Part 2: Test methods for adhesives

13007-3 Ceramic tiles - Grouts and adhesives - Part 3: Terms, definitions and specifications for grouts

13007-4 Ceramic Tiles - Grouts and adhesives - Part 4: Test methods for grouts

Where ANSI installation material standards refer to "mortars", ISO installation material standards refer to such mortars as either adhesives or mortar adhesives.

ISO adhesive and grout classifications are designated using letters to identify chemical make-up and optional properties. Numbers are used to identify performance levels. Also see Charts 1 and 2.

Adhesives - Performance Requirements:

C- Cementitious Mortars:

C1*: Normal- Tensile bond strength of ≥ 72.5 psi (≥ 5 N/mm²) when tested per ISO 13007 curing parameters, including water immersion, heat aging, and freeze-thaw cycling. Twenty-eight (28) day tensile adhesion bond strength ≥ 0.5 N/mm² (72.5 psi) after 20 minutes open time.

C2*: Improved- Tensile bond strength of ≥ 145 psi (≥ 1 N/mm²) when tested per ISO 13007 curing parameters, including water immersion, heat aging, and freeze-thaw cycling. Twenty-eight (28) day tensile adhesion bond strength ≥ 0.5 N/mm² (72.5 psi) after 20 minutes open time.

*A Tensile Bond Test quantifies the amount of vertical force required to pull a tile or stone from a given substrate after a prescribed period of time. This test can be performed both in the lab and at the jobsite.

D- Dispersion Adhesives (Mastics)

D1: Normal- Shear adhesion strength of ≥ 145 psi (≥ 1 N/mm²) when tested per ISO 13007 curing parameters, including heat aging. Twenty-eight (28) day tensile adhesion bond strength ≥ 0.5 N/mm² (72.5 psi) after 20 minutes open time.

D2: Improved- D1 performance plus additional shear adhesion strength of ≥ 72.5 psi (≥ 0.5 N/mm²) after 21 day air cure and 7 day water immersion; also shear adhesion strength of ≥ 145 psi (≥ 1 N/mm²) at elevated temperatures

R- Reaction Resin Adhesives (epoxy or polyurethane)

R1: Normal- Shear adhesion strength of ≥ 290 psi (≥ 2 N/mm²) when tested per ISO 13007 curing parameters, including water immersion. Twenty-eight (28) day tensile adhesion bond strength ≥ 0.5 N/mm² (72.5 psi) after 20 minutes open time.

R2: Improved-R1 performance plus additional shear adhesion strength of ≥ 290 psi (≥ 2 N/mm²) after thermal shock testing

Adhesives - Optional Characteristics:

F- Fast-Setting/Fast-Drying

F: Fast-setting (*cementitious*) with a minimum tensile bond strength of ≥ 72.5 psi (≥ 5 N/mm²) achieved within 24 hours or less¹. Twenty-eight (28) day tensile adhesion bond strength ≥ 0.5 N/mm² (72.5 psi) after 10 minutes open time.

F: Fast-drying² (*D2 dispersion adhesive/mastic*) with a minimum shear bond strength of ≥ 72.5 psi (≥ 0.5 N/mm²) after 7 day air cure and 7 day water immersion; also shear adhesion strength of ≥ 145 psi (≥ 1 N/mm²) at elevated temperatures.

E- Extended Open Time

E: "Extended open time" extends the open time in which a tile can be laid into the adhesive without loss of minimum bond strength. This would extend the "Open Time" of a C1 or C2, D1 or D2 adhesive from 20 minutes to 30 minutes for a twenty-eight (28) day tensile adhesion bond strength ≥ 0.5 N/mm² (72.5 psi).

T- Thixotropic [Non-Slip/Non-Sag]

T: Slip resistant adhesives must not allow a specified test tile sample applied on a vertical surface to slip more than 0.0197" (0.5 mm).

S- Deformability

S1 or S2: Transverse deformation is the ability of the mortar to accommodate movement between the tile and the substrate, expressed as either "S1" = "Normal" or "S2" "Improved".

S1: Normal- Deformability ≥ 0.1 " (≥ 2.5 mm) and < 0.2 " (< 5 mm)

S2: Improved- Deformability ≥ 0.2 " (≥ 5 mm)

P- Plywood Adhesion Bond Strength

P1 or P2: The two levels of performance bonding to plywood are "P1" = "Normal" or "P2" "Improved."

