



EN 12004 Classifications

TDS 137EN

To help simplify the selection of tile installation materials (including adhesives, grouts, membranes, and screeds) the European standards community created a classification system. The goal of the EuroNorm (EN) standards is to establish a product classification code for the European community to quickly and easily tell an architect, specifier, tile contractor or distributor exactly how a product is designed to perform.

EN standards require that tile installation components pass certain minimum performance tests before it may be accredited with a Performance Classification. This Performance Classification is expressed as letters and numbers in an easy-to-use and easy to understand code. The EN classification system is more encompassing than the ISO classification system. For more information regarding ISO classifications, please refer to TDS 137ISO. EN incorporates not only tile adhesive (EN 12004) and grout standards (EN 13888), it also incorporates screed materials (EN13813) and liquid applied water impermeable products, or waterproofing membranes (EN 14891).

TILE ADHESIVES are classified as follows according to EN 12004;

A. Types of Adhesives;

Cementitious Adhesives	C
Dispersion Adhesives	D
Reaction Resin Adhesives	R

B. Classes of Adhesives

Normal Adhesive	1
Improved Adhesive	2
Fast-Setting Adhesive	F
Adhesive with Reduced Slip	T
Adhesive with Extended Open Time	E
Deformable Adhesive	S1
Highly Deformable Adhesive	S2

For each type of adhesive, it is possible to have one of two classes, and different optional characteristics of the adhesive based on performance. The designation of the adhesive consists of the letter for the adhesive type (C, D or R), followed by the number of the class (1 or 2), and/or the corresponding letter for the characteristic(s) of the adhesive (F, T, E, S1, S2). To make it easier please refer to the chart below;

TYPE	CLASS	CHARACTERISTIC	DESCRIPTION
C	1		Normal cementitious adhesive (C1)
C	1	F	Fast-setting adhesive (C1 F)
C	1	T	Normal cementitious adhesive with slip-resistance (C1 T)
C	1	FT	Fast-setting cementitious adhesive with slip-resistance (C1 FT)
C	2		Cementitious adhesive with improved characteristics (C2)
C	2	E	Cementitious adhesive with improved characteristics and extended open time (C2 E)
C	2	F S1	Fast-setting cementitious adhesive with improved characteristics and deformable (C2F P2 S1)
C	2	T	Cementitious adhesive with improved characteristics and slip-resistance (C2 T)
C	2	TE	Cementitious adhesive with improved characteristics, slip-resistance and extended open time (C2 TE)
C	2	FT	Fast-setting cementitious adhesive with improved characteristics and slip-resistance (C2 FT)
D	1		Normal dispersion adhesive (D1)
D	1	T	Normal dispersion adhesive with slip-resistance (D1 T)
D	2		Dispersion adhesive with improved characteristics (D2)
D	2	F	Fast-drying dispersion with improved characteristics (D2 F)
D	2	T	Dispersion adhesive with improved characteristics and slip-resistance (D2 T)
D	2	TE	Dispersion adhesive with improved characteristics, slip-resistance and extended open time (D2 TE)
R	1		Normal reaction resin adhesive (R1)
R	1	T	Normal reaction resin adhesive with slip-resistance (R1 T)
R	2		Reaction resin with improved characteristics (R2)
R	2	T	Reaction resin with improved characteristics and slip-resistance (R2 T)

Note: The above mentioned designations are not all of the possible combinations. Additional designations can be inserted according to the combination of the different symbols for the characteristics. For example, C2TES1 is a deformable cementitious adhesive with improved characteristics, slip-resistance and extended open time.

Now that we know what the performance classification codes designate it is important to know exactly what each code designation means. The following terms and definitions can help understand what it all means.

Cementitious Adhesive (C) – mixture of hydraulic binding agents (e.g. portland cement), aggregates, and organic additives (e.g. latex polymers, moisture retention additive, etc...) to be mixed with water or latex admix before mixing

Dispersion Adhesive (D) – ready-to-use mixture of organic binding agents in the form of an aqueous polymer dispersion, organic additives and mineral fillers –mastic type products.

Reaction Resin Adhesive (R) – single or multi-component mixture of synthetic resin, mineral fillers and organic additives in which curing occurs by chemical reaction – epoxy or urethane based products.

Class 1 (1) – means the adhesive has passed the minimum pass level tests that are mandatory for that adhesive type.

Class 2 (2) - means the adhesive has passed the same tests as Class 1 and/or other applicable tests, but at higher pass levels.

Extended Open Time (E) – maximum time interval after application at which tiles can be embedded in the applied adhesive and meet tensile adhesion strength requirement must be ≥ 30 minutes. This designation does not apply to reaction resin adhesives (R).

