

PART 1 – GENERAL

1.1 GENERAL INSTRUCTIONS

- .1 Read and be governed by conditions of the *Contract Documents*, including Sections of Division 01.

1.2 SECTION INCLUDES

- .1 1.1 General Instructions
- .2 1.2 Section Includes
- .3 1.3 Summary
- .4 1.4 Administrative Requirements
- .5 1.5 Submittals
- .6 1.6 Closeout Submittals
- .7 1.7 Quality Assurance
- .8 1.8 Field Conditions
- .9 1.9 Extended Warranty
- .10 2.1 Performance/Design Requirements
- .11 2.2 Tile Materials
- .12 2.3 Grout and Adhesives
- .13 2.4 Accessories
- .14 3.1 Examination
- .15 3.2 Preparation
- .16 3.3 Mixing
- .17 3.4 Installation - General
- .18 3.5 Setting
- .19 3.6 Waterproofing Membrane Installation
- .20 3.7 Crack Suppression Membrane (Crack Isolation Membrane) Installation
- .21 3.8 Mortar-Bed Tiling
- .22 3.9 Thin-Set Method
- .23 3.10 Control Joints
- .24 3.11 Grouting or Pointing
- .25 3.12 Installation Tolerances
- .26 3.13 Adjusting and Cleaning

1.3 SUMMARY

- .1 Section includes
 - .1 Hard surface tiling.

1.4 ADMINISTRATIVE REQUIREMENTS

- .1 Sequencing and Scheduling

- .1 Coordinate installation of tile work with related work.
- .2 Proceed with tile work only after curbs, vents, drains, piping, and other projections through substrate have been installed and when substrate construction and framing of openings have been completed.

1.5 SUBMITTALS

- .1 Submit required submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 *Product* data sheets:
 - .1 Submit manufacturer's *Product* data sheets for *Products* proposed for use in the work of this Section.
 - .2 Submit manufacturer's installation instructions for *Products* proposed for use in the work of this Section.
- .3 Samples:
 - .1 Submit full size samples of each type of tile specified.

1.6 CLOSEOUT SUBMITTALS

- .1 Submit closeout submittals in accordance with Section 01 77 00 – Contract Closeout Procedures and Submittals.
- .2 Operation and maintenance data:
 - .1 Submit manufacturer's operation and maintenance instructions for inclusion in the operation and maintenance manuals.
- .3 Maintenance materials:
 - .1 *Provide* minimum 2% of each type and colour of tile required for the *Work* for maintenance use.
 - .2 Maintenance material to be of same production run as installed material.

1.7 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Installers / applicators / erectors:
 - .1 Execute work of this Section only by a *Subcontractor* who has adequate plant, equipment, and skilled workers to perform it expeditiously, and is known to have been responsible for satisfactory installations similar to that specified during a period of at least the immediate past five years.
 - .2 The *Contractor* shall ensure that the *Subcontractor* is a member company in good standing of the Terrazzo, Tile and Marble Association of Canada or equivalent certification acceptable to the *Consultant* and have been a member for at least the past five years.

1.8 FIELD CONDITIONS

- .1 Execute work of this Section while temperature is maintained within safe working temperatures in accordance with manufacturer's installation instructions for a period of 72 hours before, during and following installation. Avoid concentrated or irregular heating during curing period.

- .2 Protect work of this Section against damage by work of other Sections for a minimum of 72 hours after application of grouting by prohibiting passage of traffic over tile. Do not immerse in water and protect tilework from freezing for at least 28 *Days* after installation.
- .3 For concrete floor substrates subject to moisture sensitive materials, conduct the following tests in accordance with the following:
 - .1 Test for moisture vapour transmission in accordance with ASTM F710-11 and ASTM F1869-11 or ASTM F2170-11 in accordance with manufacturer's written installation instructions. Results must not exceed the written recommendations of the *Product* manufacturer.
 - .2 Test for surface Potential of Hydrogen (pH). Levels of pH shall not exceed the written recommendations of the *Product* manufacturer. Test in accordance with ASTM F710-11.
 - .3 For each test type: Conduct three tests for flooring applications up to 93 m² (1000 square feet) in area, and one additional test for each additional 93 m² (1000 square feet) of flooring area.

