

## 1 General

### 1.1 RELATED REQUIREMENTS

- .1 Section 09 22 26 - Suspension System for Gypsum Board Ceilings.
- .2 Section 09 29 00 - Gypsum Board.

### 1.2 REFERENCES

- .1 American Society for Testing and Materials (ASTM).
  - .1 ASTM A653/A653M-13, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
  - .2 ASTM A792/A792M-10(2015), Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
  - .3 ASTM C645-14, Standard Specification for Nonstructural Steel Framing Members.
  - .4 ASTM C754-15, Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
  - .5 ASTM C919-12, Standard Practice for Use of Sealants in Acoustical Applications.
  - .6 ASTM E90-09, Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
  - .7 ASTM E413-10, Classification for Rating Sound Insulation.
- .2 Underwriters Laboratories of Canada (ULC).
  - .1 CAN/ULC-S101-07, Standard Methods of Fire Endurance Tests of Building Construction and Materials.

### 1.3 SUSTAINABLE DESIGN SUBMITTALS

- .1 Construction waste management plan.
  - .1 A Construction Waste Management Plan is in place to divert waste material from landfill. Wherever practical, send waste material for reuse or recycling, and generally document this for the contractor's waste management final report.
- .2 Recycled Content.
  - .1 Refer to Section 01 47 15 - Sustainable Requirements for "List of Products Requiring Recycled Content".
  - .2 If products within this section are indicated on the "List of Products Requiring Recycled Content", only products with recycled content will be acceptable.
  - .3 For products not identified on list, source products with highest recycled content available when practical.
  - .4 Include following information with product data submission.
    - .1 Percentage of pre-consumer and post-consumer recycled content for each product.
- .3 Regional Materials.
  - .1 Refer to Section 01 47 15 - Sustainable Requirements for "List of Products Required to be Locally Sourced".

- .2 If products within this section are indicated on the “List of Products Required to be Locally Sourced”, include following information with Product Data submission:
          - .1 Extraction/Manufacturing location(s): Indicate location of extraction site or manufacturing plant, and indicate distance between extraction site or manufacturing plant and Project site.
        - .4 If requesting substitute product, ensure proposed substitution achieves above stated goals.
- 1.4 MAX. VOC CONTENT FOR SOLVENT CLEANING ACTIVITIES
  - .1 Following are some of the Maximum allowed VOC Content for following activities, as per SCAQMD Rule 1171-9 (refer to SCAQMD manual for complete list and updates):
    - .1 Product cleaning during onsite surface preparation for coatings or adhesives application, and repair and maintenance cleaning:
      - .1 General maximum VOC 25g/L.
      - .2 Electrical apparatus components and electronic components.
      - .3 Cleaning of coatings or adhesives application equipment max. VOC 25g/L.
    - .2 Refer to SCAQMD for additional information and clarification and complete list of applications.
    - .3 Any discrepancies are to be approved by Departmental Representative. Obtain written approval prior to use on site.
- 1.5 DELIVERY, STORAGE AND HANDLING
  - .1 Deliver, store and handle materials in accordance with Section 01 10 01 - General Requirements with manufacturer's written instructions.
  - .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
  - .3 Storage and Handling Requirements:
    - .1 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
    - .2 Store and protect metal framing from nicks, scratches, and blemishes.
    - .3 Replace defective or damaged materials with new.
- 1.6 QUALITY ASSURANCE
  - .1 Fire-Test-Response Characteristics: For fire resistance-rated assemblies that incorporate non-loadbearing interior steel framing, provide materials and construction identical to those tested in assembly indicated according to CAN/ULC-S101.
  - .2 STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E90 and classified according to ASTM E413.
- 2 Products
  - 2.1 MATERIALS
    - .1 Steel:
      - .1 Steel sheet components shall comply with ASTM C645 requirements for metal, unless otherwise indicated.

- .2 Steel for non-loadbearing members shall have metallic coatings that conform to ASTM A653M or ASTM A792M with minimum metallic coating weights (mass) of Z120 and AZM150 respectively.
- .2 Non-load bearing channel stud framing: to ASTM C645, roll formed from 0.48 and 0.80 mm base thickness sheet steel, for screw attachment of gypsum board.
  - .1 Knock-out service holes at 460 mm centres.
- .3 Shaft wall studs: nonload-bearing, C-T/C-H profile, fabricated from 0.53 mm and 0.81 mm galvanized steel x stud size as indicated.
- .4 Floor and ceiling tracks: to ASTM C645, in widths to suit stud sizes, minimum 32 mm flange height. Steel thickness not less than thickness of corresponding stud.
- .5 Metal channel stiffener: 1.4 mm thick base thickness sheet steel.
- .6 Backing plate/blocking: 0.91 mm sheet steel, height and width to suit.
- .7 Acoustical sealant: to ASTM C919.
- .8 Insulating strip: rubberized, moisture resistant 3 mm thick cork or foam strip, 12 mm wide, with self-sticking adhesive on one face, lengths as required.

### 3 Execution

#### 3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for non-structural metal framing application in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of Departmental Representative.
  - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  - .3 Proceed with installation only after unacceptable conditions have been remedied.

#### 3.2 ERECTION

- .1 Align partition tracks at floor and ceiling and secure at 600 mm on centre maximum.
- .2 Install damp proof course under stud shoe tracks of partitions on slabs on grade.
- .3 Place studs vertically, not more than 50 mm from abutting walls, and at each side of openings and corners.
  - .1 Position studs in tracks at floor and ceiling. Cross brace steel studs as required to provide rigid installation to manufacturer's instructions.
- .4 Erect metal studding to tolerance of 1:1000.
- .5 Attach studs to track using screws or crimp method for non-rated assemblies; screws only for fire-rated assemblies.
- .6 Co-ordinate simultaneous erection of studs with installation of service lines. When erecting studs ensure web openings are aligned.
- .7 Co-ordinate erection of studs with installation of door/window frames and special supports or anchorage for work specified in other Sections.
- .8 Frame around openings using one or two studs as follows:
  - .1 For openings 600 mm to less than 800 mm install single standard gauge stud.
  - .2 For openings 800 mm to 1200 mm install two standard gauge studs or one heavy gauge stud.

- .3 For openings greater than 1200 mm install two heavy gauge studs.
- .4 In fire rated partitions use heavy gauge studs regardless of opening width.
- .9 Erect track at head of door/window openings and sills of sidelight/window openings to accommodate intermediate studs.
  - .1 Secure track to studs at each end, in accordance with manufacturer's instructions.
  - .2 Install intermediate studs above and below openings in same manner and spacing as wall studs.
- .10 Frame openings and around built-in equipment, cabinets, access panels, on four sides. Extend framing into reveals. Check clearances with equipment suppliers.
- .11 Provide 40 mm stud, furring channel or backing plate secured between studs for attachment of fixtures behind lavatory basins, toilet and bathroom accessories, and other fixtures including grab bars and towel rails, attached to steel stud partitions.
- .12 Install steel studs or furring channel between studs for attaching electrical and other boxes.
- .13 Install framing at each side of control joint.
- .14 Extend partitions to underside of deck or structure above; unless noted otherwise on drawings.
- .15 Maintain clearance under beams and structural slabs to avoid transmission of structural loads to studs.
  - .1 Use 50 mm leg ceiling tracks. Use double track slip joint as indicated.
- .16 Install continuous insulating strips to isolate studs from uninsulated surfaces.
- .17 Install two continuous beads of acoustical sealant and insulating strip under studs and tracks around perimeter of sound control partitions.

### 3.3 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 10 01 - General Requirements.
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 10 01 - General Requirements.

### 3.4 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by non-structural metal framing application.

END OF SECTION

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Part 1 - General

## 1.1 RELATED REQUIREMENTS

- .1 Section 09 22 16 - Non-structural Metal Framing.
- .2 Section 09 29 00 - Gypsum Board.
- .3 Section 09 51 99 - Acoustical Ceilings: suspension system for acoustic panel ceilings.

## 1.2 REFERENCES

- .1 American Society for Testing and Materials (ASTM).
  - .1 ASTM C635/C635M-13a, Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustic Tile and Lay-In Panel Ceilings.
  - .2 ASTM C636/C636M-13, Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustic Tile and Lay-In Panels.

## 1.3 DESIGN CRITERIA

- .1 Maximum deflection: 1/360th of span to ASTM C635/C635M deflection test.

## 1.4 SUBMITTALS

- .1 Submit the following items in accordance with Section 01 10 01 - General Requirements.
  - .1 Catalogue cuts or standard drawings indicating details of system with project conditions clearly identified.
  - .2 Manufacturer's written installation instructions.

## 1.5 SAMPLES

- .1 Submit samples in accordance with Section 01 10 01 - General Requirements.
- .2 Submit one representative sample of main tee, cross tees and wall mouldings.

## 1.6 REGULATORY REQUIREMENTS

- .1 Fire-resistance rated suspension system: certified by a Canadian Certification Organization accredited by Standards Council of Canada.

## 1.7 SUSTAINABLE DESIGN SUBMITTALS

- .1 Construction waste management plan.
  - .1 A Construction Waste Management Plan is in place to divert waste material from landfill. Wherever practical, send waste material for reuse or recycling, and generally document this for the contractor's waste management final report.
- .2 Recycled Content.
  - .1 Refer to Section 01 47 15 - Sustainable Requirements for "List of Products Requiring Recycled Content".
  - .2 If products within this section are indicated on the "List of Products Requiring Recycled Content", only products with recycled content will be acceptable.
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- .3 Regional Materials.
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    - .1 Extraction/Manufacturing location(s): Indicate location of extraction site or manufacturing plant, and indicate distance between extraction site or manufacturing plant and Project site.
  - .4 If requesting substitute product, ensure proposed substitution achieves above stated goals.

#### 1.8 MAX. VOC CONTENT FOR SOLVENT CLEANING ACTIVITIES

- .1 Following are some of the Maximum allowed VOC Content for following activities, as per SCAQMD Rule 1171-9 (refer to SCAQMD manual for complete list and updates):
  - .1 Product cleaning during onsite surface preparation for coatings or adhesives application, and repair and maintenance cleaning:
    - .1 General maximum VOC 25g/L.
    - .2 Electrical apparatus components and electronic components.
    - .3 Cleaning of coatings or adhesives application equipment max. VOC 25g/L.
  - .2 Refer to SCAQMD for additional information and clarification and complete list of applications.
  - .3 Any discrepancies are to be approved by Departmental Representative. Obtain written approval prior to use on site.

#### 1.9 DELIVERY, STORAGE AND HANDLING

- .1 Deliver materials in original unopened packages, clearly labelled with manufacturer's name and description.
- .2 Store materials in a manner to prevent warp, scratches and damage.
- .3 Take care when handling to avoid racking, distortion and damage.

#### 1.10 ENVIRONMENTAL REQUIREMENTS

- .1 Maintain ambient temperature of not less than 15°C nor more than 30°C from 7 days before installation and maintain relative humidity not higher than 70% during same period.

### 2 Products

#### 2.1 T-BAR GRID SYSTEM

- .1 Basic materials for suspension system: commercial quality cold rolled steel, exposed surfaces prefinished in manufacturer's standard enamel.
- .2 Suspension system: Heavy duty system, to ASTM C635/C635M; consisting of main tees and furring cross channels or cross tees, certified for use in fire-rated assemblies.
- .3 Components:
  - .1 Main tee: roll formed, non-handed, single web design, 38 mm high, round top bulb, 38 mm wide flange, fabricated of 0.61 mm steel, reversible end splice, enamel finish. Furring cross channel holes 100 mm from ends; 200 mm o.c. Hanger wire holes 1200 mm o.c.
  - .2 Furring cross channels: 73 mm wide x 22 mm high, 47 mm wide knurled screw surface, fabricated of 0.53 mm steel, integral end locks at each end, enamel finish.

- .3 Furring cross tee: double web design, 38 mm high, rectangular bulb, 38 mm wide knurled screw surface and steel cap, high-tensile steel end clenched to web.
- .4 Cross tee: double web design, 38 mm high, rectangular bulb, 24 mm wide exposed flange and steel cap, high-tensile steel end clenched to web.
- .5 Channel moulding: U-shaped, hemmed edges, 25 mm flange x 25 mm opening x 12 mm flange.
- .4 Hanger wire: galvanized soft annealed steel wire, yield stress load at least three (3) times design load; minimum 2.6 mm.
- .5 Accessories: provide clips, splices, fasteners and other accessories necessary for complete installation.

## 2.2 METAL FURRING SUSPENSION SYSTEM

- .1 Furring channel: 0.53 mm electrozinc sheet steel, knurled face, 22 mm deep.
- .2 Runner channels: 38 mm x 19 mm, made from 1.52 mm cold-rolled steel; electrozinc coated.
- .3 Hangers: galvanized wire or zinc coated mild steel rods.

## 3 Execution

### 3.1 T-BAR GRID SYSTEM INSTALLATION

- .1 Install suspension system in accordance with ASTM C636/C636M and manufacturer's instructions.
- .2 Start ceiling suspension system work only after work above ceiling has been reviewed by Departmental Representative.
- .3 Secure hangers to overhead structure using attachment methods acceptable to Departmental Representative.
- .4 Install hangers on main tee spaced at maximum 1200 mm centres.
- .5 Ensure suspension system is coordinated with location of related components.
- .6 Install channel moulding on wall to provide correct ceiling height.
- .7 Completed suspension system to support superimposed loads, such as lighting fixtures, diffusers, grilles and speakers.
- .8 Support light fixtures and diffusers on main tee and cross tees. Place additional ceiling suspension hangers within 150 mm of each corner and at maximum 600 mm around perimeter of fixture.
- .9 Interlock cross member to main runner to provide rigid assembly.
- .10 Finished ceiling system to be square with adjoining walls and level within 1:1000.

### 3.2 METAL FURRING SUSPENSION SYSTEM INSTALLATION

- .1 Hangers shall support grillage independent of walls, columns, pipes, ducts; erect plumb and securely anchored to structural frame; space at 1200 mm maximum centres and not more than 150 mm from boundary walls, interruptions of continuity and change in direction. Provide 25 mm clearance at walls.

- .2 Space main carrying channels at 900 mm maximum centres and not more than 150 mm from boundary walls, interruptions of continuity and change in direction. Provide 25 mm clearance at walls. Splice main carrying channels by lapping minimum 200 mm and wire each end with two loops 50 mm from each end of overlap. Run main channels transversely to structural framing members.
- .3 Fix main carrying channels to rod anchors by saddle tying so as to prevent turning or twisting of channels and to develop full strength of hangers.
- .4 Space furring channels transverse to main carrying channels at 600 mm o.c. and not more than 150 mm from boundary walls, openings, interruptions in ceiling continuity and change in directions. Provide 25 mm clearance at walls. Level and shim furring channels to a maximum tolerance of 1:1200.
- .5 Secure furring channels to each support with clips or double 1.2 mm wire ties. Splice joints by nesting and tying channels together.
- .6 Frame around items such as recessed fixtures, diffusers, openings and where normally required, in good standard practice.

