

1 General

1.1 RELATED REQUIREMENTS

- .1 07 92 10 - Joint Sealing.
- .2 09 91 23 - Painting.

1.2 REFERENCE STANDARDS

- .1 ASTM International (ASTM).
 - .1 ASTM C475/C475M-17, Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
 - .2 ASTM C840-18b, Standard Specification for Application and Finishing of Gypsum Board.
 - .3 ASTM C1396/C1396M-17, Standard Specification for Gypsum Board.
 - .4 ASTM D3273-16, Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.

1.3 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store gypsum board assemblies' materials level off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect from nicks, scratches, and blemishes.
 - .3 Protect from weather, elements, and damage from construction operations.
 - .4 Handle gypsum boards to prevent damage to edges, ends, or surfaces.
 - .5 Replace defective or damaged materials with new.

1.4 AMBIENT CONDITIONS

- .1 Ensure temperature of surrounding areas are within recommended range of 10°C to 21°C, seven (7) days before, during and four (4) days after entire gypsum board and joint treatment operations. Avoid concentrated or irregular heating during drying. Ensure proper ventilation to eliminate excessive moisture.
- .2 Report to Departmental Representative, in writing, defects of work which may adversely affect the quality of workmanship of this section.
- .3 Commencement of work shall imply acceptance of conditions.

2 Products

2.1 GYPSUM BOARD TYPES

- .1 Moisture-resistant board: regular and Type X; to ASTM C1396/C1396M, 1200 mm wide x maximum practical lengths, tapered edges.
 - .1 Mould resistance: to ASTM D3273, score of 10.

2.2 FASTENINGS

- .1 Drywall screws: self-drilling, self-threading, case-hardened to give minimum penetration of 16 mm into wood, 10 mm into steel.

2.3 ACCESSORIES

- .1 Corner bead: 0.48 mm commercial grade sheet steel with Z275 zinc finish, perforated flanges, one-piece length per location.
- .2 Casing beads: 0.48 mm commercial grade sheet steel with Z275 zinc finish, fill-type, perforated flanges, one-piece length per location.
- .3 Control joint: 6 mm "V"-type, 0.48 mm commercial grade sheet steel with Z275 zinc finish, perforated flanges, one-piece length per location.
- .4 Jointing material:
 - .1 Tape: as recommended by gypsum board manufacturer.
 - .2 Joint compound: to ASTM C475/C475M, asbestos-free.
- .5 Insulating strip: rubberized, moisture resistant, 3 mm thick cork closed cell neoprene strip, 12 mm wide, with self-sticking permanent adhesive on one face, lengths as required.

3 Execution

3.1 GYPSUM BOARD APPLICATION

- .1 Apply gypsum board in accordance with ASTM C840 after bucks, anchors, blocking, electrical and mechanical work are approved.
- .2 Erect on walls with long side parallel or perpendicular to framing. Locate end joints over supporting members.
- .3 Keep end joints away from prominent locations.
- .4 Locate vertical joints at least 50 mm from jamb lines of openings.
- .5 Start securing in central portion of board and work towards ends and edges. Hold board firmly against framing member while installing. Install perimeter screws a minimum of 10 mm and maximum 13 mm from edges and ends of boards and opposite the screws on adjacent boards.
- .6 Screw spacing for single layer construction.
 - .1 Nonfire-rated construction:
 - .1 Ceilings - 300 mm field and edges.
 - .2 Walls - 300 mm field and edges.
- .7 Drive screws with a power screw gun and set with countersunk head slightly below surface of board.
- .8 Use maximum practical length of gypsum board. Bring boards into contact, but do not force into place. Neatly fit ends and edges where they abut.

3.2 ACCESSORIES

- .1 Erect accessories straight, plumb or level, rigid and at proper plane. Use full-length pieces where practical. Make joints tight, accurately aligned and rigidly secured. Mitre and fit corners accurately, free from rough edges.

- .2 Reinforce exterior corners with corner beads fastened 150 mm o.c. at alternate sides along entire length of bead.
- .3 Install casing beads where assembly terminates against dissimilar material, against a surface having no trim concealing its juncture, and where shown on drawings.

3.3 CONTROL JOINTS

- .1 Provide control joints:
 - .1 at expansion or control joints in substrate.
 - .2 at doors and other changes in superficial areas of walls.
 - .3 where indicated.
 - .4 and where Departmental Representative deems necessary.
- .2 Construct control joints using standard manufactured control joint. Maintain 13 mm clearance between gypsum panels.
- .3 Ensure framing member is located at each side of joint.

3.4 ACCESS DOORS

- .1 Install access doors to electrical and mechanical fixtures specified in respective sections.
- .2 Rigidly secure frames to furring or framing systems.

3.5 JOINT FINISHING

- .1 Finish joints either manually, using tools of the trade, or by a mechanical taping and filling machine of proven efficiency.
- .2 Prefill open spaces between boards, 6 mm and wider, 24 hours before embedding tape.
- .3 Apply joint compound, reinforcing tape and topping compound in accordance with manufacturer's written instructions.
- .4 Mix joint compound in strict accordance with manufacturer's recommendations.
- .5 Ensure finish is smooth, seamless, plumb, true and flush with square, neat corners.

3.6 PATCHING

- .1 Perform patching and making good to gypsum board surfaces as required, using materials specified under this section.

3.7 CLEANING

- .1 Progress Cleaning:
 - .1 Leave Work area clean at end of each day.
 - .2 Clean adjacent surfaces immediately.
 - .3 Remove droppings using recommended cleaners as work progresses.
 - .4 Wipe dust from walls and ceilings and leave work ready for painters.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

- .1 07 92 10 - Joint Sealing.

