GUIDE TO SN16 HDPE EZY-PIPE STORMWATER DN100-DN1000

Introduction

Ezypipe is a New Zealand made corrugated PE pipe system that is ideal for civil applications. Utilising the latest manufacturing technology, Ezypipe is made to a SN16 stiffness rating under the AS/NZS 5065:2005 standard, which makes it ideal for road culverts and gravity pipelines in civil applications. Supplied in 6 metre lengths, Ezypipe is very light, yet incredibly strong, and able to withstand high loads and severe impacts

This installation guide is a summary of the requirements of the relevant standards. More detail can be found in AS/NZS 2566.1:1998 *Buried Flexible Pipelines: Structural design* and AS/NZS 2566.2:2002 *Buried flexible pipelines – Installation*

Benefits of EZYPIPE SN16 corrugated pipe

- Best resistance to abrasion
- Superb hydraulic performance
- Extremely strong
- Good chemical stability
- Safe when installing due to its lightweight and flexible nature
- Less transport costs and install costs
- Quick to install – laying in 6m lengths
- Bends allow for the most direct routes and reduce the need for manholes
- Accompanied by a full range of fittings
- Can be connected to any existing or potential pipe or manhole
- Can be used in any soil conditions with a 100 year life
- Completely recyclable

Appendices:

Appendix	Document	Notes
A1	AS/NZS5065:2005 certificate	Cert No 74961
A2	Infrapipe certificate for ISO9001:2015	Cert No 78044
A3	AS1646 certificate	
A4	Solo certificates for ISO9001:2015	Cert No 290
A5	AS/NZS1260:2010 certificates for pipe for fittings	
B	Pipe drawings	
C	Fittings drawings	
D	Infrapipe supporting documents – handling, delivery and chemical resistance	

Specifying

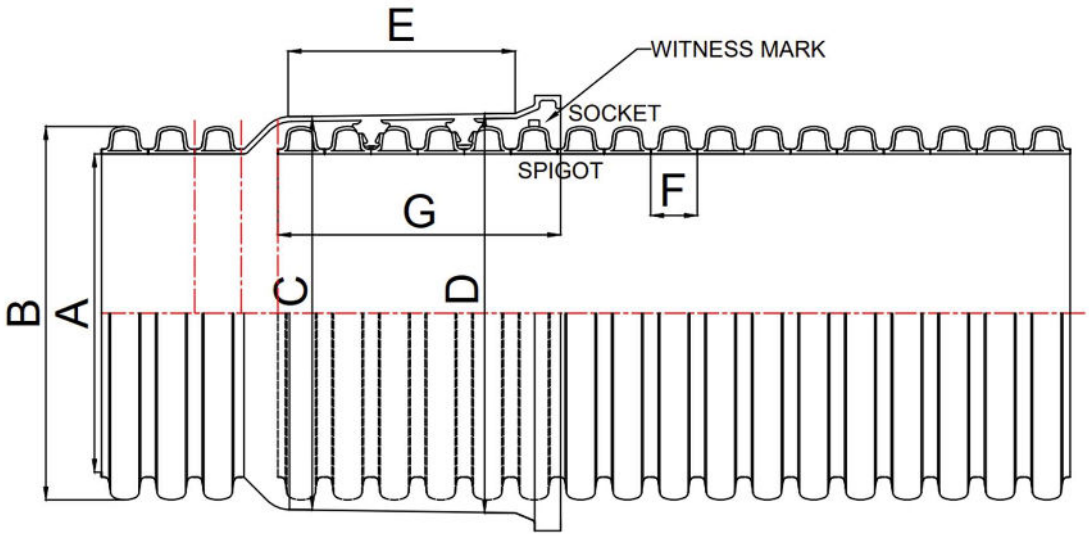
When Specifying Ezypipe, please specify as “Infrapipe Ezypipe” for the pipe reference to ensure the tendering company is able to provide a competitive tender. and for individual pipes EZY-PIPE SN16 DN375 (or SN/DN as required)

