



Note: The MUNI implemented in November 2021 replaces OPSS 1352 COMMON, November 1989 with no technical content changes.

MATERIAL SPECIFICATION FOR PRECAST CONCRETE BARRIERS

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1352.01	SCOPE
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This specification covers the requirements for precast concrete barriers.

1352.01.01 Specification Significance and Use

This specification is written as a municipal-oriented specification. Municipal-oriented specifications are developed to reflect the administration, testing, and payment policies, procedures, and practices of many municipalities in Ontario.

Use of this specification or any other specification shall be according to the Contract Documents.

1352.01.02 Appendices Significance and Use

Appendices are not for use in provincial contracts as they are developed for municipal use, and then, only when invoked by the Owner.

Appendices are developed for the Owner's use only.

Inclusion of an appendix as part of the Contract Documents is solely at the discretion of the Owner. Appendices are not a mandatory part of this specification and only become part of the Contract Documents as the Owner invokes them.

Invoking a particular appendix does not obligate an Owner to use all available appendices. Only invoked appendices form part of the Contract Documents.

The decision to use any appendix is determined by an Owner after considering their contract requirements and their administrative, payment, and testing procedures, policies, and practices. Depending on these considerations, an Owner may not wish to invoke some or any of the available appendices.

1352.02 REFERENCES

When the Contract Documents indicate that municipal-oriented specifications are to be used and there is a municipal-oriented specification of the same number as those listed below, references within this specification to an OPSS shall be deemed to mean OPSS.MUNI, unless use of a provincial-oriented specification is specified in the Contract Documents. When there is not a corresponding municipal-oriented specification, the references below shall be considered to be the OPSS listed, unless use of a provincial-oriented specification is specified in the Contract Documents.

This specification refers to the following standards, specifications or publications:

Ontario Provincial Standard Specifications, Material

OPSS 1301	Cementing Materials
OPSS 1350	Concrete - Materials and Production
OPSS 1440	Steel Reinforcement for Concrete
OPSS 1442	Epoxy Coated Reinforcing Steel Bars for Concrete
OPSS 1443	Organic Coatings for Steel Reinforcement (Concrete)

CSA Standards

CSA G164-M1981	Hot Dip Galvanizing of Irregularly Shaped Articles
CSA G189-1966	Sprayed Metal Coatings for (R1980) Atmospheric Corrosion Protection

American Society for Testing and Materials

ASTM C672-84	Test Method for Scaling Resistance of Concrete Specimens Subjected to Freezing
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1352.05 MATERIALS

1352.05.01 Concrete

Concrete shall be according to OPSS 1350, except that the restrictions on volume batching shall not apply. The Contractor shall assume the responsibility for the mix design. The following specific requirements shall apply:

Class of Concrete	30 MPa at 28 Days
Coarse Aggregate	19.0 mm nominal max. size
Maximum Slump	60 mm
Air Content	6% ± 1.5%

1352.05.02 Cement

Cement shall be Portland Cement, Portland Blast-Furnace Slag Cement (Type 10S or Type 10SM), or Portland Pozzolan Cement (Type 10P) according to OPSS 1301. Ground granulated blast-furnace slag or fly ash may be used in conjunction with Normal Portland Cement (Type 10). Ground granulated blast-furnace slag shall be according to OPSS 1301 and it shall constitute not more than 70% by the mass of the total cementing material. Fly ash shall be according to OPSS 1301 (Type F or Type C) and it shall constitute not more than 40% by the mass of the total cementing material.

1352.05.03 Barrier Connections

The precast concrete barrier connections shall be one of the following approved types:

- a) Hook and Eye
- b) Concrete Key
- c) I-Lock Connection

1352.05.04 Interlocking Components

All interlocking devices and exposed metal in the precast concrete barrier units shall be protected by using one of the following methods:

- a) Hot dip galvanizing according to CSA G164 providing a minimum zinc coating of 0.61 kg².
- b) Zinc metallizing according to CSA G189 providing a minimum metallized coating of 200 µm thickness.
- c) Coating with an approved organic coating material according to OPSS 1443.

1352.05.05 Reinforcing Steel

All reinforcing steel in permanent precast concrete barriers shall be epoxy coated according to OPSS 1442. All reinforcing steel in temporary concrete barriers shall be according to OPSS 1440.

1352.07 PRODUCTION

1352.07.01 Curing Methods

Curing shall be according to the method as submitted and approved by the Owner.

1352.07.02 Marking

The following information shall be permanently marked on the top or sides of the precast sections:

- a) Name or trademark of the manufacturer.
- b) Identification of plant if manufacturer has more than one plant.
- c) The date of manufacture.

1352.07.03 Quality Control

1352.07.03.01 Salt Scaling Test

For quality control purposes, the Contractor may use a modified version of the "Salt Scaling Test" described in section 1352.08. The modified version to be used is the visual evaluation of the surface deterioration according to ASTM C672.

1352.08 QUALITY ASSURANCE

1352.08.01 Salt Scaling Test

1352.08.01.01 General

The acceptance of permanent precast concrete barrier will be based on the results of the Salt Scaling Test as carried out by the Owner and as described in this specification.

This test determines the resistance of concrete specimens, with a salt solution ponded on the surface, to repeated cycles of freezing and thawing. Compliance with the test requirement is based upon a loss of mass of not more than 0.8 kg/m² from the surface after 50 cycles of freezing and thawing.

After 50 freeze-thaw cycles the test specimen shall not exhibit deterioration in the form of cracks, spalls, aggregate disintegration, or other objectionable features.

