A division of **WGI Westman Group Inc.**

armtec

BOSS 2000

BOSS HDPE Corrugated Pipe

Dual-wall HDPE corrugated drainage, storm and sewer pipe.

armtec.com

Today's aging infrastructure can be a financial burden on communities across Canada. With innovations in HDPE technology, BOSS pipe delivers a cost effective alternative to traditional pipe materials. It's light weight and ease of handling ensures quick and simple installation. No other product can match its superior strength, durability and hydraulic performance.

With a 75 year design service life BOSS HDPE pipe is the smart choice for your project dollars.

There is a BOSS HDPE product to meet all your drainage needs

BOSS 2000

Dual-wall corrugated HDPE drainage pipe with a smooth inner wall for optimum hydraulic performance.

BOSS POLY-TITE

Dual-wall corrugated HDPE pipe designed for water-tight sewer applications with increased gasketed joint integrity of 100 kPa.

Armtec has been involved in the manufacture and sale of High Density Polyethylene (HDPE) pipe for over 40 years, ever since it first welcomed BOSS into its family of products. Today Armtec is one of the leading manufacturers of HDPE pipe in Canada. As a 100% Canadian-owned company, Armtec delivers superior products tailored to Canada's diverse needs and weather conditions. The latest manufacturing technology is used to produce some of the industry's highest performing drainage products. With regional offices across the country, you can depend on Armtec to provide exceptional customer service and technical support every step of the way.

Features and Benefits of BOSS HDPE Pipe

LIGHTWEIGHT
Its light weight allows for safe handling and quick installation with minimal equipment

HYDRAULIC PERFORMANCE
The smooth interior ensures optimum flow capacity for storm sewer applications

COST EFFECTIVE
Less equipment and manpower required for installation

CHEMICAL/ABRASION RESISTANT
Highly resistant to chemical attack and abrasive environments

UV RESISTANT
A minimum of 2% carbon black additive protects against UV light deterioration

DURABLE
Highly durable; withstands impact in all weather conditions

Research shows that when it comes to abrasion and chemical resistance **HDPE outperforms other commercially available pipe materials:**

Figure 1: Abrasion Loss of Various Pipe Materials*

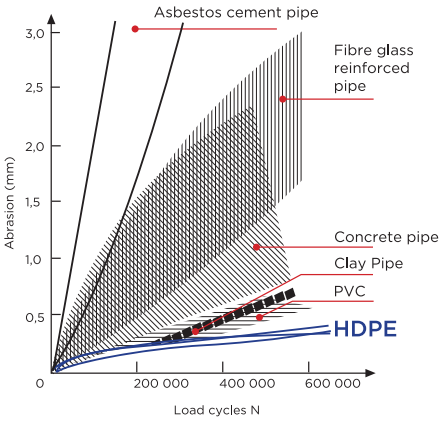
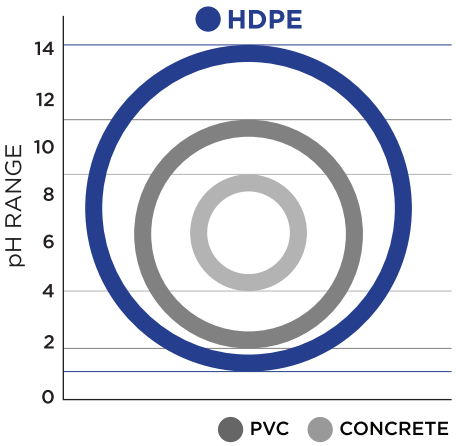


Figure 2: pH Range of Commercially Available Pipe Materials



HDPE material provides excellent resistance to both acidic and alkaline environments pH 1.25 to 14.

*Reference "Problems of Abrasion in Pipes" by O. Kirschmer

Design Service Life

The failure mode most common to HDPE pipe is either excessive wall thrust or large strains. Establishing the Design Service Life (DSL) is dependent upon limiting the stress and strain levels in the pipe wall. Thermoplastic materials, when subjected to stress or strain, exhibit time dependent relaxations referred to as creep or stress relaxation. Creep is a measure of the increase in strain with time under a constant stress while stress relaxation is the decrease in stress under a constant strain.

