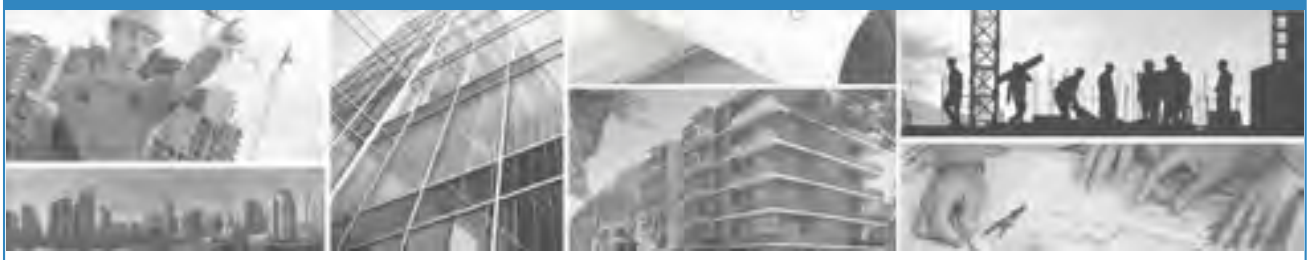

OPERATIONS AND MAINTENANCE MANUALS

Regional Lagoons Manuals > ST52 Forest Hill STP > Hydraulic

Builder
Thomas Coffey

Compiled
Feb 03, 2015

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Table of Contents

Regional Lagoons Manuals 1
ST52 Forest Hill STP 2
Electrical 3
Introduction 4
Assets 5
Maintenance 6
Operations & Tech Data 7
Warranties 8
Commissioning Information 9
Help &Contact 10
As Built Drawings 11
Hydraulic 12
Introduction 13
Assets 14
Maintenance 15
Operations & Tech Data 16
Warranties 17
Certificates 18
Commissioning Information 19
Help & Contact 20
As Built Drawings 21
Formwork/Reinforcement and Concrete (T&C) 22
Certificates 23
Chemical dosing equipment 24
Introduction 25
Maintenance 26
Operations & Tech Data 27
Warranties 28
Certificates 29
Spares 30
Help & Contact 31
As Built Drawings 32
Documents 33
Sheds 34
Introduction 35
Maintenance 36
Operations & Tech Data 37
Warranties 38
Certificates 39
Help & Contact 40
As Built Drawings 41
Thomas Coffey Finalisation documents 42
Introduction 43
Warranties 44
Commissioning Information 45
Help & Contact 46
As Built Drawings 47
Attachment Index 48

Introduction

Introduction and Scope of Works

This manual has been prepared by Flint Plumbing for the purpose of Operation and maintenance of the Forest Hill portion of work of the Regional Lagoons Project. The work has been completed as per the Contract and Construction Drawings Supplied be Thomas Coffey.

Please find complete as Built Drawing in the Drawing Section of this manual.

The Following is a brief description of the scope of work.

- Hydraulic Piping for Chlorine Rooms
- Values
- Flitration Lines
- Potable Water Lines
- Back Wash Lines
- All Associate works and Hydraulic Infrasructure
- Some Variation work to the Hydraulic Infrastructure was complete as per Thomas Coffeys Instructions.
- This work included Connection to other sub contractors packages.

Assets

Asset ID	#AST23	Parent ID	
Description	Intake pumps	Service	(2.0) Material Displacement and Direction
Subservice	(PU_) PUMP	Site	(ST052) Forest Hill
Process	(2700.0) EFFLUENT REUSE	Sub	(2710) EFFLUENT TREATMENT AND DELIVERY
Location Description	Forest Hill Lagoon 3	Make	GMP Electric Drive Semi Trash Pumps
Model	B2KQ-A/ST 2 HP	Serial Number	
Supplier	Aussie Pumps	Quantity	1
Retail Price $	1400	Install Date	Dec 9, 2013
Wty Expiry Date	Dec 9, 2014	Life Expectancy (yrs)	10
Reference Information	The factory warranty is 12 months from installation so this item will be covered by the Principal Contractor until the end of the 12 month defect liability period.		

Maintenance

Pumps

1 - Monthly
- Carry out the following tasks in accordance with AS3666, SAHB32 and the Public Health Act
- Adjust belt tension as necessary, check for wear.
- Change over duty pump, where fitted.
- Check guards are securely in place.
- Check pump and motor for vibration and bearings for noise or overheating. Repair as necessary.
- Check that gland well and drains are clear.
- If pressure gauges fitted, check operating pressures to ensure strainer is clear and pump vented.
- Inspect pump gland and adjust if necessary.
- Operate pump suction and discharge valves stop any gland leaks.
- Vent Pump.
- Visually inspect pump coupling.
- Where fitted, check operation of automatic float switch, adjust as necessary.

3 - Monthly
- Carry out the following tasks in accordance with AS3666, SAHB32 and the Public Health Act
- Lightly grease bright steel.
- With pump running lightly lubricate bearings of pump and motor.

6 - Monthly
- Carry out the following tasks in accordance with AS3666, SAHB32 and the Public Health Act
- Clean and, as necessary, reseat check valves.

12 - Monthly
- Carry out the following tasks in accordance with AS3666, SAHB32 and the Public Health Act
- Check coupling bushes for wear, if worn record/report and isolate equipment. Motor may need alignment.
- Clean pump strainer.
- Inspect exposed surfaces for corrosion, minor repair or paintwork as necessary.

36 - Monthly
- Carry out the following tasks in accordance with AS3666, SAHB32 and the Public Health Act
- Replace belts and check motor alignment and couplings as applicable.

Operations & Tech Data

Piping and Pipe Fittings

Service : (2.0) Material Displacement and Direction

Subservice : (PIP) PIPES_&_VALVES

Linked Documents

- BRO_ADVANTAGE_PE_Pipe.pdf
- Stainless Pipe Fittings.pdf
- Polyethylene Pipe and Fittings_7.pdf
- Chemical Resistance Chart.pdf
- Polyethylene Pipe and Fittings_1.pdf
- Polyethylene Pipe and Fittings_2.pdf
- Polyethylene Pipe and Fittings_3.pdf
- Polyethylene Pipe and Fittings_4.pdf
- Polyethylene Pipe and Fittings_5.pdf
- Polyethylene Pipe and Fittings_6.pdf

Valve - Technical Data

Service : (1.0) Site, Process or Subprocess

Subservice : (WP_) WATER_PS

Linked Documents

- TS2005W_Values.pdf

Sluices Values and Fittings

Service : (2.0) Material Displacement and Direction

Subservice : (PIP) PIPES_&_VALVES

Linked Documents

- TDS_Flanged_Fittings_JUN2011 (4) (2).pdf
- ABB General Terms and Conditions of Sale (Oct.2012) (2).pdf
- BRO_ADVANTAGE_PE_Pipe (3).pdf
- CPC Product Certifications (2).pdf
- DS_WM-EN_L (2).pdf

Intake pump

Service : (1.0) Site, Process or Subprocess

Subservice : (SP_) SEWER_PS

Linked Documents

- GMP Electric drive semi trash pumps.pdf

MILL TEST CERTIFICATE

Material: 316

ORDER NO.: 21427/18

Certificate No: JC08-0303

L/C Number: CD3BM898555

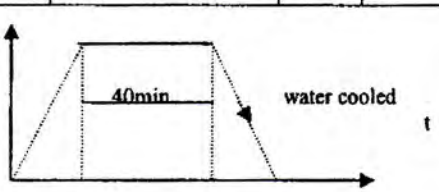
Product: STAINLESS STEEL FITTINGS

	Chemical Composition %										
	C	Si	Mn	P	S	Ni	Cr	Mo	Cu	V	REMARKS
Heat No.	0.08	1.50	1.50	0.040	0.040	9.0-12.0	18.0-21.0	2.0-3.0			
2008D0310	0.074	0.73	1.22	0.030	0.012	9.08	18.13	2.06			
2008D0309	0.072	0.77	1.17	0.028	0.016	9.12	18.17	2.10			
2008D0308	0.070	0.73	1.20	0.027	0.016	9.07	18.12	2.09			
2008D0302	0.068	0.78	1.14	0.028	0.012	9.09	18.13	2.08			
2008D0301	0.059	0.73	1.19	0.031	0.013	9.12	18.19	2.06			
2008D0300	0.068	0.79	1.20	0.032	0.018	9.09	18.13	2.11			
2008D0296	0.067	0.71	1.28	0.030	0.011	9.06	18.14	2.07			
2008D0291	0.061	0.76	1.23	0.027	0.010	9.03	18.07	2.08			
2008D0290	0.059	0.74	1.25	0.035	0.011	9.05	18.22	2.05			
2008D0289	0.066	0.76	1.18	0.033	0.011	9.16	18.09	2.13			
2008D0288	0.072	0.76	1.29	0.026	0.010	9.07	18.11	2.11			
2008D0287	0.066	0.76	1.25	0.027	0.010	9.06	18.09	2.04			
2008D0286	0.068	0.83	1.14	0.028	0.012	9.07	18.17	2.06			
2008D0285	0.059	0.79	1.26	0.026	0.010	9.10	18.18	2.04			
2008D0284	0.062	0.77	1.26	0.027	0.010	9.09	18.05	2.07			
2008D0283	0.061	0.79	1.18	0.027	0.010	9.10	18.09	2.05			
2008D0282	0.056	0.77	1.25	0.030	0.013	9.08	18.14	2.05			

Mechanical Properties	Items	Tension Test				Hardness Test	
		Yield Strength ós (Mpa)	Tensile Strength Ób(Mpa)	Elongation Of Area δ (%)	Reduction Of Area Ψ(%)	HRB	HRC
	Specification	205	485	30			
	Results	395	570	47			

Heat Treatment

Annealing:	
Normalizing:	
Quenching:	
Tempering:	
Solid solution:	1080°C



We hereby certify that the above-mentioned material properties conform with ASTM 351

Witness/reviewed by

Q. A. Manager

Chemical Resistance Tool

Plastic pipes are inert to a wide range of chemicals which would cause corrosion in a metal or cementitious pipe.

This Chemical Resistance Guide is provided by Iplex as a reference tool to ascertain the initial suitability of various plastic pipe materials for the transportation of particular chemicals.

Plastic pipe systems are ideal for transporting a wide variety of chemicals and are widely used in industries where conveyance of highly corrosive liquids and gases require products with excellent corrosion resistance.

The chemical resistance guide is provided by Iplex as a reference tool to ascertain the initial suitability of various plastic pipe materials for the transportation of a particular chemical.

Chemical Library

The data shown is largely based on immersion tests and can be taken as a general indication of the behaviour of these materials when exposed under pipeline service conditions to the chemicals listed. However it should be noted that the presence of stress can reduce chemical resistance. Also variations in the analysis of chemical compounds or combination substances, together with operating conditions such as pressure, temperature or duration of exposure can all modify the chemical resistance of particular pipe materials.

In certain cases, it may be desirable to carry out experimental tests under the envisaged service conditions or talk directly to Iplex's technical marketing group.

Unlike the corrosion mechanism in metals where there is loss of weight through progressive surface degradation, polymers and elastomers can be affected by aggressive chemicals in any one of the following ways:

- Reduction in tensile properties ie strength and elongation at break
- Swelling or absorption of the liquid
- Shrinkage or extraction of the soluble portion

Iplex provides extensive technical support and will be pleased to assist when doubt exists over a product's suitability.

The assistance provided by Formatura Iniezione Polimera Spa (FIP) in particular in the production of the information is acknowledged. Other references include ISO/TR 10358, AS 2032 and AS 2033.

No guarantee can be given in respect of the listed data. Iplex Pipelines reserves the right to make any modifications whatsoever based upon further research and experience.

Chemical resistance degree

Three different types of chemical resistance degree are used in the chemical resistance guide:

A = High Resistance

The material belonging in this category is for practical purposes corrosion-proof against the listed chemical under the specified operating temperature and concentration.

- Elongation at break - unchanged
- Swelling < 3%
- Weight loss < 0.5%

B = Limited Resistance

The material will be affected by the chemical to some extent. The expected life will therefore be shorter and it is advisable to carry out an appropriate analysis of the risks involved if the material is to be used.

- Elongation at break - less than 50% reduction
- Swelling 3 - 8%
- Weight loss 0.5 - 5%

C = No Resistance

Material in this category is subject to attack by the chemical and should therefore not be used.

- Elongation at break - more than 50% reduction
- Swelling > 8%
- Weight loss > 5%

Please Note:
Where insufficient data is available concerning the performance of the material, when exposed to a particular chemical, is has been left blank.

Abbreviations

Comm commercial solution

Conc	concentrated
Dil	dilute solution
Nd	undefined concentration
Sat	saturated solution at 20°C
Wk	weak solution

Chemical Resistance Properties of Polyethylene

Polyethylene is in chemical terms a non-polar high molecular weight paraffin of the hydrocarbon family. Hence it is very resistant to (non oxidising) strong acids, strong bases and salts. It is mildly affected by aliphatic solvents although aromatic and chlorinated solvents will cause some swelling.

Polyethylene is attacked by strongly oxidising substances such as halogens and concentrated inorganic acids such as nitric, sulphuric (including oleum), perchloric, etc.

The resistance table tabulate the chemical and temperature resistance of polyethylene, together with polypropylene and the various elastomeric materials used with the IPLEX METRIC & IPLEX RURAL compression couplings and other mechanical jointing systems.

Chemical Resistance Properties of PVC-U & PVC-M

PVC Pipe systems (PVC-U and PVC-M) have outstanding resistance to a wide range of chemical reagents at temperatures up to 50°C.

In general PVC is suitable to convey most strong acids, alkalies and aqueous solutions (except those which are strongly oxidising), aliphatic hydro carbons, fluorides, photographic and plating solutions, brine, mineral oils, fats and alcohols. The suitability of a PVC pipeline for conveying a given chemical will depend on such factors as: the concentration of the chemical in the fluid to be conveyed, flow rates, the presence of pockets or "dead spots" in the pipeline and other factors, which should be established by reference to Iplex's Technical Marketing Group.

PVC should not normally be used with aldehydes and ketones, ethers, cyclic ethers, esters and aromatic and chlorinated hydrocarbons, nitro compounds, some petrol/benzene mixtures, and similar solvents which lead to a marked swelling and softening of the material.

Consideration should also be given to the effect of the fluid on the rubber ring. Unless otherwise specified, rings of natural rubber will be supplied. Rings compounded in neoprene and styrene butadiene are also available.

Natural rubber gaskets are generally resistant to most inorganic chemicals, including acids, alkalis including salts together with organic acids, alcohols, ketones, and aldehydes. They can be attacked by ozone, strong acids, oils, greases and many hydrocarbons however.

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Product Systems
Technical Information

Polyethylene Pipe and Fittings >> Introduction

Polyethylene (PE) pipes have been produced in Australia and New Zealand since the mid 1950s. Whilst initially in small diameters for industrial and agricultural applications, PE pipes are now available in diameters as large as 2000mm. The first Australian Standard was released in 1962 and Iplex Pipelines commenced production in the early seventies. Usage has grown rapidly with over 40,000 tonnes of PE pipes being produced annually in Australasia. Polyethylene has become one of the most widely used and versatile of all plastic pipe systems.

POLiplex pipes are used for all types of liquids and gases. Common applications are:

- Mine water supply
- Irrigation supply
- Mineral slurry pipelines
- Domestic water supply house service connections
- Vacuum and gravity sewer systems
- Submarine pipelines
- Sewer rising mains
- Trenchless pipelines installed by directional drilling, slip lining and pipe bursting methods
- Process pipe work
- Compressed air services
- Electric and telecommunication cable conduits
- Natural gas transmission and reticulation

POLIplex PE pipes may be joined economically using thermal butt-welding equipment. However diameters of up to DN 110 are more commonly joined using Iplex compression couplings complying with AS/NZS 4129. These fittings provide an system for making joints quickly and easily, which can be undone and reused when altering the system layout. An alternative form of welding PE is the electrofusion system where heating elements are embedded in PE sockets. These sockets form part of a coupling or other fitting and require a controlled electrical input from a welding machine to produce a welded joint.

Product Systems
Technical Information

Polyethylene Pipe and Fittings >> Product Properties

>> Material Properties

Terms frequently used to describe this material when used for engineering applications are high density (HDPE), medium density (MDPE) and most recently high performance (HPPE) polyethylene. Others PE types, such as low density (LDPE) and linear low density (LLDPE) are sometimes used for irrigation pipelines.

The Type 50 PE of AS1159 that was in common use until 1994, is an HDPE with a long-term design stress of 5.0 MPa. AS/NZS4130 and AS/NZS allow for three specific classifications by material strengths and sub classifications by performance at elevated temperatures.

The higher strength PE 80B and PE100 compounds are sometimes referred to as second and third generation materials. They were introduced into general service in the late seventies and early nineties respectively.

POLIplex polyethylene is an integrated family of PE pipes produced by Iplex , based on PE 80B, PE 80C and PE100 materials. PE80B material has 50-year design strength of 8 MPa whilst PE100 material's minimum required strength is 10 MPa. Iplex POLIplex pipes are manufactured to AS/NZS 4130 from polyethylene's complying with AS/NZS 4131.

PE Material Type	PE80B	PE100
MRS (50 year)	8 MPa	10 MPa
Flexural Yield Strength	27MPa	32 MPa
Circumferential Flexural Modulus (3 minute)	700 MPa	950 MPa
Circumferential Flexural Creep Modulus (50 year)	200 MPa	260 MPa
Density	943 kg/m^3	955 kg/m^3
Tensile Yield Stress (50mm/min)	20 MPa	25 MPa
Tensile Yield Strain (50mm/min)	8%	10%
Tensile Modulus	650 MPa	900 MPa
Poisson's Ratio	0.4	0.4
Thermal Expansion Coefficient	0.2 mm/m K	0.18 mm/m K
Thermal Conductivity	0.38 W/m K	0.38 W/m K

Material Composition

The polyethylene compounds used in POLIplex pipes and fittings are pre-compounded resins, either black or coloured with pigment, complying with AS/NZS 4131.

The following additives, if used, are added to the PE polymer base resin during the compounding process by the raw material manufacturer.

Anti-oxidants are used to inhibit oxidation of the polymer at the compounding stage and during subsequent processing. The oxidation induction test is an indicator of the efficacy of this additive and the residual amount after processing.

Carbon black is used in all black POLIplex pipe at a concentration of 2.25 ± 0.25% by mass as an ultra violet radiation absorber.

In natural and coloured PE materials, chemical ultra violet absorbers are used in lieu of carbon black.

Product Systems
Technical Information

Polyethylene Pipe and Fittings >> Product Properties

>> Thermal Properties

The co-efficient of thermal linear expansion of polyethylene varies with temperature but at ambient lies in the range
1.2 to 2.4 x 10^{-4} per degree C. In broad terms, this is about twenty times that of steel, and therefore unrestrained pipe will expand or contract much more than the steel structure that may be supporting it.

Should the pipe be fully restrained, the strain due to thermal change will generate stress in the material. However due to the relatively low tensile deformation modulus (E) of PE and assuming a typical ambient temperature fluctuation of less than 40°C it can be assumed that the safe allowable stress will not be exceeded. Over the longer term, stress relaxation will increase the ability of PE to accommodate high thermal strains.

The conductivity of polyethylene varies with temperature almost linearly and is typically 0.47 W/m.K at 0°C to 0.37 W/m.K at 70°C.

The specific heat of polyethylene varies with temperature from 1800 Joules/kg.K at 0°C to 2200 J/kg.K at 60°C.

At temperatures above 25°C it is necessary to rerate polyethylene pipe systems. The table below provides guidance as to the maximum operating pressure of PE100 pipes.

Maximum Allowable Head (m) - PE100

Temp (◦C)	Min Life (Yr)	Design Factor	PN4	PN6.3	PN8	PN10	PN12.5	PN16	PN20	PN25
			SDR41	SDR26	SDR21	SDR17	SDR13.6	SDR11	SDR9	SDR7.4
20	100	1.0	40	64	80	100	127	160	200	250
25	100	1.1	36	58	73	91	115	145	182	227
30	100	1.1	36	58	73	91	115	145	182	227
35	50	1.2	33	53	67	83	106	133	167	208
40	50	1.2	33	53	67	83	106	133	167	208
45	35	1.3	31	49	62	77	99	123	154	192
50	22	1.4	29	46	57	71	91	114	143	179
55	15	1.4	29	46	57	71	91	114	143	179
60	7	1.5	27	43	53	67	85	107	133	167
80	1	2.0	20	32	40	50	63	80	100	125

NOTE:

i. The values tabled are for pipe manufactured to AS/NZS 4130 and fittings made from compounds complying with AS 4131.
ii. The minimum life periods may be considered to be the minimum potential service lives and represent the maximum extrapolated periods permitted by the ISO9080 extrapolation rules given the available test data.
iii. Maximum allowable operating pressure is indicated in metres head (1m = 9.81kPa).

Product Systems
Technical Information

Polyethylene Pipe and Fittings >> Product Properties

>> Chemical Resistance

Polyethylene is in chemical terms a non-polar high molecular weight paraffin of the hydrocarbon family. Hence it is very resistant to (non-oxidising) strong acids, strong bases and salts. It is mildly affected by aliphatic solvents although aromatic and chlorinated solvents will cause some swelling.

Polyethylene is attacked by strongly oxidising substances such as halogens and concentrated inorganic acids such as nitric, sulphuric (including oleum), perchloric etc.

Please view Chemical Resistance chart. (iplex.php?page=11)

Product Systems
Technical Information

Polyethylene Pipe and Fittings >> Product Properties

>> The THERMAPIPE Concept

THERMAPIPE resists the absorption of heat by the use of a highly reflective white material on the external skin of the pipe. This material extruded concurrently with the black pipe wall, forming an integral part of the pipe. Formulation of the white co-extrusion is designed to match the long term UV stability achieved by conventional black PE material.

Extensive testing has demonstrated that solar radiation has less than half the heating effect on THERMAPIPE than was recorded for conventional black PE pipes under the same conditions.

In all other respects, THERMAPIPE matches or exceeds the performance requirements of AS/NZS 4130 PE pipes, pressure applications.

By limiting the operating temperature of above ground polyethylene pipelines, a thinner walled pipe can be used than would otherwise be required in a given application. THERMAPIPE achieves the following performance improvements relative to black PE pipes;

- Thinner walled pipes providing more efficient pipe design
- Lower pipe purchase cost
- Lower pumping cost due to greater hydraulic capacity.
- Reduced thermal expansion / contraction
- Less requirement to ‘snake’ pipelines
- Extra purchase length reduced to +2% to accommodate snaking (Vs 4% for black PE)
- THERMAPIPE reduces pipe movements on tailings dam walls & pipe racks.
- Reduced anchorage loads.
- Reduced thermal stress in the pipe material.
- Higher pipe stiffness
- Greater resistance to collapse under vacuum effect.
- Easier to handle in long lengths on-site.
- Reduced temperature rise in fluid
- Contents in THERMAPIPE remain cooler than in equivalent black pipes.

Relative to other systems for limiting solar heating of PE pipes, which may include sleeving;

THERMAPIPE provides;

- Factory finished system
- No special installation steps – standard welding and jointing systems apply.
- No additional costs for installation.
- Thermal protection integral with pipe structure
- Immune to wind damage or attack by animals.
- Maintenance costs are minimal.

Design For High Temperature Service

Above ground PE pipe can absorb and shed thermal energy via a number of mechanisms. Incoming solar radiation will heat the pipe whilst re-radiation, convection and conduction to the fluid conveyed will act to cool the pipe. Variation in the incoming solar radiation intensity with time of day, cloud cover, latitude, altitude, season and pipeline orientation combine to be major determinants of pipe temperature.

Wind velocity, ambient temperature and the flow rate, temperature and nature of the conveyed fluid are also

variables acting to influence pipe wall temperature.

Much of this complexity can be reduced by considering that any pipe design must accommodate the most arduous environmental conditions to be encountered. For PE, this requires the estimation of long-term temperature conditions in the pipe, especially during summer.

Testing of conventional black PE pipe and the white THERMAPIPE material by an independent laboratory has confirmed lower radiation absorption, resulting in substantial reductions in temperature with this material.

Radiation Absorption *	
POLIplex Black PE	96%
THERMAPIPE	42%

* Absorptance (meaning) the ratio of the amount of radiation absorbed by a surface to the amount of radiation incident upon it.

THERMAPIPE is able to maintain a lower operating temperature via both the lower absorption of radiation and by maintaining free convection around the outside diameter to optimise cooling. Mean pipe wall temperature is the key parameter expressed as a simple average of inside and outside surface temperatures.

Product Systems
Technical Information

Polyethylene Pipe and Fittings >> Product Dimensions

>> Electrofusion Fittings

Iplex Pipelines and Georg Fischer Pipe Systems have a long and complementary association in the Australian market place.

An alternative form of welding PE is the electrofusion system where heating elements are embedded in PE fitting sockets. These sockets form part of a coupling or other fitting and require an electrical input from a welding machine to produce a welded joint.

The wide range selection of high quality joining systems (electrofusion and spigot fittings), machines, tools and accessories is representative of an informed and solution approach to our customers needs in the water and gas utility market.

The ELGEF-plus electrofusion procedure utilises the weldability of POLIplex materials with out the use of the relatively cumbersome butt fusion welding machine. This is achieved by using polyethylene couplings with embedded copper wire coils serving as heating elements. A portable welding machine connected to a power source provides a current source of the correct voltage and duration, which is applied to the terminals on the coupling or socket. This causes the mating surfaces of socket and pipe to be melted to give a fused contiguous whole. The electrofusion process unlike butt fusion can be used to joint pipes and fittings of differing SDR or wall thickness. The ELGEF-plus equipment can be supplied with a built in data-recording system to give full traceability of individual welds.

Electrofusion permits a safe, systematic, economic and efficient fully welded installation for both buried and aboveground PE piping systems. Iplex's Georg Fischer electrofusion products are individually sealed in PE bags and packaged in cartons to protect them from UV radiation, oxidation as well as general contamination. Additionally they are supplied with a Barcoded card that contains all relevant product information, traceability and fusion welding parameters required for joining.

To view complete range of Electrofusion fittings, please use the product search function.

Frequently Asked Questions

The following is a sample of commonly asked questions pertaining to electrofusion. Should additional information be required, please contact Iplex Pipelines direct on 131814.

Can Iplex's Georg Fischer welding machines be used on other manufacturers electrofusion fittings?
Yes, but an adapter must be used for connection pins bigger than 4.0mm

---

On automatic welding machines, will the bar code reader recognise other manufacturers bar code?
Yes, however all settings should be checked prior to welding.

What size generator is recommended for electrofusion welding machines?
Generally 5kVA generators are recommended for the standard range of fittings.

Can Iplex's Georg Fischer welding machines connect to 10amp outlets?
No. Electrical plugs are all sized for 15amps. However in limited circumstances AS/NZS approved adaptors can be utilised.

Do I need current regulator protection on the generator?
MSA 250 plus machines have an inbuilt voltage regulator where as MSA210 are more susceptible to voltage spikes. We recommend an AVR (Automatic Voltage Control Regulator) unit should be used with the generator.

Do I need qualifications for electrofusion welding?
Competent and experienced procedural training can be sufficient, but in most cases certification from a recognised training organisation is required. Details for certified training organisations can be provided.

Why do I need to scrape the pipe?
PE pipe forms an oxidised layer when exposed to UV radiation. This layer must be removed from the joining surfaces prior to welding.

Can any type of cleaning wipe/fluid be used on the prepared surface?
No. Only commercially available PE solvent cleaners are permitted, with a minimum alcohol content of 90%. Cleaning agents with additives like moisturizes or similar additives are not to be used.

Are SDR and PN ratings the same?
No. PN ratings refer to internal pressures and SDR ratings refer to pipe wall thickness.

Can differing SDR rated pipe be electrofused?
Yes. Iplex's Georg Fischer fittings are rated either SDR 11 (PN16) or SDR17 (PN10). The fittings can be used on PN 100 pipe ranging from SDR 9 (PN20) up to SDR 26 (PN6.3) ratings however the SDR of the fittings will determine the final rating of the installation. In all non-standard cases please contact Iplex to check for suitability.

Are clamps required for Electrofusion joining?
Yes. All joints must be movement and stress free through out the welding and cooling process.

Is it necessary to re-round pipe?
Pipe can become oval in shape due to storage or coiling. Rerounding is only necessary for installation of fittings if pipe is out of round.

What is the function of a squeeze off tool?
On certain pipe sizes, squeeze off tools are used to compress PE pipe where no isolation valves are installed. On completion of the repair or cut in, the tool is released and the pipe returns to original shape.

How do I store electrofusion fittings?
Fittings should be stored out of the direct sunlight and in the original packing until immediately before

use. Couplers should be stored on their flat ends.

Do I need to scrape fittings prior to use?
No, as long as fittings have been correctly stored in the original packaging. PE cleaner should still be used on all prepared surfaces.

What are cool down times?
The welding process involves two phases – fusion (heating) and cooling. Cool down times on the barcode cards or the machine display must be observed.

Why do pipe ends need to be square?
The welding process relies on pressure as well as temperature. Pipe ends need to be square to ensure alignment within the fitting and containment of melt flows.

Can welding be carried out in inclement weather?
Yes. However the electrofusion joint must be protected from all weather influences. All prepared joining surfaces must be clean and dry prior to installation. Safety precautions must be followed when using electrical equipment in all conditions.

Product Systems
Technical Information

Polyethylene Pipe and Fittings >> Standards and Approvals

>> Standards and Testing

POLIplex polyethylene is an integrated family of PE pipes produced by Iplex, based on PE 80B and PE100 materials. POLIplex pipes are manufactured to AS/NZS 4130 from polyethylene's complying with AS/NZS 4131. Iplex POLIplex pipes are StandardsMark licensed to AS/NZS 4130 by SAI Global.

TS2005W Sizes 1/2"-4"

2-PC Investment Casting Ball Valve

Full Port, Screw End, 1000WOG

Investment Castings for Body and Cap

Pressure Rating 1000PSI(PN63)

Internal entry blow-out proof stem

Threaded Ends BS 21

Material : Stainless steel 304

Pressure test: API598

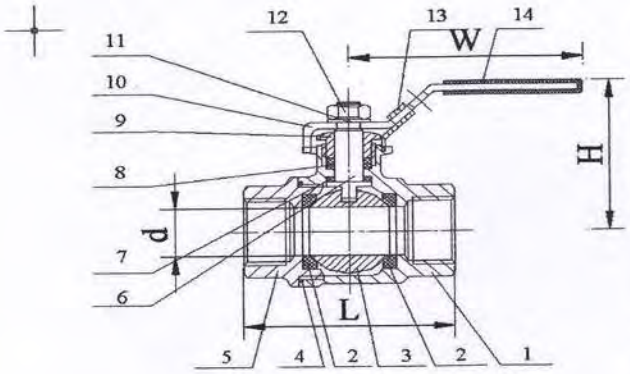
Max Working Pressure 1000PSI

BS 21

Stainless steel 304

Temp range -25-180 deg C.

T & S VALVES & FITTINGS SUPPLIES PTY LTD.
ADDRESS: 2/21 STENNETT RD INGLEBURN NSW 2565 AUSTRALIA
POSTAL ADDRESS: PO BOX 5190 MINTO BC NSW 2566
A.B.N: 33 003 085 176
A.C.N: 003 085 176
EMAIL: enquiries@tsvalves.com.au



SIZE	d	L	H	W	TORQUE(N.m)	KGS
1/4 "	12.5	49	48	100	4	0.22
3/8 "	12.5	49	48	100	4	0.22
1/2 "	15	55	52	100	5	0.23
3/4 "	20	66	57	115	8	0.44
1 "	25	78.5	75	150	10	0.60
1-1/4 "	32	90	80	150	14	1.05
1-1/2 "	38	98.5	95	180	25	1.48
2 "	50	120	110	180	40	2.61
2-1/2 "	62	147	119	245	48	4.70
3"	76	172	135	245	80	7.19
4"	94	220	158	282	103	16.10

Material List

ITEM	PARTS	MATERIAL	QTY.
1	Body	304	1
2	Ball Seat	PTFE	2
3	Ball	304	1
4	Body Gasket	PTFE	1
5	Cap	304	1
6	Stem	SS304	1
7	Thrust Washer	PTFE	1
8	Stem Packing	PTFE	1
9	Gland Nut	304	1
10	Handle	304	1
11	Spring Washer	304	1
12	Nut	304	1
13	Lock Device	304	1
14	Handle Cover	Plastic	1

tyco Water

Flanged Fittings

Ductile Iron Pipeline Systems

Flanged fittings are manufactured to AS/NZS 2280. Flange dimensions comply with AS 4087. DN 80 – DN 750

- Ductile Iron fittings for high strength and impact resistance
- Suitable for 'in ground' or 'above ground' applications
- Fittings can be encapsulated with a thermal bonded polymeric coating or cement lined and bitumen coated to suit local utility specifications.
- Self anchoring joints. No need for external anchorages.
- Integrally cast flanges on fittings. All flange dimensions comply with AS4087.
- Alternate flange dimensions available on request.

General application

Flanged Fittings provide restrained non-flexible joints in pipelines or within pipework arrangements and are commonly used in above ground applications such as pump stations and treatment plants.

Technical data

Size Range:
DN 80 – DN 750

Allowable Operating Pressures:
1600 or 3500kPa

Standards:
AS/NZS 2280 – Ductile iron pressure pipes and fittings

Certifications:
ProductMark Licence
PRD/R61/0412/1
Certified to AS 4020 – Suitable for contact with drinking water.

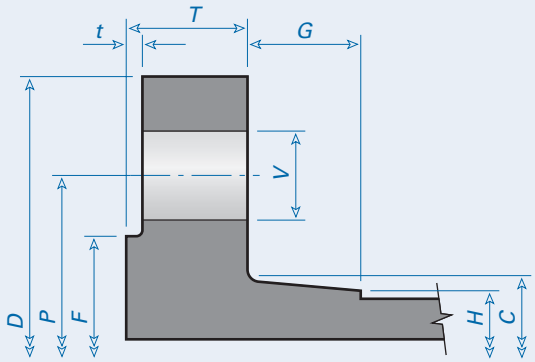
Flanged fittings typical specifying sequence

Specifying a high pressure DN 150 fusion coated flanged tee with a DN 100 branch.

Example	150x150-100	–	FL-FLxFL	TEE	HPFC
Nominal Size					
Angle (if applicable)					
End Type(s) FL – Flange / SC – Socket / SP – Spigot					
Type of Fitting TEE / BEND / TAPER / CONN					
Extra Information TC – Figure B5 Flange / HP – Figure B6 Flange CL – Cement Lined / FC – Fusion Coated					

Specifying a 22.5 degree standard pressure DN 100 cement lined, bitumen coated bend.

Example	100	22½	FL-FL	BEND	TCCL
Nominal Size					
Angle (if applicable)					
End Type(s) FL – Flange / SC – Socket / SP – Spigot					
Type of Fitting TEE / BEND / TAPER / CONN					
Extra Information TC – Figure B5 Flange / HP – Figure B6 Flange CL – Cement Lined / FC – Fusion Coated					

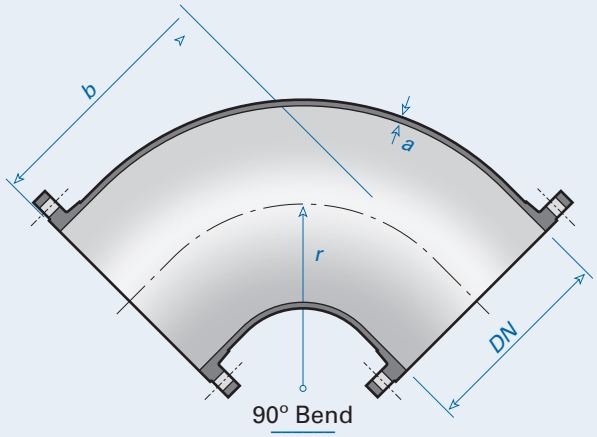


Class 16 integral flanges

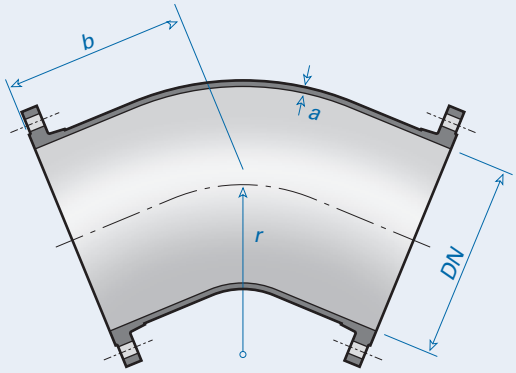
Nominal Size	Flange Dimensions					Bolting Details (to *AS 4087*)			Neck Dimensions		
	Diameter	Thickness	Diameter of Raised Face	Height of Raised Face	Pitch Circle Diameter	Number of Holes	Diameter of Holes	Fastener Size and Thread	Diameter of Large End	Diameter of Small End	Minimum Length of Taper
DN	*D*	*T*	*F*	*t*	*P*	*N*	*V*		*C*	*H*	*G*
80	185	18	122	3	146	4	18	M16	106	100	8
100	215	20	154	3	178	4	18	M16	136	126	11
150	280	23	211	3	235	8	18	M16	188	181	11
200	335	23	268	3	292	8	18	M16	243	236	12
225	370	24	300	3	324	8	18	M16	275	263	19
250	405	24	328	3	356	8	22	M20	307	290	26
300	455	30	378	4	406	12	22	M20	354	349	28
375	550	33	463	4	495	12	26	M24	439	430	30
450	640	33	552	4	584	12	26	M24	528	511	33
500	705	35	609	4	641	16	26	M24	581	564	34
600	825	42	720	5	756	16	30	M27	689	671	38
750	995	47	888	5	927	20	33	M30	855	830	53

Class 35 integral flanges

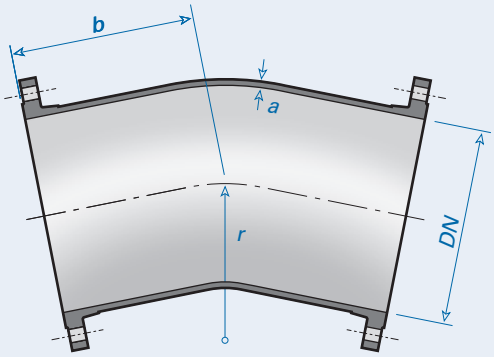
Nominal Size	Flange Dimensions					Bolting Details (to *AS 4087*)			Neck Dimensions		
	Diameter	Thickness	Diameter of Raised Face	Height of Raised Face	Pitch Circle Diameter	Number of Holes	Diameter of Holes	Fastener Size and Thread	Diameter of Large End	Diameter of Small End	Minimum Length of Taper
DN	*D*	*T*	*F*	*t*	*P*	*N*	*V*		*C*	*H*	*G*
80	205	22	141	3	165	8	18	M16	110	100	11
100	230	22	167	3	191	8	18	M16	137	126	13
150	305	27	232	3	260	12	22	M20	198	181	20
200	370	31	296	3	324	12	22	M20	257	236	27
225	405	34	324	3	356	12	26	M24	290	263	33
250	430	34	349	3	381	12	26	M24	315	290	33
300	490	38	406	4	438	16	26	M24	376	349	38
375	580	42	485	4	521	16	30	M27	459	430	42
450	675	46	571	4	610	20	33	M30	542	511	48
500	735	49	634	4	673	24	33	M30	602	564	60
600	850	54	739	5	781	24	36	M33	710	671	66
750	1015	59	898	5	940	28	36	M33	870	830	73



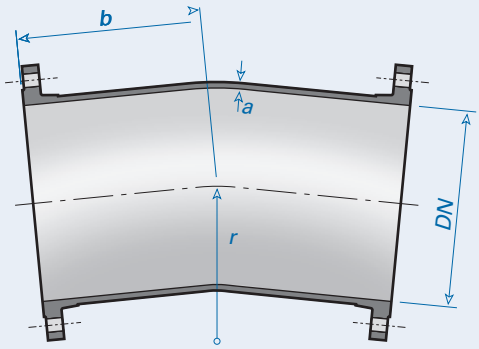
90° Bend



45° Bend



22½° Bend



11¼° Bend

Symbol

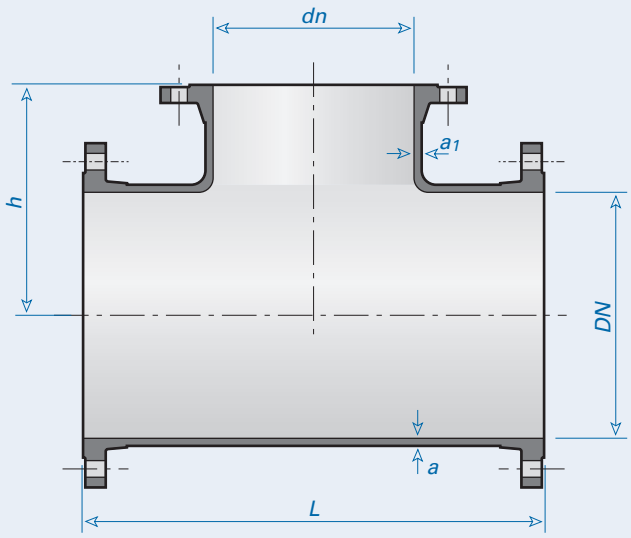
Flanged Bends

Nominal size			Dimensions *b*			
DN	*a*	*r*	*90°*	*45°*	*22½°*	*11¼°*
80	*8*	*140*	*229*	*140*	*140*	*125*
100	*5*	*152*	*241*	*152*	*152*	*152*
150	9	190	279	190	190	190
200	10	203	305	203	203	203
225	10	229	330	229	229	229
250	10	254	356	254	254	254
300	11	305	406	305	305	305
375	12	381	495	381	381	381
450	13	457	572	457	457	457
500	14	508	622	508	508	508
600	15	610	737	610	610	610
750	18	765	905	460	295	230

AUSLITE fittings are indicated in blue italics

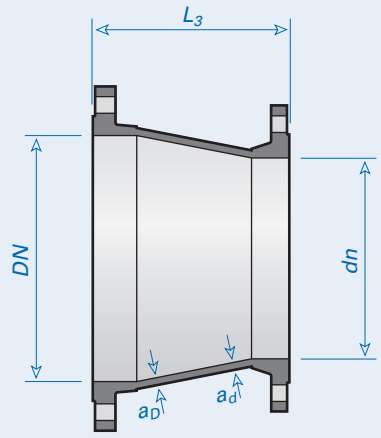
Flanged Tees

Nominal size		Dimensions			
Body	Branch				
DN	*dn*	*a*	a_1	*h*	*L*
100	80	8	8	178	356
100	100	8	8	178	356
150	100	9	8	203	406
150	150	9	9	203	406
200	100	10	8	241	484
200	150	10	9	241	484
200	200	10	10	241	484
225	100	10	8	254	508
225	150	10	9	254	508
225	200	10	10	254	508
225	225	10	10	254	508
250	100	10	8	267	534
250	150	10	9	267	534
250	200	10	10	267	534
250	225	10	10	267	534
250	250	10	10	267	534
300	100	11	8	305	610
300	150	11	9	305	610
300	200	11	10	305	610
300	225	11	10	305	610
300	250	11	10	305	610
300	300	11	11	305	610
375	200	12	10	356	738
375	225	12	10	356	738
375	250	12	10	356	738
375	300	12	11	356	738
375	375	12	12	368	738
450	250	13	10	394	814
450	300	13	11	394	814
450	375	13	12	406	814
450	450	13	13	406	814



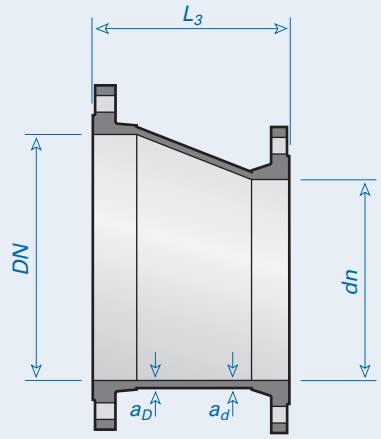
Symbol

Nominal size		Dimensions			
Body	Branch				
DN	*dn*	*a*	a_1	*h*	*L*
500	250	14	10	432	890
500	300	14	11	432	890
500	375	14	12	444	890
500	450	14	13	444	890
500	500	14	14	444	890
600	300	15	11	483	1016
600	375	15	12	495	1016
600	450	15	13	495	1016
600	500	15	14	495	1016
600	600	15	15	508	1016
750	300	18	11	615	890
750	375	18	12	645	1000
750	450	18	13	655	1080
750	500	18	14	680	1160
750	600	18	15	695	1260
750	750	18	18	725	1450



Concentric

Symbol



Eccentric

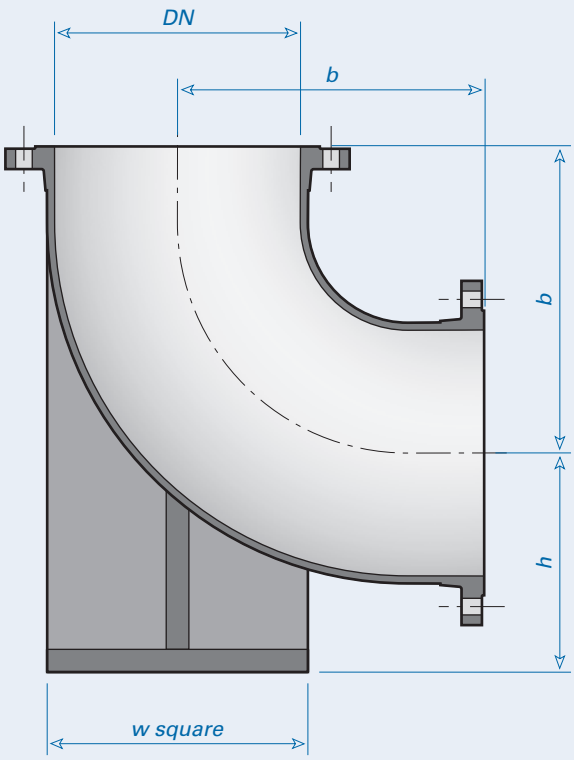
Symbol

Flanged Tapers

Nominal size		Dimensions		
DN	*dn*	a_D	*ad*	L_3
100	80	8	8	165
150	80	9	8	298
150	100	9	8	235
200	100	10	8	368
200	150	10	9	248
225	100	10	8	432
225	150	10	9	311
225	200	10	10	190
250	100	10	8	495
250	150	10	9	375
250	200	10	10	254
250	225	10	10	190
300	100	11	8	629
300	150	11	9	508
300	200	11	10	387
300	225	11	10	324
300	250	11	10	260
375	200	12	10	584
375	225	12	10	521
375	250	12	10	457
375	300	12	11	337
450	250	13	10	660
450	300	13	11	540
450	375	13	12	356
500	250	14	10	787
500	300	14	11	667
500	375	14	12	483
500	450	14	13	305
600	300	15	11	934
600	375	15	12	749
600	450	15	13	572
600	500	15	14	444
750	375	18	12	1180
750	450	18	13	1000
750	500	18	14	885
750	600	18	15	645

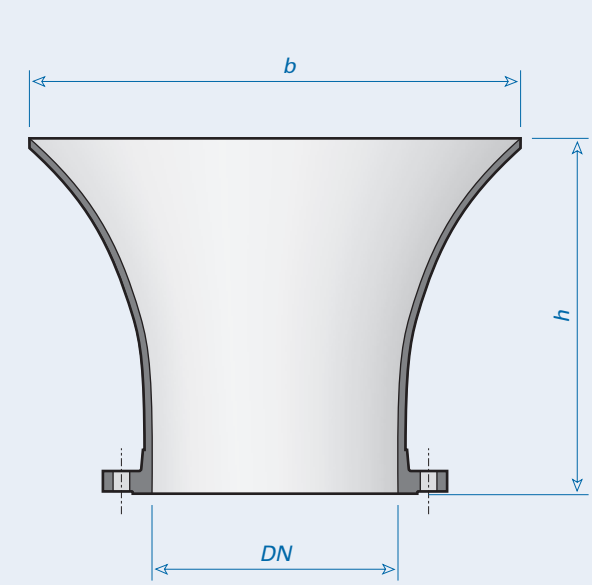
Duckfoot bends

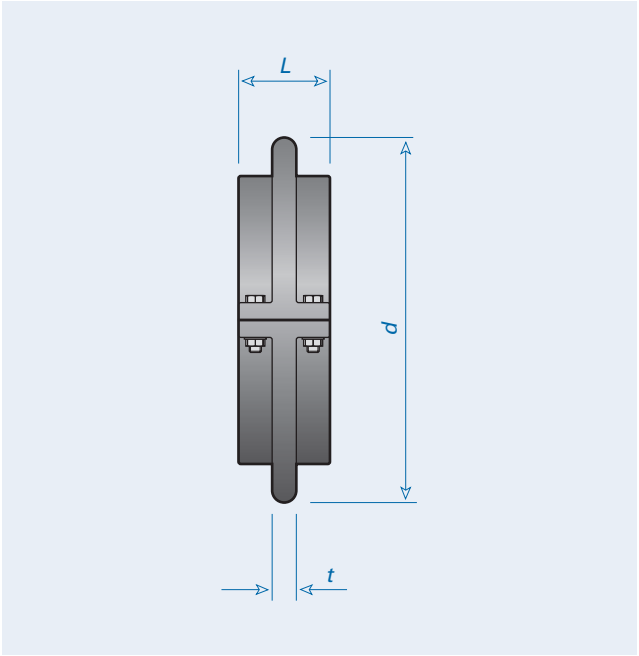
Nominal size	Dimensions		
DN	*b*	*w*	*h*
80	229	165	114
100	241	185	133
150	279	190	165
200	305	235	197
225	330	260	216
250	356	290	229
300	406	345	260
375	495	425	311
450	572	500	356
500	622	560	394
600	737	665	457



Flanged Bellmouths

Nominal size	Dimensions	
DN	*b*	*h*
100	200	152
150	245	152
200	374	305
225	425	305
250	445	380
300	650	470
375	755	525
450	765	590
500	770	650
600	840	725
750	1250	845





Puddle (weep) flanges

Nominal size	Dimensions			Ultimate shear force*
DN	*d*	*t*	*L*	*kN*
80	205	25	55	90
100	230	25	55	116
150	305	27	55	171
200	370	31	55	226
225	405	34	55	253
250	430	34	55	280
300	483	32	120	481
375	578	32	120	891
450	667	35	120	1061
500	730	38	140	1172
600	851	41	140	1397
750	1020	40	155	2881

* The ultimate shear force is a theoretical value which assumes the mode of failure to be caused by shear of the circumferential pipe wall groove. The flange is assumed to remain bolted together and the shear area is calculated over a 45˚ circumferential plane with its root at the base of the pipe groove. Mating dimensions from AS/NZS 2280 are adopted.

