MATERIAL SPECIFICATION FOR FRAMES, GRATES, COVERS, AND GRATINGS

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1850.01 SCOPE

This specification covers the requirements for frames with grates or covers for catch basins, maintenance holes, and valve chambers; ditch inlet gratings; and locking devices.

1850.01.01 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 as specified in the Contract Documents.

1850.01.02 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.

1850.02 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:

CSA Standards

G164-M92 (R2003)	Hot Dip Galvanizing of Irregularly Shaped Articles
W59-13	Welded Steel Construction (Metal Arc Welding)
CSA S6: 19	Canadian Highway Bridge Design Code

ASTM International

A36M-14	Carbon Structural Steel
A48M-03 (2016)	Gray Iron Castings
A536-84 (2009)	Ductile Iron Castings
F738M-02 (2014)	Stainless Steel Metric Bolts, Screws, and Studs
F836M-02 (2010)	Style 1 Stainless Steel Metric Nuts

Society of Automotive Engineers (SAE)

J403-2014	Chemical Compositions of SAE Carbon Steels

National Association of Architectural Metal Manufacturers (NAAMM)

Metal Bar Grating Manual

1850.03 DEFINITIONS

For the purpose of this specification, the following definitions apply:

Cover means a cast iron or ductile iron casting to allow access into a maintenance hole or valve chamber.

Frame means a cast iron or ductile iron casting to support a cover or grate.

Grate means a cast iron or ductile iron casting with parallel or lattice of cross bars to allow water flow and access into a catch basin or ditch inlet.

Grating means a fabricated lattice of steel bars covering a drain, ditch inlet, or pipe outlet.

Locking Device means a device consisting of a cast iron or ductile iron-locking lug and stainless steel bolt, nut, and washer to secure a cover to a frame.

Reticuline Bar means a sinuously bent connecting bar extending between two adjacent bearing bars, alternately contacting and being riveted to each other.

1850.04 DESIGN AND SUBMISSION REQUIREMENTS

1850.04.01 Design Requirements

Frames, grates, covers, and gratings shall be designed to an ultimate limit state of 166.6 kN wheel load. This load includes a live load factor and a dynamic load allowance specified in CSA S6. The load application shall be distributed over an area of 250 x 250 mm.

1850.05 MATERIALS

1850.05.01 Frames With Grates or Covers

1850.05.01.01 Castings

Castings shall be according to ASTM A48M, Class No. 30B, or ASTM A536, Grade 65-45-12.

1850.05.01.02 Bolts and Nuts

All bolts, nuts, and washers shall consist of stainless steel Type 304. Bolts shall be according to ASTM F738M and nuts shall be according to ASTM F836M.

1850.05.01.03 Locking Devices

All components shall be manufactured from material compatible with the associated frame and cover.

Locking lugs shall be cast according to ASTM A48M, Class No. 30B, or ASTM A536, Grade 65-45-12.

1850.05.01.04 Hinge Pins

Steel for hinge pins shall be according to ASTM A36M.

Steel pins shall be cast into the grate during the pouring and filling operation. Pins shall not be added after the grate is cast.

1850.05.02 Gratings

1850.05.02.01 Welded Steel Gratings

Steel for bearing bars and cross bars shall be according to ASTM A36M.

1850.05.02.02 Riveted Steel Gratings

Steel for bearing bars shall be according to ASTM A36M.

Steel for reticuline bars shall be according to ASTM A36M.

Rivets shall be flat-headed according to SAE J403, Grade No. 1015.

1850.05.02.03 Fasteners

Fasteners, except for the bolts, shall be hot dipped galvanized according to CSA G164-M. The bolt thread shall be coated with white non-staining grease after galvanizing.

1850.07 PRODUCTION

1850.07.01 Frames, Grates, and Covers

The castings shall be produced as specified in the Contract Documents.

The castings shall be sound, free from pouring faults, sponginess, cracks, blowholes, and other defects.

Circular frames, covers, and grates shall be furnished with machined horizontal bearing surfaces as specified in the Contract Documents. All square and rectangular frames and grates shall be furnished with an as-cast bearing surface.

1850.07.01.01 Tolerances

a) For the rectangular frame with two piece cover for meter and valve chambers, tolerances shall be as specified in the Contract Documents.

b) For all other castings, the overall casting dimensions shall conform to the following tolerances:

   i. 300 mm or less, $\pm$ 3 mm
   ii. Up to and including 900 mm, $\pm$ 6 mm

1850.07.01.02 Markings

The initials or trademark of the manufacturer, product code, year of manufacture, and additional lettering, logos, or markings as specified in the Contract Documents shall be distinctly cast in raised letters on the top side of the frame and the grate or cover.

The word DANGER shall be distinctly cast in the centre portion of the top side of all maintenance hole covers and shall be a minimum of 50 mm in height and a minimum of 6 mm in depth.

If iron for the casting is melted and poured at one foundry and labelled with the name of another organization, manufacture, or foundry, the castings shall include both the name of the producing foundry and the organization for which the casting is produced. This lettering shall be cast so that the producing foundry and the organization for which the casting is produced can be easily identified on the same side of the casting.

The initials or trademark of the manufacturer, country of manufacture, and date of manufacture (yyyy/mm/dd) shall be cast on the underside of the grate or cover, and as well, on either the top side of the frame flange or on the inside of the frame.

1850.07.01.03 Finish

All surfaces shall be bare, without any coating. The surfaces of castings shall be uniform and free of flaking rust or mounds of rust or debris.

When specified in the Contract Documents, all surfaces shall be painted in the shop with one coat of asphalt or tar base black paint having a minimum softening point of 71 °C. All joints shall be thoroughly coated.

1850.07.02 Gratings

Gratings shall be produced as specified in the Contract Documents.