In 2007 AASHTO Bridge Design Specifications adopted LRFD (Load and Resistance Factor Design) procedures for the design of thermoplastic pipes. Resistance factors vary with the various thermoplastic pipe materials available. The load and resistance factors used in the LRFD design procedure address the design criteria of limiting stress and strain levels in buried thermoplastic pipe to meet DSL demands.

Studies by the Florida Department of Transportation established a DSL of 100 years for HDPE based on laboratory evaluations. Similar studies and declarations have been made based on the publically available literature including the **Ontario Ministry of Transportation's Gravity Pipe Design Guidelines which states a 75 year DSL for HDPE.**

FLEXIBLE vs. RIGID PIPE – What's the difference?

Buried pipes are classified either as flexible or rigid, based on the stiffness of the pipe section. Rigid pipes such as concrete start to show structural stress after 2% deflection. Flexible pipes however are designed to accommodate higher levels of deflection without inducing adverse structural stresses in the pipe wall section. By designing for higher deflections (in the range of 5% for flexible pipes) the pipe wall stress is reduced by transferring overburden loads to the adjacent soil columns (soil arching).

Backfill and compaction of the backfill envelope is important to either pipe classification. Rigid pipes will develop high soil stresses directly below the pipe invert (Fig. 3A). Flexible pipes distribute more uniform soil pressures around the pipe's periphery as load is "shed" to the soil (Fig. 3B) – a phenomenon well understood from numerous studies and inspections of actual installations.

Loads in a design review are categorized as either live or dead loads. Dead loads refer to the weight of the soil mass located directly above the pipe span. Live (or moving) loads include the effects of the road surface pressures generated by wheel loads from vehicular traffic as they pass over the buried pipe. Special loading conditions may require consideration for the effects of water tables located above the pipe invert.

Figure 3a:
Load Distribution - Rigid Pipe

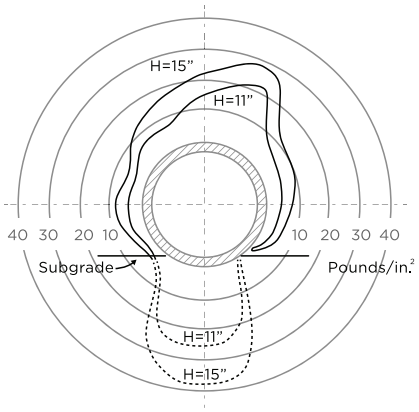
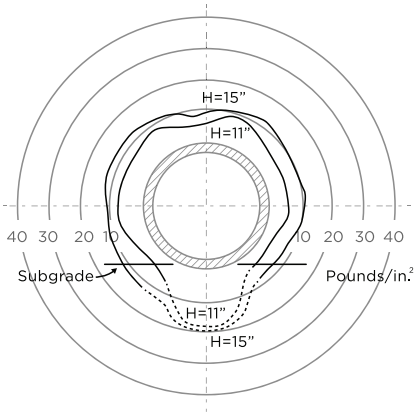


Figure 3b:
Load Distribution - Flexible Pipe



FLEXIBLE PIPE - BETTER VALUE

Whatever the application, Armtec's BOSS family of products offers better value for your project dollars. The lower initial material cost of a flexible pipe such as HDPE combined with decreased installation time means your project will be completed on time and within budget.

Open and Fair Competition

BOSS HDPE products have been successfully used on countless installations across Canada. Specifying BOSS products on your next project leads to healthy competition for the pipe business and better value overall.

BOSS 2000 HDPE Drainage Pipe

BOSS 2000 combines the strength of a corrugated outer shell with a smooth inner wall to optimize hydraulics, making it perfect for storm sewer and drainage applications where certification to CSA Group standard B182.8 and Bureau de Normalisation du Quebec standard BNQ 3624-120 is required. The pipe wall can be factory perforated and fitted with a geotextile sock for subdrain or recharge drain applications. With a service life of 75 years, BOSS 2000 ensures your infrastructure project will stand the test of time.