Note. It is recommended that puddle flanges are factory fitted onto pipes. AS/NZS 2280 calls for a machine groove to be cut into the outside surface of the pipe and the puddle flange machined accordingly to provide a nominal interference fit. An epoxy resin is utilised to prevent seepage along the outside surface of the pipe.

ABB Australia Pty Limited

A.B.N. 68 003 337 611

GENERAL TERMS AND CONDITIONS OF SALE

Goods and services are sold and supplied by ABB Australia Pty Limited on the following General Terms and Conditions of business ("**Contract**") unless otherwise expressly agreed in writing between ABB Australia Pty Limited and the Purchaser.

1. DEFINITIONS

1.1 "Vendor" means ABB Australia Pty Limited.

1.2 "Purchaser" means the person, company or other relevant legal entity to whom or to which this document is addressed.

1.3 "Australian Consumer Law" means the *Competition and Consumer Act 2010*, as amended from time to time.

1.4 "Goods" means the goods, equipment, material and/or chattels supplied by the Vendor to the Purchaser as indicated in an Order.

1.5 "Commencement Date" means the commencement date of the particular contract of which these terms and conditions form part.

1.6 "Contract Works" means, where the additional clauses E1 to E8 apply, the Goods and the erection of other works (if any) to be carried out by the Vendor at the Site.

1.7 "day" or "days" means calendar days unless stated otherwise.

1.8 "Intellectual Property Rights" means all rights in and to all technology, techniques (both patented and non-patented), know-how, confidential information, patents, copyright, designs, trade names, inventions, discoveries and all other rights as defined by Article 2 of the Convention of July 1967 establishing the World Intellectual Property Organisation, including all applications for any of such rights as may exist anywhere in the world.

1.9 "Order" means the Purchaser Order issued by the Purchaser and accepted by the Vendor in clause 3.

1.10 "PPS Act" means the *Personal Property Securities Act 2009* (Cth) as amended from time to time.

1.11 "Services" means the services specified in the Vendor's quotation or contract, including any part of the specified services.

1.12 "Site" means, if the additional clauses E1 to E8 apply, the location notified by the Purchaser where the Vendor is required to carry out the Contract Works.

2. GENERAL

2.1 These terms form part of any quotation or contract to which they are attached, and any Goods to be supplied, or supplied, by the Vendor will be or are supplied subject to these terms.

2.2 If there is any inconsistency or variance between the provisions of any quotation by the Vendor and these terms then the former shall prevail to the extent of the inconsistency or variance PROVIDED SUCH THAT notwithstanding any acceptance by the Vendor of any Order or offer to purchase from the Purchaser that may contain any provision inconsistent with or purporting to vary or reject any of these terms, any contract between the Vendor and the Purchaser arising from the Vendor's acceptance of such Order or offer to purchase shall be subject to these terms unless and to the extent only that the Vendor expressly agrees in writing to any variation thereof.

2.3 If one or more clauses of these terms or any provisions included in any quotation or contract arising between the Vendor and the Purchaser is declared legally invalid the remainder of these terms and any such provisions shall be in no way affected.

2.4 These terms shall apply to any separable portion of any quotation or contract arising between the Vendor and the Purchaser and to the Goods supplied thereunder.

2.5 THE PURCHASER'S ATTENTION IS DRAWN TO STATUTORY PROVISIONS WHICH MAY APPLY TO THIS CONTRACT. Any rights, remedies, liabilities, conditions, warranties, standards or specifications which apply to or in respect of any contract arising between the Vendor and the Purchaser under or by virtue of the Australian Consumer Law or any other enactment of Australia or of any State or Territory thereof affecting such contract and which cannot be excluded from such contract are deemed to apply to such contract notwithstanding any inconsistency with these terms.

2.6 Subject to clause 2.5, to the fullest extent permitted at law, no warranties expressed or implied by law, trade custom or otherwise and no representations, descriptions, conditions or statements are binding on the Vendor unless set out in these terms or expressly incorporated into these terms by reference by the Vendor in writing.

3. QUOTATION AND OFFER TO PURCHASE

3.1 The Vendor's quotation is not to be construed as an obligation to sell Goods and/or supply the Services to the Purchaser but is rather an invitation to the Purchaser to make an offer to purchase Goods and/or Services subject to these terms. The Purchaser's Order shall constitute such an offer to purchase. The Vendor reserves the right to make alterations to its quotation at any time before its acceptance of an Order from the Purchaser.

3.2 Notwithstanding that a quotation has been made no contract exists between the Vendor and the Purchaser until the Vendor accepts the Purchaser's Order in writing.

3.3 The Vendor's quotation relates only to such Goods and/or Services as are specified therein and is given subject to such Goods and or Services being available at the time of receipt of the Purchaser's Order. Notwithstanding any stipulation or implication in such quotation, the Vendor reserves the right to obtain such Goods or any part thereof from any factory or works in the Vendor's organisation, including any subsidiary of affiliate thereof.

3.4 Prices included in the Vendor's quotation are based upon the quantities of Goods and description of the Services referred to in the quotation. Should the Purchaser offer to purchase a quantity of Goods or type of Services which is at variance with that referred to in the quotation, the Vendor reserves the right to amend the price quoted for such Goods and/or Services.

3.5 The quotation remains open for acceptance for a period of thirty (30) days from the date of the quotation unless an alternate period is specified in the quotation.

4. SPECIFICATIONS AND DRAWINGS

Not Part of Contract

4.1 All descriptive and shipping specifications, drawings, dimensions and weights submitted by the Vendor in relation to any quotation are approximate only and any descriptions, illustrations and data contained in any catalogues price lists and/or other advertising or promotional material are intended by the Vendor only to present a general view of Goods and/or Services described therein and none of such specifications, drawings, dimensions, weights, descriptions, illustrations or data shall form part of any contract arising between the Vendor and the Purchaser.

Drawings

4.2 After Acceptance of the Purchaser's Order, the Vendor shall at the Purchaser's request provide to the Purchaser such drawings relating to the Goods the subject of the contract arising between the Vendor and the Purchaser as are in the Vendor's opinion reasonable and necessary but all and any Intellectual Property Rights in the drawings shall remain vested in the Vendor.

Confidential Information

4.3 All information relating to patents, designs, other Intellectual Property, drawings, specifications, computer programs, information, samples and the like provided by the Vendor shall be regarded as confidential and shall not be copied or disclosed by the Purchaser to a third party except with the Vendor's prior written consent, and shall only be used pursuant to the contract for which they are provided.

Sufficient Information to be Provided

4.4 The Purchaser's Order shall be accompanied by sufficient information to enable the Vendor to commence work and proceed without interruption. The Purchaser shall be responsible for, and warrant, the accuracy of the information it provides.

Purchaser's Approval of Drawings, etc.

4.5 Any drawings or other information requiring the Purchaser's approval shall be approved, amended or rejected and returned by the Purchaser to the Vendor within 14 days of the date of receipt by the Purchaser of such drawings or other information or such other period as may be agreed in writing by the Vendor and the Purchaser. Any delay beyond such 14 day period or such other period agreed to shall constitute grounds for extension of the contract period in which the Vendor is to perform its obligations under **clause 6.4** of these terms. The Purchaser will act reasonably and without undue delay in any relevant undertaking or any discretion it exercises as part of the approval process.

Incorrect Information

4.6 The Purchaser shall be responsible for and bear the cost of any alteration to Goods and/or Services supplied by the Vendor arising from any discrepancy, error or omission in any drawing, specification or other information supplied by or approved by the Purchaser.

Suitability for Purpose

4.7 Unless the Vendor has specifically agreed otherwise in writing, it has no knowledge of the use to which the Purchaser proposes to put any Goods and/or Services supplied by the Vendor to the Purchaser and the Vendor makes no representation nor gives any warranty in respect of such particular use.

Responsibility for licenses, approvals etc

4.8 Unless otherwise agreed in writing it shall be the responsibility of the Purchaser to obtain and provide any licences, access, approvals or permits as necessary for performance of any contract arising between the Vendor and the Purchaser.

5. PERFORMANCE

Performance

5.1 Any performance figures provided by the Vendor are based on the Vendor's experience and are such as the Vendor could expect to obtain on testing. The Vendor shall be under no liability or damages should Goods and/or Services supplied by it fail to attain such performance figures unless the Vendor has specifically guaranteed in writing the attainment of such performance figures, subject always to recognised tolerances applicable to such performance figures.

5.2 Where the Vendor has guaranteed performance figures in respect of Goods and/or Services supplied by it and the performance figures attained in respect of such Goods on any test are outside applicable tolerances, the Vendor shall be given reasonable time to rectify the performance of such Goods and the Vendor's liability shall be subject to **clause 13** of these terms.

Inspection and Tests

5.3 Where inspections and tests are performed they will be undertaken in accordance with the Vendor's standard practice, including test documentation, and will be carried out at the place of manufacture or elsewhere at the Vendor's sole discretion. Such inspections and tests, together with any additional tests as may be specified in the Vendor's quotation, are the only inspections and tests included In the quoted price. Should any further inspection or tests be required by the Purchaser these will be subject to the Vendor's agreement and may result in an increase in the contract price agreed by the Vendor to the Purchaser and an extension to the time for delivery.

5.4 Where the carrying out of an inspection or witnessed test has been agreed to, the Vendor shall give the Purchaser seven days' notice that the Vendor is ready to carry out such inspection or witnessed test, and if the Purchaser is absent from a duly notified inspection or witnessed test then such inspection or witnessed test shall be deemed to have been undertaken in the Purchaser's presence such that the outcome of the inspection or test will be deemed to be accepted by the Purchaser.

6. TIME/DATE FOR SUPPLY

Base Date

6.1 All dates or times quoted for completion or delivery shall be calculated from date of acceptance by the Vendor of the Purchaser's Order, together with sufficient information as referred to in **clause 4.4** of these terms.

Quoted Time

6.2 The Vendor will use reasonable endeavours to meet any delivery or completion date or period quoted but such date or time is a bona fide estimate only and is not to be construed as a fixed date or time unless specifically agreed to by the Vendor in writing.

Liquidated Damages for Delay

6.3 Subject to **clauses 6.4 and 6.5** of these terms, if a fixed date or time has been specifically agreed by the Vendor in writing and quoted for delivery and the Vendor fails to deliver within that fixed date or time or within any extension thereof as provided by **clauses 6.4 and 6.5** of these terms, and if as a result the Purchaser suffers loss, the Vendor will pay to the Purchaser for each week or part week of delay liquidated damages at the rate of 0.25% per week up to a maximum of 5.0% of that portion of the contract price which is referable to such portion only of the Goods and/or Services the subject of the contract which cannot in consequence of such delay be effectively used by the Purchaser, which payment of liquidated damages shall be in full satisfaction of and the Vendor's total liability arising from such delay.

Extension of Time

6.4 Any contract period shall be extended in respect of any delay relating to either instructions given by, or a lack of instructions from, the Purchaser, or any other acts or omissions of the Purchaser or those for whom it is responsible, including any delay or withdrawal of access by the Purchaser to the premises required for the purpose of this Agreement.

6.5 The Vendor shall not be liable to the Purchaser for any failure to meet any obligation under any contract arising between the Vendor and the Purchaser to the extent that such failure is caused by or arises from:

(i) strikes, lockouts or other industrial unrest and disputes, shortages of labour or materials, delay in manufacturing by the Vendor, its associates or suppliers, riot, civil commotion, fire, flood, earthquake, drought, loss or delay at sea or otherwise, breakdowns, pandemic, epidemic or war; or

(ii) any other cause whether arising from natural causes, human agency or anything beyond the reasonable control of the Vendor.

7. PACKING

7.1 Unless stated otherwise in any quotation packing is not included in the contract price. Any packing required by the Purchaser and not specifically stated as being included in any quotation shall be to the Purchaser's account.

7.2 Unless otherwise stipulated in writing by the Vendor any packing which may be provided by the Vendor is not returnable and must be disposed of by the Purchaser.

Where such stipulation is made the packing remains the property of the Vendor and must be returned to the Vendor's source of supply carriage paid by the Purchaser.

8. POINT OF DELIVERY

Delivery ex-works

8.1 Unless stated otherwise in any quotation, Goods are supplied ex-works at the place of manufacture and delivery to a carrier's vehicle, including loading, shall constitute delivery by the Vendor to the Purchaser. The carrier's vehicle shall be of a type allowing vertical or horizontal access for loading as required by the Vendor.

Delivery Beyond Place of Manufacture

8.2 Unless the Vendor has provided in any quotation for delivery beyond the place of manufacture, where the Purchaser requests delivery beyond such point the Vendor, at its sole discretion, may agree to act as agent for the Purchaser to effect such delivery and all costs of carriage and insurance in relation thereto will be to the Purchaser's account. In any event the Purchaser shall ensure provision of reasonable access to the point of delivery and for off-loading and/or handling without delay.

Damage or Loss in Transit

8.3 Where damage to the Goods in the course of delivery is the Vendor's responsibility, the Vendor shall at its sole discretion repair or replace free of charge Goods so damaged provided the Vendor is notified of such damage within three days of delivery.

Shortages in Delivery

8.4 Any claims for shortages in deliveries shall be notified in writing to the Vendor within ten days of receipt of such delivery.

Partial Deliveries

8.5 The Vendor reserves the right to make partial deliveries of any Goods the subject of any contracts between the Vendor and the Purchaser and to invoice such deliveries separately. Unless otherwise agreed in writing by the Vendor and the Purchaser, where such invoices relate to complete and usable Goods, payment thereof will fall due in accordance with **clause 11.1 (iv)** of these terms.

Storage

8.6 If after a period of 14 days from the date of notification by the Vendor to the Purchaser that Goods the subject of a contract between the Vendor and the Purchaser are ready for delivery and delivery of such Goods is delayed for any reason beyond the Vendor's reasonable control the Vendor shall be entitled, at its sole discretion, to arrange for suitable storage of such Goods at its premises or elsewhere and the Vendor shall take reasonable measures to protect the Purchaser's interest in such Goods. To the extent permitted by law, the Purchaser shall pay all reasonable costs of such storage together with all reasonable costs of insurance, demurrage, handling and other contingent charges applicable as set out in invoices for payment sent to the Purchaser by the Vendor in accordance with **clause 11.1 (iv)** of these terms.

Cost

8.7 Except where stipulated in the quotation, all freight and transport costs are at the Purchaser's cost. In the absence of instructions from the Purchaser on the choice of carrier, the Vendor will instruct on the Purchaser's behalf a carrier to complete delivery. For the avoidance of doubt, delivery shall not be by way of airfreight unless agreed to in writing by the Vendor and set out expressly in the Vendor's quotation.

9. INSURANCE, RISK AND PROPERTY

Insurance

9.1 Goods in respect of which the Vendor acts as the Purchaser's agent in accordance with **clauses 8.2, 8.6 and 8.7** of these terms will, unless otherwise required in writing by the Purchaser, be insured for their contract value plus 10%. The Vendor's liability in respect of such Goods shall be limited to the extent of such insurance.

9.2 The Vendor will maintain public and products liability insurance for an amount of $1 million per event and in the aggregate and which will note the interests of the Purchaser in respect of the liability of the Vendor arising out of the performance by the Vendor of the contract for the Purchaser, but limited always to the extent of cover and limitation of liability provided in the insurance maintained under this clause.

Insurance Cover for Goods under Repair

9.3 Risk in Goods the subject of any contract for repair, overhaul, modification or other work, between the Vendor and the Purchaser shall remain with the Purchaser. The Purchaser shall be responsible for effecting insurance which provides cover for the goods which are being repaired, including at the Vendor's premises, or at subcontractor's premises, or in transit to and from those premises.

Risk

9.4 Risk in Goods the subject of any contract between the Vendor and the Purchaser shall remain with the Vendor only until the first in time of any one of the following events:

(i) the passing of property in such Goods to the Purchaser; or

(ii) the delivery of such Goods by the Vendor to the Purchaser or to a carrier at the contractual point of delivery; or

(iii) upon such Goods leaving the Vendor's premises at the request of the Purchaser; or

(iv) the expiry of 14 days from the date of notification by the Vendor to the Purchaser that such Goods are ready for delivery;

and thereafter risk of damage, loss or deterioration of the Goods from any cause whatsoever shall pass to the Purchaser.

Preservation of Property Rights

9.5 Notwithstanding that risk in any Goods the subject of a contract between the Vendor and the Purchaser may in whole or in part be with the Purchaser title and property in such Goods shall remain with the Vendor until paid for in full by the Purchaser. Prior to the passing of property in such Goods they may not be resold, pledged or, subject to clauses 9.7 to 9.9 below, given in security by the Purchaser in any circumstances whatsoever.

9.6 Until such time as title and property in such Goods passes to the Purchaser the relationship between the Vendor and the Purchaser shall be fiduciary and the Purchaser shall hold the Goods as bailee for the Vendor, and:

(i) the Purchaser will store such Goods in his/its premises separately from his/its own Goods or those of any other person and in a manner which makes them readily identifiable as the Vendor's Goods;

(ii) The Purchaser is licensed by the Vendor to, in the ordinary course of his/its business, process in such fashion as he/it may wish and/or incorporate such Goods in or with any product or products, subject to the express condition that the new product or products or any other chattel whatsoever containing any part of such Goods shall be separately stored and marked so as to be identifiable as being made from or with Goods the property of the Vendor;

(iii) if Goods the property of the Vendor are mixed with goods and/or material the property of the Purchaser or are processed with or incorporated therein, the product thereof shall become and/or shall be deemed to be the sole and exclusive property of the Vendor;

(iv) if Goods the property of the Vendor are mixed with goods and/or material the property of a third party or

are processed with or incorporated therein, the product thereof shall be deemed to be owned in common by the Vendor and that third party;

(v) the Purchaser shall be at liberty to agree to sell Goods the property of the Vendor or any product produced from or with such Goods on the express condition that such an agreement to sell is made on the basis that the Purchaser is the agent of and bailee of the Vendor in respect of such Goods and/or products and that the entire proceeds of sale and monies therefore shall be held in trust on behalf of the Vendor by the Purchaser and shall not be mingled with any other monies and shall at all times be identifiable as the Vendor's monies the Purchaser shall however not represent to any third parties that it is in any way acting for the Vendor and the Vendor will not be bound by any contracts with third parties to which the Purchaser is a party; and

(vi) if the Purchaser does not receive the proceeds of any such sale he/it will, if called upon so to do by the Vendor, within seven days thereof assign and sell to the Vendor for nominal consideration all rights against the person or persons to whom such Goods and/or products were to be sold by the Purchaser.

Purchase Money Security Interest

9.7 By placing an Order for the Goods, the Purchaser acknowledges, accepts and agrees that this Contract creates a purchase money security interest (as that term is defined in the PPS Act) in the Goods as commercial property and, for avoidance of doubt, the proceeds of sale of the Goods. The Purchaser must, promptly upon request by the Vendor, sign any documents (including any new agreements), provide all necessary information and do anything else required by the Purchaser to ensure that the security interest is a perfected purchase money security interest (as that term is defined in the PPSA).

9.8 Until payment to the Vendor has been made in full for the Goods, the Purchaser acknowledges and agrees that in relation to Goods that are inventory, the Purchaser will not allow any security interest to arise in respect of the Goods unless the Vendor has perfected its purchase money security interest.

9.9 Until payment to the Vendor has been made in full for the Goods, the Purchaser acknowledges and agrees that in relation to Goods that are inventory, the Purchaser will not allow any non-purchase money security interest to arise in respect of the Goods unless the Vendor has perfected its purchase money security interest prior to the Purchaser's possession of the Goods.

9.10 The Purchaser waives its right under the PPS Act to receive a copy of any verification statement or financing change statement (as those terms are defined in the PPS Act)

10. PRICES AND CONTRACT PRICE ADJUSTMENT

Price Basis

10.1 Unless otherwise stated in writing, prices quoted by the Vendor are based on the costs of material, labour, freight, insurance, and duties and other costs and charges ruling at the date of any quotation or such other date specifically referred to therein in respect of such matters and such prices shall be subject to adjustment in respect of any variation in such costs, rates or charges or their method of assessment occurring after that date and until the completion of any contract between the Vendor and the Purchaser based on such quotation including, without limitation, changes in:

(i) Australian costs;

(ii) overseas costs;

(iii) foreign currency and exchange rates (refer to clause 10.13);

(iv) customs and excise duties, levies, charges, imposts and the like; and

(v) transport costs.

10.2 The Vendor will give the Purchaser reasonable notice of any increase in the prices quoted where the amount of such increase is, in the Vendor's opinion, substantial. Upon receipt of such notice, the Purchaser may terminate the contract with the Vendor without liability, provided that the Purchaser gives the Vendor 5 business days notice in writing of such termination and provided that it has first made payment to the Vendor for any Goods and/or Services supplied by the Vendor to the Purchaser prior to such termination.

Tax and other excluded charges

10.3. Charges specifically excluded in any quotation shall be to the Purchaser's account at cost.

10.4 Unless otherwise stated in writing in any quotation sales tax or any other tax, levy or the like imposed on either the sale, manufacture, dealing with, distribution, import or use of goods or measured by the selling price of goods or otherwise howsoever levied against or added to the price of goods shall in all cases be an excluded cost that shall be added to the price for payment by the Purchaser.

10.5 Unless otherwise stated in writing in any quotation customs duties, levies, taxes, (carbon) costs and the like imposed in respect of the goods (but always excluding those taxes referred to in **clause 10.3** of these terms) applicable at the date of any quotation or such other date specifically referred to therein in respect of such matters will be added to the price and any variation thereto, for whatever reason, shall be to the Purchaser's account at cost in accordance with **clause 10.1** of these terms.

GST

10.6 GST means any tax, levy, charge or impost implemented under the A New Tax System (Goods and Services Tax) Act (the "GST Act") or any Act of the Parliament of the Commonwealth of Australia substantially in the form of, or which has a similar effect to, the GST Act.

10.7 The price shown in this Contract does not include GST.

10.8 If the Vendor becomes liable to pay GST in respect of the sale or supply of the subject matter of this Contract, the price payable under this Contract will be increased so that after payment of the GST by the Vendor, the nett amount retained by the Vendor is the same as before GST applied.

10.9 If the Vendor becomes liable to pay GST, the Vendor will notify the Purchaser of the amount of GST to be paid and will provide the Purchaser with the appropriate invoice including a reference to the applicable amount of GST.

10.10 The Purchaser shall pay that invoice pursuant to the terms and conditions of this Agreement

Cost of Delay or Variation

10.11 Where in respect of any contract between the Vendor and the Purchaser work is delayed or varied by the act or omission of the Purchaser or that of his/its agent, or any contractor for whom he/it is responsible, the Vendor shall notify the Purchaser of any additional costs which will be incurred as a result of such delay or variation, which additional costs shall be to the account of the Purchaser. The Purchaser shall not vary the Order by greater than 15% of the value of the Order.

10.12 The Purchaser is entitled to make variations to the Order including an increase or reduction of scope of supply, character, quality, nature or design as well as change of delivery time, provided that such variations are within what the parties could reasonably expect when entering into the Agreement and that the variation shall not be greater than 15% of the value of the original Order. The variation will be formalised by the Vendor's issuance of a written variation order.

Costs of Complying with Regulations

10.13 If the costs to the Vendor of performing its obligations under any contract between the Vendor and the Purchaser shall be varied by reason of the creation or amendment after the date of quotation of any law or of any order regulation or by-law having the force of law or any applicable standard, the amount of such increase or decrease shall, as applicable be added to or deducted from the contract price AND even

where such price is quoted as firm it is subject to adjustment for cost variations caused by such creation or amendment.

Cost

10.14 For the purpose of Clause 10 of these terms the expression 'cost' is deemed to include overheads and interest paid by the Vendor.

Exchange Rate Variation

10.15 Exchange rate variation payable shall be calculated at the rate of exchange actually paid by the Vendor against the exchange rate in the quotation. If prices are expressed in different currencies and the Purchaser seeks or requires payment in any different currency, the Purchaser shall bear any foreign exchange risk arising from such payment.

11. PAYMENT

Payment Due

11.1 Unless otherwise agreed in writing by the Vendor and the Purchaser payment shall be due as follows:

(i) as to 10% of the contract price, on lodgment with the Vendor of the Purchaser's Order;

(ii) subject to **clause 11.1 (iv)** of these terms, within 14 days of receipt by Purchaser of the Vendor's written periodic invoices, which invoices shall number four and shall be sent by the Vendor to the Purchaser at times which as near as may be practically possible divide the interval between the formation of a contract between the Vendor and the Purchaser and the scheduled completion of that contract into four equal periods, and which shall each amount to 20% of the contract price;

(iii) subject to **clauses 11.1 (iv) and 11.2** of these terms, as to the remaining 10% of the contract price, on delivery;

(iv) as to Goods delivered in accordance with **clause 8.2** of these terms all monies outstanding in respect of such Goods shall be due and payable within 14 days of receipt by the Purchaser of the Vendor's invoice; and

(v) as to any additional costs incurred by the Vendor for the Purchaser's account in accordance with these terms, within 30 days of the Purchaser's receipt of the Vendor's invoice in respect of such costs.

The Purchaser is not entitled to withhold payment or make any deduction from the contract price in respect of any set-off or counter claim.

11.2 Without limiting clause 8.6, if Goods the subject of any contract between the Vendor and the Purchaser are in whole or in part ready for delivery and if delivery of such Goods is delayed by reason of instructions given, or lack of instructions by the Purchaser, then full payment of that part of the contract price outstanding shall be due and payable 14 days after notification by the Vendor to the Purchaser that such Goods are ready for delivery as though delivery had been completed in accordance with **clause 8.1** of these terms.

Delay or Default in Payment

11.3 Should the Purchaser make default in respect of any payment due to the Vendor then the Vendor shall have the right, in addition to all other rights to which it is entitled at law, to:

(i) charge interest on the overdue amount at three percent (3%) above the rate charged to the Vendor by its major banker for overdraft accommodation and calculated from the due date of payment to the actual date of full and final payment. Any payment subsequently made by the Purchaser to the Vendor shall be credited first against any interest so accrued;

(ii) suspend all deliveries or works and any contract period shall be extended by the period of the suspension; or

(iii) terminate the contract.

An election to apply any one of the above remedies shall not preclude the Vendor from subsequently electing another of them.

11.4 If as a result of the Purchaser's default in payment, a solicitor or debt collector is instructed by the Vendor, the Purchaser agrees to pay the solicitor or debt collector[s fees and disbursements and charge to the Vendor in full. The Vendor shall be entitled at any time to assign to any other person all or any part of the debt owing to the Vendor and notwithstanding any rule of common law or equity to the contrary, or the appointment of a liquidator, receiver and/or manager over the Purchaser and the assets thereof, and the assignee thereof shall be entitled to claim full rights of set-off or counter-claim against the Purchaser as charge holders or successors in respect of the debt or part thereof so assigned.

Security

11.5 Any security agreed to by the Vendor will be given in the form of a bank guarantee issued by the Vendor's bankers and will contain an expiry date not exceeding two years. The Purchaser must return and release the security on expiry of the defects liability period specified in **clause 12.4 (ii)** of these terms.

12. WARRANTY

12.1 In relation to any of the Vendor's Goods or Services purchased by the Purchaser costing up to $40,000, and otherwise in relation to any of the Vendor's Goods or Services that are of a type normally used for personal, domestic or household purposes, such Goods and Services come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and for compensation for any other reasonably foreseeable loss or damage. You are also entitled to have such Goods repaired or replaced if the Goods fail to be of acceptable quality and the failure does not amount to a major failure.

12.2 The Vendor hereby warrants to the Purchaser that Goods manufactured by the Vendor, or its related companies and/or Services provided by the Vendor, shall be free from defects due to faulty design, materials and workmanship (except as regards defects specifically drawn to the Purchaser's attention, before any contract is formed between the Vendor and the Purchaser or, if the Purchaser examines the Goods the subject of such contract before such contract is formed then except as regards defects which that examination ought to reveal). If the contract between the Vendor and the Purchaser is a contract for the supply of consumer goods, this warranty is provided in addition to other rights and remedies the Purchaser is entitled to under the Australian Consumer Law and any other law relating to the provision of the Goods and Services.

12.3 If it is proven to the Vendor's reasonable satisfaction that Goods manufactured by the Vendor or its related companies and/or Services provided by the Vendor are not free from defects due to faulty design, materials and workmanship (except as revealed by examination as referred to in **clause 12.1** of these terms) then the Vendor shall, at no cost and at its option, either:

(i) repair such Goods;

(ii) replace such Goods with the same or equivalent Goods at the point of delivery applicable to the contract under which such Goods were supplied to the Purchaser by the Vendor;

(iii) re-perform the Services or payment of the cost of having the Services supplied again; or

(iv) refund to the Purchaser the contract price of such Goods and/or Services.

The warranty above does not extend to include the Vendor's labour costs. Any removal, reinstallation and other consequential costs will be for the Purchaser's account. The warranty cover for repaired/replaced items will expire on the same date as the warranty for the rest of the Goods and/or Services. When warranty repairs are required to be carried out at locations other than Vendor Service Centres, then the cost for labour, travel, travel time and accommodation costs incurred by the Vendor will be to the Purchaser's account.

12.4 This warranty does not apply in respect of defects due to or arising from:

(i) incorrect or negligent handling, disregard of operating and/or maintenance instructions, overloading, unsuitable operating conditions, defective civil or building work, lightning, accident, neglect, faulty erection (unless carried out by the Vendor), acts of God, causes beyond the Vendor's control or whilst unauthorised repairs or alterations have been carried out or non-compliance with Goods' power and grounding specifications;

(ii) the use of goods of consumable nature; or

(iii) fair wear and tear.

12.5 This warranty does not apply unless:

(i) the Goods have been properly handled, located, used, maintained and stored;

(ii) defects occur within 12 calendar months after the Goods have been delivered to the Purchaser or, if delivery was delayed for reasons beyond the Vendor's control then within 12 calendar months of deliveries or within 18 calendar months after the Vendor first notified the Purchaser that the Vendor was ready to delivery the Goods (whichever period expires earlier);

(iii) defects occur within 6 calendar months after the Services have been performed;

(iv) the Vendor is notified in writing within seven days of the alleged defect first coming to the notice of the Purchaser;

(v) the Purchaser returns the defective Goods to the Vendor, or if necessary, at the sole discretion of the Vendor, to the works where such Goods were manufactured or assembled, free of charge; and

(vi) the Purchaser has fulfilled all of his/its contractual obligations.

12.6 The parties agree that the Purchaser shall not make a claim against the Vendor and the Vendor shall have no further liability for or in connection with the Goods and/or Services upon the expiry of two (2) years from the date of the end of the defects liability period in clause 12.5(ii) and (ii), and claims made after that period will be time barred absolutely.

12.7 The benefit of this Warranty is personal to the Purchaser and is non-assignable without the prior written consent of the Vendor.

12.8 The ABB Customer Support Centre can be contacted on:

1800 ABB Help (1800 222 435); or

by emailing: abbhelp@au.abb.com

Exclusion of UN Convention

12.9 To the fullest extent permitted by law the parties agree that the United Nations Convention on Contracts for the International Sale of Goods shall not apply to this Agreement.

13. LIMITATION OF LIABILITY

Notwithstanding anything else contained in this Contract to the contrary, and except to the extent that this Contract applies to a consumer as defined in the Australian Consumer Law, the Vendor shall not be liable (to the fullest extent permitted at law) whether by way of indemnity, guarantee, or by reason of any breach of contract, or of statutory duty or by reason of tort (including but not limited to negligence) or any other legal principle or doctrine for:

(i) any loss of profits, loss of use, loss of revenue or loss of anticipated savings or for any financial or economic loss (whether direct or indirect) or for any consequential or indirect loss or damage whatsoever; or

(ii) any other amount which in aggregate with any other liability (being any past, present or future liability) to which this clause applies, that exceeds the aggregate value of all payments of the contract price made under these terms (except in relation to a consumer contract, as defined in the Australian Consumer Law.

Otherwise, where it is permitted under Australian Consumer Law or otherwise at law to do so the remedies in clause 12.3 above will apply.

14. PATENTS AND DESIGN RIGHTS

14.1 Except where such claims relate to Goods or parts thereof based on designs, drawings or instructions specified or provided by the Purchaser, if any sustainable claim is made in relation to infringement or any Letters Patent, Registered Design, Trademark or copyright or other intellectual property right, in respect of which publication occurs prior to the date of any quotation relating to Goods and/or Services the subject of such claim, and in respect of which quotation such Goods and/or Services were supplied by the Vendor to the Purchaser, the Vendor will at its expense either replace or modify the part the subject of such infringement with a non-infringing part or procure for the Purchaser the right to use such part provided that the Vendor is given the full opportunity to conduct all negotiations in relation to such a claim AND PROVIDED THAT the Vendor shall not incur any liability for losses arising from the Purchaser's use or non-use of any infringing part.

14.2 The Purchaser warrants that any designs, drawings or instructions furnished or given by him/it to the Vendor shall not be such as to cause the Vendor to infringe any Letters Patent, Registered Design, Trademark or copyright or other intellectual property right, and the Purchaser hereby indemnifies the Vendor and agrees to keep the Vendor indemnified against any costs which may directly arise against or be incurred by the vendor by reason of any such infringement.

14.3 Ownership of Intellectual Property Rights (other than third party intellectual property rights) associated with the Works and any documentation provided by the Vendor pursuant to these terms is vested and shall remain vested in the Vendor. The Vendor grants the Purchaser a royalty free, non-exclusive, non-transferable, perpetual (subject to compliance with the terms of the license) license to use all Intellectual Property Rights associated with the Works and any documentation provided pursuant to these terms for the installation, use, support, repair, or maintenance of the Works by or on behalf of the Purchaser."

15. BANKRUPTCY, LIQUIDATION AND DEFAULT

15.1 If the Purchaser makes any default under this Contract any contract between the Vendor and the Purchaser, or:

(i) being a person, dies or commits an act of bankruptcy;

(ii) being a company, take or shall have taken against it any action for the winding up of the company or the placing of the company under official management or receivership other than for purposes of reconstruction or has an execution levied against it;

then the Vendor at its sole discretion and without prejudice to any other rights it may have under such contract or at law may give notice in writing to the Purchaser and after 14 days from the date of such notice may, unless otherwise by law, suspend or cancel such contract (including, without deferring manufacture or delivery of Goods) or require payments in cash before or on delivery of the Goods notwithstanding the terms of payment specific or may cancel any undelivered or uncompleted Goods then outstanding under such contract or may take possession of the Goods or any part thereof and for the purpose thereof enter upon any premises where such Goods are stored or reasonably thought to be stored and dispose of them in its own interest without prejudice to any claim it may have for damages for any loss resulting from such disposal and may retain any security or monies held

paid by the Purchaser in relation to such contract and apply such security or monies against assessed loss or damage incurred by it in relation to such default.

16. SERVICE OF NOTICES

For the purpose of service of any document or notice in connection with any quotation or contract it shall be sufficient for either party to forward such document or notice by first class surface mail if within Australia or first class air mail beyond Australia, with appropriate postage prepaid to the last known address of the other party and shall be deemed to have been received by the other party on the second business day following the date of posting. Everyday communications may be sent by electronic mail but those communications will not be construed to be notices for the purposes of this clause.

17. CODE OF CONDUCT/BUSINESS ETHICS

17.1 The Purchaser hereby warrants that he will not, directly or indirectly, and it has no knowledge that other persons connected with his business will, directly or indirectly, make any payment, gift or other commitment to any person including without limitation directors and employees of the Vendor or any other party in a manner contrary to applicable laws (including but not limited to the U.S. Foreign Corrupt Practices Act and, where applicable, legislation enacted by member States and signatories implementing the OECD Convention Combating Bribery of Foreign Officials), policies or standards of conduct, for the purposes of obtaining or facilitating the Purchaser's activities under this Contract.

17.2 Nothing in this Contract shall render the Vendor liable to reimburse the Purchaser for any such consideration given or promised.

17.3 The Purchaser herewith acknowledges and confirms that he has received a copy of the Vendor's Code of Conduct or has been provided information on how to access the Code of Conduct online. Purchaser hereby warrants to fully comply with such Code of Conduct.

17.4 The Purchaser shall, at all times, comply with all relevant laws, regulations, ordinances and rules having the force of law.

17.5 The Purchaser herewith takes note that the Vendor has established the following reporting channels where the Purchaser may report suspected violations of applicable laws, policies or standards of conduct:

Web portal: www.abb.com/ethics
Telephone: 1800-01-0342.
Mail: ABB Australia Pty Limited
Legal & Compliance Department
Level 19, 68 Pitt Street
Sydney NSW 2000

18. DISPUTE RESOLUTION

18.1 If there is a dispute between the parties arising out of, or in connection with, this Agreement, neither of the parties is to commence any proceedings relating to that dispute until the following procedure has been complied with:

(i) the party claiming a dispute has arisen must give written notice to the other party specifying the nature of the dispute (Dispute Notice) which:

(1) states that it is a Dispute Notice under this clause;

(2) identifies the dispute; and

(3) states the alleged relevant facts that are relied on;

(ii) Within 5 Business Days of a Dispute Notice being received by a party, a senior representative (such as the CEO) of each party must meet and will endeavour, in good faith, to:

(1) resolve the whole of the dispute or as much of the dispute as possible; and

(2) to the extent the dispute is not wholly resolved, decide what process will be used to resolve the dispute or the remaining matters that are not agreed.

18.2 Any agreement reached at a meeting pursuant to this clause 17 must be in writing and signed by both parties.

18.3 If a dispute has not been resolved within 30 Business Days after the relevant Notice of Dispute was given, then either party may (subject to any agreement to the contrary) issue proceedings to have the dispute determined, whether or not any negotiation process has commenced or concluded.

18.4 A party seeking urgent interlocutory relief may, by notice to the other party, elect not to comply with the provisions of this clause, but only to the extent of the relief sought, and only for the period required to dispose of the application for interlocutory relief.

18.5 Pending resolution of the dispute, this Contract will remain in full effect without prejudicing the parties' respective rights and remedies.

19. GENERAL

19.1 **Severance**

If any provision of this Contract or the conditions is declared by an judicial or other competent authority to be void, voidable, illegal or otherwise unenforceable, or indications to that effect are received by either of the parties from any competent authority, that provision will be severed from this Contract and the remaining provisions of this Contract will remain in full force and effect unless the Vendor decides that the effect of such severance is to defeat the original intention of the parties in which event the Vendor will, to the extent permitted by law, be entitled to terminate this Contract by thirty (30) days' notice to the Purchaser.

19.2 **Whole Agreement**

Without limiting clause 4.1 and to the extent permitted by law, each party acknowledges that this Contract contains the whole agreement between the parties in relation to the subject matter of their dealings and it has not relied upon any oral or written representation made to it by the other party, or its employees or Distributors, and has made its own independent investigations into all matters relevant to the subject matter of their dealings.

19.3 **Supersedes prior Agreement**

This Contract supersedes any prior agreement between the parties whether written or oral and any such prior agreements are cancelled as at the commencement date but without prejudice to any rights which have already accrued to either of the parties.

19.4 **Change of Address**

Each of the parties will give notice to the other of the change or acquisition of any postal or email address or telephone, fax or similar number at the earliest possible opportunity but in any event within forty-eight (48) hours of such change or acquisition.

19.5 **Interpretation**

(i) Headings contained in this Contract are for reference purposes only and will not be deemed to be any indication of the meaning of the clauses and sub clauses to which they relate.

(ii) In this Agreement, the singular includes the plural and vice versa, and each gender includes every other gender.

19.6 **Warranties by the Parties**

(i) Each of the parties warrants that it has the power to enter into this Contract and has obtained all necessary resolutions and approvals to do so.

(ii) The Purchaser warrants that:

(1) when entering into this Contract, it is not acting as the agent of any other person, company or other organization; and

(2) the Goods will not be used by the Purchaser for personal, domestic or household purposes.

19.7 **No Partnership**

The parties are not partners or joint venturers.

19.8 **The Vendor's Right to Assign**

This Contract and all rights under it may be assigned or transferred by the Vendor. The Purchaser may not assign or otherwise transfer its rights without the prior written consent of the Vendor.

19.9 **Proper Law and Jurisdiction**

These terms and conditions are governed by and construed with reference to the laws for the time being in force in the State of New South Wales. Each party irrevocably and unconditionally submits to the exclusive jurisdiction of the courts of the State of New South Wales, and of any courts that have jurisdiction to hear appeals from any of those courts, and waives any right to object to any proceedings being brought in those courts.

19.10 **Rights Cumulative**

All rights granted to the Vendor are cumulative and no exercise by either of the parties of any right under this Contract will restrict or prejudice the exercise of any other right granted by this Contract or otherwise available to the Vendor.

19.11 **Waiver**

The failure by the Vendor to enforce at any time or for any period any one or more of the terms or conditions of this Contract is not a waiver of them or of the right at any time subsequently to enforce all terms and conditions of this Agreement.

19.12 **Costs**

Each of the parties will pay the costs and expenses incurred by it in connection with this Agreement.

ADDITIONAL CLAUSES IF THE VENDOR IS RESPONSIBLE FOR ERECTION

E1 ACCESS TO AND POSSESSION OF THE SITE

The Purchaser will provide timely and suitable access to and possession of the Site for such periods as is reasonably required to perform the Contract Works, proper foundations to receive the Goods as and when delivered, adequate craneage, lifting tackle and scaffolding and suitable protection for the plant from time of delivery until the time of Taking Over.

E2 SITE FACILITIES

The Purchaser will be responsible for providing and maintaining proper fencing, lighting, guarding and watching of all the Contract Works comprised in the Contract Works until Taken Over and the proper provision during a like period of temporary roadways, footways, guards and fences as far as they may be necessary by reason of the Contract Works for the accommodation and protection of the owners and occupiers of adjacent property, public and others.

The Purchaser will provide without cost to the Vendor such supplies of electricity, water and gas as may be necessary for the purposes of the Contract Works on Site.

E3 INSURANCE OF PLANT DURING ERECTION

Unless the Vendor otherwise agrees, the Vendor will insure the Contract Works and keep each part thereof insured for its full value against damage or destruction by fire, explosion, lightning, earthquake, theft, storm, tempest, impact and aircraft damage from the date of dispatch in accordance with the Contract or the date on which it becomes the Purchaser's property, whichever is the earlier until it is Taken Over or deemed Taken Over by the Purchaser in accordance with Clause E5 and shall from time to time, when so required by the Purchaser, produce proof of insurance cover. All moneys received under any such policy shall be applied in or towards (in order of precedence):

(i) the replacement or repair of the Plant lost, damaged or destroyed;

(ii) reimbursement to the Vendor of its costs, liabilities, expenses and accounts in relation to such replacement or repair work; and

(iii) the remainder (if any) shall be paid to the Vendor,
but this provision shall not affect liabilities or obligations under this Contract.

