

PROPOSED ONTARIO PROVINCIAL **STANDARD SPECIFICATION**

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**MATERIAL AND PERFORMANCE SPECIFICATION FOR
WATERTIGHT FRAMES, COVERS, EXTENSION RISERS AND ADJUSTMENT UNITS**

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18XX.01 SCOPE

This specification covers the requirements for a watertight cover system consisting of a frame, a cover, an extension riser, and adjustment units for maintenance holes and valve chambers.

18XX.01.01 Specification Significance and Use

This specification has been developed for use in provincial and municipal-oriented Contracts. The administration, testing, and payment policies, procedures, and practices reflected in this specification correspond to those used by many municipalities and the Ontario Ministry of Transportation.

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

18XX.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.

18XX.02 REFERENCES

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

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

| | |
|------------|---|
| W59 | Welded Steel Construction (Metal Arc Welding) |
| CAN/CSA-S6 | Canadian Highway Bridge Design Code |

ASTM International

| | |
|------------|--|
| A 36/A 36M | Carbon Structural Steel |
| A 48/A 48M | Gray Iron Castings |
| A 536 | Ductile Iron Castings |
| D 412 | Vulcanized Rubber and Thermoplastic Elastomers - Tension |
| D 2240 | Rubber Property - Durometer Hardness |
| D 573 | Test Method for Rubber – Deterioration in an Air Oven |
| D 746 | Test Method for Rubber – Low Temperature Brittleness Point |
| D 1149 | Test Method for Rubber Deterioration – Surface Ozone Cracking in a Chamber |
| D 1248 | Polyethylene Plastics Extrusion Materials for Wire and Cable |

18XX.03 DEFINITIONS

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

Adjustment Units means circular or rectangular units used between the structure and the frame to adjust the elevation.

Castings means cast iron or ductile iron casting.

Composite means a structurally rigid engineered material made from blending two or more constituent materials comprising of fibres and a polymer matrix.

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

EPS means expanded polystyrene.

Extension Riser means a cast iron, ductile iron casting, composite moulding, rubber moulding, HDPE moulding or EPS moulding, designed to mate with the frame and to support a cover.

Frame means a cast iron, ductile iron casting, rubber moulding, composite moulding, HDPE moulding or EPS moulding, to support a cover and an extension riser.

HDPE means high density polyethylene.

Locking Device means a device used in conjunction with a fastener to positively lock the fastener. The locking device shall prevent the fastener from becoming loose when subjected to vibrations.

Rubber means vulcanized rubber made of high-grade natural rubber, synthetic rubber or a blend of both.

Thermoplastic Elastomer (TPE) means a material composed either of copolymers and/or a physical mix of polymers with both thermoplastic and elastomeric properties.

Watertight Cover System means at least a minimum assembly consisting of a cover and a frame. A full assembly may include an extension riser(s) and adjustment unit(s).

18XX.04 DESIGN AND SUBMISSION REQUIREMENTS

18XX.04.01 Design Requirements

- a) The watertight cover system shall, when assembled according to the Manufacturer's recommendations, be designed to resist the inflow and infiltration of water. Connections covered by this specification are adequate for inflow and infiltration hydrostatic pressures up to 48kPa (4.93m of water).
- b) Frames, covers, adjustment units and extension risers and shall be designed to a yield 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.
- c) Each component part of the system shall have, as part of its construction, the ability to limit lateral movement after installation. Lateral movement shall be limited by the integration of an interlocking of the frame and adjustment risers, as well as between the adjustment risers on their opposing surfaces by a matching rib and groove system.
- d) The seal required between the various components of the watertight cover system and the whole of the watertight cover system and the maintenance hole or valve chamber shall be made by one, some or all of the following methods:
 - i. mechanical restraint
 - ii. compression of either or all of the following materials:
 - a) rubber
 - b) TPE
 - iii. adhesive
 - iv. casting the watertight cover system integrally with the surface of the maintenance holes, and valve chambers.

18XX.05 MATERIALS

18XX.05.01 Frames, Extension Risers, Adjustment Units

18XX.05.01.01 Castings

Castings shall be according to ASTM A 48M, Class No. 30B, or ASTM A 536, Grade 65-45-12.

18XX.05.01.02 Rubber

There shall be no reclaimed material incorporated in the finished product. The properties of the rubber shall be according to Table 1.