1.2 REFERENCE STANDARDS

- .1 American National Standards institute (ANSI).
.1 ANSI A118.1:2020, Dry Set Cement Mortar.
.2 ANSI A118.11:2020, EGP Latex Portland Cement Mortar.
.3 ANSI A137.1-2019, Specification for Ceramic Tile.
- .2 ASTM International (ASTM).
.1 ASTM C144-18, Specification for Aggregate for Masonry Mortar.
.2 ASTM C920-18, Specification for Elastomeric Joint Sealants.
- .3 Terrazzo, Tile & Marble Association of Canada (TTMAC).
.1 TTMAC Specification Guide 09 30 00 Tile Installation Manual, 2019-2021.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product data:
.1 Include manufacturer's information on:
.1 Each tile type specified; marked to show construction, size and shapes; slip resistant coefficients.
.2 Mortars including ISO 13007 compliance data.
.3 Latex-Portland cement mortar and grout.
.4 Commercial Portland cement grout.
.5 Waterproofing membrane.
- .3 Samples:
.1 Tile: submit duplicate full size samples of each colour, texture, size, and pattern of tile.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver materials in containers with labels legible and intact and seals unbroken.
- .2 Store material to prevent damage or contamination.
- .3 Store materials in a dry area, protected from freezing, staining and damage.
- .4 Store cementitious materials on a dry surface.

1.5 ENVIRONMENTAL CONDITIONS

- .1 Air temperature and structural base temperature at ceramic tile installation area shall be above 12°C for 48 h before, during, and 48 h after, installation.
- .2 Do not install tiles at temperatures less than 12°C or above 38°C.

1.6 EXTRA MATERIAL

- .1 Provide minimum 2% of each type and colour of tile required for project for maintenance use. Store where directed.
- .2 Maintenance material to be of same production run as installed material.

2 Products

2.1 TILE TOLERANCES

- .1 Floor and wall flatness is critical for this project.
- .2 Do not use tiles with warpage that will cause lippage in excess to that specified herein.

2.2 FLOOR TILE

- .1 FT: Colour based porcelain.
 - .1 Properties:
 - .1 Water absorption: <0.5%.
 - .2 Dynamic Coefficient of friction (ANSI A137.1): ≥ 0.42 .
 - .3 Breaking strength: >1300 N.
 - .4 Modulus of rupture: >35 N/mm².
 - .5 Deep abrasion resistance: < 175 mm³.
 - .6 Frost-resistant.
 - .7 Stain Resistance: > Class 3.
 - .2 Size: 75 mm x 300 mm.
 - .3 Finish: matte.
 - .4 Colour variation: V2.
 - .5 Colours: Grey.

2.3 WALL TILE

- .1 WT: glazed wall tile.
 - .1 Size: 108 mm x 108 mm.
 - .2 Finish: glossy.
 - .3 Colour variation: V1.
 - .4 Colours: turquoise.
 - .5 Accessories: radiused edge tile for top of wainscotting.

2.4 MORTAR MATERIALS

- .1 Portland cement: to CSA-A5, type 10.
- .2 Sand: to ASTM C144, passing 16 mesh.
- .3 Latex additive: formulated for use in portland cement mortar and thin set bond coat.
- .4 Water: potable and free of minerals and chemicals which are detrimental to mortar and grout mixes.
- .5 Mortar (bond coat): Polymer modified, to ANSI A118.11 and ISO 13007 Series, Classification C2TE; S1 deformability.

2.5 GROUT

- .1 Floor grout: sanded, to ISO 13007 Series, Classification CG2 WA.
 - .1 Colour as selected by Departmental Representative to a maximum of six (6).
- .2 Wall grout: unsanded, to ISO 13007 Series, Classification CG2 WA.
 - .1 Colour as selected by Departmental Representative to a maximum of six (6).
- .3 Colouring Pigments:
 - .1 Pure mineral pigments, limeproof and nonfading, complying with ASTM C979.
 - .2 Colouring pigments to be added to grout by manufacturer.
 - .3 Job coloured grout are not acceptable.

2.6 MIXES

- .1 Mix bond coats and grout in accordance with manufacturer's instructions.

2.7 PATCHING AND LEVELLING COMPOUND

- .1 Portland cement base, acrylic polymer compound, manufactured specifically for resurfacing and levelling concrete floors. Products containing gypsum are not acceptable.
 - .1 Patching compound: trowel applied.
 - .2 Levelling compound: self-levelling; capable of application in layers up to 50 mm thick, being brought to feather edge.
- .2 Have not less than the following physical properties:
 - .1 Compressive strength - 25 MPa.
 - .2 Flexural strength - 7 MPa.
- .3 Ready to accept flooring within 48 hours after application.

2.8 MEMBRANES

- .1 Waterproofing: either of the following:
 - .1 Trowel applied: to ANSI 118.10 requirements for waterproofing; one-component, trowel-applied; incorporating mold and mildew resistance additive; complete with reinforcing mesh, transition membranes and components necessary for complete installation.
 - .2 Membrane system: proprietary waterproofing membrane system designed for waterproofing behind ceramic tile.

2.9 METAL TRIMS AND EDGING

- .1 Metal trim:
 - .1 Floor tile: extruded aluminum, satin anodized finish, wedge shaped, thickness and transition height to suit tile and adjacent flooring.
 - .2 Floor to base: extruded aluminum, satin anodized finish, inside 90° corner with 10 mm radius.
- .2 Control Joints - Prefabricated:
 - .1 Floor/floor: aluminum anchoring legs with PVC movement zone; colour of movement zone as selected by Departmental Representative.
- .3 Accessories: provide connectors, inside and outside corners.