E4 TESTS ON SITE

Where the Contract requires the Vendor to carry out tests on Site, the Purchaser will provide when requested, free of charge, such labour, materials, electricity, gas, fuel, water, stores, apparatus, instruments or other items as may be required from time to time and as may be reasonably demanded to carry out such tests of the plant or workmanship in accordance with this Agreement. Site tests shall be carried out within one (1) month after completion of erection. The Vendor will give the Purchaser twenty four (24) hours notice of the date on which tests will be carried out. If the Purchaser fails to attend on that date, unless otherwise arranged, the Vendor will proceed with the tests which shall be deemed to have taken place in the Purchaser's presence such that the outcome of the test will be deemed to be accepted by the Purchaser.

Where the results of such tests do not fall within any guarantees specified, the Vendor reserves the right to repeat the tests within fourteen (14) days after the date when the plant is ready for retest.

E5 TIME OF TAKING OVER

The Contract Works shall be deemed to have been taken over by Purchaser when erection has been completed or on completion of tests on site under clause E4 when these are included or one calendar month after it shall have been put into commercial use (whichever may be the earlier). Provided that in any case the Contract Works shall be deemed to have been taken over at the expiration of two calendar months after Vendor gives the Purchaser written notice that erection is complete.

The time of taking over shall not be delayed on account of additions, minor omissions, or defects, which do not materially affect the commercial use of the Contract Works.

E6 EXTRA COSTS

Any agreement by the Vendor to undertake Contract Works is based on the assumption that all civil work or other preparatory work for which the Purchaser is responsible has been completed and that the installation can be carried out with continuity during normal working hours. Should the Vendor incur extra costs or other expenses including reasonable overheads because of interruptions, delays, overtime, unusual hours, mistakes, or work for which the Vendor is not responsible under this Agreement, such extra cost, expense or reasonable overhead will be added to the price to be paid to the Vendor by the Purchaser, it being agreed, however, that overtime or unusual hours shall not be worked except with the prior arrangement of Purchaser's representative. Cost will have the same meaning as set out in clause 10.12.

E7 TIME OF COMPLETION

For contracts including erection, the delivery date shall include the addition of the period of time set out in the contract for erection or any agreed extension thereof.

E8 APPROVALS BY AUTHORITIES

The Purchaser shall obtain all such permits, consents or approvals as required by law for on in connection with the execution of the Contract Works and pay all fees therefore.

tyco Water

ADVANTAGE POLYETHYLENE PIPE

ADVANTAGE POLYETHYLENE PIPE

Tyco Water's ADVANTAGE is a high strength PE100 Polyethylene piping system and can be used for conveying all types of liquids, slurries and gases. Some of the common applications include, mineral slurry pipelines, sewer rising mains, reuse water, effluent transportation, submarine pipelines, irrigation and mine water supply. Polyethylene is the preferred material for use in trenchless pipelines which are installed by directional drilling, slip lining and pipe bursting methods. PE100 preferred jointing method is heat fusion, therefore Butt Fusion and Electrofusion equipment is required. Polyethylene cannot be jointed with adhesives or solvents.

PRODUCT RANGE

AS/NZS 4130:2009 – Polyethylene (PE) Pipes for Pressure Applications

- 16mm-800mm OD
- PN4/SDR41 – PN20/SDR9
- Pipe colour to suit required application (jacketed/sheathed, striped & customised)

Application	*Stripe/Sheath*
Miscellaneous	Black
Potable Water	Blue
Recycled Water	Purple
Sewer Rising Mains	Cream
Fire Mains	Red
Mining (Above ground)	White
Gravity Sewer	Grey
Electrical	Orange

Note: PE pipe manufacture may be subject to minimum manufacturing quantities.

Rural Stripe Green Pipe – Rural Applications

- ½"-2"
- PN 6.3/630kPa at 20˚C

AS 2439.1 – Corrugated Drainage Pipe (Draincoil)

- 100mm-160mm OD
- SN4 & SN8

TYPICAL FITTINGS

- Electrofusion
- Moulded butt weld – short & long spigot
- Fabricated
- PE restraint – mechanical couplings and valves
- Compression fittings

TECHNICAL INFORMATION

Mechanical Properties

- High tensile strength with a high resistance against fast and slow crack propagation
- Very high impact strength
- High elongation to breaking

Weathering

UV Protective additives such as carbon black as specified in AS/NZS 4130 and hindered amine light stabilisers (HALS) are added to minimise degradation. The use of carbon black as an added UV stabiliser greatly assists prolonging the life of pipe exposed to Ultra Violet Light; therefore black pipes dominate general use in above ground applications. Pipes of colour other than black should be protected from direct sunlight during storage, particularly if they are to be stored for more than 2 years.

Abrasion Resistance

Excellent resistance against abrasion, therefore PE piping systems are used in numerous applications for conveying solids and slurries.

Chemical Resistance

Please consult your Tyco Water Customer Service Representative.

INSTALLATION

Standards typically used for the installation of PE pipe systems include, but are not limited to:

- AS/NZS 2566 'Buried Flexible Pipelines – Part 1: Design and Part 2: Installation'.
- AS/NZS 2566 Supplement 'Buried Flexible Pipelines – Part 1 Structural Design – Commentary'
- AS/NZS 2033 Installation of Polyethylene Pipe System
- AS/NZS 3500 Plumbing and Drainage

WORKING TEMPERATURE

The Maximum Allowable Operating Pressure (MAOP) of a Polyethylene (PE) pipe system is influenced by the temperature of the pipe wall. The nominal pressure rating (PN) assigned to an AS/NZS 4130 PE pipe equates to performance at 20°C, i.e. a PN 16 pipe is capable of withstanding a MAOP of 160m head (1.6MPa or 16 bar pressure) when operating continuously at a uniform wall temperature of 20°C. In situations where the temperature of the pipe wall increases, the MAOP of the pipe is reduced. Therefore the Polyethylene pipe system will be required to be re-rated with the increasing temperature.

ADVANTAGE POLYETHYLENE PIPE

PACKAGING, HANDLING AND STORAGE

Polyethylene (PE) pipe is tough and resilient. However its relative lightness can be deceptive when considering the safety aspects of moving and handling. It can also be damaged by excessive scuffing or gouging of ends, external and internal surfaces during loading, unloading and transfer operations.

Transport

PE pipes should be transported on a flat-bed, container or curtain-side type vehicle, free from sharp objects and any projections. Care should be taken to ensure the size, shape, weight and centre of gravity are such that the stability and security of the load is not compromised throughout the transport journey. Furthermore, nothing should be placed on top of PE pipes during transport which could cause the pipe to deform.

Loading and Unloading

Wide slings should be used to lift pipe bundles by crane. Chains, hooks or wire rope slings should not be used since they can slip and gouge or abrade the pipe surface. Strapping or banding straps used to retain packs and bundles must not be used for lifting or handling. Allowance should be made for deflection or bending of pipes during all loading and unloading operations.

Depending on the terrain, standard forklifts can generally be used for lengths up to 6m. If a forklift is used, contact points must be protected from damage and forklift tines must not be inserted between the windings of the coils. Longer lengths should be lifted and moved by equipment fitted with loadspreading beams or attachments. Cranes or Hiabs can be efficient and safe provided precautions are made for correct slinging of the load and operation of the equipment. Larger diameter pipes (e.g. 355mm OD and over) should be handled individually. These are generally less stable than bundled lengths and will move freely unless adequately restrained.

Pipes which have been held or restrained in bundles or singly by strapping or banding etc. during storage, handling and transportation will hold considerable amounts of stored energy. Thermal expansion and contraction contributes to the amount and the direction of the stored energy. This stored energy can be hazardous if released incorrectly.

Storage

Pipe should not be stored in direct contact with the ground. Timber battens or other suitable means should be placed under the pipe in uniform spacing. Stack height should be limited to prevent pipe from losing shape due to imposed loads. Nothing should be placed on top of PE pipes during storage which could cause pipe to deform. Pipe stacks should be pegged, chocked or otherwise secured to prevent pipes rolling or falling.

Bundled packs should be stacked so that their packaging battens are in line with each other. This will facilitate easy access by the forklift truck or side loader. Where battens are not aligned additional rigid dunnage should be placed between bundles. Coils can be stored flat on a solid flat surface or in a near vertical position to prevent distortion.

Impact, abrasion and contact with hot surfaces such as vehicle exhausts can damage pipes and pipe ends. Covered storage should be considered if prolonged exposure to direct sunlight is envisaged as well as storage away from sources of direct heat or fire. Pipe should not be stored where there is a possibility of contact with chemicals (e.g. lubricating/ hydraulic oils, solvents, conditioning fluids etc). Pipe which has been heavily contaminated with such substances should be scrapped.

STANDARD DIMENSION RATIOS

Standard dimensions and weights PE100 to AS/NZS 4130

SDR 41 –PN4 (PE100)			
OD	MEAN BORE	S	kg/m
20	–	–	–
25	–	–	–
32	–	–	–
40	–	–	–
50	–	–	–
63	–	–	–
75	–	–	–
90	–	–	–
110	105	2.9	1.0
125	119	3.4	1.3
140	133	3.8	1.7
160	152	4.3	2.1
180	171	4.7	2.7
200	191	5.2	3.3
225	214	5.9	4.1
250	238	6.6	5.2
280	267	7.3	6.4
315	300	8.2	8.0
355	338	9.2	10.2
400	380	10.4	12.9
450	429	11.6	16.2
500	476	13.0	20.3
560	534	14.5	25.2
630	600	16.3	31.9
710	677	18.4	40.5
800	762	20.7	51.4

SDR 26 – PN 6.3 (PE100)			
OD	MEAN BORE	S	kg/m
20	–	–	–
25	–	–	–
32	–	–	–
40	–	–	–
50	–	–	–
63	58	2.6	0.5
75	69	3.1	0.7
90	83	3.8	1.0
110	101	4.6	1.6
125	115	5.1	2.0
140	129	5.8	2.5
160	148	6.6	3.3
180	166	7.3	4.0
200	185	8.2	5.0
225	208	9.1	6.3
250	231	10.2	7.8
280	259	11.3	9.7
315	291	12.8	12.4
355	328	14.4	15.6
400	370	16.2	19.8
450	416	18.2	25.0
500	462	20.2	30.9
560	517	22.6	38.7
630	582	25.4	49.0
710	656	28.7	62.2
800	739	32.2	78.8

SDR 21 – PN 8 (PE100)			
OD	MEAN BORE	S	kg/m
20	–	–	–
25	–	–	–
32	29	1.8	0.2
40	36	2.1	0.3
50	45	2.6	0.4
63	57	3.2	0.6
75	68	3.9	0.9
90	81	4.6	1.3
110	99	5.7	1.9
125	113	6.4	2.4
140	126	7.1	3.0
160	144	8.2	4.0
180	163	9.1	5.0
200	181	10.2	6.2
225	203	11.4	7.8
250	226	12.6	9.5
280	253	14.2	12.0
315	285	15.8	15.1
355	321	17.8	19.1
400	362	20.2	24.4
450	407	22.7	30.9
500	452	25.2	38.0
560	506	28.1	47.6
630	570	31.6	60.1
710	642	35.7	76.
800	723	40.1	97.0

S = mean wall thickness

STANDARDS

Tyco Water is committed to total quality management; this is reinforced by the following accreditations:-

- StandardsMark Licence No: SMKP25347
- WaterMark Certificate No: WMKA25347
- ISO 9001:2008 Licence No: QEC1105
- Water Services Association of Australia (WSAA) Product Appraisal Report PA 11/08

Certified Product™ Australian Standard

WaterMark™

Certified System™ Quality ISO 9001

STANDARD DIMENSION RATIOS

Standard dimensions and weights PE100 to AS/NZS 4130

SDR 17 – PN 10 (PE100)			
OD	MEAN BORE	S	kg/m
20	–	–	–
25	22	1.8	0.1
32	28	2.1	0.2
40	35	2.6	0.3
50	44	3.2	0.5
63	55	4.1	0.8
75	66	4.8	1.1
90	79	5.8	1.6
110	97	7.0	2.3
125	110	7.9	2.9
140	123	8.8	3.7
160	141	10.1	4.8
180	158	11.3	6.1
200	176	12.6	7.5
225	198	14.2	9.5
250	220	15.6	11.7
280	246	17.5	14.6
315	277	19.7	18.5
355	311	22.3	23.6
400	352	25.0	29.8
450	396	28.1	37.7
500	440	31.2	46.5
560	493	35.0	58.4
630	554	39.3	73.8
710	625	44.3	93.8
800	704	49.9	118.9

SDR 13.6 – PN 12.5 (PE100)			
OD	MEAN BORE	S	kg/m
20	17	1.8	0.1
25	21	2.1	0.2
32	27	2.6	0.2
40	34	3.2	0.4
50	42	4.0	0.6
63	53	5.0	0.9
75	64	5.9	1.3
90	76	7.0	1.9
110	93	8.6	2.8
125	106	9.8	3.6
140	119	10.9	4.5
160	136	12.5	5.9
180	153	14.1	7.4
200	170	15.5	9.1
225	191	17.5	11.6
250	212	19.4	14.3
280	238	21.7	17.8
315	268	24.5	22.6
355	302	27.5	28.7
400	340	31.0	36.3
450	382	34.9	46.0
500	425	38.7	56.7
560	476	43.4	71.2
630	535	48.7	90.0
710	603	54.9	114.3
800	680	61.8	144.9

SDR 11 – PN 16 (PE100)			
OD	MEAN BORE	S	kg/m
20	16	2.1	0.1
25	20	2.5	0.2
32	26	3.1	0.3
40	32	4.0	0.5
50	40	4.9	0.7
63	51	6.2	1.1
75	61	7.2	1.6
90	73	8.7	2.3
110	89	10.6	3.3
125	102	12.1	4.3
140	114	13.4	5.4
160	130	15.4	7.1
180	146	17.3	9.0
200	163	19.2	11.1
225	183	21.6	14.0
250	203	23.9	17.2
280	228	26.8	21.5
315	256	30.1	27.3
355	289	33.9	34.6
400	325	38.2	43.9
450	366	43.0	55.6
500	407	47.8	68.6
560	456	53.4	85.9
630	513	60.2	108.9
710	578	67.8	138.2
800	651	76.3	175.3

SDR 9 – PN 20 (PE100)			
OD	MEAN BORE	S	kg/m
20	15	2.5	0.1
25	19	3.0	0.2
32	24	3.9	0.3
40	31	4.8	0.5
50	38	6.0	0.8
63	48	7.6	1.3
75	58	8.9	1.9
90	69	10.7	2.7
110	85	13.0	4.0
125	96	14.8	5.2
140	108	16.6	6.5
160	123	18.9	8.5
180	138	21.2	10.7
200	154	23.6	13.2
225	173	26.5	16.7
250	192	29.4	20.6
280	215	33.0	25.9
315	242	37.1	32.7
355	273	41.7	41.4
400	308	47.0	52.6
450	346	52.8	66.5
500	385	58.7	82.1
560	430	65.7	103.0
630	484	73.9	130.3
710	547	83.4	165.6
800	616	93.9	210.1

S = mean wall thickness

SDR/PN CONVERSIONS FOR PE80 AND PE100

SDR	41	33	26	21	17	13.6	11	9	7.4
PE80	PN3.2	PN4	–	PN6.3	PN8	PN10	PN12.5	PN16	PN20
PE100	PN4	–	PN6.3	PN8	PN10	PN12.5	PN16	PN20	PN25

ADVANTAGE BLACK

Metric PE100 pipe designed and manufactured to AS/NZS 4130 for miscellaneous applications.

PE100 BLK ADV – PN 4

CODE	SIZE	DESCRIPTION	LENGTH
P1311.005.160	160mm	PE100 BLK ADV PN4	12m
P1311.005.180	180mm	PE100 BLK ADV PN4	12m
P1311.005.200	200mm	PE100 BLK ADV PN4	12m
P1311.005.225	225mm	PE100 BLK ADV PN4	12m
P1311.005.250	250mm	PE100 BLK ADV PN4	12m
P1311.005.280	280mm	PE100 BLK ADV PN4	12m
P1311.005.315	315mm	PE100 BLK ADV PN4	12m
P1311.005.355	355mm	PE100 BLK ADV PN4	12m
P1311.005.400	400mm	PE100 BLK ADV PN4	12m
P1311.005.450	450mm	PE100 BLK ADV PN4	12m
P1311.005.500	500mm	PE100 BLK ADV PN4	12m
P1311.005.560	560mm	PE100 BLK ADV PN4	12m
P1311.005.630	630mm	PE100 BLK ADV PN4	12m
P1311.005.710	710mm	PE100 BLK ADV PN4	12m
P1311.005.800	800mm	PE100 BLK ADV PN4	12m

PE100 BLK ADV – PN 6.3

CODE	SIZE	DESCRIPTION	LENGTH
P1312.005.160	160mm	PE100 BLK ADV PN6.3	12m
P1312.005.180	180mm	PE100 BLK ADV PN6.3	12m
P1312.005.200	200mm	PE100 BLK ADV PN6.3	12m
P1312.005.225	225mm	PE100 BLK ADV PN6.3	12m
P1312.005.250	250mm	PE100 BLK ADV PN6.3	12m
P1312.005.280	280mm	PE100 BLK ADV PN6.3	12m
P1312.005.315	315mm	PE100 BLK ADV PN6.3	12m
P1312.005.355	355mm	PE100 BLK ADV PN6.3	12m
P1312.005.400	400mm	PE100 BLK ADV PN6.3	12m
P1312.005.450	450mm	PE100 BLK ADV PN6.3	12m
P1312.005.500	500mm	PE100 BLK ADV PN6.3	12m
P1312.005.560	560mm	PE100 BLK ADV PN6.3	12m
P1312.005.630	630mm	PE100 BLK ADV PN6.3	12m
P1312.005.710	710mm	PE100 BLK ADV PN6.3	12m
P1312.005.800	800mm	PE100 BLK ADV PN6.3	12m

FEATURES

- Corrosion resistant
- Chemical resistant
- Smooth bore
- Abrasion resistant
- Weather resistant
- High flow rate
- Light weight for easy installation
- Flexible
- High impact strength
- Long life
- Trenchless construction

ADVANTAGE BLACK

Metric PE100 pipe designed and manufactured to AS/NZS 4130 for miscellaneous applications.

GENERAL APPLICATION

Advantage Black is a solid walled pipe manufactured to AS/NZS 4130 for miscellaneous pressure applications.

TECHNICAL DATA

Temperature Range: -30˚C to +60˚C

Jointing Methods: Butt welding, electrofusion, flanged joints, mechanical couplings, compression fittings

Approvals: SMKP25347, WMKA25347, WSAA 11/08

Standard: AS/NZS 4130

PE100 BLK ADV – PN 8

CODE	SIZE	DESCRIPTION	LENGTH
P1313.005.090	90mm	PE100 BLK ADV PN8	12m
P1313.005.110	110mm	PE100 BLK ADV PN8	12m
P1313.005.125	125mm	PE100 BLK ADV PN8	12m
P1313.005.140	140mm	PE100 BLK ADV PN8	12m
P1313.005.160	160mm	PE100 BLK ADV PN8	12m
P1313.005.180	180mm	PE100 BLK ADV PN8	12m
P1313.005.200	200mm	PE100 BLK ADV PN8	12m
P1313.005.225	225mm	PE100 BLK ADV PN8	12m
P1313.005.250	250mm	PE100 BLK ADV PN8	12m
P1313.005.280	280mm	PE100 BLK ADV PN8	12m
P1313.005.315	315mm	PE100 BLK ADV PN8	12m
P1313.005.355	355mm	PE100 BLK ADV PN8	12m
P1313.005.400	400mm	PE100 BLK ADV PN8	12m
P1313.005.450	450mm	PE100 BLK ADV PN8	12m
P1313.005.500	500mm	PE100 BLK ADV PN8	12m
P1313.005.560	560mm	PE100 BLK ADV PN8	12m
P1313.005.630	630mm	PE100 BLK ADV PN8	12m
P1313.005.710	710mm	PE100 BLK ADV PN8	12m
P1313.005.800	800mm	PE100 BLK ADV PN8	12m

PE100 BLK ADV – PN 10

CODE	SIZE	DESCRIPTION	LENGTH
P1314.005.090	90mm	PE100 BLK ADV PN10	12m
P1314.005.110	110mm	PE100 BLK ADV PN10	12m
P1314.005.125	125mm	PE100 BLK ADV PN10	12m
P1314.005.140	140mm	PE100 BLK ADV PN10	12m
P1314.005.160	160mm	PE100 BLK ADV PN10	12m
P1314.005.180	180mm	PE100 BLK ADV PN10	12m
P1314.005.200	200mm	PE100 BLK ADV PN10	12m
P1314.005.225	225mm	PE100 BLK ADV PN10	12m
P1314.005.250	250mm	PE100 BLK ADV PN10	12m
P1314.005.280	280mm	PE100 BLK ADV PN10	12m
P1314.005.315	315mm	PE100 BLK ADV PN10	12m
P1314.005.355	355mm	PE100 BLK ADV PN10	12m
P1314.005.400	400mm	PE100 BLK ADV PN10	12m
P1314.005.450	450mm	PE100 BLK ADV PN10	12m
P1314.005.500	500mm	PE100 BLK ADV PN10	12m
P1314.005.560	560mm	PE100 BLK ADV PN10	12m
P1314.005.630	630mm	PE100 BLK ADV PN10	12m
P1314.005.710	710mm	PE100 BLK ADV PN10	12m
P1314.005.800	800mm	PE100 BLK ADV PN10	12m

Other lengths available upon request, subject to manufacturing volumes.

ADVANTAGE BLACK

Metric PE100 pipe designed and manufactured to AS/NZS 4130 for miscellaneous applications.

PE100 BLK ADV – PN 12.5

CODE	SIZE	DESCRIPTION	LENGTH
P1315.005.090	90mm	PE100 BLK ADV PN12.5	12m
P1315.005.110	110mm	PE100 BLK ADV PN12.5	12m
P1315.005.125	125mm	PE100 BLK ADV PN12.5	12m
P1315.005.140	140mm	PE100 BLK ADV PN12.5	12m
P1315.005.160	160mm	PE100 BLK ADV PN12.5	12m
P1315.005.180	180mm	PE100 BLK ADV PN12.5	12m
P1315.005.200	200mm	PE100 BLK ADV PN12.5	12m
P1315.005.225	225mm	PE100 BLK ADV PN12.5	12m
P1315.005.250	250mm	PE100 BLK ADV PN12.5	12m
P1315.005.280	280mm	PE100 BLK ADV PN12.5	12m
P1315.005.315	315mm	PE100 BLK ADV PN12.5	12m
P1315.005.355	355mm	PE100 BLK ADV PN12.5	12m
P1315.005.400	400mm	PE100 BLK ADV PN12.5	12m
P1315.005.450	450mm	PE100 BLK ADV PN12.5	12m
P1315.005.500	500mm	PE100 BLK ADV PN12.5	12m
P1315.005.560	560mm	PE100 BLK ADV PN12.5	12m
P1315.005.630	630mm	PE100 BLK ADV PN12.5	12m
P1315.005.710	710mm	PE100 BLK ADV PN12.5	12m
P1315.005.800	800mm	PE100 BLK ADV PN12.5	12m

PE100 BLK ADV – PN 16

CODE	SIZE	DESCRIPTION	LENGTH
P1316.008.040	40mm	PE100 BLK ADV PN16	50m
P1316.010.040	40mm	PE100 BLK ADV PN16	150m
P1316.008.050	50mm	PE100 BLK ADV PN16	50m
P1316.010.050	50mm	PE100 BLK ADV PN16	150m
P1316.003.063	63mm	PE100 BLK ADV PN16	6m
P1316.008.063	63mm	PE100 BLK ADV PN16	50m
P1316.009.063	63mm	PE100 BLK ADV PN16	100m
P1316.003.075	75mm	PE100 BLK ADV PN16	6m
P1316.005.075	75mm	PE100 BLK ADV PN16	12m
P1316.009.075	75mm	PE100 BLK ADV PN16	100m
P1316.003.090	90mm	PE100 BLK ADV PN16	6m
P1316.005.090	90mm	PE100 BLK ADV PN16	12m
P1316.008.090	90mm	PE100 BLK ADV PN16	50m
P1316.009.090	90mm	PE100 BLK ADV PN16	100m
P1316.003.110	110mm	PE100 BLK ADV PN16	6m
P1316.005.110	110mm	PE100 BLK ADV PN16	12m
P1316.009.110	110mm	PE100 BLK ADV PN16	100m
P1316.003.125	125mm	PE100 BLK ADV PN16	6m
P1316.005.125	125mm	PE100 BLK ADV PN16	12m
P1316.005.140	140mm	PE100 BLK ADV PN16	12m
P1316.005.160	160mm	PE100 BLK ADV PN16	12m
P1316.003.180	180mm	PE100 BLK ADV PN16	6m
P1316.005.180	180mm	PE100 BLK ADV PN16	12m
P1316.005.200	200mm	PE100 BLK ADV PN16	12m
P1316.005.225	225mm	PE100 BLK ADV PN16	12m
P1316.005.250	250mm	PE100 BLK ADV PN16	12m
P1316.005.280	280mm	PE100 BLK ADV PN16	12m

FEATURES

- Corrosion resistant
- Chemical resistant
- Smooth bore
- Abrasion resistant
- Weather resistant
- High flow rate
- Light weight for easy installation
- Flexible
- High impact strength
- Long life
- Trenchless construction

ADVANTAGE BLACK

Metric PE100 pipe designed and manufactured to AS/NZS 4130 for miscellaneous applications.

GENERAL APPLICATION

Advantage Black is a solid walled pipe manufactured to AS/NZS 4130 for miscellaneous pressure applications.

TECHNICAL DATA

Temperature Range: -30˚C to +60˚C

Jointing Methods: Butt welding, electrofusion, flanged joints, mechanical couplings, compression fittings

Approvals: SMKP25347, WMKA25347, WSAA 11/08

Standard: AS/NZS 4130

PE100 BLK ADV – PN 16 continued

CODE	SIZE	DESCRIPTION	LENGTH
P1316.005.315	315mm	PE100 BLK ADV PN16	12m
P1316.005.355	355mm	PE100 BLK ADV PN16	12m
P1316.005.400	400mm	PE100 BLK ADV PN16	12m
P1316.005.450	450mm	PE100 BLK ADV PN16	12m
P1316.005.500	500mm	PE100 BLK ADV PN16	12m
P1316.005.560	560mm	PE100 BLK ADV PN16	12m
P1316.005.630	630mm	PE100 BLK ADV PN16	12m
P1316.005.710	710mm	PE100 BLK ADV PN16	12m
P1316.005.800	800mm	PE100 BLK ADV PN16	12m

PE100 BLK ADV – PN 20

CODE	SIZE	DESCRIPTION	LENGTH
P1317.005.110	110mm	PE100 BLK ADV PN20	12m
P1317.005.125	125mm	PE100 BLK ADV PN20	12m
P1317.005.140	140mm	PE100 BLK ADV PN20	12m
P1317.005.160	160mm	PE100 BLK ADV PN20	12m
P1317.005.180	180mm	PE100 BLK ADV PN20	12m
P1317.005.200	200mm	PE100 BLK ADV PN20	12m
P1317.005.225	225mm	PE100 BLK ADV PN20	12m
P1317.005.250	250mm	PE100 BLK ADV PN20	12m
P1317.005.280	280mm	PE100 BLK ADV PN20	12m
P1317.005.315	315mm	PE100 BLK ADV PN20	12m
P1317.005.355	355mm	PE100 BLK ADV PN20	12m
P1317.005.400	400mm	PE100 BLK ADV PN20	12m
P1317.005.450	450mm	PE100 BLK ADV PN20	12m
P1317.005.500	500mm	PE100 BLK ADV PN20	12m
P1317.005.560	560mm	PE100 BLK ADV PN20	12m
P1317.005.630	630mm	PE100 BLK ADV PN20	12m
P1317.005.710	710mm	PE100 BLK ADV PN20	12m
P1317.005.800	800mm	PE100 BLK ADV PN20	12m

Other lengths available upon request, subject to manufacturing volumes.

ADVANTAGE STRIPE BLUE

Metric PE100 pipe designed and manufactured to AS/NZS 4130 for potable water applications.

PE100 STRIPE BLUE – PN 6.3

CODE	SIZE	DESCRIPTION	LENGTH
P1222.005.090	90mm	PE100 BLU ADVST PN6.3	12m
P1222.005.110	110mm	PE100 BLU ADVST PN6.3	12m
P1222.005.125	125mm	PE100 BLU ADVST PN6.3	12m
P1222.005.140	140mm	PE100 BLU ADVST PN6.3	12m
P1222.005.160	160mm	PE100 BLU ADVST PN6.3	12m

PE100 STRIPE BLUE – PN 8

CODE	SIZE	DESCRIPTION	LENGTH
P1223.011.032	32mm	PE100 BLU ADVST PN8	200m
P1223.010.040	40mm	PE100 BLU ADVST PN8	150m
P1223.010.050	50mm	PE100 BLU ADVST PN8	150m
P1223.012.050	50mm	PE100 BLU ADVST PN8	300m
P1223.009.063	63mm	PE100 BLU ADVST PN8	100m
P1223.011.063	63mm	PE100 BLU ADVST PN8	200m
P1223.009.075	75mm	PE100 BLU ADVST PN8	100m
P1223.009.090	90mm	PE100 BLU ADVST PN8	100m
P1223.009.110	110mm	PE100 BLU ADVST PN8	100m
P1223.005.110	110mm	PE100 BLU ADVST PN8	12m
P1223.009.125	125mm	PE100 BLU ADVST PN8	100m
P1223.005.125	125mm	PE100 BLU ADVST PN8	12m
P1223.005.140	140mm	PE100 BLU ADVST PN8	12m
P1223.005.160	160mm	PE100 BLU ADVST PN8	12m

PE100 STRIPE BLUE – PN 10

CODE	SIZE	DESCRIPTION	LENGTH
P1224.011.025	25mm	PE100 BLU ADVST PN10	200m
P1224.011.032	32mm	PE100 BLU ADVST PN10	200m
P1224.010.040	40mm	PE100 BLU ADVST PN10	150m
P1224.010.050	50mm	PE100 BLU ADVST PN10	150m
P1224.009.063	63mm	PE100 BLU ADVST PN10	100m
P1224.009.075	75mm	PE100 BLU ADVST PN10	100m
P1224.009.090	90mm	PE100 BLU ADVST PN10	100m
P1224.009.110	110mm	PE100 BLU ADVST PN10	100m
P1224.009.125	125mm	PE100 BLU ADVST PN10	100m
P1224.005.125	125mm	PE100 BLU ADVST PN10	12m
P1224.005.140	140mm	PE100 BLU ADVST PN10	12m
P1224.005.160	160mm	PE100 BLU ADVST PN10	12m

FEATURES

- Corrosion resistant
- Chemical resistant
- Smooth bore
- Abrasion resistant
- Weather resistant
- High flow rate
- Light weight for easy installation
- Flexible
- High impact strength
- Long life
- Trenchless construction

ADVANTAGE STRIPE BLUE

Metric PE100 pipe designed and manufactured to AS/NZS 4130 for potable water applications.

GENERAL APPLICATION

Advantage Stripe Blue is a solid walled pipe manufactured to AS/NZS 4130 for pressure potable water applications. The pipe features blue coloured stripes around the circumference to provide identification.

TECHNICAL DATA

Temperature Range: -30˚C to +60˚C

Jointing Methods: Butt welding, electrofusion, flanged joints, mechanical couplings, compression fittings

Approvals: SMKP25347, WMKA25347, WSAA 11/08

Standard: AS/NZS 4130

PE100 STRIPE BLUE – PN 12.5

CODE	SIZE	DESCRIPTION	LENGTH
P1225.007.020	20mm	PE100 BLU ADVST PN12.5	25m
P1225.008.020	20mm	PE100 BLU ADVST PN12.5	50m
P1225.011.020	20mm	PE100 BLU ADVST PN12.5	200m
P1225.007.025	25mm	PE100 BLU ADVST PN12.5	25m
P1225.008.025	25mm	PE100 BLU ADVST PN12.5	50m
P1225.011.025	25mm	PE100 BLU ADVST PN12.5	200m
P1225.007.032	32mm	PE100 BLU ADVST PN12.5	25m
P1225.008.032	32mm	PE100 BLU ADVST PN12.5	50m
P1225.009.032	32mm	PE100 BLU ADVST PN12.5	100m
P1225.011.032	32mm	PE100 BLU ADVST PN12.5	200m
P1225.007.040	40mm	PE100 BLU ADVST PN12.5	25m
P1225.008.040	40mm	PE100 BLU ADVST PN12.5	50m
P1225.010.040	40mm	PE100 BLU ADVST PN12.5	150m
P1225.007.050	50mm	PE100 BLU ADVST PN12.5	25m
P1225.008.050	50mm	PE100 BLU ADVST PN12.5	50m
P1225.010.050	50mm	PE100 BLU ADVST PN12.5	150m
P1225.008.063	63mm	PE100 BLU ADVST PN12.5	50m
P1225.009.063	63mm	PE100 BLU ADVST PN12.5	100m
P1225.009.075	75mm	PE100 BLU ADVST PN12.5	100m
P1225.011.090	90mm	PE100 BLU ADVST PN12.5	100m
P1225.008.110	110mm	PE100 BLU ADVST PN12.5	50m
P1225.009.110	110mm	PE100 BLU ADVST PN12.5	100m
P1225.005.110	110mm	PE100 BLU ADVST PN12.5	12m
P1225.009.125	125mm	PE100 BLU ADVST PN12.5	100m
P1225.005.125	125mm	PE100 BLU ADVST PN12.5	12m
P1225.009.140	140mm	PE100 BLU ADVST PN12.5	100m
P1225.005.140	140mm	PE100 BLU ADVST PN12.5	12m
P1225.005.160	160mm	PE100 BLU ADVST PN12.5	12m
P1225.005.180	180mm	PE100 BLU ADVST PN12.5	12m
P1225.005.200	200mm	PE100 BLU ADVST PN12.5	12m
P1225.005.225	225mm	PE100 BLU ADVST PN12.5	12m
P1225.005.250	250mm	PE100 BLU ADVST PN12.5	12m
P1225.005.280	280mm	PE100 BLU ADVST PN12.5	12m
P1225.005.315	315mm	PE100 BLU ADVST PN12.5	12m
P1225.005.355	355mm	PE100 BLU ADVST PN12.5	12m
P1225.005.400	400mm	PE100 BLU ADVST PN12.5	12m
P1225.005.450	450mm	PE100 BLU ADVST PN12.5	12m
P1225.005.500	500mm	PE100 BLU ADVST PN12.5	12m
P1225.005.560	560mm	PE100 BLU ADVST PN12.5	12m
P1225.005.630	630mm	PE100 BLU ADVST PN12.5	12m
P1225.005.710	710mm	PE100 BLU ADVST PN12.5	12m
P1225.005.800	800mm	PE100 BLU ADVST PN12.5	12m

Other lengths available upon request, subject to manufacturing volumes.

ADVANTAGE STRIPE BLUE

Metric PE100 pipe designed and manufactured to AS/NZS 4130 for potable water applications.

PE100 STRIPE BLUE – PN 16

CODE	SIZE	DESCRIPTION	LENGTH
P1226.012.016	16mm	PE100 BLU ADVST PN16	300m
P1226.007.020	20mm	PE100 BLU ADVST PN16	25m
P1226.008.020	20mm	PE100 BLU ADVST PN16	50m
P1226.011.020	20mm	PE100 BLU ADVST PN16	200m
P1226.007.025	25mm	PE100 BLU ADVST PN16	25m
P1226.008.025	25mm	PE100 BLU ADVST PN16	50m
P1226.011.025	25mm	PE100 BLU ADVST PN16	200m
P1226.003.025	25mm	PE100 BLU ADVST PN16	6m
P1226.007.032	32mm	PE100 BLU ADVST PN16	25m
P1226.008.032	32mm	PE100 BLU ADVST PN16	50m
P1226.011.032	32mm	PE100 BLU ADVST PN16	200m
P1226.003.032	32mm	PE100 BLU ADVST PN16	6m
P1226.007.040	40mm	PE100 BLU ADVST PN16	25m
P1226.008.040	40mm	PE100 BLU ADVST PN16	50m
P1226.010.040	40mm	PE100 BLU ADVST PN16	150m
P1226.005.050	50mm	PE100 BLU ADVST PN16	12m
P1226.007.050	50mm	PE100 BLU ADVST PN16	25m
P1226.008.050	50mm	PE100 BLU ADVST PN16	50m
P1226.010.050	50mm	PE100 BLU ADVST PN16	150m
P1226.005.063	63mm	PE100 BLU ADVST PN16	12m
P1226.008.063	63mm	PE100 BLU ADVST PN16	50m
P1226.009.063	63mm	PE100 BLU ADVST PN16	100m
P1226.003.063	63mm	PE100 BLU ADVST PN16	6m
P1226.009.075	75mm	PE100 BLU ADVST PN16	100m
P1226.009.090	90mm	PE100 BLU ADVST PN16	100m
P1226.005.090	90mm	PE100 BLU ADVST PN16	12m
P1226.009.110	110mm	PE100 BLU ADVST PN16	100m
P1226.005.110	110mm	PE100 BLU ADVST PN16	12m
P1226.009.125	125mm	PE100 BLU ADVST PN16	100m
P1226.005.125	125mm	PE100 BLU ADVST PN16	12m
P1226.005.140	140mm	PE100 BLU ADVST PN16	12m
P1226.009.140	140mm	PE100 BLU ADVST PN16	100m
P1226.005.160	160mm	PE100 BLU ADVST PN16	12m
P1226.005.180	180mm	PE100 BLU ADVST PN16	12m
P1226.005.200	200mm	PE100 BLU ADVST PN16	12m
P1226.005.225	225mm	PE100 BLU ADVST PN16	12m
P1226.005.250	250mm	PE100 BLU ADVST PN16	12m
P1226.005.280	280mm	PE100 BLU ADVST PN16	12m
P1226.005.315	315mm	PE100 BLU ADVST PN16	12m
P1226.005.355	355mm	PE100 BLU ADVST PN16	12m
P1226.005.400	400mm	PE100 BLU ADVST PN16	12m
P1226.005.450	450mm	PE100 BLU ADVST PN16	12m
P1226.005.500	500mm	PE100 BLU ADVST PN16	12m
P1226.005.560	560mm	PE100 BLU ADVST PN16	12m
P1226.005.630	630mm	PE100 BLU ADVST PN16	12m
P1226.005.710	710mm	PE100 BLU ADVST PN16	12m
P1226.005.800	800mm	PE100 BLU ADVST PN16	12m

FEATURES

- Corrosion resistant
- Chemical resistant
- Smooth bore
- Abrasion resistant
- Weather resistant
- High flow rate
- Light weight for easy installation
- Flexible
- High impact strength
- Long life
- Trenchless construction

ADVANTAGE STRIPE BLUE

Metric PE100 pipe designed and manufactured to AS/NZS 4130 for potable water applications.

GENERAL APPLICATION

Advantage Stripe Blue is a solid walled pipe manufactured to AS/NZS 4130 for pressure potable water applications. The pipe features blue coloured stripes around the circumference to provide identification.

TECHNICAL DATA

Temperature Range: -30˚C to +60˚C

Jointing Methods: Butt welding, electrofusion, flanged joints, mechanical couplings, compression fittings

Approvals: SMKP25347, WMKA25347, WSAA 11/08

Standard: AS/NZS 4130

PE100 STRIPE BLUE – PN 20

CODE	SIZE	DESCRIPTION	LENGTH
P1227.005.110	110mm	PE100 BLU ADVST PN20	12m
P1227.005.125	125mm	PE100 BLU ADVST PN20	12m
P1227.005.140	140mm	PE100 BLU ADVST PN20	12m
P1227.005.160	160mm	PE100 BLU ADVST PN20	12m
P1227.005.180	180mm	PE100 BLU ADVST PN20	12m
P1227.005.200	200mm	PE100 BLU ADVST PN20	12m
P1227.005.225	225mm	PE100 BLU ADVST PN20	12m
P1227.005.250	250mm	PE100 BLU ADVST PN20	12m
P1227.005.280	280mm	PE100 BLU ADVST PN20	12m
P1227.005.315	315mm	PE100 BLU ADVST PN20	12m
P1227.005.355	355mm	PE100 BLU ADVST PN20	12m
P1227.005.400	400mm	PE100 BLU ADVST PN20	12m
P1227.005.450	450mm	PE100 BLU ADVST PN20	12m
P1227.005.500	500mm	PE100 BLU ADVST PN20	12m
P1227.005.560	560mm	PE100 BLU ADVST PN20	12m
P1227.005.630	630mm	PE100 BLU ADVST PN20	12m
P1227.005.710	710mm	PE100 BLU ADVST PN20	12m
P1227.005.800	800mm	PE100 BLU ADVST PN20	12m

Other lengths available upon request, subject to manufacturing volumes.

ADVANTAGE STRIPE PURPLE

Metric PE100 pipe designed and manufactured to AS/NZS 4130 for recycled water applications.

PE100 STRIPE PURPLE – PN 12.5

CODE	SIZE	DESCRIPTION	LENGTH
P1265.007.025	25mm	PE100 PUR ADVST PN12.5	25m
P1265.008.025	25mm	PE100 PUR ADVST PN12.5	50m
P1265.011.025	25mm	PE100 PUR ADVST PN12.5	200m
P1265.011.032	32mm	PE100 PUR ADVST PN12.5	200m
P1265.010.040	40mm	PE100 PUR ADVST PN12.5	150m
P1265.008.050	50mm	PE100 PUR ADVST PN12.5	50m
P1265.010.050	50mm	PE100 PUR ADVST PN12.5	150m
P1265.009.063	63mm	PE100 PUR ADVST PN12.5	100m
P1265.009.075	75mm	PE100 PUR ADVST PN12.5	100m
P1265.009.090	90mm	PE100 PUR ADVST PN12.5	100m
P1265.005.090	90mm	PE100 PUR ADVST PN12.5	12m
P1265.009.110	110mm	PE100 PUR ADVST PN12.5	100m
P1265009.125	125mm	PE100 PUR ADVST PN12.5	100m
P1265.005.125	125mm	PE100 PUR ADVST PN12.5	12m
P1265.008.140	140mm	PE100 PUR ADVST PN12.5	50m
P1265.005.140	140mm	PE100 PUR ADVST PN12.5	12m
P1265.005.160	160mm	PE100 PUR ADVST PN12.5	12m
P1265.005.180	180mm	PE100 PUR ADVST PN12.5	12m
P1265.005.200	200mm	PE100 PUR ADVST PN12.5	12m
P1265.005.225	225mm	PE100 PUR ADVST PN12.5	12m
P1265.005.250	250mm	PE100 PUR ADVST PN12.5	12m
P1265.005.280	280mm	PE100 PUR ADVST PN12.5	12m
P1265.005.315	315mm	PE100 PUR ADVST PN12.5	12m
P1265.005.355	355mm	PE100 PUR ADVST PN12.5	12m
P1265.005.400	400mm	PE100 PUR ADVST PN12.5	12m
P1265.005.450	450mm	PE100 PUR ADVST PN12.5	12m
P1265.005.500	500mm	PE100 PUR ADVST PN12.5	12m
P1265.005.560	560mm	PE100 PUR ADVST PN12.5	12m
P1265.005.630	630mm	PE100 PUR ADVST PN12.5	12m
P1265.005.710	710mm	PE100 PUR ADVST PN12.5	12m
P1265.005.800	800mm	PE100 PUR ADVST PN12.5	12m

FEATURES

- Corrosion resistant
- Chemical resistant
- Smooth bore
- Abrasion resistant
- Weather resistant
- High flow rate
- Light weight for easy installation
- Flexible
- High impact strength
- Long life
- Trenchless construction

ADVANTAGE STRIPE PURPLE

Metric PE100 pipe designed and manufactured to AS/NZS 4130 for recycled water applications.

GENERAL APPLICATION

Advantage Stripe Purple is a solid walled pipe manufactured to AS/NZS 4130 for recycled water applications. The pipe features purple coloured stripes around the circumference to provide identification.

TECHNICAL DATA

Temperature Range: -30˚C to +60˚C

Jointing Methods: Butt welding, electrofusion, flanged joints, mechanical couplings, compression fittings

Approvals: SMKP25347, WMKA25347, WSAA 11/08

Standard: AS/NZS 4130

PE100 STRIPE PURPLE – PN 16

CODE	SIZE	DESCRIPTION	LENGTH
P1266.011.025	25mm	PE100 PUR ADVST PN16	200m
P1266.003.025	25mm	PE100 PUR ADVST PN16	6m
P1266.011.032	32mm	PE100 PUR ADVST PN16	200m
P1266.003.032	32mm	PE100 PUR ADVST PN16	6m
P1266.010.040	40mm	PE100 PUR ADVST PN16	150m
P1266.010.050	50mm	PE100 PUR ADVST PN16	150m
P1266.009.063	63mm	PE100 PUR ADVST PN16	100m
P1266.003.063	63mm	PE100 PUR ADVST PN16	6m
P1266.009.075	75mm	PE100 PUR ADVST PN16	100m
P1266.009.090	90mm	PE100 PUR ADVST PN16	100m
P1266.005.090	90mm	PE100 PUR ADVST PN16	12m
P1266.003.090	90mm	PE100 PUR ADVST PN16	6m
P1266.009.110	110mm	PE100 PUR ADVST PN16	100m
P1266.009.125	125mm	PE100 PUR ADVST PN16	100m
P1266.005.125	125mm	PE100 PUR ADVST PN16	12m
P1266.005.140	140mm	PE100 PUR ADVST PN16	12m
P1266.009.140	140mm	PE100 PUR ADVST PN16	100m
P1266.005.160	160mm	PE100 PUR ADVST PN16	12m
P1266.005.180	180mm	PE100 PUR ADVST PN16	12m
P1266.005.200	200mm	PE100 PUR ADVST PN16	12m
P1266.005.225	225mm	PE100 PUR ADVST PN16	12m
P1266.005.250	250mm	PE100 PUR ADVST PN16	12m
P1266.005.280	280mm	PE100 PUR ADVST PN16	12m
P1266.005.315	315mm	PE100 PUR ADVST PN16	12m
P1266.005.355	355mm	PE100 PUR ADVST PN16	12m
P1266.005.400	400mm	PE100 PUR ADVST PN16	12m
P1266.005.450	450mm	PE100 PUR ADVST PN16	12m
P1266.005.500	500mm	PE100 PUR ADVST PN16	12m
P1266.005.560	560mm	PE100 PUR ADVST PN16	12m
P1266.005.630	630mm	PE100 PUR ADVST PN16	12m
P1266.005.710	710mm	PE100 PUR ADVST PN16	12m
P1266.005.800	800mm	PE100 PUR ADVST PN16	12m

Other lengths available upon request, subject to manufacturing volumes.