1.9 EXTENDED WARRANTY

- .1 Warrant work of this Section for a period of two years in accordance with Article A-15 of the Agreement Between *Owner* and *Contractor*.

PART 2 – PRODUCTS

2.1 PERFORMANCE/DESIGN REQUIREMENTS

- .1 Terrazzo, Tile and Marble Association of Canada ("TTMAC") Specification Guide 09 30 00 Tile Installation Manual 2012-2014.

2.2 TILE MATERIALS

- .1 Tile company, size and color as noted on the *Drawings*.

2.3 GROUT AND ADHESIVES

- .1 Acceptable manufacturers:
 - .1 Ardex Canada.
 - .2 Flextile Ltd.
 - .3 LATICRETE International, Inc.
 - .4 MAPEI Corp.
 - .5 TEC Specialty Products, Inc.
 - .6 Or Equivalent.
- .2 Setting adhesives; interior applications:
 - .1 Portland cement/sand/latex mixture, in accordance with ANSI A108/A118/A136.1-2013 and with minimum Shear Bond (Porcelain Tile, immersion and dry 28 *Day* cure tests) of 2.3 MPa (340 psi) when tested to ANSI A108/A118/A136.1-2013.
 - .1 Acceptable *Products*:
 - .1 Ardex 'X 77 Microtec Fibre Reinforced'.

- .2 Flextile '51' mixed with Flextile '44'.
 - .3 Laticrete 'Laticrete 4237 Latex Thin Set Liquid' with 'Portland 211 Crete Filler Powder'.
 - .4 Mapei 'KERALASTIC' mixed with 'KERABOND'.
 - .5 TEC Specialty Products, Inc. 'Super Flex Latex-Modified Thin Set Mortar'.
 - .6 Or Equivalent.
- .2 Metal substrate conditions: Epoxy mortar setting mix in accordance with ANSI A108/A118/A136.1- 2013.
- .1 Ardex Canada 'S 16 Rapid Setting Thin Set'.
 - .2 Flextile Ltd. '100 Flex-Epoxy'.
 - .3 Laticrete International Inc. 'Latapoxy 210 Modified Epoxy Adhesive'.
 - .4 Mapei Corp. 'Kerapoxy 9931'.
 - .5 Or Equivalent.
- .3 Grout:
- .1 TEC Specialty Products, Inc. '100% Solids Epoxy Mortar and Grout 470' or *Equivalent*.
 - .1 Sanded, polymer-modified, latex-modified, non-shrink, ANSI A108/A118/A136.1- 2013 and ANSI A108/A118/A136.1-2013.
 - .1 Ardex Canada 'FL Rapid Set, Flexible Sanded'.
 - .2 Flextile Ltd. '600'.
 - .3 Laticrete International Inc. '1500 Series' mixed with '1776 Grout Admix'.
 - .4 Mapei Corp. 'Keracolour S'.
 - .5 TEC Specialty Products, Inc. 'AccuColour Premium Sanded'.
 - .6 Or Equivalent.
 - .2 Unsanded, polymer-modified, latex-modified, non-shrink, ANSI A108/A118/A136.1-2013 and ANSI A108/A118/A136.1-2013.
 - .1 Ardex Canada 'FG-C Microtec (unsanded)'.
 - .2 Flextile Ltd. '500'.
 - .3 Laticrete International Inc. '1600 Series' mixed with '1776 Grout Admix'.
 - .4 Mapei Corp. 'Keracolour U'.
 - .5 TEC Specialty Products, Inc. 'AccuColour Premium Unsanded'.
 - .6 Or Equivalent.
 - .3 Epoxy, to ANSI A108/A118/A136.1-2013.
 - .1 Ardex Canada 'WA Epoxy Grout and Adhesive'.