2.10 ACCESSORIES

- .1 Tile spacer/leveller: of design to properly space and level tiles; plastic construction consisting of break-away spacer/leveller clip and reusable wedge. Provide separate spacer if joint width exceeds spacer/leveller.
- .2 Sealant: non-sag, two-part urethane, to ASTM C920, Type M, Grade NS, Class 25.
 - .1 VOC Limits: maximum 250 g/L in accordance with SCAQMD Rule 1168.
 - .2 Colour: as selected by Departmental Representative.
- .3 Sealers: below-surface penetrating sealer type, breathable, not affected by solvent based strippers or cleaners.
 - .1 Tile sealer: use of sealer as recommended by tile manufacturer.
 - .2 Grout sealer: use of sealer as recommended by grout manufacturer.
 - .3 VOC Limits: maximum 250 g/L in accordance with SCAQMD Rule 1168.

2.11 CLEANING COMPOUNDS

- .1 Specifically designed for cleaning masonry and concrete and which will not prevent bond of subsequent tile setting materials including patching and levelling compounds.
- .2 Materials containing acid or caustic material are not acceptable.

3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 EXAMINATION

- .1 Examine materials ordered for the project before delivering to the site; open boxes and confirm that materials match accepted samples, are free from defects and breakage detrimental to final appearance and installation, and as follows:
 - .1 Only use Grade 1 materials. Materials marked as seconds or discounted or that are not consistent with materials submitted for review will be rejected.
 - .2 Replace unacceptable materials; order replacement materials using most expedient delivery method to minimize effect on construction schedule.
- .2 Examine substrates, areas, and conditions where tile will be installed for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile and confirm the following:
 - .1 Verify that substrates for bonding tile are firm; dry; clean; free from oil, waxy films, and curing compounds.
 - .2 Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of Work, and similar items located in or behind tile have been completed before installing tile.
 - .3 Verify that joints and cracks in tile substrates are coordinated with tile joint locations; adjust joints in consultation with Departmental Representative where joints are not coordinated.
 - .4 Verify that concrete substrates have been allowed to cure for a minimum of 90 days in accordance with TTMAC requirements.

- .5 Verify that tile subject to colour variations has been blended in the factory and packaged so tile units taken from one package show the same range of colours as those taken from other packages. If not factory blended, blend tiles at site before installing.
- .6 Verify that back of tile is free from contamination before installation.
- .3 Notify Departmental Representative in writing of any conditions that are not acceptable; do not proceed with installation until unsatisfactory conditions have been corrected.

3.3 PREPARATION

- .1 Protection: Protect surrounding work from damage and disfiguration arising from work of this Section.
- .2 Surfaces: Thoroughly clean substrate surfaces receiving tile finishes to remove grease, oil or dust film, and other contaminants affecting bond of materials within bonding systems and as follows:
 - .1 Clean back of each tile before installation to remove surface contaminants and cutting residue, firing release dust and other debris detrimental to bond and final surface appearance.
- .3 Patching and Levelling: install patching and levelling compound to provide smooth and level substrate, flat and true to tolerances in plane with additional requirements as follows:
 - .1 Install patching compound wherever a slight, localized substrate irregularity exists.
 - .2 Install levelling compound wherever deep or large areas of substrate irregularity exist.
- .4 Waterproofing Membrane: Apply waterproofing membrane in accordance with TTMAC and manufacturer's instructions.

3.4 TILE INSTALLATION

- .1 Perform work in accordance with requirements of:
 - .1 TTMAC Specification Guide 09 30 00 Tile Installation Manual.
 - .2 Parts of ANSI A108 Series of tile installation standards that apply to types of bonding and grouting materials,
 - .3 Manufacturer's instructions.
- .2 Extend tile work into recesses and under or behind equipment and fixtures to form a complete covering without interruptions:
 - .1 Terminate Work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
 - .2 Make cut edges smooth, even and free from chipping.
 - .3 Do not split tile.
- .3 Accurately form intersections and returns; perform cutting and drilling of tile without marring visible surfaces:
 - .1 Cut, drill, and fit tile to accommodate work of other subcontractors penetrating or abutting work of this Section.
 - .2 Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints.
 - .3 Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so that plates, collars, or covers overlap tile and to provide a uniform joint appearance.

- .4 Lay tile in pattern as follows:
 - .1 Align joints when adjoining tiles on floor, base, walls, and trim are the same size.
 - .2 Lay out tile Work and centre tile sites in both directions in each space or on each wall area.
 - .3 Centre tile patterns between control and movement joints; notify Departmental Representative for further instructions where tile patterns do not align with control or movement joints.
 - .4 Cut tile accurately and without damage.
 - .5 Smooth exposed cut edges with abrasive stone, where exposed.
 - .6 Chipped or split edges are not acceptable.
 - .7 Minimum tile width is half unit size unless specifically indicated otherwise on Drawings.
 - .8 Adjust tile layout to minimize tile cutting.
 - .9 Provide uniform joint widths.
 - .10 Installation pattern:
 - .1 Wall tile: stack bond.
 - .2 Floor tile: staggered, to match existing.
- .5 Bonding Bed: Set tile in place while bond coat is wet and tacky and as follows:
 - .1 Adjust amount of bonding materials placed on substrates based on temperature and humidity to prevent skinning over of bonding materials.
 - .2 Use sufficient bond coat to provide a minimum 95% contact for tiles smaller than 300 mm x 300 mm and areas having Residential or Light Load Bearing Performance requirements with bonding material evenly dispersed and pressed into back of tile; refer to back buttering requirements for larger materials and installations having Moderate or higher Load Bearing Performance requirements.
 - .3 Notch bond coat in horizontal straight lines and set on freshly placed bonding material while moving (sliding) tile back and forth at 90° to notches.
 - .4 Verify that corner and edges are fully supported by bonding material.
 - .5 Set tiles to prevent lippage as indicated in paragraph 3.6.1.
 - .6 Keep two-thirds of grout joint depth free of bonding materials.
 - .7 Clean excess bonding materials from tile surface prior to final set.
 - .8 Sound tiles after bonding materials have cured and replace hollow sounding tile before grouting.
- .6 Back Buttering: Obtain 100% mortar coverage on backs of tiles, in accordance with applicable requirements for back buttering of tile in referenced TTMAC and ANSI A108 series of tile installation standards, for the following applications:
 - .1 Tile in wet areas.
 - .2 Tile having dimension of 300 mm or larger in any direction.
 - .3 Tile with raised or textured backs.
 - .4 Tiles for installations rated for Heavy or Extra Heavy Duty.
 - .5 All 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.
- .7 Spacer/leveller installation:
 - .1 Install spacer/leveller clips under tiles at "X" corners (where four tiles meet), "T" corners (where three tiles meet) and additionally, if necessary, along sides to ensure adjacent tiles are at same elevation. Insert reusable wedge between clip and draw tight using tension-adjustable-pliers.
 - .2 After grout has set, break away top of clip using rubber mallet or foot.