END OF SECTION



## 1 General

### 1.1 RELATED REQUIREMENTS

- .1 Section 07 92 10 - Joint Sealing.
- .2 Section 09 22 16 - Non-Structural Metal Framing.
- .3 Section 09 22 26 - Suspension System for Gypsum Board Ceilings.
- .4 Section 09 91 23 - Painting.

### 1.2 REFERENCES

- .1 ASTM International (ASTM).
  - .1 ASTM A1008/A1008M-13, Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.
  - .2 ASTM C475/C475M-12, Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
  - .3 ASTM C840-13, Specification for Application and Finishing of Gypsum Board.
  - .4 ASTM C919-12, Standard Practice for Use of Sealants in Acoustical Applications.
  - .5 ASTM C1396/C1396M-14, Specification for Gypsum Board.
  - .6 ASTM D3273-12, Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
  - .7 ASTM F1267-12, Standard Specification for Metal, Expanded, Steel.
- .2 Underwriters' Laboratories of Canada (ULC)
  - .1 CAN/ULC-S101-07, Standard Methods of Fire Endurance Tests of Building Construction and Materials.

### 1.3 SUSTAINABLE DESIGN SUBMITTALS

- .1 Construction waste management plan.
  - .1 A Construction Waste Management Plan is in place to divert waste material from landfill. Wherever practical, send waste material for reuse or recycling, and generally document this for the contractor's waste management final report.
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- .2 If products within this section are indicated on the “List of Products Required to be Locally Sourced”, include following information with Product Data submission:
  - .1 Extraction/Manufacturing location(s): Indicate location of extraction site or manufacturing plant, and indicate distance between extraction site or manufacturing plant and Project site.
- .4 Adhesives and Sealants.
  - .1 Include following information with Product Data submission for materials specified under this section:
    - .1 Submit manufacturer’s certification indicating VOC limits of Products used onsite and within the building envelope. Product shall comply with California’s SCAQMD #1168.
  - .5 If requesting substitute product, ensure proposed substitution achieves above stated goals.
- 1.4 MAX. VOC CONTENT FOR SOLVENT CLEANING ACTIVITIES
  - .1 Following are some of the Maximum allowed VOC Content for following activities, as per SCAQMD Rule 1171-9 (refer to SCAQMD manual for complete list and updates):
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      - .1 General maximum VOC 25g/L.
      - .2 Electrical apparatus components and electronic components.
      - .3 Cleaning of coatings or adhesives application equipment max. VOC 25g/L.
    - .2 Refer to SCAQMD for additional information and clarification and complete list of applications.
    - .3 Any discrepancies are to be approved by Departmental Representative. Obtain written approval prior to use on site.
- 1.5 DELIVERY, STORAGE AND HANDLING
  - .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
  - .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
  - .3 Storage and Handling Requirements:
    - .1 Store gypsum board assemblies materials level off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
    - .2 Store and protect from nicks, scratches, and blemishes.
    - .3 Protect from weather, elements and damage from construction operations.
    - .4 Handle gypsum boards to prevent damage to edges, ends or surfaces.
    - .5 Replace defective or damaged materials with new.
- 1.6 AMBIENT CONDITIONS
  - .1 Ensure temperature of surrounding areas are within recommended range - minimum 10°C, maximum 21°C - 7 days before, during and 4 days after entire gypsum board and joint treatment operations. Avoid concentrated or irregular heating during drying. Ensure proper ventilation to eliminate excessive moisture.
  - .2 Report to Departmental Representative, in writing, defects of work which may adversely affect the quality of workmanship of this section.

- .3 Commencement of work shall imply acceptance of conditions.

## 2 Products

### 2.1 GYPSUM BOARD TYPES

- .1 Standard: regular and Type X; to ASTM C1396/C1396M, 1200 mm wide x maximum practical lengths, tapered edges.
- .2 Moisture-resistant board: regular and Type X; to ASTM C1396/C1396M, 1200 mm wide x maximum practical lengths, tapered edges.
  - .1 Mould resistance: to ASTM D3273, score of 10.
- .3 Abuse-resistant board:
  - .1 Physical properties to meet ASTM C1396/C1396M.
  - .2 Performance requirements: to ASTM C1629; with minimum results as follows:  
Surface abrasion - Level 1; Surface Indentation - Level 1; Soft-Body Impact - Level 3; Hard-Body impact - Level 3.
  - .3 Fire rating: equivalent to Type X gypsum board when tested in accordance with CAN/ULC-S101.
  - .4 Water resistant core.
  - .5 Mould resistance: to ASTM D3273, score of 10.
- .4 Acoustic board:
  - .1 Laminated board consisting of: paper faced gypsum, sound-absorbing viscoelastic polymer core, steel, aluminum tape.
  - .2 Thickness: 15.9 mm.
  - .3 Weight: 16 kg/m<sup>2</sup>.
  - .4 Fire rating: equivalent to Type X gypsum board when tested in accordance with ASTM E119.
  - .5 Surface flame: Class A when tested in accordance with ASTM E84.
  - .6 Mold resistant face and back.
  - .7 Acceptable Materials: QuietRock 530 by Certaineed.
- .5 Coreboard: to ASTM C1396, Type X, 25 mm thick, bevelled edges.

### 2.2 CEMENT BOARD

- .1 Cement board: aggregated portland cement board with vinyl-coated, woven glass-fibre mesh embedded in front and back surfaces, specially formulated to resist water and steam, square cut and smooth finished edges.

### 2.3 FASTENINGS AND ADHESIVES

- .1 Drywall screws: self-drilling, self-threading, case-hardened to give minimum penetration of 16 mm into wood, 10 mm into steel.
- .2 Laminating compound: as recommended by manufacturer, asbestos-free.

### 2.4 ACCESSORIES

- .1 Corner bead: 0.48 mm commercial grade sheet steel with Z275 zinc finish, perforated flanges, one-piece length per location.
- .2 Casing beads: 0.48 mm commercial grade sheet steel with Z275 zinc finish, fill-type, perforated flanges, one-piece length per location.

- .3 Control joint: 6 mm "V"-type, 0.48 mm commercial grade sheet steel with Z275 zinc finish, perforated flanges, one-piece length per location.
- .4 Resilient channels: 0.48 mm commercial grade sheet steel with Z275 zinc finish, perforated flanges, 12.7 mm deep.
- .5 Acoustic insulation: mineral fibre type acoustic insulation, ULC labelled.
- .6 Acoustical sealant: to ASTM C919.
- .7 Jointing material:
  - .1 Tape: as recommended by gypsum board manufacturer.
  - .2 Joint compound: to ASTM C475, asbestos-free.
- .8 Polyethylene: to CAN/CGSB-51.34, Type 2.
- .9 Insulating strip: rubberized, moisture resistant, 3 mm thick cork closed cell neoprene strip, 12 mm wide, with self-sticking permanent adhesive on one face, lengths as required.
- .10 Security mesh: expanded steel to ASTM F1267, flattened.
  - .1 Medium security: .75-#13F, design size SWD 23.4 mm x LWD 50.8 mm.
  - .2 Attachment clip: sheet steel plate, screw attached; of size to prevent mesh from pulling-out over screw heads.
- .11 Security sheet steel: fabricated in accordance with ASTM A1008/A1008M.

### 3 Execution

#### 3.1 RESILIENT CHANNEL INSTALLATION

- .1 Erect resilient channels transversely across framing members at maximum 400 mm o.c, unless indicated otherwise, and not more than 150 mm from wall/ceiling junctures. Secure with 38 mm common nails into wood studs or 25 mm drywall screws into wood or metal studs.
- .2 Make splices over framing members. Nest lengths together, lapping minimum 75 mm. Secure with nails or screws.

#### 3.2 GYPSUM BOARD APPLICATION

- .1 Apply gypsum board in accordance with ASTM C840, locations as follows:
  - .1 Abuse-resistant type - where indicated.
  - .2 Core board at shaft wall studs.
  - .3 Standard, Type X - where indicated on drawings as "Type X," "Fireguard" or "Fire rated".
  - .4 Standard, regular - used elsewhere.
- .2 Apply after bucks, anchors, blocking, electrical and mechanical work are approved.
- .3 Provide support at cut-outs and openings for impact-resistant board.
- .4 Erect on non-rated walls with long side parallel or perpendicular to framing; on fire-rated walls with long side parallel to framing; on fire-rated and non-rated ceilings with long side perpendicular to framing. Locate end joints over supporting members.
- .5 Keep end joints away from prominent locations and central positions of ceilings.
- .6 Locate vertical joints at least 50 mm from jamb lines of openings.

- .7 Start securing in central portion of board and work towards ends and edges. Hold board firmly against framing member while installing. Install perimeter screws a minimum of 10 mm and maximum 13 mm from edges and ends of boards and opposite the screws on adjacent boards.
- .8 Screw spacing for single layer construction.
  - .1 Nonfire-rated construction
    - .1 Ceilings - 300 mm field and edges.
    - .2 Walls - 300 mm field and edges.
  - .2 Fire-rated construction
    - .1 Ceilings - 200 mm field and edges.
    - .2 Walls - 300 mm field; 200 mm edges.
- .9 Screw spacing for double layer construction.
  - .1 Walls - Metal stud construction (unless otherwise stated in ULC design).
    - .1 Base layer - 300 mm field and edges.
    - .2 Finish layer - 300 mm field and edges.
- .10 Drive screws with a power screw gun, and set with countersunk head slightly below surface of board.
- .11 Use maximum practical length of gypsum board. Bring boards into contact, but do not force into place. Neatly fit ends and edges where they abut.
- .12 Use acoustic board on both sides of partition around table top unloading station (Room 140).

### 3.3 ACCESSORIES

- .1 Erect accessories straight, plumb or level, rigid and at proper plane. Use full-length pieces where practical. Make joints tight, accurately aligned and rigidly secured. Mitre and fit corners accurately, free from rough edges.
- .2 Reinforce exterior corners with corner beads fastened 150 mm o.c. at alternate sides along entire length of bead. Provide corner beads at exposed and concealed corners of fire-rated partitions; so as to maintain fire rating.
- .3 Install casing beads where assembly terminates against dissimilar material, against a surface having no trim concealing its juncture, and where shown on drawings.
- .4 Install security mesh where indicated. Secure to studs with fine threaded drywall screws fastened through attachment clips; space clips at 400 mm o.c.
- .5 Install 1.6 mm sheet steel, full height, in walls indicated. Weld to steel studs using fillet welds at 305 mm o.c.
- .6 Install acoustic insulation in walls indicated. Spot adhere to prevent slumping.
- .7 Apply bead of acoustical sealant to top and bottom joints of gypsum board, on both sides of partitions that extend to underside of structure. Apply in accordance with Section 07 92 10 - Joint Sealing.

### 3.4 CONTROL JOINTS

- .1 Provide control joints:
  - .1 at expansion or control joints in substrate.
  - .2 at approximate 9 m spacing on ceiling.
  - .3 at approximate 9 m spacing on walls/partitions.
  - .4 at doors and other changes in superficial areas of walls.

- .5 where indicated.
- .6 and where Departmental Representative deems necessary.

- .2 Construct control joints using standard manufactured control joint. Maintain 13 mm clearance between gypsum panels.
- .3 Ensure framing member is located at each side of joint.
- .4 At fire-rated control joints, install two layers of 15.9 mm Type X gypsum board backing directly behind joint. Backing to be on edge, parallel with stud, full height and depth of stud space.

### 3.5 ACCESS DOORS

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

### 3.6 JOINT FINISHING

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

### 3.7 CEMENT BOARD

- .1 Pre-cut board to required sizes and make necessary cutouts.
- .2 Fit ends and edges closely but not forced together.
- .3 Fasten board to wood studs with 38 mm galvanized roofing nails, or blued or galvanized annular ring nails at 200 mm o.c.
- .4 Fasten board to steel studs with rust proof self-drilling, self-threading case hardened screws at 200 mm o.c.
- .5 Filling and reinforcing of joints between board is specified in Section 09 30 13 - Ceramic Tiling.

### 3.8 PATCHING

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

### 3.9 CLEANUP

- .1 After completion of gypsum board work, wipe dust from walls and ceilings, and leave work ready for painters.

END OF SECTION

## 1 General

### 1.1 RELATED REQUIREMENTS

- .1 Section 03 30 00 - Cast-in-place Concrete - Concrete Finishing.
- .2 Section 07 92 10 - Joint Sealing.

### 1.2 REFERENCES

- .1 American National Standards institute (ANSI)
  - .1 ANSI A118.11-2013, EGP Latex Portland Cement Mortar.
- .2 ASTM International (ASTM).
  - .1 ASTM C144-04, Specification for Aggregate for Masonry Mortar.
  - .2 ASTM C920-14, Specification for Elastomeric Joint Sealants.
  - .3 ASTM C979-05, Standard Specification for Pigments for Integrally Colored Concrete.
  - .4 ASTM C1028-07, Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method.
- .3 Canadian Standards Association (CSA)
  - .1 CSA A3000-13, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
- .4 International Standards Organization (ISO).
  - .1 ISO 13007 Series-2010-2014, Ceramic Tiles - Grouts and Adhesives.
- .5 Terrazzo Tile and Marble Association of Canada (TTMAC)
  - .1 Tile Specification Guide 09 30 00 Tile Installation Manual, 2012-2014.

### 1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 10 01 - General Requirements.
- .2 Product data:
  - .1 Include manufacturer's information on:
    - .1 Each tile type specified; marked to show construction, size and shapes; slip resistant coefficients.
    - .2 Mortars including ISO 13007 compliance data.
    - .3 Latex-Portland cement mortar and grout.
    - .4 Commercial Portland cement grout.
- .3 Samples:
  - .1 Tile: submit duplicate full size samples of each colour, texture, size, and pattern of tile.

### 1.4 SUSTAINABLE DESIGN SUBMITTALS

- .1 Construction waste management plan.
  - .1 A Construction Waste Management Plan is in place to divert waste material from landfill. Wherever practical, send waste material for reuse or recycling, and generally document this for the contractor's waste management final report.
- .2 Recycled Content.
  - .1 Refer to Section 01 47 15 - Sustainable Requirements for "List of Products Requiring Recycled Content".

