



**CONSTRUCTION SPECIFICATION FOR
PIPELINE AND CONDUIT INSTALLATION BY PIPE BURSTING**

TABLE OF CONTENTS

463.01	SCOPE
463.02	REFERENCES
463.03	DEFINITIONS
463.04	SUBMISSION AND DESIGN REQUIREMENTS
463.05	MATERIALS
463.06	EQUIPMENT
463.07	CONSTRUCTION
463.08	QUALITY ASSURANCE
463.09	MEASUREMENT FOR PAYMENT
463.10	BASIS OF PAYMENT

APPENDICES

463-A	Commentary
--------------	-------------------

463.01	SCOPE
---------------	--------------

This specification covers requirements for installation of pipelines and conduits using the trenchless technology known as pipe bursting.

463.01.01 Significance and Use of Appendices

Appendices are not a mandatory part of the specification unless invoked by the Owner.

Appendix 463-A is a commentary appendix to provide designers with information on the use of the specification in a Contract.

463.02

REFERENCES

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

Ontario Provincial Standard Specifications, Construction

OPSS 409	Closed Circuit Television Inspection of Pipelines
OPSS 504	Preservation, Protection, and Reconstruction of Existing Facilities
OPSS 507	Site Restoration Following Installation of Pipelines, Utilities and Associated Structures in Open Cut
OPSS 514	Trenching, Backfilling, and Compaction
OPSS 517	Dewatering of Pipeline, Utility, and Associated Structure Excavation
OPSS 538	Support Systems
OPSS 539	Temporary Protection Systems

463.03

DEFINITIONS

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

Fusion means connecting product lengths into a continuous length using elevated temperatures and pressure.

Launch Pit means an access excavation or existing access structure to an existing product for the insertion of the pipe bursting head and new product.

Pipe Bursting means the application of a pipe bursting head into the interior of and along the length of an existing product to split or fracture the existing product so that the existing product and surrounding material is opened up to a sufficient size to accommodate the insertion of a new product in the cavity created without leaving any significant voids around the new product. Pipe bursting methods include static, pneumatic, and hydraulic. Pipe bursting is also known internationally as pipe cracking or pipe splitting.

Product means pipelines or conduits.

Pull means the installation of one continuous reach of new product. Generally, a pull will commence at launch pit and terminate at a pull pit.

Pull Pit means an access excavation or existing access structure to an existing product to receive the new product or pipe bursting head or both.

Structure means a maintenance hole, valve chamber, or other such facility to access the product.

463.04

SUBMISSION AND DESIGN REQUIREMENTS

The following information shall be submitted to the Contract Administrator one week prior to construction:

- a) A work plan outlining the schedule, procedures, launch and pull pit locations, and shop drawings required to execute the work on the product, service laterals, and structures.
- b) A list of personnel, including backup personnel, and their qualifications and experience.
- c) A traffic control plan.
- d) Safety plan including the contracting company safety manual and emergency procedures.

- e) Written record of current training showing that the operator has been fully trained in the use of the fusion equipment by an authorized representative of the fusion equipment manufacturer and the product manufacturer or, where applicable, certified by the Utility for which the work is being completed.
- f) When applicable, product bypass and temporary supply system plans, including installation, operation, and testing procedures and a list of material and equipment to be used.
- g) Manufacturer's technical data containing complete information on new product:
 - i. material composition, physical properties, and dimensions;
 - ii. transport, handling, and storage recommendations;
 - iii. repair;
 - iv. fusion times and temperatures;
 - v. minimum bend radius; and
 - vi. recommended restraint method in structure.
- h) Contingency plans for the following potential conditions:
 - i. unforeseen obstructions causing burst stoppage,
 - ii. extended service disruption,
 - iii. damage to the existing service connections and the replacement product's structural integrity and methods of repair,
 - iv. damage to other existing utilities,
 - v. soil heaving or settlement, and
 - vi. contaminated soil or water.

463.05 MATERIALS

463.05.01 Pipe Materials

Pipe type, class, and size shall be as specified in the Contract Documents.