- .2 Flextile Ltd. '100 Flex-Epoxy 100% Solids Epoxy Grout'.
- .3 Laticrete International Inc. 'SpectraLOCK™ PRO Grout'.
- .4 Mapei Corp. 'Kerapoxy' and Kerapoxy CQ'.
- .5 TEC Specialty Products, Inc. '100% Solids Epoxy Mortar and Grout'.
- .6 Or Equivalent.
- .4 Scratch coat (by volume): 1 part Portland cement, 4 parts sand, and latex additive where required by TTMAC Detail. Premixed mortar may be used in accordance with manufacturer's instructions. Adjust water volume depending on moisture content of sand to obtain consistency and workability.
- .5 Slurry bond coat: mix Portland cement and water to a creamy paste consistency. Include latex additive where required by TTMAC Detail.
- .6 Mortar bed for walls (by volume): 1 part Portland cement, 4 parts sand, and latex additive where required by TTMAC Detail. Premixed mortar may be used in accordance with manufacturer's instructions. Adjust water volume depending on moisture content of sand to obtain consistency and workability.
- .7 Leveling coat (by volume): 1 part Portland cement, 4 parts sand, and latex additive where required by TTMAC Detail. Premixed mortar may be used in accordance with manufacturer's instructions.
- .8 Mortar bed for floors; where applicable: 1 part cement, 4 parts sand, 1 part water. Water volume may be adjusted depending on water content of sand.

2.4 ACCESSORIES

- .1 Waterproofing membrane: in accordance with Section 07 13 26 – Sheet Waterproofing.
- .2 Cleavage membrane: 0.11 mm (0.004") thick polyethylene film, to CAN/CGSB 51.34 - M86 (amended 1988).
- .3 Reinforcing wire fabric: galvanized welded wire fabric, 50 mm (2") x 50 mm (2"), WO.3 x WO.3 (16 ASW gauge or 1.6 mm (0.0625") diameter, in accordance with ASTM A1064/A1064M-15 and ASTM A1064/A1064M-15, except for minimum wire size.
- .4 Sealant: in accordance with CAN/CGSB 25.20-95 and tile and grout manufacturers' recommendations, colour selected by the *Consultant*.
- .5 Transition strips: purpose made metal extrusion, anodized aluminum.
- .6 Reducer strips: purpose made extrusions, anodized aluminum, maximum slope of 1:2.
- .7 Prefabricated movement joints: purpose made, having a Shore A Hardness of not less than 60 and elasticity of $\pm 40\%$ when used in accordance with TTMAC Detail 301EJ- 2002.
- .8 Floor sealer and protective coating: to tile and grout manufacturers' recommendations.
- .9 Water vapour reduction system:
 - .1 100% solids epoxy one coat system, 0 Volatile Organic compound (VOC), suitable for application to 100% Relative Humidity (RH) floors per ASTM F2170-11, designed to protect moisture sensitive adhered flooring systems from elevated moisture and alkalinity levels,