P1: Normal- Tensile adhesion bond strength of ≥ 72.5 psi (≥ 0.5 N/mm²) after 28 day cure

P2: Improved- Tensile adhesion bond strength of ≥ 145 psi (≥ 1 N/mm²) after 28 day cure

Cementitious Grouts - Performance Requirements:

CG- Cementitious Grouts:

CG1 Normal:

Abrasion resistance < 0.12 in³ (2000 mm³)

Flexural strength under standard conditions > 362.5 psi (2.5 N/mm²)

Flexural strength after freeze-thaw cycles > 362.5 psi (2.5 N/mm²)

Compressive strength under standard conditions > 2176 PSI (15 N/mm²)

Compressive strength after freeze-thaw cycles > 2176 PSI (15 N/mm²)

Shrinkage < 3 mm/m

Water absorption after 30 min < 5 g

Water absorption after 240 min < 10 g

CG2: Improved:

Meets "CG1" criteria with either improved abrasion resistance, reduced water absorption or both as given below:

Cementitious Grouts - Optional Characteristics:

A- Abrasion Resistance

A: High abrasion resistance ≤ 0.06 cu in (1000 mm³)

W- Water Absorption

W: Reduced water absorption after 30 min ≤ 2 g; reduced water absorption after 240 min ≤ 5 g

F- Fast Setting (CG1 or CG2)

F: Fast-setting with compressive strength in ≤ 24 hours under standard conditions > 2176 PSI (15 N/mm²).

Resin Reactive Grouts - Performance Requirements:

RG- Resin Reactive Grouts:

Abrasion resistance ≤ 0.015 cu in (250 mm³)

Flexural strength under standard conditions ≥ 4351 psi (30 N/mm²)

Compressive strength under standard conditions ≥ 6527 psi (45 N/mm²)

Shrinkage ≤ 1.5 mm/m

Water absorption after 240 min ≤ 0.1 g

Note: An **RG** grout will always have higher performance characteristics than the best **CG2AW** grout in addition to higher chemical resistance to a wider variety of chemicals. Always check with the grout manufacturer for chemical resistance to a specific chemical.

ISO 13007 Standards for Adhesives & Grouts

Chart 1 – Standard code(s) for Adhesives for tile & stone

Code			Description
Type	Class	Optional Characteristics	
C	-	-	<u>Cementitious mortar</u>
C	1	-	Cementitious mortar with <i>normal</i> tensile bond strength <ul style="list-style-type: none"> Tensile adhesion bond strength of $\geq .5 \text{ N/mm}^2$ (72.5 psi) when tested per 13007 curing parameters 28-day tensile adhesion bond strength of $\geq 0.5 \text{ N/mm}^2$ (72.5 psi) after 20 minutes open time
C	2	-	Cementitious mortar with <i>improved</i> tensile bond strength <ul style="list-style-type: none"> Tensile adhesion bond strength of $\geq 1 \text{ N/mm}^2$ (145 psi) when tested per 13007 curing parameters Baseline "C1" open time characteristics
C	1 or 2	E	Cementitious mortar with <i>extended open time</i> <ul style="list-style-type: none"> 28-day tensile adhesion bond strength of $\geq 0.5 \text{ N/mm}^2$ (72.5 psi) after 30 minutes open time
C	1 or 2	F	Cementitious mortar, <i>fast-setting</i> <ul style="list-style-type: none"> 24-hour¹⁾ tensile adhesion bond strength of $\geq 0.5 \text{ N/mm}^2$ (72.5 psi) 28-day tensile adhesion bond strength of $\geq 0.5 \text{ N/mm}^2$ (72.5 psi) after 10 minutes open time
C	1 or 2	T	Cementitious mortar with <i>slip resistance</i> <ul style="list-style-type: none"> Will not allow a tile applied on a vertical surface to slip more than 0.5 mm (.0196")
C	1 or 2	S1	Cementitious mortar with <i>normal</i> deformability <ul style="list-style-type: none"> Deformability $\geq 2.5 \text{ mm}$ (0.1") and $< 5 \text{ mm}$ (0.2") when tested per 13007
C	1 or 2	S2	Cementitious mortar with <i>improved</i> deformability <ul style="list-style-type: none"> Deformability $\geq 5 \text{ mm}$ (0.2") when tested per 13007
C	1 or 2	P1	Cementitious mortar with <i>normal</i> adhesion to EGP (Exterior Grade Plywood) <ul style="list-style-type: none"> 28-day tensile adhesion bond strength of $\geq 0.5 \text{ N/mm}^2$ (72.5 psi)
C	1 or 2	P2	Cementitious mortar with <i>improved</i> adhesion to EGP (Exterior Grade Plywood) <ul style="list-style-type: none"> 28-day tensile adhesion bond strength of $\geq 1 \text{ N/mm}^2$ (145 psi) Note: It is recommended with EGP installations over 16" O.C., that the "S2" code also be specified in addition to the "P2" code.
-	-	-	Cementitious mortar example, ISO 13007 Code: C2FS2P2
D	-	-	<u>Dispersion (Mastic) adhesive</u>
D	1	-	Dispersion (Mastic) adhesive with <i>normal</i> shear bond adhesion strength <ul style="list-style-type: none"> Shear adhesion bond strength of $\geq 1 \text{ N/mm}^2$ (145 psi) when tested per 13007 curing parameters 28-day tensile adhesion bond strength of $\geq 0.5 \text{ N/mm}^2$ (72.5 psi) after 20 minutes open time
D	2	-	Dispersion (Mastic) adhesive with <i>improved</i> shear bond adhesion strength <ul style="list-style-type: none"> Shear adhesion bond strength of $\geq 0.5 \text{ N/mm}^2$ (72.5 psi) after 21 day air cure, 7 day water immersion Shear adhesion bond strength of $\geq 1 \text{ N/mm}^2$ (145 psi) at elevated temperatures Baseline "D1" open time and adhesion strength characteristics for all other curing parameters
D	1 or 2	T	Dispersion (Mastic) adhesive with <i>slip resistance</i> <ul style="list-style-type: none"> Will not allow a tile applied on a vertical surface to slip more than 0.5 mm (.0196")
D	2	F or A ²⁾	Dispersion (Mastic) adhesive, <i>fast (accelerated²⁾)-drying</i> <ul style="list-style-type: none"> Shear adhesion bond strength of $\geq 0.5 \text{ N/mm}^2$ (72.5 psi) after 7 day air cure, 7 day water immersion Shear adhesion bond strength of $\geq 1 \text{ N/mm}^2$ (145 psi) at elevated temperatures
D	1 or 2	E	Dispersion (Mastic) adhesive with <i>extended open time</i> <ul style="list-style-type: none"> 28-day tensile adhesion bond strength of $\geq 0.5 \text{ N/mm}^2$ (72.5 psi) after 30 minutes open time
-	-	-	Dispersion (mastic) adhesive example, ISO 13007 Code: D2TF
R	-	-	<u>Reaction Resin (Epoxy or Urethane) adhesive</u>
R	1	-	Reaction resin (epoxy or urethane) adhesive <ul style="list-style-type: none"> Shear adhesion bond strength of $\geq 2 \text{ N/mm}^2$ (290 psi) when tested per 13007 curing parameters 28-day tensile adhesion bond strength of $\geq 0.5 \text{ N/mm}^2$ (72.5 psi) after 20 minutes open time
R	2	-	Reaction resin (epoxy or urethane) adhesive <ul style="list-style-type: none"> Shear adhesion bond strength of $\geq 2 \text{ N/mm}^2$ (290 psi) after high temperature thermal shock Baseline "R1" open time and adhesion strength characteristics for all other curing parameters
R	1 or 2	T	Reaction resin (epoxy or urethane) adhesive with <i>slip resistance</i> <ul style="list-style-type: none"> Will not allow a tile applied on a vertical surface to slip more than 0.5 mm (.0196")
-	-	-	Reaction resin (epoxy or urethane) adhesive example, ISO 13007 Code: R2T

