

- .17 CGC Gypsum Construction Handbook.
 - .18 CAN/CGSB-71.25-M88: Adhesive, for Bonding Drywall to Wood Framing and Metal Studs.
 - .19 CISCA Ceiling Systems Handbook, 2012 Edition.
 - .20 GA-214-2021: Levels of Finish for Gypsum Panel Products.
 - .21 GA-226-2019: Application of Gypsum Board to Form Curved Surfaces.
 - .22 CAN/ULC-S101-14 (REV1): Standard Method of Fire Endurance Tests of Building Construction and Materials.
 - .23 ULC List of Equipment and Materials.
- 1.3 QUALIFICATIONS
- .1 Installers: A firm specializing in erecting metal framing and installing gypsum board, having minimum 5 years documented experience.
- 1.4 DELIVERY, STORAGE AND HANDLING
- .1 Conform to ASTM C1264.
- 2 Products
- 2.1 MANUFACTURERS
- .1 Manufacturers of metal framing having Product considered acceptable for use:
 - .1 Bailey Metal Products Limited.
 - .2 CGC Inc.
 - .3 Dietrich Metal Framing.
 - .2 Manufacturers of gypsum board having Product considered acceptable for use:
 - .1 CertainTeed Canada, Inc.
 - .2 CGC Inc.
 - .3 G-P Gypsum Corporation.
 - .3 Substitution Procedures: Refer to Section 01 25 00.
- 2.2 DESCRIPTION
- .1 Interior Partitions: Vertical non-load bearing metal stud framing clad with wall boards mechanically-fastened or adhered on one or both sides, and including acoustical insulation and accessories where indicated.
 - .2 Suspended Ceilings: Horizontal non-load bearing channels and framing carrying mechanically-fastened ceiling boards.
 - .3 A non-load bearing (non-structural) member is defined as a member in a steel-framed system which is limited to transverse (out-of-plane) load of not more than 480 Pa, a superimposed axial load, exclusive of sheathing materials, of not more than 1 460 N/m, or a superimposed axial load of not more than 890 N.
 - .4 A load bearing (structural) stud may be used in a non-load bearing application; however, non-load bearing members (studs or track) may never be used in a load bearing (axial or lateral loading) application.

2.3 PERFORMANCE CRITERIA

- .1 Provide metal wall framing systems with maximum design limit of 240 Pa and maximum allowable deflection of L/360.
- .2 Provide metal ceiling framing systems with maximum allowable deflection of L/240.
- .3 Fire-Resistance Rated Assemblies: Provide Products and construction identical to those tested in listed assemblies. Conform to CAN/ULC-S101.
- .4 Sound Rated Assemblies: Provide Products and construction identical to those tested in listed assemblies. Conform to ASTM E90.
- .5 Seismic Requirements: Provide seismic restraint as required by applicable regulatory requirements, to CISCA guidelines.

2.4 METAL FRAMING

- .1 Metal Standard Duty Studs: To ASTM C645; 0.455 mm thick sheet steel; galvanized or galvalumed finish; C-Shape with 32 mm wide flange, complete with serrated faces and knock-outs for electrical fitments; depths as indicated on Drawings.
- .2 Metal Heavy Duty Studs: To ASTM C645; 0.836 mm thick sheet steel; galvanized or galvalumed finish; C-Shape with 32 mm wide flange, complete with serrated faces and knock-outs for electrical fitments; depths as indicated on Drawings.
- .3 Metal Standard Duty Floor and Ceiling Tracks: To ASTM C645; 0.455 mm thick sheet steel; galvanized or galvalumed finish; U-Shape with 32 mm wide flanges; depths as indicated on Drawings.
- .4 Metal Heavy Duty Floor and Ceiling Tracks: To ASTM C645; 0.836 mm thick sheet steel; galvanized or galvalumed finish; U-Shape with 32 mm wide flanges; depths as indicated on Drawings.
- .5 Metal Ceiling Deflection Track: To ASTM C645; 0.455 mm thick sheet steel; galvanized or galvalumed finish; U-Shape with long legs, designed to accommodate structural deflections; depths as indicated on Drawings.
- .6 Furring: To ASTM C645; 0.455 mm thick sheet steel; galvanized or galvalumed finish; and as described below:
 - .1 C-Shaped Furring Channels: 13 mm wide flange, 19 mm deep unless noted otherwise on Drawings.
 - .2 Hat-Shaped Furring Channels: 13 mm wide flange, 22 mm deep unless noted otherwise on Drawings.
 - .3 Z-Shaped Furring: With slotted or non-slotted web, 32 mm face flange, 22 mm wall attachment flange; depth as indicated on Drawings.
 - .4 Resilient Furring Channels: Designed to reduce sound transmission; 13 mm deep unless noted otherwise on Drawings.
- .7 Carrying Channels: To ASTM C754; 1.37 mm thick cold-formed steel with galvanized or galvalumed finish; having minimum yield strength of 228 MPa; C-Shape with 13 mm flange width, 38 mm deep unless noted otherwise on Drawings.
- .8 Furring Brackets: 0.79 mm thick sheet steel; galvanized or galvalumed finish; adjustable, with corrugated-edge.
- .9 Flat Strap and Backing Plates: 0.455 mm thick sheet steel; galvanized or galvalumed finish; lengths and widths as indicated on Drawings.
- .10 Channel Bridging: 0.455 mm thick sheet steel; galvanized or galvalumed finish; 13 mm wide flange, 19 mm deep unless noted otherwise on Drawings.

- .11 Hanger Wire: To ASTM A641/A641M; zinc-coated, soft-annealed, 3.77 mm OD steel wire.
- .12 Tie Wire: To ASTM A641/A641M; zinc-coated, soft-annealed, 1.21 mm OD steel wire.

2.5 BOARDS

- .1 Gypsum Wall Board (GB): To ASTM C1396/C1396M, Type X; 15.9 mm thick Type X gypsum panel with water- and mould-resistant gypsum core and paper facers, tapered edges; eg. Sheetrock Brand Mold Tough Panels FireCode X by CGC Inc.
- .2 Fire-Rated Gypsum Board (GB-FR): To ASTM C1396/C1396M, Type XC; tapered edges, ivory faced, ULC labelled; thicknesses as indicated on Drawings; eg. Sheetrock Brand FireCode C by CGC Inc.
- .3 Abuse-Resistant Gypsum Board (GB-AR): To ASTM C1629/C1629M, Type X; Level II - Mild to Moderate Duty; 15.9 mm thick gypsum abuse-resistant panel with water- and mould-resistant gypsum core and paper facers, tapered long edges and square ends; eg. Sheetrock Brand Panels Mold Tough AR FireCode X by CGC Inc.
- .4 Gypsum Ceiling Board (GB-CLG): To ASTM C1396/C1396M; 12.7 mm thick; paper-facers, eased tapered edges; maximum 6.5 kg/m² weight; eg. Sheetrock Brand Ultralight Interior Ceiling Board Sag-Resistant by CGC Inc.

2.6 ACCESSORIES

- .1 Foam Gasket: 3.2 mm thick adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement; width to suit track depth.
- .2 Corner Beads, Casing Beads, Control Joints and Edge Trim: To ASTM C1047; metal type.
- .3 Reveals and Trim Reglets: To ASTM C1047; extruded aluminum profiles; as indicated on Drawings.
- .4 Nail Fasteners: To ASTM C514; galvanized steel.
- .5 Steel Drill Screws: To ASTM C954; galvanized steel.
- .6 Self-Tapping Screws: To ASTM C1002, Type S, Fine Thread; galvanized steel.
- .7 Adhesive: To CAN/CGSB-71.25-M.
- .8 Joint Tape: Fiberglass joint tape, 50 mm wide, self-adhering type; eg. Mould Resistant Fiberglass Drywall Tape by CGC Inc.
- .9 Joint Compound: Ready-mixed drying type drywall compound, to ASTM C475/C475M; eg. Synko Brand Classic All Purpose Drywall Compound by CGC Inc.
- .10 Sealant: Interior general purpose sealant, Type SEAL-INT-GP as specified in Section 07 92 00.
- .11 Water: Potable.

2.7 MIXING

- .1 Thoroughly mix joint and skim coat materials to homogeneous mixture with trowelling consistency.

2.8 FINISHES

- .1 Galvanized Coating on Metal Framing Components: To ASTM A653/A653M, Coating Designation Z120; hot dipped zinc alloy coating.

- .2 Galvalumed Coating on Metal Framing Components: To ASTM A792/A792M, Coating Designation AZM150; hot dipped aluminum-zinc alloy coating.

3 Execution

3.1 PREPARATION

- .1 Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure.
 - .1 Ensure inserts and other provisions for anchorages to building structure have been installed to receive hangers at required spacings.
 - .2 Supply concrete inserts and other devices to other related Sections for installation in advance.

3.2 METAL WALL FRAMING

- .1 Install metal wall framing to ASTM C754 and CGC Gypsum Construction Handbook.
- .2 Where metal framing is installed directly against exterior masonry walls or dissimilar metals at exterior walls, Provide foam gasket between metal framing and exterior wall.
- .3 Install studs with flanges pointing in same direction.
- .4 Space metal stud framing in straight walls and partitions at maximum 400 mm OC.
- .5 Install track floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions of structure.
- .6 Where framing extends to overhead structural supports, Provide deflection track to create a slip-type head joints to produce joints at tops of framing system that prevent axial loading of finished assemblies due to deflection of structure.
- .7 Screw vertical studs at door opening jambs to jamb anchor clips at door frames. Install track section for cripple studs at head and secure to jamb studs.
 - .1 Provide two studs at each jamb.
 - .2 Provide cripple studs at head adjacent to each jamb stud, with minimum 13 mm clearance from jamb stud to allow for installation of control joint in finished assembly.
- .8 Provide framing below sills of openings to match framing required above opening heads.
- .9 Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated. Support closures and make partitions continuous from floor to underside of solid structure.
- .10 Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
- .11 Curved Walls and Partitions: Conform to GA-226, and as follows:
 - .1 Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
 - .2 Begin and end each arc with a stud, and space intermediate studs equally along arcs at maximum 150 mm OC.
 - .3 On straight lengths of not less than two studs at ends of arcs, place studs at maximum 150 mm OC.
- .12 Attach furring directly to concrete or masonry using stub nails, screws designed for masonry attachment or power-driven fasteners; spaced at 610 mm OC.
- .13 Z-Furring Members:
 - .1 Erect insulation vertically and hold in place with Z-furring members spaced at 610 mm OC.

- .2 Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or power-driven fasteners spaced at 610 mm OC.
- .3 At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel.
- .4 At interior corners, space second member no more than 305 mm from corner and butt insulation to fit.
- .14 Unless indicated otherwise, Provide supplementary framing and furring to conceal pipes, conduit and ducts.
- .15 Provide supplementary framing and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings and similar construction.
- .16 Install bracing at terminations in assemblies.
- .17 Do not bridge building control joints and expansion joints with non-load bearing steel framing members. Frame both sides of joints independently.
- .18 Installation Tolerances: Install framing members so fastening surfaces vary not more than 3 mm from plane formed by faces of adjacent framing members.

3.3 SUSPENDED CEILING FRAMING

- .1 Install ceiling framing to ASTM C754 and CISCA installation standards for required seismic design category.
- .2 Isolate suspension system from building structure. Prevent transfer of loading imposed by structural movement.
- .3 Install hangers plumb and free from contact with insulation or other objects within ceiling plenum.
- .4 Size supplemental suspension members and hangers to support ceiling loads within established performance limits.
- .5 Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or similar devices.
- .6 Secure wire hangers by looping and wire tying, either directly to structure or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate; and in a manner that will not cause hangers to fail or deteriorate.
- .7 Do not attach hangers to steel roof decking, or to rolled-in hanger tabs of composite steel floor decking.
- .8 Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
- .9 Do not connect or suspend steel framing from ducts, pipes or conduit.
- .10 For fire-resistance-rated assemblies, wire tie furring channels to supports.
- .11 Installation Tolerances: Level to within 3 mm in 3 600 mm, measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

3.4 ACOUSTICAL ACCESSORIES

- .1 Install resilient channels at maximum 600 mm OC.
- .2 Install acoustical sealant within designated sound-rated partitions.

