SPECIFICATION FOR THE CATHODIC PROTECTION OF EXISTING DUCTILE & CAST IRON WATER MAINS

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TS 7.20.01 GENERAL

TS 7.20.01.01 Scope of Work

This specification outlines the work to be undertaken to cathodically protect an existing ductile or cast iron water main.

Supply all labour, materials, tools, equipment, and transportation to complete the works as described in this document, as shown on the drawings, and as necessary by evidence.

Work shall include but shall not be limited to:

- Supply and installation of sacrificial anodes.
- Supply and installation of test stations and cables.
- Testing and submission of report.

TS 7.20.01.02 Workmanship

Skilled labour only shall be used for all work.

All work shall be performed according to instructions given by the Contract Administrator or his duly appointed representative using the most suitable equipment.

TS 7.20.01.03 Handling and Storage

Material shall be stored so as to prevent injury to persons and to prevent the delay of work by others.

All materials which can be damaged by exposure to the elements must be stored in a clean and dry enclosure.

Sacrificial anodes shall not be handled by their lead wires.

TS 7.20.01.04 Units

Units of measurement given in this specification are based on the International System of Units (SI) and Metric Practice Guide National Standards of Canada.

TS 7.20.02 MAGNESIUM ANODES

TS 7.20.02.01 Quantity and Description of Anodes to be Installed

The following table of anode spacing and anodes shall be strictly adhered to:

Water Main Size	Spacing
100 mm	23 m
150 mm	15 m
200 mm	11 m
250 mm	9 m
300 mm	8 m
400 mm	6 m

TS 7.20.02.02 Packaged Magnesium Anodes

Packaged magnesium anodes shall have a 14.5 kg magnesium casting having a length of 560 mm and a high potential alloy composition as per ASTM B107 (1961) M-1 specification or equal.

The magnesium casting shall be contained in a cardboard container of the following dimensions: 200 mm diameter x 700 mm long.

The magnesium casting within the container shall be supplied surrounded with a special backfill material having an electrical resistivity of less than 45 ohm-cm wet and the following composition by volume:

Gypsum	77%	$\pm$2%
Sodium Sulphate	8%	$\pm$1%
Bentonite	15%	$\pm$1%

Packaged magnesium anode shall be supplied with 3000 mm of #10/7 str. copper cable having TWH insulation colour blue.

TS 7.20.03 FIELD WORK

The Contractor will perform the following work prior to installation of the cathodic protection system:

i) Stake out all anode locations as per the anode spacing table in section TS 7.20.02.01 of this specification.

ii) The first anode shall be located within 3 m of the designated starting point of this contract. The remaining anodes will then be staked out using the table specified in section TS 7.20.02.01 of this specification.

iii) The anode locations shall be identified by stakes or paint identification in areas not suitable for the driving of stakes. The paint used shall be Day Glow Blue.

vi) Utility clearances shall be obtained from all parties which have underground utilities in the immediate vicinity of the water main to be protected.

v) All water services attached to or crossing the water main to be protected are to be located and marked out with suitable stakes or paint identification.

vi) No anode shall be located within 1 m of a water service or other underground utilities.

vii) The Contract Administrator or his designated representative shall approve the anode locations prior to the commencement of the installation.

viii) A potential survey shall be undertaken before commencement of the anode installation. These potentials shall be recorded at a maximum of 1 meter spacing.

TS 7.20.04 TEST STATIONS

The test station shall consist of a Testox or Fink Flush mount unit or approved equivalent.

The test station shall be installed plumb, to a depth of 1000 mm and shall not interfere with vehicular or pedestrian traffic.

The test station will contain an anode lead and a test lead from the ductile or cast iron water main.

Test lead from the ductile or cast iron water main shall be AWG#10/7 str. copper with TWU-40 black insulation.

The test lead and the anode lead wire shall be connected together in the test station.

Test leads and test stations shall be installed as close as practical to the start of the magnesium anode installation contract, but in no event more than 30 m from the start of the installation and thereafter at no more than 300 m intervals.

TS 7.20.05 BACKFILL OF ANODES

The anodes shall be backfilled with approved backfill material immediately after installation of the anode. In no event shall open holes be left on the street unless suitably fenced.

TS 7.20.06 FINAL CLEANUP

The Contractor shall be responsible for final clean up, restoration and paving of any pavement or concrete removed or damaged during the installation of the anode.

TS 7.20.07 TESTING OF CATHODIC PROTECTION SYSTEM

No sooner than 90 days after the completion of the anode installation specified in this document, a cathodic protection checkout survey of the cathodic protection system shall be undertaken by a N.A.C.E. Accredited Corrosion Specialist, a Senior Corrosion Technologist, or his designated representative.

This cathodic protection checkout survey shall consist of the following works:

i) Pipe-to-soil potentials of the water main shall be measured at a maximum of 1 metre intervals using a high resistance voltmeter and a $Cu:CuSO_4$ high cell at the same locations as the survey undertaken in section TS 7.20.03 part viii of this specification. The negative connection shall be made to the pipe through a test station.

ii) In the event that residential services are unavailable the negative connection may be made to the pipe at the test station specified in section TS 7.20.04 of this specification.

iii) In the event that the pipe-to-soil potentials are undertaken as specified in section TS 7.20.07 part ii of this specification the Corrosion Specialist, Senior Corrosion Technologist or his appointed representative shall take into consideration that the water main may not be electrically continuous.

iv) At each test station the Corrosion Specialist or Senior Corrosion Technologist or his representative shall record the pipe-to-soil potential of the water main with the anode connected and disconnected at the test station.

A comprehensive written report including all data obtained during the testing as well as recommendations pertinent to the continued effectiveness of the cathodic protection arrangement shall be submitted to the owner. This report shall be approved by a licensed professional engineer/accredited Corrosion Specialist prior to submission.