TECHNICAL REPORT

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Ceramic tiles — Guidelines for installation —

Part 1: Installation of ceramic wall and floor tiles

Carreaux et dalles céramiques — Lignes directrices pour l'installation —

Partie 1: Installation des carreaux et dalles céramiques au sol et aux murs

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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 (see www.iso.org/directives).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

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

ISO/TR 17870 consists of the following parts, under the general title *Ceramic tiles — Guidelines for installation*:

— *Part 1: Installation of ceramic wall and floor tiles*

— *Part 2: Installation of thin ceramic wall and floor tiles and panels*

Introduction

There are currently International Standards available for

— ceramic tiles, and

— adhesives and grouts for tiles.

NOTE ISO 13007-5, dealing with liquid-applied waterproofing membranes for use beneath ceramic tiling bonded with adhesives, is under preparation.

For these products to give satisfactory service, they need to be selected and installed competently, and they have to receive appropriate initial treatment, protection, and maintenance.

Some countries have published standards and/or guides that specify the design and installation of ceramic tiling. The purpose of ISO/TR 17870 is to foster good installation practices for ceramic wall and floor tiles, internationally.

Ceramic tiles — Guidelines for installation —

Part 1:
Installation of ceramic wall and floor tiles

1 Scope

This part of ISO/TR 17870 defines the quality of ceramic tiling and provides guidance for materials selection, installation and use, to achieve required levels of quality and performance.

It considers aspects related to the specification and installation of the tiling project, in terms of:

— manufacture and distribution of the materials (ceramic tiles, adhesives, grouts, etc.);

— specification of the tiling;

— installation of the tiling (tile fixing operations).

It is applicable to internal and external floor and wall ceramic tiling, installed by either cement mortar or other adhesive methods.

NOTE The quality of ceramic tiling depends on the following general characteristics:

— regularity;

— durability;

— safety.

The durability of the tiling can depend on its use and management.

2 Terms and definitions

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

2.1 General

2.1.1
ceramic tiling
ceramic tiles installed, together with its associated bedding and jointing

2.1.2
design (of ceramic tiling)
specification (of ceramic tiling)
selection of ceramic tiles, backgrounds, fixing methods, and fixing and jointing materials as appropriate for the structure and intended use

2.1.3
installation (of ceramic tiling)
tile fixing
application of ceramic tiling in accordance with the specification

2.2 Components of ceramic tiling

2.2.1
background
material system used as a base over which the ceramic tile is to be fixed

2.2.2
filling out layer
separate application of material to achieve the required vertical flatness (walls)

EXAMPLE Plaster, render, proprietary tile backer boards.

2.2.3
fixing surface
plane rigid surface upon which the tile is fixed

2.2.4
insulating layer
layer included to obtain sound or thermal insulation

2.2.5
intermediate joint
movement joint to divide large areas of tiling into smaller, approximately square areas

2.2.6
levelling layer
layer applied to compensate for unevenness and differences in height of the base or to accommodate services (floors)

2.2.7
movement joint
joint in tiles, backgrounds, or substrates, designed to accommodate movement

Note 1 to entry: Types of movement joints: structural joint, perimeter joint, intermediate joint.

2.2.8
perimeter joint
movement joint to isolate the ceramic tiling from adjacent building elements

2.2.9
primer
fluid material, used separately or mixed with binder to form a slurry, applied as a thin layer to improve adhesion of the bedding to the background, or to isolate the bedding material from the background surface

2.2.10
separating layer
material which separates layers within the tiling system

2.2.11
structural joint
movement joint in ceramic tiling to correspond with structural movement joint in the background

2.2.12
tile bed
bedding
layer of specified materials in which the tile is set and which bonds the tiles to the background

2.2.13
tile joint
space between adjacent tiles

2.2.14
waterproofing membrane
continuous layer of impervious material to resist the passage of water

2.3 Tiling techniques and operations

2.3.1
bonded method
floor tiling laid with a system which ensures that the bedding is bonded to the background

2.3.2
buttering method
adhesive or mortar applied to the back of the tiles, just before the tile is placed

2.3.3
contact area
proportion of the tile back and/or background support that is in contact with the bedding after the tile has been fixed into position

2.3.4
direct bedding
tile fixing directly onto a structural background

2.3.5
floating method
adhesive or mortar applied to the fixing surface, just before the tile is placed