3.5 BOARD INSTALLATION

- .1 Install board Products to ASTM C840 and the CGC Gypsum Construction Handbook.
- .2 Install gypsum ceiling and soffit board perpendicular to supports.
- .3 Screw fasten boards to furring or framing.
- .4 Install abuse-resistant gypsum board on heavy duty metal stud and track framing.
- .5 Double Layer Applications: Place first layer perpendicular to framing or furring members. Place second layer perpendicular to first layer.
- .6 Place corner beads at external corners. Place edge trim where gypsum board abuts dissimilar materials. Fasten with nail attachment, unless specified otherwise.
- .7 Provide bulkheads where changes of ceiling or height occur.
- .8 Install access panels when and where directed by affected Subcontractors.

3.6 BOARD FINISHING

- .1 Tape, fill and sand exposed joints, edges and corners to a smooth surface.
- .2 Leave surfaces smooth, even, plumb and true, ready to receive final finishes specified in other Sections.
- .3 Except as specified below, finish gypsum board to GA-214, Level 4.
 - .1 Provide Level 1 finish on concealed surfaces, such as in plenum spaces above ceilings, and behind cabinetry.

3.7 CONTROL JOINTS

- .1 Provide control joints where indicated on Drawings, and where:
 - .1 Ceiling, partition or furring abuts a structural element,
 - .2 Ceiling, partition or furring abuts dissimilar construction,
 - .3 Construction changes within plane of the partition or ceiling,
 - .4 Partition or furring run exceeds 9 000 mm,
 - .5 Ceiling dimensions exceed 15 000 mm in either direction,
 - .6 Wings of "L-", "U-" and "T"-shaped ceiling areas are joined, and
 - .7 Expansion or control joints occur in the structural elements of the building.
- .2 Break continuity of gypsum board and framing system at control joints.
- .3 Provide continuous control joint profile.

3.8 RELIEF JOINTS

- .1 Provide relief joints where indicated on Drawings and where gypsum board assemblies abut dissimilar construction.
- .2 Stop gypsum board 6 mm from abutting construction at dissimilar building elements, unless indicated otherwise.
- .3 Provide a thermal break where gypsum board comes into contact with frames. Adhere self-adhering tape to casing bead and compress during installation of gypsum board.

- .4 Provide reveal mouldings where gypsum board ceilings meet curved wall surfaces and where indicated on Drawings.

END OF SECTION

1 General

1.1 RELATED SECTIONS

- .1 Section 07 92 00 - Joint Sealants.
- .2 Section 09 65 19 - Resilient Tile Flooring.
- .3 Section 09 65 66 - Resilient Athletic Flooring.
- .4 Section 09 68 13 - Tile Carpeting.

1.2 REFERENCES

- .1 ANSI A108.01-2016: General Requirements: Subsurfaces and Preparations by Other Trades.
- .2 ANSI A108.4-2009: Installation of Ceramic Tile with Organic Adhesives or Water Cleanable Tile-Setting Epoxy Adhesive.
- .3 ANSI A108.5-1999: Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar (Reaffirmed 2010).
- .4 ANSI A108.10-1999: Installation of Grout in Tilework (Reaffirmed 2010).
- .5 ANSI A108.17-2005: Installation of Crack Isolation Membranes for Thin-Set Ceramic Tile and Dimension Stone (Reaffirmed 2016).
- .6 ANSI A118.1-2012: Specifications for Dry-Set Portland Cement Mortar.
- .7 ANSI A118.4-2012: Specifications for Modified Dry-Set Cement Mortar.
- .8 ANSI A118.7-2010: Specifications for Polymer Modified Cement Grouts for Tile Installation (Reaffirmed 2016).
- .9 ANSI A118.12-2014: Specifications for Crack Isolation Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation.
- .10 ANSI A136.1-2008: Specifications for Organic Adhesives for Installation of Ceramic Tile (Reaffirmed 2013).
- .11 ANSI A137.1-2012: Specifications for Ceramic Tile.
- .12 ASTM C144-18: Standard Specification for Aggregate for Masonry Mortar.
- .13 ASTM C207-18: Standard Specification for Hydrated Lime for Masonry Purposes.
- .14 ASTM C627-18(2024): Standard Test Method for Evaluating Ceramic Floor Tile Installation Systems Using the Robinson-Type Floor Tester.
- .15 ASTM F1869-23: Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
- .16 ASTM F3191-23: Standard Practice for Field Determination of Substrate Water Absorption (Porosity) for Substrates to Receive Resilient Flooring.
- .17 CAN/CGSB-25.20-95: Surface Sealer for Floors.
- .18 CSA A3001-18: Cementitious Materials for Use in Concrete.
- .19 TTMAC Specification Guide 09 30 00 - Tile Installation Manual 2019-2021.

1.3 SAMPLES

- .1 Submit samples as specified in Section 01 33 00.

- .2 Verification Samples: A 300 x 300 mm size panel, complete with selected grout colour; mounted to 19 mm thick plywood backer.

1.4 CLOSEOUT SUBMITTALS

- .1 Submit closeout submittals as specified in Section 01 78 00.
- .2 Maintenance Data: Latest edition of TTMAC Hard Surface Maintenance Guide; sufficient quantities for inclusion in operation and maintenance manual.

1.5 EXTRA STOCK MATERIALS

- .1 Supply extra stock materials as specified in Section 01 78 00.
- .2 Extra Stock Materials: Two percent or 4.0 m², whichever is greater, of each type and colour of installed tile; clearly marked to identify:
 - .1 Manufacturer's name,
 - .2 Product's name,
 - .3 Product colour and pattern.
- .3 Package tiles neatly in original containers, to prevent damage.

1.6 QUALIFICATIONS

- .1 Installers: Skilled workers trained and experienced in tiling and members of TTMAC.

1.7 DELIVERY STORAGE AND HANDLING

- .1 Refer to Section 01 60 00.
- .2 Store Products in a dry area, protected from freezing, staining and damage.
- .3 Store cementitious materials on a dry surface.

1.8 AMBIENT CONDITIONS

- .1 Do not install tiles at temperatures less than 12 degrees C.
- .2 Maintain temperatures at or above 12 degrees C until cementitious materials have fully cured.

2 Products

2.1 MANUFACTURERS

- .1 Manufacturers of mortars, grouts and adhesives having Product considered acceptable for use:
 - .1 Custom Building Products.
 - .2 Flextile.
 - .3 Laticrete.
 - .4 Mapei.
 - .5 Proma Adhesives, Inc.
 - .6 TEC.
- .2 Manufacturers of tile-setting accessories having Product considered acceptable for use:
 - .1 Bengard.
 - .2 Profilitec.
 - .3 Schlüter Systems (Canada) Inc.
- .3 Substitution Procedures: Refer to Section 01 25 00.

2.2 PERFORMANCE CRITERIA

- .1 Traffic Level Performance (ASTM C627): Moderate Class.

2.3 TILE MATERIALS

- .1 Porcelain Floor Tile: To ANSI A137.1; unglazed porcelain; 610 x 610 mm size; matte finish; Florence Series as distributed by Olympia tile International, Inc., colour as selected by Consultant.
- .2 Cut Base Tile: 100 mm high, full-length, site-cut from floor tile, and having at least one factory-formed edge along each tile's length; type, size, colour and texture to match adjacent flooring material.

2.4 MORTAR MATERIALS

- .1 Portland Cement: To CSA A3001, Type GU.
- .2 Hydrated Lime: To ASTM C207, Type N-Normal.
- .3 Sand: To ASTM C144, passing 16 mesh.
- .4 Dry-Set Portland Cement Mortar: To ANSI A118.1.
- .5 Latex-Portland Cement Mortar: To ANSI A118.4.
- .6 Cementitious Grout: To ANSI A118.7; rapid setting type, polymer-modified sanded grout; eg. Ultracolor Plus FA by Mapei, colour as selected by Consultant.

2.5 ACCESSORIES

- .1 Crack Isolation Membrane: To ANSI A118.12, High Performance Rating; loadbearing membrane.
- .2 Reinforcing Mesh: 50 x 50 mm size; 1.6 mm thick steel wire mesh; welded fabric, galvanized.
- .3 Organic Adhesive: To ANSI A136.1; Type 1 for wet areas and Type 2 for dry areas.
- .4 Latex Additive: Formulated for use in portland cement mortars and grout.
- .5 Water: Clean, cold and potable.
- .6 Joint Sealants: Interior tiling sealant, Type SEAL-INT-TILE as specified in Section 07 92 00 .
- .7 Tile Sealer: To CAN/CGSB-25.20, Type 1 - Penetrating.

2.6 MANUFACTURED COMPONENTS AND ACCESSORIES

- .1 Edge and Transition Strips: Roll-formed stainless steel edge strips, 3 mm wide at top edge; with integral perforated anchoring leg for setting strip into setting material; height as required; Brushed finish; eg. SCHIENE-EB by Schlüter Systems (Canada) Inc.
- .2 Tapered Transition Strips - To Other Floor Finishes: Roll-formed stainless steel transition strips; profile and height as indicated; with integral perforated anchoring leg for setting strip into setting material; sloped transition and decorative edge strip for transition from tile to lower finish; Brushed finish; eg. RENO-EBU by Schlüter Systems (Canada) Inc.
- .3 Expansion and Control Joints for Thin-Set Applications: Roll formed stainless steel profiles joined by soft CPE movement joint material, with integral perforated anchoring legs for setting joint into setting bed; height as required to suit application; insert colour as selected by Consultant; eg. DILEX-EKSN by Schlüter Systems (Canada) Inc.

2.7 MIXES

- .1 Scratch Coat (by volume): One part Portland cement, 4 parts sand, and latex additive where required by TTMAC Detail. Premixed mortar may be used per manufacturer's instructions. Adjust water volume depending on moisture content of sand to obtain consistency and workability.
- .2 Slurry Bond Coat: Mix Portland cement and water to a creamy paste consistency. Include latex additive where required by TTMAC Detail.
- .3 Levelling Coat (by volume): One part Portland cement, 4 parts sand, and latex additive where required by TTMAC Detail. Premixed mortar may be used per manufacturer's instructions.

3 Execution

3.1 EXAMINATION

- .1 Refer to Section 01 71 00.
- .2 Ensure substrates have been prepared to ANSI A108.01.
- .3 Ensure substrate surfaces are clean, dimensionally stable, cured and free of contaminants such as oil, sealers and curing compounds.
- .4 Ensure concrete has cured for minimum 28 days.
- .5 Ensure concrete slabs have not been treated with proprietary curing compounds.
- .6 Ensure concrete slabs are steel trowelled to a fine broom finish.
- .7 Ensure concrete slabs have been finished with a maximum permissible variation of 3 mm in 3 000 mm from the required plane, and not more than 1.5 mm in 305 mm when measured from high points in surface.
- .8 Conduct moisture vapour emission rate tests on concrete slabs-on-fill to ASTM F1869. Do not proceed with installation until tests indicate $MVER \leq 1.45$ kg per 100 m² for 24 hours.
- .9 Determine absorptive nature of substrates by conducting porosity tests to ASTM F3191.

3.2 PREPARATION

- .1 Protect surrounding work from damage or disfiguration.
- .2 Thoroughly clean substrates to remove grease, oil and dust film.
- .3 Prepare substrate as recommended by manufacturer for absorptive conditions determined by porosity test.
- .4 Apply latex modified cementitious levelling coat where substrate does not meet specified tolerances for flatness and levelness, and where slight irregularities exist. Limit levelling coat thickness to less than 8 mm.
- .5 Install crack isolation membrane as required by TTMAC Details, to ANSI A108.17. If membrane is applied over rough surface, apply 6 mm thick sand-bed under membrane.