ADVANTAGE STRIPE CREAM

Metric PE100 pipe designed and manufactured to AS/NZS 4130 for sewer rising main applications.

PE100 STRIPE CREAM – PN 12.5

CODE	SIZE	DESCRIPTION	LENGTH
P1295.005.110	110mm	PE100 CRM ADVST PN12.5	12m
P1295.005.125	125mm	PE100 CRM ADVST PN12.5	12m
P1295.005.140	140mm	PE100 CRM ADVST PN12.5	12m
P1295.005.160	160mm	PE100 CRM ADVST PN12.5	12m
P1295.005.180	180mm	PE100 CRM ADVST PN12.5	12m
P1295.005.200	200mm	PE100 CRM ADVST PN12.5	12m
P1295.005.225	225mm	PE100 CRM ADVST PN12.5	12m
P1295.005.250	250mm	PE100 CRM ADVST PN12.5	12m
P1295.005.280	280mm	PE100 CRM ADVST PN12.5	12m
P1295.005.315	315mm	PE100 CRM ADVST PN12.5	12m
P1295.005.355	355mm	PE100 CRM ADVST PN12.5	12m
P1295.005.400	400mm	PE100 CRM ADVST PN12.5	12m
P1295.005.450	450mm	PE100 CRM ADVST PN12.5	12m
P1295.005.500	500mm	PE100 CRM ADVST PN12.5	12m
P1295.005.560	560mm	PE100 CRM ADVST PN12.5	12m
P1295.005.630	630mm	PE100 CRM ADVST PN12.5	12m
P1295.005.710	710mm	PE100 CRM ADVST PN12.5	12m
P1295.005.800	800mm	PE100 CRM ADVST PN12.5	12m

PE100 STRIPE CREAM – PN 16

CODE	SIZE	DESCRIPTION	LENGTH
P1296.008.040	40mm	PE100 CRM ADVST PN16	50m
P1296.010.040	40mm	PE100 CRM ADVST PN16	150m
P1296.008.050	50mm	PE100 CRM ADVST PN16	50m
P1296.010.050	50mm	PE100 CRM ADVST PN16	150m
P1296.008.063	63mm	PE100 CRM ADVST PN16	50m
P1296.009.063	63mm	PE100 CRM ADVST PN16	100m
P1296.009.075	75mm	PE100 CRM ADVST PN16	100m
P1296.008.090	90mm	PE100 CRM ADVST PN16	50m
P1296.009.090	90mm	PE100 CRM ADVST PN16	100m
P1296.005.090	90mm	PE100 CRM ADVST PN16	12m
P1296.009.110	110mm	PE100 CRM ADVST PN16	100m
P1296.005.110	110mm	PE100 CRM ADVST PN16	12m
P1296.005.125	125mm	PE100 CRM ADVST PN16	12m
P1296.005.140	140mm	PE100 CRM ADVST PN16	12m
P1296.005.160	160mm	PE100 CRM ADVST PN16	12m
P1296.005.180	180mm	PE100 CRM ADVST PN16	12m
P1296.005.200	200mm	PE100 CRM ADVST PN16	12m
P1296.005.225	225mm	PE100 CRM ADVST PN16	12m
P1296.005.250	250mm	PE100 CRM ADVST PN16	12m
P1296.005.280	280mm	PE100 CRM ADVST PN16	12m
P1296.005.315	315mm	PE100 CRM ADVST PN16	12m
P1296.005.355	355mm	PE100 CRM ADVST PN16	12m
P1296.005.400	400mm	PE100 CRM ADVST PN16	12m
P1296.005.450	450mm	PE100 CRM ADVST PN16	12m
P1296.005.500	500mm	PE100 CRM ADVST PN16	12m
P1296.005.560	560mm	PE100 CRM ADVST PN16	12m
P1296.005.630	630mm	PE100 CRM ADVST PN16	12m
P1296.005.710	710mm	PE100 CRM ADVST PN16	12m
P1296.005.800	800mm	PE100 CRM ADVST PN16	12m

Other lengths available upon request, subject to manufacturing volumes.

FEATURES

- Corrosion resistant
- Chemical resistant
- Smooth bore
- Abrasion resistant
- Weather resistant
- High flow rate
- Light weight for easy installation
- Flexible
- High impact strength
- Long life
- Trenchless construction

GENERAL APPLICATION

Advantage Stripe Cream is a solid walled pipe manufactured to AS/NZS 4130 for sewer rising main applications. The pipe features cream coloured stripes around the circumference to provide identification .

TECHNICAL DATA

Temperature Range: -30˚C to +60˚C

Jointing Methods: Butt welding, electrofusion, flanged joints, mechanical couplings, compression fittings

Approvals: SMKP25347, WMKA25347, WSAA 11/08

Standard: AS/NZS 4130

ADVANTAGE STRIPE RED

Metric PE100 pipe designed and manufactured to AS/NZS 4130 for fire ring main applications.

FEATURES

- Corrosion resistant
- Chemical resistant
- Smooth bore
- Abrasion resistant
- Weather resistant
- High flow rate
- Light weight for easy installation
- Flexible
- High impact strength
- Long life
- Trenchless construction

GENERAL APPLICATION

Advantage Stripe Red is a solid walled pipe manufactured to AS/NZS 4130 for fire ring main applications. The pipe features red coloured stripes around the circumference to provide identification.

TECHNICAL DATA

Temperature Range: -30˚C to +60˚C

Jointing Methods: Butt welding, electrofusion, flanged joints, mechanical couplings, compression fittings

Approvals: SMKP25347, WMKA25347, WSAA 11/08

Standard: AS/NZS 4130

PE100 STRIPE RED – PN 16

CODE	SIZE	DESCRIPTION	LENGTH
P1236.005.090	90mm	PE100 RED ADVST PN16	12m
P1236.005.110	110mm	PE100 RED ADVST PN16	12m
P1236.005.125	125mm	PE100 RED ADVST PN16	12m
P1236.005.140	140mm	PE100 RED ADVST PN16	12m
P1236.005.160	160mm	PE100 RED ADVST PN16	12m
P1236.005.180	180mm	PE100 RED ADVST PN16	12m
P1236.005.200	200mm	PE100 RED ADVST PN16	12m
P1236.005.225	225mm	PE100 RED ADVST PN16	12m
P1236.005.250	250mm	PE100 RED ADVST PN16	12m
P1236.005.280	280mm	PE100 RED ADVST PN16	12m
P1236.005.315	315mm	PE100 RED ADVST PN16	12m
P1236.005.355	355mm	PE100 RED ADVST PN16	12m
P1236.005.400	400mm	PE100 RED ADVST PN16	12m
P1236.005.450	450mm	PE100 RED ADVST PN16	12m
P1236.005.500	500mm	PE100 RED ADVST PN16	12m
P1236.005.560	560mm	PE100 RED ADVST PN16	12m
P1236.005.630	630mm	PE100 RED ADVST PN16	12m
P1236.005.710	710mm	PE100 RED ADVST PN16	12m
P1236.005.800	800mm	PE100 RED ADVST PN16	12m

Other lengths available upon request, subject to manufacturing volumes.

ADVANTAGE SHEATH PURPLE

Metric PE100 pipe designed and manufactured to AS/NZS 4130 for recycled water applications.

PE100 SHEATH PURPLE – PN 8

CODE	SIZE	DESCRIPTION	LENGTH
P1763.008.032	32mm	PE100 PUR ADVSH PN8	50m
P1763.009.032	32mm	PE100 PUR ADVSH PN8	100m
P1763.011.032	32mm	PE100 PUR ADVSH PN8	200m
P1763.007.040	40mm	PE100 PUR ADVSH PN8	25m
P1763.007.050	50mm	PE100 PUR ADVSH PN8	25m

PE100 SHEATH PURPLE – PN 10

CODE	SIZE	DESCRIPTION	LENGTH
P1764.007.025	25mm	PE100 PUR ADVSH PN10	25m
P1764.008.025	25mm	PE100 PUR ADVSH PN10	50m
P1764.009.025	25mm	PE100 PUR ADVSH PN10	100m

PE100 SHEATH PURPLE – PN 12.5

CODE	SIZE	DESCRIPTION	LENGTH
P1765.007.025	25mm	PE100 PUR ADVSH PN12.5	25m
P1765.008.025	25mm	PE100 PUR ADVSH PN12.5	50m
P1765.009.025	25mm	PE100 PUR ADVSH PN12.5	100m
P1765.011.025	25mm	PE100 PUR ADVSH PN12.5	200m
P1765.011.032	32mm	PE100 PUR ADVSH PN12.5	200m
P1765.010.040	40mm	PE100 PUR ADVSH PN12.5	150m
P1765.008.050	50mm	PE100 PUR ADVSH PN12.5	50m
P1765.010.050	50mm	PE100 PUR ADVSH PN12.5	150m
P1765.009.063	63mm	PE100 PUR ADVSH PN12.5	100m
P1765.009.075	75mm	PE100 PUR ADVSH PN12.5	100m
P1765.009.090	90mm	PE100 PUR ADVSH PN12.5	100m
P1765.005.090	90mm	PE100 PUR ADVSH PN12.5	12m
P1765.009.110	110mm	PE100 PUR ADVSH PN12.5	100m
P1765.005.110	110mm	PE100 PUR ADVSH PN12.5	12m
P1765.005.125	125mm	PE100 PUR ADVSH PN12.5	12m
P1765.005.140	140mm	PE100 PUR ADVSH PN12.5	12m
P1765.005.160	160mm	PE100 PUR ADVSH PN12.5	12m
P1765.005.180	180mm	PE100 PUR ADVSH PN12.5	12m
P1765.005.200	200mm	PE100 PUR ADVSH PN12.5	12m
P1765.005.225	225mm	PE100 PUR ADVSH PN12.5	12m
P1765.005.250	250mm	PE100 PUR ADVSH PN12.5	12m
P1765.005.280	280mm	PE100 PUR ADVSH PN12.5	12m
P1765.005.315	315mm	PE100 PUR ADVSH PN12.5	12m
P1765.005.355	355mm	PE100 PUR ADVSH PN12.5	12m
P1765.005.400	400mm	PE100 PUR ADVSH PN12.5	12m
P1765.005.450	450mm	PE100 PUR ADVSH PN12.5	12m
P1765.005.500	500mm	PE100 PUR ADVSH PN12.5	12m
P1765.005.560	560mm	PE100 PUR ADVSH PN12.5	12m
P1765.005.630	630mm	PE100 PUR ADVSH PN12.5	12m
P1765.005.710	710mm	PE100 PUR ADVSH PN12.5	12m
P1765.005.800	800mm	PE100 PUR ADVSH PN12.5	12m

FEATURES

- Corrosion resistant
- Chemical resistant
- Smooth bore
- Abrasion resistant
- Weather resistant
- High flow rate
- Light weight for easy installation
- Flexible
- High impact strength
- Coextrusion
- Long life
- Trenchless construction

ADVANTAGE SHEATH PURPLE

Metric PE100 pipe designed and manufactured to AS/NZS 4130 for recycled water applications.

GENERAL APPLICATION

Advantage Sheath Purple is a coextruded pipe manufactured to AS/NZS 4130 for recycled water applications. The pipe features a purple coloured identification layer and is suitable for use in recycled water applications.

TECHNICAL DATA

Temperature Range: -30˚C to +60˚C

Jointing Methods: Butt welding, electrofusion, flanged joints, mechanical couplings, compression fittings

Approvals: SMKP25347, WMKA25347, WSAA 11/08

Standard: AS/NZS 4130

PE100 SHEATH PURPLE – PN 16

CODE	SIZE	DESCRIPTION	LENGTH
P1766.008.025	25mm	PE100 PUR ADVSH PN16	50m
P1766.011.025	25mm	PE100 PUR ADVSH PN16	200m
P1766.011.032	32mm	PE100 PUR ADVSH PN16	200m
P1766.008.040	40mm	PE100 PUR ADVSH PN16	50m
P1766.010.040	40mm	PE100 PUR ADVSH PN16	150m
P1766.008.050	50mm	PE100 PUR ADVSH PN16	50m
P1766.010.050	50mm	PE100 PUR ADVSH PN16	150m
P1766.008.063	63mm	PE100 PUR ADVSH PN16	50m
P1766.009.063	63mm	PE100 PUR ADVSH PN16	100m
P1766.009.075	75mm	PE100 PUR ADVSH PN16	100m
P1766.009.090	90mm	PE100 PUR ADVSH PN16	100m
P1766.009.110	110mm	PE100 PUR ADVSH PN16	100m
P1766.009.125	125mm	PE100 PUR ADVSH PN16	100m
P1766.005.125	125mm	PE100 PUR ADVSH PN16	12m
P1766.005.140	140mm	PE100 PUR ADVSH PN16	12m
P1766.009.140	140mm	PE100 PUR ADVSH PN16	100m
P1766.005.160	160mm	PE100 PUR ADVSH PN16	12m
P1766.005.180	180mm	PE100 PUR ADVSH PN16	12m
P1766.005.200	200mm	PE100 PUR ADVSH PN16	12m
P1766.005.225	225mm	PE100 PUR ADVSH PN16	12m
P1766.005.250	250mm	PE100 PUR ADVSH PN16	12m
P1766.005.280	280mm	PE100 PUR ADVSH PN16	12m
P1766.005.315	315mm	PE100 PUR ADVSH PN16	12m
P1766.005.355	355mm	PE100 PUR ADVSH PN16	12m
P1766.005.400	400mm	PE100 PUR ADVSH PN16	12m
P1766.005.450	450mm	PE100 PUR ADVSH PN16	12m
P1766.005.500	500mm	PE100 PUR ADVSH PN16	12m
P1766.005.560	560mm	PE100 PUR ADVSH PN16	12m
P1766.005.630	630mm	PE100 PUR ADVSH PN16	12m
P1766.005.710	710mm	PE100 PUR ADVSH PN16	12m
P1766.005.800	800mm	PE100 PUR ADVSH PN16	12m

Other lengths available upon request, subject to manufacturing volumes.

ADVANTAGE SHEATH WHITE

Metric PE100 pipe designed and manufactured to AS/NZS 4130 for mining applications.

PE100 SHEATH WHITE – PN 4

CODE	SIZE	DESCRIPTION	LENGTH
P1771.005.160	160mm	PE100 WHI ADVSH PN4	12m
P1771.005.180	180mm	PE100 WHI ADVSH PN4	12m
P1771.005.200	200mm	PE100 WHI ADVSH PN4	12m
P1771.005.225	225mm	PE100 WHI ADVSH PN4	12m
P1771.005.250	250mm	PE100 WHI ADVSH PN4	12m
P1771.005.280	280mm	PE100 WHI ADVSH PN4	12m
P1771.005.315	315mm	PE100 WHI ADVSH PN4	12m
P1771.005.355	355mm	PE100 WHI ADVSH PN4	12m
P1771.005.400	400mm	PE100 WHI ADVSH PN4	12m
P1771.005.450	450mm	PE100 WHI ADVSH PN4	12m
P1771.005.500	500mm	PE100 WHI ADVSH PN4	12m
P1771.005.560	560mm	PE100 WHI ADVSH PN4	12m
P1771.005.630	630mm	PE100 WHI ADVSH PN4	12m
P1771.005.710	710mm	PE100 WHI ADVSH PN4	12m
P1771.005.800	800mm	PE100 WHI ADVSH PN4	12m

PE100 SHEATH WHITE – PN 6.3

CODE	SIZE	DESCRIPTION	LENGTH
P1772.005.160	160mm	PE100 WHI ADVSH PN6.3	12m
P1772.005.180	180mm	PE100 WHI ADVSH PN6.3	12m
P1772.005.200	200mm	PE100 WHI ADVSH PN6.3	12m
P1772.005.225	225mm	PE100 WHI ADVSH PN6.3	12m
P1772.005.250	250mm	PE100 WHI ADVSH PN6.3	12m
P1772.005.280	280mm	PE100 WHI ADVSH PN6.3	12m
P1772.005.315	315mm	PE100 WHI ADVSH PN6.3	12m
P1772.005.355	355mm	PE100 WHI ADVSH PN6.3	12m
P1772.005.400	400mm	PE100 WHI ADVSH PN6.3	12m
P1772.005.450	450mm	PE100 WHI ADVSH PN6.3	12m
P1772.005.500	500mm	PE100 WHI ADVSH PN6.3	12m
P1772.005.560	560mm	PE100 WHI ADVSH PN6.3	12m
P1772.005.630	630mm	PE100 WHI ADVSH PN6.3	12m
P1772.005.710	710mm	PE100 WHI ADVSH PN6.3	12m
P1772.005.800	800mm	PE100 WHI ADVSH PN6.3	12m

FEATURES

- Corrosion resistant
- Chemical resistant
- Smooth bore
- Abrasion resistant
- Weather resistant
- High flow rate
- Light weight for easy installation
- Flexible
- High impact strength
- Coextrusion
- Long life
- Trenchless construction

ADVANTAGE SHEATH WHITE

Metric PE100 pipe designed and manufactured to AS/NZS 4130 for mining applications.

GENERAL APPLICATION

Advantage Sheath White is a coextruded pipe manufactured to AS/NZS 4130 for mining applications. The pipe features a white coloured identification layer which reduces temperature rise when exposed to sunlight. This white product is formulated for improved UV resistance compared with AS/NZS 4130 requirements for coloured sheaths which are based on short-term exposure.

TECHNICAL DATA

Temperature Range: -30˚C to +60˚C

Jointing Methods: Butt welding, electrofusion, flanged joints, mechanical couplings, compression fittings

Approvals: SMKP25347, WMKA25347, WSAA 11/08

Standard: AS/NZS 4130

PE100 SHEATH WHITE – PN 8

CODE	SIZE	DESCRIPTION	LENGTH
P1773.005.090	90mm	PE100 WHI ADVSH PN8	12m
P1773.005.110	110mm	PE100 WHI ADVSH PN8	12m
P1773.005.125	125mm	PE100 WHI ADVSH PN8	12m
P1773.005.140	140mm	PE100 WHI ADVSH PN8	12m
P1773.005.160	160mm	PE100 WHI ADVSH PN8	12m
P1773.005.180	180mm	PE100 WHI ADVSH PN8	12m
P1773.005.200	200mm	PE100 WHI ADVSH PN8	12m
P1773.005.225	225mm	PE100 WHI ADVSH PN8	12m
P1773.005.250	250mm	PE100 WHI ADVSH PN8	12m
P1773.005.280	280mm	PE100 WHI ADVSH PN8	12m
P1773.005.315	315mm	PE100 WHI ADVSH PN8	12m
P1773.005.355	355mm	PE100 WHI ADVSH PN8	12m
P1773.005.400	400mm	PE100 WHI ADVSH PN8	12m
P1773.005.450	450mm	PE100 WHI ADVSH PN8	12m
P1773.005.500	500mm	PE100 WHI ADVSH PN8	12m
P1773.005.560	560mm	PE100 WHI ADVSH PN8	12m
P1773.005.630	630mm	PE100 WHI ADVSH PN8	12m
P1773.005.710	710mm	PE100 WHI ADVSH PN8	12m
P1773.005.800	800mm	PE100 WHI ADVSH PN8	12m

PE100 SHEATH WHITE – PN 10

CODE	SIZE	DESCRIPTION	LENGTH
P1774.005.090	90mm	PE100 WHI ADVSH PN10	12m
P1774.005.110	110mm	PE100 WHI ADVSH PN10	12m
P1774.005.125	125mm	PE100 WHI ADVSH PN10	12m
P1774.005.140	140mm	PE100 WHI ADVSH PN10	12m
P1774.005.160	160mm	PE100 WHI ADVSH PN10	12m
P1774.005.180	180mm	PE100 WHI ADVSH PN10	12m
P1774.005.200	200mm	PE100 WHI ADVSH PN10	12m
P1774.005.225	225mm	PE100 WHI ADVSH PN10	12m
P1774.005.250	250mm	PE100 WHI ADVSH PN10	12m
P1774.005.280	280mm	PE100 WHI ADVSH PN10	12m
P1774.005.315	315mm	PE100 WHI ADVSH PN10	12m
P1774.005.355	355mm	PE100 WHI ADVSH PN10	12m
P1774.005.400	400mm	PE100 WHI ADVSH PN10	12m
P1774.005.450	450mm	PE100 WHI ADVSH PN10	12m
P1774.005.500	500mm	PE100 WHI ADVSH PN10	12m
P1774.005.560	560mm	PE100 WHI ADVSH PN10	12m
P1774.005.630	630mm	PE100 WHI ADVSH PN10	12m
P1774.005.710	710mm	PE100 WHI ADVSH PN10	12m
P1774.005.800	800mm	PE100 WHI ADVSH PN10	12m

Other lengths available upon request, subject to manufacturing volumes.

ADVANTAGE SHEATH WHITE

Metric PE100 pipe designed and manufactured to AS/NZS 4130 for mining applications.

PE100 SHEATH WHITE – PN 12.5

CODE	SIZE	DESCRIPTION	LENGTH
P1775.005.090	90mm	PE100 WHI ADVSH PN12.5	12m
P1775.005.110	110mm	PE100 WHI ADVSH PN12.5	12m
P1775.005.125	125mm	PE100 WHI ADVSH PN12.5	12m
P1775.005.140	140mm	PE100 WHI ADVSH PN12.5	12m
P1775.005.160	160mm	PE100 WHI ADVSH PN12.5	12m
P1775.005.180	180mm	PE100 WHI ADVSH PN12.5	12m
P1775.005.200	200mm	PE100 WHI ADVSH PN12.5	12m
P1775.005.225	225mm	PE100 WHI ADVSH PN12.5	12m
P1775.005.250	250mm	PE100 WHI ADVSH PN12.5	12m
P1775.005.280	280mm	PE100 WHI ADVSH PN12.5	12m
P1775.005.315	315mm	PE100 WHI ADVSH PN12.5	12m
P1775.005.355	355mm	PE100 WHI ADVSH PN12.5	12m
P1775.005.400	400mm	PE100 WHI ADVSH PN12.5	12m
P1775.005.450	450mm	PE100 WHI ADVSH PN12.5	12m
P1775.005.500	500mm	PE100 WHI ADVSH PN12.5	12m
P1775.005.560	560mm	PE100 WHI ADVSH PN12.5	12m
P1775.005.630	630mm	PE100 WHI ADVSH PN12.5	12m
P1775.005.710	710mm	PE100 WHI ADVSH PN12.5	12m
P1775.005.800	800mm	PE100 WHI ADVSH PN12.5	12m

PE100 SHEATH WHITE – PN 16

CODE	SIZE	DESCRIPTION	LENGTH
P1776.005.090	90mm	PE100 WHI ADVSH PN16	12m
P1776.005.110	110mm	PE100 WHI ADVSH PN16	12m
P1776.005.125	125mm	PE100 WHI ADVSH PN16	12m
P1776.005.140	140mm	PE100 WHI ADVSH PN16	12m
P1776.005.160	160mm	PE100 WHI ADVSH PN16	12m
P1776.005.180	180mm	PE100 WHI ADVSH PN16	12m
P1776.005.200	200mm	PE100 WHI ADVSH PN16	12m
P1776.005.225	225mm	PE100 WHI ADVSH PN16	12m
P1776.005.250	250mm	PE100 WHI ADVSH PN16	12m
P1776.005.280	280mm	PE100 WHI ADVSH PN16	12m
P1776.005.315	315mm	PE100 WHI ADVSH PN16	12m
P1776.005.355	355mm	PE100 WHI ADVSH PN16	12m
P1776.005.400	400mm	PE100 WHI ADVSH PN16	12m
P1776.005.450	450mm	PE100 WHI ADVSH PN16	12m
P1776.005.500	500mm	PE100 WHI ADVSH PN16	12m
P1776.005.560	560mm	PE100 WHI ADVSH PN16	12m
P1776.005.630	630mm	PE100 WHI ADVSH PN16	12m
P1776.005.710	710mm	PE100 WHI ADVSH PN16	12m
P1776.005.800	800mm	PE100 WHI ADVSH PN16	12m

FEATURES

- Corrosion resistant
- Chemical resistant
- Smooth bore
- Abrasion resistant
- Weather resistant
- High flow rate
- Light weight for easy installation
- Flexible
- High impact strength
- Coextrusion
- Long life
- Trenchless construction

ADVANTAGE SHEATH WHITE

Metric PE100 pipe designed and manufactured to AS/NZS 4130 for mining applications.

GENERAL APPLICATION

Advantage Sheath White is a coextruded pipe manufactured to AS/NZS 4130 for mining applications. The pipe features a white coloured identification layer which reduces temperature rise when exposed to sunlight. This white product is formulated for improved UV resistance compared with AS/NZS 4130 requirements for coloured sheaths which are based on short-term exposure.

TECHNICAL DATA

Temperature Range: -30˚C to +60˚C

Jointing Methods: Butt welding, electrofusion, flanged joints, mechanical couplings, compression fittings

Approvals: SMKP25347, WMKA25347, WSAA 11/08

Standard: AS/NZS 4130

PE100 SHEATH WHITE – PN 20

CODE	SIZE	DESCRIPTION	LENGTH
P1777.005.160	160mm	PE100 WHI ADVSH PN20	12m
P1777.005.180	180mm	PE100 WHI ADVSH PN20	12m
P1777.005.200	200mm	PE100 WHI ADVSH PN20	12m
P1777.005.225	225mm	PE100 WHI ADVSH PN20	12m
P1777.005.250	250mm	PE100 WHI ADVSH PN20	12m
P1777.005.280	280mm	PE100 WHI ADVSH PN20	12m
P1777.005.315	315mm	PE100 WHI ADVSH PN20	12m
P1777.005.355	355mm	PE100 WHI ADVSH PN20	12m
P1777.005.400	400mm	PE100 WHI ADVSH PN20	12m
P1777.005.450	450mm	PE100 WHI ADVSH PN20	12m
P1777.005.500	500mm	PE100 WHI ADVSH PN20	12m
P1777.005.560	560mm	PE100 WHI ADVSH PN20	12m
P1777.005.630	630mm	PE100 WHI ADVSH PN20	12m
P1777.005.710	710mm	PE100 WHI ADVSH PN20	12m
P1777.005.800	800mm	PE100 WHI ADVSH PN20	12m

Other lengths available upon request, subject to manufacturing volumes.

ADVANTAGE NUSEWER

Metric PE100 pipe designed and manufactured to AS/NZS 4130 for gravity sewer applications.

PE100 NUSEWER – PN 8

CODE	SIZE	DESCRIPTION	LENGTH
P12Z3.005.110	110mm	PE100 ADVNUSEWER PN8	12m
P12Z3.003.110	110mm	PE100 ADVNUSEWER PN8	6m
P12Z3.005.160	160mm	PE100 ADVNUSEWER PN8	12m
P12Z3.003.160	160mm	PE100 ADVNUSEWER PN8	6m
P12Z3.005.250	250mm	PE100 ADVNUSEWER PN8	12m
P12Z3.005.315	315mm	PE100 ADVNUSEWER PN8	12m

PE100 NUSEWER – PN 10

CODE	SIZE	DESCRIPTION	LENGTH
P12Z4.005.110	110mm	PE100 ADVNUSEWER PN10	12m
P12Z4.003.110	110mm	PE100 ADVNUSEWER PN10	6m
P12Z4.005.160	160mm	PE100 ADVNUSEWER PN10	12m
P12Z4.003.160	160mm	PE100 ADVNUSEWER PN10	6m
P12Z4.005.250	250mm	PE100 ADVNUSEWER PN10	12m
P12Z4.005.315	315mm	PE100 ADVNUSEWER PN10	12m

PE100 NUSEWER – PN 12.5

CODE	SIZE	DESCRIPTION	LENGTH
P12Z5.005.110	110mm	PE100 ADVNUSEWER PN12.5	12m
P12Z5.003.110	110mm	PE100 ADVNUSEWER PN12.5	6m
P12Z5.005.160	160mm	PE100 ADVNUSEWER PN12.5	12m
P12Z5.003.160	160mm	PE100 ADVNUSEWER PN12.5	6m
P12Z5.005.250	250mm	PE100 ADVNUSEWER PN12.5	12m
P12Z5.005.315	315mm	PE100 ADVNUSEWER PN12.5	12m
P12Z5.005.500	500mm	PE100 ADVNUSEWER PN12.5	12m

PE100 NUSEWER – PN 16

CODE	SIZE	DESCRIPTION	LENGTH
P12Z6.005.110	110mm	PE100 ADVNUSEWER PN16	12m
P12Z6.003.110	110mm	PE100 ADVNUSEWER PN16	6m
P12Z6.005.160	160mm	PE100 ADVNUSEWER PN16	12m
P12Z6.003.160	160mm	PE100 ADVNUSEWER PN16	6m
P12Z6.005.250	250mm	PE100 ADVNUSEWER PN16	12m
P12Z6.005.315	315mm	PE100 ADVNUSEWER PN16	12m

Other lengths available upon request, subject to manufacturing volumes.

FEATURES

- Corrosion resistant
- Chemical resistant
- Smooth bore
- Abrasion resistant
- Weather resistant
- High flow rate
- Light weight for easy installation
- Flexible
- High impact strength
- Long life
- Trenchless construction
- No joint infiltration
- No root penetration
- Low residual slime growth
- Light bore for easy inspection

GENERAL APPLICATION

Advantage NUSEWER is a coxetruded pipe manufactured to AS/NZS 4130 for sewer applications complete with grey coloured stripes around the circumference to provide identification. NUSEWER also features a non-light scattering bore to provide superior clarity for inspection purposes.

TECHNICAL DATA

Temperature Range: -30˚C to +60˚C

Jointing Methods: Butt welding, electrofusion, flanged joints, mechanical couplings, compression fittings

Approvals: SMKP25347, WMKA25347, WSAA 11/08

Standard: AS/NZS 4130

ADVANTAGE10 BLUE

Metric PE100 pipe designed and manufactured to AS/NZS 4130 featuring a damage depth indicator for miscellaneous applications.

FEATURES

- Corrosion resistant
- Chemical resistant
- Smooth bore
- Abrasion resistant
- Weather resistant
- High flow rate
- Lightweight for easy installation
- Flexible
- High impact strength
- Coextrusion
- Long life
- Trenchless construction
- Damage depth indicator

GENERAL APPLICATION

Advantage10 is a coextruded pipe made for pressure applications featuring a coloured identification layer with a 10% damage depth indicator.

TECHNICAL DATA

Temperature Range: -30˚C to +60˚C

Jointing Methods: Butt welding, electrofusion, flanged joints, mechanical couplings, compression fittings

Approvals: SMKP25347, WMKA25347, WSAA 11/08

Standard: AS/NZS 4130

PE100 ADVANTAGE10 BLUE – PN12.5

CODE	SIZE	DESCRIPTION	LENGTH
P1525.005.160	160 mm	PE100 BLU ADV10 PN12.5	12m
P1525.005.180	180 mm	PE100 BLU ADV10 PN12.5	12m
P1525.005.200	200 mm	PE100 BLU ADV10 PN12.5	12m
P1525.005.225	225 mm	PE100 BLU ADV10 PN12.5	12m
P1525.005.250	250 mm	PE100 BLU ADV10 PN12.5	12m
P1525.005.280	280 mm	PE100 BLU ADV10 PN12.5	12m
P1525.005.315	315 mm	PE100 BLU ADV10 PN12.5	12m
P1525.005.355	355 mm	PE100 BLU ADV10 PN12.5	12m
P1525.005.400	400 mm	PE100 BLU ADV10 PN12.5	12m
P1525.005.450	450 mm	PE100 BLU ADV10 PN12.5	12m
P1525.005.500	500 mm	PE100 BLU ADV10 PN12.5	12m
P1525.005.560	560 mm	PE100 BLU ADV10 PN12.5	12m
P1525.005.630	630 mm	PE100 BLU ADV10 PN12.5	12m
P1525.005.710	710 mm	PE100 BLU ADV10 PN12.5	12m
P1525.005.800	800 mm	PE100 BLU ADV10 PN12.5	12m

PE100 ADVANTAGE10 BLUE – PN16

CODE	SIZE	DESCRIPTION	LENGTH
P1526.005.160	160 mm	PE100 BLU ADV10 PN16	12m
P1526.005.180	180 mm	PE100 BLU ADV10 PN16	12m
P1526.005.200	200 mm	PE100 BLU ADV10 PN16	12m
P1526.005.225	225 mm	PE100 BLU ADV10 PN16	12m
P1526.005.250	250 mm	PE100 BLU ADV10 PN16	12m
P1526.005.280	280 mm	PE100 BLU ADV10 PN16	12m
P1526.005.315	315 mm	PE100 BLU ADV10 PN16	12m
P1526.005.355	355 mm	PE100 BLU ADV10 PN16	12m
P1526.005.400	400 mm	PE100 BLU ADV10 PN16	12m
P1526.005.450	450 mm	PE100 BLU ADV10 PN16	12m
P1526.005.500	500 mm	PE100 BLU ADV10 PN16	12m
P1526.005.560	560 mm	PE100 BLU ADV10 PN16	12m
P1526.005.630	630 mm	PE100 BLU ADV10 PN16	12m
P1526.005.710	710 mm	PE100 BLU ADV10 PN16	12m
P1526.005.800	800 mm	PE100 BLU ADV10 PN16	12m

Other lengths available upon request, subject to manufacturing volumes.

RURAL STRIPE GREEN

PE pipe designed and manufactured for rural applications.

RURAL STRIPE GREEN			
CODE	SIZE	DESCRIPTION	LENGTH
P1RG2.011.84	3/4"	RURAL GREEN STRIPE	200m
P1RG2.011.85	1"	RURAL GREEN STRIPE	200m
P1RG2.010.86	1.1/4"	RURAL GREEN STRIPE	150m
P1RG2.010.87	1.1/2"	RURAL GREEN STRIPE	150m
P1RG2.012.87	1.1/2"	RURAL GREEN STRIPE	300m
P1RG2.009.88	2"	RURAL GREEN STRIPE	100m
P1RG2.011.88	2"	RURAL GREEN STRIPE	200m

Other lengths available upon request, subject to manufacturing volumes.

FEATURES

- Corrosion resistant
- Chemical resistant
- Smooth bore
- Abrasion resistant
- Weather resistant
- High flow rate
- Light weight for easy installation
- Flexible
- High impact strength
- Trenchless construction
- Long life

GENERAL APPLICATION

Rural Stripe Green is solid walled pipe manufactured for rural applications complete with green coloured stripes around the circumference to provide identification.

TECHNICAL DATA

Jointing Method:
Rural compression fittings

Pressure Rating:
PN 6.3/630kPa at 20˚C

DRAINCOIL

PE pipe designed and manufactured to AS 2439.1 for subsoil drainage applications.

FEATURES

- Corrosion resistant
- Weather resistant
- Environmentally friendly
- Light weight for easy installation
- Flexible
- Strong corrugated profile
- Uniform drainage of the soil

GENERAL APPLICATION

Draincoil is a polyethylene subsoil drainage system manufactured to AS 2439.1 for drainage applications. The corrugated profile and uniform pattern of inlets provide even and efficient drainage along the length of the pipe.

TECHNICAL DATA

Jointing Method:
Draincoil fittings

Classification System:
SN4 = Class 200
– Surface land drainage. Pipe is manufactured from HDPE.
SN8 = Class 400
– Ideal for road, civil engineering and agricultural drainage applications. Pipe is manufactured from HDPE.
SN20 = Class 1000
– Works that are subject to heavy vehicle traffic. Pipe is manufactured from PVC.

Standard: AS 2439.1

DRAINCOIL – UNSLOTTED

CODE	SIZE	DESCRIPTION	LENGTH
PDU13.020.100	100mm	DRAINCOIL UNSLOTTED BLK SN8	20m
PDU13.009.100	100mm	DRAINCOIL UNSLOTTED BLK SN8	100m
PDU11.020.160	160mm	DRAINCOIL UNSLOTTED BLK SN4	20m
PDU11.021.160	160mm	DRAINCOIL UNSLOTTED BLK SN4	60m

DRAINCOIL – SLOTTED

CODE	SIZE	DESCRIPTION	LENGTH
PDV13.020.100	100mm	DRAINCOIL SLOTTED BLK SN8	20m
PDV13.008.100	100mm	DRAINCOIL SLOTTED BLK SN8	50m
PDV13.009.100	100mm	DRAINCOIL SLOTTED BLK SN8	100m
PDV17.009.100	100mm	DRAINCOIL SLOTTED BLK SN20	100m
PDV11.020.160	160mm	DRAINCOIL SLOTTED BLK SN4	20m
PDV11.021.160	160mm	DRAINCOIL SLOTTED BLK SN4	60m

DRAINCOIL – F-SOCK

CODE	SIZE	DESCRIPTION	LENGTH
PDX13.020.100	100mm	DRAINCOIL STD F-SOCK BLK SN8	20m
PDW13.020.100	100mm	DRAINCOIL RTA F-SOCK BLK SN8	20m
PDX13.009.100	100mm	DRAINCOIL STD F-SOCK BLK SN8	100m
PDW13.009.100	100mm	DRAINCOIL RTA F-SOCK BLK SN8	100m
PDW17.009.100	100mm	DRAINCOIL RTA F-SOCK BLK SN20	100m
PDW11.020.160	160mm	DRAINCOIL RTA F-SOCK BLK SN4	20m
PDW11.021.160	160mm	DRAINCOIL RTA F-SOCK BLK SN4	60m

Other lengths available upon request, subject to manufacturing volumes.

tyco Water

Tyco Water Pty Ltd
ABN 75 087 415 745
125-175 Patullos Lane,
Somerton VIC 3062, Australia
Tel: +61 3 9217 3188
Freecall within Australia: 1800 811 848
Fax: +61 3 9305 4380
Email: twpps@tycowater.com
Web: www.tycowater.com

TYCO WATER
CUSTOMER CENTRES
Adelaide
Tel: 08 8340 3411
Fax: 08 8340 3422
Email: cca@tycowater.com

Brisbane
Tel: 07 3266 2255
Fax: 07 3260 5221
Email: ccb@tycowater.com

Gold Coast
Tel: 07 5589 4400
Fax: 07 5534 7079
Email: ccg@tycowater.com

Melbourne
Tel: 03 9309 9133
Fax: 03 9309 6237
Email: ccm@tycowater.com

Newcastle
Tel: 02 4914 0700
Fax: 02 4966 8776
Email: ccn@tycowater.com

Perth
Tel: 08 9346 8500
Fax: 08 9346 8501
Email: ccp@tycowater.com

Sydney
Tel: 02 9612 2400
Fax: 02 9612 2499
Email: ccs@tycowater.com

Townsville
Tel: 07 4725 5940
Fax: 07 4725 4995
Email: cct@tycowater.com

APP1201PGX

ISO 9001
International Standards Certifications

ISO 9001:2008

CERTIFICATE OF REGISTRATION

THIS IS TO CERTIFY THAT THE
QUALITY MANAGEMENT SYSTEM OF

Pentair Water Solutions Pty Ltd - Currumbin

63 Currumbin Creek Road
Currumbin
QLD 4223
AUSTRALIA

Has been assessed and registered as complying with the requirements of the International Standard shown above for the following Goods and Services. Further clarifications regarding the scope of this certificate and the applicability of ISO 9001:2008 requirements may be obtained by consulting the organisation.

Design, Development, Manufacture and Supply of:

- **Polymetric Coated, Cement Lined and Unlined Ductile Iron Fittings,**
- **Valves and Flanged Pipe for use in the Water and Sewerage Reticulation Systems,**
- **Machined and Unmachined Custom Castings for Industrial Engineering Applications.**

Previously Certified to ISO 9001:2000 on 2 Dec 2003.

MEMBER OF MULTILATERAL RECOGNITION ARRANGEMENT IAF

JAS-ANZ

www.jas-anz.org/register

Tony Wilde
Group Chairman
ISC Pty Ltd, A.B.N. 45 071 810 949

Registration Number:	QAC/R61/0412
Original Registration Date:	22/Jan/2010
Re-certification Date:	15/Nov/2012
Expiry Date:	15/Nov/2015

ISC Pty Ltd., Unit 2/10 Gladstone Road, Castle Hill NSW 2154, Sydney, Australia.

International Standards Certifications Pty. Ltd.

This certificate is valid until the Expiry Date on the condition that audits are conducted and paid for as per the Certification Agreement. Should this condition not be met, cancellation procedures will be initiated and the client will be removed from the JAS-ANZ register. This Certificate remains the property of International Standards Certifications Pty Ltd and must be returned upon request. It must not be altered in any way. Intentional misuse of this certificate will result in cancellation without prior notification.
Certificates can be checked through certcheck@isc-worldwide.com

CERTIFIED PRODUCT

International Standards Certifications

AS/NZS 2280:2004

CERTIFICATE OF REGISTRATION

AS/NZS 2280:2004

Pentair Water Solutions Pty Ltd - Currumbin

ABN: 75 087 415 745

Head Office
63 Currumbin Creek Road
Currumbin
QLD 4223
AUSTRALIA

Manufacturing Sites
1. Pentair Water Solutions Pty Ltd - Currumbin
63 Currumbin Creek Road
Currumbin QLD 4223 Australia

2. Shenyang Henyi Enterprises Co. Ltd
Floor 14, Huayang International Mansion, No. 386-3, Quingnian Street
Heping District, Shenyang City, Liaoning Province, P.R. China

3. Galumph (Suzhou) Group
No. 3 Feilong Road, Meiyan Town
Wujiang City, Suzhou, Jiangsu Province, P.R. China

This is to certify that the products listed below have been assessed and registered as complying with the requirements of the standard shown above.

Design, Development, Manufacture and Supply of Ductile Iron Pipes and Fittings

Refer to the Schedule for a detailed list of Products

JAS-ANZ

www.jas-anz.org/register

Tony Wilde
Group Chairman
ISC Pty Ltd, A.B.N. 45 071 810 949

Registration Number:	PRD/R61/0412
Original Registration Date:	31/Jul/2003
Re-Certification Date:	15/Nov/2012
Expiry Date:	31/Oct/2015
Amendment Date:	12/Dec/2012

ISC Pty Ltd., Unit 2/10 Gladstone Road, Castle Hill NSW 2154, Sydney, Australia.

International Standards Certifications Pty. Ltd.

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Certificates can be checked through certcheck@isc-worldwide.com

CERTIFIED PRODUCT

International Standards Certifications

AS/NZS 2638.1:2011
&
AS/NZS 2638.2:2011

CERTIFICATE OF REGISTRATION

AS/NZS 2638.1:2011
&
AS/NZS 2638.2:2011

Pentair Water Solutions Pty Ltd - Currumbin

ABN: 75 087 415 745

Head Office
63 Currumbin Creek Road
Currumbin
QLD 4223
AUSTRALIA

Manufacturing Sites
1. Pentair Water Solutions Pty Ltd - Currumbin
63 Currumbin Creek Road
Currumbin QLD 4223 Australia

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Wujiang City, Suzhou, Jiangsu Province, P.R. China

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Design, Development, Manufacture and Supply of Ductile Iron Pipes and Fittings

Refer to the Schedule for a detailed list of Products

JAS-ANZ

www.jas-anz.org/register

Tony Wilde
Group Chairman
ISC Pty Ltd, A.B.N. 45 071 810 949

Registration Number:	PRD/R61/0412
Original Registration Date:	31/Jul/2003
Re-Certification Date:	15/Nov/2012
Expiry Date:	31/Oct/2015
Amendment Date:	12/Dec/2012

ISC Pty Ltd., Unit 2/10 Gladstone Road, Castle Hill NSW 2154, Sydney, Australia.

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Certificates can be checked through certcheck@isc-worldwide.com

CERTIFIED PRODUCT

International Standards Certifications

AS 3952:2002

CERTIFICATE OF REGISTRATION

AS/NZS 3952:2002

Pentair Water Solutions Pty Ltd - Currumbin

ABN: 75 087 415 745

Head Office
63 Currumbin Creek Road
Currumbin
QLD 4223
AUSTRALIA

Manufacturing Sites
1. Pentair Water Solutions Pty Ltd - Currumbin
63 Currumbin Creek Road
Currumbin QLD 4223 Australia

2. Shenyang Henyi Enterprises Co. Ltd
Floor 14, Huayang International Mansion, No. 386-3, Quingnian Street
Heping District, Shenyang City, Liaoning Province, P.R. China

3. Galumph (Suzhou) Group
No. 3 Feilong Road, Meiyan Town
Wujiang City, Suzhou, Jiangsu Province, P.R. China

This is to certify that the products listed below have been assessed and registered as complying with the requirements of the standard shown above.

Design, Development, Manufacture and Supply of Water Supply - Spring Hydrant Valve for Waterworks Purpose.

Refer to the Schedule for a detailed list of Products

JAS-ANZ

www.jas-anz.org/register

Tony Wilde
Group Chairman
ISC Pty Ltd, A.B.N. 45 071 810 949

Registration Number:	PRD/R61/0412
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Certificates can be checked through certcheck@isc-worldwide.com

Data sheet DS/WM–EN Rev. L

WaterMaster
Electromagnetic flowmeter

The perfect fit for all water industry applications

One solution for all your needs
— designed for use in all water and waste water applications, from sewage plants to distribution networks

State-of-the-art memory technology
— revolutionary data storage enables transmitter interchange and commissioning without the need for re-configuration

Versatile and simple configuration
— 'Through-the-Glass' (TTG) configuration eliminating the need to remove the cover
— smart key based functionality
— 'Easy Setup' function

VeriMaster in situ verification software option
— enables the customer to perform in situ verification of the flowmeter system

Unparalleled service ability
— fault-finding Help texts on the display
— minimized downtime with replaceable electronics cartridges

MID and OIML R49 approved with R49 self-checking
— Type-approved to accuracy Class 1 and Class 2 for any pipe orientation and bidirectional flows
— Type P-approved continuous self-checking of the sensor and transmitter to ensure the highest accuracy and long term performance

Innovative sensors for all applications
— optimized full-bore series for optimum turndown / low pressure drop, irrigation applications
— full-bore series for general-purpose water metering applications
— buriable sensors eliminating the need for costly chamber construction

HART, PROFIBUS DP and MODBUS
— Access to all status information

WaterMaster
Electromagnetic flowmeter

The Company

ABB is an established world force in the design and manufacture of instrumentation for industrial process control, flow measurement, gas and liquid analysis and environmental applications.

As a world leader in process automation technology our worldwide presence, comprehensive service and application-oriented know-how make ABB a leading supplier of flow measurement products.

Introduction

Setting the standard for the Water Industry

The WaterMaster range, available in sizes 10 to 2400 mm ($^3/_8$ to 96 in.), is designed specifically for use on the many diverse applications encountered in the Water and Waste-water industry. The modular design concept offers flexibility, cost-saving operation and reliability while providing a long service life and exceptionally low maintenance.

Integration into ABB asset management systems and use of the self-monitoring and diagnostic functions increase the plant availability and reduce downtimes.

