TILING

1 GENERAL

1.1 INSPECTION

Notice
Give sufficient notice so that inspection may be made of the following:

- Floor preparation and set out of floor tiles before fixing.
- Wall preparation and set out of wall tiles before fixing.
- Control joints before sealing and grouting.

1.2 SUBMISSIONS

Samples
Submit labelled samples of tiles, including fittings, accessories, grout and sealants, illustrating the range of variation in colour and finish.

1.3 INTERPRETATIONS

Definitions
For the purposes of this worksection the definitions given below apply.

- Substrates: The surfaces on which tiles are bedded.
- Bedding: Mixtures of materials which are applied to substrates in a plastic state and dry and cure to adhere tiles to substrates.
  - . Adhesive bedding: Tiling adhered by adhesives.
  - . Mortar bedding: Tiling adhered in a cementitious mortar bed.
- Pavers: Slabs made from clays, stone, precast concrete and/or other inorganic raw materials generally over 20 mm thick used as coverings for floors and supported over continuous substrates.
- Tiles: Thin slabs made from clays and/or other inorganic raw materials used generally as coverings for floors and walls and adhered to continuous supporting substrates.
  - . Natural stone: Tiles cut from natural stone.
  - . Industrial cast: Tile products of reconstituted stone. Also known as manufactured stone.
  - . Cementitious: Manufactured cement based pre-finished tiles.
  - . Terrazzo – cementitious: Manufactured cementitious terrazzo tiles formed in a suitable machine to give sufficient compaction and density to the finished surface, and moisture cured before grinding and honed at the place of manufacture. Thickness usually 35 mm.
- Wet areas: Areas within buildings with water supply and drainage systems.

1.4 TOLERANCES

Completed tiling
Conform to the **Tolerances table**.

Tolerances table

Property	**Tolerance criteria**
Alignment: Deviation of the finished tiles from a 3 m straight edge laid against any joints	< 4 mm
Flatness: Deviation of any plane surface under a 3 m straight edge laid in any direction on an area of uniform grade	< 4 mm

2 PRODUCTS

2.1 TILES AND ACCESSORIES

Tiles

Coves, nosings and skirtings: To be matching stop-end and internal and external angle tiles moulded for that purpose.

Exposed edges: To be purpose-made border tiles with the exposed edge glazed to match the tile face. If such tiles are not available, round edge with grout.

2.2 ADHESIVES

Type

General: Provide adhesives to the **Wall tiling schedule** and to the **Floor tiling schedule** and compatible with the materials and surfaces to be adhered.

Prohibited uses: Do not provide the following combinations:

- Cement-based adhesives on wood, metal, painted or glazed surfaces, gypsum-based plaster.
- Organic solvent-based adhesives on painted surfaces.
- Organic PVC-based adhesives and organic natural rubber latex adhesives in damp or wet conditions.
- PVA (polyvinyl acetate) based adhesives in wet areas or externally.

2.3 MORTAR

Materials

Cement: Cement shall conform to the requirements of ASTM specification C-150 Type 1 or similar approved standard for normal Portland cement.

- White cement: Iron salts content $\leq$ 1%.
- Off-white cement: Iron salts content $\leq$ 2.5%.

Lime: Confirm source of Lime with Engineer to ensure highest quality Lime is used in the mortar. Protect from damage on site and store minimum 300mm above ground in waterproof storage facility.

Sand: Fine aggregate with a low clay content selected for grading, sharp and free from efflorescing salts.

Measurement of volume: Measure binders and sand by volume using buckets or boxes. Do not allow sand to bulk by absorption of water.

Bedding mortar

Proportioning: Select proportions from the range 1:3 – 1:4 cement:sand to obtain satisfactory adhesion. Provide minimum water.

Terra cotta tiles: Use proprietary polymer modified mortar.

Water

General: To be clean and free from any deleterious matter.

2.4 GROUT

Type

Cement based proprietary grout: Mix with water. Fine sand may be added as a filler in wider joints.

Terra cotta tiles: Use proprietary polymer modified grout.

Portland cement based grout: Mix with fine sand. Provide minimum water consistent with workability.