2.3.6
floating and buttering method
adhesive or mortar applied to the fixing surface and to the back of the tile, just before the tile is placed

2.3.7
grouting
operation of filling the joint space between tiles other than at movement joints

2.3.8
maintenance (of ceramic tiling)
all aspects of the cleaning, treatment, and periodic repair of damage to the ceramic tiling

2.3.9
plastering
application of a gypsum plaster to a vertical background

2.3.10
rendering
application of a cement mortar to a vertical background

2.3.11
screeding
application of a screed on a floor background

2.3.12
tanking
application of an impermeable layer beneath tile and bedding to prevent water penetration into the background

2.3.13
unbonded method
any method of laying floors which provides separation of the tiling system from the background

2.4 Characteristics/aspects of ceramic tiling

2.4.1
durability
quality of tiling which maintains its characteristics over time

2.4.2
flatness
conformity of the surface of the tiling to a theoretical plane within an allowable tolerance

2.4.3
levelness
conformity of the surface of floor tiling to a fixed horizontal level within an allowable tolerance

2.4.4
lipping
deviation between tile surfaces either side of a joint (including movement joints)

2.4.5
plumbness
conformity of the surface of wall tiling, designed to be vertical, to a fixed plane within an allowable tolerance

2.4.6
slip resistance
ability of a floor tile to provide sufficient friction to resist slipping by pedestrians

3 Exchange of information

In order for the correct floor/wall covering to be installed in appropriate conditions, at the right time, etc., it is essential that all parties have a clear understanding of the requirements of the project. To ensure that this is achieved, it is essential that there is wide consultation between all the parties involved in the project, including client, sub-contractors, and materials suppliers.

As each project will be unique, it is impossible to give a definitive list of the information to be exchanged, but the following are common examples.

a) Specification: the information required (see Clause 5).

b) Special attendances: access, unloading, hoisting and storage facilities, heat, light and power, and any additional items considered necessary to expedite the work.

c) Materials: technical specification and instructions for transport, storage, use.

d) Backgrounds: type and age of construction; location within the building; type, characteristics (mechanical strength, deformation, etc.), and regularity of background (see Clause 5); and any need for an intermediate substrate or for movement joints.

e) Associated work: services embedded in or passing through the backgrounds and junctions with other adjacent finishes

f) Finishes: type, size, and colour of tiles and layout requirements.

g) Installation: type and technique (see Clause 6).

h) Programme: a time schedule for the progress of the work taking into consideration drying and curing periods of backgrounds and tiling until completion.

4 Materials

4.1 General

This clause identifies and lists the materials that can be involved in a ceramic tiling installation, and defines the main information and rules that apply to these materials.

The identification and selection of materials suitable for any given application are aspects of the specification. The relative criteria are therefore set out in 5.3.

4.2 Basic materials

The basic materials for tiling are the following:

- finishing layer:
  - ceramic tiles;
  - cementitious grouts;
  - reaction resin grouts;
  - pre-prepared or proprietary grouts;
- bedding:
  - mortar;
  - cement;
  - other binders;
  - sand and aggregates (gravel, crushed stone, etc.);
  - water;
  - admixtures;
  - adhesives;
- movement joints:
  - sealants;
  - primers;
  - back-up materials;
  - special components (profiles, etc.).

Additional intermediate layers can be the following:

- primers;
- separating layer;
- filling out layer;
- levelling layer;
- anti-fracture/de-coupling membranes;
- waterproofing membrane;

— insulating layers (sound, thermal);

— reinforced screed, etc.

4.3 Basic information

For each material, the following basic information should be provided.

a) Classification

With reference to the existing International Standards, see Bibliography.

b) Safety requirements

c) Materials transport, storage, use

d) Technical information

The technical information for a given material is usually in the form of a document, supplied by the manufacturer, containing a list of the technical characteristics as specified in the standards (where available, see Bibliography; otherwise, in other technical documents) and the results of the respective measurements, carried out according to the standardized test methods.

The information document is a basic requirement for the correct and knowledgeable selection, application, and use of materials for tiling.

— All materials

  — The delivery of materials should be so arranged as to minimize handling.

  — Adequate precautions should be taken to prevent damage. Products should be stored in clean, dry, frost free (if necessary) secure storage to avoid theft and damage.

  — The materials should be transported, stored, prepared and used strictly in accordance with the manufacturer's instructions (when applicable).

— Cement and cement-based materials

  — Cement should be stored under dry conditions, and used in order of delivery.

