
Part 1 General

1.1 RELATED SECTIONS

- .1 Section 03 10 00 - Concrete Forming
- .2 Section 03 20 00 - Concrete Reinforcing

1.2 REFERENCES

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM C260/260M-10a, Specification for Air-Entraining Admixtures for Concrete.
 - .2 ASTM C309-11, Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - .3 ASTM C494/C494M-13, Specification for Chemical Admixtures for Concrete.
 - .4 ASTM C827/C827M-10, Test Method for Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures.
 - .5 ASTM C939-10, Standard Test Method for Flow of Grout for Preplaced-Aggregate Concrete (Flow Cone Method).
 - .6 ASTM C1330 - 02(2013), Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants.
 - .7 ASTM D412 - 06a(2013), Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension.
 - .8 ASTM D2240 - 05(2010), Standard Test Method for Rubber Property - Durometer Hardness.
 - .9 ASTM F593-13, Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
- .2 Canadian Standards Association (CSA)
 - .1 CAN/CSA-A3001-13 - Cementitious Materials for Use in Concrete.
 - .2 CAN/CSA-A23.1-14, Concrete Materials and Methods of Concrete Construction.
 - .3 CAN/CSA-A23.2-14, Methods of Test for Concrete.
- .3 Society for Protective Coatings (SSPC)
 - .1 SSPC-SP12, Surface Preparation and Cleaning of Steel and Other Hard Materials by High and Ultra High Pressure Water Jetting Prior to Recoating.

1.3 DESIGN REQUIREMENTS

- .1 Alternative 1 - Performance: in accordance with CSA-A23.1/A23.2, and as described in MIXES of PART 2 - PRODUCTS.

1.4 SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit mix designs for consultant review for all mix designs related to the project.
- .3 Submit testing results and reports for review by Departmental Representative and do not proceed without written approval when deviations from mix design or parameters are found.
- .4 Concrete pours: submit accurate records of poured concrete items indicating date and location of pour, quality, air temperature and test samples taken as described in PART 3 - FIELD QUALITY CONTROL.
- .5 Submit product data for consultant review for joint sealant and backer rods.

1.5 QUALITY ASSURANCE

- .1 Submit to Departmental Representative, minimum 4 weeks prior to starting concrete work, valid and recognized certificate from plant delivering concrete.
 - .1 When plant does not hold valid certification, provide test data and certification by qualified independent inspection and testing laboratory that materials used in concrete mixture will meet specified requirements.
- .2 Minimum 4 weeks prior to starting concrete work, submit proposed quality control procedures for review by Departmental Representative on following items, where applicable:
 - .1 Falsework erection.
 - .2 Hot weather concrete.
 - .3 Cold weather concrete.
 - .4 Curing.
 - .5 Finishes.
 - .6 Formwork removal.
 - .7 Joints.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Concrete hauling time: maximum allowable time for concrete to be delivered to site of Work and discharged not to exceed 120 minutes after batching.
 - .1 Modifications to maximum time limit must be agreed to by Departmental Representative and concrete producer as described in CSA A23.1/A23.2.
 - .2 Deviations to be submitted for review by Departmental Representative.
- .2 Concrete delivery: ensure continuous concrete delivery from plant meets CSA A23.1/A23.2.

- .3 Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling.
 - .2 Divert unused concrete materials from landfill to local facility approved by Owner.
 - .3 Provide an appropriate area on the job site where concrete trucks can be safely washed. Divert unused admixtures and additive materials (pigments, fibres) from landfill to official hazardous material collections site as approved by the Owner.
 - .4 Unused admixtures and additive materials must not be disposed of into sewer systems, into ocean, onto ground or in other location where it will pose health or environmental hazard.
 - .5 Prevent admixtures and additive materials from entering drinking water supplies or streams. Using appropriate safety precautions, collect liquid or solidify liquid with inert, noncombustible material and remove for disposal. Dispose of waste in accordance with applicable local, Provincial/Territorial and National regulations.