1850.07.02.01 Welded Gratings

The end bearing bars shall be welded to the angle bars along both legs with a 5 mm fillet weld. Other bearing bars shall be spot welded on each end to the angle bar. Crossbars shall be spot welded at each point of contact with the bearing bars. Welding shall be according to CSA W59.

1850.07.02.02 Reticuline Bars

The section of reticuline bar parallel to the bearing bar at each rivet shall not exceed 40 mm.

1850.07.02.03 Tolerances

All tolerances shall be within the limits specified in the NAAMM Metal Bar Grating Manual.

1850.07.02.04 Finish

Gratings shall be hot dipped galvanized according to CSA G164-M.

1850.07.03 Locking Devices

Locking devices shall be produced as specified in the Contract Documents.

1850.08 QUALITY ASSURANCE

1850.08.01 Certificate

When requested by the Owner, the Contractor shall provide a certificate from the manufacturer to indicate that the product was produced and tested according to the appropriate specification requirements. The certificate shall be from an independent testing laboratory currently accredited by the Standards Council of Canada.

1850.08.02 Inspection and Testing

When requested by the Owner, 2 Type B test bars for each lot of castings as described in ASTM A48M shall be supplied for tension testing. Test results for the test bars shall be reported within 2 weeks from receipt of the test bars. Testing shall be completed by an independent testing laboratory currently accredited by the Standards Council of Canada.

Additionally, when requested by the Owner, an independent testing laboratory currently accredited by the Standards Council of Canada shall perform load testing and dimensioning of sample castings.

The Owner reserves the right to make inspections and tests at such time as the Owner may consider necessary to ensure the materials are in accordance with this specification. All materials failing to comply with the requirements of this specification shall be rejected.

1850.09 OWNER PURCHASE OF MATERIAL

For measurement purposes, a count shall be made of the number of grates covers and gratings with their associated frames and locking devices accepted.

Payment at the price specified in the purchasing order shall be for the supply of catch basin grates, maintenance hole and valve chamber covers, ditch inlet gratings, drain inlet gratings, pipe outlet gratings, and their associated frames and locking devices delivered to the destination on the date and time specified.

The cost of all testing, except that performed in the Owner's laboratory, shall be included in the price.

Appendix 1850-A, November 2020
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 determine if the following is required, and, if so, specify it in the Contract Documents:

- Additional lettering, logos, and markings on the top side of the frames, grates, and/or covers. (1850.07.01.02)

- If the surfaces of castings are to be painted in the shop. (1850.07.01.03)

The designer should include OPSD 402.030, Cast Iron, Rectangular Frame with Two-Piece Cover for Meter and Valve Chambers, in the Contract Documents for the tolerances shown on the drawing, as the tolerances for these frames and covers are more restrictive than other castings for frames with grates or covers. (1850.07.01.01)

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

OPSD 400.001	Hoisting Hook Rib for Cast Iron Frames for Catch Basins, Maintenance Holes, and Valve Chambers
OPSD 400.010	Cast Iron, Square Frame with Square Overflow Type Dished Grate for Catch Basins, Herring Bone Openings
OPSD 400.020	Cast Iron, Square Frame with Square Flat Grate for Catch Basins, Herring Bone Openings
OPSD 400.030	Cast Iron, Square Frame with Square V Grate for Catch Basins, Herring Bone Openings
OPSD 400.040	Cast Iron, One-Piece Frame and Flat Square Grate for Temporary Installation, Herring Bone Openings
OPSD 400.070	Cast Iron, Raised Square Frame with Circular Flat Grate for Catch Basins, Herring Bone Openings
OPSD 400.080	Cast Iron, Side Inlet for Catch Basins
OPSD 400.081	Cast Iron, Curb Inlet Frame with Two-Piece Raised Cover for Catch Basins Out of Roadway
OPSD 400.082	Cast Iron, Raised Curb Inlet Frame with Cover for Catch Basins Out of Roadway
OPSD 400.090	Cast Iron, Curb Inlet Overflow for Catch Basins
OPSD 400.100	Cast Iron, Square Frame with Square Flat Grate for Catch Basins, Perforated Openings
OPSD 400.110	Cast Iron, Square Frame with Square Overflow Type Flat Grate for Catch Basins, Perforated Openings
OPSD 400.120	Cast Iron, Square Frame with Birdcage Grate for Catch Basins
OPSD 401.010	Cast Iron, Square Frame with Circular Closed or Open Cover for Maintenance Holes
OPSD 401.020	Cast Iron, Circular Frame with Circular 745 mm Cover for Maintenance Holes
OPSD 401.030	Cast Iron, Square Frame with Circular Watertight Cover for Maintenance Holes

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OPSD 401.040	Cast Iron, Raised Square Frame with Circular Closed or Open Cover for Maintenance Holes
OPSD 401.050	Cast Iron, Raised Square Frame with Circular Watertight Cover for Maintenance Holes
OPSD 401.060	Cast Iron, Circular Locking Cover for Maintenance Holes
OPSD 402.010	Cast Iron, Square Frame with Circular Cover and Plug for Valve Chambers
OPSD 402.011	Cast Iron, Square Frame with Vented Circular Cover and Plug for Valve Chambers
OPSD 402.020	Cast Iron, Raised Square Frame with Circular Cover and Plug for Valve Chambers
OPSD 402.021	Cast Iron, Raised Square Frame with Vented Circular Cover and Plug for Valve Chambers
OPSD 402.030	Cast Iron, Rectangular Frame with Two Piece Cover for Meter and Valve Chambers
OPSD 403.010	Galvanized Steel Honey Comb Grating for Ditch Inlets
OPSD 403.011	Raised Bar Grate for Ditch Inlet, 600 x 600 mm
OPSD 804.050	Grating for Concrete Endwall