  — Cement that contains air set lumps should not be used.

— Grout

  — In order to avoid colour differences, sand and cement used for mixing grout should be from the same batch.

— Sand and aggregates

  — Sand and aggregates should be protected from contamination.

  — Any contaminated sand or aggregates should not be used.

— Water

  — Water should be clean. Seawater is not suitable.

  — All containers used for storing or carrying water or for soaking tiles should be clean.

5 Specification

5.1 General

The specification of ceramic tiling aims to identify and define, in any specific situation, one or more correct fixing methods suitable to achieve an acceptable finish complying with the general requirements of regularity, durability and safety (see Clause 7).

Specification is considered to be a duty of the designer or specifier in consultation with the project owner and with the specification approved by the project owner.

5.2 The project data

The project information constitutes the basis of the tiling specification.

5.2.1 Installation location and working conditions

The following criteria should be considered at the design stage as a basis for the specification of the materials and the tiling system.

Information on the location of the installation:

— the position of the tiling: horizontal (floors), vertical (walls), other (for example, inclined, vault, ceiling, etc.);

— the location of the tiling: outdoor/external or indoor/internal;

— the nature of the location: private/residential or public;

— the destined use of the location: domestic, commercial or industrial;

— the specific activities which will be carried out in the tiled area.

Information on working conditions:

— climate (for external tiling);

— location (for example, urban, industrial, etc.) for external tiling;

— expected traffic type (for example, pedestrian, wheels, etc.) and intensity (for floors);

— expected static and dynamic loads on floor tiling;

— presence of water or other fluids on the tiled surface;

— presence of chemicals on the tiled surface.

The information above should be used to anticipate:

— the expected level of mechanical, abrasive, chemical wetting, and thermal loads acting on the tiling;

— general (not individual) requirements regarding safety (for example, slip resistance, hygiene, etc.) or other additional requirements.

5.2.2 Backgrounds

The nature of the background is a prime consideration in deciding on the fixing method (specification of materials, in particular, adhesives, and of the tiling system, as well as of any intermediate substrate or other preparatory treatment that may be necessary before tiling). The characteristics of the background that influence the choice of fixing method are summarized in Table 1.

The characteristics listed in Table 1 can be used as a framework in order to evaluate backgrounds in the tiling design stage, as well as providing indications for the specification of the tiling system (5.4).

The following general rules should be adopted.

— Backgrounds for tiling should be sound and free from contamination.

— Cementitious backgrounds are subject to long-term shrinkage. The associated risks can be reduced by selecting a suitable time schedule and materials used.

— Levelling and/or filling out layers should be used when desired by the project owner (especially when tiling with adhesives) to achieve satisfactory surface regularity, to improve the background flatness/finish, or to compensate for floors out of level and walls out of plumb.

— Special intermediate substrates can be used for waterproofing, or for sound /thermal insulation.

— Separating layers may, where appropriate, be used to avoid the effects of dimensional instability of the background.

— In the case of deformable backgrounds, the application of a suitable layer (for example, a reinforced screed) should be considered.

Table 1 — Background characteristics

Characteristics			Description
Mechanical	Mechanical strength	— *Compressive strength* — *Bending strength* — *Pull off strength*	— Resistance to rupture or damage under working loads — Ability to support the permanent load of the tiling (tiles, mortar bed, etc.)
	Deformation under load	— *Compression* — *Deflection* — *Creep*	— Tendency of the support to deform under static and dynamic load
	Deformation without load	— *Shrinkage* — *Plastic deformation* — *Chemical shrinkage* — *Thermal and Damp* Conditions	— Movements due to non-load factors
	Surface soundness		— Ability to support the weight (walls) of the tiling system
Regularity	Flatness		— Departure from planarity (depressions, protuberances, bumps)
	Surface finish		— Texture of surface

Table 1 *(continued)*

Characteristics		Description
Chemical/Physical	Water absorption	— The amount and rate at which the background absorbs water from the bedding
	Water resistance	— The behaviour of the background exposed to contact with water (both during tile installation and in use
	Chemical	— Compatibility between the background surface and the material or layers laid on it

5.3 Selection and specification of the materials

The selection of the materials (ceramic tiles, adhesives or mortars, grouts) is a basic step in the specification of ceramic tiling, since it can significantly influence the achievement of satisfactory compliance with the general requirements of regularity, durability, and safety, which define the quality of ceramic tiling (see Clause 7).