VeriMaster – the verification tool

An easy-to-use utility, available through the infra red service port, it uses the advanced self-calibration and diagnostic capability of WaterMaster, coupled with fingerprinting technology, to determine the accuracy status of the WaterMaster flowmeter to within ±1 % of its original factory calibration. VeriMaster also supports printing of calibration verification records for regulatory compliance.

Diagnostic functions

Using its diagnostic functions, the flowmeter monitors both its own operability and the process. Limit values for the diagnostic parameters can be set locally. When these limits are exceeded, an alarm is tripped. In the event of an error, diagnostic-dependent help text appears on the display and this considerably simplifies and accelerates the troubleshooting procedure.

In accordance with NAMUR NE107, alarms and warnings are classified with the status of 'Maintenance Required', 'Check Function', 'Failure' and 'Out of Specification'.

Flow performance

Utilizing its advanced filtering methods, the WaterMaster improves accuracy even under difficult conditions by separating the noise from the measuring signal. WaterMaster has an operating flow range with ±0.4 % accuracy as standard (±0.2 % optional) in both forward and reverse flow directions.

Easy and quick commissioning

'Fit-and-Flow' data storage inside WaterMaster eliminates the need to match sensor and transmitter in the field. On initial installation, the self-configuration sequence automatically replicates into the transmitter all calibration factors, meter size and serial numbers, as well as customer site-specific settings, eliminating the potential for error.

Intuitive, convenient navigation

The 'Easy Setup' function reliably guides unpracticed users through the menu step by step. The smart key based functionality makes handling a breeze – it's just like using a cell phone. During configuration, the permissible range of each parameter is indicated on the display and invalid entries are rejected.

Universal transmitter – powerful and flexible

The backlit display can be rotated easily without the need for tools. The contrast is adjustable and the display fully-configurable. The character size, number of lines and display resolution (number of decimal points) can be set as required. In multiplex mode, several different display options can be pre-configured and invoked one after the other.

The smart modular design of the transmitter unit enables easy disassembly without the need to unscrew cables or unplug connectors. HART is used as the standard communications protocol. Optionally, the transmitter is available with PROFIBUS DP or MODBUS communication.

Assured quality

WaterMaster is designed and manufactured in accordance with international quality procedures (ISO 9001) and all flowmeters are calibrated on nationally-traceable calibration rigs to provide the end-user with complete assurance of both quality and performance of the flowmeter.

WaterMaster
Electromagnetic flowmeter

WaterMaster – always the first choice

WaterMaster sets the standard for the water industry. The specification, features and user benefits offered by this range are based on ABB's worldwide experience in this industry and they are all targeted specifically to the industry's requirements.

Submersible and buriable

WaterMaster sensors have a rugged, robust construction to ensure a long, maintenance-free life under the arduous conditions experienced in the Water and Waste Industry. The sensors are, as standard, inherently submersible (IP68, NEMA 6P), thus ensuring suitability for installation in chambers and metering pits that are susceptible to flooding.

A unique feature of the WaterMaster sensors is that sizes DN40 to DN2400 ($1^1/_2$ to 96 in. NB) are buriable; installation simply involves excavating to the underground pipe, fitting the sensor, cabling back to the transmitter and then backfilling the hole.

The WaterMaster family

Overview of the WaterMaster

A wide range of features and user benefits are built into WaterMaster as standard:

- bi-directional flow
- OIML-type continuous self-checking, with alarms, ensures both sensor and transmitter accuracy
- true electrode and coil impedance measurement
- comprehensive simulation mode
- universal switch-mode power supply (options are available for AC and DC supplies)
- comprehensive self-diagnostics compliant with NAMUR NE107
- programmable multiple-alarm capability
- bus options: HART (4 to 20 mA), PROFIBUS DP (RS485), MODBUS (RS485)
- 3 configurable pulse / frequency and alarm outputs
- advanced infrared service port supports remote HMI, HART, cyclic data out and parameter download
- VeriMaster in situ verification software available as option
- read-only switch and ultra-secure service password for total security

WaterMaster
Electromagnetic flowmeter

OIML / MID approved

WaterMaster has been type tested and Internationally approved to the highest accuracy class 1 and 2 for cold and hot potable water meters – OIML R49-1 (Organisation Internationale de Métrologie Légale). For full details, OIML R49 is available to download from www.oiml.org. Its requirements are very similar to other International standards, such as EN14154 and ISO4064.

WaterMaster has been assessed by type approval at the National Measurement Office (NMO) to OIML R49 and passed to the very highest accuracy designations for sizes DN40 to DN200 (1½ to 8 in. NB).

The approval is for:

- Class 1 and Class 2 accuracy (calibration option)
- Environmental class T50 for water temperatures of 0.1 to 50 °C (32.18 to 122 °F)
- Electromagnetic Environment E2 (10 V/m)
- Any pipe orientation
- 5 Diameters upstream pipe
- 0 Diameters downstream pipe
- Pressure Loss Class <0.25 bar (3.62 psi)
- Integral or remote transmitter (<200 m [<656 ft.] cable)
- DN40 to DN200 (1½ to 8 in. NB), bi-directional flow

A major advance in WaterMaster is the self-checking capabilities that meet and exceed the R49 requirements and is the first electromagnetic flowmeter to be approved to OIML Type P permanent self checking during normal operation (not just at startup) and alarm indication for:

- transmitter and sensor status, with an accuracy alarm
- program ROM and RAM status
- double, independent storage of totalizer values, in both the sensor and transmitter non-volatile memories
- display test

The OIML R49-1 certificate of conformity is available from:

http://www.abb.com/product/seitp330/b42ec2377d3293cdc12573de003db93b.aspx

WaterMaster is also approved under the EU Measuring Instruments Directive (MID) 2004/22/EC, that covers putting into use water flowmeters for certain applications. MID WaterMaster is secured against tamping and is available as an option, along with fingerprinting for ABB VeriMaster in situ verification product, with certificate printout to ±1 % accuracy.

WaterMaster certificates of EC type-examination of a measuring instrument are available from:

http://www.abb.com/product/seitp330/b42ec2377d3293cdc12573de003db93b.aspx

Superior control through advanced sensor design

The innovative, patented octagonal sensor design improves flow profile and reduces up- and down-stream piping requirements for the most commonly used sizes of 40 to 200 mm (1½ to 8 in.). This optimized full bore meter provides very impressive results in the most difficult of installation requirements.

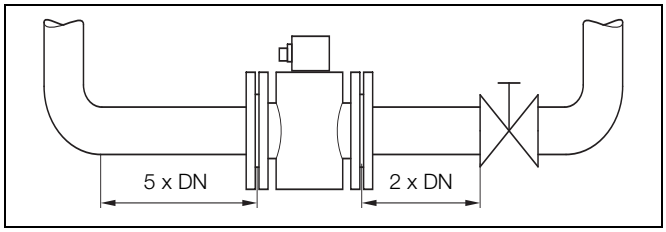
The content below is the extract from OIML R49 test requirements:

6.8 Flow disturbance tests (R 49-1, 5.3.4)

6.8.1 Object of tests

To verify that the meter complies with the requirements of 5.3.4 in R 49-1 for forward flow and where appropriate for reverse flow (see R 49-1, 3.2.5).

Note 1: The effects on the error (of indication) of a water meter of the presence of specified, common types of disturbed flow upstream and downstream of the meter are measured.



Recommended upstream / downstream conditions

Note 2: Types 1 and 2 disturbance devices are used in the tests to create left-handed (sinistrorsal) and right-handed (dextrorsal), rotational velocity fields (swirl), respectively. The flow disturbance is of a type usually found downstream of two 90° bends directly connected at right angles. A type 3 disturbance device creates an asymmetric velocity profile usually found downstream of a protruding pipe joint, single bend, or a gate valve not fully opened.

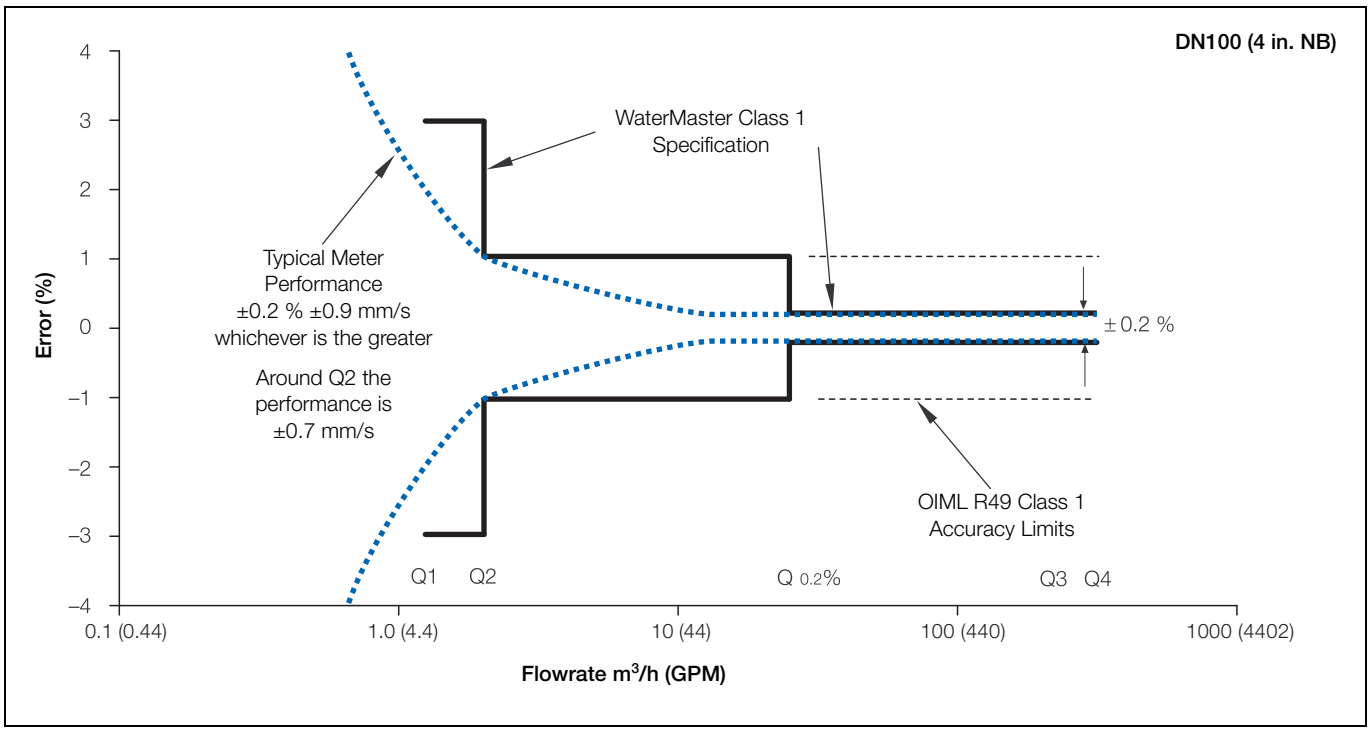
WaterMaster octagonal bore

The unique design of the reduced-bore sensor conditions the flow profile in the measuring section so that distortions in the flow profile, either upstream or downstream, are flattened. The result is excellent in situ flowmeter performance, even with very bad hydraulic installation conditions.

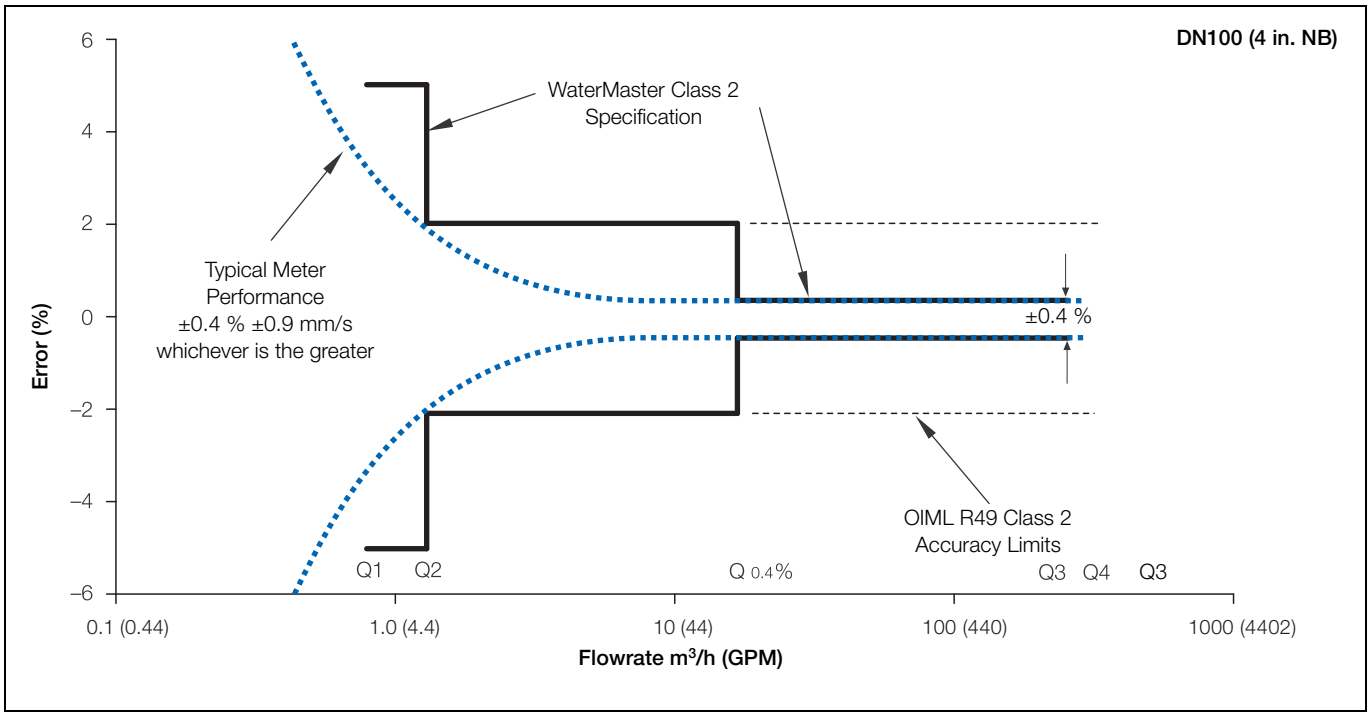
WaterMaster
Electromagnetic flowmeter

Specification

WaterMaster specification to OIML R49 Class 1



WaterMaster specification to OIML R49 Class 2



Although OIML R49 does not define the flow accuracy below Q1, WaterMaster continues to measure flow at lower flow rates down to a cutoff velocity of ±5 mm/s (±0.2 in./s). The accuracy between cutoff and Q1 is typically ±0.9 mm/s (±0.04. in./s).

WaterMaster
Electromagnetic flowmeter

WaterMaster optimized full-bore meter / full-bore meter flow performance (m^3/h)

			Standard Calibration 0.4 % Class 2			High Accuracy Calibration 0.2 % Class 1		
	Q4	Q3	$Q_{0.4\%}$	Q2	Q1	$Q_{0.2\%}$	Q2	Q1
DN	(m^3/h)	(m^3/h)	(m^3/h)	(m^3/h)	(m^3/h)	(m^3/h)	(m^3/h)	(m^3/h)
10	3.1	2.5	0.167	0.02	0.006	0.31	0.02	0.012
15	7.9	6.3	0.42	0.04	0.016	0.8	0.05	0.03
20	12.5	10	0.67	0.063	0.025	1.3	0.08	0.05
25	20	16	1.1	0.13	0.05	2	0.13	0.08
32	31.25	25	1.67	0.13	0.08	3	0.20	0.13
40*	50	40	4.2	0.25	0.1	6	0.32	0.2
50*	79	63	4.2	0.4	0.16	8	0.5	0.32
65*	125	100	6.7	0.63	0.25	13	0.8	0.5
80*	200	160	11	1	0.4	16	1.3	0.8
100*	313	250	17	1.6	0.63	25	2	1.3
125*	500	400	27	2.5	1	40	3.2	2
150*	788	630	42	4	1.6	63	5	3.2
200*	1,250	1,000	67	6.3	2.5	100	8	5
250	2,000	1,600	107	10	4	160	13	8
300	3,125	2,500	167	16	6.3	250	20	13
350	5,000	4,000	267	25	10	400	32	20
400	5,000	4,000	267	25	10	400	32	20
450	7,875	6,300	420	39	16	630	50	32
500	7,875	6,300	420	39	16	630	50	32
600	12,500	10,000	667	63	25	1000	80	50
700	20,000	16,000	1067	100	40	1600	160	100
750 / 760	20,000	16,000	1067	100	40	1600	160	100
800	20,000	16,000	1067	100	40	1600	160	100
900	31,250	25,000	1667	156	63	2500	250	156
1000	31,250	25,000	1667	156	63	2500	250	156
1050	31,250	25,000	1667	156	63	2500	250	156
1100	31,250	25,000	1667	156	63	2500	250	156
1200	50,000	40,000	2667	250	100	4000	400	250
1350	78,750	63,000	4200	394	158	6300	630	394
1400	78,750	63,000	4200	394	158	6300	630	394
1500	78,750	63,000	4200	394	158	6300	630	394
1600	78,750	63,000	4200	394	158	6300	630	394
1650	78,750	63,000	4200	394	158	6300	630	394
1800	125,000	100,000	6667	625	250	10000	1000	625
1950	125,000	100,000	6667	625	250	10000	1000	625
2000	125,000	100,000	6667	625	250	10000	1000	625
2100	125,000	100,000	6667	625	250	10000	1000	625
2200	200,000	160,000	16000	1600	640	16000	1600	1000
2400	200,000	160,000	16000	1600	640	16000	1600	1000

* OIML R49 Certificate of Conformance to Class 1 and Class 2, with OIML R49 and MID versions available.

Note. OIML R49–1 allow Class 1 for meters only with $Q_3 \geq 100$ m^3/h. Meters outside this range have been tested and conform to Class 1.

WaterMaster
Electromagnetic flowmeter

WaterMaster optimized full-bore meter / full-bore meter flow performance (GPM)

			Standard Calibration 0.4 % Class 2			High Accuracy Calibration 0.2 % Class 1		
	Q4	Q3	$Q_{0.4\%}$	Q2	Q1	$Q_{0.2\%}$	Q2	Q1
NPS/NB (DN)	(GPM)	(GPM)	(GPM)	(GPM)	(GPM)	(GPM)	(GPM)	(GPM)
3/8 (10)	13.8	11	0.73	0.06	0.035	1.38	0.09	0.053
1/2 (15)	34.7	27.7	1.85	0.14	0.09	3.48	0.22	0.14
3/4 (20)	55	44	2.94	0.22	0.14	5.5	0.35	0.22
1 (25)	88	70.4	4.7	0.35	0.22	8.8	0.57	0.35
1 1/4 (32)	137.6	110	7.3	0.57	0.35	13.2	0.88	0.57
1 1/2 (40)	220	176	18.5	0.89	0.56	26.4	1.41	0.88
2 (50)	347	277	18.5	1.41	0.88	34.7	2.22	1.39
2 1/2 (65)	550	440	29.4	2.24	1.40	55.0	3.52	2.20
3 (80)	881	704	47.0	3.58	2.24	70.4	5.64	3.52
4 (100)	1,376	1,101	73.4	5.59	3.49	110	8.81	5.50
5 (125)	1,376	1,101	73.4	5.59	3.49	110	8.81	5.50
6 (150)	3,467	2,774	185	14.1	8.81	277	22.2	13.9
8 (200)	5,504	4,403	294	22.4	14.0	440	35.2	22.0
10 (250)	8,806	7,045	470	35.8	22.4	704	56.4	35.2
12 (300)	13,759	11,007	734	55.9	34.9	1,101	88.1	55.0
14 (350)	22,014	17,611	1,174	89.5	55.9	1,761	141	88.1
16 (400)	22,014	17,611	1,174	89.5	55.9	1,761	141	88.1
18 (450)	34,673	27,738	1,849	141	88.1	2,774	222	139
20 (500)	34,673	27,738	1,849	141	88.1	2,774	222	139
24 (600)	55,036	44,029	2,935	224	140	4,403	352	220
27/28* (700)	88,057	70,446	7,045	451	282	7,045	704	440
30 (760)	88,057	70,446	7,045	451	282	7,045	704	440
32 (800)	88,057	70,446	7,045	451	282	7,045	704	440
36 (900)	137,590	110,072	11,007	704	440	11,007	1,100	688
39/40* (1000)	137,590	110,072	11,007	704	440	11,007	1,100	688
42 (1050)	137,590	110,072	11,007	704	440	11,007	1,100	688
48 (1200)	220,143	176,115	17,611	1,127	704	17,611	1,761	1,101
54 (1400)	346,726	277,381	27,738	1,775	1,110	27,738	2,773	1,733
60 (1500)	346,726	277,381	27,738	1,775	1,110	27,738	2,773	1,733
66 (1600)	346,726	277,381	27,738	1,775	1,110	27,738	2,773	1,733
72 (1800)	550,358	440,287	44,029	2,818	1,761	44,029	4,403	2,752
78 (2000)	550,358	440,287	44,029	2,818	1,761	44,029	4,403	2,752
84 (2200)	880,573	704,459	70,446	4,509	2,818	70,446	7,045	4,403
96 (2400)	880,573	704,459	70,446	4,509	2,818	70,446	7,045	4,403

*Size is dependent on flange specification

WaterMaster
Electromagnetic flowmeter

Specification – sensor

Functional specification

Pressure limitations

As per flange rating – non approved
PN16 for OIML R49, MID Approved

Pressure equipment directive 97/23/EC

This product is applicable in networks for the supply, distribution and discharge of water and associated equipment and is therefore exempt.

Temperature limitations

Ambient temperature	
Remote transmitter	–20 to 70 °C (–4 to 158 °F)
Integral transmitter	–20 to 60 °C (–4 to 140 °F)
Process temperature	–6 to 70 °C (21 to 158 °F) – non approved 0.1 to 50 °C (32.2 to 122 °F) – OIML R49 T50 Approved

IP rating

IP68 (NEMA 6) to 10m (33 ft.) depth

IP67 (NEMA 4X)

Buriable (sensor only)

FEV, FEF and FEW (DN700 to 2400 [27/28* to 96 in. NB) to 5 m (16 ft.)

*Size is dependent on flange specification

Conductivity

>5µS cm^{-1}

Transmitter mounting

Integral or remote

Electrical connections

20 mm glands

$^1/_2$ in. NPT
20 mm armored glands

Sensor cable

ABB WaterMaster cable available in two forms – standard and armored
Maximum length 200 m (660 ft.)

Physical specification

Wetted parts

Electrode material

Stainless steel 316 L / 316 Ti

Super-austenitic steel

Hastelloy® C-22 and Hastelloy C4

(other electrode materials available on request)

Potential equalizing rings

Minimum of 1 recommended
(for insulated bore upstream and downstream pipes)

Lining material / potable water approvals

			Potable Water Approvals				
Code	Size Range	Liner	WRAS	WRAS 60°C	ACS	NSF	AZ/ NZS 4020
FEW	DN10 – 32 ($^3/_8$ – $1^1/_4$ in. NB)	PTFE	✓				
FEV	DN40 – 200 ($1^1/_2$ – 8 in. NB)	Poly-propylene	✓			NSF-61	✓
FEF	DN250 –600 (10 – 24 in. NB)	Elastomer	✓		✓	NSF-61	✓
FEW	DN700 – 2400 (27/28* – 96 in. NB)	Elastomer	✓				
FEW	DN700 – 2400 (27/28* – 96 in. NB)	Hard rubber		✓		NSF approved material	

*Size is dependent on flange specification

Lining protection plates

Not required

Installation conditions (recommended)

Upstream ≥ 5D

Downstream ≥ 2D

Pressure loss

Negligible at Q3	All full bore meters
<0.25 bar (<3.62 psi) at Q3	FEV (DN40 to 200 [$1^1/_2$ to 8 in. NB])

Non-wetted parts

Flange material

Carbon steel	(DN20 to DN2400 [$^3/_4$ to 96 in. NB])
Stainless steel	(DN10 to DN2400 [$^3/_8$ to 96 in. NB])

Housing material

Carbon steel	FEV (DN40 to 200 [$1^1/_2$ to 8 in. NB])
	FEW (DN700 to 2400 [18 to 96 in. NB])
Plastic	FEF (DN250 to 600 [10 to 24 in. NB])
Aluminium	FEW (DN10 to 400 [$^3/_8$ to 16 in. NB])

Terminal box material

Polycarbonate, aluminium or stainless

Cable gland material

Plastic, brass or stainless steel

Paint specification

Paint coat ≥70 µm thick RAL 9002 (light grey)

WaterMaster
Electromagnetic flowmeter

Specification – transmitter

Functional specification

Power supply

Mains	85 to 265 V AC @ <7 VA
Low voltage	24 V AC +10 %/–30 % @ <7 VA
DC	24 V ±30 % @ <0.4 A

Supply voltage fluctuations within the specified range have no effect on accuracy

Digital Outputs (3)

Rating 30 V @ 220 mA, open collector, galvanically isolated

Maximum output frequency 5250 Hz

1 off dedicated to Alarm / Logic, programmable function

2 off configurable to either Pulse / Frequency or Alarm/Logic function

Current output – HART FEX100 variant

4 to 20 mA or 4 to 12/20 mA, galvanically isolated

Maximum loop resistance 750 Ω

HART protocol Version 5.7 (HART registered)

Signal levels compliant with NAMUR NE 43 (3.8 to 20.5 mA)

Low alarm 3.6 mA, High alarm 21.8 mA

Additional accuracy

±0.1 % of reading

Temperature coefficient: typically <±20 ppm/°C

RS485 Communications – PROFIBUS FEX100-DP variant

Registered name: FEX100-DP

RS485 (9.6kbps to 1.5Mbps), galvanically isolated

DPV0, DPV1

PA Profile 3.01

Standard idents: 9700, 9740, 9741

FEX100-DP specific ident: 3431

3 Concurrent MS2 master connections

RS485 Communications – MODBUS FEX100-MB variant

MODBUS RTU protocol

RS485 (9.6kbps to 115.2kbps), galvanically isolated

Electrical connections

20 mm glands 1/2 in. NPT, 20 mm armored glands

Temperature limitations

Ambient temperature	–20 to 60 °C (–4 to 140 °F)
Temperature coefficient	Typically <±10 ppm/°C @ Vel ≥0.5 mls

Environmental protection

Humidity: 0 to 100 %

Rating: IP67 (NEMA 4X) to 1m (3.3 ft.) depth

Tamper-proof security

Write access prevented by internal switch combined with external security seals for MID applications

Languages

English, French, German, Italian, Spanish, Polish

Infrared service port

USB adapter (accessory), USB 1.1. and 2.0 compatible

Driver software for Windows 2000, XP, 7 (32-bit) and Vista

Housing material

Powder-coated aluminium with glass window

Paint specification

Paint coat ≥70 µm thick RAL 9002 (light grey)

Transmitter vibration testing

Vibration level: 7 m/s^2

Frequency range: 20 to 150 Hz

No. of sweeps in 3 orthogonal planes: 20

Undetectable shift in transmitter span or zero performance

Hazardous approvals (HART variant only)

FM & FMc Class 1 Div 2

(FM listing NI / 1 / 2 / ABCD / T4, S / II, III / 2 / FG /T4, Ta=60C; Type 4X, IP67 – for transmitter and integral mounting Ta=70C, Type 6P, IP68 – for remote sensor type, IP67 on DN10 to 32 [3/8 to 1 1/4 in.NB])

(FMc listing NI / 1 / 2 / ABCD / T4, DIP / II, III / 2 / FG /T4, Ta=60C; Type 4X, IP67 – for transmitter and integral mounting Ta=70C, Type 6P, IP68 – for remote sensor type, IP67 on DN10 to 32 [3/8 to 1 1/4 in.NB])

FET, FEV, FEW and FEF DN700 to 2200 (27/28* to 84 in. NB) only

*Size is dependent on flange specification

Declaration of Conformance

Copies of CE and PED certification will be available on request.

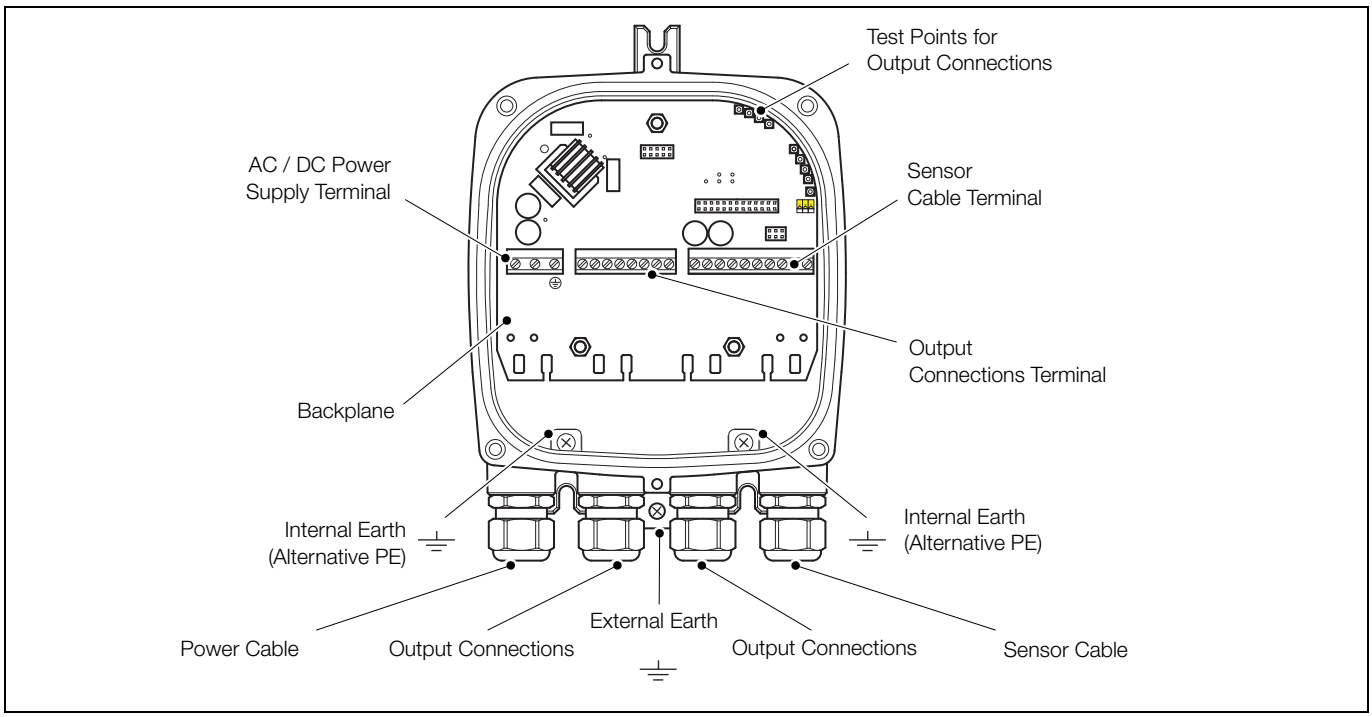
WaterMaster has OIML R49 Certificate of Conformity to accuracy class 1 and 2 (FEV DN40 to 200 [1 1/2 to 8 in.NB]). Copies of accuracy certification are available on request.

WaterMaster (FEV DN40 to 200 [1 1/2 to 8 in.NB]) has been type examined under directive MID 2004/22/EC, Annex MI-001. Copies of this certificate are available on request.

Transmitter connections

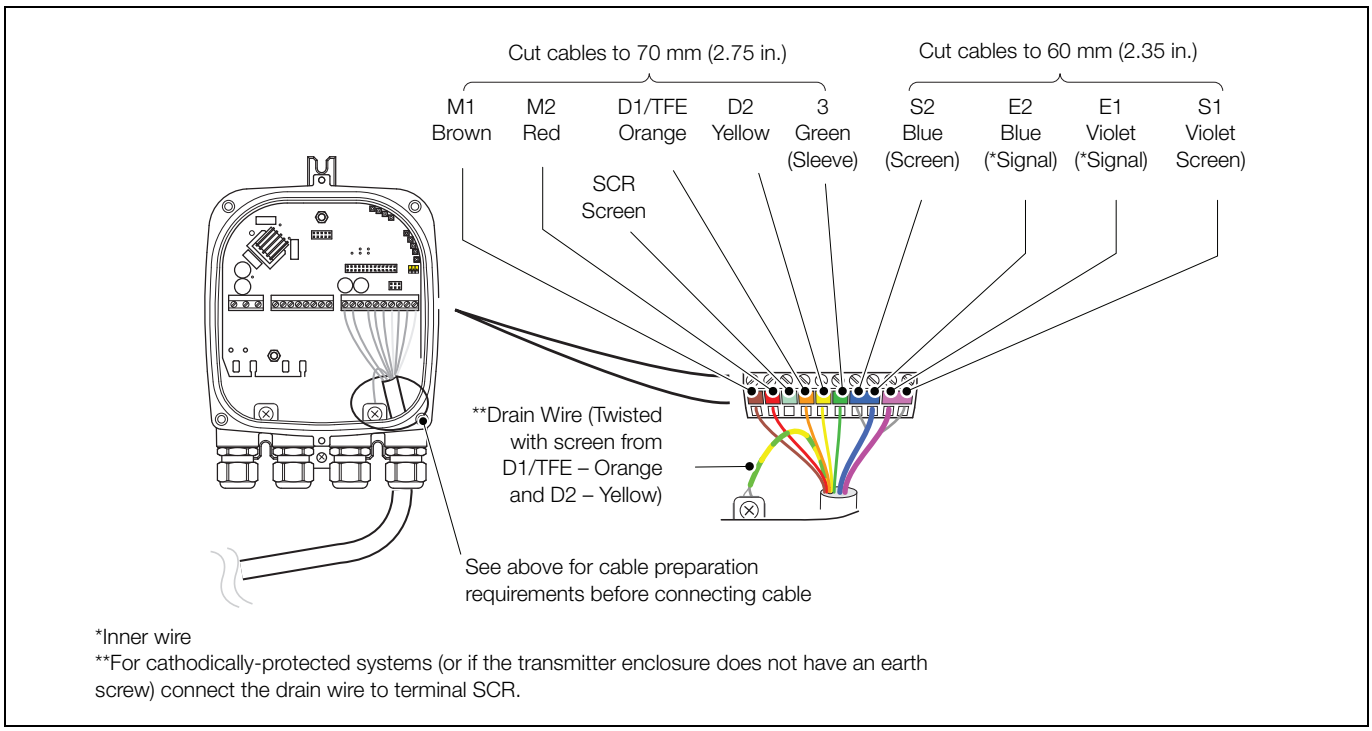
Transmitter terminal connections overview

This section is intended to give an overview of installation of a flowmeter. For Installation requirements, technical information and Health and safety precautions – refer to the User Guide OI/FET100–EN.



Cable gland / conduit entry (remote transmitter shown)

Sensor cable terminal connections and recommended cable lengths



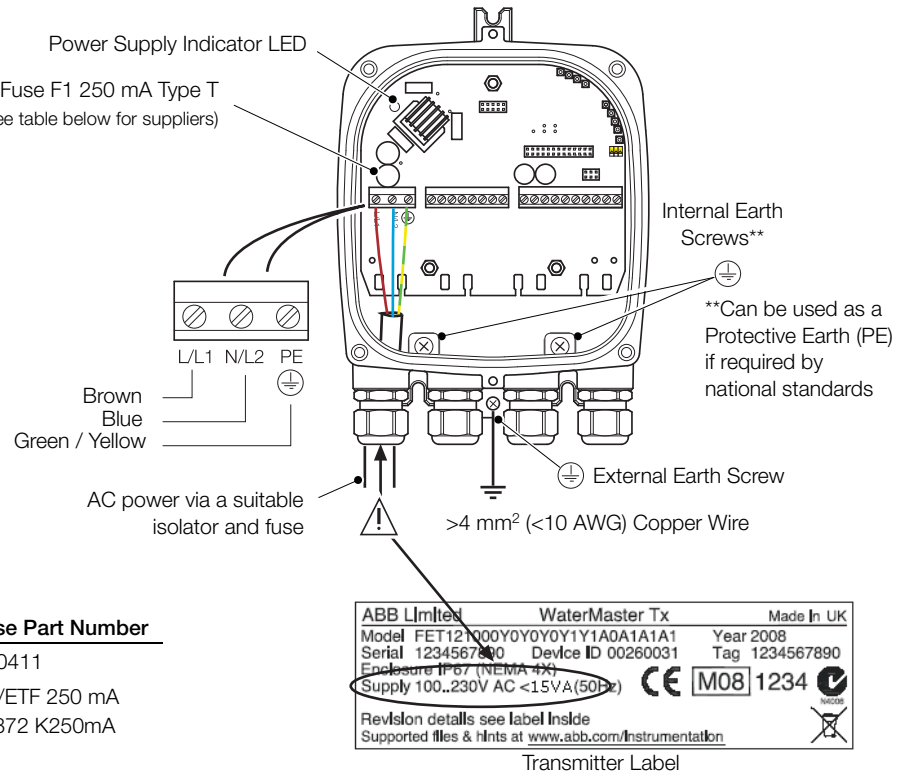
*Inner wire
**For cathodically-protected systems (or if the transmitter enclosure does not have an earth screw) connect the drain wire to terminal SCR.

Sensor cable connections at transmitter terminal block – standard system

WaterMaster
Electromagnetic flowmeter

Power supply connections

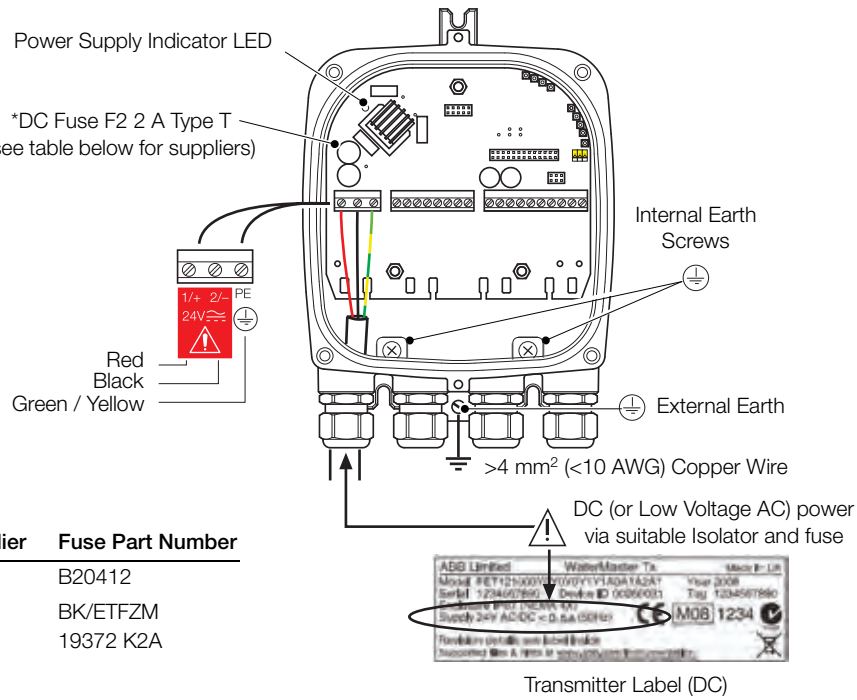
AC power supply



*Fuse Supplier	Fuse Part Number
ABB	B20411
Bussmann	BK/ETF 250 mA
Wickmann	19372 K250mA

AC power supply connections

DC (and low voltage AC) power supply



*Fuse Supplier	Fuse Part Number
ABB	B20412
Bussmann	BK/ETFZM
Wickmann	19372 K2A

DC (and low voltage AC) power supply connections

Configuration DIP switches

Three configuration DIP switches are mounted on the transmitter backplane board.

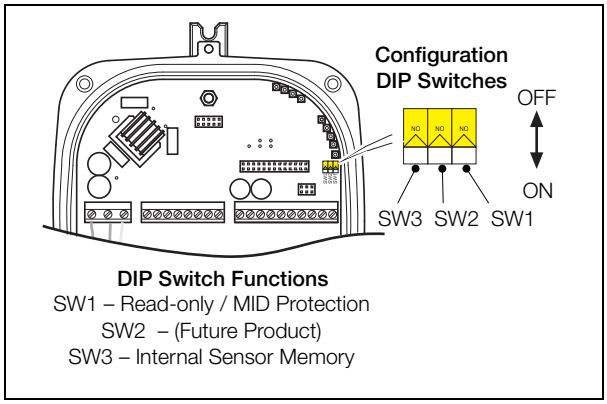
These are factory-set as follows:

- Remote transmitter – all OFF
- Integral transmitter – SW3 ON

For MID-compliant flowmeters the read-only / MID protection switch is set to 'ON' to ensure the meter is secure from tampering.

For HART software versions prior to 01.02.XX, this switch (set after commissioning) prevents login via the keypad or bus at any security level.

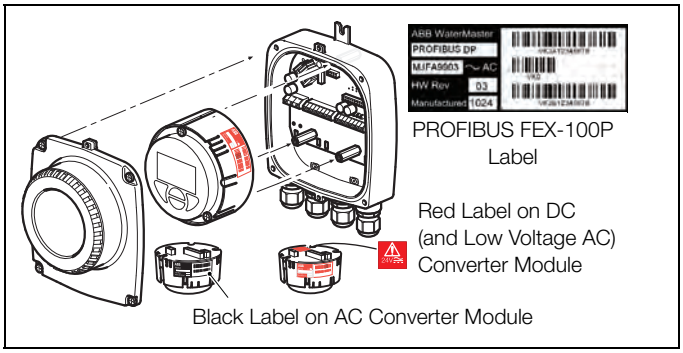
From HART software version 01.03.XX onwards and for all PROFIBUS software versions, on MID meters, all metrological-related parameters are locked and inaccessible at the Service level. Standard and Advanced user level parameters can still be modified via the HMI or bus.



Configuration DIP switches

Converter module identification

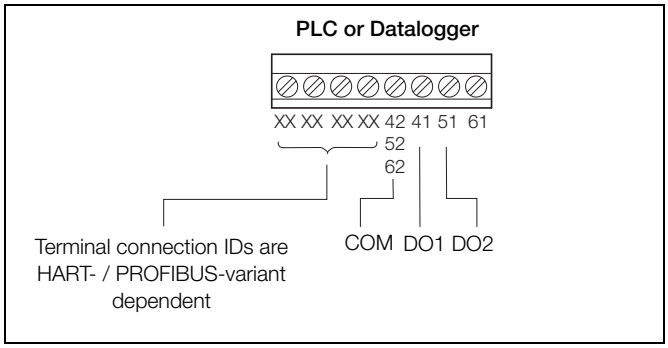
Note. The communications bus type is HART FEX100 if not specified on the converter module label. An example of the PROFIBUS FEX100-DP variant converter module label is shown below.



Converter module identification

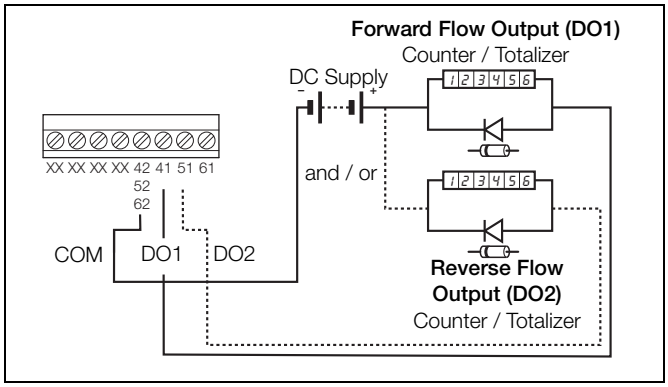
Output connections

Frequency outputs

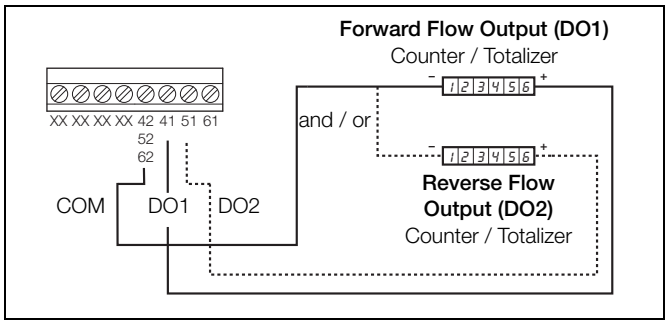


PLC / Datalogger connections

Note. Digital outputs DO1 and DO2 are polarity sensitive. The common (negative) connection for these outputs is designated 'COM'.

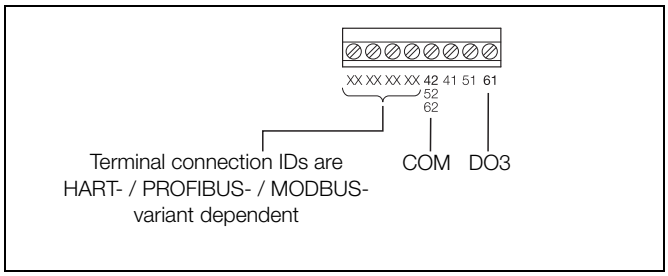


Electromechanical connections

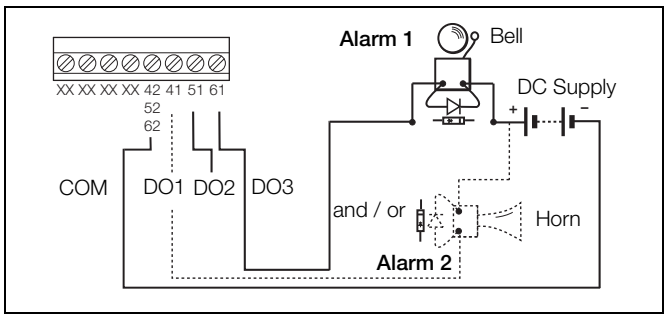


Telemetry / Electronic counters connections

Alarm outputs



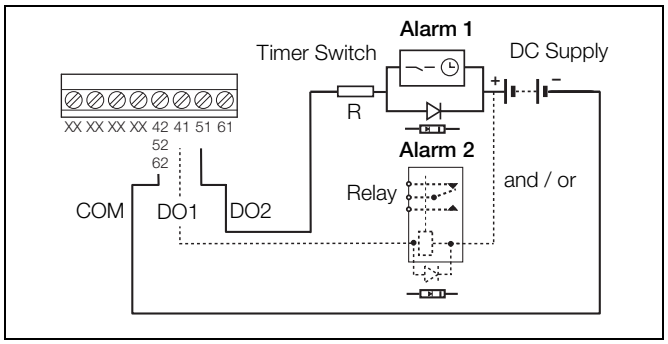
Alarm output connections



Alarm output connections

Note.

