INTERNATIONAL STANDARD

ISO 13007-1

Third edition
2014-05-15

Ceramic tiles — Grouts and adhesives —

Part 1: Terms, definitions and specifications for adhesives

Carreaux céramiques — Mortiers de joints et colles —

Partie 1: Termes, définitions et spécifications relatives aux colles

Reference number
ISO 13007-1:2014(E)

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Published in Switzerland

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2. www.iso.org/directives

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The committee responsible for this document is ISO/TC 189, *Ceramic Tiles*.

This third edition cancels and replaces the first and second editions (ISO 13007-1:2004, ISO 13007-1:2010), which have been technically revised.

ISO 13007 consists of the following parts, under the general title *Ceramic Tiles — Grouts and Adhesives*:

— *Part 1: Terms, definitions and specifications for adhesives*

— *Part 2: Test methods for adhesives*

— *Part 3: Terms, definitions and specifications for grouts*

— *Part 4: Test methods for grouts*

Ceramic tiles — Grouts and adhesives —

Part 1:
Terms, definitions and specifications for adhesives

1 Scope

This part of ISO 13007 applies to ceramic tile adhesives for internal and external tile installations on walls and floors.

This part of ISO 13007 gives the terminology, concerning the products, working methods, application properties, etc., for ceramic tile adhesives

This part of ISO 13007 specifies the values of performance requirements for all ceramic tile adhesives [cementitious (C), dispersion (D) and reaction resin (R) adhesives].

This part of ISO 13007 does not contain criteria or recommendations for the design and installation of ceramic tiles.

NOTE Ceramic tile adhesives can also be used for other types of tiles (natural and agglomerated stones, etc.), where these do not adversely affect the materials.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 13006, *Ceramic tiles — Definitions, classification, characteristics and marking*

ISO 13007-2, *Ceramic tiles — Grouts and adhesives — Part 2: Test methods for adhesives*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
substrate
fixing surface
surface on which the tile is installed or fixed

3.2
wall and floor tiles
tiles made out of ceramic tile or natural and agglomerated stones

Note 1 to entry: ISO 13006 should be used for definitions, classification, characteristics and marking of ceramic tile.

3.3
cementitious adhesive (C)
mixture of hydraulic binding agents, aggregates, and organic additives, to be mixed with water or liquid admix just before use

3.4
dispersion adhesive (D)
ready for use mixture of organic binding agent(s) that is in the form of an aqueous polymer dispersion, organic additives and mineral fillers

3.5
reaction resin adhesive (R)
single or multi-component mixture of synthetic resin, mineral fillers and organic additives in which curing occurs by chemical reaction

3.6
notched trowel
toothed tool, which makes it possible to apply the adhesive as a series of ribs of a uniform thickness onto the fixing surface and/or the reverse face of the tile

3.7
application to one surface only
adhesive applied only to the fixing surface with a trowel to obtain a uniform layer and then combed with a notched trowel

3.8
application to both surfaces
adhesive applied to the fixing surface and to the reverse surface of the tiles

3.9
shelf life
time of storage under stated conditions during which an adhesive may be expected to maintain its working properties

3.10
maturing Time
interval between the time when the cementitious adhesive is mixed and the time when it is ready for use

3.11
pot-life
time interval during which the adhesive can be used after mixing

3.12
open time
maximum time interval after application at which tiles can be embedded in the applied adhesive and meet the specified tensile adhesion strength requirement

3.13
slip
downward movement of a tile applied to a combed adhesive layer on a vertical surface

3.14
adjustability
maximum time interval after which the tile's position in the adhesive layer can be adjusted without significant loss of adhesion strength

3.15
adhesion strength
maximum strength per unit surface area which can be measured by shear or tensile testing

3.16
deformability
capacity of a hardened adhesive to be deformed by stresses between the tile and the fixing surface without damage to the installed surface

3.17
transverse deformation
deflection recorded at the center when a beam of hardened adhesive is subjected to three point loading

3.18
fundamental characteristics
characteristics that an adhesive absolutely must have

3.19
additional characteristics
characteristics for specific service conditions where enhanced levels of performance are required

3.20
special characteristics
characteristics of the adhesive which provide further information about its general performance

4 Classification and designation

Tile adhesives are defined in three types, according to the definitions reported in 3.2:

C Cementitious adhesive;

D Dispersion adhesive;

R Reaction resin adhesive.