- warranted by manufacturer to cover subsequent flooring materials and labour, compatible with finish flooring products.
- .2 ASTM E96/E96M-10 water vapour transmission (wet methods) performance shall be documented by independent testing laboratory at a minimum 97% for water vapour transmission reduction compared to untreated concrete.
 - .3 ASTM E96/E96M-10 perm rating shall not exceed a 0.10 Perm rating.
 - .4 ASTM D1308-02(2013) insensitivity to alkaline environment up to, and including, pH 14 in a 14 Day bath test.
 - .5 Ensure manufacturer certifies acceptance and exposure to continuous topical water exposure after final cure.
 - .6 Water vapour reduction system shall be a single coat, stand alone system with no requirements for additional components such as sand broadcast for adhesion of flooring systems.
 - .7 System shall reduce Calcium Chloride readings of up to 25lbs/1000 ft²/24 hrs by 97% in one coat. System must be able to perform as required with RH Probe readings of 100%.
- .10 Edge Protection and Transition Profiles for Floors
- .1 At Same Height Transitions:
 - .1 Schluter-SCHIENE: L-shaped profile with 1/8 inch (3 mm) wide visible surface integrated trapezoid-perforated anchoring leg, and integrated grout joint spacer.
 - .1 Anchoring Leg: Straight anchoring leg.
 - .2 Anchoring Leg: Radius anchoring leg for radius applications.
 - .3 Profile Height: As required to coordinate with tile selection and setting system.
 - .4 Material and Finish:
 - .1 AE: Satin Anodized Aluminum.
 - .5 Or equivalent.
 - .2 At Sloped Transitions:
 - .1 Schluter-RENO-RAMP-K: Anodized aluminum profile with textured, sloped exposed surface, tapered leading edge, and integrated grout joint spacer.
 - .1 Material and Finish: AE: Satin Anodized Aluminum.
 - .2 Profile Height: 1/2 inch (13 mm).
 - .3 Ramp Length: 2-1/2 inch (64 mm).
 - .4 Or equivalent.
- .11 Finishing and Edge-Protection Profiles for Walls
- .1 At Corners and Tile Edges (unless noted otherwise):

- .1 Schluter-JOLLY: L-shaped profile. 9/64 inch (3.5 mm) wide top and vertical wall sections that together form the visible surface. Integrated trapezoid-perforated anchoring leg, and integrated grout joint spacer.
 - .1 Corners: Matching inside corners.
 - .2 Corners: Matching outside corners.
 - .3 Anchoring Leg: Straight anchoring leg.
 - .4 Profile Height: As required to coordinate with tile selection and setting system.
 - .5 Material and Finish:
 - .1 AE: Satin Anodized Aluminum.
 - .6 Or equivalent.
- .2 At Corners and Tile Edges (where noted):
 - .1 Schluter-SCHIENE: L-shaped profile with 1/8 inch (3.2 mm) wide visible surface, integrated trapezoid-perforated anchoring leg, and integrated grout joint spacer.
 - .1 Anchoring Leg: Straight anchoring leg.
 - .2 Anchoring Leg: Radius anchoring leg for radius applications.
 - .3 Profile Height: As required to coordinate with tile selection and setting system.
 - .4 Material and Finish:
 - .1 AE: Satin Anodized Aluminum.
 - .5 Or equivalent.

PART 3 - EXECUTION

3.1 EXAMINATION

- .1 Ensure compatibility of *Products* supplied under this Section, and which bear contact with substrate.
- .2 Before work of this Section commences, examine the areas to be covered and report any flaw or adverse conditions in writing to the *Consultant*. Do not proceed with the tile work until surfaces and conditions comply with the requirements indicated in the manufacturer's instructions and in ANSI A108/A118/A136.1-2013) specification.
- .3 Miscalibrated tiles, tiles with chipped corners, tiles with holes, shall not be accepted by the *Contractor* for installation.
- .4 Carefully inspect the tiles for colour variation. Tiles presenting noticeable variations shall be carefully selected, set aside and used in areas where they fit in the pattern homogeneously. *Provide* for appropriate lighting equipment in addition to existing lighting in the immediate area where the installation is being performed so that any shade differences which are normally very slight can be identified easily.

