

Part 1 General

1.1 REFERENCES

- .1 American Concrete Institute (ACI):
 - .1 ACI 302.1R-15, Guide for Floor and Slab Construction.
- .2 American Society for Testing and Materials International (ASTM)
 - .1 ASTM D1751-04(2013)e1, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
 - .2 ASTM D1752-04a(2013) Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.
- .3 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-25.20-95, Surface Sealer for Floors.
- .4 Canadian Standards Association (CSA)
 - .1 CSA A23.1-14/A23.2-14 - Concrete materials and methods of concrete construction / Test methods and standard practices for concrete.
 - .2 CSA A23.3-14, Design of Concrete Structures.
 - .3 CAN/CSA A3000-13, Cementitious materials compendium (Consists of A3001, A3002, A3003, A3004 and A3005), Includes Update No. 1 (2014), Update No. 2 (2014), Update No. 3 (2014).
- .5 South Coast Air Quality Management District (SCAQMD), California State
 - .1 SCAQMD Rule 1113-16, Architectural Coatings.

1.2 PERFORMANCE REQUIREMENTS

- .1 Product quality and quality of work in accordance with Section 01 11 00 – General Requirements: Common Product Requirements.
- .2 Submit written declaration that components used are compatible and will not adversely affect finished flooring products and their installation adhesives.
- .3 Concrete works: refer to structural drawings and specifications for concrete requirements. Concrete shall comply with CSA A23.1, CSA A23.2, CSA A23.3, and CAN/CSA A3000.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit product data in accordance with Section 01 11 00 – General Requirements: Submittal Procedures.
 - .1 Submit manufacturer's printed product literature, specifications and data sheet for each product specified.
 - .2 Include application instructions for concrete floor treatments.
- .2 Submit closeout data in accordance with Section 01 11 00 – General Requirements: Closeout Submittals.
 - .1 Provide manufacturer's printed recommendations for general maintenance, including cleaning instructions and submit a complete list of floor care products that will be required for on-going maintenance.
- .3 Submit concrete cube tests of concrete at 24 hours, 3 days and 28 days in accordance with Section 01 11 00 – General Requirements: Submittal Procedures.

1.4 ENVIRONMENTAL REQUIREMENTS

- .1 Temporary lighting: Minimum 1200 W light source, placed 2.5 m above floor surface, for each 40 sq m of floor being treated.
- .2 Electrical power: Provide sufficient electrical power to operate equipment normally used during construction.
- .3 Work area: Make the work area water tight protected against rain and detrimental weather conditions.
- .4 Temperature: Maintain ambient temperature of not less than 10°C from 7 days before installation to at least 48 hours after completion of work and maintain relative humidity not higher than 40% during same period.
- .5 Moisture: Ensure concrete substrate is within moisture limits prescribed by flooring manufacturer.
- .6 Safety: Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials.
- .7 Ventilation:
 - .1 Arrange for ventilation system to be operated during installation of concrete floor treatment materials by use of approved portable supply and exhaust fans.
 - .2 Ventilate enclosed spaces in accordance with Section 01 51 00 - Temporary Utilities.
 - .3 Provide continuous ventilation during and after coating application.

Part 2 Products

2.1 PERFORMANCE/DESIGN CRITERIA

- .1 Concrete finishing: to CSA A23.1/A23.2.
- .2 F3-Finishing, Floors having an overall F number of $F_F 30 \times F_L 25$; similar to CSA A23.1 Class C Slab Finishing.
- .3 Grinding and polishing of concrete floors: to Section 09 66 13 - Concrete Polishing.

2.2 CONCRETE PATCHING AND LEVELLING MATERIALS

- .1 Thick bed mortar: Performance standard to ANSI A118.4. Latex additive mixed with Portland cement and sand in accordance with manufacturer's instructions, with the following minimum properties:
 - .1 Bonding strength, 28 days: ≥ 1.2 MPa.
 - .2 Compressive strength after 28 days: ≥ 40 MPa.
 - .3 Flexural strength after 28 days: ≥ 7 MPa.
- .2 Self-levelling and smoothing underlayment: Performance standard to ANSI A118.4, ASTM C349 (and CGSB 71-GP-30M), Type 2, with the following minimum properties:
 - .1 Resistance to abrasion Taber Abrasimeter (abrading wheel – 500 g at 200 rpm), 28 days: ≥ 1.2 g weight loss.
 - .2 Compressive strength after 28 days: ≥ 35 N/mm².
 - .3 Flexural strength after 28 days: ≥ 8 N/mm².
 - .4 Brinell hardness after 28 days: 100 N/mm².
- .3 Featheredging Materials: Polymer-modified, cementitious, 2-component, fast-setting, trowel-applied, with the following minimum properties:
 - .1 Bond strength after 28 days: 14 MPa.
 - .2 Bond strength pull-out test after 28 days: ≥ 2 MPa