For each type it is possible to have different classes, related to combinations of the different additional and special characteristics, in accordance with Tables 1, 2, and 3. These classes are designated with the following abbreviations:

1 normal adhesive

2 improved adhesive

F fast setting cementitious adhesive

A accelerated drying dispersion adhesive

T slip resistant adhesive

E adhesive with extended open time

S special deformable characteristic for cementitious adhesives only

P adhesive with adhesion to exterior glue plywood

The designation of the adhesive is generated with the symbol of the type (C, D, or R), followed by the abbreviation of the class or classes to which it belongs. The following table describes the designation of current tile adhesives

Table 1 — Examples of Designation and Classification

Symbol type	Number	Class	Description
C	1		Normal cementitious adhesive
C	1	F	Fast setting cementitious adhesive
C	1	T	Normal cementitious adhesive with slip resistance
C	1	FT	Fast setting cementitious adhesive with slip resistance
C	2		Cementitious adhesive with improved characteristics
C	2	E	Cementitious adhesive with improved characteristics and extended open time
C	2	F	Fast setting cementitious adhesive with improved characteristics
C	2	T	Cementitious adhesive with improved characteristics and slip resistance
C	2	TE	Cementitious adhesive with improved characteristics, slip resistance and extended open time
C	2	FT	Fast setting cementitious adhesive with improved characteristics and slip resistance
D	1		Normal dispersion adhesive
D	1	T	Normal cementitious adhesive with slip resistance
D	2		Dispersion adhesive with improved characteristics
D	2	A	Accelerated drying dispersion adhesive with improved characteristics
D	2	T	Dispersion adhesive with improved characteristics with slip resistance
D	2	TE	Dispersion adhesive with improved characteristics, slip resistance and extended open time
R	1		Normal reaction resin adhesive
R	1	T	Normal reaction resin adhesive with slip resistance
R	2		Reaction resin adhesive with improved characteristics
R	2	T	Reaction resin adhesive with improved characteristics and slip resistance

NOTE Additional designations can be inserted according to the combination of the different symbols of the characteristics. For example: C2ES1P1 – Deformable, improved cementitious adhesive with extended open time and normal adhesion to exterior glue plywood.

5 Requirements

5.1 Substrates

The standard concrete substrate is mandatory. Other substrates may be used upon agreement if the substrate is recommended for the ceramic tile application by the adhesive manufacturer.

5.1.1 Exterior Glue Plywood

The exterior glue plywood substrate shall conform to the requirements for exterior plywood[1)]. Test substrate must be at least 18,25 mm (23/32 of an inch) in thickness and must be selected from the Group

1) Published requirements may be found in the US Voluntary Product Standard PS 1-09, Structural Plywood available online at: www.apawood.org.

1 wood species with a wood veneer quality of "C-C plugged" or better and have no visible flaws in the "C-plugged" test area. Plywood with at least one C plugged side as the test surface is preferred[2)].

5.1.2 Other Substrates

To demonstrate compatibility with other optional substrates, the adhesive shall be applied to the selected substrate in accordance with the Tensile Adhesion Strength Method (ISO 13007-2:2010, 4.4.4.2). When the result of >0,5 N/mm^2 is achieved or cohesive failure occurs in the substrate, the requirement is considered satisfied.

5.2 Specifications for Cementitious Adhesives (C)

Cementitious Adhesives shall comply with all of the C1 Fundamental Characteristics reported in Table 2. The amount of water and/or liquid admix required for preparing the cementitious adhesive must be the same for all tests. The additional characteristics for C2 (improved performance) products are also contained in Table 2. Table 3 reports the Special Characteristics that can be reported for cementitious adhesives.

Table 2 — Specifications for Cementitious Adhesives (C)

Classification	Property	Requirement	Test Method ISO 13007-2:2010
C1 - Normal cementitious adhesives (Fundamental characteristics)	Tensile adhesion strength	≥ 0,5 N/mm^2	4.4.4.2
	Tensile adhesion strength after water immersion	≥ 0,5 N/mm^2	4.4.4.3
	Tensile adhesion strength after heat aging	≥ 0,5 N/mm^2	4.4.4.4
	Tensile adhesion strength after freeze–thaw cycle	≥ 0,5 N/mm^2	4.4.4.5
	Open time: tensile adhesion strength	≥ 0,5 N/mm^2 After not less than 20 min.	4.1
C2 - Improved cementitious adhesives (Additional characteristics)	Tensile adhesion strength	≥ 1,0 N/mm^2	4.4.4.2
	Tensile adhesion strength after water immersion	≥ 1,0 N/mm^2	4.4.4.3
	Tensile adhesion strength after heat aging	≥ 1,0 N/mm^2	4.4.4.4
	Tensile adhesion strength after freeze–thaw cycle	≥ 1,0 N/mm^2	4.4.4.5

2) Plywood meeting the requirements of 5.1.1 may be obtained through the Tile Council of North America (TCNA). Typically either Douglas Fir or Southern Yellow Pine plywood is supplied.