3.2 PREPARATION

.1 Water vapour reduction system:

- .1 Where concrete substrate exhibits higher than permitted moisture and alkalinity levels, *Provide* water vapour reduction system to protect moisture sensitive flooring system from elevated moisture and alkalinity levels.
 - .1 Shot blast floors to an International Concrete Repair Institute (ICRI) Concrete Surface Profile (CSP) #3 or #4 and clean surfaces with an industrial vacuum cleaner and remove residues from the substrate. Grinding is allowed only in areas not accessible by shot blasting. Remove defective materials, and foreign matter such as dust, adhesives, levelling compounds, paint, dirt, floor hardeners, bond breakers, oil, grease, curing agents, form release agents, efflorescence, laitance, and other deleterious substances. Repair cracks, expansion joints, control joints, and open surface honeycombs and fill in accordance with water vapour reduction system manufacturer's recommendations.
 - .2 Reinforcing fibres, if applicable, that are visible after shot blasting shall be removed and vacuumed leaving no fibres left on the concrete surfaces.
 - .3 Repair concrete prior to moisture vapour reduction system installation by using water vapour reduction system manufacturer's recommended bonding emulsion with approved concrete repair materials. Comply with requirements as listed in water vapour reduction system manufacturer's technical data information. Consult with vapour reduction manufacturer.
 - .4 Shot blast a small test area and review surface profile with the finished flooring applicator. As the water vapour reduction system is not a levelling material, *Provide* feather finish or levelling material to "flatten" or level the water vapour reduction system treated concrete prior to the flooring installation.
 - .5 Apply moisture vapour reduction system monolithically to manufacturer's recommended spreading rate in number of coats to achieve manufacturer's recommended thickness.
 - .6 Consult with vapour reduction manufacturer and comply with requirements as listed in water vapour reduction system manufacturer's technical data information.
 - .7 Review surface profile with the finished flooring applicator. As the water vapour reduction system is not a levelling material, *Provide* feather finish or levelling material to "flatten" or level the water vapour reduction system treated concrete prior to the flooring installation. Flooring installation shall not show telegraphing of substrate. Flooring installation shall be homogenous free of substrate lines, pockets, bumps and unevenness.
 - .8 Verify proper adhesion of flooring adhesives, coatings, and levelling compounds to the final vapour reduction coating system for acceptability.
 - .9 Do not proceed with finished flooring installation if moisture vapour transmission exceeds maximum permitted rates.

.2 Wall surfaces:

- .1 Roughen surfaces with previously painted glossy finishes by sandpaper or other abrasive medium, and completely remove finishes which are not compatible with products specified under this Section.
- .2 Completely remove contaminants and deleterious substances and debris which may prevent, reduce, and affect adhesion or performance or may act as bond breaker.

- .3 Prime gypsum, wood or porous concrete with primer, brush or roller applied at full strength in accordance with adhesive manufacturer's recommendations.
- .3 Floor surfaces:
 - .1 Completely remove contaminants and deleterious substances and debris which may prevent, reduce, and affect adhesion or performance or may act as bond breaker.
 - .2 Concrete shall be minimum of 120 *Days* old.
- .4 Wire brush steel substrates to remove deleterious substances and rust, to promote full adhesion to steel.

3.3 MIXING

- .1 Mix mortars, additives and grouts in accordance with manufacturer's requirements.
- .2 Rotating blade mechanical mixer: Pour latex additive, start mixer and add sand first, followed by Portland cement. Mix no mortar in same mixer as a dissimilar type of mortar unless the mixer is first thoroughly washed clean.
- .3 Pail batch mixing with low revolution drill mixers as follows:
 - .1 Premix separately prior to adding to the latex additive.
 - .2 Pour latex additive into clean mixing vessel and add dry materials slowly while mixing into a homogeneous and smooth consistency.