18XX.05.01.03 HDPE

HDPE frames, extension risers and adjustment units shall be manufactured of injection moulding material of high density polyethylene. The properties of the injection moulding material shall be according to ASTM D 1248, Type III, Class B, Category 3.

18XX.05.01.04 EPS

EPS frames, extension risers and adjustment units shall be manufactured using high density expanded polystyrene. Core material shall be made of expanded polystyrene that is polymerized during pre-expansion and aging. Recycled EPS material shall not be used.

18XX.05.02 Covers

18XX.05.02.01 Castings

Castings shall be according to ASTM A 48M, Class No. 30B, or ASTM A 536, Grade 65-45-12.

18XX.05.02.02 Composite

Composite mouldings shall be according to all applicable ASTM standards. In the absence of an applicable ASTM standard, it is the Owner's responsibility to accept the manufacturer's performance specifications.

18XX.05.03 Locking Devices, Bolts, Nuts and Fasteners

All components shall be manufactured from a non-corroding material compatible with the associated frame and cover.

18XX.07 PRODUCTION

18XX.07.01 Tolerances

The dimensions shall be within one percent of dimension to a maximum of 6mm.

18XX.07.02 Markings

18XX.07.02.01 Covers

The initials or trademark of the manufacturer, country of manufacture, and year of manufacture shall be cast on the underside of the cover, and as well, on either the top side of the frame flange.

18XX.07.02.02 Frame, Extension Riser and Adjustment Unit

Each frame, extension riser and adjustment unit shall be clearly marked in a manner that will not affect the performance of the assembly with the following information:

- a) Manufacturer's name.
- b) Product trade name/catalogue number, if applicable.

- c) Country of manufacture.
- d) Year of manufacture.
- e) On the surface of the adjustment unit is to be indicated as the top.

18XX.07.03 Finish

18XX.07.03.01 Castings

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.

18XX.07.03.02 Rubber, HDPE, EPS

All surfaces shall be such that they shall have no voided areas, cracks, separations, or protrusions. Ripples or sags on vertical walls shall not cover more than 10% of the surface area. The colour shall be consistent.

18XX.08 QUALITY ASSURANCE

18XX.08.01 Certificate

The Contractor shall provide to the Owner a current certificate from the Manufacturer to indicate that the watertight cover system was designed in accordance with 18XX.04.01 and tested in accordance with 18XX.08.02. The certificate shall be from an independent testing laboratory currently accredited by the Standards Council of Canada. A certificate shall be deemed current if it represents the current design and is no more than three years old from the date of the previous test.

18XX.08.02 Inspection and Testing

A hydrostatic pressure of 48 kPa (4.93 m of water) shall be applied to the exterior of the watertight manhole cover system for a period of 10 minutes.

There shall be no leakage through the watertight cover system's individual components as described in Section 18XX.03 and the watertight cover system as a whole. Leakage shall be construed to mean freely dripping water emanating at the interface between the various components as described in Section OPXX.03. Damp spots and beads of moisture adhering to the walls of the sections shall not be considered as leakage.

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.

18XX.09 OWNER PURCHASE OF MATERIAL

Payment at the price specified in the purchasing order shall be for the supply of maintenance hole and valve chamber covers, 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 18XX-A

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:

- In order not to exclude emerging technologies, the Owner reserves the right to specify a product which contains materials not covered in this specification provided the watertight cover system meets all requirements of this specification.
- Additional lettering, logos, and markings on the top side of the frames or covers. (18XX.07.02)
- If the surfaces of castings are to be painted in the shop. (18XX.07.03.01)

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

None.

TABLE 1
Rubber Properties

| | ASTM Standard | Test Requirements | Properties | Units |
|-----------------------------|------------------------------------|--|-------------------------------|---|
| Physical Properties | D 2240 D 412 | Min. Hardness Min. tensile strength Min. ultimate elongation | 75 1200 300 | Shore "A" points psi percentage |
| Heat Resistance | D 573 at Specified temp | Specified temp. of the test Aging time Max. change in durometer Max. change in tensile Max. change in elongation | 70 96 +15 -20 -25 | Deg. C Hours Shore "A" points percent percent |
| Compression Set | D395 Method B at Specified temp | Specified temp. of test Max. permissible change(after 22 hours) | 70 -25 | deg. C percent |
| Low Temp Brittleness | D 746 Procedure B | Tested at -40 deg. C | passes | |
| Ozone Resistance | D 1149 | Concentration of ozone Duration of test | 50 72 No cracks | mPa hours |