

# Municipal Concrete Technical Specification

## Concrete Sidewalks, Curbs and Gutters



Ready Mixed Concrete  
Association of Ontario

Concrete Ontario has over 250 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 non-profit association, serving the ready mixed concrete industry.

**The pillar to the success of any project is a clearly defined material design specification!**

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**



Not 25MPa, not 30MPa, but a minimum 28-day strength of **32MPa**.  
(CSA A23.1-14 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 A23.1-14 Table 2)

~~Min. 325kg/m<sup>3</sup>~~

~~Min. 355kg/m<sup>3</sup>~~

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

~~4.5-7.5% air~~

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 A23.1-14 Tables 1 & 2)

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



All Concrete Ontario ECO certified ready mixed concrete producers **strictly** follow the **Alternative #1 Performance, of CSA A23.1-14 Table 5** titled “**Alternative methods for specifying concrete.**” This alternative allows the suppliers to provide an optimized product through their available resources and encourages competition amongst themselves. In turn, an overall superior product is provided to the industry.

When owners or concrete specifiers **impose limits on mix proportions, plastic concrete specifications or ask for other requirements in contrast to the aforementioned design, the full responsibility of concrete performance is assumed by the owner as per the Alternative #2 Prescription, of CSA A23.1-14 Table 5.**

### Frequently asked specification questions:

- Does a minimum cement content need to be specified?** The answer is **NO**. Specifying minimum cement contents is an obsolete approach and should be discontinued for any sidewalk, curb and gutter projects. The concrete supplier uses their available resources to meet the minimum requirements for these applications. If a minimum cement content is specified, alternative 2, the prescription approach is in effect and the owner assumes full responsibility for the concrete. (CSA A23.1-14 Table 5) 
  - Should the slag or fly ash percentage be limited in the specification?** The answer is **NO**. The concrete supplier is responsible for the performance of the mix and through customer feedback and experience will be able to set percentage limits internally to provide a quality product. In addition, effective use of supplementary cementing materials must be encouraged from a sustainability aspect. The percentage of supplementary cementing materials is not disclosed until the values approach HVSCM 1 and HVSCM 2 limits. (CSA A23.1-14 8.7.1)   

  - What slump should be specified for concrete sidewalks, curbs and gutters?** The answer is, **it depends!** The applications will dictate what slump the contractor wishes to use. Limiting a slump range other than using the tolerances specified in CSA A23.1 4.3.2.3.2 (I.e. Max. 80 mm) hinders the concrete supplier from providing a consistent mixture and it limits the contractor’s ability to perform their work. Implications may include additional costs due to rejected loads and delays in the project schedule. Slump and workability requirements are best addressed by the designer, contractor, and producer discussing the project requirements. 
- Typical slumps and tolerances preferred by the industry for sidewalks, curbs and gutters:**  
**Hand work: 80 ± 30 mm      Machine work: 40 ± 20 mm**
- Should the plastic air content range be adjusted?** The answer is **NO**. The plastic air range is defined in CSA A23.1-14 Table 4 and must be followed to meet the durability requirements of the required class of exposure. Without any technical justification, the air range should not be altered as it compromises the supplier’s ability to provide a consistent and predictable air content. 
  - What else should be considered?** Proper timing, handling and placing, curing and protection of the concrete to ensure that the specified product as delivered will perform in its hardened state. The importance of early concrete curing cannot be overstated! For additional information please visit [ConcreteOntario.org](http://ConcreteOntario.org).

### References:

- CSA A23.1-14/A23.2-14 - Concrete materials and methods of concrete construction/Test methods and standard practices for concrete
- OPSS.MUNI 1350 (Nov. '14) - Material specification for concrete – Materials and production
- OPSS.MUNI 904 (Nov. '12) - Construction specification for concrete structures