3.3 INSTALLATION

- .1 Install Products to TTMAC Specification Guide 09 30 00, as scheduled below.
- .2 Apply tile using water-resistant organic adhesives to ANSI A108.4.
- .3 Apply tile using dry-set Portland cement mortar or latex-Portland cement mortar to ANSI A108.5.

- .4 Install tiles with straight, uniform joints, to tile manufacturers' recommended joint widths.
- .5 Fit tile units around corners, fitments, fixtures, drains and other built-in objects to maintain uniform joint appearance.
- .6 Make cut edges smooth, even and free from chipping. Do not split tile.
- .7 Lay out tiles according to patterns indicated on Drawings. Ensure perimeter and cut tiles are minimum half size.
- .8 Set tiles in place while bond coat is wet and tacky, prior to skinning over. Slide tile back and forth to ensure proper bond and level surface. Avoid lippage.
- .9 Clean backs of tiles and back butter tiles to ensure 95 percent bond coverage.
- .10 Clean excess mortar from surface prior to final set.
- .11 Sound tiles after setting materials have cured and replace hollow sounding tile before grouting.
- .12 Exterior Surfaces and Wet Areas (Thin Set Method): Notch adhesive in straight lines, backbutter tile and set on freshly trowelled thin-set mortar. Move tile back and forth perpendicular to notches.
- .13 Ungauged Slate, Marble, Stone and Large Ceramics: Immediately prior to setting, backbutter tile through push box or box screed to achieve uniform thickness of tile and mortar.
- .14 Install site-cut tiles with site-cut edges concealed within either grouted joint or metal trim. Visually expose only factory-made edges.
- .15 Keep two-thirds the depth of grout joints free of setting material.

3.4 MOVEMENT JOINTS

- .1 Install control and expansion joints to TTMAC Detail 301MJ.
- .2 Keep control joints and expansion joints free of setting materials.
- .3 In addition to guidelines outlined in TTMAC Specification Guide 09 30 00, Provide movement joints over cold joints, saw cuts, at columns and at wall plane changes.

3.5 TILE-SETTING ACCESSORIES INSTALLATION

- .1 Install tile-setting accessories in continuous lengths, to level straight lines by pressing perforated anchoring leg solidly into tile setting material.
- .2 Butt ends of units tightly together with hairline joint. Trowel additional layer of tile setting material over anchored leg prior to placement of tiles.
- .3 Unless specified otherwise, solidly embed tiles over anchoring leg of installed trim with surface of tile flush with top of tile-setting accessories.
- .4 Leave 3 mm joint between tile and tile-setting accessories for filling with grout.
- .5 Install pre-formed corners, end-caps and trim at changes in direction and at terminations. Mitered joints will be rejected.
- .6 Expansion and Control Joints: Solidly embed tiles over installed edge strips with joint surface either flush with top of joint or 1 mm below top of tile.

3.6 GROUTING

- .1 Allow proper setting time prior to grouting.
- .2 Preseal tiles requiring protection from grout staining.

- .3 Apply cementitious grout to ANSI A108.10.
- .4 Force grout into joints to ensure dense finish.
- .5 Remove excess and polish with clean cloths.
- 3.7 FIELD QUALITY CONTROL
 - .1 Inspect completed work and replace broken, cracked or damaged tile.
- 3.8 TOLERANCES
 - .1 Level tiles to a 1 mm tolerance over a 3 mm wide joint.
- 3.9 CLEANING
 - .1 Refer to Section 01 74 00.
 - .2 Apply tile sealer to floor tiles.
- 3.10 PROTECTION
 - .1 Protect finished areas from traffic until setting materials have sufficiently cured.
 - .2 Protect grouted areas from traffic for 24 hours after grouting.
 - .3 Protect finished areas with temporary protective coverings.
 - .4 Protect base tile from impact, vibration, heavy hammering on adjacent and opposite walls for at least 14 days after installation.
- 3.11 SCHEDULE
 - .1 Tile Installed Over Masonry or Concrete Walls - Thin-Set Method: TTMAC Detail 303W (Interior/Exterior).
 - .2 Tile Bonded to Concrete Slab - Thin-Set Method: TTMAC Detail 311F (A - Interior/Exterior), (C - Crack Concrete Interior/Exterior - Full Coverage) or (D - Uncoupling Over Green/Young Concrete).
 - .3 Large Format Tile on Interior Floors: TTMAC Detail 329 LFT.

END OF SECTION

- 1 General
- 1.1 RELATED SECTIONS
 - .1 Section 09 21 16 - Gypsum Board Assemblies.
- 1.2 REFERENCES
 - .1 ASTM A123/A123M-17: Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - .2 ASTM A153/A153M-23: Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - .3 ASTM A641/A641M-19: Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
 - .4 ASTM C635/C635M-17: Standard Specification for Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
 - .5 ASTM E580/E580M-20: Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels in Areas Subject to Earthquake Ground Motions.
 - .6 ASTM E1264-23: Standard Classification for Acoustical Ceiling Products.
 - .7 CISCA Ceiling Systems Handbook, 2012 Edition.
 - .8 ICC-ESR-1308: Fire and Nonfire-Resistance-Rated Suspended Ceiling Framing Systems.
 - .9 CAN/ULC-S102-2018 (REV1): Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
 - .10 ULC List of Equipment and Materials.
- 1.3 SAMPLES
 - .1 Submit samples as specified in Section 01 33 00.
 - .2 Verification Samples: Duplicate 140 x 290 mm size sample of each specified acoustic lay-in tile, indicating texture, pattern, colour and edge profile.
- 1.4 EXTRA STOCK MATERIALS
 - .1 Supply extra stock materials as specified in Section 01 78 00.
 - .2 Extra Stock Materials: Minimum two full bundles for each lay-in tile ceiling Product, colour and pattern; clearly marked to identify:
 - .1 Manufacturer's name,
 - .2 Product's name,
 - .3 Product colour and pattern.
 - .3 Store bundles in original undamaged packages, in a warm, dry area.
- 1.5 QUALIFICATIONS
 - .1 Installers: A firm specializing in installing suspended ceiling grid and lay-in tile ceiling systems, having minimum 3 years documented experience.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Refer to Section 01 60 00.
- .2 Deliver Products undamaged original containers.
- .3 Store Products in warm, dry area.

1.7 EXISTING CONDITIONS

- .1 Where existing ceilings require patching, use existing matching acoustic tiles removed from other areas.
- .2 Protect material designated for re-use.
- .3 Arrange for Consultant to inspect and accept existing materials designated for reuse prior to installation.

2 Products

2.1 MANUFACTURERS

- .1 Manufacturers having Product considered acceptable for use:
 - .1 Armstrong World Industries.
 - .2 CertainTeed Canada, Inc.
 - .3 CGC Inc.
 - .4 Rockfon.
- .2 Substitution Procedures: Refer to Section 01 25 00.

2.2 REGULATORY REQUIREMENTS

- .1 Seismic Requirements: Provide seismic restraint as required by applicable regulatory requirements to ASTM E580/E580M and CISCA guidelines.

2.3 MATERIALS

- .1 Suspended Ceiling Grid: To ASTM C635/C635M, Class HD, and ICC-ESR-1308; commercial quality, cold rolled steel, non-fire rated; main tees, cross tees and grid adapters with exposed 24 mm T-shape, 43 mm high; die cut and interlocking components; baked enamel finish; eg. Prelude XL by Armstrong World Industries.
- .2 Acoustic Lay-in Tile: Wet-formed mineral fiber non-sagging lay-in tile, to ASTM E1264, Type III, Form 2, Pattern C E; complete with anti-mould and mildew treatment, and sag resisting treatment; as follows:
 - .1 Size: 610 x 1 220 mm size,
 - .2 Thickness: 19 mm.
 - .3 Pattern: Medium texture, fissured.
 - .4 Edge: Square.
 - .5 Weight: 6.74 kg/m².
 - .6 Finish: Factory-applied latex paint, White colour.
 - .7 Fire Resistance (CAN/ULC S102): Class A.
 - .8 Noise Reduction Coefficient: 0.70.
 - .9 Light Reflectance: 0.85.
 - .10 Manufacturer and Product Name: eg. School Zone Fine Fissured - 1714 by Armstrong World Industries.

- .3 Cloud Kits: Sizes and shapes as indicated on Drawings, comprised as follows:
 - .1 Suspension System and Perimeter Trim: Factory pre-cut 24 mm wide ceiling grid, and 100 mm high perimeter trim, powder coated finish on all surfaces; eg. Formations Acoustical and Accent Cloud Kits by Armstrong World Industries.
 - .2 Metal Mesh Panels: 6 mm thick 2Cell (welded) wire mesh panels with 88 percent open area and square tegular edges; factory pre-cut perimeter units and additional matching 610 x 610 mm size panels as required by cloud size and configuration; powder coated finish; eg. Metalworks Mesh - Welded Wire 8191AM by Armstrong World Industries.
- .4 Accessories: Stabilizer bars, clips, seismic clips, splices, edge mouldings, and hold down clips; same material and finish as cloud kit suspension system.
- .5 Support Channels and Hangers: Galvanized steel, to rigidly secure ceiling system with maximum deflection of L/360.
- .6 Hanger Wire: To ASTM A641/A641M; zinc-coated, soft-annealed, 3.77 mm OD steel wire.
- .7 Tie Wire: To ASTM A641/A641M; zinc-coated, soft-annealed, 1.21 mm OD steel wire.

2.4 FINISHES

- .1 Galvanized Coating on Steel Components: To ASTM A123/A123M, Coating Grade 35; hot dipped zinc alloy coating.
- .2 Galvanized Coating on Steel Hardware: To ASTM A153/A153M, Classes B3, C or D; hot dipped zinc alloy coating.
- .3 Baked Enamel Coating on Suspended Ceiling Grid and Trim: One coat of zinc oxide primer sprayed and baked followed by two coats of semi-gloss enamel sprayed and baked; White colour.
- .4 Powder Coated Finish on Cloud Kit Grid, Trim and Mesh: Electrostatic spray-applied polymer powder coating, factory applied to minimum 0.05 mm dry film thickness; White colour.

3 Execution

3.1 EXAMINATION

- .1 Refer to Section 01 71 00.
- .2 Verify layout of hangers will not interfere with other work.
- .3 Verify ducts, pipes, fittings and other penetrations have been properly installed.

3.2 INSTALLATION

- .1 Install Products to ASTM E580/E580M, and CISCA installation standards for required seismic category.
- .2 Suspended Grids
 - .1 Hang ceiling grid directly from structural elements, independent of walls, columns, metal deck, ducts, pipe fittings and conduit. Provide additional support channels and hangers as required.
 - .2 Space hangers at maximum 1 220 mm OC along supporting grillage, and not more than 150 mm OC from ends. Do not place hangers in front of access panels.
 - .3 Where ducts or other equipment prevent regular spacing of hangers, reinforce nearest affected hangers to span extra distance.
 - .4 Install additional hangers and reinforcing to accommodate loads being carried.
 - .5 Provide suspension hanger at each corner of suspended fixtures, and at maximum 610 mm OC around perimeter of fixture.

