Municipal Concrete Technical Specification

Concrete Sidewalks, Curbs and Gutters

CONCRETE ONTARIO

Ready Mixed Concrete Association of Ontario

Concrete Ontario has over 270 ECO certified concrete plants across Ontario.

In an industry with continuously evolving specifications, it is imperative that owners, contractors, consultants, municipalities, and concrete suppliers are aware which type of concrete should be used based on the application.

Concrete Ontario helps to educate said parties by providing guidance and training, to minimize performance issues of the concrete, but also to minimize liabilities for all parties involved.

The construction of concrete sidewalks, curbs and gutters is a daily occurrence in the province of Ontario, and very detailed specifications must be followed to provide municipalities with a durable, long-term product. Contractors and concrete suppliers must work collectively to provide exterior concrete flatwork that is both beautiful and durable when the optimal concrete performance mix is ordered, handled, placed, finished, cured and protected meeting the municipalities' specifications. Every aspect of the project must be carefully planned to ensure the concrete, in its hardened state, will be resilient and visually appealing.

Concrete Ontario is a not-for-profit association, serving the ready mixed concrete industry.

Concrete Ontario has compiled all the **latest municipal and national specifications** for concrete sidewalks, curbs and gutters. Based on the concrete exposure conditions for these applications, the following mix design specification should be the only standard used in Ontario **by all municipalities**. The raw materials comprising the specified mix design below must be in conformance with the latest OPSS and CSA A23.1 standards.

32MPa, Max. 0.45 w/cm, Class C-2, 5-8% air

A minimum 28-day strength of 32MPa. **(CSA A23.1:19 Table 2)**

Max. 0. 45 w/cm refers to the maximum water to cementing materials ratio. The lower the value, the less permeable and more durable the concrete will be. **(CSA A23.1:19 Table 2)**

Air entrainment provides freeze-thaw durability and the plastic air content range is dependent on aggregate size used. For typical 14-20 mm aggregate, the required air range is 5-8% air. **(CSA A23.1:19 Table 4)**

The class of exposure identifies the type of concrete and the environment the concrete will be subjected to. Class C-2 refers to non-structurally reinforced (i.e., plain) concrete exposed to chlorides and freezing and thawing. Class C-2, by default, requires a minimum 28-day strength of 32MPa. **(CSA A23.1:19 Tables 1 & 2)**

All Concrete Ontario certified ready mixed concrete producers **strictly** follow the **Performance Alternative of CSA A23.1:19 Table 5**. This alternative allows the suppliers to provide an optimized product through available resources and encourages competition amongst themselves. In turn, an overall superior product is provided to the industry.

Concrete Ontario members provide ~96% of all ready mixed concrete in Ontario.

Specification Parameter Summary

Performance Requirement	OPSS.MUNI 1350 (Nov. '19)	CSA A23.1:19	Ontario-Wide Mix Design Parameters
CSA Exposure Class	**1350.05.02.02** Concrete having various exposure classifications shall meet the most stringent requirements of CSA A23.1, Tables 1, 2, and 3	**Table 1 - Class C-2** Non-structurally reinforced (i.e., plain) concrete exposed to chlorides and freezing and thawing. Examples: Pavements, sidewalks, curbs, and gutters.	Class C-2
Maximum W/CM	**1350.05.02.02**	**Table 2 – Max. 0.45**	Max. 0.45
Minimum Specified Strength	**1350.05.02.03** The concrete compressive strength shall be according to CSA A23.1, Tables 1, 2, and 3, and as specified in the Contract Documents.	**Table 2 – 32MPa @ 28 d**	32MPa @ 28 d
SCM %	**1350.05.01.01** Portland cement shall be used; however, a portion of it may be replaced by SCM. HVSCM 1 concrete shall only be used with prior written approval of the Owner.	**Table 5 Alternative 1** The supplier shall d) certify that the concrete complies with the performance criteria specified	Not specified unless HVSCM 1 and 2 levels are being used (CSA A23.1 Clause 8.7.1)
Minimum cement content	**1350.04.02.01** The Contractor, in concert with the concrete supplier, shall: a) Establish the concrete mix properties to meet performance criteria for plastic and hardened concrete	**Table 5 Alternative 1** The supplier shall d) certify that the concrete complies with the performance criteria specified	Not specified No minimum cement content 1. Identify Class of exposure 2. Identify maximum w/cm
Plastic Air Content, %	**1350.05.02.04** The total air content of the concrete, measured with an air meter immediately prior to placing, shall be as shown in CSA A23.1, Table 4.	**Table 4** Air content category 1 nominal maximum sizes of coarse aggregate (14-20mm) 5-8%	5-8%
Slump	**1350.05.02.05** Slump requirements shall be identified and reviewed by the Contractor and concrete supplier prior to construction	**4.3.2.3.1 General** Slump requirements shall be identified and reviewed by the contractor and concrete supplier prior to construction.	Target slump specified by contractor and concrete supplier. The tolerances for concrete slump acceptance and rejection in the Work Area shall be as follows: a) Slumps < 80 mm – tolerance: ± 20 mm b) Slumps 80-180 mm – tolerance: ± 30 mm c) Slumps > 180 mm – tolerance: ± 40 mm

Owners may still order concrete to a *Prescriptive Specification* as outlined in CSA A23.1 Table 5. If this option is selected, the Owner shall identify the following:

1. The mix proportions, including the quantities of any or all materials (i.e., admixtures, aggregates, cementitious materials, and water) by mass per m^3 of concrete
2. The range of air content
3. The slump range
4. Any other requirements

Concrete Ontario members will be sending along the Prescriptive Mix Design Acknowledgement Letter to all Owners selecting this option.

References:

1. CSA A23.1:19/A23.2:19 - Concrete materials and methods of concrete construction/Test methods and standard practices for concrete
2. OPSS.MUNI 1350 (Nov. '19) - Material specification for concrete – Materials and production