- .2 If products within this section are indicated on the “List of Products Requiring Recycled Content”, only products with recycled content will be acceptable.
- .3 For products not identified on list, source products with highest recycled content available when practical.
- .4 Include following information with product data submission.
  - .1 Percentage of pre-consumer and post-consumer recycled content for each product.
- .3 Regional Materials.
  - .1 Refer to Section 01 47 15 - Sustainable Requirements for “List of Products Required to be Locally Sourced”.
  - .2 If products within this section are indicated on the “List of Products Required to be Locally Sourced”, include following information with Product Data submission:
    - .1 Extraction/Manufacturing location(s): Indicate location of extraction site or manufacturing plant, and indicate distance between extraction site or manufacturing plant and Project site.
- .4 Adhesives and Sealants.
  - .1 Include following information with Product Data submission for materials specified under this section:
    - .1 Submit manufacturer’s certification indicating VOC limits of Products used onsite and within the building envelope. Product shall comply with California’s SCAQMD #1168.
- .5 If requesting substitute product, ensure proposed substitution achieves above stated goals.

#### 1.5 MAX. VOC CONTENT FOR SOLVENT CLEANING ACTIVITIES

- .1 Following are some of the Maximum allowed VOC Content for following activities, as per SCAQMD Rule 1171-9 (refer to SCAQMD manual for complete list and updates):
  - .1 Product cleaning during onsite surface preparation for coatings or adhesives application, and repair and maintenance cleaning:
    - .1 General maximum VOC 25g/L.
    - .2 Electrical apparatus components and electronic components.
    - .3 Cleaning of coatings or adhesives application equipment max. VOC 25g/L.
  - .2 Refer to SCAQMD for additional information and clarification and complete list of applications.
  - .3 Any discrepancies are to be approved by Departmental Representative. Obtain written approval prior to use on site.

#### 1.6 DELIVERY, STORAGE AND HANDLING

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

#### 1.7 ENVIRONMENTAL CONDITIONS

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



## 1.8 EXTRA MATERIAL

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

## 2 Products

### 2.1 PRODUCT SUBSTITUTIONS

- .1 Requests for use of product substitution (request for equals):
  - .1 Request shall be accompanied by duplicate samples as follows:
    - .1 Pattern: submit full size samples to indicate pattern only; colour of sample at contractor's discretion.
    - .2 Colour: submit 38 mm x 38 mm sample of each colour available within specified pattern. Samples to be actual pieces of flooring; photographic reproductions are not acceptable.
    - .3 Requests will not be entertained unless samples are submitted.
  - .2 Consideration will be based upon technical requirements, and pattern and colour availability.

### 2.2 TILE TOLERANCES

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

### 2.3 FLOOR TILE

- .1 CT-1: Porcelain body ceramic tile.
  - .1 Properties:
    - .1 Water absorption: <0.5%.
    - .2 Breaking strength: >35 N/mm<sup>2</sup>.
    - .3 Frost-proof.
    - .4 Stain Resistance: 5.
    - .5 Hardness (Mohs): >7.
    - .6 Coefficient of friction (ASTM C1028): Dry >0.83; Wet >0.61.
  - .2 Standard of acceptance: based upon Unicom Starker Maxxi Compact with Grip finish by Elegant flooring.
  - .3 Size: 300 mm x 600 mm x 10 mm.
  - .4 Colours: as selected by Departmental Representative to a maximum of four (4).
- .2 CT-6: porcelain mosaic.
  - .1 Properties:
    - .1 Water absorption: <0.5%.
    - .2 Frost-resistant.
    - .3 Hardness (Mohs): 8.
  - .2 Standard of acceptance: based upon Quebec Series by Olympia.
  - .3 Size: 300 mm x 300 mm sheet consisting of individual 50 mm x 50 mm x 6 mm tiles; aligned in straight grid; matte finish.
  - .4 Colour: as selected by Departmental Representative to a maximum of two (2).

## 2.4 WALL TILE

- .1 CT-2: Porcelain body ceramic tile.
  - .1 Properties:
    - .1 Water absorption: <0.5%.
    - .2 Breaking strength: >35 N/mm<sup>2</sup>.
    - .3 Frost-proof.
    - .4 Stain Resistance: 5.
    - .5 Hardness (Mohs): >7.
    - .6 Coefficient of friction (ASTM C1028): Dry >0.83; Wet >0.61.
  - .2 Standard of acceptance: based upon Unicom Starker Maxxi Compact with Lappato finish by Elegant flooring.
  - .3 Size: 300 mm x 600 mm x 10 mm.
  - .4 Colours: as selected by Departmental Representative to a maximum of four (4).
- .2 CT-3:
  - .1 Standard of acceptance: based upon Vitra Vision Series with glossy finish by Centura.
  - .2 Size: 100 mm x 300 mm.
  - .3 Colours: as selected by Departmental Representative to a maximum of two (2).
- .3 CT-4:
  - .1 Standard of acceptance: based upon Corten Series with semi-polished finish by Cera Gres.
  - .2 Size: 300 mm x 600 mm x 10 mm.
  - .3 Colours: as selected by Departmental Representative to a maximum of two (2).
- .4 CT-5: glass mosaic.
  - .1 Properties:
    - .1 Water absorption: <0.5%.
    - .2 Hardness (Mohs): 4.
  - .2 Standard of acceptance: based upon Color Wave by Elegant Flooring.
  - .3 Size: 300 mm x 300 mm sheet consisting of individual 25 mm x 150 mm x 8 mm tiles; tiles aligned in straight grid.
  - .4 Colours: four (4); Red Hot CW30 16MSIP and three additional colour as selected by Departmental Representative.

## 2.5 TACTILE WALKING SURFACE INDICATORS

- .1 Indicators: cast-in-place tiles; having in-line truncated dome pattern; thru colour; 610 mm x 1220 mm x 5 mm nominal thickness.
  - .1 Color: Federal Yellow.
- .2 Construction: matte finish, exterior grade homogeneous glass and carbon reinforced polyester based Sheet Molding Compound composite material. Reinforce truncated domes with fiberglass reinforcement.
- .3 Design:
  - .1 Domes: raised truncated domes of 5 mm nominal height, base diameter of 23 mm and top diameter of 12 mm; arranged in 60 mm square grid pattern.
  - .2 Field area: non-slip textured surface with a minimum static coefficient of friction of 0.80, wet and dry. At a minimum, CIP Tile thickness shall measure 0.20" (nominal).
  - .3 Internal embedment ribs at 75 mm on center maximum.
- .4 Protect surface factory installed plastic sheeting.

## 2.6 MORTAR MATERIALS

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

## 2.7 GROUT

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

## 2.8 ACCESSORIES

- .1 Sealant: non-sag, two-part urethane, to ASTM C920, Type M, Grade NS, Class 25.
  - .1 Colour: as selected by Departmental Representative.
- .2 Sealers: below-surface penetrating sealer type, breathable, not affected by solvent based strippers or cleaners.
  - .1 Tile sealer: use of sealer as recommended by tile manufacturer.
  - .2 Grout sealer: use of sealer as recommended by grout manufacturer.
- .3 Trim:
  - .1 Floor tile: extruded aluminum, satin anodized finish, wedge shaped, thickness to suit tile and adjacent flooring.
    - .1 Standard of acceptance: Reno-U (AE) Series by Schluter
  - .2 Wall tile:
    - .1 General: extruded aluminum, round edging, satin anodized finish.
      - .1 Standard of acceptance: Rondec (AE) Series by Schluter.
    - .2 Outside vertical corners in shower area: corner profile, brushed stainless steel.
      - .1 Standard of acceptance: ECK-E by Schluter.
    - .3 Cap at top of ceramic tile base: square edging, satin anodized finish.
      - .1 Standard of acceptance: Schiene (AE) by Schluter.
    - .4 Exposed ends of tile backsplash: square edging, satin anodized finish.
      - .1 Standard of acceptance: Schiene (AE) by Schluter.
  - .3 Control joint: PVC construction, resilient movement zones of colour to match grout colour.
    - .1 Standard of acceptance: Dilex Series by Schluter.

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

## 2.9 MIXES

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

## 2.10 PATCHING AND LEVELLING COMPOUND

- .1 Portland cement base, acrylic polymer compound, manufactured specifically for resurfacing and levelling concrete floors. Products containing gypsum are not acceptable.
- .2 Have not less than the following physical properties:
  - .1 Compressive strength - 25 MPa.
  - .2 Tensile strength - 7 MPa.
  - .3 Flexural strength - 7 MPa.
  - .4 Density - 1.9.
- .3 Capable of application in layers up to 50 mm thick, being brought to feather edge, and trowelled to smooth finish.
- .4 Ready for use in 48 hours after application.

## 2.11 CLEANING COMPOUNDS

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

## 3 Execution

### 3.1 WORKMANSHIP

- .1 Do tile work in accordance with TTMAC Tile Installation Manual, except where specified otherwise.
- .2 Apply tile to clean and sound surfaces.
- .3 Fit tile around corners, fitments, fixtures, drains and other built-in objects. Maintain uniform joint appearance. Cut edges smooth and even. Do not split tiles.
- .4 Maximum surface tolerance 1:800.
- .5 Make joints between tile uniform and approximately 3 mm wide, plumb, straight, true, even and flush with adjacent tile. Align patterns.
- .6 Lay out tiles so perimeter tiles are minimum 1/2 size.
- .7 Sound tiles after setting and replace hollow-sounding units to obtain full bond.
- .8 Make internal angles square; use metal trim at external angles.
- .9 Use metal trim at termination of wall tile panels, except where panel abuts projecting surface or differing plane.

- .10 Clean installed tile surfaces after installation and grouting cured.

### 3.2 TILE INSTALLATION

- .1 Start tiling only after permanent lighting is installed and operational. Install tiles with permanent lighting turned on, to ensure tile installation does not produce shadows.
- .2 Install tiles in accordance with TTMAC details.
  - .1 Walls - thinset method:
    - .1 Stud walls: 305W with waterproof membrane.
  - .2 Floors:
    - .1 Concrete slab: 311F with waterproof membrane.
- .3 Provide levelling coat over substrate as required to ensure lippage tolerance can be met.

### 3.3 TACTILE WALKING SURFACE INDICATORS INSTALLATION

- .1 Install in accordance with manufacturer's instructions.
- .2 Oriented rows of truncated domes parallel with direction of ramp.
- .3 Tamp or vibrate into fresh concrete to ensure no voids or air pockets exist. Maintain field level flush to adjacent concrete surface.
- .4 Remove protective plastic sheeting within 24 hours of installation.

### 3.4 CONTROL JOINTS

- .1 Provide control joints where indicated below. Keep building expansion joints free of mortar and grout.
  - .1 Provide control joints:
    - .1 Over similar joints in structure.
    - .2 At approximate 3000 mm spacing in large, unbroken floor areas.
    - .3 At changes in superficial areas in walls such as doors and windows.
    - .4 Where Departmental Representative deems necessary.
- .2 Use control joint trim for interior floors. Make wall tile joint width same as tile joints and fill with sealant. Keep building expansion joints free of mortar and grout.

### 3.5 TOLERANCES

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

### 3.6 FLOOR SEALER AND PROTECTIVE COATING

- .1 Apply in accordance with manufacturer's instructions.

END OF SECTION

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## 1 General

### 1.1 RELATED REQUIREMENTS

- .1 Section 09 22 26 - Suspension System For Gypsum Board Ceilings.
- .2 Section 09 84 13 - Acoustic Wall Panels.
- .3 Section 23 37 13 - Grilles, Registers and Diffusers.
- .4 Section 26 50 00 - Lighting.

### 1.2 REFERENCES

- .1 ASTM International (ASTM).
  - .1 ASTM C635/C635M-13a, Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustic Tile and Lay-in Panel Ceilings.
  - .2 ASTM E84-14, Standard Test Method for Surface Burning Characteristics of Building Materials.
  - .3 ASTM E413-10, Classification for Rating Sound Insulation.
  - .4 ASTM E1264-14, Standard Classification for Acoustical Ceiling Products.
- .2 Underwriter's Laboratories of Canada (ULC)
  - .1 CAN/ULC-S102-10, Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

### 1.3 DESIGN CRITERIA

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

### 1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 10 01 - General Requirements.
- .2 Product Data:
  - .1 Submit manufacturer's instructions, printed product literature and data sheets for ceiling panels and ceiling suspension system and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Samples:
  - .1 Submit duplicate 100 mm x 100 mm samples of standard colours. Samples to be actual pieces of coloured panels.
  - .2 If requested, submit one representative model of each type of suspension system for approval before installation.

### 1.5 SUSTAINABLE DESIGN SUBMITTALS

- .1 Construction waste management plan.
  - .1 A Construction Waste Management Plan is in place to divert waste material from landfill. Wherever practical, send waste material for reuse or recycling, and generally document this for the contractor's waste management final report.
- .2 Recycled Content.
  - .1 Refer to Section 01 47 15 - Sustainable Requirements for "List of Products Requiring Recycled Content".

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- .2 If products within this section are indicated on the “List of Products Requiring Recycled Content”, only products with recycled content will be acceptable.
- .3 For products not identified on list, source products with highest recycled content available when practical.
- .4 Include following information with product data submission.
  - .1 Percentage of pre-consumer and post-consumer recycled content for each product.
- .3 Regional Materials.
  - .1 Refer to Section 01 47 15 - Sustainable Requirements for “List of Products Required to be Locally Sourced”.
  - .2 If products within this section are indicated on the “List of Products Required to be Locally Sourced”, include following information with Product Data submission:
    - .1 Extraction/Manufacturing location(s): Indicate location of extraction site or manufacturing plant, and indicate distance between extraction site or manufacturing plant and Project site.
- .4 If requesting substitute product, ensure proposed substitution achieves above stated goals.

#### 1.6 MAX. VOC CONTENT FOR SOLVENT CLEANING ACTIVITIES

- .1 Following are some of the Maximum allowed VOC Content for following activities, as per SCAQMD Rule 1171-9 (refer to SCAQMD manual for complete list and updates):
  - .1 Product cleaning during onsite surface preparation for coatings or adhesives application, and repair and maintenance cleaning:
    - .1 General maximum VOC 25g/L.
    - .2 Electrical apparatus components and electronic components.
    - .3 Cleaning of coatings or adhesives application equipment max. VOC 25g/L.
  - .2 Refer to SCAQMD for additional information and clarification and complete list of applications.
  - .3 Any discrepancies are to be approved by Departmental Representative. Obtain written approval prior to use on site.

#### 1.7 DELIVERY, STORAGE AND HANDLING

- .1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Handle materials to prevent damage to edges or surfaces. Protect metal accessories and trim from being bent or damaged.
- .3 Store and protect from nicks, scratches, and blemishes.
- .4 Replace defective/damaged materials with new.

#### 1.8 JOB CONDITIONS

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

#### 1.9 MAINTENANCE MATERIALS

- .1 Submit maintenance materials in accordance with Section 01 10 01 - General Requirements.

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- .2 Deliver acoustical units amounting to 2% of gross ceiling area for each pattern and type required for this project.
- .3 Materials to be same production run as installed material. Clearly identify each type of acoustic unit, including colour and texture.
- .4 Store extra materials where directed by Departmental Representative.