- .6 Locate ceiling grid system on room axis leaving equal border units according to reflected ceiling plan.
 - .7 Install main tees suspended at maximum 1 220 mm OC and maximum 600 mm from wall.
 - .8 Install cross tees and grid adapters perpendicular to main tees, and interlock with main tees.
 - .9 Frame around fixtures and openings.
 - .10 Install edge moulding at intersection of ceiling and vertical surfaces.
 - .11 Form expansion joints as detailed. Form to accommodate plus or minus 25 mm movement. Maintain visual closure.
- .3 Cloud Kits
- .1 Assemble cloud kits.
 - .2 Suspend clouds at heights above finished floor as indicated on Drawings.
 - .3 Suspend clouds directly from structural elements, independent of walls, columns, metal deck, ducts, pipe fittings and conduit.
 - .4 Provide additional support channels and hangers as required.
 - .5 Install exposed perimeter trim at cloud edges.
 - .6 Fit pre-cut metal mesh panels in place, free of damaged edges.
- .4 Acoustic Lay-in Tiles
- .1 Fit lay-in tiles in place, free from damaged edges.
 - .2 Neatly cut lay-in tiles to accommodate necessary penetrations.
 - .3 Cut and rabbet lay-in tiles at border areas and vertical surfaces.
 - .4 Lay directional patterned units one way with pattern parallel to longest room axis. Fit border neatly against abutting surfaces.
 - .5 Install hold-down clips to retain panels tight to grid system within 6 000 mm of exterior doors.

3.3 TOLERANCES

- .1 Variation from Flat and Level Surface: ≤ 3 mm in 3 000 mm.

END OF SECTION

1 General

1.1 RELATED SECTIONS

- .1 Section 04 22 00 - Concrete Unit Masonry.
- .2 Section 05 51 00 - Metal Stairs.
- .3 Section 09 21 16 - Gypsum Board Assemblies.
- .4 Section 09 65 19 - Resilient Tile Flooring.
- .5 Section 09 65 66 - Resilient Athletic Flooring.
- .6 Section 09 68 13 - Tile Carpeting.

1.2 REFERENCES

- .1 ASTM F1861-21: Standard Specification for Resilient Wall Base.
- .2 ASTM F2169-15(2020): Standard Specification for Resilient Stair Treads.

1.3 SAMPLES

- .1 Submit samples as specified in Section 01 33 00.
- .2 Selection Samples: Duplicate 100 mm long sample sets, illustrating manufacturer's complete line of available colour selections.

1.4 CLOSEOUT SUBMITTALS

- .1 Submit closeout submittals as specified in Section 01 78 00.
- .2 Maintenance Data: Manufacturer's standard maintenance and cleaning guidelines; sufficient quantity for inclusion in operation and maintenance manual.

1.5 EXTRA STOCK MATERIALS

- .1 Supply extra stock materials as specified in Section 01 78 00.
- .2 Extra Stock Materials: Three percent or 6 m², whichever is greater, of each Product, colour and pattern; clearly marked to identify:
 - .1 Manufacturer's name,
 - .2 Product's name,
 - .3 Product colour and pattern.
- .3 Package Products neatly in original containers, to prevent damage.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Refer to Section 01 60 00.
- .2 Deliver and store Products undamaged in original wrapping or cartons.
- .3 Store Products for minimum 3 days prior to installation in a warm, dry room; stacked not more than four boxes high.

1.7 AMBIENT CONDITIONS

- .1 Maintain ambient air temperature of 20 degrees C three days prior to, during, and 48 hours after installation of flooring materials.
- .2 Maintain ambient air relative humidity between 35 percent and 55 percent RH.

- .3 Do not install Products in conditions of high humidity or where exposed to cold drafts.
- .4 In hot weather, protect Products from direct sunlight.
- .5 Provide adequate ventilation.

2 Products

2.1 MANUFACTURERS

- .1 Manufacturers having Product considered acceptable for use:
 - .1 Armstrong World Industries.
 - .2 Roppe Corporation.
 - .3 Tarkett Johnsonite.
- .2 Substitution Procedures: Refer to Section 01 25 00.

2.2 MATERIALS

- .1 Resilient Base (RB-1): To ASTM F1861, Type TP, Group 1, Style A - Straight; 3.2 mm thick thermoplastic rubber, 102 mm high; top set; colours as selected by Consultant.
- .2 Resilient Base (RB-2): To ASTM F1861, Type TP, Group 1, Style B - Cove; 3.2 mm thick thermoplastic rubber, 102 mm high; top set; complete with pre-moulded end stops and external corners; colours as selected by Consultant.
- .3 Resilient Transition Strips (RTS): Thermoset vulcanized rubber, smooth, purpose made to accommodate wheeled traffic and prevent tripping; tapered designs to suit nature of transition; colours as selected by Consultant.
- .4 Resilient Stair Tread and Riser (RSTR): To ASTM F2169, Type TS, Class 1 and 2, Group 1 and 2; 6 mm thick thermoset vulcanized rubber one-piece stair tread and riser with hammered texture; complete with 50 mm wide co-extruded visually-impaired strip; eg. Angle Fit Rubber Stair Treads with Integrated Riser VIHNTSR by Tarkett Johnsonite, colour as selected by Consultant.
- .5 Resilient Stair Riser (RSR): To ASTM F1861, Type TP, Group 1; 2.0 mm thick thermoplastic rubber one-piece stair riser; Smooth texture; eg. RR-XX by Tarkett Johnsonite, colour as selected by Consultant.
- .6 Resilient Stair Nosing (RSN): To ASTM F2169, Type TV, Class 1, Group 1; 4.76 mm thick thermoplastic vinyl nosing with 75 mm horizontal return and 55 mm return down edge of tread, full width of stair tread in one piece; Smooth pattern; complete with 50 mm wide co-extruded visually-impaired strip; eg. VIRCN-XX-B by Tarkett Johnsonite, colour as selected by Consultant.

2.3 ADHESIVES

- .1 Adhesive for Resilient Base, Trim and Accessories: Non-flammable, solvent free contact adhesive, neoprene water-based formulation, Off-white colour; eg. Johnsonite #946 Premium Contact Adhesive by Tarkett Johnsonite.
- .2 Adhesive for Resilient Stair Treads and Risers: Water based acrylic adhesive, White colour; eg. Johnsonite #965 Flooring and Tread Adhesive by Tarkett Johnsonite.

2.4 ACCESSORIES

- .1 Filler: Premixed latex filler, White colour.
- .2 Primers: Acrylic, waterproof type; as recommended by manufacturer.

- .3 Sealers and Wax: As recommended by manufacturer.

- 3 Execution
- 3.1 EXAMINATION
 - .1 Refer to Section 01 71 00.
 - .2 Verify surfaces are dry, true, even and smooth.
 - .3 Verify surfaces are free of gaps, holes and depressions.
 - .4 Verify surfaces are free of paint, grease and oil.
- 3.2 PREPARATION
 - .1 Clean substrate to remove deleterious matter which would impair adhesion of Products.
 - .2 Prepare substrate to a smooth and flat surface, as follows:
 - .1 Remove ridges and bumps by grinding or other means.
 - .2 Fill low spots, cracks, joints, holes and other defects with filler.
 - .3 Apply, trowel and float filler to leave smooth, flat, hard surface.
 - .4 Prohibit traffic until filler is cured.
 - .5 Vacuum clean substrate.
 - .3 Prime substrates to ensure proper adhesion of Products.
- 3.3 INSTALLATION
 - .1 Install Products on solid backing.
 - .2 Bond Products tight to surfaces.
 - .3 Mitre internal corners.
 - .4 At exposed ends and external corners, conform to the following:
 - .1 Coved Base: Use pre-moulded units.
 - .2 Straight Base: V-cut back of base strip to two-thirds of its thickness and fold to desired shape.
 - .5 Scribe and fit base to door frames and other interruptions.
 - .6 Install combination stair treads and risers in single pieces covering full width, depth and height of stair tread and riser.
 - .7 Install stair risers to lowest riser in each stair run, single piece for entire width and height of riser.
 - .8 Install stair nosings in single pieces covering full width of landing edge.
- 3.4 CLEANING
 - .1 Refer to Section 01 74 00.
 - .2 Clean, seal and wax installed Products.
- 3.5 PROTECTION
 - .1 Refer to Section 01 76 00.

- .2 Protect completed installation with suitable and durable materials.

END OF SECTION

1 General

1.1 RELATED SECTIONS

- .1 Section 09 65 13 - Resilient Base and Accessories.
- .2 Section 09 65 66 - Resilient Athletic Flooring.
- .3 Section 09 68 13 - Tile Carpeting.

1.2 REFERENCES

- .1 ASTM F710-22: Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
- .2 ASTM F1066-23: Standard Specification for Vinyl Composition Floor Tile.
- .3 ASTM F1869-23: Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
- .4 ASTM F2170-19a: Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.
- .5 ASTM F2678-16(2021): Standard Practice for Preparing Panel Underlayments, Thick Poured Gypsum Concrete Underlayments, Thick Poured Lightweight Cellular Concrete Underlayments, and Concrete Subfloors with Underlayment Patching Compounds to Receive Resilient Flooring.
- .6 ASTM F3191-23: Standard Practice for Field Determination of Substrate Water Absorption (Porosity) for Substrates to Receive Resilient Flooring.
- .7 ASTM F3441-23a: Standard Guide for Measurement of pH Below Resilient Flooring Installations.

1.3 SAMPLES

- .1 Submit samples as specified in Section 01 33 00.
- .2 Selection Samples: Duplicate 300 x 300 mm size samples of each specified Product, illustrating manufacturer's complete line of available colours and patterns.

1.4 CLOSEOUT SUBMITTALS

- .1 Submit closeout submittals as specified in Section 01 78 00.
- .2 Maintenance Data: Manufacturer's standard maintenance and cleaning guidelines; sufficient quantity for inclusion in operation and maintenance manual.

1.5 EXTRA STOCK MATERIALS

- .1 Supply extra stock materials as specified in Section 01 78 00.
- .2 Extra Stock Materials: Three percent or 6 m², whichever is greater, of each resilient flooring Product, colour and pattern; clearly marked to identify:
 - .1 Manufacturer's name,
 - .2 Product's name,
 - .3 Product colour and pattern.
- .3 Package tile products neatly in original containers, to prevent damage.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Refer to Section 01 60 00.
- .2 Deliver and store Products undamaged in original wrapping or cartons.
- .3 Store Products for minimum 3 days prior to installation in a warm, dry room.
- .4 Store Products stacked not more than four boxes high.

1.7 AMBIENT CONDITIONS

- .1 Maintain ambient air temperature of 20 degrees C three days prior to, during and 48 hours after installation.
- .2 Maintain ambient air relative humidity between 35 percent and 55 percent RH.
- .3 Do not lay flooring in conditions of high humidity or where exposed to cold drafts.
- .4 In hot weather, protect flooring from direct sunlight.
- .5 Provide adequate ventilation.

2 Products

2.1 MANUFACTURERS

- .1 Manufacturers having Product considered acceptable for use:
 - .1 Amtico.
 - .2 Armstrong World Industries.
 - .3 Flextile.
 - .4 Mannington.
 - .5 Tarkett Johnsonite.
- .2 Substitution Procedures: Refer to Section 01 25 00.

2.2 MATERIALS

- .1 Vinyl Composition Tile (VCT): To ASTM F1066, Composition 1, Class 2; reinforced resilient vinyl tile, as follows:
 - .1 Thickness: 3.2 mm.
 - .2 Tile Size: 305 x 305 mm.
 - .3 Colours: As selected by Consultant.
 - .4 Manufacturer and Product Name: eg. Standard Excelon - Imperial Texture by Armstrong World Industries.
- .2 Adhesive: Water-based / latex resin adhesive, Clear colour; eg. S-515 Tile Strong Adhesive by Armstrong World Industries.
- .3 Underlayment Patching Compound: Self-drying, hydraulic cement-based underlayment, having a trowel-applied consistency; mould- and mildew-resistant; capable of achieving a true feather edge; zero VOC content; eg. Feather Finish by Ardex Americas.
- .4 Primers: Acrylic, waterproof type; as recommended by flooring manufacturer.
- .5 Sealers and Wax: As recommended by flooring manufacturer.