Slip-Resistance (T) – the downward movement of a tile applied to a combed adhesive layer on a vertical surface must be $\leq 0.5\text{mm}$ for a C or D adhesive, and $\leq 5\text{mm}$ for a type R adhesive.

Fast-Setting (F) – adhesive with accelerated cure time that must achieve the minimum strength requirements of a fast-setting adhesive. This designation does not apply to reaction resin adhesives (R).

Deformability (S) – capacity of a hardened adhesive to be deformed by stresses between the tile and the substrate without damage to the installed surface – to pass S1 requirements an adhesive must be able to deform $\geq 2.5\text{mm}$ but $< 5\text{mm}$; to pass S2 requirements an adhesive must be able to deform $\geq 5\text{mm}$. This designation does not apply to reaction resin adhesives (R) or dispersion adhesives (D).

The stand alone designations are separate from the main designation. For example; a cementitious adhesive that has improved characteristics, is fast-setting and has slip resistance would get a designation of C2FT. If that same adhesive is deformable it would get an S1 designation. So, the result would be 2 separate designations; **C2FT S1**.

TILE GROUTS are classified as follows according to EN 13888;

A. Types of Grouts;

- | | |
|--------------------------|-----------|
| 1. Cementitious Grouts | CG |
| 2. Reaction Resin Grouts | RG |

B. Classes of Cementitious Grouts

- | | |
|-------------------|----------|
| 1. Normal Grout | 1 |
| 2. Improved Grout | 2 |

C. Characteristics of Cementitious Grouts (optional)

- | | |
|-----------------------------------|----------|
| 1. Fast-Setting/Drying Grout | F |
| 2. High Abrasion Resistance Grout | A |
| 3. Reduced Water Absorption Grout | W |

For cementitious grouts, it is possible to have different classes, and different optional characteristics of the adhesive based on performance. The designation of the grout consists of the letter for the grout type (CG or RG), followed by the number of the class (1 or 2) – cementitious only, and/or the corresponding letter for the characteristic(s) of the adhesive (F, A, W). To make it easier please refer to the chart below;

TYPE	CLASS	DESCRIPTION
CG	1	Normal cementitious grout (CG1)
CG	2	Cementitious grout with improved characteristics: high abrasion resistance and reduced water absorption (CG2)
RG		Reaction resin grout (RG)

Note: The above mentioned designations are not all of the possible combinations. Additional designations can be inserted according to the combination of the different symbols for the characteristics. For example, CG2AW is a cementitious grout with improved characteristics, high abrasion resistance and reduced water absorption.

Reaction resin grouts have only one designation; RG.

Now that we know what the performance classification codes designate it is important to know exactly what each code designation means. The following terms and definitions can help understand what it all means.

Cementitious Grout (CG) – mixture of hydraulic binding agents (e.g. portland cement), aggregates, and organic additives (e.g. latex polymers, moisture retention additive, etc...) to be mixed with water or latex admix just before use.

Reaction Resin Grout (RG) – mixture of synthetic resin, aggregates, organic and inorganic additives in which hardening occurs by chemical reaction

Class 1 (1) – means the adhesive has passed the minimum pass level tests that are mandatory for that adhesive type.

Class 2 (2) - means the adhesive has passed the same tests as Class 1 and/or other applicable tests, but at higher pass levels.

Abrasion Resistance – capability of a grout to resist wear as measured using EN 12808-2. For a cementitious grout to be rated as Class 1 requires $\leq 2,000 \text{ mm}^3$ and Class 2 requires $\leq 1,000 \text{ mm}^3$. A reaction resin grout requires $\leq 250 \text{ mm}^3$ to attain an RG designation.

Water Absorption – amount of water absorbed by capillary action when the surface of the grout prism is in contact with water without any additional pressure as measured using EN 12808-5. The test for a cementitious grout is conducted over two time frames. For a cementitious grout to be rated as Class 1 requires $\leq 5 \text{ g}$ after 30 minutes and $\leq 10 \text{ g}$ after 240 minutes; for a grout to be rated as Class 2 requires $\leq 2 \text{ g}$ after 30 minutes and $\leq 5 \text{ g}$ after 240 minutes. A reaction resin grout requires $\leq 0.5 \text{ g}$ after 240 minutes.

Flexural Strength After Dry Storage – maximum value of a grout prism failure determined by exerting a force in flexure at 3 points and is measured using EN 12808-3. The requirement for a cementitious grout is $\geq 3.5 \text{ n/mm}^2$ (MPa) and the requirement for a reaction resin grout is $\geq 30 \text{ n/mm}^2$.