- .3 Compressive strength after 28 days: ≥ 40 MPa.
- .4 Flexural strength after 28 days: ≥ 14 MPa.
- .5 Splitting tensile strength after 28 days: ≥ 5 MPa.
- .4 Grout for filling core holes, to ASTM C1107, with the following minimum properties:
 - .1 Bond strength after 28 days: 13 MPa.
 - .2 Compressive strength after 28 days: ≥ 40 MPa.
 - .3 Flexural strength after 28 days: ≥ 7 MPa.
 - .4 Splitting tensile strength after 28 days: ≥ 3 MPa.
- .5 Supply fast-set structural grout, including drop-in anchors and threaded rod to anchor furniture and other fixed equipment. Confirm acceptability of selections prior to ordering and distribution.

2.3 PENETRATING SEALER

- .1 High-Performance Penetrating Water Repellent Sealer.
- .2 Acceptable Materials:
 - .1 Hydrozo 100, by BASF Building Systems, minimum application rate 155 mL/m².
 - .2 Sealmaster 100%, by Technical Barrier Systems Inc., minimum application rate 199 mL/m².
 - .3 Dry-Trete 1000L, by DRE Industries Inc., minimum application rate 167 mL/m².
 - .4 Protectosil 300, by Evonik Degussa Corporation, minimum application rate 185 mL/m².
 - .5 SW-244-100VOC, by Sherwin Williams, minimum application rate 242 mL/m².
 - .6 SIL-ACT ATS 100, by Advanced Chemical Technologies, minimum application rate 246 mL/m².
 - .7 Sikagard SN-100, by Sika Canada Inc., minimum application rate 158 mL/m².
 - .8 SIL-ACT ATS 100 LV, by Advanced Chemical Technologies, minimum application rate 244 mL/m².
 - .9 UltraGuard, Protocol Environmental Solutions, minimum application rate 213 mL/m².

2.4 FOOD-SAFE PENETRATING SEALER

- .1 At polished concrete counters, Provide food-safe penetrating sealer, with following minimum properties:
- .2 Two-component, moisture-cure high solids hybrid water-based polyurethane coating, UV-stable, food-safe, designed for concrete surfaces.
- .3 Solids content: 64%.
- .4 Basis of Design Product: similar to Surecrete XS-327 by Surecrete Design Products, with same or better physical properties and performance characteristics.

2.5 CURING AND SEALING COMPOUNDS

- .1 Exterior Curing and Sealing Compound: Seal Cure, by W.R. Meadows, or equivalent.
- .2 Interior Curing and Sealing Compound: VOCOMP-30, by W.R. Meadows, or equivalent.

2.6 MIXES

- .1 Mixing, ratios and application in accordance with manufacturer's instructions.

2.7 ACCESSORIES

- .1 Water: potable.
- .2 Joint Filler Strips:
 - .1 Floor Isolation Joints: ASTM D1751, bituminous impregnated fibreboard, or ASTM D1752, cork or self-expanding cork, 13 mm thick minimum.
 - .2 Edge Joint Filler: ASTM D1751, bituminous impregnated fibreboard, 13 mm thick minimum.
- .3 Control Joint Filler: Two-component, epoxy-urethane, load-bearing, self-levelling sealant.

Part 3 Execution

3.1 GENERAL CONCRETING PROCEDURES

- .1 Comply with the requirements of Structural Drawings, and as follows:
 - .1 Avoid over troweling.
 - .2 Do not finish concrete surfaces when bleed water is present.
 - .3 Keep concrete continuously moist for at least 24 hours.
 - .4 Never add water on site to plant-supplied concrete during placement or finishing.
 - .5 Maintain concrete above 10°C during and for three days after concrete placement.
 - .6 Protect fresh concrete from rapid drying, direct sun and wind.
 - .7 Supply and place layer of sand over vapour retarder to allow some moisture loss at bottom of slab.
 - .8 Never place concrete on frozen substrate.
 - .9 Locate mesh no more than 50 mm below surface of slab. Lap mesh at least one square. Use chairs to support mesh at the correct height during concrete placement (do not use the hook and pull method).
 - .10 Ensure the minimum concrete cover over reinforcing steel is at least 76 mm.
 - .11 Lap steel at least 24 bar diameters, but not less than 300 mm.
 - .12 Install wing insulation at perimeter of grade beams and insulate exterior vertical face of grade beams. Refer to Section 07 21 13 – Board Insulation for insulation specifications.