¹⁾ Proposed revisions to ISO 13007 require that fast-setting (F) cementitious mortars meet the 0.5 N/mm² tensile adhesion requirement in 6 hours or less

²⁾ Proposed revisions to ISO 13007 refer to "fast-drying" dispersion (mastic) adhesives (F) as "accelerated-drying" (A), and some products may be labeled or referred to as such.

Chart 2 - Standard code(s) for *Grouts* for tile & stone

Code			Description
Type	Class	Optional Characteristics	
CG	-	-	<u>Cementitious grout</u>
CG	1	-	<p><u>Normal</u> cementitious grout</p> <ul style="list-style-type: none"> • Abrasion resistance < 2000 mm³ (0.12 in³) • Flexural strength under standard conditions > 2.5 N/mm² (362.5 psi) • Flexural strength after freeze-thaw cycles > 2.5 N/mm² (362.5 psi) • Compressive strength under standard conditions > 15 N/mm² (2176 psi) • Compressive strength after freeze-thaw cycles > 15 N/mm² (2176 psi) • Shrinkage < 3 mm/m • Water absorption after 30 min < 5 g • Water absorption after 240 min < 10 g
CG	2	A	<p>Improved cementitious grout with <u>high abrasion resistance</u></p> <ul style="list-style-type: none"> • Baseline "CG1" characteristics • Abrasion resistance < 1000 mm³ (0.06 in³)
CG	2	W	<p>Improved cementitious grout with <u>reduced water absorption</u></p> <ul style="list-style-type: none"> • Baseline "CG1" characteristics • 30 minute water absorption < 2 g • 240 minute water absorption < 5 g
CG	1 or 2	F	<p><u>Fast-setting</u> cementitious grout</p> <ul style="list-style-type: none"> • Baseline "CG1", "CG2A", or "CG2W" characteristics • 24 hour compressive strength under standard conditions > 15 N/mm² (2176 psi)
-	-	-	Improved cementitious grout example, ISO 13007 Code: CG2FAW
RG	-	-	<u>Reaction Resin (Epoxy or Urethane) grout</u>
RG	-	-	<ul style="list-style-type: none"> • Abrasion resistance ≤ 250 mm³ (0.15 in³) • Flexural strength under standard conditions ≥ 30 N/mm² (4351 psi) • Compressive strength under standard conditions ≥ 45 N/mm² (6527 psi) • Shrinkage ≤ 1.5 mm/m • Water absorption after 240 min ≤ 0.1 g <p>Note: An RG grout will always have higher performance characteristics than the best CG2AW grout in addition to higher chemical resistance to a wider variety of chemicals. <i>Check with the grout manufacturer for chemical resistance to a specific chemical.</i></p>