Flexural Strength After Freeze/Thaw Cycles – maximum value of a grout prism failure determined by exerting a force in flexure at 3 points after going through a prescribed number of freeze/thaw cycles, and is measured using EN 12808-3. The requirement for a cementitious grout is $\geq 3.5 \text{ n/mm}^2$ (MPa). This test is not required for a reaction resin grout.

Compressive Strength After Dry Storage – maximum value of a grout prism failure determined by exerting a force in compression on 2 opposite points and is measured using EN 12808-3. The requirement for a cementitious grout is $\geq 15 \text{ n/mm}^2$ (MPa) and the requirement for a reaction resin grout is 45 n/mm^2 .

Compressive Strength After Freeze/Thaw Cycles – maximum value of a grout prism failure determined by exerting a force in compression on 2 opposite points after going through a prescribed number of freeze/thaw cycles, and is measured using EN 12808-3. The requirement for this test is $\geq 15 \text{ n/mm}^2$ (MPa).

Shrinkage – reduction in length of a grout prism during hardening as measured using EN 12808-4. The requirement for a cementitious grout is $\leq 2 \text{ mm/m}$ and the requirement for a reaction resin grout is $\leq 1.5 \text{ mm/m}$.

The same test results for Flexural Strength, Compressive Strength and Shrinkage are required for both Class 1 and Class 2. The only two tests requiring improved results to attain CG2 are Abrasion Resistance and Water Absorption.

The EuroNorms, to this point have a great similarity to ISO requirements and designations; however, the EN standards go further and include Screed Materials (EN 13813) and Liquid Applied Water Impermeable Products for Use Beneath Ceramic Tiling Bonded with Adhesives (EN 14891).

SCREED MATERIALS are classified according to EN13813. Classifications for Screed Materials are descriptive in the fact that the performance is stated within the classification. Since LATICRETE only manufactures cementitious screeds, this Technical Data Sheet will only focus on this screed type.

A. Types of Screeds;

- | | |
|-------------------------|-----------|
| 1. <u>Cementitious*</u> | CT |
| 2. Calcium Sulfate | CA |
| 3. Magnesite | MA |
| 4. Mastic Asphalt | AS |
| 5. Synthetic Resin | SR |

B. Properties of Screeds (properties required for cementitious screeds);

- | | |
|--|------------|
| 1. Compressive Strength | C |
| 2. Flexural Strength | F |
| 3. Wear Resistance (one of three test methods) | |
| a. Böhme | A |
| b. Rolling Wheel | RWA |
| c. BCA | AR |

C. Performance of Screed – a numerical designation stating the performance of the screed in n/mm^2 (MPa).

The above mentioned properties of screeds (B.) are required for cementitious screeds. There are other properties which are optional (e.g. surface hardness (**SH**), modulus of elasticity (**E**), impact resistance (**IR**), bond strength (**B**), and more...) and may (or may not) be included in the classification. Wear Resistance would only apply if the screed will be used as a wearing surface and would not apply to a screed which will be clad with tile, stone or other hard wearing surface.

Polymer modification of the screed material would also be designated within the classification.

The designation for LATICRETE® 3701 Fortified Mortar Bed, not used as a wearing surface, would be;

EN 13813 Polymer Modified CT-C36-F8.5 – which means a polymer modified cementitious screed (CT) with a compressive strength (C) of 36 n/mm^2 (MPa) and a flexural strength (F) of 8.5 n/mm^2 (MPa).

MEMBRANE MATERIALS are classified as follows according to EN14891.

A. Types of Membranes;

- | | |
|---|-----------|
| 1. Cementitious Liquid-applied Water Impermeable Membrane | CM |
| 2. Dispersion Liquid-applied Water Impermeable Membrane | DM |
| 3. Reaction Resin Liquid-applied Water Impermeable Membrane | RM |

B. Classes of Membranes;

- | | |
|--|----------|
| 1. Crack Bridging Ability at Low Temperature | O |
| 2. Resistant to Contact with Chlorinated Water | P |

For each type of membrane, it is possible to have none of, one or both classes, and different optional characteristics of the adhesive based on performance. The designation of the adhesive consists of the letter for the adhesive type (CM, DM or RM), followed by the letter designation of the class (O or P). To make it easier please refer to the chart below;