3.4 INSTALLATION - GENERAL

- .1 *Install Products* in accordance with manufacturer's specifications and as indicated in this Section.
- .2 *Install* in accordance with TTMAC Specification Guide 09 30 00 Tile Installation Manual 2012-2014, except where specified otherwise in the Contract Documents.
- .3 *Install* in accordance with ANSI A108/A118/A136.1-2013 and ANSI A108/A118/A136.1- 2013.
- .4 Lay out tile work as indicated on the *Drawings*, and where lay-out not indicated, lay-out tiles so tiles less than 1/2 the least dimension do not occur and with minimum amount of cutting.
- .5 Make joints even, straight, plumb and of uniform width.
- .6 *Provide* uniform positive slope to floor drains, to minimum allowable slope of 20 mm/m (1/4 inch/ft).
- .7 *Provide* edge protection at tile edges and corners, unless otherwise indicated in the Contract Documents, using maximum length pieces.
- .8 *Provide* edge protection and transition strips at tile transitions, unless otherwise indicated in the Contract Documents, using maximum length pieces.
- .9 Lap tile at inside corners and seal around doors. Apply sealant in accordance with Section 07 92 00 – Joint Sealants and manufacturer's instructions. Sealant colour to later selection by the *Consultant*.
- .10 Install flooring to entire area indicated or scheduled, including coverplates occurring within finished floor areas. Maintain overall continuity of colour and pattern with pieces of flooring installed on cover plates. Tightly butt edges to perimeter of floor around cover plates and to cover plates. Do not install flooring to floor drains occurring within finished floor areas.

- .11 Review locations of tile accessories with the *Consultant* prior to setting tile and comply with directions of the *Consultant*.

3.5 SETTING

- .1 Using a damp towel, wipe off the back side of floor tile to remove any dust or other residue that may be left over from the manufacturing process.
- .2 Place as much tile as possible in one operation before setting bed reaches initial set. Clean back and remove bed when it has set before tile is laid.
- .3 Prime materials and by methods specified by manufacturer of bond coat.
- .4 Line up joints between tile installed on stairs from tread to tread.
- .5 Except where tiles have setting tabs, and except for expansion, control and isolation joints, maintain joint widths as selected by the *Consultant*.
- .6 Back up tile coves, curbs and other shaped pieces solid with mortar. Rigidly set, reinforce or otherwise make firm and secure such pieces.
- .7 Beat tiles in thoroughly and sufficiently to cause mortar ribs or notches to come together into a continuous void free bed and allow the mortar to flow up partially into the joint space to maximum of 1/3 the thickness of the tile. Sound floor tiles by tapping and reset all tiles with voids in setting bed.
- .8 Tile shall contact setting materials for minimum of 95% coverage.
- .9 Obtain 100% mortar coverage with applicable requirements for back buttering of tile in referenced TTMAC and ANSI A108/A118/A136.1-2013 series of tile installation standards for the following:
 - .1 Tile in wet areas:
 - .2 Tile installed with chemical resistant mortars and grouts.
 - .3 Tile having tiles 300 mm (12") or larger in any direction.
 - .4 Tile having tiles with raised or textured backs.
 - .5 Tile having tile installation rated for Heavy or Extra Heavy Duty.
 - .6 Porcelain tiles with more than 20% of the tile backs covered with firing release dust back buttered so that 100% of the back is covered with adhesive mortar rated for C627, Extra Heavy Duty rating.
- .10 Remove any excess setting material from the joint area so that 2/3 of the depth of the tile is available for grouting.
- .11 Remove smudges or smears of setting material from the tile surface with a damp sponge or cloth immediately after final adjustment and beat-in while the mortar is fresh.
- .12 Do necessary cutting and drilling of fixtures, fittings, and built-in or penetrating units without marring the tile. Replace all cracked or damaged tile.
- .13 Form external angles with round edge tile extending over edge of square edge adjacent tile. Internal angles shall be formed square, carrying one flat tile past edge of other.
- .14 Extend tile into recesses at windows, doors, or other openings.

- .15 Extend tiles 100 mm (4") behind mirrors, and fully behind cabinets, cupboards and other fixed objects at walls.
- .16 Cut tiles to conform to irregularities in wall lines and vertical planes along outer edges. Smooth cut edges with carborundum block or by other means to *Provide* clean straight edge.
- .17 At floor drains in mortar bed: *Provide* minimum setting bed of 10 mm (3/8"), sloped to drain at 6 mm (1/4") in 305 mm (12").