3 Execution

3.1 EXAMINATION

- .1 Refer to Section 01 71 00.
- .2 Verify substrates are dry, true, even and smooth.
- .3 Verify substrates are free of gaps, holes and depressions.
- .4 Verify substrates are free of paint, grease and oil.
- .5 Verify concrete slabs have cured for minimum 28 days.
- .6 Verify concrete slabs have pH level between 5 and 11, to ASTM F3441.
- .7 Conduct moisture vapour emission rate tests on concrete slabs-on-fill to ASTM F1869. Do not proceed with installation until tests indicate MVER \leq 3.17 kg per 100 m² for 24 hours.
- .8 Conduct relative humidity tests on concrete slabs to ASTM F2170. Do not proceed with installation until tests indicate RH \leq 75 percent.
- .9 Determine absorptive nature of substrates by conducting porosity tests to ASTM F3191.

3.2 PREPARATION

- .1 Prepare substrate as recommended by manufacturer for absorptive conditions determined by porosity test. Conform to ASTM F710.
- .2 Prepare underlayment patching compounds and surrounding slab surface to ASTM F2678.
- .3 Clean substrate to remove deleterious matter that would impair subsequent installation.
- .4 Prime substrates to ensure proper adhesion of Products.

3.3 INSTALLATION

- .1 Install Products with joints and seams parallel to building lines to produce symmetrical tile patterns.
- .2 Spread only enough adhesive to permit installation of Products before initial set.
- .3 Set Products in place, press with heavy roller to attain full adhesion.
- .4 Provide perimeter tile of similar size within any given area.
- .5 Provide accent tiles, feature strips and inserts where indicated on Drawings.
- .6 Lay flooring continuously from wall to wall in each area, including beneath casework.
- .7 Where adjacent floor finish is dissimilar, terminate resilient tile flooring at centre line of door openings.
- .8 Provide transition strip along junction of dissimilar flooring materials.
- .9 Scribe flooring to walls, columns, floor outlets and other appurtenances to produce tight joints.

3.4 CLEANING

- .1 Refer to Section 01 74 00.
- .2 Clean, seal and wax installed Products.

3.5 PROTECTION

- .1 Refer to Section 01 76 00.
- .2 Protect completed installation with suitable and durable protective coverings or by keeping traffic off floor.

END OF SECTION

1 General

1.1 RELATED SECTIONS

- .1 Section 09 65 13 - Resilient Base and Accessories.
- .2 Section 09 65 19 - Resilient Tile Flooring.
- .3 Section 09 68 13 - Tile Carpeting.
- .4 Section 11 66 23 - Gymnasium Equipment.

1.2 REFERENCES

- .1 ASTM F710-22: Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
- .2 ASTM F1303-04(2021): Standard Specification for Sheet Vinyl Floor Covering with Backing.
- .3 ASTM F1516-13(2018): Standard Practice for Sealing Seams of Resilient Flooring Products by the Heat Weld Method (when Recommended).
- .4 ASTM F1869-23: Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
- .5 ASTM F2170-19a: Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.
- .6 ASTM F2772-11(2019): Standard Specification for Athletic Performance Properties of Indoor Sports Floor Systems.
- .7 ASTM F2678-16(2021): Standard Practice for Preparing Panel Underlayments, Thick Poured Gypsum Concrete Underlayments, Thick Poured Lightweight Cellular Concrete Underlayments, and Concrete Subfloors with Underlayment Patching Compounds to Receive Resilient Flooring.
- .8 ASTM F3191-16: Standard Practice for Field Determination of Substrate Water Absorption (Porosity) for Substrates to Receive Resilient Flooring.

1.3 SHOP DRAWINGS

- .1 Submit Shop Drawings as specified in Section 01 33 00.
- .2 Shop Drawings: Project-specific drawings, illustrating game line layout, locations and sizes of special graphics, floor inserts, and equipment anchors. Note colours and thicknesses of games lines and graphic inserts.

1.4 CLOSEOUT SUBMITTALS

- .1 Submit closeout submittals as specified in Section 01 78 00.
- .2 Maintenance Data: Manufacturer's standard maintenance and cleaning guidelines; sufficient quantity for inclusion in operation and maintenance manual.

1.5 EXTRA STOCK MATERIALS

- .1 Supply extra stock materials as specified in Section 01 78 00.
- .2 Extra Stock Materials: One percent of each resilient athletic flooring Product, colour and pattern; clearly marked to identify:
 - .1 Manufacturer's name,
 - .2 Product's name,
 - .3 Product colour and pattern.

- .3 Supply roll goods in full width rolls.
- .4 Store roll goods in upright position, with roll wrapped in a protective cover to prevent damage.

1.6 QUALIFICATIONS

- .1 Installer: A firm specializing in installing resilient athletic flooring, approved by flooring manufacturer and having minimum two years documented experience indicating successful completion of not less than 5 similar installations.

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Refer to Section 01 60 00.
- .2 Deliver and store Products undamaged in original wrapping or cartons, with manufacturer's labels and seals intact.
- .3 Store Products in up-right position in a warm dry room for minimum 3 days prior to installation.

1.8 AMBIENT CONDITIONS

- .1 Maintain ambient air temperature between 18 degrees C and 30 degrees C.
- .2 Do not lay Products in conditions of high humidity or where exposed to cold drafts.
- .3 In hot weather, protect flooring from direct sunlight.
- .4 Provide adequate ventilation.

1.9 WARRANTY

- .1 Submit extended warranties in accordance with General Conditions of the Contract.
- .2 Installer's Extended Warranty: For a period of two years, covering against punctures, tears, delamination, and excessive wear.
- .3 Manufacturer's Extended Warranty: A non-prorated manufacturer's extended warranty, covering against the following:
 - .1 Product defects for 10 years.
 - .2 Wear through wear layer (with surface as defined in ASTM F1303) for 15 years.

2 Products

2.1 MANUFACTURERS

- .1 Manufacturers having Product considered acceptable for use:
 - .1 Gerflor Sports Flooring.
 - .2 Tarkett Sports.
- .2 Substitution Procedures: Refer to Section 01 25 00.

2.2 PERFORMANCE CRITERIA

- .1 Resilient Athletic Flooring: To ASTM F2772, as follows:
 - .1 Shock Absorption: 22-33 percent.
 - .2 Vertical Deformation: Maximum 3.5 mm.
 - .3 Ball Bounce: Minimum 90 percent.
 - .4 Sliding Coefficient: 80 -110.

2.3 MATERIALS

- .1 Resilient Athletic Flooring (RAF): To ASTM F2772, Class 2; 6.5 mm overall thickness, homogenous wear-layer combined with closed-cell foam cushioned backing, reinforced with fiberglass mesh interlayer; integral fungistatic and bacteriostatic treatment; eg. Omnisports Multiflex by Tarkett Sports, woodgrain pattern and colour as selected by Consultant, complete with line work and graphic inserts as indicated on Drawings.
- .2 Welding Rods: 4 mm OD vinyl, solid colour; colour matched to sheet flooring.
- .3 Levelling Compound: Approved by manufacturer to correct minor subfloor deviations.
- .4 Adhesive: Two-part, solvent free adhesive; eg. Multi-Poxy by Tarkett Sports.
- .5 Seaming Tape: eg. Tarkotape by Tarkett Sports.
- .6 Game Line Primer and Paint: As recommended by flooring manufacturer.

3 Execution

3.1 EXAMINATION

- .1 Refer to Section 01 71 00.
- .2 Verify concrete slab is adequately vapour sealed.
- .3 Verify adequate perimeter drainage has been installed.
- .4 Verify concrete slab is clean and dry.
- .5 Verify no curing compounds or sealers have been applied to concrete slab.
- .6 Verify variations in concrete slab do not exceed plus or minus 3 mm in 3 000 mm radius.
- .7 Verify concrete slabs have cured for minimum 28 days.
- .8 Verify concrete slabs have neutral alkalinity and have carbonized.
- .9 Conduct moisture vapour emission rate tests on concrete slabs-on-fill to ASTM F1869. Do not proceed with installation until tests indicate $MVER \leq 6.8$ kg per 100 sm for a 24 hour period.
- .10 Conduct relative humidity tests on concrete slabs to ASTM F2170. Do not proceed with flooring installation until tests indicate $RH \leq 90$ percent.
- .11 Determine absorptive nature of substrates by conducting porosity tests to ASTM F3191.

3.2 PREPARATION

- .1 Prepare substrate as recommended by manufacturer for absorptive conditions determined by porosity test. Conform to ASTM F710.
- .2 Prepare levelling compounds and surrounding concrete slab to ASTM F2678.
- .3 Fill cracks, grooves, voids and construction joints with approved levelling compound.
- .4 Remove high spots on floor slab by grinding method.
- .5 Remove deleterious matter which would impair adhesion of flooring.
- .6 Broom clean substrate.

3.3 INSTALLATION

- .1 Install Product using loose laid, non-adhered method, similar to Tarkett GreenLay.
- .2 Minimize cross seams.
- .3 Terminate flooring at centerline of openings where adjacent floor finish or colour is dissimilar.
- .4 Cut neatly around penetrations.
- .5 Heat weld seams to ASTM F1516 using matching welding rods.
- .6 Lay out game lines and special graphics in accordance with accepted Shop Drawings.

3.4 PROTECTION

- .1 Refer to Section 01 76 00.
- .2 Restrict access to completed installation for 72 hours after completion of flooring.
- .3 Protect completed installation with suitable and durable protective coverings or by keeping traffic off floor.

END OF SECTION

1 General

1.1 RELATED SECTIONS

- .1 Section 09 65 13 - Resilient Base and Accessories.
- .2 Section 09 65 19 - Resilient Tile Flooring.
- .3 Section 09 65 66 - Resilient Athletic Flooring.

1.2 REFERENCES

- .1 ASTM F1869-23: Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
- .2 ASTM F2170-19a: Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.
- .3 ASTM F3191-23: Standard Practice for Field Determination of Substrate Water Absorption (Porosity) for Substrates to Receive Resilient Flooring.
- .4 CAN/CGSB-71.20-M88: Adhesive, Contact, Brushable.
- .5 CAN/CGSB-71.28-M88: Adhesive, for Direct Glue-Down Carpet Installation.
- .6 CRI 104-2002: Standard for Installation Specification of Commercial Carpet.

1.3 PRODUCT DATA

- .1 Submit Product data as specified in Section 01 33 00.
- .2 Product Data: Manufacturer's standard data sheets, indicating physical and performance characteristics; sizes, patterns, colours available, and method of installation.

1.4 SAMPLES

- .1 Submit samples as specified in Section 01 33 00.
- .2 Selection Samples: Duplicate complete sets, 150 x 150 mm in size; illustrating colour and pattern selection for each specified carpet tile.

1.5 CLOSEOUT SUBMITTALS

- .1 Submit closeout submittals as specified in Section 01 78 00.
- .2 Maintenance Data: Manufacturer's standard maintenance and cleaning guidelines; sufficient quantity for inclusion in operation and maintenance manual.

1.6 EXTRA STOCK MATERIALS

- .1 Supply extra stock materials as specified in Section 01 78 00.
- .2 Extra Stock Materials: Minimum 4 percent for each carpet tile flooring Product, colour and pattern; clearly marked to identify:
 - .1 Manufacturer's name,
 - .2 Product's name,
 - .3 Product colour and pattern.
- .3 Package Products neatly in original containers, to prevent damage.

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Refer to Section 01 60 00.
- .2 Deliver Products in original packaging, with each package having its register number properly marked on each bale.
- .3 Protect Products from damage, dirt, stains and moisture.

1.8 AMBIENT CONDITIONS

- .1 Maintain ambient air temperature at 21 degrees Celsius for 48 hours before, during and after installation.
- .2 Maintain substrate temperature at 10 degrees Celsius.

1.9 WARRANTY

- .1 Submit extended warranties in accordance with the General Conditions of the Contract.
- .2 Installer's Extended Warranty: For a period of two years, covering against loose fitting, breaking or unraveling of seams or breaking away from sub-base, and failure of materials or workmanship which proves detrimental to the appearance or performance of the carpeting.
- .3 Manufacturer's Extended Warranty: For a period of 15 years, covering against wear, colour fading and deterioration of backing materials.