A very wide range of products are available on the market: products with different appearance (for example, tiles having different format, colours, surface texture, decorations, etc.), different technical characteristics, and associated different expected performance levels (for example, in terms of resistance to mechanical loads, or to frost and other extreme conditions of temperature or humidity). The technical characteristics of ceramic tiles, adhesives, and grouts will be documented in the manufacturer's technical specifications, which therefore represent basic documents for the selection of materials. Three general criteria for the selection of the materials should be adopted, see 5.3.1 to 5.3.3.

5.3.1 Criterion of performance

This criterion is based on the comparison of

— the expected loads and needs associated with the intended end-use and expected working conditions of the tiling (5.2.1), as well as to the characteristics of the background (5.2.2), with

— the technical characteristics and performance level of the material, as documented in its technical specification (Clause 4).

The criterion of performance is the following:

— "the performance level of the material selected should not be lower than the expected demands of the end-use environment as communicated by the project owner."

5.3.2 Criterion of compatibility

The criterion of compatibility is the following:

— "the materials selected should be reciprocally compatible."

The information on compatibility or possible incompatibilities is usually found in the technical specification or informative documentation supplied by the manufacturer (for example, adhesives designed for particular types of background materials).

5.3.3 Criterion of safety

The criterion of safety is the following:

— "the materials selected should be selected considering their safe use and meet local building code regulations for safety, understanding that individual use and owner maintenance also affect individual safety."

EXAMPLE In external walls, the use of tiles of a suitable type and size can be specified taking into account the fixing system, which for large format tiles might need to be mechanical.

5.4 Specification of the tiling

5.4.1 Tiling system

Tiling systems can be classified essentially according to:

— the type of tile bed (or bedding):
  — cement mortar;
  — adhesive;
  — mechanical;
— the need of specified layer(s) under the tile bed, such as screed, reinforced screed; levelling out layer; levelling layer; separating layer; etc. (see 2.2).
— the method of application of the bedding (see 2.3):
  — floating method;
  — buttering method;
  — floating and buttering method;
  — bonded method;
  — unbonded method.

The choice of the tiling system should take into consideration both the characteristics of the background, and the expected end-use environment as communicated by the project owner.

5.4.2 Tile joints

Tiles should be positioned with regular straight joints, the width of which should be specified taking into account the type, size and dimensional tolerances of the tiles, the characteristics of the background, the installation method, and the expected end use of the tiling and anticipated loads likely to be imposed as communicated by the project owner.

5.4.3 Movement joints

Consideration should be given at the design stage to the provision of movement joints (structural joints, perimeter joints, intermediate joints). The specification for the movement joint should include information on type, materials, construction, dimensions (width and depth), and position.

— Type, materials, and construction

  — back-up and sealing material, metal angles, etc.; or pre-formed movement joints.

— Dimensions

  — Width:

    — perimeter joints: minimum width (for example, 6 mm);

    — intermediate joints: minimum width (for example, 6 mm);

    — structural joints: width should be greater than or equal to the joint in the background.

  — Depth:

    — perimeter joints: depth to penetrate to the full depth of the screed or render;

    — intermediate joints: depth to penetrate to the full depth of the screed or render;

    — structural joints: depth to be continuous from the joint in the background.

— Position:

  — perimeter joints: where the tiling abuts a restraining surface;

  — intermediate joints: minimum area between joints and/or the distance between joints should be specified. Different limits or reference values should be established according to the end use environment as communicated by the project owner (for example, for internal or external applications and areas of tiling that incorporate underfloor heating). Areas between joints should be approximately square where applicable;

  — structural joints: immediately over and continuous with structural movement joints in the background.

6 Installation

6.1 General

The installation of ceramic tiling may include the following:

— analysis of the specification and planning of the work;

— control of environmental conditions;

— possible storage and control of the materials depending on when transfer to the owner or others occurs;

— control and preparation of the background (fixing surface);

— preparation of the bedding material (mortar, adhesive);

— application of the bedding and application of tiles;

— preparation and application of the grout;

— installation of movement joints;

— cleaning and protection depending on when transfer to the owner or others occurs and provisions by owner for protection of the finish work.