TYPICAL APPLICATIONS

- Municipal and Highway Storm Sewers and Drainage Culverts
- Resource Road Culverts
- Leachate Collection Systems
- Stormwater Management
- Recharge Drainage Systems
- Airport Runway Drainage

WIDE RANGE OF FABRICATED AND MOULDED FITTINGS AND COUPLERS AVAILABLE

(Fig. 4, pg. 12)

- Tees
- Wyes
- Elbows
- Crosses
- Repair couplings
- Concentric reducers
- Eccentric reducers
- End caps
- Manhole adapter

BOSS PRODUCTION USES ADVANCED MANUFACTURING TECHNOLOGY

COUPLERS AVAILABLE

- External double bell snap couplers (100mm – 200mm)
- External split couplers (250mm – 900mm)
- Repair couplers
- Ultra-Stab (gasketed bell & spigot) joints, when required

BOSS IS MANUFACTURED WITH UV INHIBITORS TO PREVENT DETERIORATION

BOSS 2000 Specifications

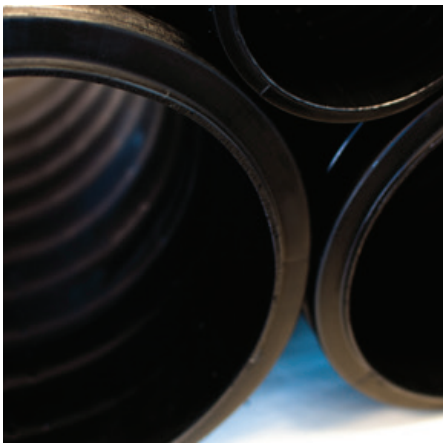
STOCKED LENGTHS	6 metres
CUSTOM LENGTHS	Available on special order
STOCKED STIFFNESS	320 kPa (100mm – 900mm) – CSA 182.8 210 kPa (250mm – 900mm)
JOINING SYSTEMS	**WATER-TIGHT** • Ultra Stab 75 (100mm – 900mm) - CSA 182.8 Type 1, BNQ 3624-120 **SOIL-TIGHT** • External double bell 'snap' coupler (100mm - 200mm) - CSA 182.8 Type 2, BNQ 3624-120 • External 'split' coupler (250mm - 900mm) - CSA 182.8 Type 3, BNQ 3624-120
FITTINGS AVAILABLE	Refer to Fig. 4, pg. 12
APPLICABLE STANDARDS	CSA B182.8, BNQ 3624-120

NOTE: PERFORATED PIPE AND FILTER SOCK AVAILABLE ON SPECIAL ORDER. PLEASE CONTACT AN ARMTEC REPRESENTATIVE FOR FURTHER INFORMATION.

NOMINAL INSIDE DIAMETERS (mm)	100	150	200	250	300	375	450	525	600	750	900
OUTSIDE DIAMETERS (mm)	120	177	234	292	361	444	540	627	726	895	1,087

NOTE: MANNING'S 'N' VALUE = 0.012

If you wish to specify HDPE for your storm sewer application the following is suggested:
HDPE in accordance to CSA Group specification B182.8, with Type 1 water-tight joints (75 kPa).



BOSS 2000
VARIOUS SIZES TO ACCOMMODATE ALMOST ANY PROJECT

BOSS 2000
DETAIL OF 300mm

BOSS POLY-TITE HDPE Drainage Pipe

With its unique 100 kPa joint rating and 320 kPa pipe stiffness, BOSS POLY-TITE is specially designed for the most conservative municipal sewer applications. This durable and highly resistant dual-wall product also features a smooth interior for optimal hydraulic performance and a 75 year design service life.

Bell and gasketed joints allow both simple field connection and sanitary quality joint integrity, meeting your sewer pipe performance needs. BOSS POLY-TITE is factory tested and certified to CSA Group standard B182.6 with a CSA 100 kPa (15 psi) certified joint (for 100mm to 750mm).

TYPICAL APPLICATIONS

- Municipal storm sewers
- Industrial sewers
- Leak-proof sewers

WIDE RANGE OF FABRICATED AND MOULDED FITTINGS AND COUPLERS AVAILABLE

(Fig. 4, pg. 12)

- Tees
- Wyes
- Elbows
- Crosses
- Repair couplings
- Concentric reducers
- Eccentric reducers
- End caps
- Manhole adapters

BOSS POLY-TITE IS EASILY CUT AND SNAPPED INTO PLACE WITH SIMPLE GASKETED BELL AND SPIGOT JOINTS

BOSS POLY-TITE Specifications

STOCKED LENGTHS	6 metre
CUSTOM LENGTHS	Available on special order
STOCKED STIFFNESS	320 kPa
JOINING SYSTEMS	**SANITARY QUALITY:** ULTRA STAB 100 (CSA B182.6)
FITTINGS AVAILABLE	Refer to Fig. 4, pg. 12
APPLICABLE STANDARDS	CSA B182.6