TYPE	CLASS	DESCRIPTION
CM		Normal cementitious liquid-applied water impermeable membrane (CM)
DM		Normal dispersion liquid-applied water impermeable membrane (DM)
RM		Normal reaction resin liquid-applied water impermeable membrane (RM)
CM	O	Cementitious liquid-applied water impermeable membrane with crack bridging ability at low temperature (CM O)
DM	O	Dispersion liquid-applied water impermeable membrane with crack bridging ability at low temperature (DM O)
RM	O	Reaction resin liquid-applied water impermeable membrane with crack bridging ability at low temperature (RM O)
CM	P	Cementitious liquid-applied water impermeable membrane resistant to contact with chlorinated water (CM P)
DM	P	Dispersion liquid-applied water impermeable membrane resistant to contact with chlorinated water (DM P)
RM	P	Reaction resin liquid-applied water impermeable membrane resistant to contact with chlorinated water (CM P)
CM	OP	Cementitious liquid-applied water impermeable membrane with crack bridging ability at low temperature and resistant to contact with chlorinated water (CM OP)
DM	OP	Dispersion liquid-applied water impermeable membrane with crack bridging ability at low temperature and resistant to contact with chlorinated water (DM OP)
RM	OP	Reaction resin liquid-applied water impermeable membrane with crack bridging ability at low temperature and resistant to contact with chlorinated water (CM OP)

Now that we know what the performance classification codes of these membranes designate it is important to know exactly what each code designation refers. The following terms and definitions can help understand what it all means.

Cementitious Liquid-applied Water Impermeable Membrane (CM) – mixture of hydraulic binding agents (e.g. portland cement), aggregates, and organic additives (e.g. latex polymers, moisture retention additive, etc...) that only has to be mixed with water or liquid admixture just before use.

Dispersion Liquid-applied Water Impermeable Membrane (DM) – mixture of organic binding agents in the form of an aqueous polymer dispersion, organic additives and mineral fillers.

Reaction Resin Liquid-applied Water Impermeable Membrane (R) – mixture of synthetic resin, mineral fillers and organic additives in which hardening occurs by chemical reaction

Initial Tensile Adhesion Strength – determines the tensile strength of the membrane after 28 days as per EN14891 A6.2. All membrane types must meet the requirement of $\geq 0.5 \text{ n/mm}^2$ (MPa).

Tensile Adhesion Strength After Water Contact – determines the tensile strength of the membrane after 28 day cure (of which 21 days are submerged) as per EN14891 A6.3 or A6.4. All membrane types must meet the requirement of $\geq 0.5 \text{ n/mm}^2$ (MPa).

Tensile Adhesion Strength After Heat Ageing – determines the tensile strength of the membrane after 28 day cure (of which the final 14 days are in an oven at 70°C) as per EN14891 A6.5. All membrane types must meet the requirement of $\geq 0.5 \text{ n/mm}^2$ (MPa).

Tensile Adhesion Strength After Freeze/Thaw Cycles – determines the tensile strength of the membrane after performing 25 freeze/thaw cycles as per EN14891 6.6. All membrane types must meet the requirement of $\geq 0.5 \text{ n/mm}^2$ (MPa).

Tensile Adhesion Strength After Contact with Lime Water – determines the tensile strength of the membrane after 7 days submersion in saturated lime water as per EN14891 A6.9. All membrane types must meet the requirement of $\geq 0.5 \text{ n/mm}^2$ (MPa).

Waterproofing – determines the impermeability of the membrane in preventing water penetration through the membrane as per EN14891 A7.0. All membrane types must have no penetration of water.

Crack Bridging Ability Under Standard Conditions – determines the ability of the membrane to resist cracking as per EN14891 A8.2. All membrane types must meet the requirement of $\geq 0.75 \text{ mm}$.

The above mentioned requirements must be met to achieve a standard rating for the membrane type (e.g. CM, DM or RM). To achieve improved characteristics the following requirements must be met;

Tensile Adhesion Strength After Contact with Chlorinated Water – determines the tensile strength of the membrane after 28 day cure (of which 7 days are submerged in chlorinated water) as per EN14891 A6.7 or A6.8. All membrane types must meet the requirement of $\geq 0.5 \text{ n/mm}^2$ (MPa) to attain the **P** designation.

Crack Bridging Ability At Low Temperature (-5°C) – determines the tensile strength of the membrane after performing 25 freeze/thaw cycles at the stated temperature as per EN14891 8.3. All membrane types must meet the requirement of ≥ 0.5 n/mm² (MPa) to attain the **O** designation.

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LATICRETE INTERNATIONAL, INC. ▪ 1 LATICRETE Park North ▪ Bethany, CT 06524-3423 USA
800.243.4788 ▪ support@laticrete.com ▪ www.laticrete.com

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