

Municipal Consent Requirements
for the Installation of Services
within the City of Toronto Streets

APPENDIX I SPECIFICATION FOR UNSHRINKABLE FILL

MT 13.10.01 SCOPE

This Specification covers the requirements for the supply of all materials, labour and equipment necessary for the placing of Unshrinkable Fill, in underground service and utility trenches, and around structures.

MT 13.10.02 REFERENCES

This specification refers to the latest (current) edition of the following:

Toronto Transportation Specifications

MT 13.00 – Non-Structural Concrete

Canadian Standards Association (CSA)

CAN/CSA-A23.2 – Methods of Test for Concrete

MT 13.10.03 DEFINITIONS

For the purposes of this specification the following definitions apply:

Commissioner: means the Commissioner of Transportation and designated staff and any appointed engineering firm and/or appointed testing firm for the Contract.

Unshrinkable Fill: means a mixture of aggregates, cementing material and water, with or without chemical admixtures, that hardens into a material with higher strength than soil but less than 0.4 Mpa compressive strength at 28 days, that can be removed with hand tools.

MT 13.10.04 SUBMISSION AND DESIGN REQUIREMENTS

MT 13.10.04.01 General

Any required submissions shall be in writing. All submissions shall be submitted to the Commissioner at least three weeks prior to the beginning of the work.

The requirements for submissions and design requirements are given in MT 13.00.

MT 13.10.04.02 MATERIALS

Prior to starting the work, the contractor shall supply the Commissioner with Material Safety Data Sheets (MSDS) for all the materials to be incorporated in the work.

MT 13.10.05 MATERIALS

MT 13.10.05.01 Supply of Materials

Unless otherwise specified in the Contract, the Contractor shall supply all materials necessary for the execution and completion of the work.

Unshrinkable Fill shall be supplied by a certified supplier from the Unshrinkable Fill Suppliers Qualification Program.

MT 13.10.05.02 Unshrinkable Fill

The materials for and the production of Unshrinkable Fill shall meet the requirements of MT 13.00 and the following:

(i)	Cement type	Type 10 Normal Portland
(ii)	Minimum 24 hour cylinder compressive strength	0.07 MPa
(iii)	Maximum 28 day cylinder compressive strength	0.4 MPa
(iv)	Class of exposure	N/A
(v)	Nominal maximum size of coarse aggregate	37.5 mm
(vi)	Slump at point of discharge	180±40 mm

High-early strength Portland cement (Type 30) shall not be used.

Blend hydraulic cements shall not be used.

Supplementary cementing materials (fly ash, silica fume and/or slag cement) shall not be used.

Coarse aggregate of the nominal maximum size shall be incorporated into the mix. The percentage of coarse aggregate shall be a minimum of 50 percent of the mass of the total aggregate.

MT 13.10.06 EQUIPMENT

MT 13.10.06.01 Discharge Equipment

Unshrinkable Fill shall be placed into the excavation using the chutes of the conveying equipment, by pumping, or with the use of buckets.

MT 13.10.06.02 Bracing and Shoring

Bracing, shoring or sheeting shall be placed to protect the services, utilities or surrounding excavation, and shall be removed as the backfilling proceeds.

MT 13.10.07 CONSTRUCTION

MT 13.10.07.01 Placing Unshrinkable Fill

The material shall flow into the excavation so that it fills the entire space. Care shall be taken that no air is trapped beneath horizontal projections or in other locations in the excavation.

Unshrinkable Fill shall not be placed in direct contact with gas mains or plastic pipe. A layer of carefully compacted granular material shall be placed to ensure a separation of 300mm between the Unshrinkable Fill and the gas or plastic pipes.

MT 13.10.07.02 Removal of Shoring and Bracing

When bracing, shoring and/or sheet is used to support the sides of the excavation or to prevent movements that could damage other services or adjacent structures, this support system shall be removed as the backfilling progresses.

MT 13.10.07.03 Finishing Unshrinkable Fill

The unshrinkable fill surface shall be screeded while it is still sufficiently flowable to achieve the desired grades and elevation. The surface shall be uniformed and free from undulations and projections.

MT 13.10.07.04 Unshrinkable Fill Protection

Where Unshrinkable Fill is placed, it shall be protected from vehicular traffic including construction equipment for at least 24 hours, by covering with a steel plate of sufficient

strength to support the traffic during this period. The steel plates shall be fastened to the asphalt surface with steel spikes to prevent any displacement of the plate. The steel spikes shall be hammered flush with the top of the plates and extended the full depth of the asphalt or a maximum 150mm. The edges of the plates shall be ramped with HL 3 FINE temporary asphalt or as directed by the Commissioner.

Where vehicular traffic is not being accommodated, the backfilled excavation shall be covered with wooden planking or other protection for users of the road allowance until the unshrinkable fill can support the mass of an adult person.

MT 13.10.08.01 Acceptance Sampling and Testing

The Commissioner shall perform all acceptance sampling and testing necessary to determine conformance with the Contract requirements. Sampling and testing shall conform to the requirements of CAN/CSA-A23.2. The Commissioner will determine the lot sizes. The Contractor shall assist, as necessary, in obtaining samples of Unshrinkable Fill for testing.

The Contractor shall be responsible for the collection and disposal of the remains of all Unshrinkable Fill used for testing purposes. In order to simplify collection and handling, the Contractor should set aside a designated location for the temporary piling of this discarded material close to the point of discharge from the delivery truck and shall provide assistance to transport the material into the designated location.

MT 13.10.08.02 Acceptance Criteria

MT 13.10.08.02.01 General

The compressive strength shall be the criteria for the acceptance of Unshrinkable Fill.

MT 13.10.08.02.02 Unshrinkable Fill Compressive Strength

The Unshrinkable fill shall be sampled in accordance with CAN/CSA-A23.2-1C, with compressive strength specimens made in accordance with CAN/CSA-A23.2-3C and tested in accordance with CAN/CSA-A23.2-9C. Slump (CAN/CSA-A23.2-5C) testing shall be completed each time the unshrinkable fill is sampled for compressive strength.

To conform to the specified nominal minimum 28 day strength requirements:

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- (i) The average of all groups of three consecutive strength tests shall be equal to or less than the specified strength.
- (ii) No individual strength test shall be more than 0.1 MPa above the specified strength.

A compressive strength test result is the average strength or two 100 x 200 mm or two 150 x 300mm concrete cylinders tested at the same age.

Unshrinkable Fill represented by compressive strength samples or cores exceeding the requirements shall be removed and replaced at the Contractor's expense.

MT 13.10.09 MEASUREMENT FOR PAY

MT 13.10.09.01 Unshrinkable Fill

Measurement for the above item shall be by volume, in cubic metres (m³).

Measurement shall be by the summation of delivery tickets, except that the total volume shall not exceed 10% of the theoretical volume.

MT 13.10.10 BASIS FOR PAYMENT

MT 13.10.10.01 Unshrinkable Fill – Item

Payment at the contract price for the above item shall be full compensation for all labour, equipment, materials and incidentals to do the work. Payment shall include, but not be limited to, the supply, placing and finishing of the Unshrinkable Fill and the supplying, placing and removal of steel plates, including the steel spikes and the HL 3 FINE asphalt ramping, wooden planking or any other protection required.

No payment will be made when the supply and placement of the above item is included in a separate contract item, other than Unshrinkable Fill.