Table 1 SN16 sizes

DN	ID (A)	Cross-section Area (mm)	Effective Length	Weight(KG)
100	98	2533	6413	5
150	147	5294	6348	8
200	196	10132	6283	12
225	218	10910	6283	17
300	295	22796	6188	28
375	375	39540	6188	45
450	450	55786	6123	70
525	525	76730	6041	95
600	600	104304	5920	115
800	800	185429	5936	195
1000	1000	282395	5892	324

Dimensions Table

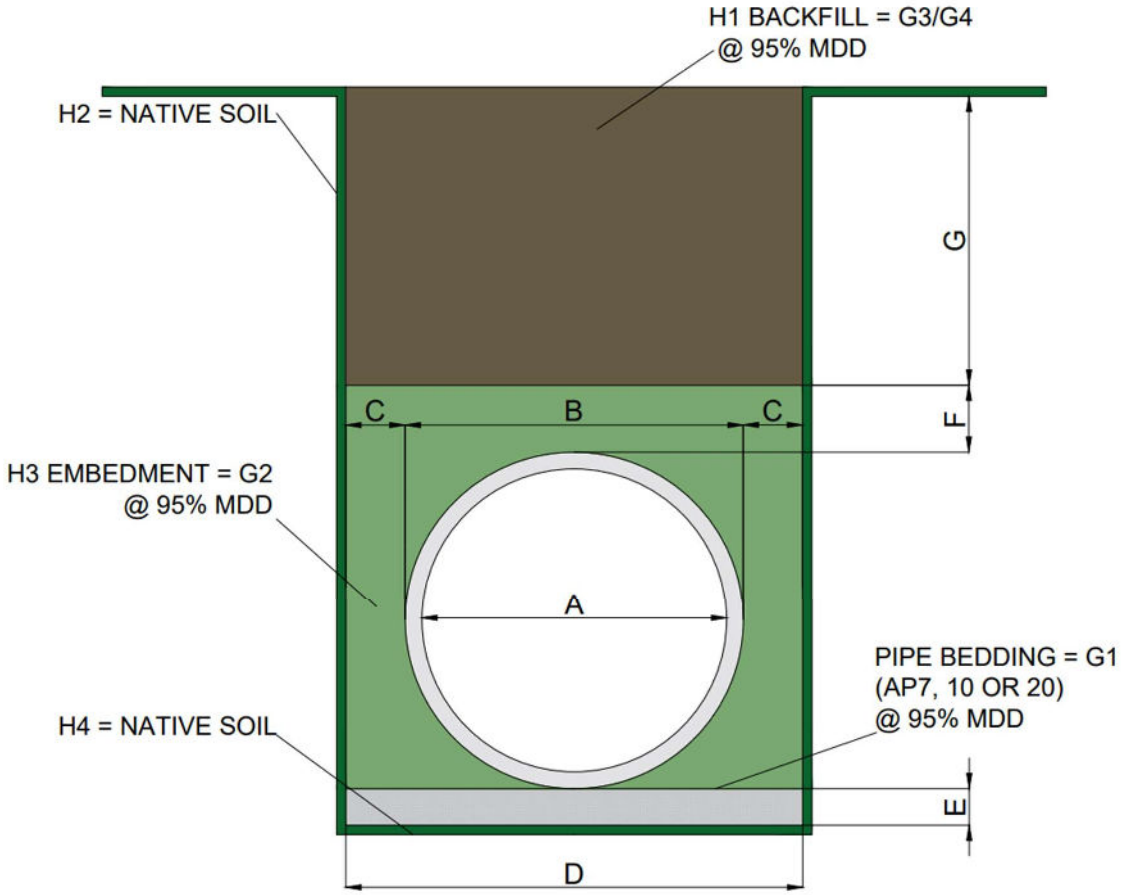
Table 2 SN16 EZY-PIPE DIMENSIONS in mm



DN	B OD	C Socket ID	D Socket OD	E Spigot Length	F Pitch	G Socket Length
100	115	118/120	121/123	99	14.37	87
150	171	176/178	178/180	119	12.55	113
200	230	235/238	240/243	172	28.73	148
225	254	260/263	265/268	170	28.73	146
300	345	352/367	359/363	235	43.1	201
375	437	444/448	452/456	245	49.26	218
450	523	530/535	540/545	274	57.47	230
525	611	618/623	629/634	276	68.96	276
600	702	709/715	722/728	426	86.2	353
800	936	913/919	928/934	435	114.93	336
1000	1166	1137/1143	1154/1160	443	114.93	391