Valves shall be as specified in the Contract Documents.

Fittings shall be suitable for and compatible with the type, class, and size of pipe with which they will be used.

463.05.02 Lubricant

Lubricant used to reduce friction, to maintain the annular space created by the pipe bursting head, and to allow the insertion of the new product shall be non-toxic and biodegradable.

463.06 EQUIPMENT

463.06.01 Pipe Bursting Head

The pipe bursting head shall be according to the manufacturer's specifications for head sizes recommended for various product diameters and types, as well as parameters associated with maximum allowable upsize percentages.

463.06.02 Pipe Bursting Power Source

The pipe bursting power source shall generate sufficient force to burst and compact the existing product into the surrounding material.

463.06.03 Fusion Equipment

Fusion equipment shall be sized and rated for the product. Fusion clamps shall be sized to clamp the new product properly.

463.07 CONSTRUCTION

463.07.01 General

The product shall be installed to the alignment, grade, and ovality specified in the Contract Documents.

The Contract Administrator shall be notified at least 48 hours in advance of starting work.

463.07.02 Site Preparation

The work site shall be graded or filled to provide a level working area for the pipe bursting equipment. No alterations beyond what is required for the pipe bursting operations are to be made. All activities shall be confined to designated work areas.

463.07.03 Preservation and Protection of Existing Facilities

Preservation and protection of existing facilities shall be according to OPSS 504.

When specified in the Contract Documents, an existing facility shall be exposed to verify its horizontal and vertical location. The number of exposures required to monitor work progress shall be as specified in the Contract Documents.

463.07.04 Transporting, Unloading, Storing, and Handling Materials

Manufacturer's handling, and storage recommendations shall be followed.

463.07.05 Trenching, Backfilling, and Compacting

Trenching, backfilling, and compacting for launch pits, pull pits, and other excavation locations shall be according to OPSS 514.

Launch and pull pits shall be sized to allow the use of the pipe bursting equipment and to allow the product to be installed such that the product manufacturer's recommendations for product bending radius are not exceeded.

463.07.06 Support Systems

Support systems shall be according to OPSS 538.

463.07.07 Dewatering

Dewatering shall be according to OPSS 517.

463.07.08 Temporary Protection Systems

The construction of all protection schemes shall be according to OPSS 539. Where the stability, safety, or function of an existing roadway, railway, watercourse, other works, or proposed works may be impaired due to the method of operation, protection shall be provided. Protection may include sheathing, shoring, and piles where necessary to prevent damage to such works or proposed works.

463.07.09 Product Bypass

When specified in the Contract Documents, during the execution of the work the flow within the existing product shall be bypassed around the product being replaced, and the continuity of service to each facility connected to the affected section of product shall be maintained.

The pumps and by-pass lines shall be of adequate capacity and size to handle all flows.

463.07.10 Preparation of Existing Product and Structures

All existing crosses, tees, valves, and service connections are to be located, exposed, and disconnected prior to any pipe bursting operation.

Prior to pipe bursting, the inlets, outlets, and benching of existing structures shall be enlarged sufficiently for clearance of the pipe bursting head and the new product. Enlargements shall be made neatly and be no greater than that required for their purpose. Size of the enlargements shall be sufficient to allow for restoration and sealing to the new product.

Existing product shall be cleared of obstructions prior to bursting as specified in the Contract Documents.

463.07.11 Product Joining

463.07.11.01 General

The product shall be joined according to manufacturer's recommendations.

The product shall be assembled and joined at the site to provide a leak proof joint.

Where space and Contract Documents permit, the length of the product to be pulled shall be joined as one length before commencement of the pulling operation.

When used, fusion shall be performed by technicians trained in the use of the fusion equipment.

Joints shall be sufficiently strong to undergo the loading of the installation process. All joints shall be subject to acceptance by the Contract Administrator prior to insertion.

463.07.11.02 Connection to Product or Structures

Product shall be allowed to recover before connection to new or existing product or structures are made. Product recovery time shall be according to manufacturer's recommendations.