NOMINAL INSIDE DIAMETERS (mm)	100	150	200	250	300	375	450	525	600	750	900
OUTSIDE DIAMETERS (mm)	120	180	240	305	375	470	530	580	710	920	1,087

NOTE: MANNING'S 'N' VALUE = 0.012

If you wish to specify HDPE for your leak-proof sewer application the following is suggested:
HDPE in accordance to CSA Group specification, B182.6, with sanitary quality joints (100 kPa).

BOSS POLY-TITE COMES WITH A PLUG AND PLAY JOINING SYSTEM

BOSS POLY-TITE: 150mm

BOSS POLY-TITE BELL DETAIL

Advantages For Contractors

The design and construction of BOSS products offers a distinct weight advantage over conventional concrete pipe. The BOSS pipe provides ease of handling, positioning, installing and connecting possibilities that conventional pipe cannot match. At less than 10% the weight of concrete pipe and with simpler joint assembly, BOSS pipe provides contractors with marked productivity improvements and increased safety when handling sewer pipe.

INSTALLATION SAVINGS

Low weight and standard 6 metre lengths allow easy handling and quick installation.

QUICK ON-SITE CUTTING

BOSS pipe can be trimmed to length in seconds, using cutting tools found on most municipal construction sites.

IMPACT TOUGHNESS

BOSS pipe is highly resistant to the rigours of installation handling in Canada's extreme weather conditions.

SAFER HANDLING

At less than 10% the weight per metre compared to concrete pipe, **BOSS** pipe provides both the handler and installer with a big safety advantage.

FITTINGS & ACCESSORIES

A full range of fittings and accessories are available including moulded, adaptive and made-to-orde items for every project need (see Fig. 4, pg. 12).

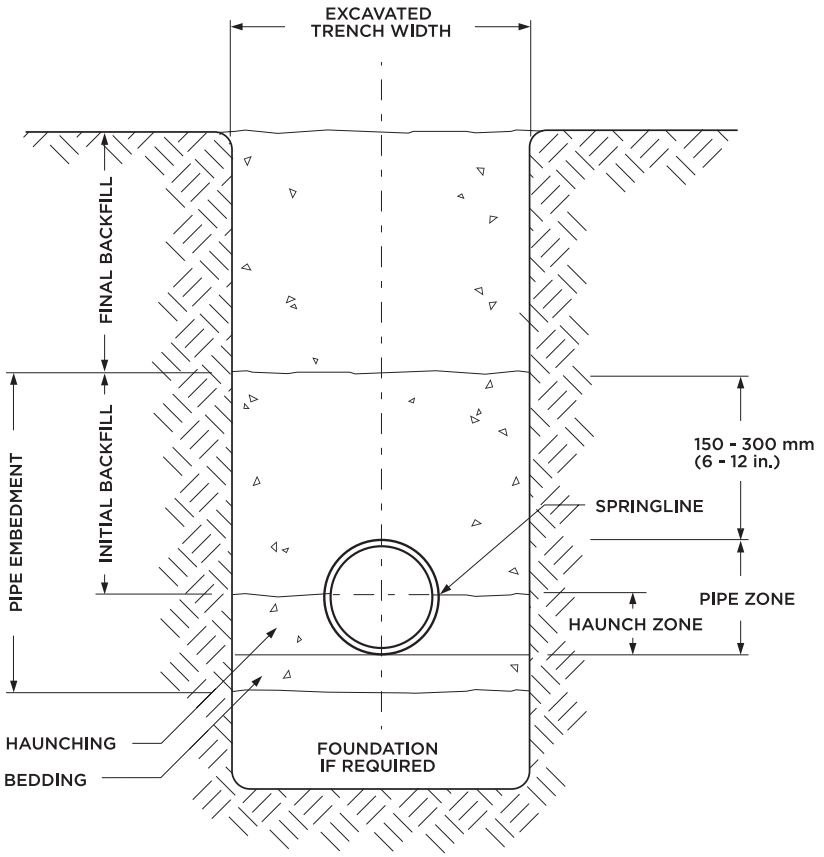
PLUG & PLAY

Cut the pipe, add the gasket, and plug the pipe into the bell!