2 Products

2.1 MANUFACTURERS

- .1 Manufacturers having Product considered acceptable for use:
 - .1 InterfaceFLOR Commercial.
- .2 Substitution Procedures: Refer to Section 01 25 00.

2.2 MATERIALS

- .1 Carpet Tile (CPT): Tufted pattern loop, 100 percent solution dyed Type 6 nylon fibre, with Intersept preservative protection and Protekt stain protection; and having the following properties:
 - .1 Tile Size: 500 x 500 mm.
 - .2 Backing: GlasBAC.
 - .3 Machine Gauge: 39.4 ends / 10 cm.
 - .4 Stitch Count: 27.6 ends / 10 cm.
 - .5 Pile Height: 3.3 mm.
 - .6 Pile Thickness: 1.9 mm.
 - .7 Tufted Yarn Weight: 882 g/m².
 - .8 Colours: As selected by Consultant.
 - .9 Manufacturer's Name and Product: Cambria by InterfaceFLOR Commercial.
- .2 Carpet Base: Carpet type to match adjacent flooring, bound seam edge, with invisible seams; 100 mm high; as supplied by InterfaceFLOR Commercial.

2.3 ADHESIVES

- .1 Carpet Adhesive: To CAN/CGSB-71.28-M, solvent free, latex based waterproof adhesive; eg. Eco Tech 9600 by Chembond Ltd.
- .2 Base Adhesive: Contact type, to CAN/CGSB-71.20-M, waterproof, brushable.

- .3 Seam Adhesive: Latex seam sealer or thermoplastic adhesive.

2.4 ACCESSORIES

- .1 Sub-Floor Filler: White premix latex.
- .2 Transition Strips: Resilient type, as specified in Section 09 65 13.

3 Execution

3.1 EXAMINATION

- .1 Refer to Section 01 71 00.
- .2 Verify concrete floors have cured for minimum 28 days.
- .3 Verify concrete slabs have a pH level between 7 and 9.
- .4 Conduct moisture vapour emission rate tests on concrete slabs-on-fill to ASTM F1869. Do not proceed with installation until tests indicate $MVER \leq 2.27$ kg per 100 sm for 24 hours.
- .5 Conduct relative humidity tests on concrete slabs to ASTM F2170. Do not proceed with installation until tests indicate $RH \leq 75$ percent.
- .6 Determine absorptive nature of substrate by conducting porosity tests to ASTM F3191.

3.2 PREPARATION

- .1 Prepare substrate as recommended by manufacturer for absorptive conditions determined by porosity test.
- .2 Remove subfloor ridges and bumps.
- .3 Fill low spots, cracks, joints, holes and other defects with sub-floor filler.

3.3 INSTALLATION

- .1 Install carpet tile to CRI 104 for Direct Glue-Down Installation Method.
- .2 Lay carpet tile in non-directional pattern.
- .3 Verify carpet tile pattern match to ensure minimal variation between dye lots.
- .4 Lay carpet tile with joints and seams parallel to building lines to produce symmetrical tile patterns. Provide perimeter tile of similar size within any given area.
- .5 Lay carpet tile continuously from wall to wall in each area, including beneath casework.
- .6 Cut and fit carpet tiles around interruptions.
- .7 Fit carpet tiles tight to intersection with vertical surfaces without gaps.
- .8 Install carpet base tight to wall surfaces with contact adhesive, with the top edge parallel to floor line. Ensure seams are invisible.

3.4 CLEANING

- .1 Refer to Section 01 74 00.
- .2 Remove dirt, carpet scraps, and threads from carpet surface.
- .3 Clean carpet with a beater-type vacuum cleaner.

- .4 Remove soiled spots or adhesive from carpet with a proper spot remover.
- .5 Remove loose pieces of face yarn with sharp scissors.

3.5 PROTECTION

- .1 Refer to Section 01 76 00.
- .2 Protect completed installation with protective coverings.

END OF SECTION

1 General

1.1 PRODUCTS FURNISHED OR INSTALLED UNDER OTHER SECTIONS

- .1 Carefully examine scope of the Work as indicated on Drawings, and include all finishing, whether specifically mentioned or not, except as specifically excluded below:
- .1 Section 04 21 00 - Clay Unit Masonry: Integral colour.
 - .2 Section 05 50 00 - Metal Fabrications: Shop priming.
 - .3 Section 05 51 00 - Metal Stairs: Shop priming.
 - .4 Section 06 24 00 - High Pressure Decorative Laminate: Integral colour.
 - .5 Section 06 41 00 - Architectural Wood Casework: Shop finishing.
 - .6 Section 07 42 43 - Composite Wall Panels: Shop finishing.
 - .7 Section 07 62 00 - Sheet Metal Flashing and Trim: Shop finishing.
 - .8 Section 07 72 33 - Roof Hatches: Shop priming.
 - .9 Section 07 84 00 - Firestopping: Integral colour.
 - .10 Section 07 92 00 - Joint Sealants: Integral colour.
 - .11 Section 08 12 13 - Hollow Metal Frames: Galvannealed coating.
 - .12 Section 08 13 13 - Hollow Metal Doors: Galvannealed coating.
 - .13 Section 08 51 13 - Aluminum Windows: Anodized coating.
 - .14 Section 08 71 00 - Door Hardware: Shop finishing.
 - .15 Section 09 51 23 - Acoustical Tile Ceilings: Shop finishing.
 - .16 Section 09 65 66 - Resilient Athletic Flooring: Game line markings.
 - .17 Section 10 11 00 - Visual Display Surfaces: Shop finishing.
 - .18 Section 10 14 00 - Signage: Shop finishing.
 - .19 Section 11 52 13 - Projection Screens: Shop finishing.
 - .20 Section 10 56 13 - Metal Storage Shelving: Shop finishing.
 - .21 Section 11 66 23 - Gymnasium Equipment: Shop finishing.
 - .22 Section 11 66 53 - Gymnasium Dividers: Shop finishing.
 - .23 Section 12 24 13.13 - Motorized Roller Window Shades: Anodized coating.
 - .24 Section 12 24 13.16 - Manual Roller Window Shades: Anodized coating.
 - .25 Section 14 42 16 - Vertical Wheelchair Lift: Shop finishing.
 - .26 Section 32 17 23 - Pavement Markings.
 - .27 Do not paint glass surfaces.
 - .28 Do not paint plastic components.
 - .29 Do not paint plated, polished or anodized metal components.
 - .30 Do not paint stainless steel components.

1.2 RELATED SECTIONS

- .1 Section 04 22 00 - Concrete Unit Masonry.
- .2 Section 05 50 00 - Metal Fabrications.
- .3 Section 05 51 00 - Metal Stairs.
- .4 Section 06 10 00 - Rough Carpentry.
- .5 Section 06 15 33 - Wood.
- .6 Section 06 20 00 - Finish Carpentry.
- .7 Section 06 41 00 - Architectural Wood Casework.
- .8 Section 07 72 33 - Roof Hatches.
- .9 Section 08 12 13 - Hollow Metal Frames.
- .10 Section 08 13 13 - Hollow Metal Doors.
- .11 Section 09 21 16 - Gypsum Board Assemblies.

1.3 REFERENCES

- .1 MPI Architectural Painting Specification Manual.
- .2 MPI Maintenance Repainting Manual.
- .3 SSPC Painting Manual, Volume 2 - Systems and Specifications.

1.4 SCHEDULING

- .1 Schedule painting operations to prevent disruption to the Work.
- .2 Schedule painting and coating operations in occupied facilities to prevent disruption of occupants at existing facility. Conduct painting and coating after facility working hours and on weekends in accordance with Owner's operating requirements.
- .3 Schedule work such that finished surfaces have dried before occupants are affected.
- .4 Schedule site finishing of doors and frames prior to door, glass and hardware installation.
- .5 Obtain written authorization from Consultant for changes in work schedule.

1.5 PRODUCT DATA

- .1 Submit Product data as specified in Section 01 33 00.
- .2 Product Data: Manufacturers' standard data sheets for each finishing Product being used, indicating relevant MPI finish system, volatile organic compound (VOC) content and volume solids (VOL SOL) content.

1.6 SAMPLES

- .1 Submit samples as specified in Section 01 33 00.
- .2 Selection Samples: A full range of colour selector samples for each type of coating required.
- .3 Verification Samples: If requested by Consultant, prepare 1 000 x 1 000 mm size sample panels. Apply finish to actual substrate material or to an acceptable alternate material if required to be portable.

1.7 EXTRA STOCK MATERIALS

- .1 Supply extra stock materials as specified in Section 01 78 00.
- .2 Extra Stock Materials: Minimum 4 L of each Product, colour and sheen used.
- .3 Supply extra stock materials in unopened, new containers, clearly labelled as to manufacturer, Product, colour and sheen.

1.8 QUALIFICATIONS

- .1 Applicators: A firm specializing in commercial painting and finishing of buildings in accordance with MPI Architectural Painting Specification Manual and MPI Maintenance Repainting Manual, having minimum 10 years documented experience.

1.9 DELIVERY, STORAGE AND HANDLING

- .1 Refer to Section 01 60 00.
- .2 Deliver Products in original containers with unbroken seals and labelled to indicate name of manufacturer, brand, colour and quality of contents.
- .3 Store thinners, loose soaked rags and similar combustible materials in closed containers. Remove from Place of the Work or store in an assigned area.

- .4 Provide adequate safe-guards against spontaneous combustion of finishing materials.
- .5 Arrange for properly enclosed and heated space, satisfactory to Consultant, to be used as paint shop. Store Products at minimum 10 degrees C.

1.10 AMBIENT CONDITIONS

- .1 Conform to MPI Architectural Painting Specification Manual.
- .2 Apply water-based paints only when temperature of surfaces to be finished and surrounding air temperatures are between 10 degrees C and 30 degrees C.
- .3 Apply solvent-thinned paints only when temperature of surfaces to be finished and surrounding air temperatures are between 6 degrees C and 32 degrees C.
- .4 Do not apply finishes in snow, rain, fog or mist.
- .5 Do not apply finishes when relative humidity exceeds 85 percent RH; or at temperatures less than 2 degrees C above dew point; or to damp or wet surfaces.

2 Products

2.1 MANUFACTURERS

- .1 Manufacturer: Use only Products from manufacturers listed in MPI Architectural Painting Specification Manual for specified paint and finish system.
- .2 Single-Source Responsibility: Provide primers and undercoats from same manufacturer as finish coats.

2.2 DESCRIPTION

- .1 Gloss Ratings: Paint gloss shall be defined as the sheen rating of applied paint, in accordance with the following gloss level categories, as defined in MPI Architectural Painting Specification Manual:
 - .1 Gloss Level G1: Matte or Flat finish.
 - .2 Gloss Level G2: Velvet finish.
 - .3 Gloss Level G3: Eggshell finish.
 - .4 Gloss Level G4: Satin finish.
 - .5 Gloss Level G5: Semi-Gloss finish.
 - .6 Gloss Level G6: Gloss finish.
 - .7 Gloss Level G7: High-Gloss finish.
- .2 Colours: A maximum of 5 exterior colours and 20 interior colours may be required. There may be more than two colours used in each room or space.

2.3 PERFORMANCE CRITERIA

- .1 Volatile Organic Compound Content (VOC): Use only paints and coatings having a volatile organic compound (VOC) content as follows:
 - .1 Gloss Level G1: < 50 g/L.
 - .2 Gloss Levels G2-G7: < 150 g/L.
- .2 Volume Solids Content (VOL SOL): Use only paints and coatings having a volume solids (VOL SOL) content as follows:
 - .1 Alkyd Paints and Coatings: \geq 45 percent.
 - .2 Latex Paints and Coatings: \geq 40 percent.