The product connection in the structure shall be leak proof.

463.07.11.03 Service Connections

Service connection work shall be as specified in the Contract Documents.

Service connection work shall not commence until the product has fully recovered according to manufacturer's recommendations.

463.07.12 Product Installation

Installation procedures shall be according to the product manufacturer's guidelines.

The product shall be protected from damage during the installation process.

Suitable guides shall be used to protect the product from damage at the insertion point.

Upon commencement of the bursting process, product insertion shall be continuous from the launch pit to the pull pit, except as approved by the Contract Administrator. A pushing machine may be utilized to assist insertion from the rear.

When specified in the Contract Documents, a weak link, breakaway connector, or load monitor shall be used to prevent excess pulling force from damaging the product.

463.07.13 Structures and Valves

Where the new product enters or exits an existing structure, the wall shall be restored as specified in the Contract Documents. Restoration shall securely locate and anchor the new product in the wall and shall produce a leak proof seal.

The existing structure's benching shall be restored according to the requirements of the new product, any other incoming product, and as specified in the Contract Documents.

Where new structures or valves are required, they shall be installed as specified in the Contract Documents.

463.07.14 Testing

Testing of the product joining and installation shall be as specified in the Contract Documents.

463.07.15 Record Keeping

Verification record requirements of the alignment and grade of the installed product shall be as specified in the Contract Documents. A copy of the verification records shall be given to the Contract Administrator at the completion of the pipe bursting operations.

463.07.16 Closed Circuit Television (CCTV) Inspection

When specified in the Contract Documents, CCTV inspection shall be according to OPSS 409.

463.07.17 Site Restoration

Following pipe bursting operations, the work-site shall be restored according to OPSS 507.

463.07.18 Management of Excess Material

Management of excess material shall be according to the Contract Documents.

463.08 QUALITY ASSURANCE

463.08.01 Acceptance Criteria

Acceptance criteria for the product installation shall be as specified in the Contract Documents.

463.09 MEASUREMENT FOR PAYMENT

463.09.01 Actual Measurement

463.09.01.01 Product Installation by Pipe Bursting

Measurement for a product installation by pipe bursting is in metres along the horizontal centreline of the product between connecting points or, if there is no connecting point, to the end of the product. When the connecting point is a structure, measurement for a product installation is in metres to the center of the structure.

463.09.01.02 Service Connections

For measurement purposes, a count will be made of the number of existing services that are disconnected from the existing product then connected to the new product.

463.09.02 Plan Quantity Measurements

When payment is by Plan Quantity, such measurement shall be based on the units shown in the clauses under Actual Measurement.

463.10 BASIS OF PAYMENT

- 463.10.01 Product Installation by Pipe Bursting, “*type of product, diameter of product, use of product*” - Item**
- Product Bypass - Item**
- Service Connections - Item**

Payment at the Contract price for the above tender items shall be full compensation for all labour, Equipment, and Material to do the work.

463.10.02 Closed Circuit Television Inspection

When the Contract does not contain a separate tender item for CCTV inspection, the Contract price for the Product Installation by Pipe Bursting item shall include full compensation for all labour, Equipment, and Material to do the work of CCTV Inspection.

Appendix 463-A, Commentary for OPSS 463, November 2004

Note: This appendix does not form part of the standard specification. It is intended to provide information to the designer on the use of this specification in a contract.

Designer Action/Considerations

This specification was written to encompass the majority of pipe bursting operations for small and medium sized projects. However, the basic design considerations should always include: properly planned entry and exit point; grade of existing host pipe; adjacent utilities; and connection requirements.

The International Pipe Bursting Association (IPBA) normally assigns pipe-bursting work to one of 3 classifications. These classifications are intended for use as general guidelines when considering replacement of existing pipe by pipe bursting techniques.