Preparation

The trench is required to be created to the following minimum dimensions:



Note minimum soil quality for Bedding (G1), Embedment (G2) and Backfill (any)

Trench Depth

Trench Depth is derived from Table 3 – Depth of Pipe Section plus the Cover Height from Table 4:

TRENCH DEPTH = DEPTH OF PIPE SECTION + COVER DEPTH

Trench Width

Trench Width is shown in Table 4, derived from 2 * C (Side Width) plus B (OD)

Table 3 Trench dimensions in mm

DN	B OD	C SIDE WIDTH	D TOTAL WIDTH	E BEDDING DEPTH	F BACKFILL DEPTH	DEPTH OF PIPE SECTION
100	115	100	315	75	100	290
150	171	100	371	75	100	346
200	230	150	530	100	150	480
225	254	150	554	100	150	504
300	345	150	645	100	150	595
375	437	200	837	100	200	687
450	523	200	923	100	200	773
525	611	300	1211	150	300	911
600	702	300	1302	150	300	1002
800	936	300	1536	150	300	1236
1000	1166	350	1866	150	350	466

Suitable bedding material is GAP 7, 10 or 20 compacted to 95% MDD

BACKFILL MATERIAL CLASSIFICATION TABLE:

GRANULAR BACKFILL			COHESIVE BACKFILL
G1	G2	G3	G4
• Graded Crushed Rock • River Gravel and Beach • Gravel	• Valley Sand • Drift & Basin Sand • Dune Sand • Beach Sand	• Weathered Gravel • Clayey Gravel • Loamy Sand • Liquid Sand • Alluvial Clay	• Clay • Loess • Loam • Alluvial Marl

Cover

Once the trench has been created as above with the required level of appropriate backfill, the minimum cover below is required based on soil type:

Table 4 Cover Depths in mm

Pipe size (DN)	Soil Type	HN/HO-72	Pedestrian	No loading
100-300	**G1**	600	300	200
100-300	**G2**	800	400	300
100-300	**G3**	1000	500	400
100-300	**G4**	1200	600	500
375-600	**G1**	800	300	300
375-600	**G2**	1000	500	400
375-600	**G3**	1200	600	500
375-600	**G4**	1400	700	600
800-1000	**G1**	1000	500	400
800-1000	**G2**	1200	600	500
800-1000	**G3**	1400	700	600
800-1000	**G4**	1600	800	700

SOIL TYPES:

GROUP – SOIL ZONES AS PER DRAWINGS	SOIL DENSITY (KN/M3)	INTERNAL FRICTION ANGLE	MODULUS OF ELASTICITY IN N/MM2 AT VARIOUS COMPACTIONS RATES/MDD					
			85	90	92	95	97	100
G1	20	35	2.0	6	9	16	23	40
G2	20	30	1.2	3	4	8	11	20
G3	20	25	0.8	2	3	5	8	13
G4	20	20	0.6	1.5	2	4	6	10

Loading/unloading, handling, storage & inspection

Infrapipe has a detailed document on Loading/Unloading, Handling & Storing these products. Please read and follow this document

Infrapipe has a detailed document on Inspection on Delivery

Cutting

When cutting follow these instructions:

1. Wear appropriate PPE.
2. Support the pipe so that it is flat and will be restrained before and after the cut.
3. Cut in the groove (narrowest part) of the pipe.
4. Cut squarely throughout the cut.
5. Remove all burrs.
6. Create a new witness mark equal to the length of the socket that the pipe is being inserted into (see Table 5 on the next page for location).