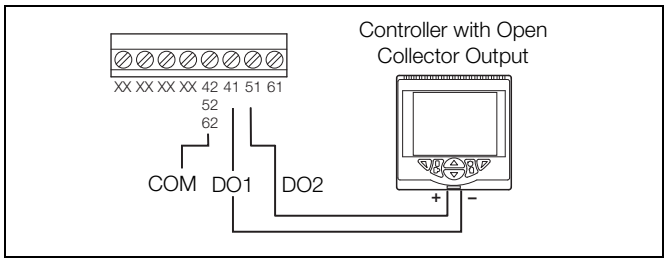
- Normal alarm / logic output is from DO3 (terminal 61). DO1 (41) and DO2 (51) can also be configured as alarms if required but are then NOT available as frequency / pulse outputs as shown in *Electromechanical connections* and *Telemetry / Electronic counters connections*, opposite.
- Bell and horn shown for example only. Any suitable alarm device may be used (for example, lamp, siren, buzzer etc.).



Relay and timers output connections

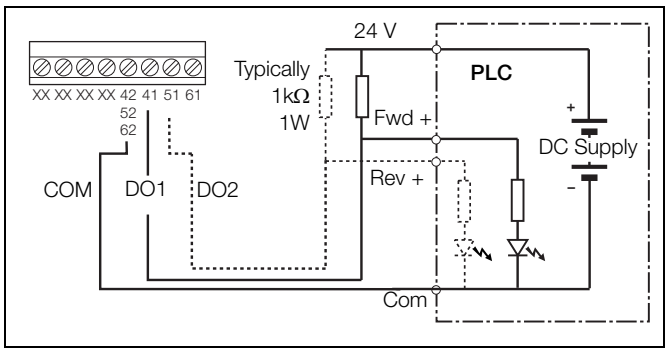
Note. Relay and timer switch shown for example only.

Contact input

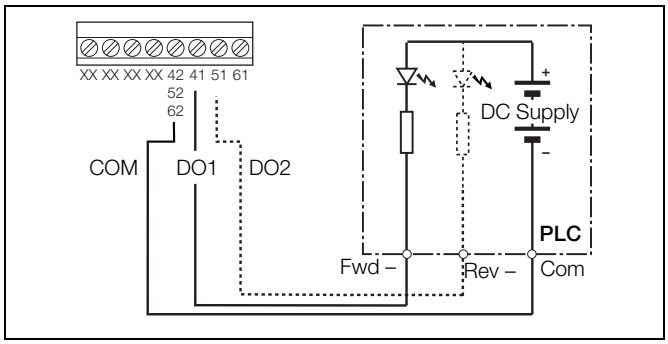


Open collector (or grounded contact) connections

PLC interface



PLC – common –ve connections

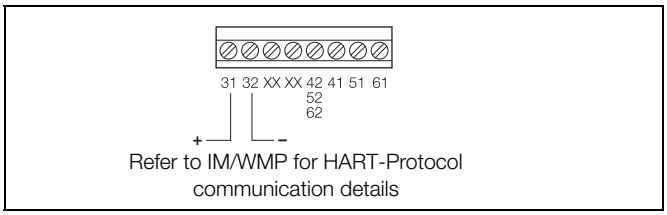


PLC – Common +ve connections

Note.

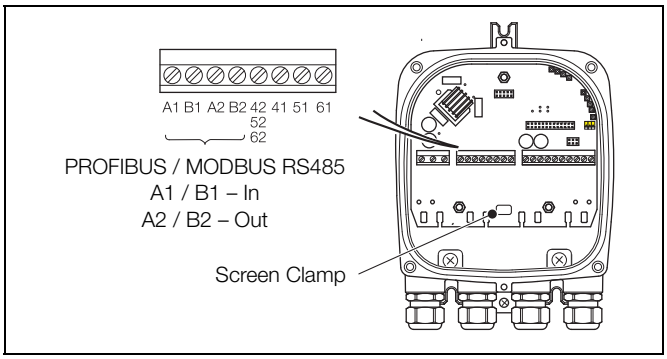
- WaterMaster digital outputs are NPN optocoupled transistors used as switches.
- Maximum allowed voltage at collector is 30 V DC
- Maximum allowed current across transistor is 220 mA.

Current output (4 to 20 ma) – HART (FEX100) variant



Current output (4 to 20 mA) – HART (FEX100) variant

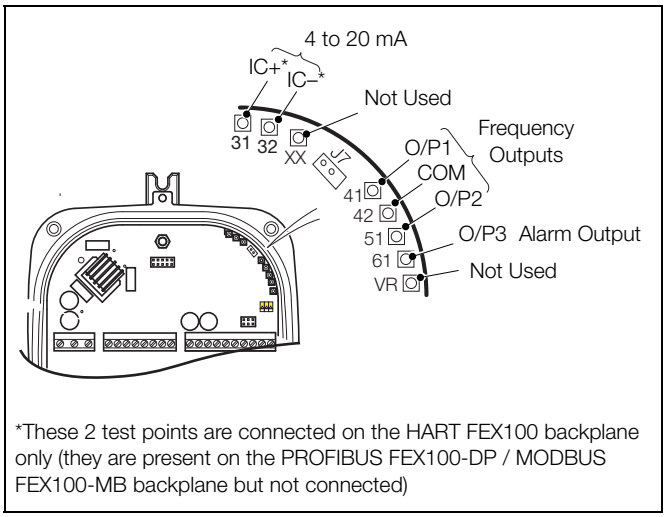
RS485 communications – PROFIBUS (FEX100-DP) and MODBUS (FEX100-MB) variants



WaterMaster RS485 backplane connections to PROFIBUS / MODBUS networks

Test point access

Note. A typical DVM probe can access (fit) the PCB's test holes.



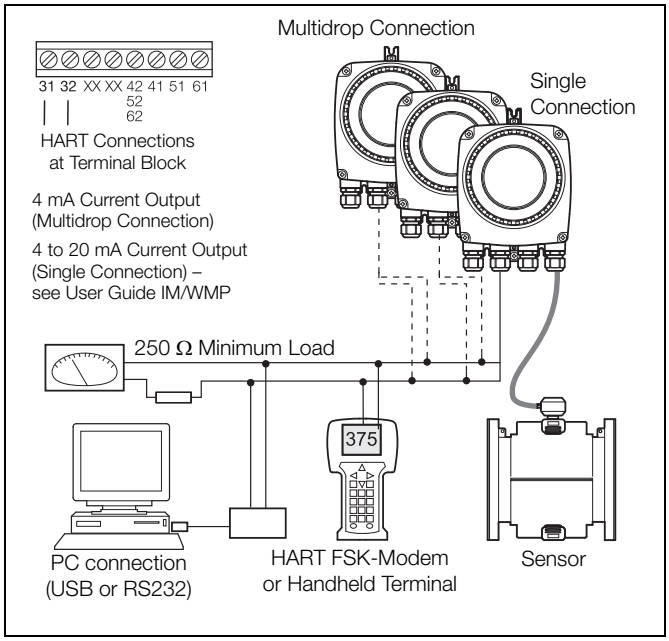
Transmitter PCB board test point access

Digital communication

The transmitter has the following options for digital communication.

HART protocol

The unit is registered with HART Communication Foundation.



HART-Protocol connection (remote installation shown)

HART protocol	
Configuration	Directly on the Device Software Asset Vision Basic (+ HART -DTM)
Transmission	Install a HART modem (FSK [Frequency Shift Keyed]-Modem) for HART-Communication when connecting to a PC. The HART-Modem converts the analog 4 to 20 mA signal into a digital output signal (Bell Standard 202) and connects to the PC using a USB (or RS232C) connector
Max. signal amplitude	1.2 mAss
Current output load	Min. 250Ω, max. = 560Ω
Cable	AWG 24 twisted
Max. cable length	1500 m (4921 ft.)
Baud rate	1.200 baud
Display	Log. 1: 1,200 Hz Log. 0: 2.200 Hz

System integration

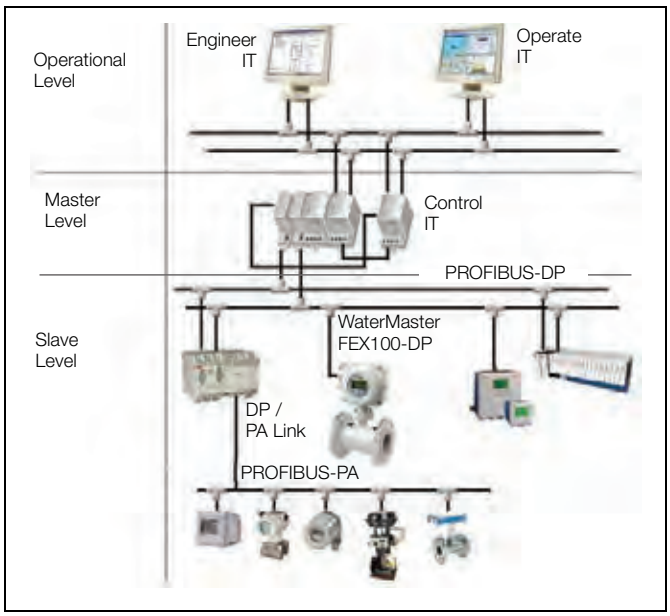
WaterMaster can be integrated into control systems and configuration devices using any Frame application, such as ABB AssetVision or similar third-party applications. ABB Device Type Managers (DTMs) for WaterMaster provide a unified structure for accessing device parameters, configuring and operating the devices and diagnosing problems. FDT (Field Device Tool) technology standardizes the communication and configuration interface between all field devices and host systems.

PROFIBUS DP protocol

PROFIBUS is a manufacturer-independent, open Fieldbus standard for a wide range of applications in manufacturing, process and building automation. Manufacturer independence and openness are ensured by the international standard EN 50170.

PROFIBUS DP ID no.	0x3431
Alternative standard ID no.	0x9701 or 0x9741
Configuration	Directly on the device Software Asset Vision Basic (+PROFIBUS DP-DTM)
Transmission signal	Accuracy to IEC 61158-2
Cable	Shielded, twisted cable (accurate to IEC 61158-2, types A or B)

All devices are connected in a bus structure ('line') as shown in below. Up to 32 stations (master or slaves) can be linked to create one 'segment', although it is recommended not to install more than 16 devices on a single segment. Each end of a segment must be terminated by an active bus terminating resistor. Both bus terminators must always be powered to ensure fault-free operation, therefore it is strongly recommended that they are connected to a back-up power supply. The use of bus amplifiers (repeaters) and segment couplers can be used to extend the network.



Typical PROFIBUS network

System integration

The GSD file for WaterMasters specifies the device-specific Ident No. 3431. It conforms to the PROFIBUS standard, providing a clear and comprehensive description of each instrument in a precisely defined format.

This enables the system configuration tool to use the information automatically when configuring a PROFIBUS bus system.

The ABB GSD file (Ident No. 3431) is divided into 2 sections:

- General specifications

  Identification of the device, together with hardware and software versions, baud rates supported and the possible time intervals for monitoring times.

- DP slave-related specifications

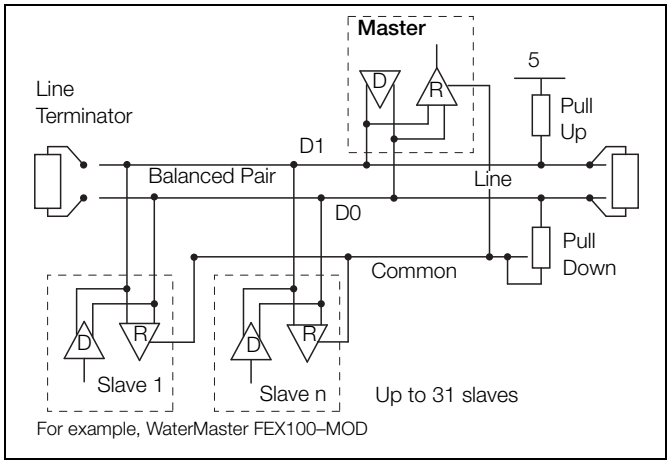
  Information about the user parameter block for device-specific configuration and modules containing details of the input and output data that can be exchanged cyclically with a PROFIBUS master.

The WaterMaster GSD file (ABB_3431.gsd) is available for download from the ABB website at: www.abb.com/fieldbus (follow the link for PROFIBUS DP field devices).

MODBUS protocol

MODBUS is an open standard that is owned and administered by an independent group of device manufacturers called the Modbus Organization (www.modbus.org).

Using the MODBUS protocol, devices from different manufacturers exchange information on the same communications bus without the need for special interface equipment. WaterMaster FEX100-MB follows the specification for Modbus Over Serial Line V1.02, using 2-wire TIA/EIA-485 (RS485) physical layer.



Typical MODBUS RS485 2-wire network Installation

Cable Properties

The end-to-end length of the trunk cable must be limited. The maximum length depends on the Baud rate, the cable (gauge, capacitance or characteristic impedance), the number of loads on the daisy chain and the network configuration (2-wire or 4-wire).

For 9600 Baud rate and AWG26 (or wider) gauge, the maximum length is 1000 m (3280 ft.). Where 4-wire cabling is used as a 2-wire cabling system the maximum length must be divided by 2. The tap cables must be short, never more than 20 m (65.6 ft.). If a multi-port tap is used with n derivations, each one must have a maximum length of 40 m (131 ft.) divided by n.

The maximum serial data transmission line length for RS485 systems is 1200 m (3937 ft.). The lengths of cable that can be used are determined by the cable type, typically:

- Up to 6 m (19.7 ft.) – standard screened or twisted pair cable.
- Up to 300 m (984 ft.) – twin twisted pair with overall foil screen and an integral drain wire – for example, Belden 9502 or equivalent.
- Up to 1200 m (3937 ft.) – twin twisted pair with separate foil screens and integral drain wires – for example, Belden 9729 or equivalent.

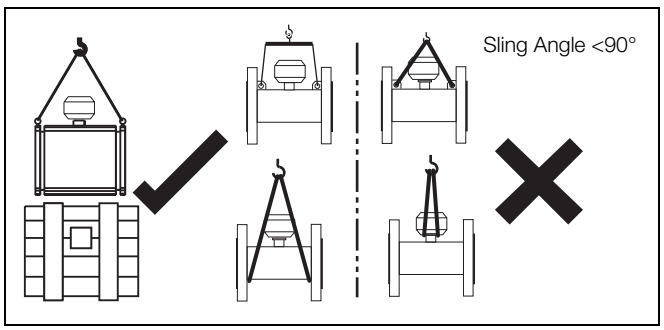
Category 5 cables may be used for RS485-MODBUS to a maximum length of 600 m (1968 ft.). For the balanced pairs used in an RS485-system, a characteristic impedance with value higher than 100Ω is preferred especially for 19200 and higher Baud rates.

Installation requirements

This section is intended to give an overview of installation of a flowmeter. For Installation requirements, technical information and Health and Safety precautions refer to User Guide OI/FEF/FEV/FEW–EN.

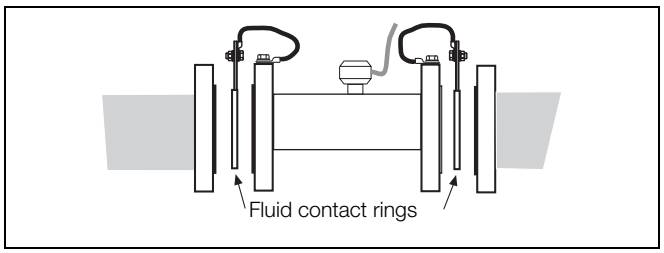
Unpacking the flowmeter

Care must be taken when lifting the flowmeter to use the lifting hooks provided or sling under the body of the meter. Never lift using the terminal connection box of the sensor cable as this will cause damage and invalidate warranty.



Grounding

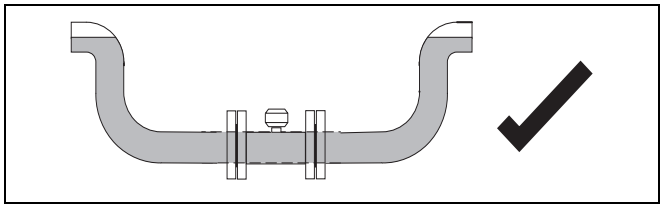
The flowmeter sensor must be connected to ground potential. For technical reasons, this potential should be identical to the potential of the metering fluid. For plastic or insulated lined pipelines, the fluid is grounded by installing a minimum of 1 earthing rings. When there are stray potentials present in the pipeline, an earthing ring is recommended on both ends of the meter sensor.



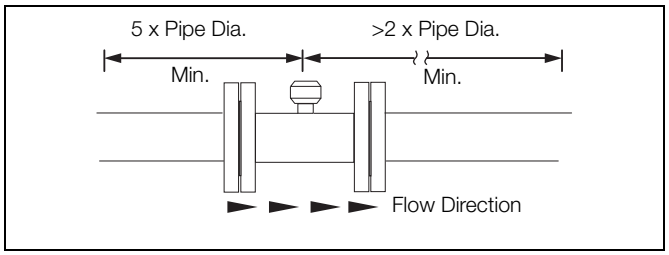
Mounting

The installation conditions shown below must be observed to achieve the best operational results.

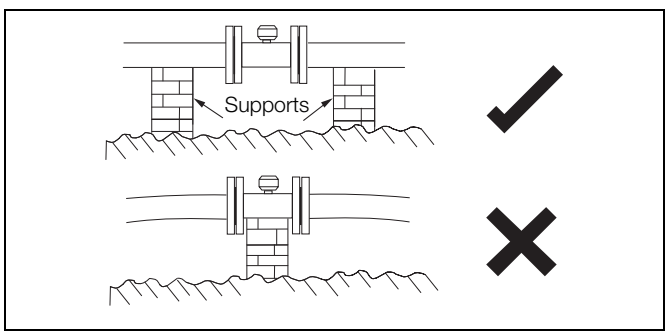
The sensor tube must always be completely full.



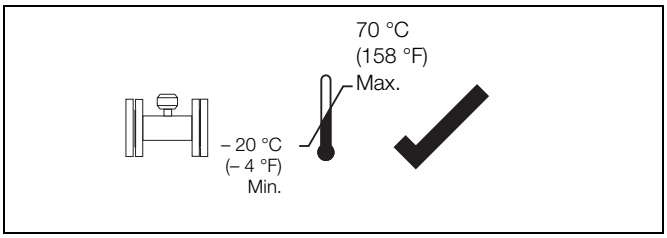
The flow direction must correspond to the identification plate. The device measures the flowrate in both directions. Forward flow is the factory setting.



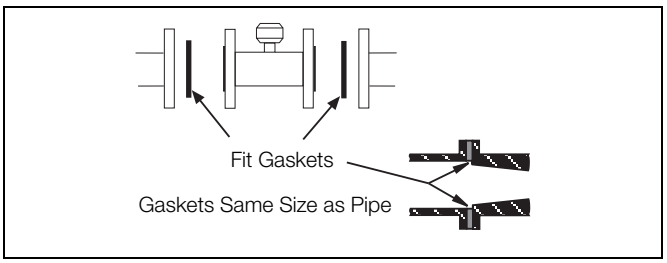
The devices must be installed without mechanical tension (torsion, bending). If required support the pipeline.



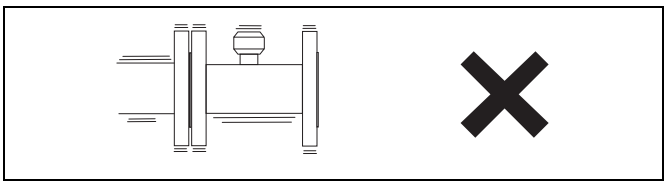
The flange seals must be made from a compatible material for the fluid and fluid temperatures if required.



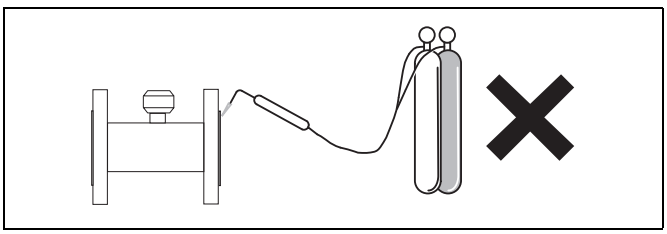
Seals must not extend into the flow area since possible turbulence could influence the device accuracy.



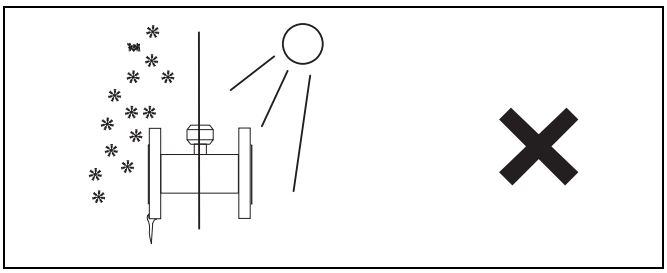
The pipeline may not exert any unallowable forces and torques on the device, such as vibration.



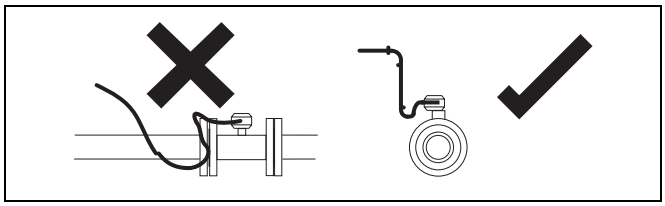
The flowmeter must not be submitted to any localized heat during installation; take care to remember this is a measuring instrument.



The flowmeter must not be exposed to direct sunlight or provide for appropriate sun protection where necessary.

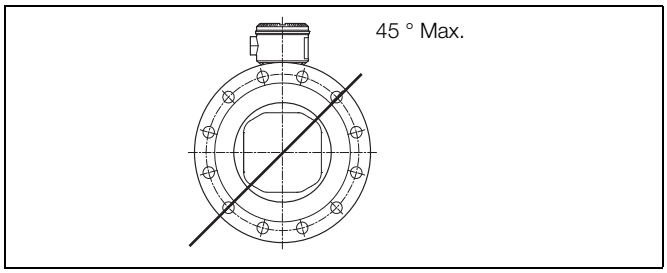


The cable to the flowmeter should be installed neatly or within a conduit, both loose or conduit should have a u shape below the terminal connection box height to allow any water run off to avoid any capillary action into the flowmeter sensor.



Electrode axis

Electrode axis should be horizontal if at all possible or no more than 45° from horizontal.

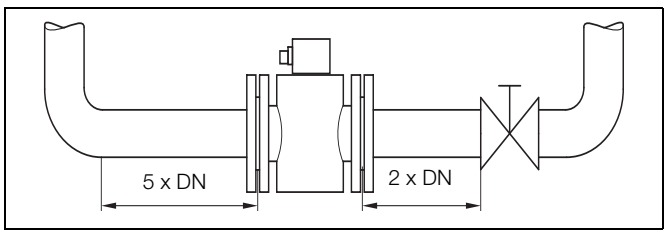


Up and Down stream pipe sections

The metering principle is independent of the flow profile as long as standing eddies do not extend into the metering section, such as may occur after double elbows, in the event of tangential inflow or where half-open gate valves are located upstream of the flowmeter sensor. In such cases, best practice installation measures should be put in place to normalize the flow profile.

- Whereever possible do not install fittings (for example, manifolds, valves) directly in front of the flowmeter sensor.
- Butterfly valves should be installed so that the valve plate does not extend into the flowmeter sensor.
- Valves or other turn-off components should be installed in the Downstream pipe section.

Experience has shown that, in most installations, straight upstream sections 3 x DN long and straight downstream sections 2 x DN long are normally sufficient. We would recommend conditions of 5 x DN straight upstream and 2 x DN straight downstream where possible.

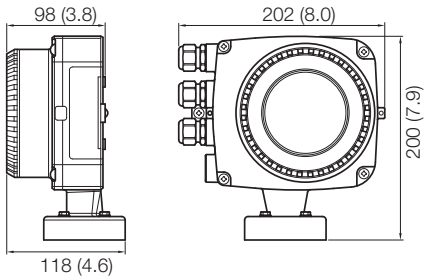


WaterMaster
Electromagnetic flowmeter

Transmitter dimensions

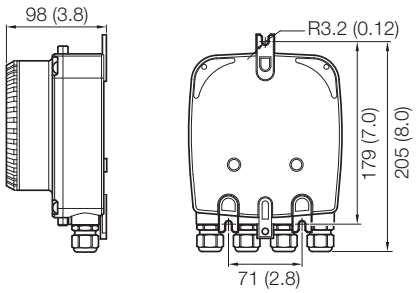
Integral transmitter

Dimensions in mm (in.)



Remote transmitter

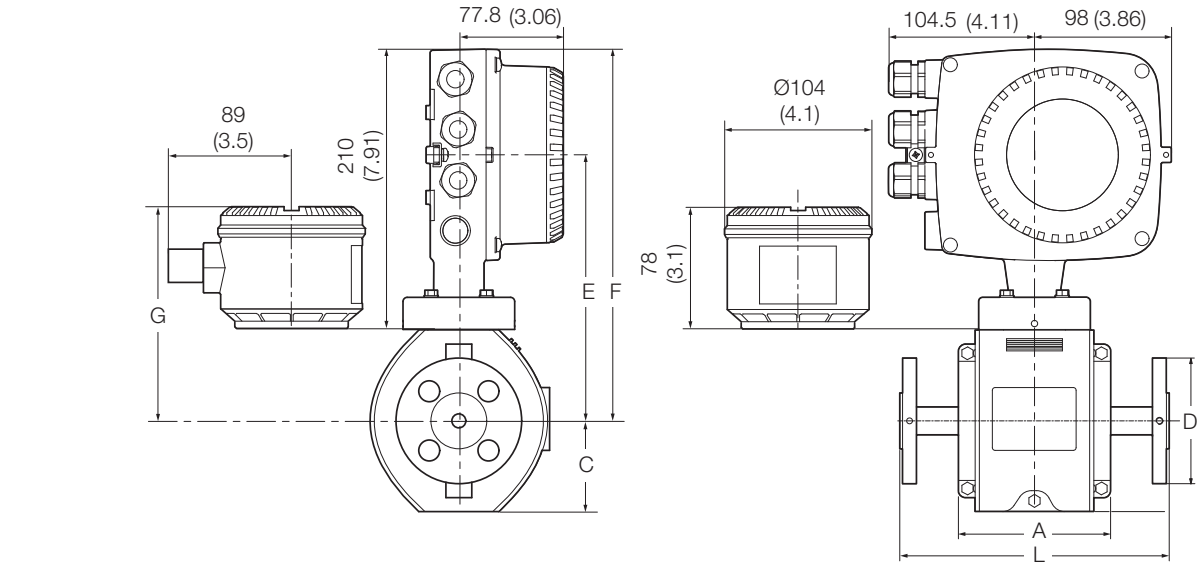
Dimensions in mm (in.)



Sensor dimensions

FEW – DN10 to 32 (3/8 to 1 1/4 in. NB)

Dimensions in mm (in.)



DN10 to 32(3/8 to 1 1/4 in. NB) (FEW)

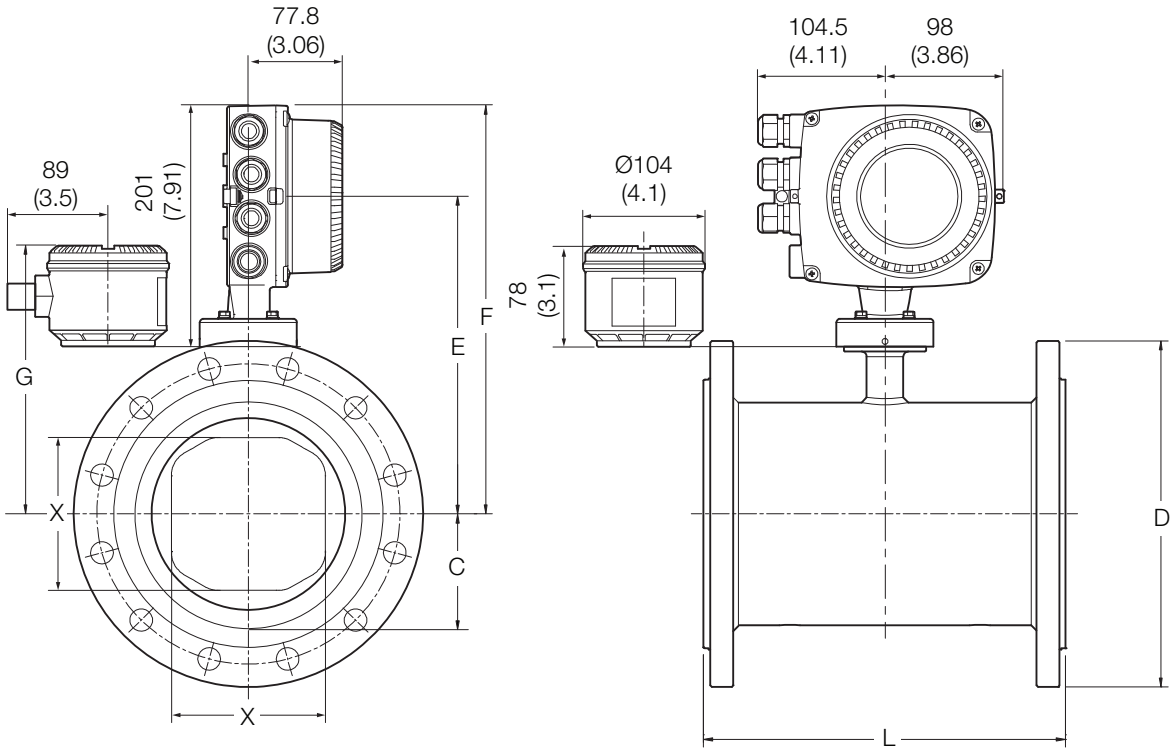
		Dimensions in mm (in.)							Approx. weight in kg (lb)	
DN	Mating flange type	D	L	F	C	E	G	A	Integral	Remote
DN10 (3/8 in.)	PN40	90 (3.54)	200 (7.87)	350 (13.78)	82 (3.23)	275 (10.83)	230 (9.06)	113 (4.45)	6 (13.2)	4 (8.8)
	CL150	90 (3.54)								
	CL300	95 (3.74)								
DN15 (1/2 in.)	PN40	95 (3.74)	200 (7.87)	350 (13.78)	82 (3.23)	275 (10.83)	230 (9.06)	113 (4.45)		
	CL150	90 (3.54)								
	CL300	95 (3.74)								
DN20 (3/4 in.)	PN40	105 (4.13)	200 (7.87)	350 (13.78)	82 (3.23)	275 (10.83)	230 (9.06)	113 (4.45)	8.5 (18.7)	6.5 (14.3)
	CL150	98 (3.86)								
	CL300	117 (4.61)								
DN25 (1 in.)	PN40	115 (4.53)	200 (7.87)	350 (13.78)	82 (3.23)	275 (10.83)	230 (9.06)	113 (4.45)		
	CL150	108 (4.25)								
	CL300	124 (4.88)								
DN32 (1 1/4 in.)	PN40	140 (5.51)	200 (7.87)	350 (13.78)	92 (3.62)	275 (10.83)	230 (9.06)	113 (4.45)		
	CL150	117 (4.61)								
	CL300	133 (5.24)								

DN10 to 32 (3/8 to 1 1/4 in. NB) (FEW) dimensions / weights

WaterMaster
Electromagnetic flowmeter

FEV – DN40 to 200 (1½ to 8 in. NB)

Dimensions in mm (in.)



DN40 to 200 (1½ to 8 in. NB) (FEV)

		Dimensions in mm (in.)							Approx. weight in kg (lb)	
DN	Mating flange type	D	L	F	C	E	G	X	Integral	Remote
DN40 (1½ in.)	EN1092-1 PN10, PN40	150 (5.91)	200 (7.87)	260 (10.24)	30.4 (1.20)	185 (7.28)	138 (5.43)	30 (1.18)	15 (33)	13 (29)
	ASME B16.5 CLASS 150	127 (5.00)								
	JIS 10K	140 (5.51)								
	AS2129 TABLE F	140 (5.51)								
	AS2129 TABLE C D E	135 (5.31)								
	AS4087 PN14	135 (5.31)								
DN50 (2 in.)	EN1092-1 PN10, PN16	165 (6.50)	200 (7.87)	270 (10.63)	38.3 (1.51)	195 (7.68)	146 (5.75)	38 (1.50)	16 (35)	14 (31)
	ASME B16.5 CLASS 150	152.4 (6.00)								
	JIS 10K	155 (6.10)								
	AS4087 PN21	165 (6.50)								
	AS2129 TABLE F	165 (6.50)								
	AS2129 TABLE C D E	150 (5.91)								
	AS4087 PN14, PN16	150 (5.91)								
DN65 (2½ in.)	AS4087 PN14, PN16	165 (6.50)	200 (7.87)	275 (10.83)	45.2 (1.78)	200 (7.87)	152 (5.98)	48 (1.89)	18 (40)	16 (35)
	AS2129 TABLE C D E	165 (6.50)								
	EN1092-1 PN10	185 (7.28)								
	EN1092-1 PN16	185 (7.28)								

DN40 to 200 (1½ to 8 in. NB) (FEV) dimensions / weights

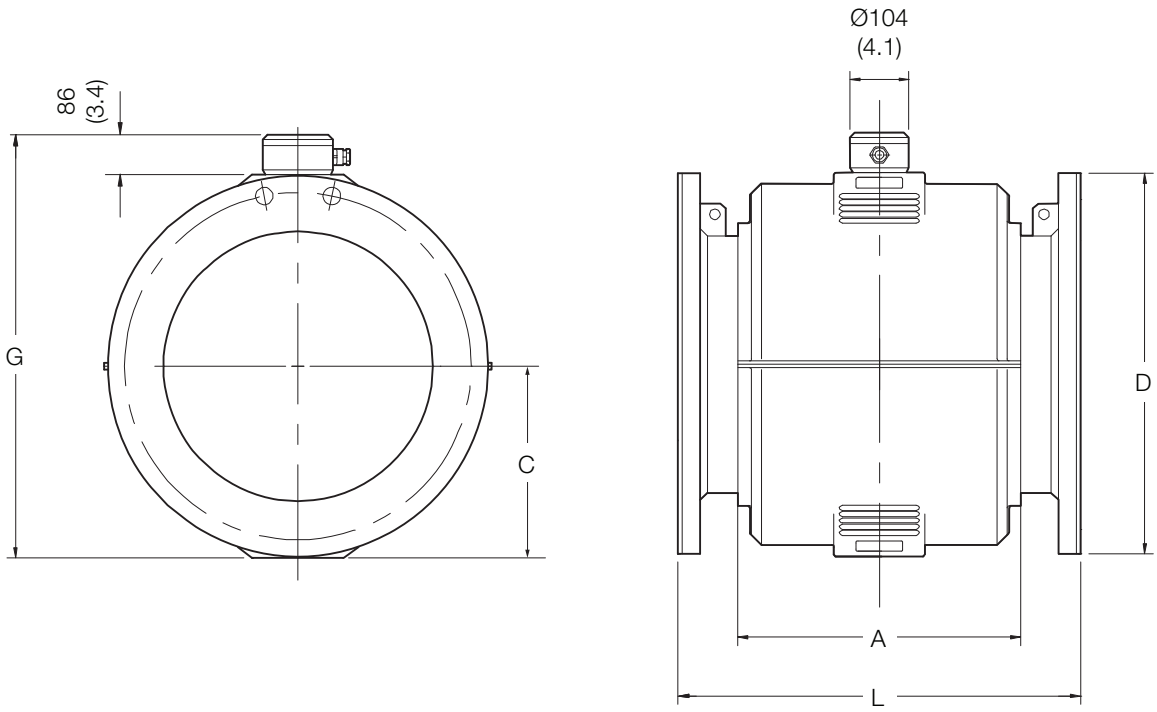
		Dimensions in mm (in.)							Approx. weight in kg (lb)	
DN	Mating flange type	D	L	F	C	E	G	X	Integral	Remote
DN80 (3 in.)	EN1092-1 PN10, PN16	200 (7.87)	200 (7.87)	280 (11.02)	51.5 (2.03)	205 (8.07)	156 (6.14)	61 (2.40)	19 (42)	17 (37)
	ASME B16.5 CLASS 150	190 (7.48)								
	JIS 7.5K	211 (8.31)								
	JIS 10K	185 (7.28)								
	AS2129 TABLE C D E	185 (7.28)								
	AS4087 PN14, PN16	185 (7.28)								
	AS2129 TABLE F	205 (8.07)								
	AS4087 PN21	205 (8.07)								
DN100 (4 in.)	EN1092-1 PN10, PN16	220 (8.66)	250 (9.84)	320 (12.60)	63.75 (2.51)	245 (9.65)	196.8 (7.75)	70 (2.76)	22 (49)	20 (44)
	ASME B16.5 CLASS 150	228.6 (9.00)								
	JIS 7.5K	238 (9.37)								
	JIS 10K	210 (8.27)								
	AS2129 TABLE C D	215 (8.46)								
	AS4087 PN14, PN16	215 (8.46)								
	AS2129 TABLE E	215 (8.46)								
	AS4087 PN21	230 (9.06)								
	AS2129 TABLE F	230 (9.06)								
DN125 (5 in.)	EN1092-1 PN10, PN16	250 (9.84)	250 (9.84)	320 (12.60)	63.75 (2.51)	245 (9.65)	197 (7.76)	70 (2.76)	29 (64)	27 (60)
	ASME B16.5 CLASS 150	254 (10.00)								
	JIS 10K	250 (9.84)								
	AS2129 TABLE C D E	255 (10.04)								
	AS2129 TABLE F	280 (11.02)								
DN150 (6 in.)	EN1092 PN10, PN16	285 (11.22)	300 (11.81)	340 (13.39)	84.4 (3.32)	265 (10.43)	217 (8.54)	103 (4.06)	35 (77)	33 (73)
	ASME B16.5 CLASS 150	279 (10.98)								
	JIS 7.5k	290 (11.42)								
	JIS 10K	280 (11.02)								
	AS2129 TABLE C D	280 (11.02)								
	AS4087 PN14, PN16	280 (11.02)								
	AS2129 TABLE E	280 (11.02)								
	AS2129 TABLE F	305 (12.01)								
	AS4087 PN21	305 (12.01)								
DN200 (8 in.)	EN1092-1 PN10	340 (13.39)	350 (13.78)	365 (14.37)	109.8 (4.32)	290 (11.42)	243 (9.57)	150 (5.91)	52 (115)	50 (110)
	EN1092-1 PN16	340 (13.39)								
	ASME B16.5 CLASS 150	345 (13.58)								
	JIS 7.5K	342 (13.46)								
	JIS 10K	330 (12.99)								
	AS2129 TABLE C D	335 (13.19)								
	AS4087 PN14, PN 16	335 (13.19)								
	AS2129 TABLE E	335 (13.19)								
	AS2129 TABLE F	370 (14.57)								
	AS4087 PN21	370 (14.57)								

DN40 to 200 (1½ to 8 in. NB) (FEV) dimensions / weights (Continued)

WaterMaster
Electromagnetic flowmeter

FEF – DN250 to 600 (10 to 24 in. NB)

Dimensions in mm (in.)



DN250 to 600 (10 to 24 in. NB) (FEF)

DN	Mating flange type	Dimensions in mm (in.) D	L	C	G	A	Approx. weight in kg (lb)
DN250 (10 in.)	ASME B16.5 CLASS 150	405 (15.94)	450 (17.72)	215 (8.46)	301 (11.85)	300 (11.81)	88 (194)
	ASME B16.5 CLASS 300	445 (17.52)	490 (19.29)				
	EN1092 -1 PN10	395 (15.55)	450 (17.72)				
	EN1092 – 1 PN16	405 (15.94)	450 (17.72)				
	EN1092 – 1 PN25	425 (16.73)	490 (19.29)				
	EN1092 – 1 PN40	450 (17.72)	490 (19.29)				
	JIS 5K	385 (15.16)	450 (17.72)				
	JIS 10K	400 (15.75)	450 (17.72)				
	AS4087 PN14, PN16	405 (15.94)	450 (17.72)				
	AS2129 TABLE C D		450 (17.72)				
	AS2129 TABLE E		450 (17.72)				
	AS4087 PN21	430 (16.93)	450 (17.72)				
	AS2129 TABLE F		450 (17.72)				

DN250 to 600 (10 to 24 in. NB) (FEF) dimensions / weights

DN	Mating flange type	Dimensions in mm (in.)					Approx. weight in kg (lb)
		D	L	C	G	A	
DN300 (12 in.)	ASME B16.5 CLASS 150	485 (19.09)	500 (19.69)	231 (9.09)	317 (12.48)	352 (13.86)	128 (282)
	ASME B16.5 CLASS 300	520 (20.47)	540 (21.26)				
	EN1092 – 1 PN10	445 (17.52)	500 (19.69)				
	EN1092 – 1 PN16	460 (18.11)	500 (19.69)				
	EN1092 – 1 PN25	485 (19.09)	540 (21.26)				
	EN1092 – 1 PN40	515 (20.28)	540 (21.26)				
	JIS 5K	430 (16.93)	500 (19.69)				
	JIS 10K	445 (17.52)	500 (19.69)				
	AS4087 PN14, PN16	455 (17.91)	500 (19.69)				
	AS2129 TABLE TABLE C D	455 (17.91)	500 (19.69)				
	AS2129 TABLE E	455 (17.91)	500 (19.69)				
	AS4087 PN21	490 (19.29)	500 (19.69)				
	AS2129 TABLE F	490 (19.29)	500 (19.69)				
DN350 (14 in.)	ASME B16.5 CLASS 150	535 (21.06)	550 (21.65)	257.5 (10.14)	346 (13.62)	376 (14.80)	100 (220)
	ASME B16.5 CLASS 300	585 (23.03)	570 (22.44)				
	EN1092 – 1 PN10	505 (19.88)	550 (21.65)				
	EN1092 – 1 PN16	520 (20.47)	550 (21.65)				
	EN1092 – 1 PN25	555 (21.85)	570 (22.44)				
	EN1092 – 1 PN40	580 (22.83)	570 (22.44)				
	JIS 5K	480 (18.90)	550 (21.65)				
	JIS 7.5K	530 (20.87)	550 (21.65)				
	JIS 10K	490 (19.29)	550 (21.65)				
	AS4087 PN14, PN16	525 (20.67)	550 (21.65)				
	AS2129 TABLE C D E	525 (20.67)	550 (21.65)				
	AS4087 PN21	550 (21.65)	550 (21.65)				
	AS2129 TABLE F	550 (21.65)	550 (21.65)				
	AS4087 PN35	550 (21.65)	570 (22.44)				
	AS2129 TABLE H	550 (21.65)	570 (22.44)				
DN375 (15 in.)	AS4087 PN14, PN16	550 (21.65)	550 (21.65)	257.5 (10.14)	346 (13.62)	376 (14.80)	115 (253)
	AS2129 TABLE C	550 (21.65)	550 (21.65)				
	AS4087 PN35	580 (22.83)	570 (22.44)				
DN400 (16 in.)	ASME B16.5 CLASS 150	600 (23.62)	600 (23.62)	285 (11.22)	371 (14.61)	420 (16.54)	115 (253)
	ASME B16.5 CLASS 300	650 (25.59)	620 (24.41)				
	EN1092 – 1 PN10	565 (22.24)	600 (23.62)				
	EN1092 – 1 PN16	580 (22.83)	600 (23.62)				
	EN1092 – 1 PN25	620 (24.41)	620 (24.41)				
	EN1092 – 1 PN40	660 (25.98)	620 (24.41)				
	JIS 5K	540 (21.26)	600 (23.62)				
	JIS 7.5K	582 (22.91)	600 (23.62)				
	JIS 10K	560 (22.05)	600 (23.62)				
	AS4087 PN14, PN16	580 (22.83)	600 (23.62)				
	AS2129 TABLE C D E	580 (22.83)	600 (23.62)				
	AS4087 PN21	610 (24.02)	600 (23.62)				
	AS2129 TABLE F	610 (24.02)	600 (23.62)				
	AS4087 PN35	610 (24.02)	620 (24.41)				
	AS2129 TABLE H	610 (24.02)	620 (24.41)				

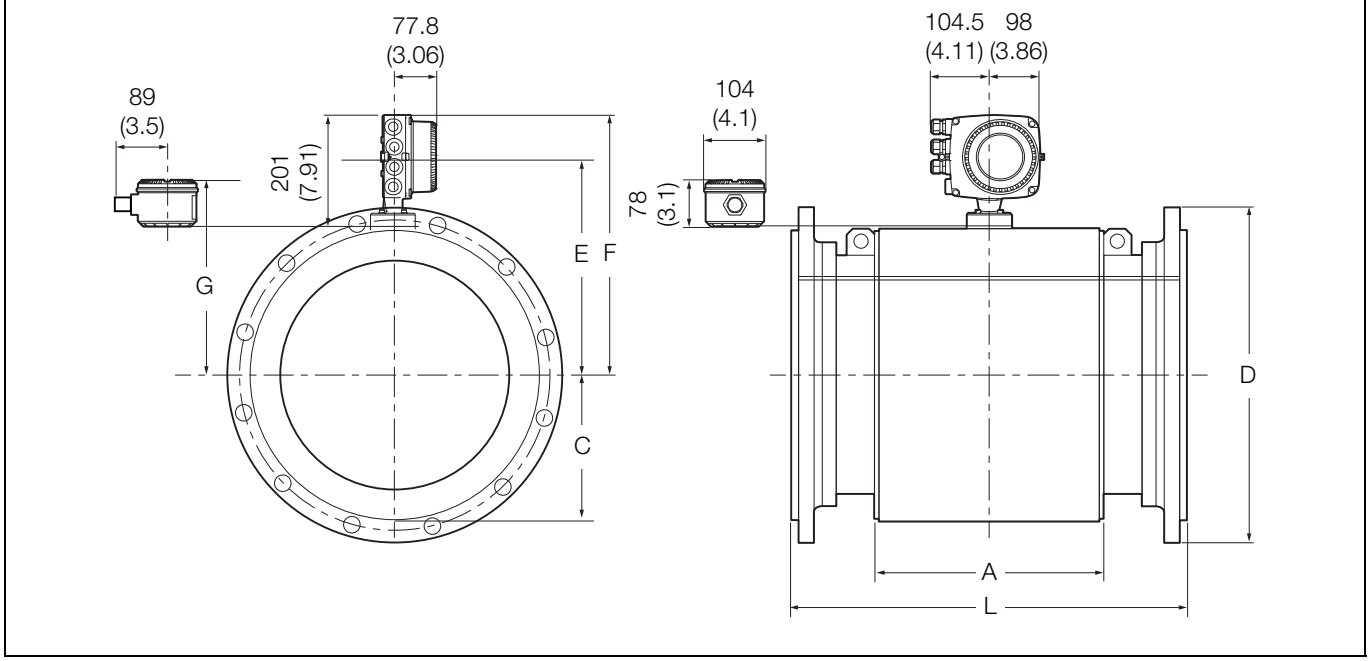
DN250 to 600 (10 to 24 in. NB) (FEF) dimensions / weights (Continued)

DN	Mating flange type	Dimensions in mm (in.)					Approx. weight in kg (lb)
		D	L	C	G	A	
DN450 (18 in.)	ASME B16.5 CLASS 150	635 (25.00)	700 (27.56)	317.5 (12.50)	402 (15.83)	480 (18.90)	160 (352)
	ASME B16.5 CLASS 300	710 (27.95)					
	EN1092 – 1 PN10	615 (24.21)					
	EN1092 – 1 PN16	640 (25.20)					
	EN1092 – 1 PN25	670 (26.38)					
	EN1092 – 1 PN40	685 (26.97)					
	JIS 5K	605 (23.82)					
	JIS 7.5K	652 (25.67)					
	JIS 10K	620 (24.41)					
	AS4087 PN14, PN16	640 (25.20)					
	AS2129 TABLE C D	640 (25.20)					
	AS2129 TABLE E	640 (25.20)					
	AS4087 PN21	675 (26.57)					
	AS2129 TABLE F	675 (26.57)					
	AS4087 PN35	675 (26.57)					
	AS2129 TABLE H	675 (26.57)					
DN500 (20 in.)	ASME B16.5 CLASS 150	700 (27.56)	770 (30.31)	345 (13.58)	429 (16.89)	520 (20.47)	217 (455)
	ASME B16.5 CLASS 300	775 (30.51)					
	EN1092 – 1 PN10	670 (26.38)					
	EN1092 – 1 PN16	715 (28.15)					
	EN1092 – 1 PN25	730 (28.74)					
	EN1092 – 1 PN40	755 (29.72)					
	JIS 5K	655 (25.79)					
	JIS 7.5K	706 (27.80)					
	JIS 10K	675 (26.57)					
	AS4087 PN 14, PN16	705 (27.76)					
	AS2129 TABLE C D E	705 (27.76)					
	AS4087 PN21	735 (28.94)					
	AS2129 TABLE F	735 (28.94)					
	AS4087 PN35	735 (28.94)					
	AS2129 TABLE H	735 (28.94)					
DN600 (24 in.)	ASME B16.5 CLASS 150	815 (32.09)	920 (36.22)	387.5 (15.25)	472 (18.58)	610 (24.02)	315 (693)
	ASME B16.5 CLASS 300	915 (36.02)					
	EN1092 – 1 PN10	780 (30.71)					
	EN1092 – 1 PN16	840 (33.07)					
	EN1092 – 1 PN25	845 (33.27)					
	EN1092 – 1 PN40	890 (35.04)					
	JIS 5K	770 (30.31)					
	JIS 7.5K	810 (31.89)					
	JIS 10K	795 (31.30)					
	AS4087 PN14, PN16	825 (32.48)					
	AS2129 TABLE C D	825 (32.48)					
	AS2129 TABLE E	825 (32.48)					
	AS4087 PN21	850 (33.46)					
	AS2129 TABLE F	850 (33.46)					
	AS4087 PN35	850 (33.46)					
	AS2129 TABLE H	850 (33.46)					

DN250 to 600 (10 to 24 in. NB) (FEF) dimensions / weights (Continued)

FEW – DN700 to 2400 (28 to 96 in. NB)

Dimensions in mm (in.)