Installation Guidelines

As with any sewer pipe material the key to a successful installation of BOSS HDPE pipe is the achievement of stable and permanent support through the selection and compaction of proper embedment materials.

Complete guidelines and procedures can be found in CSA standard B182.11 "Recommended Practice for Installation of Thermoplastic Drain, Storm, and Sewer Pipe and Fittings" or BNQ 1809-300.



1. Foundation preparation

The pipe must rest on a smooth, stable foundation, free of rocks and clumps.

2. Bedding

Bedding should consist of compacted well-graded granular material, levelled to the proper grade.

3. Haunching

Haunching should be the same material as bedding, placed and compacted in successive lifts of 150mm, up to the springline of the pipe and compacted to 95% Standard Proctor Density.

4. Initial backfill

Backfill should be the same material as for haunching, extending from the springline to 300mm above the pipe crown. For pipe diameters less than 300mm, this dimension may be reduced to one pipe diameter, but not less than 150mm. Compaction should be to 95% Standard Proctor Density.

5. Final backfill

Select native materials may be used for final backfill, depending on the application. Large rocks or clumps should not be placed within 600mm of the pipe.

BACKFILLING BOSS 2000

PREPARING THE SOIL FOR HDPE PIPE INSTALLATION

Height-of-Cover Table

Nominal Inside Diameter	Minimum Cover CL-625[1] or HS-25[2]	Minimum Cover E-80[3]	Maximum Cover 320 kPa Pipe Stiffness[4]	Maximum Cover 210 kPa Pipe Stiffness[4]
(mm)	(m)	(m)	(m)	(m)
100	0.3	0.6	16.5	16.5
150	0.3	0.6	15.5	15.5
200	0.3	0.6	15.5	15.5
250	0.3	0.6	15.8	13.7
300	0.3	0.6	10.7	9.1
375	0.3	0.6	11.6	10.4
450	0.3	0.6	10.4	8.5
525	0.3	0.6	11.0	9.4
600	0.3	0.6	9.1	7.6
750	0.3	0.6	10.1	8.2
900	0.3	0.6	8.8	7.6