2.4 MATERIALS

- .1 Paints and Coatings: Use only Products meeting specified performance criteria and listed in most current Approved Products List included in MPI Architectural Painting Specification Manual, for each specified paint and finish system.
- .2 Paint Accessory Materials: Linseed oil, shellac, turpentine and other materials of commercial quality.

2.5 MIXING

- .1 Pigments shall be fully ground and shall maintain a soft paste consistency in the vehicle during storage, that can and will be dispersed readily and uniformly by paddle to a complete, homogeneous mixture.
- .2 Carefully mix and prepare paint materials according to manufacturer's directions.
- .3 Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
- .4 Stir material before application to produce a mixture of uniform density. Do not stir surface film into material. Remove film and, if necessary, strain material before using.
- .5 Use only thinners approved by paint manufacturer, and only within recommended limits.
- .6 Tint each undercoat a lighter shade to facilitate identification of each coat where multiple coats of same material are applied. Tint undercoats to match colour of finish coat, but with sufficient differences in shade of undercoats to distinguish each separate coat.

3 Execution

3.1 EXAMINATION

- .1 Refer to Section 01 71 00.
- .2 Measure moisture content of surfaces using an electronic moisture metre. Do not apply finishes unless moisture content of surfaces are below recommended maximum values.

3.2 PREPARATION

- .1 Prepare surfaces to MPI Architectural Painting Specification Manual.
- .2 Prepare existing, previously finished surfaces designated for re-finishing to MPI Maintenance Repainting Manual.
- .3 Mask out surrounding surfaces not to receive paint, to protect from overspray or overbrushing.
- .4 Remove hardware and accessories, plates, machined surfaces, lighting fixtures and similar items already installed but not intended to be painted.
- .5 Remove mildew, efflorescence and foreign materials from surfaces using appropriate methods.
- .6 Correct minor defects and deficiencies in surfaces which affect application of paints and coatings.
- .7 Clean and prepare surfaces to be painted according to manufacturers' instructions for each particular substrate condition and finish system.
- .8 Provide barrier coats over incompatible primers.

- .9 Clean ungalvanized ferrous metal surfaces designated to receive site finish. Use solvent or mechanical cleaning methods to SSPC Painting Manual, Volume 2 - Systems and Specifications.
- .10 Clean galvanized surfaces with non-petroleum-based solvents. Surface to be free of oil and surface contaminants. Remove pretreatment from galvanized steel metal fabricated from coil stock by mechanical methods.

3.3 APPLICATION

- .1 Apply Products to MPI Architectural Painting Specification Manual.
- .2 Protect adjacent surfaces and areas, including equipment, labels and signage from damage during painting operations. Use drop cloths, shields, masking, templates or other suitable protective means.
- .3 Make Good damage caused by failure to protect surfaces.
- .4 Erect barriers or screens and post signs to warn of or limit or direct traffic away or around work areas as required.
- .5 Use methods best suited for substrate and type of material being applied.
- .6 Do not use compressed air or aerosol methods of application without prior written approval of Consultant.
- .7 Spread finishes evenly and flow on smoothly without runs or sags.
- .8 Apply Products no thinner than manufacturer's recommended spreading rate. Provide total dry film thickness of entire system as recommended by manufacturer.
- .9 Apply Products under adequate illumination.
- .10 Sand lightly between coats to achieve required finish.
- .11 Where clear finishes are required, tint fillers to match wood. Work fillers into grain before set. Wipe excess from surface.
- .12 Back prime interior wood work with enamel primer sealer paint.
- .13 Back prime exterior wood work with exterior primer paint.
- .14 Pigmented (Opaque) Finishes: Completely cover substrate to a smooth, opaque surface of uniform finish, colour, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness or other surface imperfections will not be accepted.
- .15 Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, cloudiness, colour irregularity, runs, brush marks, orange peel, nail holes or other surface imperfections.
- .16 Match approved samples for colour, texture, and coverage. Remove, refinish or repaint work not complying with specified requirements.

3.4 FACILITY SERVICES

- .1 Unless otherwise specified or noted, paint "unfinished" conduits, piping, hangers, ductwork and other mechanical and electrical equipment with colour and texture to match adjacent surfaces, in the following areas:
 - .1 Where exposed-to-view in exterior and interior areas.
 - .2 In high humidity interior areas.
 - .3 In mechanical and electrical rooms.

- .2 Remove finished louvres, grilles, covers, and access panels on facility service components from location and paint separately. Finish paint primed equipment to colour selected by Consultant.
- .3 Paint inside of air ducts, convection and baseboard heating cabinets where visible behind louvers, grilles and diffusers for minimum 460 mm or beyond sight line, whichever is greater with primer and one coat of matt black (non-reflecting) paint.
- .4 Paint inside of light valances gloss white.
- .5 Paint disconnect switches for fire alarm system and exit light systems in red enamel.
- .6 Paint red or band fire protection piping and sprinkler lines. Keep sprinkler heads free of paint.
- .7 Paint yellow or band natural gas piping.
- .8 Backprime and paint face and edges of plywood service panels a semi-gloss, gray colour before installation of telephone and electrical equipment. Leave equipment in original finish except for touch-up as required. Paint conduits, mounting accessories and other unfinished items.
- .9 Paint exterior steel electrical light standards.
- .10 Do not paint outdoor transformers and substation equipment.
- .11 Colour code equipment, piping, conduit and exposed ductwork in accordance with colour schedule. Colour band and identify with flow arrows, names and numbering.
- .12 In unfinished areas, leave exposed conduits, piping, hangers, ductwork and other facility service components in original finish. Touch-up scratches and marks.
- .13 Touch-up scratches and marks on factory painted finishes and equipment with paint as supplied by equipment manufacturer.
- .14 Do not paint over nameplates.

3.5 FIELD QUALITY CONTROL

- .1 Inspect surfaces, preparation and paint applications.
- .2 Painted surfaces shall be considered to lack uniformity and soundness if any of the following defects are apparent:
 - .1 Brush or roller marks, streaks, laps, runs, sags, drips, heavy stippling, hiding or shadowing by inefficient application methods, skipped or missed areas, and foreign materials in painted coatings.
 - .2 Evidence of poor coverage at fastener heads, plate edges, lap joints, crevices, pockets, corners and re-entrant angles.
 - .3 Damage due to touching before paint is sufficiently dry or other contributory cause.
 - .4 Damage due to application on moist surfaces or caused by inadequate protection from weather.
 - .5 Damage or contamination of paint due to blown contaminants (dust, spray paint, etc).
- .3 Painted surfaces will be rejected if any of the following are evident under natural lighting source for exterior surfaces and final lighting source (including daylight) for interior surfaces:
 - .1 Visible defects are evident on vertical surfaces when viewed at normal viewing angles from a distance of not less than 1 000 mm.
 - .2 Visible defects are evident on horizontal surfaces when viewed at normal viewing angles from distance of not less than 1 000 mm.
 - .3 Visible defects are evident on ceiling, soffit and other overhead surfaces when viewed at normal viewing angles.
 - .4 When final coat on any surface exhibits a lack of uniformity of colour, sheen, texture and hiding across full surface area.

- .4 Make Good rejected surfaces. Small affected areas may be touched up; large affected areas or areas without sufficient dry film thickness of paint shall be repainted. Runs, sags or damaged paint shall be removed by scraper or by sanding prior to application of paint.

3.6 ADJUSTING

- .1 Following completion of painting and finishing operations, reinstall removed items.
- .2 Remove protective covers and masking from protected surfaces.
- .3 Repaint damaged surfaces to satisfaction of Consultant.

3.7 CLEANING

- .1 Refer to Section 01 74 00.
- .2 Remove paint where spilled, splashed, splattered or sprayed using means and materials that are not detrimental to affected surfaces.
- .3 Keep work area free from unnecessary accumulation of tools, equipment, surplus materials and debris.
- .4 Remove combustible rubbish materials and empty paint cans each day and safely dispose of in accordance with authorities having jurisdiction.
- .5 Clean equipment and dispose of wash water / solvents as well as other cleaning and protective materials, paints, thinners, paint removers and strippers in accordance with authorities having jurisdiction.
- .6 Leave the Work clean and free from dirt and debris.

3.8 WASTE MANAGEMENT

- .1 Paint, stain, wood preservative finishes and related materials (thinner, solvents, etc.) are regarded as hazardous products and are subject to regulations for disposal. Obtain information on these controls from authorities having jurisdiction.
- .2 Separate and recycle waste materials. Where paint recycling is available, collect waste paint by type and deliver to recycling or collection facility. Materials that 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 To reduce the amount of contaminants entering waterways, sanitary sewers, storm sewers or into the ground strictly adhere to the following procedures:
 - .1 Retain cleaning water for water-based materials to allow sediments to be filtered out. Do not clean equipment using free draining water.
 - .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 an approved legal manner in accordance with applicable regulatory requirements dealing with hazardous waste.
 - .5 Empty paint cans are to be dry prior to disposal or recycling.
 - .6 Close and tightly seal partly used cans of materials, including sealant and adhesive containers and store protected in well ventilated fire-safe area at moderate temperature.
- .5 Set aside and protect surplus and uncontaminated finish materials not required by Owner and deliver or arrange collection of verifiable re-use or re-manufacturing.

3.9 PROTECTION

- .1 Refer to Section 01 76 00.
- .2 Protect other surfaces from paint or damage.
- .3 Repair damage.

3.10 FINISH SCHEDULE

- .1 Provide indicated paint and finish systems for identified substrates to MPI Architectural Painting Specification Manual.
- .2 Refinishing Existing, Previously Finished Surfaces:
 - .1 Refer to MPI Maintenance Repainting Manual Section for refinishing existing finishes.
 - .2 Use finish coat of respective new surface finish system for minor repair of existing finishes.
 - .3 Use system primer where existing finishes are damaged down to bare surface.
- .3 Exterior Painting and Finishing Schedule
 - .1 Concrete Vertical Surfaces
 - .1 Opaque Painted Finish: EXT. 3.1C - W.B. LIGHT INDUSTRIAL COATING (over w.b. alkali resistant primer), Premium Grade; Gloss Level G3.
 - .2 Structural Steel
 - .1 Corrosion-Resistant Opaque Painted Finish: EXT. 5.1B - W.B. LIGHT INDUSTRIAL COATING (over inorganic zinc), Premium Grade; Gloss Level G5.
 - .3 Metal Fabrications
 - .1 Opaque Painted Finish: EXT. 5.1D - ALKYD (over alkyd metal primer), Premium Grade; Gloss Level G5.
 - .4 Galvanized and Galvannealed Metal
 - .1 Opaque Painted Finish: EXT. 5.3B - ALKYD (over cementitious primer), Premium Grade; Gloss Level G6.
 - .5 Aluminum (Not Anodized)
 - .1 Opaque Painted Finish: EXT. 5.4H - LATEX (over q.d. metal primer), Premium Grade, Gloss Level G6.
 - .6 Dimension Lumber and Panels
 - .1 Opaque Painted Finish: EXT 6.2A - LATEX (over alkyd/oil primer), Premium Grade; Gloss Level G5.
 - .2 Opaque Stained Finish: EXT. 6.2B - SOLID COLOR STAIN, W.B. (over alkyd/oil primer), Premium Grade; Gloss Level G1.
 - .3 Semi-Transparent Stained Finish: EXT. 6.2E - VARNISH, S.B. (over s.b. stain), Premium Grade; Gloss Level G5.
 - .7 Dressed Lumber and Panels
 - .1 Opaque Painted Finish: EXT. 6.3A - LATEX (over alkyd/oil primer), Premium Grade; Gloss Level G5.
 - .2 Semi-Transparent Stained Finish: EXT. 6.3E - VARNISH, S.B. (over s.b. stain), Premium Grade; Gloss Level G5.
 - .3 Opaque Stained Finish: EXT. 6.3K - SOLID COLOR STAIN, W.B. (over alkyd/oil primer), Premium Grade; Gloss Level G1.
- .4 Interior Painting and Finishing Schedule
 - .1 Concrete Surfaces (except floors)
 - .1 Epoxy Finish: INT. 3.1G - EPOXY-MODIFIED LATEX (for smooth concrete), Premium Grade; Gloss Level G6.
 - .2 Opaque Painted Finish: INT. 3.1M - INSTITUTIONAL LOW ODOR / VOC, Premium Grade; Gloss Level G4.
 - .2 Concrete Floors
 - .1 Epoxy Finish: INT. 3.2C - EPOXY, Premium Grade; Gloss Level G5.