DN700 to 2400 (28 to 96 in. NB) (FEW)

		Dimensions in mm (in.)							Approx. weight in kg (lb)	
DN	Mating flange type	D	L	F	C	E	G	A	Integral	Remote
DN700 (28 in.)	JIS 5K	875 (34.45)	910 (35.83)	604 (23.77)	403 (15.87)	528 (20.79)	530 (20.87)	444 (17.48)	216 (475)	214 (471)
	JIS 10K	905 (35.63)							282 (620)	280 (616)
	PN6	860 (33.86)							225 (495)	223 (491)
	PN10	895 (35.24)							303 (667)	301 (662)
	PN16	910 (35.83)							337 (741)	335 (737)
	AWWA C207 CLASS B	927 (36.50)							249 (548)	247 (543)
	AWWA C207 CLASS D	927 (36.50)							280 (616)	278 (612)
	AS4087 PN16	910 (35.83)							359 (790)	357 (785)
	AS2129 TABLE-D	910 (35.83)							263 (579)	261 (574)
	AS2129 TABLE-E	910 (35.83)							337 (741)	335 (737)
	PN25	960 (37.80)							471 (10.36)	469 (1032)
	PN40	995 (39.17)							586 (1289)	584 (1285)
	AWWA C207 CLASS E	927 (36.50)							472 (1038)	470 (1034)
	AWWA C207 CLASS F	1035 (40.75)							715 (1573)	713 (1569)
	AS4087 PN35	935							539 (1186)	537 (1181)
	ASME CL150 SERIES A	925 (36.42)							503 (1107)	501 (1102)
	ASME CL150 SERIES B	835 (32.87)							323 (711)	321 (706)
	ASME CL300 SERIES B	920 (36.22)							631 (1388)	629 (1384)

DN700 to 2400 (28 to 96 in. NB) (FEW) dimensions / weights

		Dimensions in mm (in.)							Approx. weight in kg (lb)	
DN	Mating flange type	D	L	F	C	E	G	A	Integral	Remote
DN750 (30 in.)	JIS 5K	945 (37.20)	990 (38.98)	630 (24.79)	429 (16.89)	554 (21.81)	556 (21.89)	444 (17.48)	251 (552)	249 (548)
	JIS 10K	970 (38.19)							327 (719)	325 (715)
	AWWA C207 CLASS B	984 (38.74)							273 (601)	271 (596)
	AWWA C207 CLASS D	984 (38.74)							344 (757)	342 (752)
	AS4087 PN16	995 (39.17)							467 (1027)	465 (1023)
	AS2129 TABLE-D	995 (39.17)							340 (748)	338 (744)
	AS2129 TABLE-E	995 (39.17)							454 (999)	452 (994)
	AWWA C207 CLASS E	984 (38.74)							496 (1091)	494 (1087)
	AWWA C207 CLASS F	1092 (43.99)							790 (1738)	788 (1734)
	AS4087 PN35	1015 (39.96)							663 (1459)	661 (1454)
	ASME CL150 SERIES A	985 (38.78)							544 (1197)	542 (1192)
	ASME CL150 SERIES B	885 (34.84)							320 (704)	318 (700)
	ASME CL300 SERIES B	990 (38.98)							748 (1646)	746 (1641)
DN800 (32 in.)	JIS 5K	995 (39.17)	1040 (40.04)	654 (25.74)	453 (17.83)	578 (22.76)	580 (22.83)	542 (21.34)	280 (616)	278 (612)
	JIS 10K	1020 (40.16)							364 (801)	362 (796)
	PN6	975 (38.39)							294 (647)	292 (642)
	PN10	1015 (39.96)							406 (893)	404 (889)
	PN16	1025 (40.35)							469 (1032)	467 (1027)
	AWWA C207 CLASS B	1060 (41.73)							328 (722)	326 (717)
	AWWA C207 CLASS D	1060 (41.73)							408 (898)	406 (893)
	AS4087 PN16	1060 (41.73)							530 (1166)	528 (1162)
	AS2129 TABLE-D	1060 (41.73)							386 (849)	384 (845)
	AS2129 TABLE-E	1060 (41.73)							519 (1142)	517 (1137)
	PN25	1085 (42.72)							615 (1353)	613 (1349)
	PN40	1140 (44.88)							866 (1905)	864 (1901)
	AWWA C207 CLASS E	1060 (41.73)							634 (1395)	632 (1390)
	AWWA C207 CLASS F	1150 (45.28)							897 (1973)	895 (1969)
	AS4087 PN35	1060 (41.73)							751 (1652)	749 (1648)
	ASME CL150 SERIES A	1060 (41.73)							700 (1540)	698 (1536)
	ASME CL150 SERIES B	940 (37.01)							406 (893)	404 (889)
	ASME CL300 SERIES B	1055 (41.54)							933 (2053)	931 (2048
DN900 (36 in.)	JIS 5K	1095 (43.11)	1170 (46.06)	705 (27.7()	504 (19.84)	629 (24.76)	631 (24.84)	570 (22.44)	369 812)	367 (807)
	JIS 10K	1120 (44.09)							445 (979)	443 (975)
	PN6	1075 (42.32)							390 (858)	388 (854)
	PN10	1115 (43.90)							502 (1104)	500 (1100)
	PN16	1125 (44.29)							589 (1296)	587 (1291)
	AWWA C207 CLASS B	1168 (45.98)							417 (917)	415 (913)
	AWWA C207 CLASS D	1168 (45.98)							493 (1085)	491 (1080)
	AWWA C207 CLASS E	1168 (45.98)							827 (1819)	825 (1815)
	AWWA C207 CLASS F	1270 (50.00)							1150 (2530)	1148 (2526)
	AS4087 PN16	1175 (46.26)							706 (1553)	704 (1549)
	AS2129 TABLE-D	1175 (46.26)							514 (1131)	512 (1126)
	AS2129 TABLE-E	1175 (46.26)							694 (1527)	692 (1522)
	PN25	1185 (46.65)							819 (1802)	817 (1797)
	PN40	1250 (49.21)							1158 (2548)	1156 (2543)
	AS4087 PN35	1185 (46.65)							1044 (2297)	1042 (2292)
	ASME CL150 SERIES A	1170 (46.06)							961 (2114)	959 (2110)
	ASME CL150 SERIES B	1055 (41.54)							595 (1309)	593 (1305)
	ASME CL300 SERIES B	1170 (46.06)							1147 (2523)	1145 (2519)

DN700 to 2400 (28 to 96 in. NB) (FEW) dimensions / weights (Continued)

		Dimensions in mm (in.)							Approx. weight in kg (lb)	
DN	Mating flange type	D	L	F	C	E	G	A	Integral	Remote
DN1000 (40 in.)	JIS 5K	1195 (47.05)	1300 (51.18)	755 (29.71)	554 (21.81)	679 (26.73)	681 (26.81)	624 (24.57)	441 (970)	439 (966)
	JIS 10K	1235 (48.62)							572 (1258)	570 (1254)
	PN6	1175 (46.26)							466 (1025)	464 (1021)
	PN10	1230 (48.43)							674 (1483)	672 (1478)
	PN16	1255 (49.41)							879 (1934)	877 (1929)
	AWWA C207 CLASS B	1289 (50.75)							503 (1107)	501 (1102)
	AWWA C207 CLASS D	1289 (50.75)							659 (1450)	657 (1445)
	AWWA C207 CLASS E	1289 (50.75)							1028 (2262)	1026 (2257)
	AWWA C207 CLASS F	1378 (54.25)							1367 (3007)	1365 (3003)
	AS4087 PN16	1255 (49.41)							831 (1828)	829 (1824)
	AS2129 TABLE-D	1255 (49.41)							610 (1342)	608 (1338)
	AS2129 TABLE-E	1255 (49.41)							833 (1833)	831 (1028)
	PN25	1320 (51.97)							1207 (2655)	1205 (2651)
	PN40	1360 (53.54)							1413 (3109)	1411 (3104)
	AS4087 PN35	1275 (50.20)							1244 (2737)	1242 (2732)
	ASME CL150 SERIES A	1290 (50.79)							1149 (2528)	1147 (2523)
	ASME CL300 SERIES A	1240 (48.82)							1349 (2968)	1347 (2963)
	ASME CL150 SERIES B	1175 (46.26)							738 (1624)	736 (1619)
	ASME CL300 SERIES B	1275 (50.20)							1487 (3271)	1485 (3267)
DN1050 (42 in.)	AWWA C207 CLASS B	1346 (5299)	1365 (53.74)	808 (31.82)	608 (23.92)	733 (28.84)	735 (28.92)	624 (24.57)	564 (1241)	562 (1236)
	AWWA C207 CLASS D	1346 (5299)							669 (1472)	667 (1467)
	AWWA C207 CLASS E	1346 (5299)							1143 (2515)	1141 (2510)
	AWWA C207 CLASS F	1448 (57.01)							1568 (3450)	1566 (3445)
	ASME CL150 SERIES B	1225 (48.23)							809 (1780)	807 (1775)
	ASME CL150 SERIES A	1345 (52.95)							1289 (2836)	1287 (2831)
	ASME CL300 SERIES A	1290 (50.79)							1527 (3359)	1525 (3355)
	ASME CL300 SERIES B	1335 (52.56)							1704 (3749)	1702 (3744)
DN1100 (44 in.)	JIS 5K	1305 (51.38)	1430 (56.30)						510 (1122)	508 (1118)
	JIS 10K	1345 (52.95)							689 (1516)	687 (1511)
	AWWA C207 CLASS B	1403 (55.24)							615 (1353)	613 (1349)
	AWWA C207 CLASS D	1403 (55.24)							807 (1775)	805 (1771)
	AWWA C207 CLASS E	1404 (55.26)							1205 (2651)	1203 (2647)
	AWWA C207 CLASS F	1505 (59.25)							1719 (3782)	1717 (3777)
DN1200 (48 in.)	JIS 5K	1420 (55.91)	1560 (61.42)	860 (33.85)	659 (25.94)	784 (30.87)	786 (30.94)	802 (31.57)	651 (1432)	649 (1428)
	JIS 10K	1465 (57.68)							967 (2127)	965 (2123)
	PN6	1405 (55.31)							710 (1562)	708 (1558)
	PN10	1455 (57.28)							1107 (2435)	1105 (2431)
	PN16	1485 (58.46)							1363 (2999)	1361 (2994)
	AWWA C207 CLASS B	1511 (59.49)							772 (1698)	770 (1694)
	AWWA C207 CLASS D	1511 (59.49)							999 (2198)	997 (2193)
	AWWA C207 CLASS E	1511 (59.49)							1458 (3208)	1456 (3203)
	AWWA C207 CLASS F	1651 (65.00)							2400 (5280)	2398 (5276)
	AS4087 PN16	1490 (58.66)							1253 (2757)	1251 (2752)
	AS2129 TABLE-D	1490 (58.66)							1023 (2251)	1021 (2246)
	AS2129 TABLE-E	1490 (58.66)							1272 (2798)	1270 (2794)
	PN25	1530 (60.24)							1559 (3430)	1557 (3425)
	PN40	1575 (62.01)							2133 (4693)	2131 (4688)
	AS4087 PN35	1530 (60.24)							2115 (4653)	2113 (4649)
	ASME CL150 SERIES A	1510 (59.45)							1707 (3755)	1705 (3751)
	ASME CL300 SERIES A	1465 (57.68)							2163 (4759)	2161 (4754)
	ASME CL150 SERIES B	1390 (54.72)							1085 (2387)	1083 (2383)
	ASME CL300 SERIES B	1510 (59.45)							2352 (5174)	2350 (5170)

DN700 to 2400 (28 to 96 in. NB) (FEW) dimensions / weights (Continued)

		Dimensions in mm (in.)							Approx. weight in kg (lb)	
DN	Mating flange type	D	L	F	C	E	G	A	Integral	Remote
DN1350 (54 in.)	AWWA C207 CLASS B	1683 (66.26)	1755 (69.09)	955 (37.59)	754 (29.69)	879 (34.61)	881 (34.69)	902 (35.51	981 (2158)	979 (2154)
	AWWA C207 CLASS D	1683 (66.26)							1213 (2669)	1211 (2664)
	AWWA C207 CLASS E	1683 (66.26)							1942 (4272)	1940 (4268)
DN1400 (56 in.)	PN6	1630 (64.17)	1820 (71.65)						1085 (2387)	1083 (2383)
	PN10	1675 (65.94)							1731 (3808)	1729 (3804)
	PN16	1685 (66.34)							1770 (3894)	1768 (3890)
	ASME CL150 SERIES B	1600 (62.99)							1593 (3505)	1591 (3500)
	PN25	1755 (69.09)							2368 (5210)	2366 (5205)
	PN40	1795 (70.67)							3086 (6789)	3084 (6785)
	ASME CL150 SERIES A	1745 (68.70)							2556 (5623)	2554 (5619)
	ASME CL300 SERIES A	1710 (67.32)							3376 (7427)	3374 (7423)
	ASME CL300 SERIES B	1765 (69.49)							3758 (8268)	3756 (8263)
DN1500 (60 in.)	JIS 5K	1730 (68.11)	1950 (76.77)	1065 (41.92)	864 (34.02)	989 (38.94)	991 (39.02)	910 (35.83)	1029 (2264)	1027 (2259)
	JIS 10K	1795 (70.67)							1504 (3309)	1502 (3304)
	ASME CL150 SERIES B	1725 (67.91)							2031 (4468)	2029 (4464)
	AWWA C207 CLASS B	1854 (72.99)							1229 (2704)	1227 (2699)
	AWWA C207 CLASS D	1854 (72.99)							1514 (3331)	1512 (3326)
	AWWA C207 CLASS E	1854 (72.99)							2544 (5597)	2542 (5592)
	ASME CL150 SERIES A	1855 (73.03)							3084 (6785)	3082 (6780)
	ASME CL300 SERIES A	1810 (71.26)							3875 (8525)	3873 (8521)
	ASME CL300 SERIES B	1880 (74.02							4181 (9198)	4179 (9194)
DN1600 (64 in.)	PN6	1830 (72.05)	2080 (81.89)	1066 (41.96)	865 (34.06)	990 (38.98)	992 (39.06)	1000 (39.37)	1434 (3155)	1432 (3150)
	PN10	1915 (75.39)							2525 (5555)	2523 (5551)
	PN25	1975 (77.76)							3201 (7042)	3199 (7038)
	PN16	1930 (75.98)							2768 (6090)	2766 (6085)
	PN40	2025 (79.72)							4375 (9625)	4373 (9621)
DN1650 (66 in.)	AWWA C207 CLASS B	2032 (80.00)	2145 (84.45)	1116 (43.94)	915 (36.02)	1040 (40.94)	1042 (41.02)	1000 (39.37)	1504 (3309)	1502 (3304)
	AWWA C207 CLASS D	2032 (80.00)							2025 (4455)	2023 (4451)
DN1800 (72 in.)	PN6	2045 (80.51)	2340 (92.13)	1181 (46.50)	980 (38.58)	1105 (43.50)	1107 (43.48)	1100 (43.31)	1853 (4077)	1851 (4072)
	PN10	2115 (83.27)							3180 (6996)	3178 (6992)
	PN16	2130 (83.86)							3657 (8045)	3655 (8041)
	PN25	2195 (86.42)							4422 (9728)	4420 (9724)
	AWWA C207 CLASS B	2197 (86.50)							1773 (3901)	1771 (3896)
	AWWA C207 CLASS D	2197 (86.50)							2387 (5251)	2385 (5247)
DN1950 (78 in.)	AWWA C207 CLASS B	2362 (92.99)	2535 (99.80)	1291 (50.81)	1090 (42.91)	1215 (47.83)	1217 (47.91)	1180 (46.46)	2309 (5080)	2307 (5075)
	AWWA C207 CLASS D	2362 (92.99)							3037 (6681)	3035 (6677)
DN2000 (80 in.)	PN6	2265 (89.17)	2600 (102.36)						2581 (5678)	2579 (5674)
	PN10	2325 (91.54)							4254 (9359)	4252 (9354)
	PN16	2345 (92.32)							4556 (10023)	4554 (10019)
	PN25	2425 (95.47)							5896 (12971)	5894 (12967)
DN2100 (84 in.)	AWWA C207 CLASS B	2534 (99.76)	2730 (107.48)	1395 (54.91)	1194 (47.01)	1319 (51,93)	1321 (52.01)	1180 (46.46)	2641 (5810)	2639 (5806)
	AWWA C207 CLASS D	2534 (99.76)							3487 (7671)	3485 (7667)
DN2200 (88 in.)	PN6	2475 (97.44)	2860 (112.60)					1330 (52.36)	3363 (7399)	3361 (7394)
	PN10	2550 (100.39)							5795 (12749)	5793 (12745)
DN2400 (96 in.)	PN6	2685 (105.71	3120 (122.83)	1495 (58.85)	1294 (50.94	1419 (55.87)	1421 (55.94)	1450 (57.09)	4100 (9020)	4098 (9016)
	PN10	2760 (108.66)							6968 (15330)	6966 (15325)

DN700 to 2400 (28 to 96 in. NB) (FEW) dimensions / weights (Continued)

Ordering information

Electromagnetic flowmeter WaterMaster – FEW11, FEW12 and FEW18

Variant digit number	1 … 5	6	7 … 9	10	11	12	13	14, 15	16	17	18	19	20	21	22	23	24	25	26	27	Options
Flowmeter system – full bore, integral mount (DN10 to DN32 Only)	**FEW11**																				
Flowmeter system – full bore, remote mount	**FEW12**		**XXX**	**X**	**X**	**X**	**X**	**XX**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	
Full bore sensor only – for use with WaterMaster transmitter / remote	**FEW18**																				
Design																					
Non-hazardous areas		1																			
Hazardous areas		5																			
Bore diameter																					
DN10 (3/8 in.)			010																		
DN15 (1/2 in.)			015																		
DN20 (3/4 in.)			020																		
DN25 (1 in.)			025																		
DN32 (1 1/4 in.)			032																		
Liner material																					
PTFE				A																	
Electrode design																					
Standard					1																
Other					9																
Measuring electrodes material																					
Hastelloy® C-4 (2.4610)						D															
Grounding accessories																					
Not required							0														
One potential equalizing ring (stainless steel)							3														
Two potential equalizing rings (stainless steel)							4														
Other							9														
Process connection type																					
ASME B16.5 B class 150								A1													
ASME B16.5 B class 300								A3													
ISO / EN PN40								S4													
DIN PN40								D4													
Other								Z9													
Process connection material																					
Carbon steel flanges – DN20 to DN32 (3/4 to 1 1/4 in. NB)									B												
Stainless steel flange 1.4571 (316 Ti) – DN10 to DN15 (3/8 to 1/2 in. NB)									D												
Other									Z												
Usage certifications																					
Standard (without PED)										1											
Other										9											
Calibration type																					
Class 2 calibration – standard accuracy 0.4 %											A										
Class 1 calibration – enhanced accuracy 0.2 %											B										
Extended range, class 1 calibration – standard accuracy 0.4 %											N										
Extended range, class 2 calibration – enhanced accuracy 0.2 %											P										
Temperature range installation / ambient temperature range																					
Standard design/ –20 … 60 °C (–4 … 140 °F)												1									
Nameplate																					
Adhesive													A								
Signal cable length and type																					
Without signal cable														0							
5 m (15 ft.) cable														1							
10 m (30 ft.) cable														2							
20 m (60 ft.) cable														3							
30 m (100 ft.) cable														4							
50 m (165 ft.) cable														5							
80 m (260 ft.) cable														6							
100 m (325 ft.) cable														7							
150 m (490 ft.) cable														8							
Special length or cable type														9							
Explosion protection certification																					
General purpose (non-Ex design)															A						
FM Class 1 Div. 2															G						
FMc Class 1 Div. 2															P						
Others															Z						

Continued on next page…

WaterMaster
Electromagnetic flowmeter

Variant digit number	1 … 5	6	7 … 9	10	11	12	13	14, 15	16	17	18	19	20	21	22	23	24	25	26	27	Options
Flowmeter system – full bore, integral mount (DN10 to DN32 Only)	**FEW11**																				
Flowmeter system – full bore, remote mount	**FEW12**		**XXX**	**X**	**X**	**X**	**X**	**XX**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	
Full bore sensor only – for use with WaterMaster transmitter / remote	**FEW18**																				

Protection class transmitter / protection class sensor

IP67 (NEMA 4X) / IP67 (NEMA 4X) – cable not fitted and potted to sensor	1
IP67 (NEMA 4X) / IP67 (NEMA 4X) – cable fitted and potted to sensor	7

Cable conduits*

M20 x 1.5 (plastic)	A
NPT 1/2 in. (blanked when cable not fitted)	B
M20 SWA (armored)	D
M20 SWA sensor, M20 x 1.5 (plastic) power / output	F
Without	Y

Power supply

Without	0
100... 230 V AC, 50 Hz	1
24 V AC or 24 V DC, 50 Hz	2
100... 230 V AC, 60 Hz	3
24 V AC or 24 V DC, 60 Hz	4

Input and output signal type

HART + 20 mA + pulse + contact output	A
PROFIBUS DP RS485 physical layer + pulse + contact output (general-purpose design only)	G
MODBUS RTU RS485 physical layer + pulse + contact output (general-purpose design only)	M
Without	Y

Configuration type / diagnostics type

Not required	0
Factory default/ standard	1

Options**

Accessories

Configuration lead	AC

Documentation language

German	M1	French	M4	Swedish	M7	Portuguese	MA
Italian	M2	English	M5 (default)	Finnish	M8	Danish	MF
Spanish	M3					Norwegen	MN

Verification type

Without fingerprint	V0
VeriMaster	V3

Potable water approval

WRAS – cold water approval	CWA
Without	CWY

Power supply frequency (sensor FEW 18 only)

50 Hz	F5	60 Hz	F6

Number of testpoints (FEW 10 to 32 only)

1 Point	T1
3 Points	T3

* For FM or FMC Approved versions, NPT only permitted.
** Add codes for options.

WaterMaster
Electromagnetic flowmeter

Electromagnetic flowmeter WaterMaster FEV11, FEV12 and FEV18

Variant digit number	1 … 5	6	7 … 9	10	11	12	13	14, 15	16	17	18	19	20	21	22	23	24	25	26	27	Options
Flowmeter system, optimized full bore, integral mount	**FEV11**																				
Flowmeter system, optimized full bore, remote mount	**FEV12**		XXX	X	X	X	X	XX	X	X	X	X	X	X	X	X	X	X	X	X	
Optimized full bore sensor only, for use with WaterMaster transmitter/remote	**FEV18**																				
Design																					
Non-hazardous areas		1																			
Hazardous areas		5																			
Bore diameter																					
DN40 (1½ in.)			040																		
DN50 (2 in.)			050																		
DN65 (2½ in.)			065																		
DN80 (3 in.)			080																		
DN100 (4 in.)			100																		
DN125 (5 in.)			125																		
DN150 (6 in.)			150																		
DN200 (8 in.)			200																		
Liner material																					
Polypropylene				V																	
Electrode design																					
Standard					1																
Measuring electrodes material																					
Stainless steel 316						S															
Hastelloy® C-22						C															
Super-austenitic steel						U															
Grounding accessories																					
Standard							1														
One potential equalizing ring (stainless steel)							3														
Two potential equalizing rings (stainless steel)							4														
Process connection type																					
Flanges ASME B16.5 class 150								A1													
Flanges AS 4087 PN21 (≥ DN50 [2 in. NB])								E0													
Flanges AS 4087 PN16 (≥ DN50 [2 in. NB])								E1													
Flanges AS 4087 PN14								E2													
Flanges AS 2129 Table F								E3													
Flanges AS 2129 Table E								E4													
Flanges AS 2129 Table D								E5													
Flanges AS 2129 Table C								E6													
Flanges JIS G5527 7.5K (≥ DN100 [4 in. NB])								J0													
Flanges JIS B2220 10K								J1													
ISO/EN PN10								S1													
ISO / EN PN16 (≥ DN50 [2 in. NB])								S2													
ISO / EN PN40 (DN40 [1½ in. NB] only) 16 bar rated								S4													
Process connection material																					
Carbon steel flanges									B												
Usage certifications																					
Standard										1											
Calibration type																					
Class 2 Calibration – standard accuracy 0.4 %											A										
Class 1 Calibration – enhanced accuracy 0.2 %											B										
Extended range, class 1 calibration – standard accuracy 0.4 %											N										
Extended range, class 2 calibration – high accuracy 0.2 %											P										

Continued on next page…

WaterMaster
Electromagnetic flowmeter

Variant digit number	1 … 5	6	7 … 9	10	11	12	13	14, 15	16	17	18	19	20	21	22	23	24	25	26	27	Options
Flowmeter system, optimized full bore, integral mount	**FEV11**																				
Flowmeter system, optimized full bore, remote mount	**FEV12**		**XXX**	**X**	**X**	**X**	**X**	**XX**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	
Optimized full bore sensor only, for use with WaterMaster transmitter/remote	**FEV18**																				
Temperature range installation / ambient temperature range																					
Standard design / –20 … 60 °C (–4 … 140 °F)												1									
Nameplate																					
Adhesive													A								
Signal cable length and type*																					
Without signal cable														0							
5 m (15 ft.) cable														1							
10 m (30 ft.) cable														2							
20 m (60 ft.) cable														3							
30 m (100 ft.) cable														4							
50 m (165 ft.) cable														5							
80 m (260 ft.) cable														6							
100 m (325 ft.) cable														7							
150 m (490 ft.) cable														8							
Special length > 150 m (> 490 ft.)														9							
Explosion protection certification																					
General purpose (non-Ex design)															A						
FM Class 1 Div. 2															G						
FMc Class 1 Div. 2															P						
Others															Z						
Protection class transmitter / protection class sensor																					
IP67 (NEMA 4X) / IP67 (NEMA 4X) – integral																1					
IP67 (NEMA 4X) / IP68 (NEMA 6P) – cable not fitted and not potted																2					
IP67 (NEMA 4X) / IP68 (NEMA 6P) – cable fitted and potted																3					
Cable conduits *																					
M20 x 1.5 (plastic)																	A				
NPT ½ in. (blanked when cable not fitted)																	B				
M20 SWA (armored)																	D				
M20 SWA sensor, M20 x 1.5 (plastic) power / output																	F				
Without																	Y				
Power supply																					
Without																		0			
100... 230 V AC, 50 Hz																		1			
24 V AC or 24 V DC, 50 Hz																		2			
100... 230 V AC, 60 Hz																		3			
24 V AC or 24 V DC, 60 Hz																		4			
Others																		9			
Input and output signal type																					
HART + 20 mA + pulse + contact output																			A		
PROFIBUS DP RS485 physical layer + pulse + contact output (general-purpose design only)																			G		
MODBUS RTU RS485 physical layer + pulse + contact output (general-purpose design only)																			M		
Without																			Y		
Configuration type / diagnostics type																					
Without																				0	
Factory defaults / standard diagnostics																				1	

Continued on next page…

* The type of signal cable supplied (standard or armored) depends on the type of cable conduit (variant digit number 24) ordered.
For FM or FMC Approved versions, NPT only permitted.

WaterMaster
Electromagnetic flowmeter

Variant digit number	1 … 5	6	7 … 9	10	11	12	13	14, 15	16	17	18	19	20	21	22	23	24	25	26	27	Options
Flowmeter system, optimized full bore, integral mount	**FEV11**		XXX	X	X	X	X	XX	X	X	X	X	X	X	X	X	X	X	X	X	
Flowmeter system, optimized full bore, remote mount	**FEV12**																				
Optimized full bore sensor only, for use with WaterMaster transmitter/remote	**FEV18**																				

Options**

Accessories

Configuration lead	AC

Documentation language

German	M1	Swedish	M7
Italian	M2	Finnish	M8
Spanish	M3	Portuguese	MA
French	M4	Danish	MF
English	M5 (default)	Norwegian	MN

Other usage certifications

Measuring Instruments Directive (MID)	CM1
OIML R49 Calibration	CM2

Verification type

Without fingerprint	V0
VeriMaster	V3

Potable water approval

WRAS – cold water approval	CWA
NSF – 61 meter approval	CWC
Without	CWY

Power supply frequency (sensor FEV18 only)

50 Hz	F5	60 Hz	F6

Number of testpoints

1 Point	T1
3 Points	T3

**Add codes for options.

WaterMaster
Electromagnetic flowmeter

Electromagnetic flowmeter WaterMaster FEF12 and FEF18 (Sizes up to DN2400 [96 in. NB] still available on request)

Variant digit number	1 … 5	6	7 … 9	10	11	12	13	14, 15	16	17	18	19	20	21	22	23	24	25	26	27	Options
Flowmeter system, full bore, remote mount	**FEF12**																				
Full bore sensor only, for use with WaterMaster transmitter / remote	**FEF18**		**XXX**	**X**	**X**	**X**	**X**	**XX**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	
Design																					
Non-hazardous areas		1																			
Hazardous areas (DN≥700 [27/28* in. NB])		5																			
*Size is dependent on flange specification																					
Bore diameter																					
DN250 (10 in.)			250																		
DN300 (12 in.)			300																		
DN350 (14 in.)			350																		
DN375 (15 in.)			375																		
DN400 (16 in.)			400																		
DN450 (18 in.)			450																		
DN500 (20 in.)			500																		
DN600 (24 in.)			600																		
Others			999																		
Liner material																					
Elastomer				K																	
Electrode design																					
Standard					1																
Others					9																
Measuring electrodes material																					
Stainless steel 316						S															
Hastelloy® C-22						C															
Super-austenitic steel (DN250 to 600 [10 to 24 in. NB])						U															
Others						Z															
Grounding accessories																					
Standard							1														
One potential equalizing ring (stainless steel)							3														
Two potential equalizing rings (stainless steel)							4														
Others							9														
Process connection type																					
Flanges ASME B16.5 class 150								A1													
Flanges ASME B16.5 class 300								A3													
Flanges AWWA C207 class B								C1													
Flanges AWWA C207 class D								C2													
Flanges AS 4087 PN21								E0													
Flanges AS 4087 PN16								E1													
Flanges AS 4087 PN14								E2													
Flanges AS 2129 Table F								E3													
Flanges AS 2129 Table E								E4													
Flanges AS 2129 Table D								E5													
Flanges AS 2129 Table C								E6													
Flanges AS 2129 Table H								E7													
Flanges AS 4087 PN35								E8													
Flanges JIS G5527 7.5K								J0													
Flanges JIS B2220 10K								J1													
Flanges JIS B2220 5K								J2													
Flanges ISO / EN PN6								S0													
Flanges ISO / EN PN10								S1													
Flanges ISO / EN PN16								S2													
Flanges ISO / EN PN25								S3													
Flanges ISO / EN PN40								S4													
Others								Z9													
Process connection material																					
Carbon steel flanges									B												
Others									Z												
Usage certifications																					
Standard										1											
Calibration type																					
Class 2 Calibration – standard accuracy 0.4 %											A										
Class 1 Calibration – enhanced accuracy 0.2 %											B										
Extended range, class 1 calibration – standard accuracy 0.4 %											N										
Extended range, class 2 calibration – enhanced accuracy 0.2 %											P										
Temperature range installation / ambient temperature range																					
Standard design / –20 … 60 °C (–4 … 140 °F)												1									

Continued on next page …

WaterMaster
Electromagnetic flowmeter

Variant digit number	1 … 5	6	7 … 9	10	11	12	13	14, 15	16	17	18	19	20	21	22	23	24	25	26	27	Options
Flowmeter system, full bore, remote mount	**FEF12**		XXX	X	X	X	X	XX	X	X	X	X	X	X	X	X	X	X	X	X	
Full bore sensor only, for use with WaterMaster transmitter / remote	**FEF18**																				

Nameplate

Adhesive	A

Signal cable length and type*

Without signal cable	0
5 m (15 ft.) cable	1
10 m (30 ft.) cable	2
20 m (60 ft.) cable	3
30 m (100 ft.) cable	4
50 m (165 ft.) cable	5
80 m (260 ft.) cable	6
100 m (325 ft.) cable	7
150 m (490 ft.) cable	8
Special Length > 150 m (> 490 ft.) (and / or armored cable)	9

Explosion protection certification

General purpose (non-Ex design)	A
FM Class 1 Div. 2 (DN≥700 [27/28* in. NB]) DN≤1600 [66 in. NB])	G
FMc Class 1 Div. 2 (DN≥700 [27/28* in. NB]) DN≤1600 [66 in. NB])	P
Others	Z

Protection class transmitter / protection class sensor

IP67 (NEMA 4X) / IP68 (NEMA 6P) – cable not fitted and not potted	2
IP67 (NEMA 4X) / IP68 (NEMA 6P) – cable fitted and potted	3

Cable conduits**

M20 x 1.5 (plastic)	A
NPT 1/2 in. (blanked when cable not fitted)	B
M20 SWA (armored)	D
M20 SWA sensor, M20 x 1.5 (plastic) power / output	F
Without	Y

Power supply

Without	0
100... 230 V AC (50 Hz)	1
24 V AC or 24 V DC (50 Hz)	2
100... 230 V AC (60 Hz)	3
24 V AC or 24 V DC (60 Hz)	4

Input and output signal type

HART + 20 mA + pulse + contact output	A
PROFIBUS DP RS485 physical layer + pulse + contact output (general-purpose design only)	G
MODBUS RTU RS485 physical layer + pulse + contact output (general-purpose design only)	M
Without	Y

Configuration type / diagnostics type

Without	0
Factory defaults / standard diagnostics	1

Options***

Accessories

Configuration lead	AC

Documentation language

German	M1	French	M4	Swedish	M7	Portuguese	MA
Italian	M2	English	M5 (default)	Finnish	M8	Danish	MF
Spanish	M3					Norwegen	MN

Verification type

Without fingerprint	V0
VeriMaster	V3

Potable water approvals

WRAS – cold water approval	CWA
NSF-61 meter approval	CWC
ACS	CWF
Without	CWY

Power supply frequency (sensor FEF 18 only)

50 Hz	F5	60 Hz	F6

Number of testpoints

1 Point	T1
3 Points	T3

*Size is dependent on flange specification
**The type of signal cable supplied (standard or armored) depends on the type of cable conduit (variant digit number 24) ordered.
For FM or FMC Approved versions, NPT only permitted.
***Add codes for options.

WaterMaster
Electromagnetic flowmeter

Electromagnetic flowmeter WaterMaster – FEW31, FEW32 and FEW38 (FEF still available on request)

Variant digit number	1 … 5	6	7 … 9	10	11	12	13	14, 15	16	17	18	19	20	21	22	23	24	25	26	27	Options
Flowmeter system – full bore, integral mount	**FEW31**																				
Flowmeter system – full bore, remote mount	**FEW32**		**XXX**	**X**	**X**	**X**	**X**	**XX**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	
Full bore sensor only – for use with WaterMaster transmitter/remote	**FEW38**																				
Design																					
Non-hazardous areas		1																			
Hazardous areas		5																			
Bore diameter																					
DN700 (28 in.)			700																		
DN750 (30 in.)			750																		
DN800 (32 in.)			800																		
DN900 (36 in.)			900																		
DN1000 (40 in.)			001																		
DN1050 (42 in.)			051																		
DN1100 (44 in.)			101																		
DN1200 (48 in.)			201																		
DN1350 (54 in.)			351																		
DN1400 (56 in.)			401																		
DN1500 (60 in.)			501																		
DN1600 (64 in.)			601																		
DN1650 (66 in.)			651																		
DN1800 (72 in.)			801																		
DN1950 (78 in.)			951																		
DN2000 (80 in.)			002																		
DN2100 (84 in.)			102																		
DN2200 (88 in.)			202																		
DN2400 (95 in.)			402																		
Liner material																					
Hard rubber				H																	
Elastomer				K																	
Electrode design																					
Standard					1																
Other					9																
Measuring electrodes material																					
Hastelloy® C-4 (2.4610)						D															
Stainless steel 316L						S															
Hastelloy C-22						C															
Grounding accessories																					
Not required							0														
Standard							1														
One potential equalizing ring (stainless steel)							3														
Two potential equalizing rings (stainless steel)							4														

Continued on next page…

WaterMaster
Electromagnetic flowmeter

Variant digit number	1 … 5	6	7 … 9	10	11	12	13	14, 15	16	17	18	19	20	21	22	23	24	25	26	27	Options
Flowmeter system – full bore, integral mount	**FEW31**																				
Flowmeter system – full bore, remote mount	**FEW32**		**XXX**	**X**	**X**	**X**	**X**	**XX**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	
Full bore sensor only – for use with WaterMaster transmitter/remote	**FEW38**																				

Process connection type

Flanges ANSI / ASME B16.5 / 16.47 series B Class 150	A1
Flanges ANSI / ASME B16.5 / 16.47 series B Class 300	A3
Flanges ANSI / ASME B16.5 / 16.47 series A Class 150	B1
Flanges ANSI / ASME B16.5 / 16.47 series A Class 300	B3
Flanges AWWA C207 Class B	C1
Flanges AWWA C207 Class D	C2
Flanges AWWA C207 Class E	C3
Flanges AWWA C207 Class F	C4
Flanges JIS 10K	J1
Flanges JIS 5K	J2
Flanges AS 4087 PN 16	E1
Flanges AS 2129 Table E	E4
Flanges AS 2129 Table D	E5
Flanges AS 4087 PN 35	E8
ISO 7005, DIN, EN 1092-1 PN6	S0
ISO 7005, DIN, EN 1092-1 PN10	S1
ISO 7005, DIN, EN 1092-1 PN16	S2
ISO 7005, DIN, EN 1092-1 PN25	S3
ISO 7005, DIN, EN 1092-1 PN40	S4

Process connection material

Carbon steel flanges	B
Stainless steel flange	D

Usage certifications

Standard (without PED)	1

Calibration type

Class 2 calibration – standard accuracy 0.4 %	A
Class 1 calibration – enhanced accuracy 0.2 %	B

Temperature range installation / ambient temperature range

Standard design/ –20 … 60 °C (–4 … 140 °F)	1

Nameplate

Adhesive	A

Signal cable length and type

Without signal cable	0
5 m (15 ft.) cable	1
10 m (30 ft.) cable	2
20 m (60 ft.) cable	3
30 m (100 ft.) cable	4
50 m (165 ft.) cable	5
80 m (260 ft.) cable	6
100 m (325 ft.) cable	7
150 m (490 ft.) cable	8
Special length or cable type	9

Explosion protection certification*

General purpose (non-Ex design)	A

Continued on next page…

WaterMaster
Electromagnetic flowmeter

Variant digit number	1 … 5	6	7 … 9	10	11	12	13	14, 15	16	17	18	19	20	21	22	23	24	25	26	27	Options
Flowmeter system – full bore, integral mount	**FEW31**																				
Flowmeter system – full bore, remote mount	**FEW32**		**XXX**	**X**	**X**	**X**	**X**	**XX**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	
Full bore sensor only – for use with WaterMaster transmitter/remote	**FEW38**																				

Protection class transmitter / protection class sensor

IP67 (NEMA 4X) / IP67 (NEMA 4X) – cable not fitted and not potted to sensor	1
IP 67 (NEMA 4x) / IP68 (NEMA 6P) – cable not fitted and not potted to sensor	2
IP 67 (NEMA 4x) / IP68 (NEMA 6P) – cable fitted and potted to sensor	3

Cable conduits **

M20 x 1.5 (plastic)	A
NPT 1/2 in. (blanked when cable not fitted)	B
M20 SWA (armored)	D
M20 SWA sensor, M20 x 1.5 (plastic) power / output	F
Without	Y

Power supply

Without	0
100 ... 230 V AC, 50 Hz	1
24 V AC or 24 V DC, 50 Hz	2
100... 230 V AC, 60 Hz	3
24 V AC or 24 V DC, 60 Hz	4

Input and output signal type

HART + 20 mA + pulse + contact output	A
PROFIBUS DP RS485 physical layer + pulse + contact output (general-purpose design only)	G
MODBUS RTU RS485 physical layer + pulse + contact output (general-purpose design only)	M
Without	Y

Configuration type / diagnostics type

Not required	0
Factory default / Standard	1

Options***

Accessories

Configuration lead	AC

Documentation language

German	M1	French	M4	Swedish	M7	Portuguese	MA
Italian	M2	English	M5 (default)	Finnish	M8	Danish	MF
Spanish	M3					Norwegen	MN

Verification type

Without fingerprint	V0
VeriMaster	V3

Potable water approval

WRAS – cold water approval	CWA
WRAS – 60 °C water approval	CWK
NSF material approval	CWM
Without	CWY

Power supply frequency (sensor FEW38 only)

50 Hz	F5	60 Hz	F6

* FM approval in process. FEF product still available with full FM approval

** The type of signal cable supplied (standard or armored) depends on the type of cable conduit (variant digit number 24) ordered. For FM or FMC Approved versions, NPT only permitted.

*** Add codes for options.

WaterMaster
Electromagnetic flowmeter

Electromagnetic flowmeter transmitter for WaterMaster FET10 and FET12

Variant digit number	1 … 5	6	7	8	9	10	11	12	13	14	15	Options
Transmitter converter module	**FET10**		x	x	x	x	x	x	x	x	x	
Remote transmitter	**FET12**											
Design												
Non-hazardous area		1										
Hazardous area		5										
Temperature range installation / ambient temperature range												
Standard design / –20 … 60 °C (–4 … 140 °F)			1									
Nameplate												
Adhesive				A								
Signal cable length and type												
Without signal cable					0							
Explosion protection certification												
Without (transmitter only)						Y						
FM Class 1 Div. 2						G						
FMc Class 1 Div. 2						P						
Others						Z						
Protection class transmitter / protection class sensor												
IP67 (NEMA 4X) / IP67 (NEMA 4X)							1					
Cable conduits												
M20 x 1.5 (plastic)								A				
NPT ½ in. (blanked when cable not fitted)								B				
M20 SWA (armored)								D				
M20 SWA sensor, M20 x 1.5 (plastic) power / output								F				
Without								Y				
Power supply												
100... 230 V AC									1			
24 V AC or 24 V DC									2			
Input and output signal type*												
HART + 20 mA + pulse + contact output										A		
PROFIBUS DP RS485 physical layer + pulse + contact output (general-purpose design only)										G		
MODBUS RTU RS485 physical layer + pulse + contact output (general-purpose design only)										M		
Configuration type / diagnostics type												
Factory defaults / standard diagnostics											1	

Options**

Accessories

Configuration lead	AC

Documentation language

German	M1	French	M4	Swedish	M7	Portuguese	MA
Italian	M2	English	M5 (default)	Finnish	M8	Danish	MF
Spanish	M3					Norwegen	MN

Other usage certifications

Measuring Instruments Directive (MID)	CM1

*The transmitter converter module Input and Output Signal Type must match the transmitter backplane output configuration (HART or PROFIBUS) – see OI/FET100-EN.
**Add codes for options.