Classification	Depth of Pipe	Existing Pipe Diameter	New Pipe Diameter Options	Burst Length
A - ROUTINE	< 3.65 m	100 - 300 mm	Size for Size To 1 Up size	0 - 100 m
B - CHALLENGING TO MODERATELY DIFFICULT	> 3.65 m < 5.5 m	300 - 500 mm	2 Up sizes	100 - 140 m
C - DIFFICULT TO EXTREMELY DIFFICULT	> 5.5 m	500 - 900 mm	3 or more Up sizes	> 140 m

The designer may consider a pre-qualification process, if the project is in Classification B or C.

The designer should include the following in the Contract Documents:

- Pipe type, class, and size. (463.05.01)
- Valve type, class, and size. (463.05.01)
- Product alignment, grade, and ovality. (463 07.01)
- Obstructions to be cleared, e.g., rocks, debris, or mechanical obstructions, e.g., repair sleeves, clamps, couplings, and intolerable deviations in grade or alignment. (463.07.10)
- Service connection work. (463.07.11.03)
- Wall restoration. (463.07.13)
- Benching restoration. (463.07.13)
- New structure requirements. (463.07.13)
- Testing of product joining and installation, e.g., hydrostatic, air, or BACT-T. (463.07.14)
- Verification record requirements, e.g., reporting information available from the pipe bursting machine, daylighting, installation of tracer wire with the product, or the use of acoustic or magnetic locating equipment. (463.07.15)

Appendix 463-A

- Acceptance criteria, e.g., successful bursting operation from entry to pull back location; CCTV inspection, removal of extra coupon pipe length from the pull back pit to view for stresses, or grade verification. (463.08.01)

The designer should give consideration, in consultation with the pipe manufacturer, to minimum allowable product bending radii commensurate with the pipeline's strength.

The designer should give special consideration to the required grades at the entry and exit points. The designer may undertake a CCTV inspection and sonde location analysis prior to pipe bursting to review the existing line and grade to determine if deviations are acceptable.

Product upsizing by using a pipe bursting technique may induce stresses in the surrounding soil resulting in potential damage to nearby utilities and foundations. The degree of distortion on the zone of influence is a function of the degree of upsizing, the pipe material of a nearby utility, the location of nearby utilities in relation to the pipe burst pipe, and the soil conditions. The designer may consider exposure of critical services by non-destructive methods to monitor the pipe bursting progress and impacts. If this is a requirement of the Contract, the designer should specify it in the Contract Documents. (463.07.03)

The designer should consider the need for product bypass, temporary potable water supply system, or temporary flow stoppage or blockage with inflatable plugs during the pipe bursting operation. The designer may require that during the execution of the work the flow shall be bypassed around the product being replaced and the continuity of service to each facility connected to the affected section of product be maintained. The designer should consider what should be done if there is an extended service disruption. If a product bypass is a requirement of the Contract, the designer should specify it in the Contract Documents. (463.07.09)

For certain product installations the designer may consider the requirement of a weak link, breakaway connector, or load monitor to prevent excess pulling force from damaging the product. If this is a requirement of the Contract, the designer should specify it in the Contract Documents. (463.07.12)

The designer should consider the type of interface and the degree of continuity between the new product and the existing structure to ensure appropriate anchoring and seals in order to prevent new product retraction or inadvertent leaks to the new system. (463.07.13)

The designer may specify the completion of a CCTV inspection of the product after installation, particularly where grade thresholds are critical. In smaller diameter product installations where the designer elects to complete a CCTV survey, the designer may wish to specify a lighter interior colour of the product installation if available. If this is a requirement of the Contract, the designer should specify it in the Contract Documents. (463.07.16)

The designer may consider including a process regarding payment for failed pipe bursting attempts in the Contract Documents.

The tender item description for Product Installation by Pipe Bursting should include reference to one or more of the attributes shown, i.e., type of product, diameter of product, and use of product, to be complete. (463.10.01)

The designer should ensure that the Ontario Provincial Standards General Conditions of Contract and the 100 Series General Specifications are included in the Contract Documents.

Related Ontario Provincial Standard Drawings

None