## 2 Products

### 2.1 PANELS

- .1 Acoustic ceiling panel - ACP-1 and ACP-6:
  - .1 ASTM E1264 Classification: Type IV, Form 2, Pattern E.
  - .2 Construction: mineral base.
  - .3 Pattern: lightly textured.
  - .4 Flame spread rating: 25 or less in accordance with CAN/ULC-S102.
  - .5 Smoke developed: 50 or less in accordance with CAN/ULC-S102.
  - .6 Noise reduction coefficient (NRC): 0.70.
  - .7 Ceiling Attenuation Class (CAC) rating: 35 in accordance with ASTM E1264
  - .8 Light reflectance range: 0.89.
  - .9 Edge type: square.
  - .10 Colour: white.
  - .11 Size:
    - .1 ACP-1: 610 mm x 1220 mm x 19 mm thick.
    - .2 ACP-6: 610 mm x 610 mm x 19 mm thick.
  - .12 Shape: flat.
  - .13 Surface coverings: low VOC paint.
  - .14 Recycled content: 76%.
  - .15 Antimicrobial treated to protect against growth of mold, mildew and bacteria.
  - .16 Suspension system: panel to lay in 23.8 mm exposed grid.
- .2 High NRC panels - ACP-2:
  - .1 ASTM E1264 Classification: Type IV, Form 2, Pattern E.
  - .2 Construction: mineral base.
  - .3 Pattern: lightly textured (to match ACP-1 and ACP-6).
  - .4 Flame spread rating: 25 or less in accordance with CAN/ULC-S102.
  - .5 Smoke developed: 50 or less in accordance with CAN/ULC-S102.
  - .6 Noise reduction coefficient (NRC): 0.80.
  - .7 Ceiling Attenuation Class (CAC) rating: 35 in accordance with ASTM E1264
  - .8 Light reflectance range: 0.89.
  - .9 Edge type: square.
  - .10 Colour: white.
  - .11 Size: 610 mm x 1220 mm x 22 mm thick.
  - .12 Shape: flat.
  - .13 Surface coverings: low VOC paint.
  - .14 Recycled content: 65%.
  - .15 Antimicrobial treated to protect against growth of mold, mildew and bacteria.
  - .16 Suspension system: panel to lay in 23.8 mm exposed grid.
- .3 Abuse-resistant panels - ACP-3:
  - .1 ASTM E1264 Classification: Type III, Form 2, Pattern CE.
  - .2 Construction: mineral fibre.
  - .3 Pattern: lightly textured, perforated.
  - .4 Flame spread rating: 25 or less in accordance with CAN/ULC-S102.



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- .5 Smoke developed: 50 or less in accordance with CAN/ULC-S102.
- .6 Noise reduction coefficient (NRC): 0.55.
- .7 Ceiling Attenuation Class (CAC) rating: 35 in accordance with ASTM E1264
- .8 Light reflectance range: 0.86.
- .9 Edge type: square.
- .10 Colour: white.
- .11 Size: 610 mm x 1220 mm x 16 mm thick.
- .12 Shape: flat.
- .13 Surface coverings: low VOC paint.
- .14 Recycled content: 49%.
- .15 Antimicrobial treated to protect against growth of mold, mildew and bacteria.
- .16 Suspension system: panel to lay in 23.8 mm exposed grid.
- .4 High CAC panels - ACP-4 and ACP-5:
  - .1 Construction: 12.7 mm gypsum board with 25.4 mm thick 6-7 pcf fiberglass absorber in extruded aluminum frame.
    - .1 Where panels require field cutting, supply units without aluminum frame while matching all standard panels.
  - .2 Fire test data: Class A when tested in accordance with ASTM E84.
  - .3 Noise reduction coefficient (NRC): 0.80.
  - .4 Ceiling Attenuation Class (CAC) rating: 53 in accordance with ASTM E413.
  - .5 Edge type: Square reveal
  - .6 Size: 610 mm x 1220 mm x 45 mm thick, with a 13 mm reveal.
  - .7 Surface covering:
    - .1 100% Polyester fabric, FR701 Style 2100 by Guilford of Maine.
    - .2 Stretch fabric over frame with no visible sagging, wrinkles, or imperfections.
    - .3 Colour as selected by Departmental Representative from fabric manufacturer's standard colours.
  - .8 Suspension system:
    - .1 ACP-4: panel to lay in 23.8 mm exposed grid.
    - .2 ACP-5: panel adhered to substrate.
  - .9 Standard of acceptance:
    - .1 Embassy Ceiling Panels by Kinetics Noise Control.
- .5 Acoustical insulation: glass fibre, roll insulation; acoustically rated.

## 2.2 SUSPENSION SYSTEM

- .1 Suspension system: to ASTM C635/C635M; 23.8 mm exposed grid system, heavy duty main tee, intermediate cross tee; fabricated from hot-dipped galvanized steel.
  - .1 Minimum recycled content: 64%.
- .2 Finish: baked polyester or powder coated; flat white to match acoustic panels.
- .3 Accessories: provide suspension system complete with following accessories.
  - .1 Wall moulding: shadow moulding; overall size 50 mm wide x 30 mm high with 19 mm wide x 7 mm high reveal.
  - .2 Hanger wire: 2.6 mm diameter, galvanized soft annealed steel wire.
  - .3 Other accessories as required for complete system.

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### 3 Execution

#### 3.1 SUSPENSION SYSTEM INSTALLATION

- .1 Erect ceiling suspension system after items such as anchors, blocking, sound and fire barriers, electrical and mechanical work above ceiling have been reviewed by Departmental Representative.
- .2 Lay out system according to reflected ceiling plan.
- .3 Ensure suspension system is coordinated with location of related components.
- .4 Install wall mouldings to provide correct ceiling height. Finished ceiling system to be level within 1:1200. Use shadow type wall mouldings unless noted otherwise.
- .5 Support suspension system main tees at 1220 mm o.c. maximum with hanger wire from building structural system. Complete assembly shall support superimposed loads, such as lighting fixtures, diffusers and grilles.
  - .1 Assembly for High CAC panel shall support weight of up to 17 kg/m<sup>2</sup>.
- .6 Support light fixtures and diffusers with supplemental hangers as follows:
  - .1 Standard 610 mm x 1220 mm fluorescent light fixtures and mechanical and electrical fixtures weighing more than 11.4 kg: within 150 mm of each corner of light fixture.
  - .2 Smaller fixtures: no supplemental hangers required.
- .7 Interlock cross member to main tee to provide rigid assembly.
- .8 Install suspension assembly in accordance with manufacturer's instructions.
- .9 Frame at openings for light fixtures and air diffusers.

#### 3.2 PANEL INSTALLATION

- .1 Install panels where shown on drawings under conditions outlined in current bulletin of the Canadian Acoustical and Insulating Materials Association.
  - .1 Install High CAC panels in ceilings requiring CAC 53.
- .2 Neatly cut and fit around items such as sprinkler heads, lighting fixtures, access panels and mechanical equipment.
- .3 Lay acoustic insulation over ceilings indicated.

#### 3.3 ADJUSTING

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

#### 3.4 CLEANUP

- .1 Clean visible metal parts of suspension system. Touch up scratches, abrasions, voids and other defects in painted surfaces.

END OF SECTION

## 1 General

### 1.1 RELATED SECTIONS

- .1 09 65 19 - Resilient Tile Flooring: resilient base.

### 1.2 REFERENCES

- .1 ASTM International (ASTM).
  - .1 ASTM C1028-07, Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method.
  - .2 ASTM D412-06a(2013), Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension.
  - .3 ASTM D2047-11, Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine.
  - .4 ASTM D2240-05(2010), Test Method for Rubber Property - Durometer Hardness.
  - .5 ASTM D3389-10, Standard Test Method for Coated Fabrics Abrasion Resistance (Rotary Platform Abrader).
  - .6 ASTM E648-14, Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.
  - .7 ASTM E662-13, Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.
  - .8 ASTM F386-11, Standard Test Method for Thickness of Resilient Flooring Materials Having Flat Surfaces.
  - .9 ASTM F410-08(2013), Standard Test Method for Wear Layer Thickness of Resilient Floor Coverings by Optical Measurement.
  - .10 ASTM F510/F510M-14, Standard Test Method for Resistance to Abrasion of Resilient Floor Coverings Using an Abrader with a Grit Feed Method.
  - .11 ASTM F925-13, Standard Test Method for Resistance to Chemicals of Resilient Flooring.
  - .12 ASTM F970-07(2011), Standard Test Method for Static Load Limit.
  - .13 ASTM F1303-04(2014), Standard Specification for Sheet Vinyl Floor Covering with Backing.
  - .14 ASTM F1514- 03(2013), Standard Test Method for Measuring Heat Stability of Resilient Flooring by Color Change.
  - .15 ASTM F1515-03(2008), Standard Test Method for Measuring Light Stability of Resilient Flooring by Color Change.
  - .16 ASTM F1859-12, Standard Specification for Rubber Sheet Floor Covering Without Backing.
  - .17 ASTM F1914-07(2011), Standard Test Methods for Short-Term Indentation and Residual Indentation of Resilient Floor Covering.
  - .18 ASTM G21-13, Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.
  - .19 ASTM F2034-08(2013), Specification for Sheet Linoleum Floor Covering.
- .2 Canadian Standards Association (CSA).
  - .1 CSA O151-09, Canadian Softwood Plywood.

### 1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 10 01 - General Requirements.
- .2 Samples:
  - .1 Submit duplicate 50 mm x 50 mm size samples of full range of colours.
  - .2 Samples submitted for colour selection shall be actual pieces of products. Photo representations will not be acceptable.
  - .3
- .3 Closeout submittals:
  - .1 Provide maintenance data for resilient flooring for incorporation into maintenance manual.

### 1.4 SUSTAINABLE DESIGN SUBMITTALS

- .1 Construction waste management plan.
  - .1 A Construction Waste Management Plan is in place to divert waste material from landfill. Wherever practical, send waste material for reuse or recycling, and generally document this for the contractor's waste management final report.
- .2 Recycled Content.
  - .1 Refer to Section 01 47 15 - Sustainable Requirements for "List of Products Requiring Recycled Content".
  - .2 If products within this section are indicated on the "List of Products Requiring Recycled Content", only products with recycled content will be acceptable.
  - .3 For products not identified on list, source products with highest recycled content available when practical.
  - .4 Include following information with product data submission.
    - .1 Percentage of pre-consumer and post-consumer recycled content for each product.
- .3 Regional Materials.
  - .1 Refer to Section 01 47 15 - Sustainable Requirements for "List of Products Required to be Locally Sourced".
  - .2 If products within this section are indicated on the "List of Products Required to be Locally Sourced", include following information with Product Data submission:
    - .1 Extraction/Manufacturing location(s): Indicate location of extraction site or manufacturing plant, and indicate distance between extraction site or manufacturing plant and Project site.
- .4 Adhesives and Sealants.
  - .1 Include following information with Product Data submission for materials specified under this section:
    - .1 Submit manufacturer's certification indicating VOC limits of Products used onsite and within the building envelope. Product shall comply with California's SCAQMD #1168.
- .5 Flooring Systems.
  - .1 Hard Surface Flooring (including resilient base): Submit manufacturer's certification indicating that Product is listed and approved under FloorScore certification program.
- .6 If requesting substitute product, ensure proposed substitution achieves above stated goals.

## 1.5 MAX. VOC CONTENT FOR SOLVENT CLEANING ACTIVITIES

- .1 Following are some of the Maximum allowed VOC Content for following activities, as per SCAQMD Rule 1171-9 (refer to SCAQMD manual for complete list and updates):
  - .1 Product cleaning during onsite surface preparation for coatings or adhesives application, and repair and maintenance cleaning:
    - .1 General maximum VOC 25g/L.
    - .2 Electrical apparatus components and electronic components.
    - .3 Cleaning of coatings or adhesives application equipment max. VOC 25g/L.
  - .2 Refer to SCAQMD for additional information and clarification and complete list of applications.
  - .3 Any discrepancies are to be approved by Departmental Representative. Obtain written approval prior to use on site.

## 1.6 ENVIRONMENTAL REQUIREMENTS

- .1 Air temperature and structural base temperature at flooring installation area shall be above 20°C for 48 hours before, during and 48 hours after installation.

## 1.7 EXTRA MATERIALS

- .1 Provide extra materials of resilient sheet flooring and adhesives in accordance with Section 01 10 01 - General Requirements .
- .2 Provide additional 2% of each colour, pattern and type flooring material required for this project for maintenance use. Size: full width x 3 m long.
- .3 Extra materials to be from same production run as installed materials.
- .4 Clearly identify each container of floor tile and each container of adhesive.
- .5 Deliver to Departmental Representative, upon completion of the work of this section.
- .6 Store where directed by Departmental Representative.

## 2 Products

### 2.1 RUBBER FLOORING

- .1 Sport Flooring
  - .1 Construction: Calendered and vulcanized natural and synthetic rubber. Embossed, nonporous, anti-glare surface layer vulcanized to load bearing backing.
  - .2 Thickness: 10 mm overall.
  - .3 Standard of acceptance: Sport Impact 10 mm by Mondo.
  - .4 Colour: as selected by Departmental Representative; only one (1) colour will be used.

### 2.2 VINYL FLOORING

- .1 Sheet vinyl - Type 1: to ASTM F1913; homogeneous, calendered and pressed; semi-directional design, colour and pattern throughout.
  - .1 Properties:
    - .1 Wear layer thickness (ASTM F410): 2.0 mm.
    - .2 Total thickness (ASTM F386): 2.0 mm.
    - .3 Weight: 3120 g/m<sup>2</sup>.

- .4 Width: 2000 mm.
- .5 Surface treatment: treated to increase durability, toughness and wear resistance.
- .6 Anti-bacterial and fungicidal treated.
- .7 Recyclable.
- .2 Performance requirements:
  - .1 Abrasion (ASTM F510/F510M): 3.5 mg.
  - .2 Coefficient of friction (ASTM C1028): 0.67.
  - .3 Static load @ 250 psi (ASTM F970): 0.05 mm.
  - .4 Indentation - Residual (ASTM F1914): 0.05 mm.
  - .5 Fire rating: Class 1.
- .3 Colour: as selected by Departmental Representative to a maximum of two (2).
- .4 Standard of acceptance: Mipolam Cosmo by Gerflor.
- .2 Sheet vinyl - Type 2: to ASTM F1303; multi-layered, calendered and pressed; semi-directional design, colour and pattern throughout.
  - .1 Properties:
    - .1 Wear layer thickness (ASTM F410): 0.97 mm.
    - .2 Total thickness (ASTM F386): 2.0 mm.
    - .3 Weight: 2680 g/m<sup>2</sup>.
    - .4 Width: 2000 mm.
    - .5 Surface treatment: treated to increase durability, toughness and wear resistance.
    - .6 Anti-bacterial and fungicidal treated.
    - .7 Recyclable.
  - .2 Performance requirements:
    - .1 Slip resistance: R10.
    - .2 Indentation - Residual: 0.03 mm.
    - .3 Fire rating: Class 1.
  - .3 Colour: as selected by Departmental Representative to a maximum of two (2).
  - .4 Standard of acceptance: Taralay Premium Compact Indiana by Gerflor.
- .3 Slip-resistant sheet vinyl: 2.0 mm thick PVC, aluminum oxide and coloured quartz throughout thickness, silicon carbide grains on the surface, integral bacteriostat.
  - .1 Standard of acceptance: Altro Walkway 20 by Altro Floors, Tarasafe Standard b7 Gerflor.
  - .2 Seaming: Welding rods. Colour as selected by Departmental Representative.
  - .3 Colour: as selected by Departmental Representative to a maximum of two (2).