- .8 Grouting: Install grout in accordance with manufacturer's written instructions, the requirements of TTMAC, and as follows:
 - .1 Allow proper setting time before application of grout.
 - .2 Pre-seal or wax tiles requiring protection from grout staining.
 - .3 Force grout into joints to a smooth, dense finish.
- .9 Remove excess grout in accordance with manufacturer's written instructions and polish tile with clean cloths.

3.5 SEALING

- .1 Apply tile sealer and grout sealer in accordance with manufacturer's written instructions.

3.6 TOLERANCES

- .1 Set and level tile flush with adjacent tile, with lippage tolerances as follows:
 - .1 Standard lippage tolerance: 0.78 mm for joints up to 6 mm wide; 1.5 mm for joints wider than 6 mm.
 - .2 Special lippage tolerance: to prevent unwanted shadowing on walls caused by ceiling mounted lights, lippage tolerance for wall tile will be in accordance with mock-ups approved by Departmental Representative.

3.7 METAL TRIM INSTALLATION

- .1 Install metal trim at:
 - .1 Edge where floor tile meets different flooring materials.
 - .2 Joint between floor tile and wall tile.

3.8 CONTROL JOINTS

- .1 Provide control joints:
 - .1 Over similar joints in structure.
 - .2 Wherever a change in backing material occurs.
 - .3 At changes in superficial areas in walls (such as doors).
 - .4 At transitions in floors that include corridors and changes in direction.
 - .5 Around penetrating pipes and fixtures.
 - .6 Where tile abuts other materials or fixtures.
 - .7 Where Departmental Representative deems necessary.
- .2 Review location of control joints with Departmental Representative prior to starting installation.
- .3 Install control joints in tile work in accordance with TTMAC Detail 301MJ; keep joints free of bonding materials and as follows:
 - .1 Prefabricated joints:
 - .1 Use prefabricated joints for straight applications.
 - .2 Install in accordance with manufacturer's written instructions, set with top surface of joint profile slightly below top surface of tile.
 - .2 Caulked joints:
 - .1 Cut tiles to establish line of joints; sawn joints after installation of tiles will not be acceptable to Departmental Representative.
 - .2 Prepare joints and apply sealants in accordance with requirements of Section 07 92 10 - Joint Sealing.

3.9 CLEANING

- .1 Progress Cleaning:
 - .1 Leave Work area clean at end of each day.
 - .2 Clean adjacent surfaces immediately.
 - .3 Clean tile surfaces so they are free of foreign matter using manufacturer recommended cleaning products and methods after completion of placement and grouting and as follows:
 - .1 Remove grout residue from tile as soon as possible.
 - .2 Unglazed tile may be cleaned with acid solutions only when permitted by tile and grout manufacturer's written instructions, but no sooner than 10 days after installation; protect metal surfaces, cast iron, and vitreous plumbing fixtures from effects of acid cleaning.
 - .3 Flush surface with clean water before and after cleaning.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

3.10 PROTECTION

- .1 Protection: Leave finished installation clean and free of cracked, chipped, broken, unbonded, or other tile deficiencies as follows:
 - .1 Protect finished areas from traffic until setting materials have sufficiently cured in accordance with TTMAC requirements.
 - .2 Protect floor areas from traffic after grouting is completed in accordance with manufacturer's written instructions.
 - .3 Prevent foot and wheel traffic from floors for a minimum of 24 hours after completion of grouting.
 - .4 Use stepping boards where access is required for light foot traffic only after four (4) hours from completion of grouting.
 - .5 Provide protective covering until Substantial Performance of the Work.
 - .6 Protect wall tiles and bases from impact, vibration, heavy hammering on adjacent and opposite walls for a minimum of seven (7) days after installation.

3.11 INSTALLATION SCHEDULE

- .1 Install tiles in accordance with following details in TTMAC Specification Guide 09 30 00 Tile Installation Manual.
 - .1 Walls - thinset method:
 - .1 Stud walls: 304W with waterproofing membrane.
 - .2 Floors:
 - .1 Large format tiles: 329LFT.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

- .1 23 37 13 - Grilles, Registers and Diffusers.
- .2 26 50 00 - Lighting.

1.2 REFERENCE STANDARDS

- .1 ASTM International (ASTM).
 - .1 ASTM C635/C635M-17, Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustic Tile and Lay-In Panel Ceilings.
 - .2 ASTM E1264-19, Standard Classification for Acoustical Ceiling Products.
- .2 Underwriter's Laboratories of Canada (ULC).
 - .1 ULC-S102-18, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

1.3 DESIGN CRITERIA

- .1 Suspension system shall support the ceiling assembly shown on drawings or specified herein, with maximum deflection of 1/360th of span.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for ceiling panels and ceiling suspension system and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Samples:
 - .1 If requested, submit one representative model of each type of suspension system for approval before installation.