1352.08.01.02 Apparatus

The freezing apparatus shall consist of a suitable cabinet or cold room capable of maintaining an air temperature of -18 °C ± 2 °C.

The thawing and air drying apparatus shall consist of a suitable cabinet or room with controls to maintain an air temperature of 23 °C ± 2 °C and a relative humidity of 50 percent ± 5 percent. The scales or balance shall have a minimum capacity of 5,000 g with an accuracy of 0.1 g. The drying oven shall be capable of maintaining a temperature of 105 °C ± 2 °C.

1352.08.01.03 Freezing and Thawing Cycle

One freeze-thaw cycle shall be completed every 24 hours. The cycle shall consist of 16 hours \pm 1 hour freezing followed by 8 hours \pm 1 hours thawing. When, due to work schedules or other reasons a thaw period cannot commence at the specified time, the specimens shall remain in the freezing cabinet at $-18\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$.

1352.08.01.04 Test Specimens

For the purposes of the test, two specimens 75 mm thick and at least 300 x 300 mm or 300 mm in diameter will be selected from the finished product by the Owner's representative. Specimens shall be representative of the Contractor's production.

Upon receipt of the specimens in the laboratory an epoxy mortar dyke or other suitable dyke shall be cast around the edges of the test specimen to expose a surface 250 x 250 mm or 250 mm in diameter, as shown in Figure 1. The surface of the specimen ponded in this test will normally be the outside surface of the barrier.

The dyked surface shall be flooded with water, 6 mm deep for 3 days to check for possible leakage.

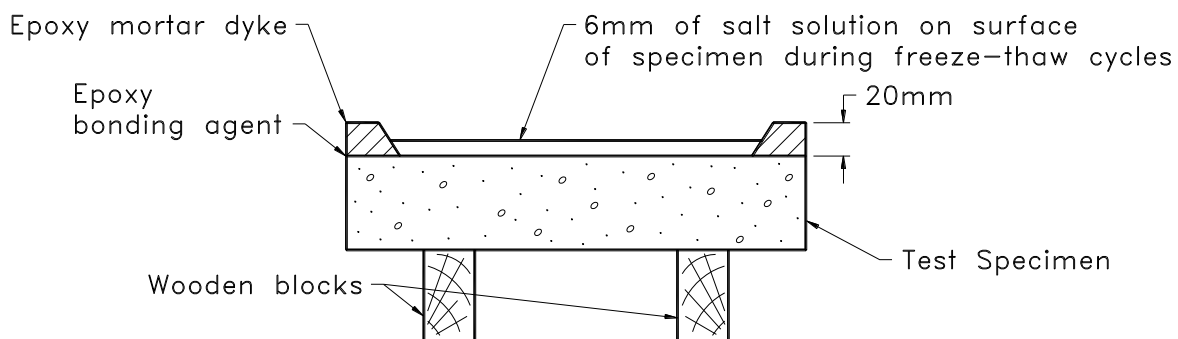


Figure 1

1352.08.01.05 Test Procedure

The water on the surface of the specimens shall be replaced by a solution of sodium chloride (concentration 3 percent by mass) to a depth of 6 mm.

The specimens shall then be subjected to continuous freeze-thaw cycles as specified in clauses 1352.08.01.01 and 1352.08.01.03.

After each 5 cycles, the salt solution and the particles of deteriorated concrete shall be removed from the slab and collected in a watertight container. The operation is best accomplished by tilting the slab into a funnel approximately 500 mm in diameter and washing the surface of the slab with a 3 percent sodium chloride solution. This washing should continue until all loose particles are removed from the concrete. The solution shall then be strained through a filter and the residue dried out at $105\text{ }^{\circ}\text{C}$ to a constant weight condition. The residue shall be cumulatively weighed after each 5 cycles. This residue shall be defined as the loss of mass and expressed in kilograms per square metre of exposed slab area.

The loss of mass shall be calculated to the nearest 0.1 kg/m^2 .

After the washing of each slab a new solution of sodium chloride shall be placed on the surface.

The test shall continue until 50 freeze-thaw cycles have been completed.

During the test, each specimen shall be positioned and supported to allow free air circulation under, around, and over the test pieces.

The bottom of the specimens shall be supported on wooden blocks but not in a manner as to prevent movement of moisture through the test pieces.

1352.08.01.06 Report

The report shall include the following:

- a) Identification.
- b) Photographs of the test specimens before and after the 50 cycle freeze-thaw test. Photographs at intermediate stages of the test are optional.
- c) A graph of the cumulative mass loss of each specimen plotted in kilograms per metre squared against the number of freeze-thaw cycles at 5 cycle intervals.

1352.09 OWNER PURCHASE OF MATERIAL

1352.09.01 Measurement and Payment

For measurement purposes, a count shall be made of the number of precast concrete barrier units delivered and accepted.

Payment at the price specified in the purchasing order shall be for the supply of precast barrier units delivered to the destination on the date and time specified.

**Appendix 1352-A, November 2021
FOR USE WHILE DESIGNING MUNICIPAL CONTRACTS**

Note: This is a non-mandatory Commentary Appendix intended to provide information to a designer, during the design stage of a contract, on the use of the OPS specification in a municipal contract. This appendix does not form part of the standard specification. Actions and considerations discussed in this appendix are for information purposes only and do not supersede an Owner's design decisions and methodology.

Designer Action/Considerations

The designer should ensure that the General Conditions of Contract and the 100 Series General Specifications are included in the Contract Documents.

Related Ontario Provincial Standard Drawings

No information provided here.