### 2.3 ACCESSORIES

- .1 Primers and adhesives: low VOC, type as recommended by resilient flooring manufacturer for specific material on applicable substrate, above, on or below grade.
- .2 Sub-floor filler and leveller: cementitious type as recommended by flooring manufacturer for use with their product.
- .3 Welding rod: type as recommended by flooring manufacturer; of colour selected by Departmental Representative.
- .4 Transition strips: vinyl reducer strips; wedge shaped, of thickness to suit.
  - .1 Colour: as selected by Departmental Representative to a maximum of eight (8).
- .5 Dressing: sealer, wax, polish, etc. of type recommended by flooring material manufacturer for flooring type and location. Use Low-VOC type.

### 3 Execution

#### 3.1 INSPECTION

- .1 Ensure floor surfaces are smooth and flat to plus or minus 1:1000.
- .2 Have resilient floor representative test concrete floor using test methods recommended by the flooring manufacturer to ensure they are dry and exhibit negative alkalinity, carbonization or dusting.
- .3 Test concrete subfloors approximately one month prior to installation of resilient floor.

#### 3.2 SUB-FLOOR TREATMENT

- .1 Remove subfloor ridges and bumps.
- .2 Fill low spots, cracks, joints, holes and other defects with subfloor filler; trowel and float to leave smooth, flat, hard surfaces. Prohibit traffic until subfloor filler is cured.
- .3 Prime/seal in accordance with flooring manufacturer's printed instructions.

#### 3.3 APPLICATION

- .1 Install in accordance with manufacturer's current installation guide.
- .2 Apply adhesive uniformly in accordance with manufacturer's instructions. Do not spread more adhesive than can be covered before initial set takes place.
- .3 Lay flooring to produce a minimum number of seams. Border widths minimum one-third width of full material.
- .4 Run sheets parallel to length of room.
- .5 As installation progresses, roll flooring with 45 kg roller to ensure full adhesion. Use hand roller in areas not accessible with large roller.
- .6 Cut flooring and fit neatly around fixed or excessively heavy objects.
- .7 Terminate flooring at centreline of door in openings where adjacent floor finish or colour is dissimilar.
- .8 Install transition strips at unprotected or exposed edges where flooring terminates.
- .9 Heat weld seams with welding rod in accordance with manufacturer's printed instructions.

#### 3.4 CLEANING, MAINTENANCE AND PROTECTION

- .1 Initial maintenance:
  - .1 Clean flooring, seal and apply minimum two coats of dressing in accordance with flooring manufacturer's instruction.
- .2 Preparation for traffic:
  - .1 Prior to substantial completion; clean flooring and apply a minimum of three coats of dressing in accordance with flooring manufacturer's instructions.
- .3 Protect installed flooring as recommended by flooring manufacturer.

END OF SECTION

## 1 General

### 1.1 RELATED SECTIONS

- .1 Section 09 65 16 - Resilient Sheet Flooring.
- .2 Section 09 67 70 - Specialty Epoxy Coatings.

### 1.2 REFERENCES

- .1 American Society for Testing and Materials (ASTM)
  - .1 ASTM F970-07(2011), Standard Test Method for Static Load Limit.
  - .2 ASTM F1861-08(2012)e1, Standard Specification for Resilient Wall Base.
  - .3 ASTM F1914-07(2011), Standard Test Methods for Short-Term Indentation and Residual Indentation of Resilient Floor Covering.
  - .4 ASTM F2982-13, Standard Specification for Polyester Composition Floor Tile.
- .2 Underwriters Laboratories of Canada (ULC).
  - .1 CAN/ULC-S102.2-10, Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Covering and Miscellaneous Materials and Assemblies.

### 1.3 SUBMITTALS

- .1 Submit in accordance with Section 01 10 01 - General Requirements.
- .2 Samples:
  - .1 Submit duplicate tile in size specified; 300 mm long base.
- .3 Closeout submittals:
  - .1 Provide maintenance data for resilient flooring for incorporation into maintenance manual.

### 1.4 SUSTAINABLE DESIGN SUBMITTALS

- .1 Construction waste management plan.
  - .1 A Construction Waste Management Plan is in place to divert waste material from landfill. Wherever practical, send waste material for reuse or recycling, and generally document this for the contractor's waste management final report.
- .2 Recycled Content.
  - .1 Refer to Section 01 47 15 - Sustainable Requirements for "List of Products Requiring Recycled Content".
  - .2 If products within this section are indicated on the "List of Products Requiring Recycled Content", only products with recycled content will be acceptable.
  - .3 For products not identified on list, source products with highest recycled content available when practical.
  - .4 Include following information with product data submission.
    - .1 Percentage of pre-consumer and post-consumer recycled content for each product.
- .3 Regional Materials.
  - .1 Refer to Section 01 47 15 - Sustainable Requirements for "List of Products Required to be Locally Sourced".



- .2 If products within this section are indicated on the “List of Products Required to be Locally Sourced”, include following information with Product Data submission:
  - .1 Extraction/Manufacturing location(s): Indicate location of extraction site or manufacturing plant, and indicate distance between extraction site or manufacturing plant and Project site.
- .4 Adhesives and Sealants.
  - .1 Include following information with Product Data submission for materials specified under this section:
    - .1 Submit manufacturer’s certification indicating VOC limits of Products used onsite and within the building envelope. Product shall comply with California’s SCAQMD #1168.
- .5 Flooring Systems.
  - .1 Hard Surface Flooring (including resilient base): Submit manufacturer’s certification indicating that Product is listed and approved under FloorScore certification program.
- .6 If requesting substitute product, ensure proposed substitution achieves above stated goals.

#### 1.5 MAX. VOC CONTENT FOR SOLVENT CLEANING ACTIVITIES

- .1 Following are some of the Maximum allowed VOC Content for following activities, as per SCAQMD Rule 1171-9 (refer to SCAQMD manual for complete list and updates):
  - .1 Product cleaning during onsite surface preparation for coatings or adhesives application, and repair and maintenance cleaning:
    - .1 General maximum VOC 25g/L.
    - .2 Electrical apparatus components and electronic components.
    - .3 Cleaning of coatings or adhesives application equipment max. VOC 25g/L.
  - .2 Refer to SCAQMD for additional information and clarification and complete list of applications.
  - .3 Any discrepancies are to be approved by Departmental Representative. Obtain written approval prior to use on site.

#### 1.6 EXTRA MATERIALS

- .1 Provide maintenance materials of resilient tile flooring, base and adhesive in accordance with Section 01 10 01 - General Requirements.
- .2 Provide additional 2% of each colour, pattern and type flooring material required for this project for maintenance use.
- .3 Extra materials to be from same production run as installed materials.
- .4 Clearly identify each container of floor tile and each container of adhesive.
- .5 Deliver to Departmental Representative, upon completion of the work of this section.
- .6 Store where directed by Departmental Representative.

## 2 Products

### 2.1 PRODUCT SUBSTITUTIONS

- .1 Requests for use of product substitution (request for equals):
  - .1 Requests shall be accompanied by duplicate samples as follows:
    - .1 Pattern: submit full size samples to indicate pattern only; colour of sample at contractor's discretion.
    - .2 Colour: submit 38 mm x 38 mm sample of each colour available within specified pattern. Samples to be actual pieces of flooring; photographic reproductions are not acceptable.
    - .3 Requests will not be entertained unless samples are submitted.
  - .2 Consideration will be based upon technical requirements, and pattern and colour availability.

### 2.2 FLOORING AND BASE

- .1 PVC-Free tile: to ASTM F2982.
  - .1 Linear pattern: through pattern and colour.
    - .1 Size: 305 mm x 610 mm x 3.2 mm size.
    - .2 Standard of acceptance: Striations by Armstrong.
  - .2 Performance data:
    - .1 Indentation @ 10 minutes (ASTM F1914): < 0.38 mm.
    - .2 Static load limit @250 lbs (ASTM F970): < 0.127 mm.
    - .3 Fire performance (CAN/ULC-S102.2):
      - .1 Flame spread: 0.
      - .2 Smoke Developed: 25.
  - .3 Colours: as selected by Departmental Representative, to a maximum of four (4).
- .2 Resilient base: to ASTM F1861, rubber, minimum 1200 mm length and 100 mm high, including premoulded corners and end stops.
  - .1 Profiles:
    - .1 Carpet: wedge sloped profile with 6 mm notch to receive carpet.
      - .1 Standard of acceptance: TightLock Carpet by Johnsonite.
    - .2 Hard flooring: standard cove profile, 3 mm thick.
  - .2 Colours: as selected by Departmental Representative; to a maximum of three (3).

### 2.3 ACCESSORIES

- .1 Primers and adhesives: unless specified otherwise, use waterproof, low-VOC type, as recommended by flooring manufacturer for specific material on applicable substrate, above, at or below grade.
- .2 Sub-floor filler and leveller: white premix latex requiring water only to produce cementitious paste as recommended by flooring manufacturer for use with their product.
- .3 Metal edge strips: aluminum extruded, smooth, mill finish polished with lip to extend under floor finish, shoulder flush with top of adjacent floor finish.
- .4 Sealer: Low-VOC type recommended by flooring manufacturer.
- .5 Dressing: sealer, wax, polish, etc. of type recommended by flooring material manufacturer for material type and location. Use Low-VOC type.

### 3 Execution

#### 3.1 INSPECTION

- .1 Ensure floor surfaces are smooth and flat to plus or minus 1:1000.
- .2 Have resilient floor representative test concrete floor using test methods recommended by the flooring manufacturer to ensure they are dry and exhibit negative alkalinity, carbonization or dusting.
- .3 Test concrete subfloors approximately one month prior to installation of resilient floor.

#### 3.2 SUB-FLOOR TREATMENT

- .1 Remove sub-floor ridges and bumps.
- .2 Fill low spots, cracks, joints, holes and other defects with sub-floor filler. Trowel and float to leave smooth, flat, hard surfaces. Prohibit traffic until subfloor filler is cured.
- .3 Treat control joints in accordance with manufacturer's instructions.
- .4 Prime/seal in accordance with flooring manufacturer's printed instructions.

#### 3.3 TILE APPLICATION

- .1 Apply adhesive uniformly using recommended trowel in accordance with flooring manufacturer's instructions. Do not spread more adhesive than can be covered by flooring before initial set takes place.
- .2 Lay flooring with joints parallel to building lines to produce symmetrical tile pattern. Border tiles minimum half tile width. Distribute variations in shade or pattern to obtain a uniform effect. Abrupt variations will not be permitted.
- .3 Install flooring to square grid pattern with all joints aligned, with pattern grain alternating to produce basket weave pattern.
- .4 Work from off tile whenever possible. When necessary to work on the tile, avoid shifting by using kneeling boards and by cutting tile to butt tightly at wall junctions.
- .5 As installation progresses, roll flooring in 2 directions with 45 kg minimum roller to ensure full adhesion.
- .6 Cut tile and fit neatly around fixed objects.
- .7 Terminate flooring at centerline of door in openings where adjacent floor finish or colour is dissimilar.
- .8 Install metal edge strips at unprotected or exposed edges where flooring terminates.

#### 3.4 BASE APPLICATION

- .1 Lay out base to keep number of joints at minimum. Base joints at maximum length available or at internal or premoulded corners.
- .2 Clean substrate and prime with one coat of adhesive.
- .3 Apply adhesive to back of base.
- .4 Set base against wall and floor surfaces tightly by using 3 kg hand roller.
- .5 Install straight and level to variation of 1:1000.

.6 Scribe and fit to door frames and other obstructions. Use premoulded end pieces at flush door frames.

.7 Cope internal corners. Use premoulded corner units for right angle external corners.

### 3.5 MAINTENANCE

.1 Initial maintenance:

.1 Clean flooring, seal and apply minimum two coats of dressing in accordance with flooring manufacturer's instruction.

.2 Preparation for traffic:

.1 Prior to substantial completion; clean flooring and apply a minimum of three coats of dressing in accordance with flooring manufacturer's instructions.

.3 Clean, seal and wax base surfaces in accordance with flooring manufacturer's instructions. In carpeted areas clean, seal and wax base surface before carpet installation.

### 3.6 PROTECTION OF FINISHED WORK

.1 Prohibit traffic on floor for 48 hours after installation.

END OF SECTION

## 1 General

### 1.1 RELATED SECTIONS

- .1 Section 09 91 23 - Painting.

### 1.2 REFERENCES

- .1 ASTM International (ASTM).
  - .1 ASTM C1028-07e1, Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method.
  - .2 ASTM D570-98(2010)e1, Standard Test Method for Water Absorption of Plastics.
  - .3 ASTM D638-10, Standard Test Method for Tensile Properties of Plastics.
  - .4 ASTM D4060-10, Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser.
  - .5 ASTM D4541-09e1, Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.
  - .6 ASTM D5628-10, Standard Test Method for Impact Resistance of Flat, Rigid Plastic Specimens by Means of a Falling Dart (Tup or Falling Mass).
  - .7 ASTM E96/E96M-13, Standard Test Methods for Water Vapor Transmission of Materials.
  - .8 ASTM G152-13, Standard Practice for Operating Open Flame Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials.
- .2 Canadian General Standards Board (CGSB).
  - .1 CGSB 1-GP-71, Methods of Testing Paints and Pigments (Issue of August 1974 reprinted, incorporating amendments 1 to 12 and Supplement 1).
- .3 Underwriters Laboratories of Canada (ULC).
  - .1 CAN/ULC-S102-10, Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

### 1.3 SUBMITTALS

- .1 Submit in accordance with Section 01 10 01 - General Requirements.
- .2 Product data:
  - .1 Submit manufacturer's technical data, installation instructions, and general recommendations.
- .3 Samples:
  - .1 Label samples with project name and number, applicator, names of material and manufacturer, area where material will be applied, date of sample, colour, gloss, texture.
  - .2 Floor texture verification samples:
    - .1 Submit duplicate 300 mm x 300 mm samples, on rigid backing, indicating three (3) different floor coating textures, for selection by Departmental Representative.
    - .2 If no textures are found be acceptable to Departmental Representative, submit an additional samples until approved texture is obtained.
  - .3 Colour samples:
    - .1 Submit duplicate 300 mm x 300 mm samples, on rigid backing, of each colour and texture combination for floor and wall/ceiling coating.