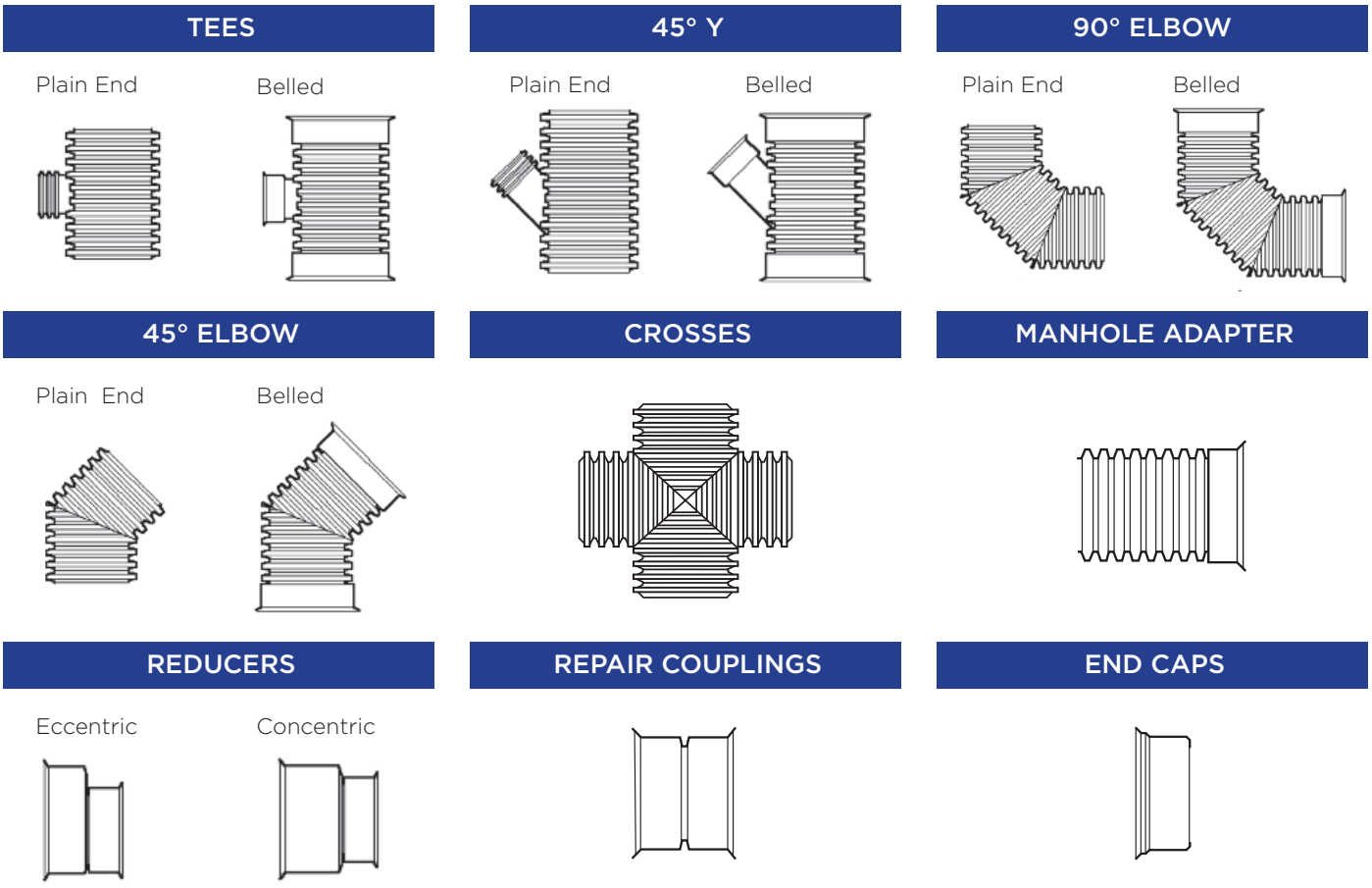
NOTES:
1. CSA S6 CL-625 TRUCK LOADING
2. AASHTO HS-25 TRUCK LOADING
3. COOPER E-80 RAILWAY LOADING
4. BASED ON DESIGN METHOD SPECIFIED IN "AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SEVENTH EDITION, 2014, SECTION 12.12 - THERMOPLASTIC PIPES"

Contact your Armtec Representative for special installation recommendations outside these guidelines.

BOSS HDPE IS LIGHTWEIGHT AND EASY TO HANDLE

Easy To Use Fittings

Figure 4: Fitting Configurations




BOSS CAN BE CUSTOMIZED FOR YOUR SPECIFIC PROJECT DESIGN

Joining Systems

CSA B182.8: Type 1 Water-tight Joining System Ultra-Stab® 75 for BOSS 2000

Ultra-Stab 75 incorporates a Styrene-Butadiene Rubber (SBR) gasket which offers a Type 1 water-tight gasketed joint. It is intended for water-tight applications in which the system will keep water in or out under normal gravity flow operating pressures. The joint tightness is certified to CSA B182.8 standard and is lab-tested at 75 kPa in accordance with ASTM D3212 standard.

Ultra-Stab® 75 Coupler BOSS 2000 (100mm – 900mm)

- The bell is lubricated and the gasketed end is pushed in to the orange seating mark
- Lubricant is supplied by Armtec

CSA B182.6: Sanitary Quality Joining System Ultra-Stab® 100 for POLY-TITE

This joining system incorporates a SBR gasket and is rated for sanitary applications. The joint is certified to CSA B182.6 standard and is laboratory tested at 100 kPa in accordance with ASTM D3212 standard. In special applications where hydrocarbon contamination or other aggressive effluents are expected, resistant gaskets made from other rubber compounds are specially ordered.

Ultra-Stab® 100 Coupler POLY-TITE (200mm – 750mm)

- The bell is lubricated and the gasketed end is pushed in as far as the orange seating mark
- Lubricant is supplied by Armtec

CSA B182.8: Type 2 Silt-Tight Joining Systems for BOSS 2000

Snap coupler double bell joining systems have two gaskets and provide a silt-tight joint rated to 13.8 kPa. They offer superior mechanical pull-apart strength and a low cost pipe connection.