6.2 Analysis of the specification and planning of the work

6.2.1 On the basis of the specification [materials (ceramic tiles, adhesives or mortars, grouts), see 5.3; tiling system see 5.4.1; tile joints (width) see 5.4.2; movement joints see 5.4.3], taking into account the characteristics of the background and the environmental conditions on the work site, a schedule of the work should be prepared. This scheduled work plan should reflect the time requirements for the different operations, as well as the time required by some materials (for example, the bedding materials: adhesives or mortars) or layers (for example, a levelling layer) to reach suitable levels of mechanical strength.

6.2.2 A preliminary setting out of the tiling is advisable, in order to avoid, as far as possible, small or unequal cut courses, as well as to optimize the lay-out.

6.3 Control of environmental conditions

6.3.1 Environmental temperature, humidity, exposure to sunny, windy, or rainy conditions can influence the application behaviour and ageing of some materials (mortars, adhesives, grouts). Therefore, acceptable parameters for environmental conditions should be agreed by all parties, taking into account the materials and the tiling system adopted.

For example:

— installation of ceramic tiles should not be undertaken when the temperature of the air, backgrounds, or materials is less than 5 °C;

— external tiling should not be undertaken under adverse climatic conditions (rain, snow, wind).

6.3.2 Lighting conditions on the work site can influence the standard of workmanship that can be achieved (regularity requirements, 7.2.2). Therefore, acceptable lighting conditions should be specified at the design stage.

For example:

— where work is carried out in artificial light, the direction and intensity of the temporary lighting should be similar to the intended final lighting.

6.4 Storage and control of the materials

6.4.1 Materials should be stored and controlled according to the specification considered (see 4.3 c).

6.4.2 Technical information supplied by the manufacturers of the materials used (tiles, adhesives, grouts, etc.) should be carefully reviewed. All the relevant storage, control, preparation, and application conditions should be carried out strictly in accordance with the manufacturer's instructions.

6.5 Control and preparation of the background, preparation of the bedding material, application of bedding and tiles

6.5.1 These operations may involve taking into account the behaviour or characteristics of materials, which may bring about detrimental effects, if unsuitably managed. The associated risks should be prevented through advisable procedures.

For example:

— installation by cement mortar: for walls and bonded floors, porous backgrounds should be well wetted to control excessive suction of water from the mortar;

— tiles should be provided from the same dye lot/production run. If not the tiles should be mixed before fixing to the extent reasonably practical and confirmed with the project owner [the effects of any shade variations — acceptable according to the relevant Standards (see Bibliography) — become less visible after this procedure];

— some porous tiles to be installed by cement mortar should be suitably soaked in water prior to fixing in order to prevent the risk of water being removed from the mortar by absorption of the tile;

— allow excess water to drain off prior to fixing.

6.5.2 All these tiling operations should be carried out taking into account the specific characteristics of the materials used (and the manufacturer's instructions, which should be strictly followed, as stated above), and being aware that the regularity and durability requisites of the tiling (see 7.2.2 and 7.2.3) can be complied with, provided the following conditions are reached:

— the tile bed is reasonably uniform in thickness where relevant (reference: the specified thickness);

— the tile bed meets criteria established by the mortar manufacturer and the tile manufacturer.

These factors are more critical and important, the higher the level of expected exposure of the tiling to mechanical, thermal, or damp conditions, (see 5.2.1). Also, the type of tile, its size, and the profile of its back surface, are important too from this point of view. Therefore, the recourse to special techniques can be specified in particular situations.

For example:

— backgrounds should be checked as having the regularity characteristics considered in the specification. Any discrepancy from the specification should be communicated to the appropriate parties.

Installation with adhesives:

— the choice of a notched trowel for the application of adhesive beds depends on the type of installation, the tolerance in the background, the size of the tile, and the type of adhesive;

— with heavily keyed tiles it may be necessary to fill in with adhesive any recess in the back of the tile, prior to placing them into the bedding, also considering though possible shrinkage of the mortar (depending on its properties) and the strain that can place on the tile;

— for internal tiling with large format tiles, i.e. 3 600 cm^2 or over and expected to be exposed to heavy mechanical, thermal, or damp conditions, the adoption of the floating and buttering method is advisable. For external tiling with large format tiles, mechanical fixing should be considered.

6.6 Installation of movement joints

At the positions specified by the designer, open joints through the tiling and tile bedding should be provided, leaving them clean and clear of debris, for filling with the specified sealant.

Alternatively, build into the tile and bed for the full thickness, preformed deformable movement joint strips as specified.