- .4 Approved colour and texture samples shall become the standard of quality for colour and finish for this project.
- .4 Provide maintenance data for incorporation into manual specified in Section 01 10 01 - General Requirements.

#### 1.4 SUSTAINABLE DESIGN SUBMITTALS

- .1 Construction waste management plan.
  - .1 A Construction Waste Management Plan is in place to divert waste material from landfill. Wherever practical, send waste material for reuse or recycling, and generally document this for the contractor's waste management final report.
- .2 Recycled Content.
  - .1 Refer to Section 01 47 15 - Sustainable Requirements for "List of Products Requiring Recycled Content".
  - .2 If products within this section are indicated on the "List of Products Requiring Recycled Content", only products with recycled content will be acceptable.
  - .3 For products not identified on list, source products with highest recycled content available when practical.
  - .4 Include following information with product data submission.
    - .1 Percentage of pre-consumer and post-consumer recycled content for each product.
- .3 Regional Materials.
  - .1 Refer to Section 01 47 15 - Sustainable Requirements for "List of Products Required to be Locally Sourced".
  - .2 If products within this section are indicated on the "List of Products Required to be Locally Sourced", include following information with Product Data submission:
    - .1 Extraction/Manufacturing location(s): Indicate location of extraction site or manufacturing plant, and indicate distance between extraction site or manufacturing plant and Project site.
- .4 Adhesives and Sealants.
  - .1 Include following information with Product Data submission for materials specified under this section:
    - .1 Submit manufacturer's certification indicating VOC limits of Products used onsite and within the building envelope. Product shall comply with California's SCAQMD #1168.

#### 1.5 QUALITY ASSURANCE

- .1 Installation shall be done only by certified applicators. Submit written verification from manufacturer indicating certification of applicator.
- .2 Manufacturer's representative.
  - .1 Manufacturer's representative shall attend trade start-up meeting and be present for construction of mock-ups.
  - .2 Have manufacturer's representative inspect site before, during, and after installation.
  - .3 Manufacturer's representative shall provide written report regarding findings, indicating acceptance or recommending changes.

- .3 Flooring tradesman.
  - .1 Each flooring tradesman working on this project shall have undergone training specific to the installation of the product being installed and shall have a minimum five (5) years of experience in installation of epoxy coatings.
- .4 Mock-ups:
  - .1 Construct mock-up for each floor coating and wall/ceiling coating.
  - .2 Departmental Representative will select minimum 10m<sup>2</sup> area for each mock-up.
  - .3 Apply coatings to mock-up area in accordance with specifications and manufacturer's instructions using products and procedures that will be used for actual operations, and to Departmental Representative's approval.
  - .4 Approved mock-ups will remain as part of Work.
  - .5 Have manufacturer's technical representative present during application of materials in mock-up.
  - .6 No further coating application shall take place until, full approval of mock-ups is received from Departmental Representative.
  - .7 Mock-ups will be the standard used throughout project. Work which does not comply with mock-ups will be rejected. Bring rejected work up to standard of mock-up room at no increase in contract price.
  - .8 Departmental Representative's decision as to compliance with mock-ups shall be final.

#### 1.6 PRE-INSTALLATION MEETING

- .1 Hold a pre-installation meeting before starting work of this section.
- .2 Flooring subcontractor, manufacturer's technical representative, general contractor and Departmental Representative shall be present.
- .3 Ensure the following items are present.
  - .1 Specifications.
  - .2 Finish schedule.
  - .3 Colour schedule.
  - .4 Product data sheets.
  - .5 Material safety data sheets (MSDS).
- .4 Review specification for work and determine complete understanding of requirements and responsibilities relative to work included, storage and handling of materials, materials to be used, installation of materials, sequence and quality control, Project staffing, restrictions on areas of flooring installation and other matters affecting construction, to permit compliance with intent of this section.

#### 1.7 MAX. VOC CONTENT FOR SOLVENT CLEANING ACTIVITIES

- .1 Following are some of the Maximum allowed VOC Content for following activities, as per SCAQMD Rule 1171-9 (refer to SCAQMD manual for complete list and updates):
  - .1 Product cleaning during onsite surface preparation for coatings or adhesives application, and repair and maintenance cleaning:
    - .1 General maximum VOC 25g/L.
    - .2 Electrical apparatus components and electronic components.
    - .3 Cleaning of coatings or adhesives application equipment max. VOC 25g/L.
  - .2 Refer to SCAQMD for additional information and clarification and complete list of applications.

- .3 Any discrepancies are to be approved by Departmental Representative. Obtain written approval prior to use on site.

## 1.8 DELIVERY, STORAGE AND HANDLING

- .1 Deliver and store material in undamaged, unopened containers, with manufacturer's labels and seals intact.
- .2 Store materials to comply with manufacturer's directions to prevent deterioration due to moisture, heat, cold, direct sunlight or any other causes.
- .3 Keep containers sealed when not in use.

## 1.9 ENVIRONMENTAL REQUIREMENTS

- .1 Air and substrate temperature to be minimum 10°C for 24 hours before, during and for minimum 48 hours after application or until coatings are fully cured.
- .2 Substrate temperatures shall be minimum 3°C above measured dew point.

## 2 Products

### 2.1 FLOOR COATING

- .1 Floor coating: two-part, high solids, low odour, low VOC, fine textured, glossy, pigmented epoxy floor coating containing an antimicrobial additive that inhibits growth of bacteria, molds, mildew and fungi for lifetime of the coating.
  - .1 Approved product (no substitutions): Sikagard Duroplast 100 by Sika Canada Inc.
  - .2 Texture: as approved by Departmental Representative.
  - .3 Properties:
    - .1 Water Vapour Transmission (ASTM E96, Procedure B): 0.89 perm (Without fibreglass).
    - .2 Impact Resistance (ASTM D5628):
      - .1 Micro cracks at 1.31 J (11.6 lb-in) (Concrete no fiberglass).
      - .2 Visible cracks at 2.2 J (19.3 lb-in).
    - .3 Scrubbability CGSB 1-GP-71 (125.1): 10000 cycles Unaffected.
    - .4 Abrasion Resistance (ASTM D4060): (CS-17 wheels) 80 mg loss.
    - .5 Light Resistance, 100 hours
      - .1 CGSB 1-GP-71 (120.1) - Colored coating: Unaffected.
      - .2 ASTM G152 - White coating: Yellowing.
    - .6 Tensile Strength - Not reinforced (ASTM D638, Type IV): 350 microns thick, 20.5 MPa.
    - .7 Elongation at Break - Not reinforced (ASTM D638, Type IV): 350 microns thick, 3.5%.
    - .8 Adhesion - on concrete (ASTM D4541): > 4.9 MPa (substrate failure).
    - .9 Hardness Barcol: 60.
    - .10 Fire ratings (CAN/ULC-S102):
      - .1 Flame Spread: 6.
      - .2 Smoke Developed: 110.
    - .11 Water Absorption (ASTM D570):
      - .1 Permeability - 24 h: 1.6 gr/m<sup>2</sup>.
      - .2 Immersion - 24 h: 0.62%.
      - .3 Immersion - 7 days: 0.63%.
      - .4 2 h in boiling water: -2.04%.



- .12 VOC content:
  - .1 Not thinned: 43 g/L.
  - .2 Thinned: 86 g/L.
- .2 Primer: floor coating thinned 5%.
- .3 Cove base cap trim: extruded aluminum, radiused edge; clear anodized finish.

## 2.2 WALL AND CEILING COATING

- .1 Wall coating: two part, high solids, low odour, low VOC, fine textured, pigmented, water based epoxy wall coating containing an antimicrobial additive that inhibits the growth of bacteria, molds, mildew and fungi for lifetime of the coating.
  - .1 Approved product (no substitutions): Sikagard Duroplast 150 by Sika Canada Inc.
  - .2 Properties:
    - .1 Water Vapour Transmission (ASTM E96, Procedure B): 3.8 perm.
    - .2 Abrasion Resistance (ASTM D4060): (CS-17 wheels) 97 mg loss.
    - .3 Tensile Strength (ASTM D638): 1016 microns thick, 15.5 MPa.
    - .4 Elongation at Break (ASTM D638): 1016 microns thick, 5.3%.
    - .5 Adhesion - on concrete (ASTM D4541): > 4.2 MPa (substrate failure).
    - .6 Static Coefficient of Friction (ASTM C1028):
      - .1 Dry surface 0.74
      - .2 Wet surface 0.70
    - .7 Fire ratings (CAN/ULC-S102):
      - .1 Flame Spread: 6.
      - .2 Smoke Developed: 52.
    - .8 Water Absorption (ASTM D570):
      - .1 Permeability - 24 h: 1.6 gr/m<sup>2</sup>.
      - .2 Immersion - 24 h: 0.62%.
      - .3 Immersion - 7 days: 0.63%.
      - .4 2 h in boiling water: -2.04%.
    - .9 VOC content:
      - .1 Gloss: 138 g/L.
      - .2 Satin: 58 g/L.
      - .3 Matte: 43 g/L.
  - .2 Primer/block filler: Sikagard Duroplast VA or Sikagard Duroplast EE.
  - .3 Fillers: one-component, polymer modified repair mortar.
    - .1 SikaTop or Sika MonoTop Mortars by Sika.

## 3 Execution

### 3.1 PREPARATION

- .1 Ensure surface is sound and free from cracks, holes and other deficiencies; repair in accordance with manufacturer's instructions.
- .2 Floor:
  - .1 Clean concrete slab free from foreign matter. Remove laitance by mechanical means approved by flooring manufacturer and acceptable to Departmental Representative, to achieve a profile equivalent to ICRI-CSP 3-4.

- .3 Walls:
  - .1 Masonry: Remove efflorescence, loose mortar, mortar spatters, residues, oxidation powder and other foreign matter by scraping and wire brushing. Fill bug holes, cracks and irregularities with filler.
  - .2 Concrete: remove laitance, oxidation powder and all foreign matter from surface. Prepare concrete to produce an open textured, sandpaper-like finish and uniform surface (ICRI - CSP 1-2). Fill bug holes, cracks and irregularities with filler.
- .4 Maintain continuity of control and expansion joints through systems. Fill joints with joint sealant.
- .5 Mask/cover adjacent surfaces, fixtures, equipment by suitable means to protect them from damage from the operations of this trade. Make good damage by this trade at own expense and to Departmental Representative's satisfaction.

### 3.2 SURFACE CONDITIONS

- .1 Surfaces shall be clean, dimensionally stable, cured and free of contaminants such as oil, sealers and curing compounds.
- .2 Ensure concrete and masonry are cured for minimum 28 days with moisture content no greater than 14%.
- .3 Allow fillers to cure for minimum 3 days.
- .4 Examine site conditions and areas for defects of work prepared by other trades in which the work of this section is to be applied.
- .5 Report to the Departmental Representative in writing, defects of work which may adversely affect the quality of workmanship of this section.
- .6 Commencement of work shall imply acceptance of surfaces.

### 3.3 APPLICATION

- .1 Mix and apply epoxy coating systems in accordance with manufacturer's instruction, and where possible under direction of manufacturer's representative.
- .2 Apply by brush, roller or spray-equipment
- .3 Thickness:
  - .1 Wall/ceiling coating: Apply two top coats (6-8 mils WFT per coat).
  - .2 Floor coating: Apply two top coats (6-8 mils WFT per coat). Broadcast with aggregate at rate to provide slip-resistant surface texture approved by Departmental Representative. Install cap trim at top of cove base; except, in Rooms 165, 167, 168 and 170.

### 3.4 CLEANING AND PROTECTION

- .1 Clean uncured flooring materials from surfaces with solvent. Removal of cured materials requires scraping, chipping or grinding.
- .2 Protect flooring materials from wear and damage during construction operations.
- .3 Clean flooring just prior to final acceptance using materials and procedures recommended by flooring manufacturer.

END OF SECTION

## 1 General

### 1.1 RELATED SECTIONS

- .1 Section 09 65 19 - Resilient Tile Flooring: Resilient Base.

### 1.2 REFERENCES

- .1 American Association of Textile Chemists and Colorists (AATCC)
  - .1 AATCC 16-2004, Color Fastness to Light.
  - .2 AATCC 134-2011, Electrostatic Propensity of Carpets.
  - .3 AATCC 138-2010, Cleaning: Washing of Textile Floor Coverings (Reaffirmed).
  - .4 AATCC 174-2011, Antimicrobial Activity Assessment of Carpets.
- .2 ASTM International (ASTM).
  - .1 ASTM E662-13, Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.
- .3 Carpet and Rug Institute (CRI)
  - .1 Carpet Installation Standard, 2011.
  - .2 IAQ Carpet Testing Program.
- .4 NSF International(NSF).
  - .1 NSF 140-2013, Sustainability Assessment for Carpet.
- .5 Underwriters' Laboratories of Canada (ULC)
  - .1 CAN/ULC-S102-10, Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
  - .2 CAN/ULC-S102.2-10, Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Covering and Miscellaneous Materials and Assemblies.

### 1.3 SUBMITTALS

- .1 Submit control submittals in accordance with Section 01 10 01 - General Requirements.
- .2 Control submittals:
  - .1 Submit verification to demonstrate compliance with CAN/ULCS102 and CAN/ULCS102.2.
  - .2 Submit proof that carpet has been tested and passed the Indoor Air Quality (IAQ) Carpet Testing Program requirements of the Carpet and Rug Institute (CRI) and the Canadian Carpet Institute (CCI).
  - .3 Submit carpet schedule using same room designations indicated on drawings.
  - .4 Submit carpet manufacturer's installation instructions: Indicate special procedures and perimeter conditions requiring special attention.
- .3 Product data:
  - .1 Submit product data sheet for each carpet, undercushion, adhesive, carpet protection and subfloor patching compound.
  - .2 Submit WHMIS MSDS - Material Safety Data Sheets acceptable to Labour Canada and Health Canada for carpet adhesive and seam adhesive. Indicate VOC content.
  - .3 Submit data on specified products, describing physical and performance characteristics, sizes, patterns, colours, and methods of installation.
- .4 Samples
  - .1 Submit duplicate full size pieces of each carpet tile specified.

#### 1.4 CLOSEOUT SUBMITTALS

- .1 Submit operation and maintenance data for incorporation into manual specified in Section 01 10 01 - General Requirements.
- .2 Submit maintenance data: Include maintenance procedures, recommendations for maintenance materials and equipment, and suggested schedule for cleaning.
- .3 Include information on recycling of carpet including manufacturer's reprocessing program. Indicate which portions of materials are recyclable.