External Double Bell Snap BOSS 2000 (100mm – 200mm)

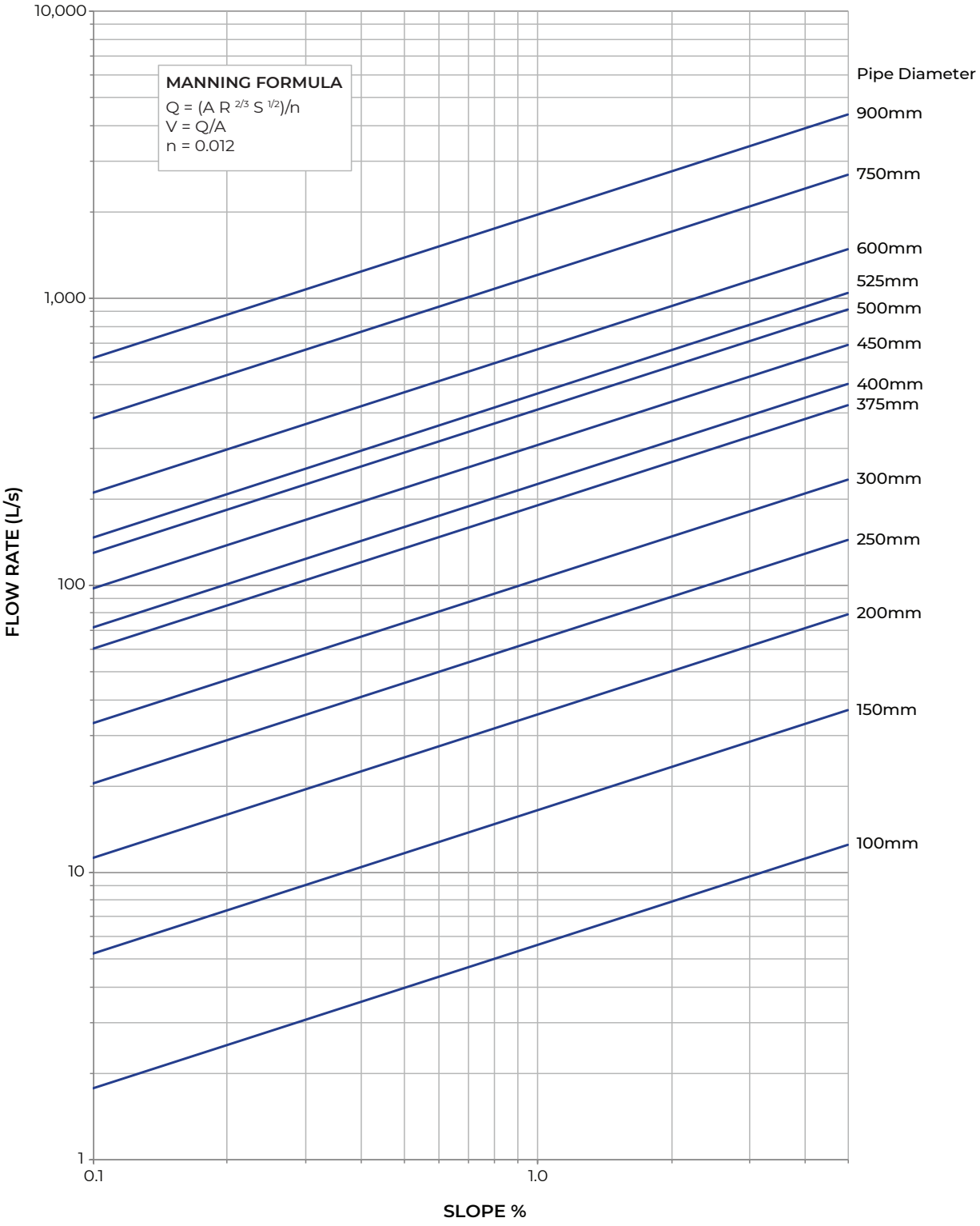
CSA B182.8: Type 3 Soil-Tight Joining Systems for BOSS 2000

External split coupler non-gasketed joining systems use closure ties tightened to provide a soil-tight joint between two pipes. Non-gasketed soil-tight joining systems are intended for backfill conditions that are not saturated with suspended fines. In these conditions, the pipe joints can simply be wrapped in a “sock” of Geotextile.