Joining

EZY-PIPE is joined by a rubber ring which should accompany the pipe and be sealed in a bag and undamaged on receipt. These rings are made in NZ to AS1646.2:2000 *Elastomeric seals for waterworks purposes*. When joining one EZY-PIPE to the next, follow these instructions:

1. Inspect socket and spigot for damage or debris and clean as required
2. Place the rubber ring on the FIRST FULL GROOVE on the spigot
3. Apply pipe lubricant generously to the socket (not the spigot)
4. Lift the pipe into the trench
5. Ensure the pipe alignment is correct and an indentation has been formed below the socket to ensure the pipe alignment is unaffected – see table below for approximate indent dimensions
6. Push the spigot end into the socket up to the witness mark

Table 5 Indent Dimensions in mm

DN	Indent Depth	Indent Length	Witness mark # of rings	
100	15	150	6	
150	20	150	5	
200	20	200	5	
225	20	200	5	
300	25	250	4	
375	25	300	5	
450	25	300	4	
525	25	300	4	
600	25	400	6	
800	25	450	4	
1000	25	500	6	

Bends

- Bends are available in the following configurations up to DN525:
- Bends of 90,45,22,11 degrees with a standard radius (1.5 times the diameter) are available up to DN525:

Table 6 Bends Standard Radii

DN	Std Radius		DN	Std Radius
100	150		300	450
150	225		375	562
200	300		450	675
225	337		525	787

- Alternative radii from x 1 diameter up are available as a custom item.
- DN600-DN1000 bends are achieved by integrating into the Krah system (see below) and can be made for any angle and any radius.
- Bends have two sockets and come with 2 rubber rings.

Reducers

Reducers are available to reduce one size as follows. Reducers have female sockets for both diameters.

- 225>150
- 300>225
- 375>300
- 450>375
- 525>450
- 600>525

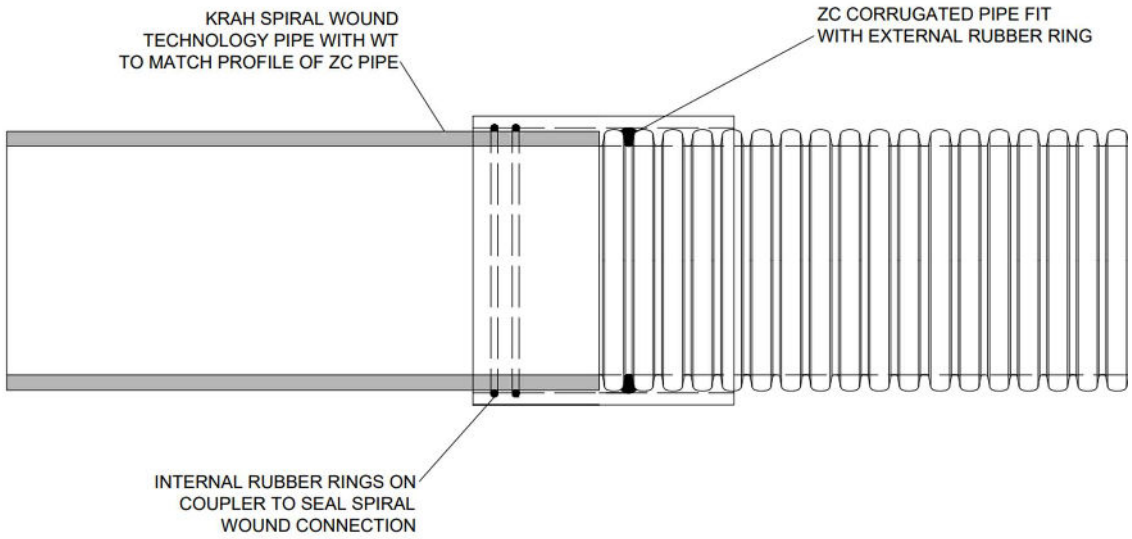
Reducers can be custom-made for 1000>800 and 800>600

If pipelines have been designed with 700 or 900 ID, the potential economies from this product are such that they can be quoted in 800 or 1000 respectively.