6.7 Cleaning and protection

The tiling work should be cleaned and protected against premature loading and adverse climatic conditions (see 8.2 and 8.3) as per an understanding with the project owner on when transfer takes place and who is responsible prior to that time.

7 Quality of ceramic tiling: characteristics and requirements

7.1 General characteristics of ceramic tiling

The quality of ceramic tiling depends on the following general characteristics:

— regularity, which includes characteristics such as flatness, lipping, levelness, and plumbness;

— durability, which includes the resistance of the tiling to abrasion, loads, and conditions associated with the intended end use of the tiling;

— safety, which includes tiling characteristics such as slip resistance and certain limited aspects of fire resistance.

Further characteristics, such as impermeability, thermal or sound insulation, insulation from impact noise, are considered to be special performance characteristics for the tiling.

7.2 Guidelines for the specification of requirements and their recommended tolerances

7.2.1 General

This clause covers the general requirements related to the characteristics listed in 7.1. The relevant tiling properties, the measuring method and the reference limit value (when available), as well as some general (qualitative) concepts.

Each reference limit value is recommended as the minimum acceptable level of the respective characteristic or property.

NOTE National standards or guides can adopt tolerances that are equal to or more severe than the reference limit values reported in this document.

It is assumed that compliance with both the general and specific tiling tolerances presented in this part of ISO/TR 17870 depends on (i) the quality, characteristics and performance of the materials used (tiles, adhesives, grouts, etc.), (ii) the suitability and correctness of the design, (iii) the suitability and correctness of the installation activities, and (iv) the suitability and correctness of the use of the tiling.

7.2.2 Regularity

7.2.2.1 General

Visual examination of tiling should be carried out from a distance of at least 1,5 m, without acute angled lighting.

7.2.2.2 Flatness

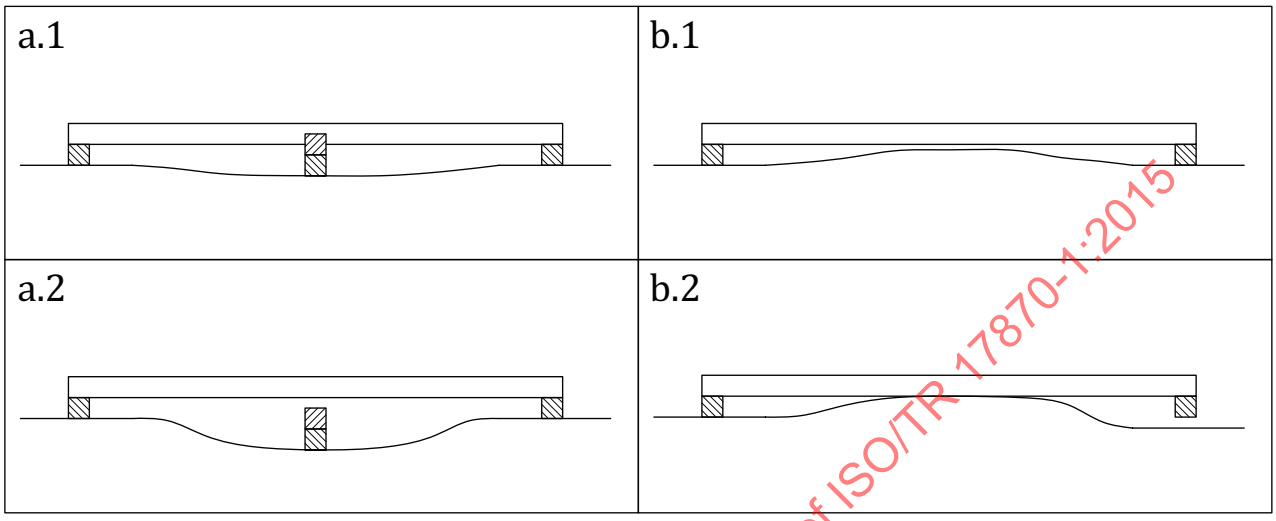
This is applicable to both floor and wall tiling.

Method: ISO 7976-1:1989, 7.3.1.

Reference limit: Tolerance = ±3 mm under a 2 m straightedge but no tighter than the actual background over which the tile is being installed unless provisions for a levelling layer have been made.

A 2 m straightedge with 3 mm “feet” at each end is placed on the tiling. The max distance X between the surface and the straightedge is measured, using a rule or a measuring wedge. The straightness deviation is (X-3), and this is an indicator of flatness.