#### 1.5 SUSTAINABLE DESIGN SUBMITTALS

- .1 Construction waste management plan.
  - .1 A Construction Waste Management Plan is in place to divert waste material from landfill. Wherever practical, send waste material for reuse or recycling, and generally document this for the contractor's waste management final report.
- .2 Recycled Content.
  - .1 Refer to Section 01 47 15 - Sustainable Requirements for "List of Products Requiring Recycled Content".
  - .2 If products within this section are indicated on the "List of Products Requiring Recycled Content", only products with recycled content will be acceptable.
  - .3 For products not identified on list, source products with highest recycled content available when practical.
  - .4 Include following information with product data submission.
    - .1 Percentage of pre-consumer and post-consumer recycled content for each product.
- .3 Regional Materials.
  - .1 Refer to Section 01 47 15 - Sustainable Requirements for "List of Products Required to be Locally Sourced".
  - .2 If products within this section are indicated on the "List of Products Required to be Locally Sourced", include following information with Product Data submission:
    - .1 Extraction/Manufacturing location(s): Indicate location of extraction site or manufacturing plant, and indicate distance between extraction site or manufacturing plant and Project site.
- .4 Adhesives and Sealants.
  - .1 Include following information with Product Data submission for materials specified under this section:
    - .1 Submit manufacturer's certification indicating VOC limits of Products used onsite and within the building envelope. Product shall comply with California's SCAQMD #1168.
- .5 Flooring Systems.
  - .1 Carpets: Submit manufacturer's certification indicating that Product is listed and approved under Carpet and Rug Institute's (CRI) Green Label Program or Green Label Plus Program.
- .6 If requesting substitute product, ensure proposed substitution achieves above stated goals.

#### 1.6 REGULATORY REQUIREMENTS

- .1 Indoor Air Quality: compliance with CRI/CCI Green Label Indoor Air Quality Program, CRI/CCI-IAQ requirements for maximum total volatile chemicals released into air. Label each carpet product with CRI/CCI-IAQ label.

- .2 Provide documentation that product meets or exceeds following criteria based on an emission factor measured in mg/m<sup>2</sup>/hr:
  - .1 Total Volatile Organic Compounds - 0.5.
  - .2 Formaldehyde - 0.05.
  - .3 4-phenylcyclohexene - 0.05.
  - .4 Styrene - 0.4.

#### 1.7 MAX. VOC CONTENT FOR SOLVENT CLEANING ACTIVITIES

- .1 Following are some of the Maximum allowed VOC Content for following activities, as per SCAQMD Rule 1171-9 (refer to SCAQMD manual for complete list and updates):
  - .1 Product cleaning during onsite surface preparation for coatings or adhesives application, and repair and maintenance cleaning:
    - .1 General maximum VOC 25g/L.
    - .2 Electrical apparatus components and electronic components.
    - .3 Cleaning of coatings or adhesives application equipment max. VOC 25g/L.
  - .2 Refer to SCAQMD for additional information and clarification and complete list of applications.
  - .3 Any discrepancies are to be approved by Departmental Representative. Obtain written approval prior to use on site.

#### 1.8 DELIVERY, STORAGE AND HANDLING

- .1 Label packaged materials. for carpet tile products indicate nominal dimensions of tile and indicate installation direction.
- .2 Store packaged materials in original containers or wrapping with manufacturer's seals and labels intact.
- .3 Store carpeting and accessories in location as directed. Store carpet and adhesive at minimum temperature of 18°C and relative humidity of maximum 65% for minimum of 48 hours before installation.
- .4 Prevent damage to materials during handling and storage. Keep materials under cover and free from dampness.
- .5 Store on pallet form as supplied by manufacturer. Do not stack pallets.

#### 1.9 ENVIRONMENTAL REQUIREMENTS

- .1 Moisture: Ensure substrate is within moisture limits and alkalinity limits prescribed by manufacturer. Prepare moisture testing and provide report to Departmental Representative.
- .2 Temperature: Maintain ambient temperature of not less than 18°C from 48 hours before installation to at least 48 hours after completion of work.
- .3 Relative humidity: Maintain relative humidity between 10 and 65% RH for 48 hours before, during and 48 hours after installation.
- .4 Safety: Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials.
- .5 Do not install carpet until space is enclosed and weatherproof, wet-work in space is completed and nominally dry, work above ceilings is complete.

#### 1.10 EXTRA MATERIALS

- .1 Provide extra materials in accordance with 01 10 01 - General Requirements.

- .2 Provide one full box of carpet tile in colour and pattern of carpeting. Provide in full size tiles.
- .3 Extra materials to be from same production run as installed materials.
- .4 Deliver and store where directed by Contractor.

## 2 Products

### 2.1 MANUFACTURERS

- .1 Certified to Carpet and Rug Institute's and the Canadian Carpet Institute IAQ requirements.

### 2.2 CARPET TYPE 1

- .1 Carpet Type 1:
  - .1 Standard of acceptance: based upon Accent Flannel by Interface Flor.
- .2 Product specifications:
  - .1 Construction: tufted cut pile.
  - .2 Tufted Yarn Weight: 814 g/m<sup>2</sup>.
  - .3 Machine Gauge: 39.4 ends/10 cm.
  - .4 Pile Height: 4.7 mm.
  - .5 Pile Thickness: 3.9 mm.
  - .6 Stitches: 40.7 ends/10cm.
  - .7 Pile Density: 208.7 g.m<sup>3</sup>.
  - .8 Dimensions: 500 mm x 500 mm.
  - .9 Colour: as selected by Departmental Representative to a maximum of two (2).
- .3 General:
  - .1 Yarn System: 100% recycled Type 6 nylon.
  - .2 Soil/Stain Protection: Protekt<sup>2</sup>.
  - .3 Antimicrobial Treatment (AATCC 138 Washed) (AATCC 174 Parts 2&3): Intersept.
  - .4 Backing: GlasBac.
  - .5 Total recycle content: 63%.
- .4 Performance Specifications
  - .1 Indoor Air Quality: Green Label Plus Certified #GLP0820
  - .2 Sustainable Carpet Assessment Standard (NSF-140): Gold.
  - .3 Radiant Panel (ASTM E648): Class 1.
  - .4 Smoke Density (ASTM E662) <450.
  - .5 Lightfastness (AATCC 16 - E): > 4.0 @ 60 AFU.
  - .6 Static (AATCC 134): < 3.0 KV.

### 2.3 CARPET TYPE 2

- .1 Carpet Type 2:
  - .1 Standard of acceptance: based upon Human Nature HN20 by Interface Flor.
- .2 Product specifications:
  - .1 Construction: tufted cut & loop.
  - .2 Pile Thickness: 3.1 mm.
  - .3 Pile Density: 6387
  - .4 Dimensions: 500 mm x 500 mm.
  - .5 Colour: as selected by Departmental Representative to a maximum of two (2).

- .3 General:
  - .1 Yarn System: post-consumer content Type 6 nylon.
  - .2 Soil/Stain Protection: Protekt<sup>2</sup>.
  - .3 Antimicrobial Treatment: (AATCC 138 Washed) (AATCC 174 Parts 2&3) Intersept.
  - .4 Backing: GlasBac RE.
- .4 Performance Specifications
  - .1 Indoor Air Quality: Green Label Plus Certified #GLP0820
  - .2 Sustainable Carpet Assessment Standard (NSF-140): Platinum.
  - .3 Radiant Panel (ASTM E648): Class 1.
  - .4 Smoke Density (ASTM E662) <450.
  - .5 Lightfastness (AATCC 16 - E): > 4.0 @ 60 AFU.
  - .6 Static (AATCC 134): < 3.0 KV.

## 2.4 ACCESSORIES

- .1 Adhesive: Pressure sensitive type recommended by carpet tile manufacturer for direct glue down installation of carpet.
- .2 Carpet protection: non-staining heavy duty kraft paper or other material acceptable to Departmental Representative.
- .3 Concrete floor sealer: as recommended by carpet tile manufacturer.
- .4 Subfloor patching compound: Portland cement base filler, mix with latex to form a cementitious paste.
- .5 Carpet base: broadloom carpet in pattern specified; bound edges.
- .6 Carpet transitions: vinyl, wedge shaped, designed for overlap onto carpet.
  - .1 Standard of acceptance: CTA Series by Johnsonite Flooring Products Division.
  - .2 Colour: as selected by Departmental Representative; to a maximum of two (2).

## 3 Execution

### 3.1 PREPARATION

- .1 Prepare floor surfaces in accordance with CRI Carpet Installation Standard.
- .2 Pre-condition carpet following manufacturer's printed instructions.
- .3 Install feathering strip at transitions between carpet and porcelain tile.
- .4 Treat control joints in accordance with manufacturer's instructions.

### 3.2 INSTALLATION - GENERAL

- .1 Install in accordance with manufacturer's printed instructions and in accordance with CRI Carpet Installation Standard.
- .2 Install carpet after finishing work is completed.
- .3 Finish installation to present smooth wearing surface free from burring and other faults.
- .4 Use material from same dye lot. Ensure colour, pattern and texture match within any one visual area..
- .5 Fit neatly around fixed architectural, mechanical and electrical items; around perimeter of rooms into recesses, and around projections.

.6 Extend carpet into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

.7 Install carpet smooth and free of defects.

### 3.3 CARPET TILE INSTALLATION

.1 Apply adhesive and install carpet tile in accordance with manufacturer's written instructions using full spread application.

.2 Lay carpet tile with butt seams.

.3 Roll carpet tile with appropriate roller for complete contact of carpet to sub-floor.

.4 Layout pattern:

.1 Carpet Type 1: brick pattern; for areas except Room 104.

.2 Carpet Type 2: ashlar pattern; for Room 104.

### 3.4 PROTECTION OF FINISHED WORK

.1 Vacuum carpets clean immediately after completion of installation. Protect traffic areas.

.2 Prohibit traffic on carpet for a period of 24 hours until adhesive is cured.

.3 Install carpet protection to satisfaction of Departmental Representative.

END OF SECTION



## 1 General

### 1.1 RELATED SECTIONS

- .1 Section 09 51 99 - Acoustic Ceilings.

### 1.2 SUBMITTALS

- .1 Submit in accordance with Section 01 10 01 - General Requirements.
- .2 Product data:
  - .1 submit manufacture's catalogue information edited to indicate specific products and related accessories being provided for this Project.
- .3 Shop drawings:
  - .1 Indicate panel sizes, thickness and edge details; details of fastening, joint between panels, inside and outside corners.
  - .2 Provide wall elevations showing panel arrangement, mounting heights, and locations and sizes of cut-outs.
- .4 Samples:
  - .1 Submit duplicate samples of each colour/pattern of fabric available.
  - .2 Submit duplicate 300 mm x 300 mm sample of each type acoustical unit.
- .5 Maintenance data:
  - .1 Submit recommended procedures for normal cleaning and removal of stains. Include precautions in use of cleaning materials that may be detrimental to surfaces.

### 1.3 SUSTAINABLE DESIGN SUBMITTALS

- .1 Construction waste management plan.
  - .1 A Construction Waste Management Plan is in place to divert waste material from landfill. Wherever practical, send waste material for reuse or recycling, and generally document this for the contractor's waste management final report.
- .2 Recycled Content.
  - .1 Refer to Section 01 47 15 - Sustainable Requirements for "List of Products Requiring Recycled Content".
  - .2 If products within this section are indicated on the "List of Products Requiring Recycled Content", only products with recycled content will be acceptable.
  - .3 For products not identified on list, source products with highest recycled content available when practical.
  - .4 Include following information with product data submission.
    - .1 Percentage of pre-consumer and post-consumer recycled content for each product.
- .3 Regional Materials.
  - .1 Refer to Section 01 47 15 - Sustainable Requirements for "List of Products Required to be Locally Sourced".

- .2 If products within this section are indicated on the “List of Products Required to be Locally Sourced”, include following information with Product Data submission:
  - .1 Extraction/Manufacturing location(s): Indicate location of extraction site or manufacturing plant, and indicate distance between extraction site or manufacturing plant and Project site.
- .4 Adhesives and Sealants.
  - .1 Include following information with Product Data submission for materials specified under this section:
    - .1 Submit manufacturer’s certification indicating VOC limits of Products used onsite and within the building envelope. Product shall comply with California’s SCAQMD #1168.
  - .5 If requesting substitute product, ensure proposed substitution achieves above stated goals.
- 1.4 MAX. VOC CONTENT FOR SOLVENT CLEANING ACTIVITIES
  - .1 Following are some of the Maximum allowed VOC Content for following activities, as per SCAQMD Rule 1171-9 (refer to SCAQMD manual for complete list and updates):
    - .1 Product cleaning during onsite surface preparation for coatings or adhesives application, and repair and maintenance cleaning:
      - .1 General maximum VOC 25g/L.
      - .2 Electrical apparatus components and electronic components.
      - .3 Cleaning of coatings or adhesives application equipment max. VOC 25g/L.
    - .2 Refer to SCAQMD for additional information and clarification and complete list of applications.
    - .3 Any discrepancies are to be approved by Departmental Representative. Obtain written approval prior to use on site.
- 1.5 ENVIRONMENTAL REQUIREMENTS
  - .1 Install after building is enclosed and dust generating activities are completed.
  - .2 Permit wet work to dry prior to commencement of installation.
  - .3 Maintain uniform minimum temperature of 15°C and relative humidity of 20- 40% prior to, during and after installation.
- 1.6 EXTRA MATERIALS
  - .1 Submit extra materials in accordance with Section 01 10 01 - General Requirements.
  - .2 Provide additional fabric, equivalent to that required to cover four (4) panels. Materials to be from same dye lot as used for installed material.
  - .3 Wrap and clearly identify each package including colour and type. Store where directed by Departmental Representative.
- 2 Products
  - 2.1 WALL PANELS
    - .1 Panels: prefabricated fabric covered panels; of size indicated x 25 mm total thickness.
      - .1 Acceptable Materials: Type a.p. by Decoustics, Type TS-100 by Techni-Silence; Avanti Acoustical Wall Panels by Sound Solutions.

- .2 Performance:
    - .1 Flame spread rating: Class A (25 or less).
    - .2 Sound absorption: NRC 0.80 minimum.
  - .3 Construction:
    - .1 Core: Single piece rigid fibreglass, 6 lb/ft<sup>3</sup> density.
    - .2 Edge finish: chemically hardened using resin.
      - .1 Edge design: 45° return at jambs and head of door frames; square profile elsewhere.
    - .3 Fabric: as selected by Departmental Representative from manufacturer's standard range.
    - .4 Provide cutouts as required for mechanical and electrical services.
  - .4 Mounting system: manufacturer's standard concealed rail or clip system for wall mounting.
- 3 Execution
- 3.1 INSTALLATION
- .1 Ensure substrate surface is straight to tolerance of plus or minus 3 mm over 3000 mm.
  - .2 Install acoustic wall panels plumb and in proper alignment. Arrange panels as indicated.
- 3.2 CLEANING
- .1 Keep acoustic installation and all components clean. Remove blemishes immediately.
- 3.3 PROTECTION
- .1 Use polyethylene to protect finished acoustical wall treatment from damage.
  - .2 Remove prior to substantial completion.