3.6 WATERPROOFING MEMBRANE INSTALLATION

- .1 *Install* waterproofing membrane in shower areas in accordance with manufacturer's instructions and Section 07 13 26 – Sheet Waterproofing.

3.7 CRACK SUPPRESSION MEMBRANE (CRACK ISOLATION MEMBRANE) INSTALLATION

- .1 *Install* membrane in accordance with manufacturer's instructions.
- .2 Prepare substrate in accordance with manufacturer's instructions.
- .3 *Install* crack suppression membrane to substrates for tile flooring installations located on suspended structural floor assemblies. Treat substrate with full coverage of crack isolation membrane and reinforcement in accordance with crack isolation membrane manufacturer's installation instructions.

3.8 MORTAR-BED TILING

- .1 Verify 25 mm (1") nominal bed thickness has been allowed. Apply latex-Portland cement thin bed mortar with flat trowel as a slurry bond coat approximately 1.5 mm (1/16") thick over clean concrete slab in compliance with current revision of ANSI A108/A118/A136.1-2013 (A-1 through A-3; A-4.1a.5.2).
- .2 Place latex-Portland cement thick bed mortar over slurry bond coat while bond coat is wet and tacky. Omit reinforcing wire fabric and fully compact bed by tamping.
- .3 Spread latex-Portland cement thin bed mortar with flat trowel over surface of "green"/fresh mortar bed as a slurry bond coat approximately 1.5 mm (1/16") thick.
- .4 Apply latex-Portland cement thin bed mortar slurry bond coat to back of tile or threshold and place each piece/sheet while slurry bond coats are wet and tacky. Beat with a hardwood block or rubber mallet to level/imbed pieces before mortar bed takes initial set.
- .5 Clean excess mortar/adhesive from finished surfaces.
- .6 For installation of tile over cured (pre-floated) latex-Portland cement thick bed mortar, follow Thin Bed Method.

3.9 THIN-SET METHOD

- .1 *Install* thin-set mortar in compliance with current revisions of ANSI A108/A118/A136.1- 2013) (A-1 through A-3) and ANSI A108/A118/A136.1-2013) (A-4.3).
- .2 Use the appropriate trowel notch size to ensure full bedding of the tile.
- .3 Work thin-set mortar into good contact with the substrate and comb with notched side of trowel.
- .4 Beat each piece/sheet into the thin-set mortar with a beating block or rubber mallet to insure full bedding and flatness.

- .5 Allow installation to set until firm.
- .6 Clean excess thin-set mortar from tile face and joints between pieces.
- .7 Do not cover, bridge or fill tile joints located over expansion joints with adhesive.

3.10 CONTROL JOINTS

- .1 Carry substrate control and movements joints through to tile work.
- .2 *Install* control joints around the perimeter of tiled areas, around columns and where tile abuts other hard materials, also incorporate control joints over all building expansion joints.
- .3 Cut tiles or stones on both sides along the edges of control or expansion joints.
- .4 *Provide* control joints equal to width of interior tile joints in floors and walls at perimeters of floor and within 4800 mm to 6100 mm (16 ft to 20 ft) centre to centre by raking out joints to full depth of tile and cleaning joints for application of sealant in accordance with Section 07 92 00 – Joint Sealants. In areas subject to sunlight or exposed to exterior *Provide* control joints within 2400 mm to 3500 mm (8 ft to 12 ft) centre to centre.
- .1 Review locations with the *Consultant* prior to setting tile and comply with instruction given by the *Consultant*.