Connecting to HDPE pipes

EZY-PIPE can also be easily integrated into the Krah system produced by Infrapipe (in diameters 375+) creating a further range of options for connecting to other materials and diameters. See here for more details

Connecting to solid-wall HDPE requires a custom-made slip coupling (see below for more details). Connecting to other HDPE corrugated pipes is also easily possible with a custom-made slip coupling:

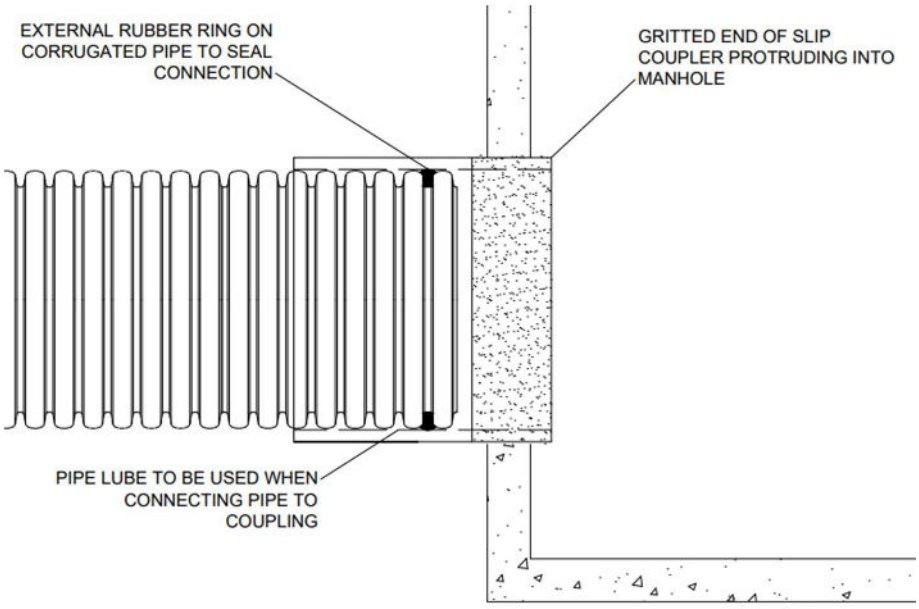


Connecting to manholes or other pipes of concrete, clay or PVC

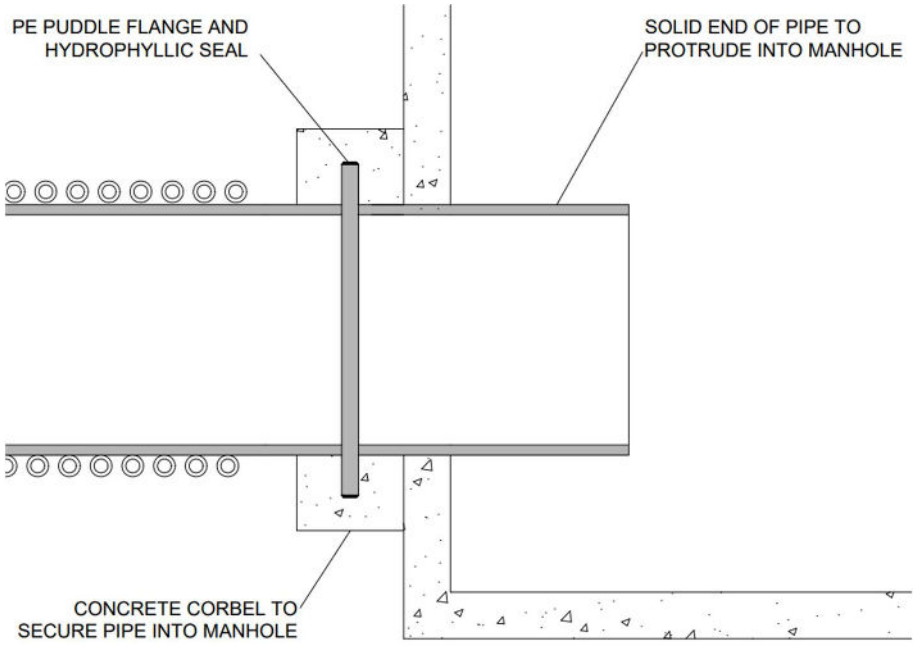
EZY-PIPE can be easily joined to pipes of other materials and diameters and to existing manholes. This can be achieved in the following ways:

1. Using a standard manhole connector (DN100-DN450)
2. Using a custom-made fitting such as a slip coupler (DN375-DN1000)
3. Creating a concrete/epoxy mortar corbel around the join (DN100-1000)
4. Using a join to a Krah pipe and then a puddle flange and/or hydrophillic seal in conjunction with a concrete/epoxy mortar corbel (DN375-DN1000)

1- A standard manhole connector



2 – A slip coupler



3 & 4 – A puddle flange & a concrete corbel

Connecting with fittings

EZY-PIPE can be connected with a variety of fittings listed below. For unusual requirements, custom-made fittings can be fabricated. Fittings have all female sockets and come with a rubber ring for each socket. Screw cap & base, reducing T junctions and reducing Y junctions are available on request. Other fittings are either STD (standard, some quantities held in stock) or POA (Price On Application)

Table 7 Fittings availability

DN	T Junction	Y Junction	Coupler	Manhole Connector	End Cap
100	POA	POA	POA	POA	POA
150	POA	POA	POA	POA	POA
200	POA	POA	POA	POA	POA
225	STD	STD	STD	STD	STD
300	STD	STD	STD	STD	STD
375	STD	STD	STD	STD	STD
450	STD	STD	STD	STD	STD
525	POA	POA	POA	POA	POA
600	POA	POA	POA	POA	POA
800	POA	POA	POA	POA	POA
1000	POA	POA	POA	POA	POA

Installing or retrofitting smaller laterals

Installing laterals of 100 or 150mm diameter is best achieved using Fernco fittings. For 100 and 150mm laterals, the twin-wall saddle is ideal.

The Fernco twin-wall saddle

See the datasheet for this solution (Fernco twin-wall saddles)

Installing larger laterals

Where a pipe of greater than 150mm is to be introduced, reducing T junctions or reducing Y junctions can be used and are a standard item up to pipe DN450.

Retrofitting laterals

The most economical and efficient way to retrofit a lateral is with the Fernco Storm-T fitting:

See the datasheet for this solution (Fernco Storm-T)

A Fernco Storm-T fitting

Installing or retrofitting larger laterals or onto larger pipes

If the above options do not suit the diameters of the lateral or the main pipe, then a connection can be achieved in one of two ways:

- An interface with a Krah product which can then be custom-made to receive the lateral
- An interface with a manhole (as above) which then joins the pipes

Half-lengths & further products

- Half-lengths (3m) for use in short runs or trench shields will be available later in 2024.
- Endless (no socket) lengths will be available in 2025 in sizes DN100-600
- Double sockets will be available in 2025 in sizes DN100-600

Maintenance & modification

- Nil maintenance of this product is required.
- For modifications, contact Infrapipe who can advise on the best way to achieve this.

Care of the product and maintaining your warranty

- For full details on how to care for the product read Infrapipes Guide to Maintaining your warranty
- Due to the wall thickness of this product, HDPE welding is not recommended
- In the event of damage during or after installation, repairs can be conducted by cutting out the damaged section and using shear bands with a new section of pipe as shown below. For further advice, contact Infrapipe.

Standards, Certification & Testing

1. This product has been certified to AS/NZS 5065:2005 licence no. AMI 74961, the certificate is Appendix A1.
2. Infrapipe is certified to ISO 9001:2015 licence no. AMI 78044, the certificate is Appendix A2.
3. The fittings are produced using pipes made to AS/NZS 1260:2017 licence numbers BV 2802 and WMK 26689, the certificates are Appendix A5. **See below for further details on fitting certification.**
4. The rubber rings are certified to AS1646.2:2007 *Elastomeric seals for waterworks purposes* and AS/NZS 4020:2018, the certificate is Appendix A3
5. Pipes are tested by Infrapipe in their test lab in accordance with ISO 9969:2016 *Thermoplastic pipes – Determination of Ring Stiffness*

Administration

- Pipes are held in stock in Auckland, Palmerston North, Nelson and Christchurch. Some fittings are held in stock but most have a 2 week leadtime.
- Codes are in the back pages of this document.
- A schedule document is available to download
- Orders should be emailed to sales@infrapipe.co.nz