END OF SECTION

## 1 General

### 1.1 RELATED SECTIONS

- .1 Section 09 67 70 - Specialty Epoxy Coatings.
- .2 Section 26 05 00 - Common Work Results For Electrical: painting of plywood backboards.

### 1.2 REFERENCES

- .1 Environmental Protection Agency (EPA)
  - .1 SW-846, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.
- .2 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
  - .1 Material Safety Data Sheets (MSDS).
- .3 Master Painters Institute (MPI)
  - .1 MPI Architectural Painting Specifications Manual, 2004.

### 1.3 QUALITY ASSURANCE

- .1 Mock-up room:
  - .1 Departmental Representative will select a room to be a mock-up. More than one room may be selected so that each different paint system is covered.
  - .2 Paint mock-up room in accordance with specification, using products and procedures that will be used for actual painting operations, and to Departmental Representative's approval.
  - .3 Have paint manufacturer's technical representative present during application of materials in mock-up room.
  - .4 No further painting, including priming, shall take place until, full approval of mock-up room is received from Departmental Representative.
  - .5 Mock-up room will be the standard used throughout the project. Any work which does not comply with mock-up room will be rejected. Bring rejected work up to standard of mock-up room at no additional expense.
  - .6 Departmental Representative's decision as to compliance with mock-up room shall be final.
- .2 Pre-Installation Meeting:
  - .1 Convene pre-installation meeting prior to beginning work of this Section.
    - .1 Verify project requirements.
    - .2 Review installation and substrate conditions.
    - .3 Coordination with other building subtrades.
    - .4 Review manufacturer's and MPI installation instructions, procedures and warranty requirements.

### 1.4 SCHEDULING

- .1 Submit work schedule for various stages of painting to Departmental Representative for review. Submit schedule minimum of 48 hours in advance of proposed operations.
- .2 Obtain written authorization from Departmental Representative for changes in work schedule.

## 1.5 ACTION AND INFORMATIONAL SUBMITTALS

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

## 1.6 SUSTAINABLE DESIGN SUBMITTALS

- .1 Construction waste management plan.
  - .1 A Construction Waste Management Plan is in place to divert waste material from landfill. Wherever practical, send waste material for reuse or recycling, and generally document this for the contractor's waste management final report.
- .2 Recycled Content.
  - .1 Refer to Section 01 47 15 - Sustainable Requirements for "List of Products Requiring Recycled Content".
  - .2 If products within this section are indicated on the "List of Products Requiring Recycled Content", only products with recycled content will be acceptable.
  - .3 For products not identified on list, source products with highest recycled content available when practical.
  - .4 Include following information with product data submission.
    - .1 Percentage of pre-consumer and post-consumer recycled content for each product.
- .3 Regional Materials.
  - .1 Refer to Section 01 47 15 - Sustainable Requirements for "List of Products Required to be Locally Sourced".

- .2 If products within this section are indicated on the “List of Products Required to be Locally Sourced”, include following information with Product Data submission:
  - .1 Extraction/Manufacturing location(s): Indicate location of extraction site or manufacturing plant, and indicate distance between extraction site or manufacturing plant and Project site.
- .4 Paints and Coatings.
  - .1 Provide low VOC Products as specified herein and complying with local regulations regarding toxic and hazardous materials.
  - .2 Ensure primers, paints and coatings used onsite and within building envelope meet or exceed requirements of following standards:
    - .1 Interior and Exterior Paints: GS-11
    - .2 Anti-Corrosive Paint: GS-11
    - .3 Clear Wood Finishes and other coating not covered in GS-11: SCAQMD #1113.
  - .3 Submit manufacturer’s certification indicating VOC limits of Products.
- .5 If requesting substitute product, ensure proposed substitution achieves above stated goals.

#### 1.7 MAX. VOC CONTENT FOR SOLVENT CLEANING ACTIVITIES

- .1 Following are some of the Maximum allowed VOC Content for following activities, as per SCAQMD Rule 1171-9 (refer to SCAQMD manual for complete list and updates):
  - .1 Product cleaning during onsite surface preparation for coatings or adhesives application, and repair and maintenance cleaning:
    - .1 General maximum VOC 25g/L.
    - .2 Electrical apparatus components and electronic components.
    - .3 Cleaning of coatings or adhesives application equipment max. VOC 25g/L.
  - .2 Refer to SCAQMD for additional information and clarification and complete list of applications.
  - .3 Any discrepancies are to be approved by Departmental Representative. Obtain written approval prior to use on site.

#### 1.8 DELIVERY, STORAGE AND HANDLING

- .1 Packing, Shipping, Handling and Unloading:
  - .1 Pack, ship, handle and unload materials in accordance with manufacturer's written instructions.
- .2 Acceptance at Site:
  - .1 Identify products and materials with labels indicating:
    - .1 Manufacturer's name and address.
    - .2 Type of paint or coating.
    - .3 Compliance with applicable standard.
    - .4 Colour number in accordance with established colour schedule.
- .3 Remove damaged and rejected materials from site.
- .4 Storage and Protection:
  - .1 Provide and maintain dry, temperature controlled, secure storage.
  - .2 Store materials and supplies away from heat generating devices.
  - .3 Store materials and equipment in well ventilated area within temperature range 7°C to 30°C.

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

## 1.9 SITE CONDITIONS

- .1 Temperature, Humidity and Substrate Moisture Content Levels:
  - .1 Unless pre-approved written approval by Departmental Representative and product manufacturer, perform no painting when:
    - .1 Ambient air and substrate temperatures are below 10°C.
    - .2 Substrate temperature is above 32°C unless paint is specifically formulated for application at high temperatures.
    - .3 Substrate and ambient air temperatures are not expected to fall within MPI or paint manufacturer's prescribed limits.

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

## 1.10 EXTRA MATERIALS

- .1 Quantity:
  - .1 Finishing coat: turn over surplus full cans of paint to Departmental Representative. If, within each type and colour of finish coat, less than one can of paint remains, provide one - four litre can for maintenance purposes. Identify colour and paint type in relation to established colour schedule and finish system.
  - .2 Provide one - four litre can of each type and colour of primer and stain. Identify colour and paint type in relation to established colour schedule and finish system.
- .2 Extra materials shall be from same production run as products installed. Package products with protective covering and identify with descriptive labels.
- .3 Delivery, storage and protection: comply with Departmental Representative's requirements for delivery and storage of extra materials.

## 2 Products

### 2.1 MATERIALS

- .1 Paints, primers, coatings, varnishes, stains, lacquers etc. shall conform to Green Seal Standard GS-11, Green Seal Standard GC-03, or the California South Coast Air Quality Management District (SCAQMD) Rule #1133.



- .2 Materials (primers, paints, coatings, varnishes, stains, lacquers) shall be listed in the MPI Approved Products List (APL).
- .3 Other paint materials such as linseed oil, shellac, turpentine, etc. shall be the highest quality product of an approved manufacturer listed in MPI Painting Specification Manual and shall be compatible with other coating materials as required.
- .4 Only qualified products with E2 or E3 "Environmentally Friendly" rating are acceptable for use on this project.
- .5 Where possible, provide paint materials for paint systems from single manufacturer.
- .6 Whiteboard paint:
  - .1 Low VOC paint, developed specifically for use as a write-on/wipe-off surface, compatible with dry erase markers. Complete with manufacturer recommended white primer.
    - .1 Colour: white.
  - .2 Accessories: provide following for each wall painted with whiteboard paint.
    - .1 Markers: One (1) set (red, blue, green, black) dry erase markers; type as recommended by paint manufacturer.
    - .2 One (1) Cleaning cloth.
    - .3 One (1) bottle manufacturer approved cleaner.

## 2.2 COLOURS

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

## 2.3 MIXING AND TINTING

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

## 2.4 GLOSS/SHEEN RATINGS

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

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

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

## 2.5 INTERIOR PAINTING SYSTEMS

- .1 Interior paint system shall be premium grade in accordance with MPI.
- .2 Concrete floors.
- .1 INT 3.2G - Concrete Floor Sealer, W.B.
- .2 INT 3.2L - Epoxy floor paint, water-borne.
- .3 Structural steel and metal fabrications:
- .1 INT 5.1B - Waterborne light industrial, Level 5 - semi-gloss coating.
- .1 Miscellaneous Metal items.
- .4 Concrete Masonry Units:
- .1 INT 4.2D High performance architectural latex, Level 3 - eggshell finish.
- .2 INT 4.2G - Epoxy (tile-like) finish - Level 6 - Gloss.
- .5 Galvanized metal:
- .1 INT 5.3D - Epoxy (over epoxy primer)
- .1 Steel doors and frames.
- .6 Dressed Lumber:
- .1 INT 6.3U - Latex G5 semi-gloss finish (over alkyd primer).
- .1 Finish carpentry items (except Change Room bench planks).
- .2 INT 6.3W - Water Borne Varnish, Clear (over stain), G5 semi-gloss finish.
- .1 Hardwood edges and glass stops of plastic laminate faced doors, interior bench slats.
- .7 Gypsum board: gypsum wallboard, drywall, "sheet rock type material":
- .1 INT 9.2A - Latex, Level 1 - matte finish (over latex sealer).
- .1 Includes ceilings.
- .2 INT 9.2B - High performance architectural latex, Level 3 - eggshell finish.
- .1 INT 9.2E - Epoxy (tile-like) finish (over latex sealer) - Level 6 - Gloss.
- .3 Whiteboard paint:
- .1 One coat primer.
- .2 Two coats whiteboard paint.

## 2.6 EXTERIOR PAINTING SYSTEMS

- .1 Concrete Horizontal Surfaces.
  - .1 EXT 3.2A - Latex G2/3 - low gloss finish.
    - .1 Includes exposed concrete fill in security bollard.
- .2 Galvanized metal: not chromate passivated
  - .1 EXT 5.3L - Polyurethane, Pigmented (over epoxy primer) - G6 Gloss finish
    - .1 Includes steel doors and frames.
- .3 Epoxy coated reinforcing steel between wythes of glass block
  - .1 EXT 5.3L - Polyurethane, Pigmented (over epoxy primer) - G6 Gloss finish

## 2.7 SOURCE QUALITY CONTROL

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

## 3 Execution

### 3.1 MANUFACTURER'S INSTRUCTIONS

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

### 3.2 GENERAL

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

### 3.3 EXAMINATION

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

### 3.4 PREPARATION

- .1 Protection:
  - .1 Protect existing building surfaces and adjacent structures from paint spatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore surfaces as directed by Departmental Representative.
  - .2 Protect items that are permanently attached such as Fire Labels on doors and frames.
  - .3 Protect factory finished products and equipment.

- .2 Surface Preparation:
  - .1 Remove electrical cover plates, light fixtures, surface hardware on doors, washroom accessories and other surface mounted equipment, fittings and fastenings prior to undertaking painting operations. Identify and store items in secure location and re-installed after painting is completed.
  - .2 Move and cover furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.
  - .3 Place "WET PAINT" signs in occupied areas as painting operations progress. Signs to approval of Departmental Representative.
- .3 Clean and prepare surfaces in accordance with MPI Architectural Painting Specification Manual requirements. Refer to MPI Manual in regard to specific requirements and as follows:
  - .1 Remove dust, dirt, and other surface debris by vacuuming, wiping with dry, clean cloth or other method acceptable to Departmental Representative.
  - .2 Wash surfaces with a biodegradable detergent and bleach where applicable and clean warm water using a stiff bristle brush to remove dirt, oil and other surface contaminants.
  - .3 Rinse scrubbed surfaces with clean water until foreign matter is flushed from surface.
  - .4 Allow surfaces to drain completely and allow to dry thoroughly.
  - .5 Prepare surfaces for water-based painting, water-based cleaners should be used in place of organic solvents.
  - .6 Use trigger operated spray nozzles for water hoses.
  - .7 Many water-based paints cannot be removed with water once dried. Minimize use of mineral spirits or organic solvents to clean up water-based paints.
- .4 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before prime coat is applied and between applications of remaining coats. Apply primer, paint, or pretreatment as soon as possible after cleaning and before deterioration occurs.
- .5 Where possible, prime non-exposed surfaces of new wood surfaces before installation. Use same primers as specified for exposed surfaces.
  - .1 Apply MPI #36 vinyl sealer over knots, pitch, sap and resinous areas.
  - .2 Apply wood filler to nail holes and cracks.
  - .3 Tint filler to match stains for stained woodwork.
- .6 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 1000 mm.
- .7 Clean metal surfaces to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease and other foreign substances in accordance with MPI requirements. Remove traces of blast products from surfaces, pockets and corners to be painted by brushing with clean brushes, blowing with clean dry compressed air or vacuum cleaning.
- .8 Touch up of shop primers with primer as specified.

### 3.5 APPLICATION

- .1 Method of application to be as approved by Departmental Representative. Apply paint by brush or roller. Use of spray equipment only when approved by Departmental Representative. Conform to manufacturer's application instructions unless specified otherwise.

- .2 Brush and Roller Application:
  - .1 Apply paint in uniform layer using brush and/or roller type suitable for application.
  - .2 Work paint into cracks, crevices and corners.
  - .3 Paint surfaces and corners not accessible to brush using daubers and/or sheepskins.
  - .4 Brush and/or roll out runs and sags, and over-lap marks. Rolled surfaces free of roller tracking and heavy stipple.
  - .5 Remove runs, sags and brush marks from finished work and repaint.
- .3 Apply coat of paint in continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.
- .4 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.
- .5 Sand and dust between coats to remove visible defects.
- .6 Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as tops of interior cupboards and cabinets and projecting ledges.
- .7 Finish closets and alcoves as specified for adjoining rooms.
- .8 Finish top, bottom, edges and cutouts of doors after fitting as specified for door surfaces.

### 3.6 MECHANICAL/ELECTRICAL EQUIPMENT

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

### 3.7 ELECTRICAL PANELS AND FIRE EXTINGUISHER CABINETS

- .1 Electrical panels and fire extinguisher cabinets will be supplied with a baked-on primer finish.
- .2 Roughen exposed surfaces to receive paint by sanding or other means to create a bond for spray paint.
- .3 Spray paint cabinets, in colour as selected by Departmental Representative, prior to installation. Touch up damaged surfaces after installation.

### 3.8 FIELD QUALITY CONTROL

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

### 3.9 RESTORATION

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

END OF SECTION