1.5 MAINTENANCE MATERIALS

- .1 Submit maintenance materials in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Deliver acoustical units amounting to 2% of gross ceiling area for each pattern and type required for this project.
- .3 Materials to be same production run as installed material. Clearly identify each type of acoustic unit, including colour and texture.
- .4 Store extra materials where directed by Departmental Representative.
- .5 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .6 Handle materials to prevent damage to edges or surfaces. Protect metal accessories and trim from being bent or damaged.
- .7 Store and protect from nicks, scratches, and blemishes.

- .8 Replace defective/damaged materials with new.

1.6 JOB CONDITIONS

- .1 Start work in areas after glazing is complete, concrete is dry, where ambient temperature is above 16°C, and when mechanical and electrical work installed above the ceiling is tested and approved.

2 Products

2.1 PANELS

- .1 Acoustic ceiling panels shall be fabricated with no added ureaformaldehyde.
- .2 Acoustic ceiling panel (ACP-1):
 - .1 ASTM E1264 classification: Type III, Form 2, Pattern CE.
 - .2 Construction: mineral fibre.
 - .3 Pattern: non-directional fissured.
 - .4 Flame spread rating: 25 or less in accordance with ULC-S102.
 - .5 Smoke developed: 50 or less in accordance with ULC-S102.
 - .6 Noise reduction coefficient (NRC): 0.55.
 - .7 Ceiling Attenuation Class (CAC) rating: 35 in accordance with ASTM E1264.
 - .8 Light reflectance range: 0.85.
 - .9 Edge type: square.
 - .10 Colour: white.
 - .11 Size: 610 mm x 610 mm x 15 mm.
 - .12 Shape: flat.
 - .13 Surface coverings: low VOC paint.
 - .14 Antimicrobial treatment: inorganic; resistant to growth of mold, mildew, and bacteria.
 - .15 Suspension system: panel to lay in 23.8 mm exposed grid.

2.2 SUSPENSION SYSTEM

- .1 Suspension system: to ASTM C635/C635M; 23.8 mm exposed grid system, heavy duty main tee, intermediate cross tee; fabricated from hot-dipped galvanized steel.
 - .1 Minimum recycled content: 64%.
- .2 Finish: baked polyester or powder coated; flat white to match acoustic panels.

2.3 ACCESSORIES

- .1 Provide suspension system complete with following accessories.
 - .1 Wall moulding: angle shaped.
 - .2 Hanger wire: 2.6 mm diameter, galvanized soft annealed steel wire.
 - .3 Other accessories as required for complete system.

3 Execution

3.1 SUSPENSION SYSTEM INSTALLATION

- .1 Install suspension system in accordance with accepted shop drawings and ASTM C636/C636M.
- .2 Install after items such as anchors, blocking, sound and fire barriers, electrical and mechanical work above ceiling have been reviewed by Departmental Representative.

- .3 Lay out system according to reflected ceiling plan.
- .4 Ensure suspension system is coordinated with location of related components.
- .5 Install wall mouldings to provide correct ceiling height. Finished ceiling system to be level within 1:1200. Use shadow type wall mouldings unless noted otherwise.
- .6 Support suspension system main tees at 1220 mm o.c. maximum with hanger wire from building structural system. Complete assembly shall support superimposed loads, such as lighting fixtures, diffusers and grilles.
- .7 Support light fixtures and diffusers with supplemental hangers as follows:
 - .1 Non-rated system:
 - .1 Standard 610 mm x 1220 mm fluorescent light fixtures and mechanical and electrical fixtures weighing more than 11.4 kg: within 150 mm of each corner of light fixture.
 - .2 Smaller fixtures: no supplemental hangers required.
- .8 Interlock cross member to main tee to provide rigid assembly.
- .9 Install suspension assembly in accordance with manufacturer's instructions.
- .10 Frame at openings for light fixtures and air diffusers.

3.2 PANEL INSTALLATION

- .1 Install panels where shown on drawings under conditions outlined in current bulletin of the Canadian Acoustical and Insulating Materials Association.
- .2 Neatly cut and fit around items such as sprinkler heads, lighting fixtures, access panels and mechanical equipment.

3.3 ADJUSTING

- .1 Adjust sags or twists which may develop in the suspension system. Remove damaged or faulty parts of the system and install new.
- .2 Remove soiled or damaged panels and install new.

3.4 CLEANING

- .1 Progress Cleaning:
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.
 - .1 Clean visible metal parts of suspension system.
 - .2 Touch up scratches, abrasions, voids and other defects in painted surfaces.

3.5 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by acoustical suspension installation.

END OF SECTION

1 General

1.1 REFERENCE STANDARDS

- .1 Environmental Protection Agency (EPA).
 - .1 SW-846, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.
- .2 Master Painters Institute (MPI).
 - .1 MPI Architectural Painting Specifications Manual, 2004.
- .3 United Nations (UN).
 - .1 Globally Harmonized System of Classification and Labelling of Chemicals (GHS).

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit product data and instructions for each paint and coating product to be used.
 - .2 Submit product data for the use and application of paint thinner.
- .3 Submit GHS Safety Data Sheets (SDS). Indicate VOCs during application and curing.
- .4 Samples:
 - .1 Submit full range colour sample chips to indicate where colour availability is restricted.
- .5 Test reports: submit certified test reports for paint from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.
 - .1 Lead, cadmium, and chromium: presence of and amounts.
 - .2 Mercury: presence of and amounts.
 - .3 Organochlorines and PCBs: presence of and amounts.
- .6 Manufacturer's Instructions:
 - .1 Submit manufacturer's installation and application instructions.
 - .2 Submit manufacturer's cleaning instructions for whiteboard paint.
- .7 Closeout Submittals: submit maintenance data for incorporation into maintenance manual include following:
 - .1 Product name, type and use.
 - .2 Manufacturer's product number.
 - .3 Colour numbers.
 - .4 MPI Environmentally Friendly classification system rating.