External Split Coupler BOSS 2000 (250mm – 900mm)

Hydraulics

Flow and Sizing Chart for **BOSS 2000** and **BOSS POLY-TITE**



Filter Sock

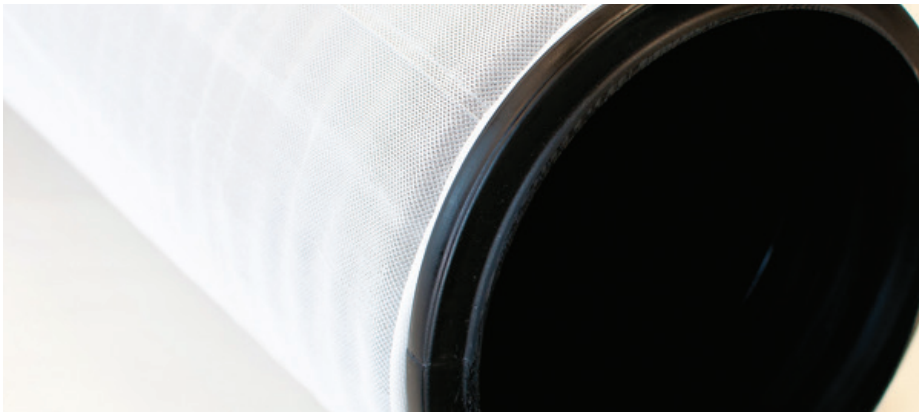
A filter sock prevents problem-sized particles from flowing into perforated pipe and clogging the drain. Some extremely small (colloidal) particles pass through the sock, and out the drain line suspended in the water. The removal of these particles enhances the soil's permeability near the drain lines.

Specification

1. **Pipe product desired**
   Smooth interior (BOSS 2000 or BOSS POLY-TITE)
2. **Solid, perforated, perforated with filter sock, or perforated with non-woven geotextile.**
3. **Diameter and length required, either total length or length of each piece and number of pieces.**
4. **Pipe stiffness**
   - 210 kPa
   - 320 kPa
5. **Joining system required**
   - **Sanitary, per CSA B182.6**
     – Ultra-Stab 100, CSA certified to 100 kPa pressure
   - **Water-tight, Type 1 joint per CSA B182.8 / BNQ 3624-120**
     – Ultra-Stab 75, CSA certified to 75 kPa test pressure
   - **Soil-tight, Type 3 joint per CSA B182.8 / BNQ 3624-120**
6. **Gasket material**
   For service conditions that are not compatible with Nitrile please contact an Armtec representative.
7. **Governing Specifications**
   - **CSA B182.6** (intended for sanitary applications)
   - **CSA B182.8** (intended for storm sewer or culvert applications encompassing water-tight, soil-tight and silt-tight joining systems)
   - **BNQ 3624-120** (intended for storm sewer or culvert applications encompassing water-tight, soil-tight and silt-tight joining systems)
8. **Compliance**
   Product marking required per the applicable CSA or BNQ standard.

Geotextiles

A selection of non-woven geotextile sock is also available for critical applications. Armtec carries a complete line of geotextile products in rolls for a complete trench wrap French drain package. Armtec can recommend a material type for all applications.



BOSS 2000: 200MM WITH FILTER SOCK

Armtec is a member of the Plastics Pipe Institute

Armtec is environmentally conscious
by supporting limited paper usage.

Armtec is a member of
the Plastics Pipe Institute

ATLANTIC

Shediac, NB
Sackville, NB
Truro, NS
Bishop's Falls, NL
St. John's, NL

CENTRAL

Cambridge, ON
Comber, ON
Forest, ON
Guelph, ON
Peterborough, ON
Sudbury, ON
Thunder Bay, ON
Tillsonburg, ON
Walkerton, ON
St-Augustin, QC
St-Clet, QC

PRAIRIES

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Edmonton, AB
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Ponoka, AB
Redwater, AB
Winnipeg, MB
Regina, SK
Saskatoon, SK

WESTERN

Dawson Creek, BC
Genelle, BC
Langley, BC
Nanaimo, BC
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CANADA BEST MANAGED COMPANIES
Platinum member

Find out how **BOSS HDPE Pipe** can be used on your next project.

Call **1-800-565-1152** or visit **armtec**.com