Table 3 — Specifications for Cementitious Adhesives (C) — Special Characteristics

Special Characteristic	Property	Requirement	Test Method ISO 13007-2:2010
T - Slip Resistance	Slip	≤ 0,5 mm	4.2
F - Fast Setting Adhesives	Tensile adhesion strength	≥ 0,5 N/mm² after no more than 6h	4.4.4.2
	Open time: tensile adhesion strength	≥ 0,5 N/mm² after not less than 10 min.	4.1
	All other requirements at least equal to or better than those listed for C1 adhesives as in Table 2	See Table 2 under C1 Adhesives	See Table 2 under C1 adhesives
S - Transverse Deformation	Deformable adhesive—S1	≥ 2,5 mm, < 5 mm	4.5
	Highly deformable adhesives—S2	≥ 5 mm	4.5
E - Extended Open Time	Extended open time: Tensile Adhesion Strength	≥ 0,5 N/mm² after not less than 30 min.	4.1
P –Exterior Glue Plywood Adhesion (Optional Substrates)	Normal Exterior Glue Plywood Adhesion (P1)	≥ 0,5 N/mm²	4.4.4.2
	Improved Exterior Glue Plywood Adhesion (P2)	≥ 1 N/mm²	4.4.4.2

5.3 Specifications for Dispersion Adhesives (D)

All Dispersion Adhesives shall comply with the D1 Fundamental Characteristics reported in Table 4. The Additional characteristics for D2 (improved performance) products are also contained in Table 4. Table 5 reports the Special Characteristics that can be reported for dispersion adhesives.

Table 4 — Specifications for Dispersion Adhesives (D)

Classification	Property	Requirement	Test Method ISO 13007-2:2010
D1 - Normal Adhesive (Fundamental Characteristics)	Shear adhesion strength	≥ 1 N/mm²	4.3.4
	Shear Adhesion strength after heat aging	≥ 1 N/mm²	4.3.6
	Open time: tensile adhesion strength	≥ 0,5 N/mm² after not less than 20 min.	4.1
D2 - Improved Adhesive (Additional Characteristics)	Shear adhesion strength after 21 days air cure, 7 days water immersion	≥ 0,5 N/mm²	4.3.5
	Shear adhesion strength at elevated temperature	≥ 1 N/mm²	4.3.7

Table 5 — Specifications for Dispersion Adhesives (D) - Special Characteristics

Special Characteristic	Property	Requirement	Test Method ISO 13007-2:2010
T –Slip Resistance	Vertical slip resistance	≤ 0,5 mm	4.2
A - Accelerated Drying	Shear adhesion strength after 7 days air cure, 7 days water immersion	≥ 0,5 N/mm^2	4.3.5
	Shear adhesion strength at elevated temperature	≥ 1 N/mm^2	4.3.7
E - Extended Open Time	Extended open time: tensile adhesion strength	≥ 0,5 N/mm^2 after not less than 30 min.	4.1

5.4 Specifications for Reaction Resin Adhesives (R)

All reaction resin adhesives shall comply with the R1 fundamental characteristics reported in Table 6. The additional characteristics for R2 (improved performance) products are also contained in Table 6. Table 7 reports the Special Characteristics that can be reported for reaction resin adhesives.

Regarding the characteristic of chemical resistance, there is no indication of limit value or chemical agent. When specific chemical resistance data are required for a project, testing shall conform to (ISO 13007-2:2010, 4.6, Determination of Chemical Resistance) with chemical concentrations and immersion temperatures chosen to simulate exposure conditions. The test media shall consist of media to which the chemical resistant materials are to be exposed in service and the test conditions (temperature, etc.) shall simulate the anticipated service and exposure conditions as closely as possible.

Table 6 — Specifications for Reaction Resin Adhesives (R)

Classification	Property	Requirement	Test Method ISO 13007-2:2010
R1 - Normal Adhesive (Fundamental Characteristics)	Shear adhesion strength	≥ 2 N/mm^2	4.3.4
	Shear adhesion strength after water immersion	≥ 2 N/mm^2	4.3.5
	Open time: tensile adhesion strength	≥ 0,5 N/mm^2 after not less than 20 min.	4.1
R2 - Improved Adhesives (Additional Characteristics)	Shear adhesion strength after thermal shock	≥ 2 N/mm^2	4.3.8

Table 7 — Specification for Reaction Resin Adhesives (R) -Special Characteristics

Special Characteristic	Property	Requirement	Test Method ISO 13007-2:2010
T - Slip Resistance	Vertical slip resistance	≤ 0,5 mm	4.2

6 Marking, labelling and packaging

Products complying with the requirements of this part of ISO 13007 shall be clearly marked with the following information:

a) Name of the product

b) Manufacturer's mark and place of origin