All documents (including this), are available at Infrapipe's website - Downloads

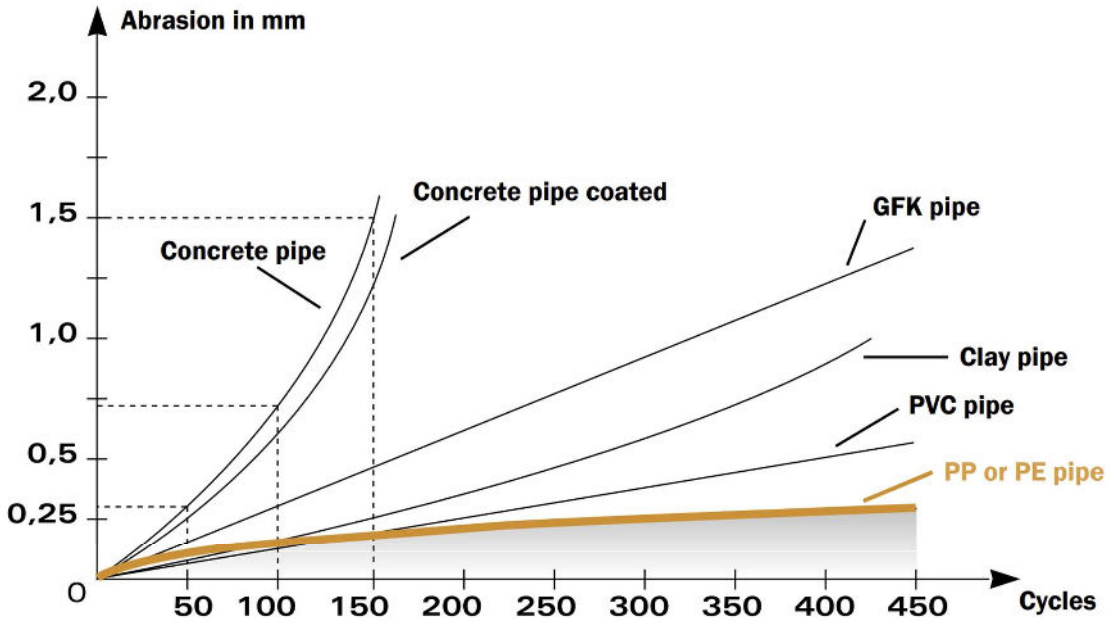
Technical specifications

Friction resistance/Velocity of HDPE – 7.5m/s

- The Colebrook-white roughness coefficient for new polypropylene pipes is in the range 0.003–0.015mm.

Abrasion resistance

HDPE has the optimum abrasion resistance of any pipe material as proven in numerous tests:



Abrasion curve of various pipe materials according to the Darmstadt procedure.

The Darmstadt procedure, which has been the standard for abrasion testing since the 1960s, simulates the abrasion and resulting wear of liners and pipes that would occur in actual operating conditions by tilting a pipe section containing a mix of sand, gravel and water through 22.5degrees above and below the horizontal for at least 100,000 cycles. The results for PP or PE pipe show a greater resistance to abrasion and hence operating life.

Pressure

EZYPIPE is tested to 20psi and therefore approved for use up to 1 Bar (14.5psi)

Marking

Product is marked in two ways.

In addition to the witness mark, the socket end is embossed with the "DN/ID" and "Made in NZ to AS NZS 5065".

There is also print on the pipe as follows:

- Manufacturers name
- Nominal size
- Class
- Material
- Date of manufacture DD-MM-YY

An example is:

INFRAPIPE – DN300 – SN16 – PP - 150724

Due to the shape of the product, some characters may be illegible in any given mark, however as the code is repeated every metre the entire marking can be derived from combining multiple marks.

Chemical resistance

Polypropylene is highly inert and therefore has superb resistance to NZ soils.

The Infrapipe chart of chemical resistance can be found here

Longevity

Polypropylene has a one hundred year life.

Fittings Certification

HDPE custom-made Krah fittings are certified under AS/NZS 5065:2005 *Polyethylene and polypropylene pipes and fittings for drainage and sewerage applications.* The certificate is in Appendix A2.