- For joints < 3 mm: 1 cement:2 sand.
- For joints $\geq$ 3 mm: 1 cement:3 sand.

Pigments

Pigments for coloured grout: Provide colourfast fillers compatible with the grout material. For cement-based grouts, provide lime-proof natural or synthetic metallic oxides compatible with cement.

3 EXECUTION

Provide tiling systems to walls, floors and other substrates as follows:

- Consistent in colour and finish.
- Firmly bonded to substrates for the expected life of the installation.
- Resistant to expected impacts in use.
- Set out with joints accurately aligned in both directions and wall tiling joints level and plumb.
- To direct all water flowing from supply points to drainage outlets without leakage to the substrate or adjacent areas.

3.1 SUBSTRATES

Drying and shrinkage

Before tiling, allow at least the following times to elapse (for initial drying out and shrinkage) for these substrates:

- Concrete slabs: 42 days.
- Concrete blockwork: 28 days.
- Toppings on slabs and rendering on blockwork: A further 21 days.

3.2 PREPARATION

Ambient temperature

If the ambient temperature is less than 5 or more than 35°C, do not lay tiles.

Substrates

Ensure substrates are as follows:

- Clean and free of any deposit or finish which may impair adhesion or location of tiles.
- If solid or continuous, excessive projections are hacked off and voids and hollows are filled with a cement:sand mix not stronger than the substrate nor weaker than the bedding.

Absorbent substrates: If suction is excessive, control it by dampening but avoid over-wetting and do not apply mortar bedding to substrates showing surface moisture.

Dense concrete: If not sufficiently rough to provide a mechanical key, roughen by scratching or hacking to remove 3 mm of the surface and expose the aggregate; then apply a bonding treatment.

3.3 TILING GENERALLY

Sequence

General: Fix wall tiles before floor tiles.

Cutting and laying

Cutting: Cut tiles neatly to fit around fixtures and fittings, and at margins where necessary. Drill holes without damaging tile faces. Rub edges smooth without chipping.

Laying: Return tiles into sills and openings. Butt up to returns, frames, fittings, and other finishes.

Variations

Distribute variations in hue, colour, or pattern uniformly, by mixing tiles or tile batches before laying.

Protection

Floor tiles: Keep traffic off floor tiles until the bedding has set and attained its working strength.

Cleaning: Keep the work clean as it proceeds and protect finished work from damage.

3.4 SETTING OUT

Tile joints

Set out tiles to give uniform joint widths within the following limits:

- Ceramic floor tiles: 4 to 6 mm.
- Quarry floor tiles: 6 to 12 mm.
- Terrazzo and stone pavers to floor: 2 to 3 mm.
- Large and/or irregular floor tiles: 6 to 12 mm.
- Mounted mosaics: To match mounting pattern.

- Ceramic wall tiles: 3 to 5 mm.
- Terrazzo and stone wall panels: 2 to 3 mm.

Margins
Provide whole or purpose-made tiles at margins where practicable, otherwise set out to give equal margins of cut tiles. If margins less than half tile width are unavoidable, locate the cut tiles where they are least conspicuous.

Fixtures
If possible position tiles so that holes for fixtures and other penetrations occur at the intersection of horizontal and vertical joints or on the centre lines of tiles. Continue tiling fully behind fixtures which are not built in to the tiling surface. Before tiling ensure that fixtures interrupting the tile surfaces are accurately positioned in their designed or optimum locations relative to the tile layout.

3.5 FALLS AND LEVELS

Grading
Grade floor tiling to even and correct falls to floor wastes and elsewhere as required. Make level junctions with walls. Where falls are not required lay level.

Fall, general: 1:100 minimum.

Fall, in shower areas: 1:60 minimum.

3.6 BEDDING

Preparation of tiles
Adhesive bedding: Fix tiles dry; do not soak.

Mortar bedding: Soak porous tiles in water for half an hour and then drain until the surface water has disappeared.

Terra cotta tiles: Use pre sealed tiles or apply a breathable sealer and lay dry. If a final sealed finish is selected, use a compatible laying sealer.