EXAMPLE Compliance with the above tolerance can be assessed as shown in Figure 1 using a fillet 6 mm thick.



Key

a.1 within the tolerance
a.2 out of tolerance
b.1 within the tolerance
b.2 out of tolerance

Figure 1 — Flatness measurement

Remarks:

1) To this recommended tolerance, the relevant tolerance of the tile used should be added.

2) When fixed with adhesive, the finished tiling tolerance will depend upon that of the background.

7.2.2.3 Lipping

This is applicable to both floor and wall tiling.

Method: Straightedge across joints.

A suitable length straightedge is placed on the floor resting on the lipped edge, with the straightedge held flat to the tile. Any gap between the overhanging straightedge and the adjacent tile is measured by calibrated wedge (see Figure 2) or other thickness gauge.

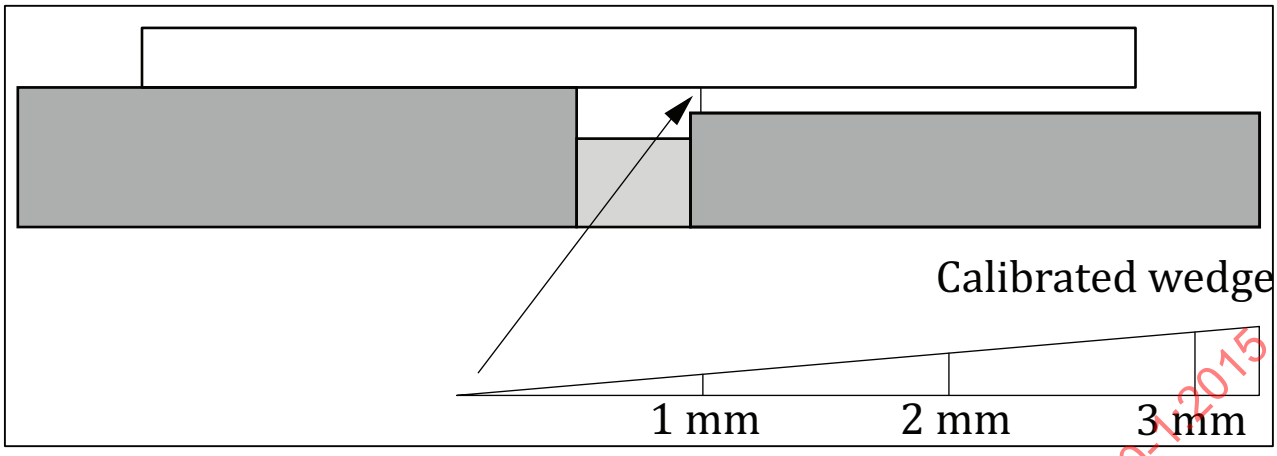


Figure 2 — Lipping measurement

Reference limits: Tolerance = 1 mm max, for joints <6 mm wide; 2 mm max, for joints ≥6 mm wide.

Remarks: To this recommended tolerance, the relevant tolerance of the tile used may be added.

7.2.2.4 Levelness

This is applicable to floor tiling, except at perimeters, etc., recognizing though that certain sloping conditions should not be levelled where it would impact adjoining spaces and doorways, etc., or where needed to maintain drainage, and only when desired by the project owner.

Method: Use of a levelling device (water level, optical level, laser level, etc.).

Reference limits: Tolerance = ± L/600, where L = measured length between fixed data, in mm.

Remarks: Greater accuracy may be needed at partitions, door openings, and where plant is to be installed directly on the floor.

7.2.2.5 Plumbness

This is applicable to wall tiling where desired by the project owner and recognizing that when tiles are fixed with adhesive, the finished tiling tolerance will depend upon that of the background.

Method: Use of a plumb rule.

Reference limits: Tolerance = ±h/600, where h = measured height of the wall, in mm.

7.2.2.6 Width and straightness of joints

This is applicable to both floor and wall tiling.

The joints between tiles are an important feature of any tiling installation, particularly when small tiles, wide joints, or contrasting coloured grouts are specified. The width of the joints between tiles should be even and of regular dimension (subject to the manufacturing tolerance for the type of tile specified). Generally, tile joints should be straight in alignment unless the tiles are, by design, irregular in shape. Special attention is recommended at “eye level” for wall tiling and for large areas of floor tiling where the joint lines can be sighted.

