

PART 1 - GENERAL

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| <u>1.1 WORK INCLUDED</u> | .1 | This section specifies requirements for constructing cast-in-place concrete. Work includes supply and installation of formwork, reinforcement, concrete and accessories. |
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| <u>1.2 REFERENCE STANDARDS</u> | .1 | ASTM A933-2014, Standard Specification for vinyl Coated Steel Wire and Welded Wire Reinforcement. |
| | .2 | ASTM C260-10a, Standard Specification for Air-Entraining Admixtures for Concrete |
| | .3 | ASTM C309-11, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete. |
| | .4 | ASTM C494/C494M-2013, Standard Specification for Chemical Admixtures for Concrete. |
| | .5 | ASTM C1017-2013, Standard Specification for Chemical Admixtures for Use in Producing Flooring Concrete. |
| | .6 | AASHTO M182-05(R2012), Burlap Cloth Made from Jute or Kenaf. |
| | .7 | CAN/CSA-A3000-2013, Cementitious Materials Compendium. |
| | .8 | CSA-A23.1/A23.2-2014, Concrete Materials and Methods of Concrete Construction/Methods of Test Standard Practice for Concrete. |
| | .9 | CSA S269.3-M92(R2013), Concrete Formwork. |
| | .10 | CSA G30.18-2009, Billet-Steel Bars for Concrete Reinforcement |
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| <u>1.3 SUBMITTALS</u> | .1 | Submit shop drawings and samples in accordance with Section 01 33 00. |
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PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Portland Cement: to CSA Standard A3000, Type GU, Normal and CSA A23.1, Table 6, Type GU.
- .2 Blended Hydraulic Cement: CSA Standard A3000 and CSA A23.1, Table 7. Ternary blended cements may be used with the concurrence of the Departmental representative.
- .3 Aggregates: to CSA-A23.1. For exposure Classes C-XL, C-1, C-2, C-3, C-4 and F-1, supply certification that the concrete mixtures have been evaluated for alkali-aggregate reaction and that measures have been taken to improve the reaction.
- .4 Water: to CSA-A23.1, Table 9.
- .5 Admixtures:
 - .1 Air Entraining: to ASTM C260.
 - .2 Chemical: to ASTM C494/C494M or C1017 for flowing Concrete.
- .6 Supplementary Cementing Materials:
 - .1 Low Calcium Fly Ash (Class F): to CSA A3000 and CSA 23.1, Table 8. Certification shall be provided for the fly ash used in the concrete.
- .7 Reinforcement:
 - .1 Bars: to CSA G30.18, billet steel, grade 400, deformed.
 - .2 Welded Steel Wire Fabric: to ASTM A933.
 - .3 Bar Supports and Spacers: to CSA-A23.1.
- .8 Formwork:
 - .1 Forms: to CSA-A23.1, plywood and lumber, clean and free of loose knots, splits or metal.
 - .2 Release Agent: non-staining natural organic chemicals of sprayable consistency which prevent adhesion of concrete to forms.
 - .3 Design: to CSA S269.3.
- .9 Curing Compound: to CSA A23.1, white. Refer to AASHTO M182; ASTM 309.
- .10 Non-shrink Grout: pre-mixed, dry pack or pourable, containing non-metallic aggregate, plasticizing agents and cement, minimum compressive strength of 45 MPa at 28 days.

- 2.2 CONCRETE MIX .1 Proportion normal density concrete in accordance with CSA-A23.1, Alternative 1 to give following properties for interior equipment pads:
- .1 Cement: Type GU.
 - .2 Minimum compressive strength at 28 days: 25 MPa.
 - .3 Class of exposure: N.
 - .4 Nominal size of coarse aggregate: 20 mm.
 - .5 Slump at time and point of discharge: 80 ±30mm.
 - .6 Air content: 3% maximum.
 - .7 Chemical admixtures: type as approved, and in accordance with ASTM C494.
 - .8 Maximum water cement ratio: 0.55.
- .2 Ready mix plant shall conform to CSA and possess a current active membership in the Atlantic Provinces Ready Mix Concrete Association.

PART 3 - EXECUTION

- 3.1 GENERAL .1 Do concrete work to CSA-A23.1 and as herein specified.
- .2 Use ready-mixed concrete unless on-site mixing approved.
- .3 Do not change concrete mix without prior approval of Departmental Representative. Changes in material supply will require submission of a new mix design for review.
- .4 If on-site mixing is approved, equipment to be capable of accurately proportioning ingredients to produce required concrete.
- 3.2 FORMWORK AND FALSEWORK .1 Construct formwork and falsework to CSA-A23.1 and CSA S269.1.
- .2 Construct formwork to produce finished concrete to required shape, dimensions and levels indicated within tolerances required by CSA-A23.1. Provide close fitting joints to prevent leakage of mortar and form ties and bracing sufficient to withstand pressure of plastic concrete without deflection.
- .3 Use approved form release agent.
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- 3.2 FORMWORK AND FALSEWORK
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- .4 Do formwork removal in accordance with CSA A23.1.
- .5 Fill form tie holes with non-shrink mortar and finish to texture of adjacent concrete.
- 3.3 REINFORCEMENT AND EMBEDDED ITEMS
- .1 Clean reinforcing of rust build-up, mill scale or other coatings that prevent or reduce bond.
- .2 Bend all bars cold to measurements required.
- .3 Confirm reinforcement and inserts are not disturbed during concrete placement.
- .4 Place and support reinforcing using bar supports and side form spacers to obtain cover, spacing and location indicated.
- 3.4 PLACING
- .1 Place concrete to CSA A23.1, Section 7.
- .2 Place concrete on dampened base.
- .3 Convey concrete from mixer to forms by methods that will maintain specified slump and prevent segregation.
- .4 Do not drop concrete more than 1.5 metres vertically unless it can be shown that the concrete will not segregate. Deposit concrete in final position in forms to avoid lateral movement.
- .5 Place concrete in continuous operation, starting from lowest point in form, in lifts not greater than 500mm.
- .6 Vibrate or tamp each layer to obtain dense homogeneous structure free of cold joints, fill planes, voids and honeycombing. For vertical installation vibrate at least 150mm into previously placed layers. Concrete to be well bonded to all reinforcing steel, anchors, waterstops and other embedded parts.
- 3.5 JOINTS
- .1 Make joints in accordance with CSA-A23.1, Section 7.3.
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- 3.6 FINISHING .1 Finish concrete in accordance with CSA A23.1, Section 7.5.
- 3.7 CURING AND PROTECTION .1 Provide curing and protection to CSA A23.1, Section 7.4. The temperature of the concrete as placed to be within the limits of Table 14.
- .2 After placing is completed, maintain minimum curing conditions for the concrete in accordance with CSA-A23.1, Section 7.4.
- 3.8 CONCRETE QUALITY .1 Departmental Representative will require inspection or testing of concrete in accordance with CSA-A23.1, using CSA certified concrete laboratory.
- 3.9 DEFECTIVE WORK .1 Remediate all structural defects in unexposed concrete such as spalling, low points and delaminating where defect could cause long term deterioration of the structure.
- .2 Remediate all structural defects and all aesthetic defects in exposed concrete. Aesthetic defects include honeycombing, blemishes, embedded debris from tie holes and other surface defects.
- .3 Submit method and obtain approval of Departmental Representative prior to proceeding with remediation of all structural and aesthetic defects.