1.3 DELIVERY, STORAGE AND HANDLING

- .1 Packing, Shipping, Handling and Unloading:
 - .1 Pack, ship, handle, and unload materials in accordance with manufacturer's written instructions.
- .2 Acceptance at Site:
 - .1 Identify products and materials with labels indicating:
 - .1 Manufacturer's name and address.
 - .2 Type of paint or coating.

- .3 Compliance with applicable standard.
- .4 Colour number in accordance with established colour schedule.
- .3 Remove damaged and rejected materials from site.
- .4 Storage and Protection:
 - .1 Provide and maintain dry, temperature controlled, secure storage.
 - .2 Store materials and supplies away from heat generating devices.
 - .3 Store materials and equipment in well ventilated area within temperature range 7°C to 30°C.
- .5 Store temperature sensitive products above minimum temperature as recommended by manufacturer.
- .6 Keep areas used for storage, cleaning, and preparation clean and orderly. After completion of operations, return areas to clean condition.
- .7 Remove paint materials from storage only in quantities required for same day use.
- .8 Fire Safety Requirements:
 - .1 Provide one 9 kg Type ABC fire extinguisher adjacent to storage area.
 - .2 Store oily rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.
 - .3 Handle, store, use and dispose of flammable and combustible materials in accordance with National Fire Code of Canada requirements.
- .9 Waste Management and Disposal:
 - .1 Paint, stain and wood preservative finishes and related materials (thinners, and solvents) are regarded as hazardous products and are subject to regulations for disposal. Information on these controls can be obtained from Provincial Ministries of Environment and Regional levels of Government.
 - .2 Material which cannot be reused must be treated as hazardous waste and disposed of in an appropriate manner.
 - .3 Place materials defined as hazardous or toxic waste, including used sealant and adhesive tubes and containers, in containers or areas designated for hazardous waste.
 - .4 Ensure emptied containers are sealed and stored safely.
 - .5 To reduce the volume of contaminants entering waterways, sanitary/storm drain systems or into ground follow these procedures:
 - .1 Retain cleaning water for water-based materials to allow sediments to be filtered out.
 - .2 Retain cleaners, thinners, solvents and excess paint and place in designated containers and ensure proper disposal.
 - .3 Return solvent and oil soaked rags used during painting operations for contaminant recovery, proper disposal, or appropriate cleaning and laundering.
 - .4 Dispose of contaminants in approved legal manner in accordance with hazardous waste regulations.
 - .5 Empty paint cans are to be dry prior to disposal or recycling (where available).

1.4 SITE CONDITIONS

- .1 Temperature, Humidity and Substrate Moisture Content Levels:
 - .1 Unless pre-approved written approval by Departmental Representative and product manufacturer, perform no painting when:
 - .1 Ambient air and substrate temperatures are below 10°C.
 - .2 Substrate temperature is above 32°C unless paint is specifically formulated for application at high temperatures.
 - .3 Substrate and ambient air temperatures are not expected to fall within MPI or paint manufacturer's prescribed limits.
 - .4 The relative humidity is under 85% or when the dew point is more than 3°C variance between the air/surface temperature. Paint should not be applied if the dew point is less than 3°C below the ambient or surface temperature. Use sling psychrometer to establish the relative humidity before beginning paint work.
 - .5 Rain or snow are forecast to occur before paint has thoroughly cured or when it is foggy, misty, raining or snowing at site.
 - .6 Ensure that conditions are within specified limits during drying or curing process, until newly applied coating can itself withstand 'normal' adverse environmental factors.
 - .2 Perform painting work when maximum moisture content of the substrate is below:
 - .1 12% for concrete and masonry.
 - .2 15% for wood.
 - .3 12% for gypsum board.
 - .3 Test for moisture using calibrated electronic Moisture Meter. Test concrete floors for moisture using "cover patch test".
 - .4 Test concrete, masonry and plaster surfaces for alkalinity as required.
- .2 Surface and Environmental Conditions:
 - .1 Apply paint finish in areas where dust is no longer being generated by related construction operations or when wind or ventilation conditions are such that airborne particles will not affect quality of finished surface.
 - .2 Apply paint to adequately prepared surfaces and to surfaces within moisture limits.
 - .3 Apply paint when previous coat of paint is dry or adequately cured.
- .3 Additional interior application requirements:
 - .1 Apply paint finishes when temperature at location of installation can be satisfactorily maintained within manufacturer's recommendations.

1.5 EXTRA MATERIALS

- .1 Quantity:
 - .1 Finishing coat: turn over surplus full cans of paint to Departmental Representative. If, within each type and colour of finish coat, less than one can of paint remains, provide one (1) – one litre can for maintenance purposes. Identify colour and paint type in relation to established colour schedule and finish system.
 - .2 Identify colour and paint type in relation to established colour schedule and finish system.
- .2 Extra materials shall be from same production run as products installed. Package products with protective covering and identify with descriptive labels.

- .3 Delivery, storage, and protection: comply with Departmental Representative's requirements for delivery and storage of extra materials.

2 Products

2.1 MATERIALS

- .1 Paints, primers, coatings, varnishes, stains, lacquers etc. shall conform to Green Seal Standard GS-11, Green Seal Standard GC-03, or the California South Coast Air Quality Management District (SCAQMD) Rule #1133.
- .2 Materials (primers, paints, coatings, varnishes, stains, lacquers) shall be listed in the MPI Approved Products List (APL).
- .3 Other paint materials such as linseed oil, shellac, turpentine, etc. shall be the highest quality product of an approved manufacturer listed in MPI Painting Specification Manual and shall be compatible with other coating materials as required.
- .4 Only listed products with E2 or E3 "Environmentally Friendly" rating are acceptable for use on this project (E3 only for X-Green products). Where a manufacturer has both E2 and E3 rated products listed under an individual MPI number; use product with E3 rating.
- .5 Where possible, provide paint materials for paint systems from single manufacturer.
- .6 Dry erase coating:
 - .1 Two-component, water-based polyurethane, clear coating; having VOC of <100 g/L.