3.11 GROUTING OR POINTING

- .1 *Install* grout to comply with ANSI A108/A118/A136.1-2013 and ANSI A108/A118/A136.1- 2013) unless otherwise specified in the Contract Documents and in accordance with manufacturer's printed instructions.
- .2 Allow tile installation to cure a minimum of 24 hours at ambient temperature of 21°C prior to grouting.
- .3 Verify grout joints are free of dirt, debris, water or tile spacers and face of tiles are clean
- .4 Apply grout release to face of absorptive, abrasive, non-slip or rough textured tile units that are not hot paraffin coated to facilitate cleaning.
- .5 Spread using a sharp edged, hard rubber float and work grout into joints using 45° diagonal strokes.
- .6 Pack joints full and free of voids/pits. Stroke diagonally to remove excess grout and to avoid pulling grout out of filled joints.
- .7 Once excess grout is removed, begin cleaning grout haze before grout is fully cured. Using a circular motion, lightly scrub grouted surfaces with the damp sponge to dissolve grout film/haze. Drag sponge diagonally over scrubbed surfaces to remove froth. Rinse sponge frequently and change rinse water at least every 2 m² (200 ft²). Repeat cleaning sequence again if grout haze is still present.
- .8 Allow grout joints to become firm. Buff surface of grout with clean coarse cloth. Inspect joint for pinholes/voids and repair them with freshly mixed grout. Within 24 hours, check for remaining haze and remove it with warm soapy water and a nylon scrubbing pad, using a circular motion, to lightly scrub surfaces and dissolve haze/film.
- .9 Chemical resistant, water cleanable tile-grouting epoxy (ANSI A108/A118/A136.1-2013):
 - .1 *Install* chemical epoxy resistant grout in compliance with current revisions of ANSI A108/A118/A136.1-2013 and ANSI A108/A118/A136.1-2013.

- .2 Once excess grout is removed, begin cleaning grout haze approximately 20-30 minutes after grouting depending on temperature. Using a circular motion, lightly scrub grouted surfaces with the damp sponge to dissolve grout film/haze. Drag sponge diagonally over scrubbed surfaces to remove froth. Rinse sponge frequently and change cleaning solution at least every 4.7 m² (50 ft²).
- .3 Within 1 hour of finishing first cleaning, clean the same area again following the same procedure but utilizing a clean white scrub pad and fresh cleaning solution. Rinse scrub pad frequently. Drag a clean sponge diagonally over scrubbed surfaces to remove froth. Use each side of sponge only once before rinsing and change cleaning solution at least every 4.7 m² (50 ft²). Allow cleaned areas to dry and inspect tile surface. Rinse with clean water and allow surface to dry. Inspect grout joint for pinholes/voids and repair them with freshly mixed grout.
- .10 Grout joint width to be 1.5 mm (1/16") unless otherwise indicated in the *Contract Documents*.
- .11 Grout joint width to be 3.2 mm (1/8") unless otherwise indicated in the *Contract Documents*.
- .12 Use caution when using sanded grouts to prevent scratching of tile or other material surfaces.
- .13 Do not cover bridge or fill any expansion joints in tile with grout.
- .14 Do not cover bridge or fill any expansion joints in tile with grout.

3.12 INSTALLATION TOLERANCES

- .1 Maximum allowable lippage:
 - .1 Tile up to 152 mm x 152 mm (6" x 6") in size: 0.79 mm (1/32").
 - .2 Tile greater than 152 mm x 152 mm (6" x 6") in size: 1.5 mm (1/16").
- .2 Finish planes shall be straight and plumb to within 6 mm in 3 m (1/4" in 10 feet).

3.13 ADJUSTING AND CLEANING

- .1 Clean installed tile surfaces after grouting has cured.
- .2 Re-point joints after cleaning to eliminate imperfections. Avoid scratching tile surfaces.
- .3 Prohibit traffic during installation and for minimum 48 hours after installation.
- .4 Protect floors from impact and vibration for a minimum of 48 hours after installation.
- .5 *Install* floor protection in areas where other work, repairs and installation of equipment, and foot traffic will occur.

END OF SECTION