Part 2 Products

2.1 MATERIALS

- .1 Cement: to CAN/CSA-A3001, Type 10 Portland Cement.
- .2 Water: to CSA-A23.1.
- .3 Aggregates: to CAN/CSA-A23.1/A23.2.
- .4 Admixtures:
 - .1 Air entraining admixture: to ASTM C260/260M.
 - .2 Chemical admixtures: to ASTM C494/C494M.
- .5 Shrinkage compensating grout: premixed compound consisting of non-metallic aggregate, Portland cement, water reducing and plasticizing agents to CSA-A23.1/A23.2.
 - .1 Compressive strength: 50 MPa at 28 days.
 - .2 Net shrinkage at 28 days: maximum 2 %.
- .6 Curing compound: to CSA-A23.1/A23.2, Type 1-chlorinated rubber.
- .7 Adhesive for anchoring reinforcing steel and anchor rods: Hilti HIT-HY 200 Adhesive or approved equal.
- .8 Joint sealant: Sikaflex 2c NS/SL or approved equal.

2.2 MIXES

- .1 Alternative 1 - Performance Method for specifying concrete: to meet performance criteria in accordance with CAN/CSA-A23.1/A23.2. (for interior slabs):

- .1 Use Type 10 cement or mixture of cement and supplementary cementing materials to CAN/CSA-A23.5-03.
- .2 Minimum compressive strength at twenty-eight (28) days: 21 MPa.
- .3 Class of exposure: N
- .4 Nominal size of coarse aggregate: 20mm
- .5 Slump at time and point of discharge: as per CSA specifications.
Air content: 0 to 3%.
- .6 Chemical admixtures: to be in accordance with CSA-A266.4-78.
- .2 Proportion normal density concrete in accordance with CAN/CSA-A23.1-14, Alternative one (1), to give the following properties (for concrete in exterior walls & footings):
 - .1 Use Type 10 cement or mixture of cement and supplementary cementing materials to CAN/CSA- A23.5.
 - .2 Minimum compressive strength at 28 days: as specified on drawings.
 - .3 Class of exposure: F-2.
 - .4 Nominal size of coarse aggregate: 20mm
 - .5 Slump at time and point of discharge: as per CSA specifications.
 - .6 Air content: 4 to 7%.
 - .7 Chemical admixtures: to be in accordance with CSA-A266.4.

Part 3 Execution

3.1 PREPARATION

- .1 Obtain Departmental Representative's approval before placing concrete.
 - .1 Provide 24 hours notice prior to placing of concrete.
- .2 Place concrete reinforcing in accordance with Section 03 20 00 - Concrete Reinforcing.
- .3 During concreting operations:
 - .1 Development of cold joints not allowed.
 - .2 Ensure concrete delivery and handling facilitates placing with minimum of re-handling, and without damage to existing structure or Work.
- .4 Pumping of concrete is permitted only after approval of equipment and mix.
- .5 Ensure reinforcement and inserts are not disturbed during concrete placement.
- .6 Prior to placing of concrete obtain Departmental Representative 's approval of proposed method for protection of concrete during placing and curing in adverse weather.
- .7 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.

- .8 Do not place load upon new concrete until authorized by Departmental Representative.

3.2 CONSTRUCTION

- .1 Do cast-in-place concrete work in accordance with CSA-A23.1/A23.2.
- .2 Finishing and curing:
- .1 Finish concrete in accordance with CSA-A23.1/A23.2.
 - .2 Use procedures as reviewed by Departmental Representative to remove excess bleed water. Ensure surface is not damaged.
 - .3 Cure concrete in accordance with ACI 308.1 specifications and the following:
 - .1 Wet cure concrete with a fog mist spray, sprinkler or wet burlap for 5 to 7 days; or
 - .2 Apply a liquid membrane forming curing compound, to be applied in 2 coats.
 - .4 Use curing compounds compatible with applied finish on concrete surfaces. Provide written declaration that compounds used are compatible.
 - .5 Slabs-on-grade to be finished in accordance with CSA A23.1, Table 19, Class C.
 - .6 Rub exposed sharp edges of concrete with carborundum to produce 3 mm radius edges unless otherwise indicated.
 - .7 Concrete shall be saw cut as soon as possible after finishing without causing excessive raveling and before shrinkage cracks occur. Saw cutting shall be completed within 24 hours of the concrete achieving final set.

3.3 FIELD QUALITY CONTROL

- .1 Inspection and testing of concrete and concrete materials will be carried out by testing laboratory designated by Owner for review in accordance with CSA-A23.1/A23.2.
- .2 Owner will pay for costs of tests.
- .3 Non-Destructive Methods for Testing Concrete: in accordance with CSA-A23.1/A23.2.
- .4 Inspection or testing by Consultant will not augment or replace Contractor quality control nor relieve Contractor of his contractual responsibility.

END OF SECTION