2.2 COLOURS

- .1 Departmental Representative will provide Colour Schedule after Contract award.
- .2 Selection of colours will be from manufacturers full range of colours.
- .3 Wall colours will be limited to a maximum of four (4) colours.
- .4 Second coat in a three coat system to be tinted slightly lighter colour than top coat to show visible difference between coats.

2.3 MIXING AND TINTING

- .1 Perform colour tinting operations prior to delivery of paint to site. Obtain written approval from Departmental Representative for tinting of painting materials.
- .2 Mix paste, powder or catalyzed paint mixes in accordance with manufacturer's written instructions.
- .3 Use and add thinner in accordance with paint manufacturer's recommendations. Do not use kerosene or similar organic solvents to thin water-based paints.
- .4 Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and colour and gloss uniformity.

2.4 GLOSS/SHEEN RATINGS

- .1 Paint gloss is defined as sheen rating of applied paint, in accordance with following values:

	Gloss @ 60 degrees	Sheen @ 85 degrees
Gloss Level 1 - Matte Finish (flat)	Max. 5	Max. 10
Gloss Level 2 - Velvet-Like Finish	Max. 10	10 to 35
Gloss Level 3 - Eggshell Finish	10 to 25	10 to 35
Gloss Level 4 - Satin-Like Finish	20 to 35	min. 35
Gloss Level 5 - Traditional Semi-Gloss Finish	35 to 70	
Gloss Level 6 - Traditional Gloss	70 to 85	
Gloss Level 7 - High Gloss Finish	More than 85	

- .2 Gloss level ratings of painted surfaces as indicated.

2.5 INTERIOR PAINTING SYSTEMS

- .1 Unless otherwise noted, all painting work shall be in accordance with MPI Premium Grade finish requirements.
- .2 Painting systems:
- .1 Systems specified are for new surfaces.
 - .2 For repaint work, use same paint system as for new surfaces, with the following exceptions for priming:
 - .1 Omitting primer is acceptable only on DSD-1 - sound surfaces.
 - .2 Touch-up priming, or spot priming is acceptable on DSD-2 - slight to moderately deteriorated surfaces.
 - .3 Use full coat of primer on DSD-3 - severely deteriorated surfaces.
- .3 Galvanized metal:
- .1 INT 5.3K - W.B. Light Industrial Coating (over w.b. galvanized primer), G5 - semi-gloss finish. Use pre-catalyzed epoxy.
 - .1 Primer: MPI#134 X-Green.
 - .2 Top coats: MPI#153 X-Green.
 - .3 Location/items: Steel doors and frames.
- .4 Gypsum board: gypsum wallboard, drywall, "sheet rock type material":
- .1 INT 9.2B - High Performance Architectural Latex (over latex primer/sealer), G3 - eggshell finish.
 - .1 Primer: MPI#50 X-Green; only Zero VOC products are acceptable.
 - .2 Top coats: MPI#139 X-Green.
 - .3 Location/Items: Walls except for those listed in Formula INT 9.2F.
 - .2 INT 9.2F - Epoxy - Modified Latex finish (over latex sealer), G5 - Semi-Gloss finish.
 - .1 Primer: MPI#50 X-Green; only Zero VOC products are acceptable.
 - .2 Top coats: MPI#215.
 - .3 Locations/Items: Washroom walls.
- .5 Dry erase coating:
- .1 Apply one (1) coat dry erase coating.

2.6 SOURCE QUALITY CONTROL

- .1 Perform following tests on each batch of consolidated post-consumer material before surface coating is reformulated and canned. Testing by laboratory or facility which has been accredited by Standards Council of Canada.
 - .1 Lead, cadmium and chromium are to be determined using ICP-AES (Inductively Coupled Plasma - Atomic Emission Spectroscopy) technique no. 6010 as defined in EPA SW-846.
 - .2 Mercury is to be determined by Cold Vapour Atomic Absorption Spectroscopy using Technique no. 7471 as defined in EPA SW-846.
 - .3 Organochlorines and PCBs are to be determined by Gas Chromatography using Technique no. 8081 as defined in EPA SW-846.

3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and data sheet.

3.2 GENERAL

- .1 Perform preparation and operations for painting in accordance with MPI Architectural Painting Specifications Manual except where specified otherwise.
- .2 Apply paint materials in accordance with paint manufacturer's written application instructions.

3.3 EXAMINATION

- .1 Investigate existing substrates for problems related to proper and complete preparation of surfaces to be painted. Report to Departmental Representative damages, defects, unsatisfactory or unfavourable conditions before proceeding with work.

3.4 PREPARATION

- .1 Protection:
 - .1 Protect existing building surfaces and adjacent structures from paint spatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore surfaces as directed by Departmental Representative.
 - .2 Protect items that are permanently attached such as Fire Labels on doors and frames.
 - .3 Protect factory finished products and equipment.
- .2 Surface Preparation:
 - .1 Remove electrical cover plates, light fixtures, surface hardware on doors, washroom accessories and other surface mounted equipment, fittings and fastenings prior to undertaking painting operations. Identify and store items in secure location and re-installed after painting is completed.
 - .2 Move and cover furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.
 - .3 Place "WET PAINT" signs in occupied areas as painting operations progress. Signs to approval of Departmental Representative.