- .3 Concrete Masonry Units
 - .1 Opaque Painted Finish: INT. 4.2E - INSTITUTIONAL LOW ODOR / VOC (over latex block filler), Premium Grade; Gloss Level G4.
 - .2 Epoxy Finish: INT. 4.2J - EPOXY-MODIFIED LATEX (over latex block filler) FOR DRY ENVIRONMENTS, Premium Grade; Gloss Level G6.
- .4 Structural Steel, Steel Joists, Steel Deck and Metal Fabrications
 - .1 Opaque Painted Finish - Overhead Applications: INT. 5.1C - W.B. DRY FALL (over q. d. alkyd primer), Budget Grade; Gloss Level G5.
 - .2 Opaque Painted Finish: INT. 5.1E - ALKYD (over q.d. alkyd primer), Premium Grade; Gloss Level G5.
 - .3 Epoxy Finish: INT. 5.1K - EPOXY-MODIFIED LATEX (over w.b. rust-inhibitive primer), Premium Grade; Gloss Level G6.
- .5 Galvanized and Galvannealed Metal
 - .1 Opaque Painted Finish: INT. 5.3N - INSTITUTIONAL LOW ODOR / VOC (over w. b. galvanized primer), Premium Grade; Gloss Level G5.
- .6 Dimension Lumber and Panels
 - .1 Semi-Transparent Stained Fire Retardant Finish: INT. 6.2FF - FIRE RETARDANT, PIGMENTED, W.B., Premium Grade; Gloss Level G4.
 - .2 Semi-Transparent Stained Finish: INT. 6.2J - POLYURETHANE VARNISH (over s.b. stain), Premium Grade; Gloss Level G4.
 - .3 Opaque Painted Finish: INT. 6.2L - INSTITUTIONAL LOW ODOR / VOC (over latex primer), Premium Grade; Gloss Level G5.
- .7 Dressed Lumber, Panels and Veneers
 - .1 Semi-Transparent Stained Finish: INT. 6.3EE - POLYURETHANE VARNISH (over w.b. stain), Premium Grade; Gloss Level G4.
 - .2 Semi-Transparent Stained Fire Retardant Finish: INT. 6.3RR - FIRE RETARDANT, PIGMENTED, W.B., Gloss Level G4.
 - .3 Opaque Painted Finish: INT. 6.3V - INSTITUTIONAL LOW ODOR / VOC (over latex primer), Premium Grade; Gloss Level G5.
- .8 Plaster and Gypsum Board
 - .1 Epoxy Finish: INT. 9.2F - EPOXY-MODIFIED LATEX (over latex primer/sealer), Premium Grade; Gloss Level G6.
 - .2 Opaque Painted Finish: INT. 9.2M - INSTITUTIONAL LOW ODOR / VOC (over latex primer/sealer), Premium Grade; Gloss Levels as follows:
 - .1 Ceiling Applications: G1.
 - .2 Other Applications: G3.

END OF SECTION

1 General

1.1 RELATED SECTIONS

- .1 Section 04 22 00 - Concrete Unit Masonry.
- .2 Section 06 20 00 - Finish Carpentry.
- .3 Section 06 41 00 - Architectural Wood Casework.
- .4 Section 09 21 16 - Gypsum Board Assemblies.

1.2 REFERENCES

- .1 AAMA 611-20: Voluntary Specification for Anodized Architectural Aluminum.
- .2 ASTM A424/A424M-18: Standard Specification for Steel, Sheet, for Porcelain Enameling.
- .3 ASTM A653/A653M-23: Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .4 ASTM B221M-21: Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).
- .5 PEI 1002: Manual and Performance Specifications for Porcelain Enamel Writing Surfaces.
- .6 CAN/ULC-S102-2018 (REV1): Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
- .7 CAN/ULC-S706.1-2020: Standard for Wood Fibre Insulating Boards for Buildings.

1.3 SHOP DRAWINGS

- .1 Submit Shop Drawings as specified in Section 01 33 00.
- .2 Shop Drawings: Project-specific drawings, illustrating materials, layouts, component dimensions and thicknesses, details of connections and fastening, trim and hardware, and shop-applied finishes.

1.4 CLOSE-OUT SUBMITTALS

- .1 Submit closeout submittals as specified in Section 01 78 00.
- .2 Maintenance Data: Manufacturer's standard maintenance and cleaning guidelines; sufficient quantity for inclusion in operation and maintenance manual.
- .3 Additionally, apply removable maintenance instruction labels to each markerboard.

1.5 MOCK-UPS

- .1 Construct mock-ups as specified in Section 01 40 00.
- .2 Mock-Up Panel: A 1 000 x 1 000 mm size mock-up panel; comprised of two markerboard panels; demonstrating quality of writing surface, trim and method of joining adjacent panels.
- .3 Accepted mock-ups will be used as the standard for acceptance of the Work.
- .4 Remove and replace installed Product that does not conform to accepted mock-up.
- .5 Remove mock-ups from Place of the Work upon Ready-for-Takeover.

1.6 WARRANTY

- .1 Submit extended warranty in accordance with General Conditions of the Contract.
- .2 Manufacturer's Extended Warranty: Warrant markerboards for a period of 10 years against defects other than those due to normal usage and wear, including fading, crazing, chipping, peeling and surface becoming slick, glassy or otherwise unsuitable for use.

2 Products

2.1 MANUFACTURERS

- .1 Manufacturers having Product considered acceptable for use:
 - .1 ASI Visual Display Products, Inc.
 - .2 Claridge.
 - .3 Delta Products, Ltd.
 - .4 Global School Products Inc.
 - .5 Martack Specialties Ltd.
- .2 Substitution Procedures: Refer to Section 01 25 00.

2.2 DESCRIPTION

- .1 Use only matching components from a single manufacturer's series of Products.

2.3 REGULATORY REQUIREMENTS

- .1 Test Products for surface burning characteristics to CAN/ULC-S102.

2.4 MATERIALS

- .1 Extruded Aluminum: To ASTM B221M, 6063 alloy, T5 temper.
- .2 Porcelain Enameled Sheet Steel: To ASTM A424/A424M, Type I, Commercial Steel.
- .3 Sheet Steel: To ASTM A653/A653M, Commercial Steel (CS), Types A, B, and C; galvanized.
- .4 Fibreboard: To CAN/ULC-S706.1, Type I; impregnated, sound absorbing type.

2.5 MANUFACTURED UNITS

- .1 Markerboard: Sandwich type construction, as follows:
 - .1 Face Panel: 0.76 mm thick porcelain enameled sheet steel; writable and washable surface, acid-resistant; White colour.
 - .2 Core: 11 mm thick fibreboard.
 - .3 Back-up Balancing Sheet: 0.4 mm thick sheet steel.
- .2 Aluminum Trim: 1.5 mm thick extruded aluminum profiles; eg. Series 9800 by ASI Visual Display Products, Inc., comprised of:
 - .1 Perimeter and divider trim,
 - .2 Map rail, with integral tan cork insert, end stops and two combination roller map hooks for every 1 830 mm of map rail,
 - .3 Concealed mechanical joining system, including 25 mm wide integrally slotted PVC inserts laminated into ends of panels, and 2.0 mm thick galvanized steel splines.
 - .4 Marker tray, with contour fitting end castings; non-protruding type.

2.6 FABRICATION

- .1 Factory laminate core to face panel and back-up balancing sheet under heat and pressure.

2.7 FINISHES

- .1 Anodized Coating on Extruded Aluminum: To AAMA 611, AA-A41 Clear etched and anodized satin finish, free from extruding draw marks and surface scratches.
- .2 Porcelain Enamel Coating on Sheet Steel: To PEI 1002; with gloss factor between 6 - 8 when measured with 45 degree glossometer.
- .3 Galvannealed Coating on Sheet Steel: To ASTM A653/A653M, Coating Designation ZF120; wiped zinc-iron alloy coating, with streak-free matte grey appearance.

3 Execution

3.1 EXAMINATION

- .1 Refer to Section 01 71 00.
- .2 Verify millwork units designated to incorporate visual display surfaces are installed.

3.2 INSTALLATION

- .1 Install components to ensure a rigid, straight, square and plumb installation with horizontal lines level.
- .2 Securely attach aluminum trims, ensuring fastenings are concealed.
- .3 Join markerboards together using concealed mechanical joining system to ensure a flush butted joint, with hairline appearance.

3.3 ADJUSTING

- .1 Leave visual display boards in a state suitable for immediate use by Owner.

3.4 CLEANING

- .1 Refer to Section 01 74 00.
- .2 Clean down, remove dirt and leave elements in first class condition.

END OF SECTION

- 1 General
 - 1.1 RELATED SECTIONS
 - .1 Section 04 22 00 - Concrete Unit Masonry.
 - .2 Section 08 13 13 - Hollow Metal Doors.
 - .3 Section 08 80 00 - Glazing.
 - .4 Section 09 21 16 - Gypsum Board Assemblies.
 - 1.2 SHOP DRAWINGS
 - .1 Submit Shop Drawings as specified in Section 01 33 00.
 - .2 Shop Drawings: Project-specific drawings, illustrating materials, dimensions, thicknesses, design style, fonts and font sizes, finishes, methods of attachment and special details.
 - 1.3 SAMPLES
 - .1 Submit samples as specified in Section 01 33 00.
 - .2 Verification Samples: One full size sample of each sign type, illustrating size, thickness, method of attachment, font style, font size, and factory-applied finishes.
 - 1.4 CLOSEOUT SUBMITTALS
 - .1 Submit closeout submittals as specified in Section 01 78 00.
 - .2 Maintenance Data: Manufacturer's standard care, maintenance and cleaning guidelines; sufficient quantity for inclusion in operation and maintenance manual.
- 2 Products
 - 2.1 MATERIALS
 - .1 Fasteners: Countersunk screw-type with tamperproof heads, complete with plastic wall plugs when required for securement to wall surfaces; suitable sizes for intended application. Do not use through-fastening types.
 - .2 Adhesive: As recommended by sign manufacturer.
 - 2.2 FABRICATION
 - .1 Fabricate sign plates with letters and numbers centered within sign plate's length and height.
 - .2 Provide countersunk holes for screw fasteners.
- 3 Execution
 - 3.1 INSTALLATION
 - .1 Install signs straight, plumb, level and secured in a manner to prevent distortion or displacement.
 - .2 Finished work shall be free of defects, warping, open seams and rattles.
 - .3 Provide double-sided foam tape adhesive on rear face of sign plates prior to securing with mechanical fasteners.

- .4 Provide routing or mortising for items required to be mortised, rebated or otherwise housed within material.
- .5 Replace Products that are bent, scratched or damaged.
- .6 Provide fasteners to full required complement, properly tightened.
- .7 Exposed fasteners shall be neatly executed and shall match adjacent surfaces.
- .8 Install braille signage adjacent to sign plates.
- .9 Do not fasten signage through acoustically-rated or fire-rated doors.

3.2 PROTECTION

- .1 Refer to Section 01 76 00.
- .2 Protect installed Products with temporary removable film.

3.3 ATTACHMENTS

- .1 Refer to attached 12-page signage schedule, as prepared by Owner.

END OF SECTION