3.2 EXAMINATION

- .1 Prepare floor surface in accordance with CSA A23.1.
- .2 Verify that slab surfaces are ready to receive work and elevations are as required.

3.3 REPAIR OF CONCRETE

- .1 Examine all concrete surfaces and clearly mark out defective areas to be repaired. Obtain the Departmental Representative's authorization of the delineated repair areas and the proposed method and equipment to be used for the repairs prior to commencing with the work.
- .2 Completely remove all damaged, deteriorated, loosened, or unbonded concrete down to sound concrete. Remove microfractured surfaces resulting from the initial concrete removal process.
- .3 Sawcut the perimeter of areas requiring concrete removal and replacement perpendicular to the surface to a minimum depth of 25 mm. Do not use any repair method that produces a featheredge.

- .4 Prior to filling, provide a repair area that is clean and saturated surface dry except where the repair technique requires a dry surface.
- .5 Use dry-pack mortar for filling holes left by the removal of form ties, for narrow grooves cut for repair of cracks, and for repair of small honeycombed areas where lateral restraint can be obtained. Pre-soak the repair area, allow the area to attain a saturated surface dry condition, and apply a cement paste bond coat prior to filling with mortar. Dry-pack mortar shall consist of 1 part Portland cement to 2.5 parts sand, by mass.
- .6 Mortar filling with a polymerized mortar placed under pressure by use of a mortar gun or head box may be used for repairing defects that are too wide for dry-pack filling, too shallow for concrete placement, and no deeper than the far side of the reinforcement that is nearest the surface. Treat the surface of the concrete to be repaired with a compatible acrylic bonding agent as authorized by the Departmental Representative prior to mortar filling.
- .7 Completely remove honeycombed areas down to sound concrete or to the required depth behind the reinforcing steel, whichever is greater. The depth required beyond the reinforcing steel is 1.5 times the maximum aggregate size of the replacement concrete or 25 mm, whichever is greater. Treat the surface of the concrete to be repaired with a high percentage solids epoxy bonding agent or acrylic bonding agent as authorized by the Departmental Representative prior to concrete replacement. Construct the repair area slightly proud of the general surface and then grind it to match within the specified tolerances.
- .8 Repair abrupt and gradual irregularities that exceed the specified tolerances by no more than 10 mm by grinding. Limit the depth of grinding such that no aggregate particles are exposed more than 3 mm in cross section at the finished surface.
- .9 Where surface grinding results or will result in exposure of aggregate particles that exceed the specified limits, or where the abrupt and gradual irregularities exceed the specified tolerances by more than 10 mm, repair the irregularities by removing the concrete to a depth below the reinforcing steel of 1.5 times the maximum aggregate size of the replacement concrete or 25 mm, whichever is greater. Treat and construct the repair area as specified for honeycombed areas.
- .10 Provide replacement concrete that has the same strength and durability characteristics as the adjacent specified concrete. Use cement that provides a finish colour that matches the surrounding concrete surfaces in areas that are permanently exposed.
- .11 Following repairs, promptly initiate curing. Provide completed repair areas that are tightly bonded.

3.4 MEASURING

- .1 Classification of Surface Irregularities:
 - .1 Local surface irregularities are classified as abrupt or gradual.
 - .2 Abrupt irregularities mean offsets or fins caused by displaced or misplaced form sheeting, lining, or form sections or by defective form lumber, or improper screeding or trowelling. Abrupt irregularities also include any isolated irregularity in which the maximum dimension of the irregularity perpendicular to the surface is greater than the maximum dimension of the irregularity in the plane of the surface.
 - .3 Gradual irregularities mean bulges or depressions resulting in gradual changes in the concrete surface.
- .2 Measuring Surface Irregularities:

- .1 Measure irregularities as deviations from a surface, with a straightedge or shaped template authorized by the Departmental Representative. Move the position of the straightedge about the irregularity as necessary to locate the point where the maximum height and slope exists. Provide 3 m long straightedges for taking measurements.
- .2 For irregularities protruding above the surface, place 1 end of the straightedge on top of the irregularity. The height of the irregularity is determined by measuring the gap perpendicular to the straightedge. The length of the irregularity is determined by measuring the distance along the straightedge from the gap to the point of contact at the top of the irregularity.
- .3 For irregularities extending below the surface, place the straightedge across the irregularity. The height of the irregularity is determined by measuring the gap between the straightedge and the surface. The length of the irregularity is the distance along the straightedge from the gap to the point of contact with the surface.
- .4 Check finished concrete surfaces immediately after final working, and again at the end of the curing period and verify their compliance with the specified tolerances.

3.5 PREPARATION OF SLAB

- .1 Rub exposed sharp edges of concrete with carborundum to produce 3 mm radiused edges unless otherwise indicated.
- .2 Saw cut control joints to CSA A23.1, 24-hours maximum after placing of concrete.
- .3 The tops of all floor slabs, including slabs on grade, are to be brought to an even, level or sloping surface as indicated on the drawings, ready to receive the specified finish.
- .4 Interior floors indicated as exposed concrete are to be finished in accordance with the slab finishing schedule on the structural drawings. For slab areas not noted in the finishing schedule, slabs shall be smooth concrete with steel trowel finish.
- .5 Depress floor slabs where shown and as required for floor finishes.
- .6 Remove any curing agents used during concrete installation a minimum of 28 days prior to installation of flooring materials.
- .7 Use mechanical stripping to remove chlorinated rubber or existing surface coatings.
- .8 Use protective clothing, eye protection, and respiratory equipment during stripping of chlorinated rubber or existing surface coatings.

3.6 FINISHING FORMED SURFACES

- .1 Requirements listed below apply to normal structural concrete; refer to Division 03 Structural Drawings, Notes and Specifications for additional requirements for formed exposed architectural concrete.
- .2 Unspecified Finish: Provide following finishes as applicable when finish of formed surfaces is not specifically indicated:
 - .1 Unexposed Surfaces:
 - .1 Rough form finish for concrete not exposed to view.
 - .2 Smooth form finish for concrete to receive membrane waterproofing.
 - .2 Exposed Surfaces:
 - .1 Smooth form finish for concrete surfaces exposed to view.
 - .3 Exposed Surfaces at Retaining Wall:
 - .1 Board formed liner, rough form finish.

- .3 Rough Form Finish: Leave surfaces with texture imparted by forms; patch tie holes and defects; remove fins longer than 6 mm high.
- .4 Smooth Form Finish: Coordinate as necessary to secure form construction using smooth, hard, uniform surfaces with number of seams kept to a minimum, uniformly spaced in an orderly pattern; patch tie holes and defects; completely remove fins.
- .5 Sack Rubbed Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes; add white hydraulic cement in amounts determined by trial patches so colour of dry grout will match adjacent surfaces; rub surfaces with clean burlap and keep damp by fog spray for a minimum of 36 hours after grout whitens.
- .6 Related Unformed Finish: Strike-off concrete smooth and finish with using texture matching adjacent formed surfaces at tops of walls, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces; continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces.

3.7 FINISHING FLOORS AND SLABS

- .1 Finish floors and slabs in accordance with CSA A23.1 and ACI 302.1R recommendations for screeding, re-straightening, and finishing operations for concrete surfaces; do not wet concrete surfaces.
- .2 Float (Initial) Finishing:
 - .1 Consolidate surface with power driven floats or by hand floating if area is small or inaccessible to power driven floats.
 - .2 Re-straighten, cut down high spots, and fill low spots.
 - .3 Repeat float passes and re-straightening until surface is left with a uniform, smooth, granular texture.
 - .4 Apply float finishing to surfaces receiving trowel finishing and receiving waterproofing.
- .3 Trowel (Final) Finishing:
 - .1 Commence trowel finishing after all bleed water has disappeared and when the concrete has stiffened sufficiently to prevent the working of excess mortar to the surface.
 - .2 Apply first trowelling and consolidate concrete by hand or power-driven trowel after applying float finishing; continue trowelling passes and re-straighten until surface is free of trowel marks and uniform in texture and appearance; repair or smooth any surface defects that would telegraph through applied coatings or floor covering.
 - .3 Apply a trowel finishing to surfaces exposed to view or receiving waterproofing, and as directed.
 - .4 Finish surfaces to the tolerances indicated above.
- .4 Fine Broom Finishing:
 - .1 Apply a fine broom finishing to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.
 - .2 Slightly roughen trafficked surface by brooming with fibre bristle broom perpendicular to main traffic route immediately after float finishing.
 - .3 Coordinate required final finishing with Departmental Representative before application.