- .3 Clean and prepare surfaces in accordance with MPI Architectural Painting Specification Manual requirements. Refer to MPI Manual in regard to specific requirements and as follows:
 - .1 Remove dust, dirt, and other surface debris by vacuuming, wiping with dry, clean cloth or other method acceptable to Departmental Representative.
 - .2 Wash surfaces with a biodegradable detergent and bleach where applicable and clean warm water using a stiff bristle brush to remove dirt, oil and other surface contaminants.
 - .3 Rinse scrubbed surfaces with clean water until foreign matter is flushed from surface.
 - .4 Allow surfaces to drain completely and allow to dry thoroughly.
 - .5 Prepare surfaces for water-based painting, water-based cleaners should be used in place of organic solvents.
 - .6 Use trigger operated spray nozzles for water hoses.
 - .7 Many water-based paints cannot be removed with water once dried. Minimize use of mineral spirits or organic solvents to clean up water-based paints.
- .4 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil, and solvents before prime coat is applied and between applications of remaining coats. Apply primer, paint, or pretreatment as soon as possible after cleaning and before deterioration occurs.
- .5 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 1000 mm.
- .6 Clean metal surfaces to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease, and other foreign substances in accordance with MPI requirements. Remove traces of blast products from surfaces, pockets, and corners to be painted by brushing with clean brushes, blowing with clean dry compressed air or vacuum cleaning.
- .7 Touch up of shop primers with primer as specified.

3.5 APPLICATION

- .1 Method of application to be as approved by Departmental Representative. Apply paint by brush or roller. Use of spray equipment only when approved by Departmental Representative. Conform to manufacturer's application instructions unless specified otherwise.
- .2 Brush and Roller Application:
 - .1 Apply paint in uniform layer using brush and/or roller type suitable for application.
 - .2 Work paint into cracks, crevices, and corners.
 - .3 Paint surfaces and corners not accessible to brush using daubers and/or sheepskins.
 - .4 Brush and/or roll out runs and sags, and over-lap marks. Rolled surfaces free of roller tracking and heavy stipple.
 - .5 Remove runs, sags and brush marks from finished work and repaint.
- .3 Apply coat of paint in continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.
- .4 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time as recommended by manufacturer.
- .5 Sand and dust between coats to remove visible defects.

3.6 MECHANICAL/ELECTRICAL EQUIPMENT

- .1 Paint finished area exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment with colour and finish to match adjacent surfaces, except as indicated.
 - .1 Paint fire protection piping red.
- .2 Mechanical and electrical rooms: paint exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment when wall/ceiling that item is attached to or suspended from, is scheduled to be painted.
 - .1 Paint fire protection piping red.
- .3 Other unfinished areas: leave exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment in original finish and touch up scratches and marks.
- .4 Where required by code, paint exposed mechanical and electrical items whether or not room is painted.
- .5 Touch up scratches and marks on factory painted finishes and equipment with paint as supplied by manufacturer of equipment.
- .6 Do not paint over nameplates.
- .7 Keep sprinkler heads free of paint.
- .8 Paint inside of ductwork where visible behind grilles, registers and diffusers with primer and one coat of matte black paint.

3.7 INTERIOR REPAINTING

- .1 All interior repainting shall match and be fully compatible with existing finishes.
- .2 Remove dirt, dust, oil, grease, rust stains, mould, mildew, and other contaminants. Remove loose and flaking paint to expose sound surface.
- .3 Glossy surfaces:
 - .1 Sand glossy surfaces to promote better adhesion of new paint system.
 - .2 If sanding of glossy surfaces cannot be undertaken, notify Departmental Representative, and provide bonding primer that is formulated specifically for adhering to glossy surfaces.
- .4 Compatibility testing:
 - .1 Test for compatibility between new paint systems and existing paint systems before undertaking full scale painting process.
 - .1 Notify Departmental Representative if incompatibility is observed and await direction.
 - .2 If full scale painting has been undertaken before testing for compatibility and incompatibility is observed:
 - .1 Remove new incompatible paint system in its entirety, take corrective action necessary, and reapply topcoats specified; all at no increase in contract price.
- .5 Take care not to disturb or damage existing interior wall finishes.
- .6 Unless noted otherwise, repainting shall be limited to surfaces of walls, ceilings, floors, etc., where renovation or alteration has taken place.
- .7 Repaint entire interior surfaces of walls, ceilings, floors, etc. Patch/spot painting will not be accepted unless approved by Departmental Representative.

- .8 Paint new surface run/exposed pipes, ducts and conduits where existing wall/ceiling is painted.
- .9 Paint existing surfaces:
 - .1 Scheduled or noted to be repainted.
 - .2 That have been patched/repaired.
 - .3 Where items have been removed/relocated that leave an unfinished surface or finished surface that is visibly different from remainder of existing surface (e.g. different colour or colour not faded to same degree).
- .10 Repaint surfaces damaged during or after painting, at no increase in Contract price. Cost, including material and labour, shall be borne by trade responsible for damage.
- .11 Apply sufficient coats paint to properly hide old colour and produce a solid, uniform appearance satisfactory to the Departmental Representative.

3.8 FIELD QUALITY CONTROL

- .1 Standard of Acceptance:
 - .1 Walls: no defects visible from a distance of 1000 mm at 90° to surface.
 - .2 Ceilings: no defects visible from floor at 45° to surface when viewed using final lighting source.
 - .3 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.
- .2 Advise Departmental Representative when surfaces and applied coating is ready for inspection. Do not proceed with subsequent coats until previous coat has been approved.
- .3 Retain purchase orders, invoices and other documents to prove conformance with noted MPI requirements when requested by Departmental Representative.

3.9 CLEANING

- .1 Progress Cleaning:
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

3.10 RESTORATION

- .1 Clean and re-install hardware items removed before undertaken painting operations.
- .2 Remove protective coverings and warning signs as soon as practical after operations cease.
- .3 Remove paint splashings on exposed surfaces that were not painted. Remove smears and spatter immediately as operations progress, using compatible solvent.
- .4 Protect freshly completed surfaces from paint droppings and dust using methods acceptable to Departmental Representative. Avoid scuffing newly applied paint.
- .5 Restore areas used for storage, cleaning, mixing and handling of paint to clean condition as approved by Departmental Representative.

END OF SECTION