PVC fitting manufacturer Solo is registered under ISO 9001:2015. The certificate is in Appendix A4.

PVC fabricated Fittings are assessed under AS/NZS 1254:2010 *PVC-U pipes and fittings for stormwater and surface water applications* Section 6 FABRICATED FITTINGS (excerpt below). The following operative sections apply:

6.2 (b) "Pipes and moulded fittings used in the manufacture of fabricated fittings shall .. comply with the requirements of AS/NZS 1260:2017 (>SN4)"

The source pipe for the fittings is produced from compliant pipe and the certificate is attached in Appendix A5.

6.3 "Fabricated fittings shall comply with the relevant provisions of Clauses 5.2 and 5.3"

5.2 and 5.3 stipulate fitting dimensions and wall thicknesses only for moulded fittings for solvent cement jointing except that 5.2.3 also states that "Sockets on moulded fittings for elastomeric seal jointing shall be in accordance with the requirements of Section 7". Section 7 is addressed below.

6.3 "Where fabricated fittings are composed of pipe sections, the sockets shall comply .. with Section 7 for elastomeric seal joints"

Section 7 has two requirements:

1. That the seal complies with AS1646:2017, see above, certificate in Appendix A3.

2. That the effective sealing length is no less than a given value as per the table below:

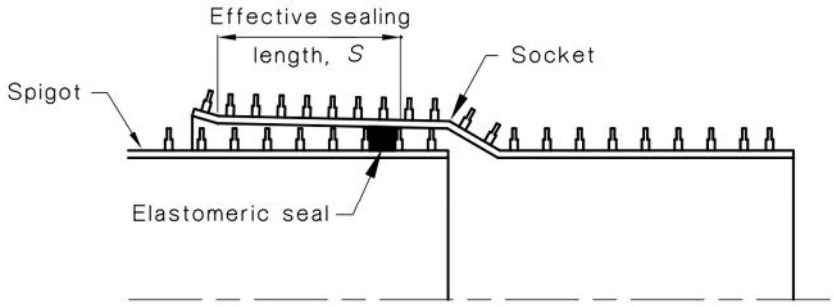


FIGURE 7.2 TYPICAL ELASTOMERIC SEAL JOINT ON RIBBED AND PROFILE WALL PIPES AND FITTINGS

Table 9 Effective Sealing lengths from AS/NZS 1254

DN	Minimum effective sealing length mm	EZYPIPE effective sealing length mm (Spigot Length – 1 * Pitch)(E-F)
100	41	85
150	47	107
225	55	142
300	63	192
375	75	196

450 and over is not stipulated in the standard but it can be seen that the design exceeds the requirement by a factor of 1 to 2.5

6.4 "The minimum free bore of the fitting shall be not less than 95% of the minimum mean inside diameter of the corresponding pipe"

The table below shows the free bore in relation to the requirement in the standard:

Table 10 Free bore requirements from AS/NZS 1254

DN	Actual ID mm	Free bore mm at 95% of ID	Actual Fitting ID mm
100	98	93	101.6
150	147	140	147.9
225	218	207	231.3
300	295	280	290.8
375	375	356	370.1
450	450	427	460.7

6.5 Marking

Fittings are marked accordingly with the following:

- The manufacturers name
- Nominal size
- The letters "PVC" or "PVC-U"
- The angle of the fitting in the case of bends and branches
- The word "STORMWATER"
- The class of fitting
- The number of this standard

An example is:

Solo – DN375 – PVC-U – 45 – STORMWATER – SN16 – AS/NZS1254

About Infrapipe

Pictures
In test, joined (witness mark), in fittings?, Pipe being carried by 1-2 people
Capacity at gradients/hydraulic capacity – DF to provide
Product codes
Products
R Rings
Solo Fittings
Fernco

This means that by using EZYPIPE cost is saved by using smaller (and cheaper) pipes and also using bends to avoid manholes. Installation costs are lower due to the lightweight and long length of the pipes. The resistance to abrasion and chemical stability ensure that the best hydraulic performance continues for a century.

Product showing witness mark

Equivalent product substitution information for dispensation applications

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