3.8 POLISHED CONCRETE COUNTERS

- .1 Colour: natural concrete, light grey overall appearance per approved sample.
- .2 At concrete countertops, finish shall be polished concrete.

- .3 Use steel forms for the work, and coordinate with masonry trade for built-in items and attachment to structure.
- .4 Protect vertical counter walls and adjacent surfaces as required to prevent penetrating sealer splashes onto surfaces.
- .5 Horizontal surfaces shall be flat: plus or minus 3 mm over 3050 mm, and finished to bring fine aggregate to surface.
- .6 Grind surfaces to be polished to achieve Concrete Polishing Association of America (CPAA) Class B aggregate exposure (salt and pepper finish); approximate depth of grinding to achieve Class B finish: about 1.6 mm (1/16-inch).
- .7 Clean fully cured concrete countertop by running water over the surface and then going over it with a squeegee to remove any grit that could gouge the concrete during grinding processes.
- .8 At surfaces to be polished, fill any surface flaws or bugholes with patching slurry, with cured colour to match adjacent concrete.
- .9 Begin polishing using #50-grit pad. Treat all surfaces, including edges. Supply constant stream of water during all grinding procedures.
- .10 Follow #50-grit polishing with #100-grit pad and polish all surfaces again.
- .11 Repeat procedure using successively finer grit pads until finishing using a #400 grit pad; required finish is 'Level 2 Class B' (honed with fine aggregate visible) per Concrete Polishing Association of America (CPAA) criteria.
- .12 Use hand-held diamond blocks or pads to polish any areas that cannot be reached by electric polisher. Use pads to round edges of counters: 3 mm radiused edges.
- .13 Clean surfaces and apply food-safe concrete penetrating sealer to all exposed concrete surfaces taking measures to protect adjacent surfaces from splashes etc..
- .14 Apply in 3 coats: prime coat diluted by clean potable water 7:1 to achieve 8% solids; first coat diluted with clean potable water 2:1 to achieve 21% solids; second topcoat diluted with clean potable water 2:1 to achieve 21% solids.

3.9 CURING AND SEALING

- .1 Comply with the requirements of Structural Drawings, and as follows:
 - .1 Maintain all material and equipment required for curing and protection on hand at the Site prior to placing any concrete.
 - .2 Do not commence curing until after finishing.
 - .3 Commence curing of exposed surfaces as soon as the concrete has hardened sufficiently to prevent surface damage.
 - .4 Continuously moist cure all concrete for a minimum duration of 7 consecutive days at an ambient temperature maintained above 10°C.
 - .5 Continuously moist cure concrete by covering with absorptive mat or fabric kept wet by using a system of perforated pipes, mechanical sprinklers, porous hoses, or by other methods that keep all surfaces continuously wet. Initially cure formed surfaces by leaving forms in position and keeping such forms continuously wet.
 - .6 Do not use curing water that is more than 11°C cooler than the concrete temperature.
 - .7 Use of curing and sealing compounds as specified is acceptable, but must be uniform in application, and provide a consistent finished appearance. Use one product only for exterior work, and one product only for interior work.
 - .1 Apply curing and sealing compounds at a uniform rate by mechanical application methods. Provide complete coverage by applying 2 coats at right

angles to each other. Coverage rates as recommended by product manufacturer. Apply curing compound immediately after finishing and as soon as the free water on the surface has disappeared and no water sheen is visible, but not so late that the compound will be absorbed into the concrete.

3.10 JOINT SEALANTS AND CONCRETE SEALERS

- .1 Seal horizontal control joints, isolation joints and edge joints with appropriate fillers and sealants.
- .2 Mask as required. Clean sealant from adjacent surfaces.
- .3 Apply penetrating concrete sealer in accordance with sealer manufacturer's printed preparation and application instructions.

3.1 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 11 00 - General Requirements: Cleaning. 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 11 00 - General Requirements: Cleaning.
- .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 11 00 - General Requirements: Waste Management and Disposal. Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.2 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by Work of this Section.

END OF SECTION