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**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.

1850.02 REFERENCES

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

CSA Standards

G164-M92 (R2003) Hot Dip Galvanizing of Irregularly Shaped Articles
W59-03 Welded Steel Construction (Metal Arc Welding)
CAN/CSA-S6-14 Canadian Highway Bridge Design Code

ASTM International

A 36/A 36M-08 Carbon Structural Steel

A 48/A 48M-03 Gray Iron Castings
A 536-84 (2009) Ductile Iron Castings
F 738M-02 (2008) Stainless Steel Metric Bolts, Screws, and Studs
F 836M-02 (2010) Style 1 Stainless Steel Metric Nuts

Society of Automotive Engineers (SAE)

J403-01 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 CAN/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 A 48M, Class No. 30B, or ASTM A 536, 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 F 738M and nuts shall be according to ASTM F 836M.

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 A 48M, Class No. 30B, or ASTM A 536, Grade 65-45-12.

1850.05.01.04 Hinge Pins

Steel for hinge pins shall be according to ASTM A 36M.

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 A 36M.

1850.05.02.02 Riveted Steel Gratings

Steel for bearing bars shall be according to ASTM A 36M.

Steel for reticuline bars shall be according to ASTM A 36M.

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, ± 3 mm
 - ii. Up to and including 900 mm, ± 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, manufacturer, 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 A 48M 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.