Bedding
Use bedding methods and materials which are appropriate to the tile, the substrate, the conditions of service, and which leave the tile firmly and solidly bedded in the bedding material and adhered to the substrate. Form falls integral with the substrate.

Thin adhesive beds
Provide only if the substrate deviation is less than 3 mm when tested with a 3 m straight edge. Cover the entire tile back with adhesive when the tile is bedded.

Thickness: 1.5 – 3 mm.

Thick adhesive beds
Provide on substrates with deviations up to 6 mm when tested with a 3 m straight edge, and with tiles having deep keys.

Nominal thickness: 6 mm.

Adhesive bedding application
Apply adhesive by notched trowel to walls and floors and direct to tiles if required, to provide evenly distributed coverage after laying.

Wall tile spacers: Do not use spacer types that inhibit the distribution of adhesive.

Curing: Allow the adhesive to cure for the period nominated by the manufacturer prior to grouting or allowing foot traffic.

Mortar beds
For floor tiles: Either lightly dust the screeded bed surface with dry cement and trowel level until the cement is damp, or spread a thin slurry of neat cement, or cement-based thin bed adhesive, on to the tile back. Do not provide mortar after initial set has occurred.

- Nominal thickness: 20 to 40 mm.

3.7 MOVEMENT JOINTS

General
Provide movement joints to the **Movement joints schedule** and as follows:

- Location:

. Over structural (isolation, contraction, expansion) joints.
. Close to external corners in large tiled areas.
. Around the perimeter of the floor.
. At junctions between different substrates.
. To divide large tiled areas into bays, maximum 5 m wide, maximum 16 m^2.
. At abutments with the building structural frame and over supporting walls or beams where flexing of the substrate is anticipated.

- Depth of joint: Right through to the substrate.
- Sealant width: 6 – 10 mm.
- Depth of elastomeric sealant: One half the joint width, or 6 mm, whichever is the greater.

Movement joint materials
Divider strip: A proprietary expansion joint consisting of a neoprene filler sandwiched between plates with lugs or ribs for mechanical keying. Set flush with the finished surface.

Sealant: Two-pack self-levelling non-hardening mould resistant, one-part silicone or polyurethane sealant applied over a backing rod. Finish flush with the tile surface.

Backing rod: Compressible closed cell polyethylene foam with a bond-breaking surface.

3.8 GROUTED AND CAULKED JOINTS

Grouted joints
Commence grouting as soon as practicable after bedding has set. Clean out joints as necessary before grouting.

Face grouting: Fill the joints solid and tool flush. Clean off surplus grout. Wash down when the grout has set. When grout is dry, polish the surface with a clean cloth.

Edges of tiles: Grout exposed edge joints.

Mosaic tiles
Grouting mosaics: If paper faced mosaics are to be bedded in cement mortar, pre-grout the sheeted mosaics from the back before fixing. After fixing, rub grout into the surface of the joints to fill any voids left from pre-grouting. Clean off surplus grout. When grout has set, wash down. If necessary use a proprietary cement remover.

Sealant joints
Provide joints filled with sealant and finished flush with the tile surface as follows:

- Where tiling is cut around sanitary fixtures.
- Around fixtures interrupting the tile surface, for example pipes, brackets, bolts and nibs.
- At junctions with elements such as window and door frames and built-in cupboards.

Width: 5 mm.

Depth: Equal to the tile thickness.

3.9 JOINT ACCESSORIES

Floor finish dividers
Finish tiled floors at junctions with differing floor finishes with a corrosion resistant metal dividing strip suitably fixed to the substrate, with top edge flush with the finished floor. Where changes of floor finish occur at doorways make the junction directly below the closed door.

3.10 COMPLETION

Cementitious terrazzo tiled surfaces
In situ grind and polish the completed installation with equipment nominated by the tile supplier.

Spare tiles
Supply spare matching tiles and accessories of each type for future replacement purposes. Store the spare materials on site where directed by the Engineer.

Quantity: At least 1% of the quantity installed.

Cleaning
Clean tiled surfaces using an appropriate tile cleaning agent, and polish.