Common accessories

Accessory	Item Number
WaterMaster AC Fuse F1 Type T 250 mA A/S TR5	B20411
WaterMaster DC Fuse F2 Type T 2 A A/S TR5	B20412
WaterMaster Infra Red Comms Pack	MJBX9932
WaterMaster Backplane PCB Board (STD)	WATX2505
WaterMaster Sensor PCB Board	WATX2506
WaterMaster Comms Cable	WEBC2500
Signal cable for remote WaterMaster transmitter 5 m (15 ft.) 10 m (30 ft.) 20 m (60 ft.) 30 m (100 ft.) 50 m (165 ft.) 80 m (260 ft.) 100 m (325 ft.) 150 m (490 ft.) 500 m (1650 ft.)	 STT4500/05 STT4500/10 STT4500/20 STT4500/30 STT4500/50 STT4500/80 STT4500/100 STT4500/150 STT4500/500
Armored signal cable for remote WaterMaster transmitter 5 m (15 ft.) 10 m (30 ft.) 20 m (60 ft.) 30 m (100 ft.) 50 m (165 ft.) 80 m (260 ft.) 100 m (325 ft.) 150 m (490 ft.) 500 m (1650 ft.)	 STT4501/05 STT4501/10 STT4501/20 STT4501/30 STT4501/50 STT4501/80 STT4501/100 STT4501/150 STT4501/500

Contact us

ABB Limited
Process Automation
Oldends Lane
Stonehouse
Gloucestershire GL10 3TA
UK
Tel: +44 1453 826 661
Fax: +44 1453 829 671
instrumentation@gb.abb.com

ABB Inc.
Process Automation
125 E. County Line Road
Warminster
PA 18974
USA
Tel: +1 215 674 6000
Fax: +1 215 674 7183

ABB Engineering (Shanghai) Ltd.
No. 5, Lane 369, Chuangye Road
201319, Shanghai,
P.R. China
Phone: +86 (0) 21 6105 6666
Fax: +86 (0) 21 6105 6992
Mail:china.instrumentation@cn.abb.com

www.abb.com

3KXF211101R1001

DS/WM-EN Rev. L 05.2012

INDUSTRIAL PUMPS

ELECTRIC TRASH PUMPS

DIRTY WATER SPECIALISTS

CAST IRON & STAINLESS STEEL

- ☑ 2", 3" & 4"
- ☑ Heavy duty TEFC motors
- ☑ Heavy duty cast iron
- ☑ Big open non clog impeller
- ☑ Easy access clean out port
- ☑ Stainless steel shaft & wear place
- ☑ Silicon carbide seals standard
- ☑ Stainless steel pumps for aggressive applications

Applications:

- EFFLUENT TRANSFER
- IRRIGATION
- LIVESTOCK WASTE
- INDUSTRIAL WASTE PUMP OUT
- ABATTOIR WASTE
- BATCH PLANT RECIRCULATION
- MINERAL PROCESSING
- QUARRY DEWATERING

Distributed by:

Aussie Pumps

www.aussiepumps.com.au

Aussie Pumps

AUSSIE GMP PUMPS

GMP Electric Drive Semi Trash Pumps

Aussie GMP self priming centrifugal electric drive semi trash pumps in 2", 3" and 4" configurations, designed for high and low pressure operations.

Pumps feature big open impellers, non clog design, silicon carbide mechanical seal, stainless steel wear plate and large front opening port to permit cleaning without pipe work disconnection. Flows available to 2,300 litres per minute and heads to 35 metres.

Available in cast iron and 316 grade stainless steel, these heavy duty pumps are suitable for a wide range of industrial and agricultural applications.

Stainless steel pumps are corrosion and abrasion resistant and suitable for handling aggressive liquids.

Applications:

Cast Iron

- Industrial waste pump out
- Livestock effluent pump out
- Public sewage works
- Abattoir waste pump out
- Piggeries, chicken processing, feed lots
- Wash bay water recirculation
- Batch plant recirculation
- mineral processing
- Quarry dewatering

Stainless steel

- Mine tailings dam pump out
- Aggressive water pumping
- Sewage handling
- Acid & solvent pumping
- Industrial food waste

Features

- Heavy duty cast construction
- Open non clog style impeller
- Self primes from 6 metres vertical lift
- Front mounted clean out port
- Close coupled to a heavy duty TEFC single or three phase IP rated electric drive motor
- Cast iron foot mounting
- Silicon carbide seals standard on cast iron pumps, other seals available on request
- Stainless steel wear plate

Benefits

- Long trouble free life
- Pumps solids in suspension
- Ready to pump in minimum amount of time
- Pump clean out without pipe work dismantling
- Electric motor convenience with compact design for ease of installation
- Stable, easy to install
- Flexibility of handled liquids
- Protects pump from wear, cuts operating costs

					Cast Iron				Stainless Steel			
Model	**Motor**	**kW**	**IP rating**	**Suct/Del**	**Total Head (m)**	**Max Capacity (l/m)**	**Solid size (mm)**	**CAT No. (old/current)**	**Total Head (m)**	**Max Capacity (l/m)**	**Solid size (mm)**	**CAT No. (old/current)**
B1½KQ-A/ST	1HP single phase 240v 1HP three phase 415v	0.75	54	1½"x1½"	12	130	6	EA9M EA9N				
B2KQ-A/ST	2HP single phase 240v 2HP 3 phase 415v	1.5	54	2" x 2"	18	440	19	EA3L/**EAR3** EA8M/**EAR4**	20	440	16	EA7T/**EA7G** **EA7E**
B3KQ-A/ST	3 HP single phase 240v 3 HP 3 phase 415v	2.2	54	3" x 3"	16	900	27	EA3M/**EAR5** **EAR6**				
B3XR-A/ST	5.5 HP 3 phase 415v	4	55	3" x 3"	26	1300	19	EAS1/**EAFV**				
	7.5 HP 3 phase 415v	5.5			26	1400	24	EAS3/**EANH**				
	10 HP 3 phase 415v	7.5			31	1500	24	EAS5/**EANL**				
B4KQ-A/ST	5.5 HP 3 phase 415v	4	55	4" x 4"	14	1600	37	EAR8/**EAGF**				
B4XR-A/ST	15HP 3 phase 415v	11	55	4" x 4"	30	2200	35	**EADL**				
	20HP 3 phase 415v	15			29	2300	39	EAS7/**EANM**				

Certified System
Quality
ISO 9001
SAI GLOBAL

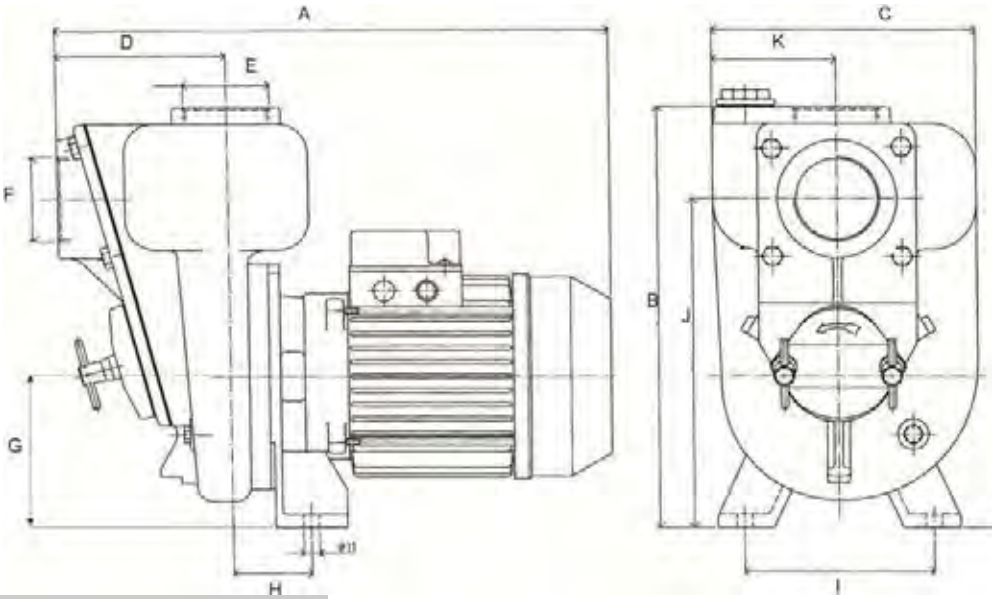
Australian Pump Industries Pty Ltd | 7 Gladstone Road, Castle Hill NSW 2154 | P: 02 8865 3500 | F: 02 9894 4240 | www.aussiepumps.com.au

Aussie Pumps

AUSSIE GMP PUMPS

GMP Electric Drive Semi Trash Pumps

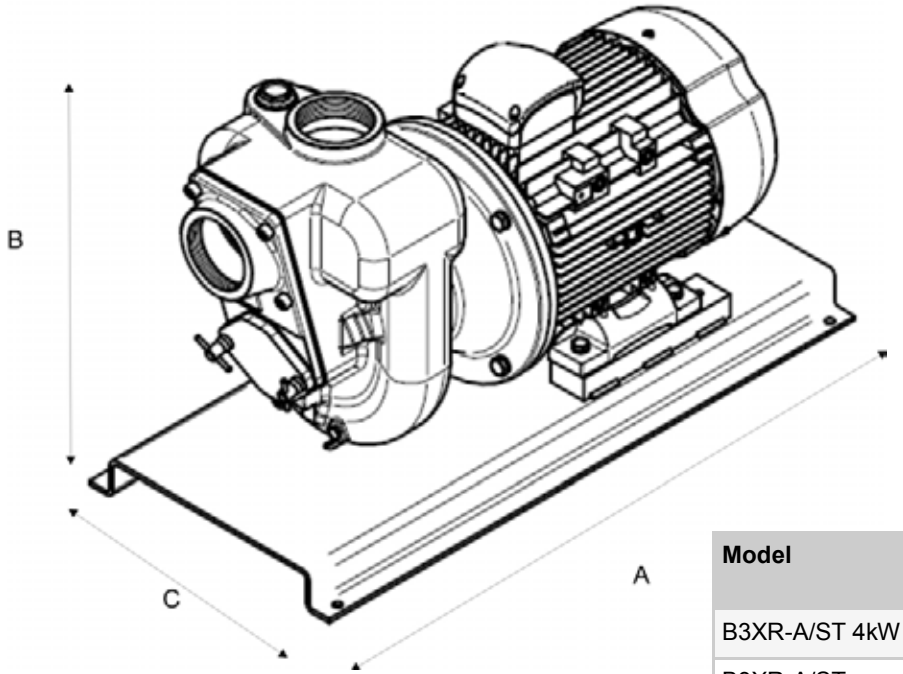
Dimensions:



Model	Length - A (mm)	Height - B (mm)	Width - C (mm)
B1½KQ-A/ST	275	285	215
B2KQ-A/ST	410	294	185
B3KQ-A/ST*	485	295	190

Full data sheet available for each pump … contact Aussie Pumps

* clean out port is a different shape on this model to that shown in diagram



Model	Length - A (mm)	Height - B (mm)	Width - C (mm)
B3XR-A/ST 4kW	700	450	360
B3XR-A/ST 5.5kW or 7.5kW	790	470	360
B4KQ-A/ST	700	455	360
B4XR-A/ST	1000	544	470

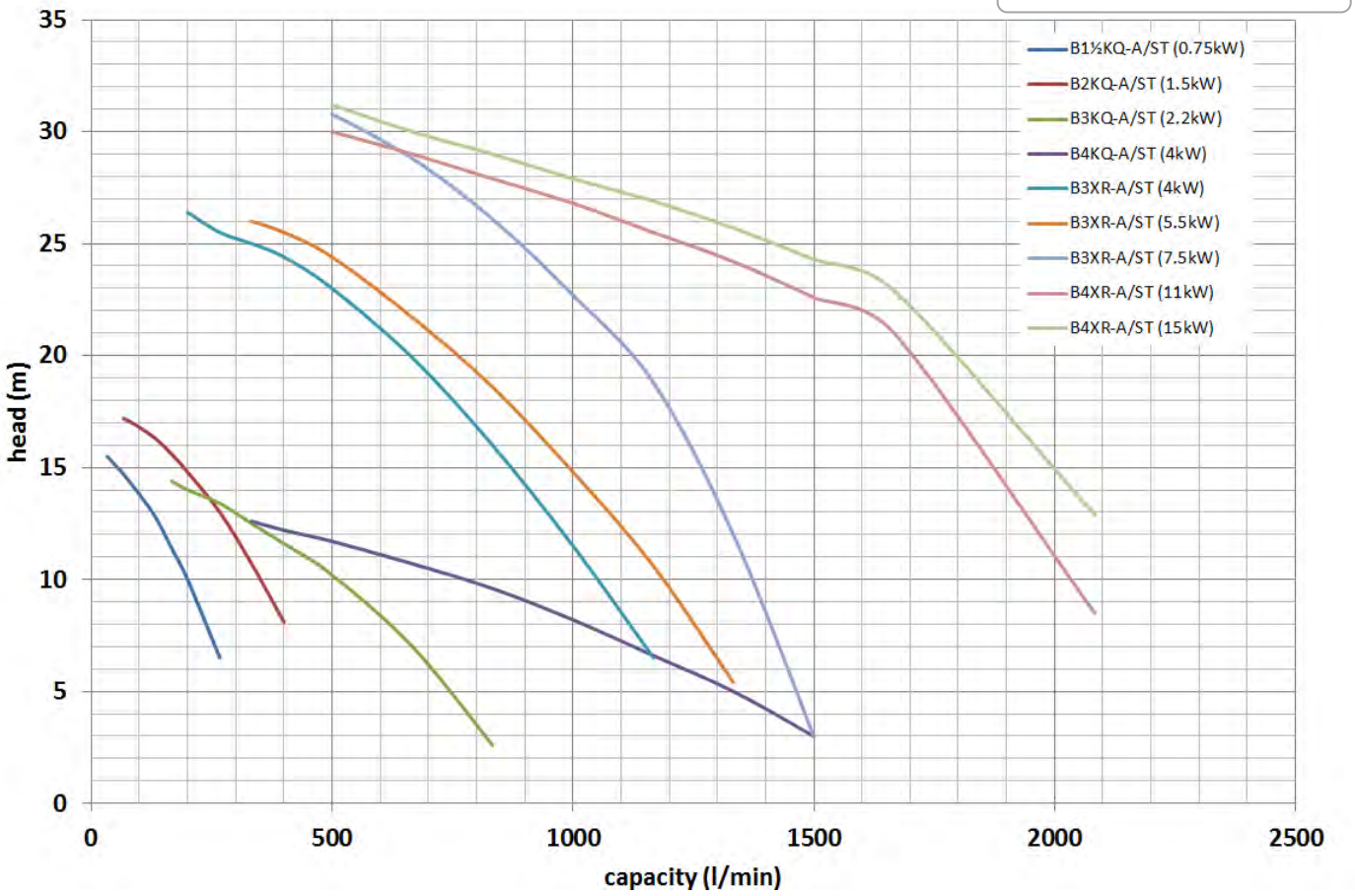
Aussie Pumps

AUSSIE GMP PUMPS

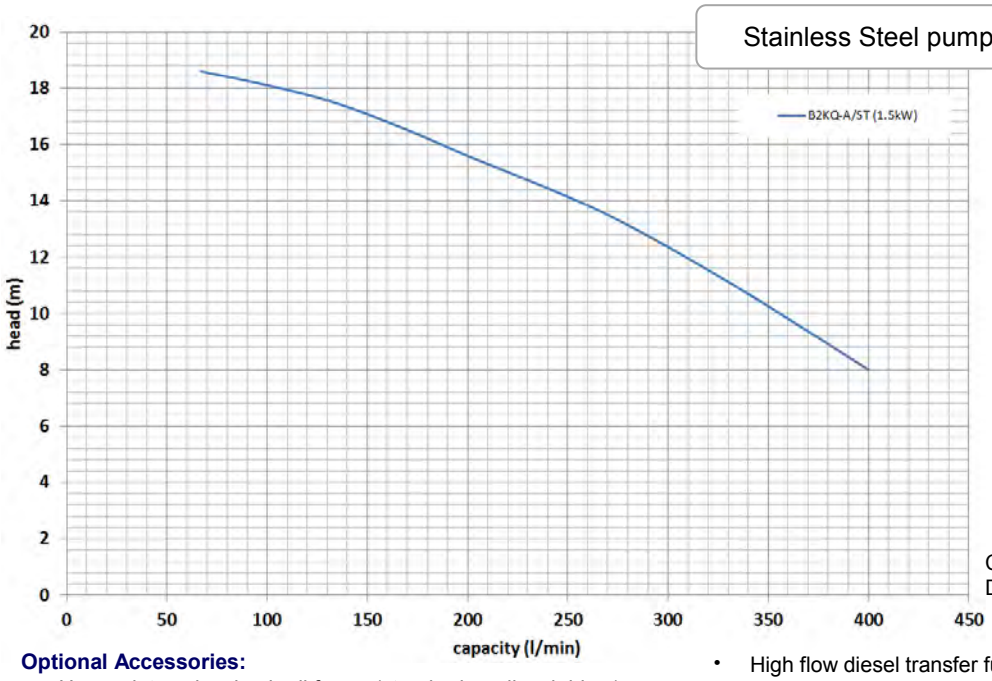
GMP Electric Drive Semi Trash Pumps

Curve Performance:

Cast Iron pumps



Stainless Steel pumps



Curves should be used as a guide only.
Detailed curves available on request.

Optional Accessories:

- Heavy duty galvanised roll frame (standard on diesel drive)
- Heavy duty suction hoses 2" and 3"
- Medium pressure lay flat delivery hose, working pressure 100 psi
- High flow diesel transfer fuel nozzle
- Carbon ceramic, silicon carbide, tungsten carbide or Viton seals available
- Strainers and couplings

Due to our program of continuous product development the manufacturer reserves the right to alter specifications without notice.

Australian Pump Industries Pty Ltd | 7 Gladstone Road, Castle Hill NSW 2154 | P: 02 8865 3500 | F: 02 9894 4240 | www.aussiepumps.com.au

Warranties

Flint Plumbing - Letter of Warranty

Flint Plumbing Warrant their works from the date of practical completion for 12 months as per the terms and conditions of their contract with Thomas & Coffey.

Certificates

Form 16 - Hydraulics

Linked Documents

Form 16 - Forrest Hill001.pdf

Form 4 - Hydraulic Services

Linked Documents

IMG.pdf

Plumbing Certification Letter email from Lockyer Valley Council

Linked Documents

Laidley and Forest Hill Plumbing Certification.pdf

Building Regulation 2006 s32 s43 s44 s46 & s47

Inspection Certificate / Aspect Certificate / QBSA Licensee Aspect Certificate 16

NOTE

Inspection certificates certify that the stages of building work comply with the development approval.

Aspect certificates certify that the aspects that make up the stages of building work comply with the development approval.

Inspection certificates and aspect certificates must be signed by the building certifier or the individual assessed by the building certifier as competent (*Building Regulation 2006* s17).

QBSA licensees can certify that the aspect of building work for a single detached 1a or class 10 building or structure complies with the approval under section 43 of the *Building Regulation 2006*. A QBSA licensee must be licensed to carry out the work for the aspect and give a certificate OR the aspect of the work is carried out by the QBSA licensee who, when it was carried out, held a licence for the aspect.

1. Indicate the type of certificate

☐ **Inspection Certificate** for

☐ Stage of building work (for single detached class 1a or class 10 building or structure)
(indicate the stage) _____

☒ Aspect of building work
(indicate the aspect) INGROUND SERVICES

☐ **QBSA Licensee Aspect Certificate**

Scope of the work

Scope of the work covered by the licence class under the *Queensland Building Services Authority Regulation 2003* for the aspect being certified, eg scope of work for a waterproofing licence is "installing waterproofing materials or systems for preventing moisture penetration". An aspect being certified may include "wet area sealing to showers".

MF INTAKE LINES, FILTRATE LINES, BACKWASH LINE, POTABLE WATER.

2. Property description

The description must identify all land the subject of the application.

The lot & plan details (eg. SP / RP) are shown on title documents or a rates notice.

If the plan is not registered by title, provide previous lot and plan details.

Street address *(include no., street, suburb / locality & postcode)*

LOT 1 OFF DOBT ROAD
FOREST HILL. Postcode 4342

Lot & plan details *(Attach list if necessary)*

In which local government area is the land situated?

3. Building description

Building description	Class of building / structure
SEWER TREATMENT PLANT	

LOCAL GOVERNMENT USE ONLY

Form 16 continued

4. Description of component/s certified
Clearly describe the extent of work covered by this certificate.

INTAKE LINE TO MF BUILDING.
BACKWASH LINE. FILTRATE LINE.
POTABLE WATER LINE.

5. Basis of certification
Detail the basis for giving the certificate and the extent to which tests, specifications, rules, standards, codes of practice and other publications, were relied upon.

TO A.S. 3500

6. Reference documentation
Clearly identify any relevant documentation. e.g. numbered structurll engineering plans.

QLD URBAN UTILITIES DRAWINGS.
986/5/S-0104-110-0, 111-0, 112-0,
114-0, 120-0, 121-0, 122-0,

7. Building certifier reference number and development approval number

Building certifier reference number

Development approval number

8. Building Certifier or competent person details

A competent person must be assessed as competent before carrying out the inspection.

The builder for the work cannot give a stage certificate of inspection.

A competent person is assessed by the building certifier for the work as competent to practice in an aspect of the building and specification design, because of the individual's skill, experience and qualifications.' The competent person must be registered or licensed under a law applying in the State to practice the aspect.

If no relevant law requires the individual to be licensed or registered, the certifier must assess the individual as having appropriate experience, qualifications or skills to be able to give the help.

If the chief executive issues any guidelines for assessing a competent person, the building certifier must use the guidelines when assessing the person.

Name (*in full*)
RUSSELL FLINT

Company name *if applicable*
FLINT PLUMBING

Contact person
RUSSELL FLINT

Phone no. *business hours*
07-55716633

Mobile no.
0418574246

Fax no.

Email address
flintplumbing@bigpond.com

Postal address
P.O. BOX 458
LABRADOR QLD Postcode 4215.

Licence class
B&S.

Licence number
723843

Date approval to inspect received from building certifier

9. Signature of building certifier, competent person or QBSA licensee

☐ **Inspection Certificate for stage or aspect**
I certify that on an inspection carried out in accordance with best industry practice, the building work described above, complies with the building development approval.

☐ **QBSA Licensee Aspect Certificate**
I, the QBSA licensee for the aspect of building work, certify the aspect of building work stated in section 1 "scope of the work" complies with the building development approval, or the aspect; or

☐ A person who may under s42(c)(ii) give a QBSA licensee certificate for the aspect if it complies with the requirements for self assessable building work under the *Building Regulation 2006* s26.

Signature

Date
15/7/13.

Flint Plumbing & Drainage Pty Ltd

ABN 53 061 178 989
P.O. Box 458, Labrador QLD. 4215
Mobile: 0411 874 246
Phone/Fax: 07 5571 6633
Email: flintplumbing@bigpond.com

Date: ..... **Page. No.** .....

- ❑ **ORDER**
- ❑ **QUOTATION**
- ❑ **REQUEST FOR INFORMATION**
- ❑ **VARIATION REQUEST**
- ❑ **MEMORANDOM**
- ❑ **SITE INSTRUCTION**

COMPANY: .....

FAX: .....

ATTENTION: .....

PROJECT:

DETAILS: .....

FORM 4—NOTIFIABLE WORK
section 87, *Plumbing and Drainage Act 2002* (PDA)

M 173902

Address

FOREST HILL STP LOT 1
OFF DOOT ROAD 4342

Categories of work

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	X														

I hereby state that the work indicated above was completed within 10 business days of the date of this form and the work complies with the PDA and the Standard Plumbing and Drainage Regulation 2003.

Responsible person

RUSSELL FLINT

Plumbing Industry Council licence number

12756

Signature

Date 17072013

Where the work performed involves underground drainage, an as-constructed diagram must be submitted with this form.

PRIVACY NOTICE: The information on this form is collected as required under the PDA by the Department of Housing and Public Works on behalf of the Plumbing Industry Council (PIC). This information may be stored by the PIC and/or the Department and their agents and contractors and made available to the property owner or person who requested the work and will be used for administration, compliance, statistical research and evaluation of plumbing and drainage laws. Your personal information may be disclosed to other government agencies, local government authorities and third parties for purposes relating to administering and monitoring compliance with the PDA. Personal information will otherwise only be disclosed to third parties with your consent or in accordance with the *Information Privacy Act 2009*.

Version 6

Note: Signatories to this memo warrant they have the authority to do so.

• INDUSTRIAL • COMMERCIAL • DOMESTIC • GENERAL MAINTENANCE

Toby Grayson

Subject: FW: Query regarding the installation of a safety shower on 2 x QUU treatment plants.

From: Matthew Smith [mailto:MSmith@lvrc.qld.gov.au]
Sent: Wednesday, 12 February 2014 2:18 PM
To: Toby Grayson
Subject: RE: Query regarding the installation of a safety shower on 2 x QUU treatment plants.

Hi Toby,
Further to our conversation, a hose tap would fit under the definition of appliance as described below.
Kind Regards,

Matthew Smith
Coordinator Plumbing
P 07 54620339
M 0419 673 189
E msmith@lvrc.qld.gov.au

Lockyer Valley Regional Council
26 Railway Street (PO Box 82) Gatton Qld 4343
1300 00 5872 (LVRC)
www.lockyervalley.qld.gov.au

From: Toby Grayson [mailto:TGrayson@thomascoffey.com.au]
Sent: Wednesday, 12 February 2014 2:08 PM
To: Matthew Smith
Subject: RE: Query regarding the installation of a safety shower on 2 x QUU treatment plants.

Thanks Matthew,

The Form 4's were submitted by Flint Plumbing a number of months ago.

I can provide copies if you require.

Regards

Toby

From: Matthew Smith [mailto:MSmith@lvrc.qld.gov.au]
Sent: Wednesday, 12 February 2014 2:06 PM
To: Toby Grayson
Subject: Query regarding the installation of a safety shower on 2 x QUU treatment plants.

Hi Toby,
The plumbing works being carried out in the installation of 2 safety showers, as described can be classed as notifiable works and will require your plumber to submit a form 4 to the Plumbing Industry Council.
The works would be covered under item 2 of the schedule of works (schedule 2 part 1 of the Standard Plumbing and Drainage Regulation (SPDR) 2003) for **extending, altering**, replacing, or removing water supply pipework, other than extending or removing a fire service (as the water tank was existing).
I have classed the safety shower as an appliance opposed to a fixture. This is taken from the glossary of AS3500.0:2003, which is called up under the P & D Act 2002.
***Fixture** – a receptacle with necessary appurtenances designed for a specific purpose, the use or operation of which results in **a discharge into the sanitary plumbing or sanitary drainage installation**.*
Basically if the safety shower has no sanitary drain, it isn't a fixture.

The installation of an appliance fits under the scope of minor works (see schedule 3 SPDR 2003) which requires no plumbing compliance permit or notification to the Plumbing Industry Council.
If the shower did have a sanitary drainage connection it would be classed as a fixture and would require a compliance permit from the local government when installed in a new building.
I hope this answers your enquiry.
If you have any further queries, please let me know.
Kind Regards,

Matthew Smith
Coordinator Plumbing
P 07 54620339
M 0419 673 189
E msmith@lvrc.qld.gov.au

Lockyer Valley Regional Council
26 Railway Street (PO Box 82) Gatton Qld 4343
1300 00 5872 (LVRC)
www.lockyervalley.qld.gov.au

Please update all correspondence and references to:
LVRC
PO Box 82
GATTON QLD 4343

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Commissioning Information

ITP's - Hydraulics

Linked Documents

- ITP - Forrest Hill001.pdf
- ITP - Forrest Hill002.pdf
- ITP - Forrest Hill003.pdf
- ITP - Forrest Hill004.pdf
- ITP - Forrest Hill005.pdf

Flint Plumbing & Drainage Pty Ltd.
P.O. Box 458, Labrador Qld. 4215.
0411874246.
A.B.N. 53061178989.

PROJECT-: Regional Lagoons Sewerage Treatment Plant ~~Oxley~~ FOREST HILL QLD.
Date -: 10-5-2013

Inspection & Test Plan / Check List.

Trade HYDRAULIC SERVICES **Item:** Storm Water Pipe PE Polyethylene Pipe.		**Contractor:** Flint Plumbing.	**Location:** Forest Hill. 90 OD PE OVERFLOW LINE.
Approved Thomas & Coffey Project Manager:		**Specification:** Specification: Hydraulics Services Shop drawings; notes & Scope	INSPECTIONS & VERIFICATION

WORK ACTIVITY/ SEQUENCE	REFERENCE (ie Aus. Standard, Contract Clause and/or Dwg No)	ACCEPTANCE CRITERIA	S/Contractor	Date	Thomas & Coffey	Date	Client		COMMENTS
SCOPE OF WORKS	Shop Drawings AS3500	• Check documents are current & for construction • Check scope of works • Check levels & falls	S	31-5-13	S	31/5/13			V/A LINE APPROVED BY OUR
SET OUT	Shop Drawings	• Follow survey pegs and building profiles • Follow surveyed building levels • Mark out pipe/pit locations and co-ordinate with other trades • Check documents are current & for construction	S	31-5-13	S	31/5/13			" " " "
EXCAVATION		• Excavate trenches to minimal size • Grade trenches to falls • Bed pipes on sand or blue metal	S	31-5-13	S	31/5/13			EXISTING SERVICES LOCATED
PIPEWORK - 100 SN 10 PIPEWORK - PE 100, 90, 110, 140 & 160 OD Pipe. Polytec Electrofusion Accreditation No- E 12228.	Drawings - 486/5/5-0108-115, A 486/5/5-0108-116, O Drawings - 486/5/5-0108-110 A 486/5/5-0108-111, A	• UPVC Pipe work up to100 &150 diameter) • Jointing methods as per specification – Solvent & Rubber Ring Joint • Laid at min 1% gradient • Pipe work generally 150 mm PE 100 Pipe, 90 OD, 110 OD, 140 OD & 160 OD Jointing of pipe by fusion welding as per the Electrofusion Welding of Polythene Pipe Polytec System. All testing of pipes as per the certified system above.	S	31-5-13	S	31/5/13			
PIPEWORK TESTING	Testing for non pressure Pipeline will be low pressure air test as per AS 2566.2 Testing for pressure pipelines will be as per 2.13.5 WSA 01 to 1250 kpa.	• As per manufactures specification • Test Results • 90 OD, PE 100 • 110 OD, PE 100 • 140 OD, PE 100 • 160 OD, PE 100.	S	31-5-13	S	31/5/13			

PROJECT: Regional Lagoons Sewerage Treatment Plant
Boonah.

Trade Item:	**HYDRAULIC SERVICES** **Storm Water Pipe** **PE Polyethylene Pipe.**	**Contractor:**	Flint Plumbing.	**Location:**	**Forest Hill.**
Approved Thomas & Coffey Project Manager:		**Specification:**	Specification: Hydraulics Services Shop drawings; notes & Scope .	**INSPECTIONS & VERIFICATION**	

WORK ACTIVITY/ SEQUENCE	REFERENCE (ie Aus. Standard, Contract Clause and/or Dwg No)	ACCEPTANCE CRITERIA	S/Contractor	Date	Thomas & Coffey	Date	Client		COMMENTS
PITS - Types	Schedule on drawing	• Pre-cast concrete pit with grate covers in accordance with the specification. • Non trafficable areas wheel rated at 495Kg • Vehicular parking rated wheel load 1690 Kg • Truck manoeuvring rated wheel load 2450 Kg	S N/A		S				
PITS - Installation	Drawing construction notes	• Bed pits on sand or blue metal • Install pit for correct IL • Top of pit covers, levels as per spec – paving flush; landscaping 25 mm below	S N/A		S				
SUBSOIL DRAINAGE –	As above drawings for SN 10 PIPE	• Corrugated 100mm UPVC class 400, with filter sock • Bed and backfill agg line with 5 TO 7mm coarse aggregate bedding	S N/A		S				
BACKFILL COMPACTION	Service trenching	• Backfill pipe with coarse aggregate material then backfill with selected excavated material • Check backfill complete and carried out to Engineer's instruction	Note	31-5-13	Note				5mm DRAINAGE GRAVEL Sign off drawings for each section of work inspected Record type of bedding material etc
DETECTABLE TAPE		• Detectable tape if required	S	31-5-13	S				W/O 300mm ABOVE PIPework
LOCAL AUTHORITY APPROVAL		• Local Authority approval	S						
HYDROSTATIC TEST		• As per Urban Utilities Requirements	S	31-5-13	S				TESTED TO 1250 KPA
			S		S				

Note: Signatures are required under "Verification" column. Do not just tick !

H = Hold W = Witness S =Sign-off

PROJECT: Regional Lagoons Sewerage Treatment Plant
Boonah.

Trade Item:	**HYDRAULIC SERVICES Storm Water Pipe PE Polyethylene Pipe.**	**Contractor:** Flint Plumbing.	**Location:** **Forest Hill.**
Approved Thomas & Coffey Project Manager:		**Specification:** Specification: Hydraulics Services Shop drawings; notes & Scope	INSPECTIONS & VERIFICATION

WORK ACTIVITY/ SEQUENCE	REFERENCE (ie Aus. Standard, Contract Clause and/or Dwg No)	ACCEPTANCE CRITERIA	S/Contractor	Date	Thomas & Coffey	Date	Client		COMMENTS
	AUST - NZ STANDARDS CURVES APPROVED BY QUU	APPROVED CURVES	✓	31-5-13		31/5/13			
WORK AS EXECUTED		• PROGRESSIVE • Drawings are diagrammatic only	Note		Note				
FINAL TRIM/ CLEAN SITE		• Final clean and grade site area affected by the stormwater scope of works • Excess spoil spread on site, or removed	S		S				
FINAL INSPECTION	Verify all inspections complete & collate records	• All complete, check as builts are complete			S				

COMMENTS:

Note: Signatures are required under "Verification" column. Do not just tick !

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Flint Plumbing & Drainage Pty Ltd.
P.O. Box 458, Labrador Qld. 4215.
0411874246.
A.B.N. 53061178989.

PROJECT-: Regional Lagoons Sewerage Treatment Plant ~~Laidley~~ Forest Hill QLD.
Date -: 10-5-2013

Inspection & Test Plan / Check List.

Trade **HYDRAULIC SERVICES** **Item:** **Storm Water Pipe** **PE Polyethylene Pipe.**		**Contractor:** Flint Plumbing.	**Location:** **Forest Hill.** 90 OD PE INTAKE LINE.
Approved Thomas & Coffey Project Manager:		**Specification:** Specification: Hydraulics Services Shop drawings; notes & Scope	INSPECTIONS & VERIFICATION

WORK ACTIVITY/ SEQUENCE	REFERENCE (ie Aus. Standard, Contract Clause and/or Dwg No)	ACCEPTANCE CRITERIA	S/Contractor	Date	Thomas & Coffey	Date	Client	COMMENTS
SCOPE OF WORKS	Shop Drawings AS3500	• Check documents are current & for construction • Check scope of works • Check levels & falls	S	23-5-13	S	24/5/13		AS PER CHANGES APPROVED BY ANN.
SET OUT	Shop Drawings	• Follow survey pegs and building profiles • Follow surveyed building levels • Mark out pipe/pit locations and co-ordinate with other trades • Check documents are current & for construction	S	23-5-13	S	24/5/13		" " " "
EXCAVATION		• Excavate trenches to minimal size • Grade trenches to falls • Bed pipes on sand or blue metal	S	23-5-13	S	24/5/13		ALL EXISTING SERVICES LOCATED
PIPEWORK - 100 SN 10 PIPEWORK - PE 100, 90, 110, 140 & 160 OD Pipe. Polytec Electrofusion Accreditation No- E 12228.	Drawings -: 486/5/5-0108-115, A 486/5/5-0108-116, O Drawings -: 486/5/5-0108-110, A 486/5/5-0108-111, A	• UPVC Pipe work up to100 &150 diameter) • Jointing methods as per specification – Solvent & • Rubber Ring Joint. • Laid at min 1% gradient • Pipe work generally 150 mm. PE 100 Pipe, 90 OD, 110 OD, 140 OD & 160 OD Jointing of pipe by fusion welding as per the Electrofusion Welding of Polythene Pipe Polytec System. All testing of pipes as per the certified system above.	S	23-5-13	S	23/5/13		
PIPEWORK TESTING.	Testing for non pressure Pipeline will be low pressure air test as per AS 2566.2 Testing for pressure pipelines will be as per 2.13.5 WSA 01 to 1250 kpa.	• As per manufactures specification • Test Results. • 90 OD, PE 100 • 110 OD, PE 100 • 140 OD, PE 100 • 160 OD, PE 100.	S	23-5-13	S	23/5/13		

PROJECT: Regional Lagoons Sewerage Treatment Plant
Boonah.

Trade Item:	**HYDRAULIC SERVICES** **Storm Water Pipe** **PE Polyethylene Pipe.**	**Contractor:**	Flint Plumbing.	**Location:**	**Forest Hill.**
Approved Thomas & Coffey Project Manager:		**Specification:**	Specification; Hydraulics Services Shop drawings; notes & Scope .	**INSPECTIONS & VERIFICATION**	

WORK ACTIVITY/ SEQUENCE	REFERENCE (ie Aus. Standard, Contract Clause and/or Dwg No)	ACCEPTANCE CRITERIA	S/Contractor	Date	Thomas & Coffey	Date	Client		COMMENTS
PITS - Types	Schedule on drawing	• Pre-cast concrete pit with grate covers in accordance with the specification • Non trafficable areas wheel rated at 495Kg • Vehicular parking rated wheel load 1690 Kg • Truck manoeuvring rated wheel load 2450 Kg	S N/A		S				
PITS - Installation	Drawing construction notes	• Bed pits on sand or blue metal • Install pit for correct IL • Top of pit covers, levels as per spec – paving flush; landscaping 25 mm below	S N/A		S				
SUBSOIL DRAINAGE –	As above drawings for SN 10 PIPE	• Corrugated 100mm UPVC class 400, with filter sock • Bed and backfill agg line with 5 TO 7mm coarse aggregate bedding	S N/A		S				
BACKFILL COMPACTION	Service trenching	• Backfill pipe with coarse aggregate material then backfill with selected excavated material • Check backfill complete and carried out to Engineer's instruction	Note AA	23-5-0	Note				5mm DRAINAGE GRAVEL Sign off drawings for each section of work inspected. Record type of bedding material etc
DETECTABLE TAPE		• Detectable tape if required	S AA	23513	S	2/5/2			LAID 300mm ABOVE PIPE WORK.
LOCAL AUTHORITY APPROVAL		• Local Authority approval	S			2/5/2			
HYDROSTATIC TEST		• As per Urban Utilities Requirements.	S AA	23-5-0	S	2/5/2			TESTED TO 250 KPA.
			S		S				

Note: Signatures are required under "Verification" column. Do not just tick !

H = Hold W = Witness S =Sign-off

PROJECT: Regional Lagoons Sewerage Treatment Plant
Boonah.

Trade Item:	**HYDRAULIC SERVICES** **Storm Water Pipe** **PE Polyethylene Pipe.**	**Contractor:**	Flint Plumbing.	**Location:**	**Forest Hill.**
Approved Thomas & Coffey Project Manager:		**Specification:**	Specification: Hydraulics Services Shop drawings; notes & Scope .	INSPECTIONS & VERIFICATION	

WORK ACTIVITY/ SEQUENCE	REFERENCE (ie Aus. Standard, Contract Clause and/or Dwg No)	ACCEPTANCE CRITERIA	S/Contractor	Date	Thomas & Coffey	Date	Client		COMMENTS
90 OD PE. INTAKE LINE.	AUST NZ STANDARDS CHANGES APPROVED BY QUU	HYDRAULICS, SPECIFICATION APPROVED CHANGES	RA	23-5-13	[redacted]	23/5/13			
WORK AS EXECUTED		• PROGRESSIVE • Drawings are diagrammatic only	Note		Note				
FINAL TRIM/ CLEAN SITE		• Final clean and grade site area affected by the stormwater scope of works • Excess spoil spread on site, or removed	S		S				
FINAL INSPECTION	Verify all inspections complete & collate records	• All complete, check as builts are complete			S				

COMMENTS:

Note: Signatures are required under "Verification" column. Do not just tick !

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Flint Plumbing & Drainage Pty Ltd.
P.O. Box 458, Labrador Qld. 4215.
[redacted]
0411874246.
A.B.N. 53061178989.

PROJECT-: Regional Lagoons Sewerage Treatment Plant ~~Laidley~~ Forest Hill Qt.
Date -: 10-5-2013

Inspection & Test Plan / Check List.

Trade Item:	**HYDRAULIC SERVICES Storm Water Pipe PE Polyethylene Pipe.**	**Contractor:** Flint Plumbing.			**Location:** **Forest Hill.** 100 SC BACKWASH LINE.					
Approved Thomas & Coffey Project Manager:		**Specification:** Specification: Hydraulics Services Shop drawings; notes & Scope.			**INSPECTIONS & VERIFICATION**					
WORK ACTIVITY/ SEQUENCE	**REFERENCE** (ie Aus. Standard, Contract Clause and/or Dwg No)	**ACCEPTANCE CRITERIA**	**S/Contractor**	**Date**	**Thomas & Coffey**	**Date**	**Client**		**COMMENTS**	
SCOPE OF WORKS	Shop Drawings AS3500	• Check documents are current & for construction • Check scope of works • Check levels & falls	S	24-5-13	S				AS PER WORKING DRAWINGS ON SITE.	
SET OUT	Shop Drawings	• Follow survey pegs and building profiles • Follow surveyed building levels • Mark out pipe/pit locations and co-ordinate with other trades • Check documents are current & for construction	S	24-5-0	S	24/5/13				
EXCAVATION		• Excavate trenches to minimal size • Grade trenches to falls • Bed pipes on sand or blue metal	S	24-5-13	S				EXISTING SERVICES LOCATED.	
PIPEWORK - 100 SN 10 PIPEWORK -. PE 100, 90 110, 140 & 160 OD Pipe Polytec Electrofusion Accreditation No- E 12228.	Drawings - 486/5/5-0108-115. A 486/5/5-0108-116. O Drawings - 486/5/5-0108-110 A 486/5/5-0108-111. A	• UPVC Pipe work up to100 &150 diameter) • Jointing methods as per specification – Solvent & • Rubber Ring Joint. • Laid at min 1% gradient • Pipe work generally 150 mm PE 100 Pipe, 90 OD, 110 OD, 140 OD & 160 OD Jointing of pipe by fusion welding as per the Electrofusion Welding of Polythene Pipe Polytec System. All testing of pipes as per the certified system above	S	24-5-13	S	24/5/13				
PIPEWORK TESTING	Testing for non pressure Pipeline will be low pressure air test as per AS 2566.2 Testing for pressure pipelines will be as per 2.13.5 WSA 01 to 1250 kpa.	• As per manufactures specification • Test Results. • 90 OD, PE 100 • 110 OD, PE 100 • 140 OD, PE 100 • 160 OD, PE 100.	S	24-5-13	S				LOW LEVEL AIR TEST.	

PROJECT: Regional Lagoons Sewerage Treatment Plant
Boonah.

Trade Item:	**HYDRAULIC SERVICES** **Storm Water Pipe** **PE Polyethylene Pipe.**	**Contractor:** Flint Plumbing.	**Location:** **Forest Hill.**
Approved Thomas & Coffey Project Manager:		**Specification:** Specification: Hydraulics Services Shop drawings; notes & Scope	**INSPECTIONS & VERIFICATION**

WORK ACTIVITY/ SEQUENCE	REFERENCE (ie Aus. Standard, Contract Clause and/or Dwg No)	ACCEPTANCE CRITERIA	S/Contractor	Date	Thomas & Coffey	Date	Client		COMMENTS
PITS - Types	Schedule on drawing	• Pre-cast concrete pit with grate covers in accordance with the specification. • Non trafficable areas wheel rated at 495Kg • Vehicular parking rated wheel load 1690 Kg • Truck manoeuvring rated wheel load 2450 Kg	S N/A		S				
PITS - Installation	Drawing construction notes	• Bed pits on sand or blue metal • Install pit for correct IL • Top of pit covers, levels as per spec – paving flush; landscaping 25 mm below	S N/A		S				
SUBSOIL DRAINAGE –	As above drawings for SN 10 PIPE	• Corrugated 100mm UPVC class 400, with filter sock • Bed and backfill agg line with 5 TO 7mm coarse aggregate bedding	S N/A		S				
BACKFILL COMPACTION	Service trenching	• Backfill pipe with coarse aggregate material then backfill with selected excavated material • Check backfill complete and carried out to Engineer's instruction	Note RA	24-5-15	Note	21/5/15			5mm DRAINAGE GRAVEL Sign off drawings for each section of work inspected. Record type of bedding material etc
DETECTABLE TAPE		• Detectable tape if required	S NA	24-5-15	S				LAID 300 ABOVE PIPE WORK.
LOCAL AUTHORITY APPROVAL		• Local Authority approval	S						
HYDROSTATIC TEST		• As per Urban Utilities Requirements	S		S				
			S		S				

Note: Signatures are required under "Verification" column. Do not just tick !

H = Hold W = Witness S =Sign-off

Trade / Item:	HYDRAULIC SERVICES Storm Water Pipe PE Polyethylene Pipe.	Contractor:	Flint Plumbing.	Location:	Forest Hill.
Approved Thomas & Coffey Project Manager:		Specification:	Specification: Hydraulics Services Shop drawings; notes & Scope .	INSPECTIONS & VERIFICATION	

WORK ACTIVITY/ SEQUENCE	REFERENCE (ie Aus. Standard, Contract Clause and/or Dwg No)	ACCEPTANCE CRITERIA	S/Contractor	Date	Thomas & Coffey	Date	Client		COMMENTS
100 PE BACKWASH	AUST NZ STANDARDS. CONTRACT DRAWINGS	HYDRAULIC DRAWINGS SPECIFICATIONS & NOTES	[signature]	24-5-15	[signature]	28/5/15			PIPEWORK INCASED IN CONCRETE TO QUU REQUIREMENTS
WORK AS EXECUTED		• PROGRESSIVE • Drawings are diagrammatic only	Note		Note				
FINAL TRIM/ CLEAN SITE		• Final clean and grade site area affected by the stormwater scope of works • Excess spoil spread on site, or removed	S		S				
FINAL INSPECTION	Verify all inspections complete & collate records	• All complete, check as builts are complete			S				

COMMENTS:

Note: Signatures are required under "Verification" column. Do not just tick !

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Flint Plumbing & Drainage Pty Ltd.
P.O. Box 458, Labrador Qld. 4215.
0411874246.
A.B.N. 53061178989.

PROJECT-: Regional Lagoons Sewerage Treatment Plant ~~Building~~ Forest Hill.
Date -: 10-5-2013

Inspection & Test Plan / Check List.

Trade **HYDRAULIC SERVICES** **Item:** **Storm Water Pipe** **PE Polyethylene Pipe.**	**Contractor:** Flint Plumbing.	**Location:** **Forest Hill.** STORMWATER PIPE WORK TO M.F BUILDING	
Approved Thomas & Coffey Project Manager:	**Specification:** Specification; Hydraulics Services Shop drawings; notes & Scope .	**INSPECTIONS & VERIFICATION**	

WORK ACTIVITY/ SEQUENCE	REFERENCE (ie Aus. Standard, Contract Clause and/or Dwg No)	ACCEPTANCE CRITERIA	S/Contractor	Date	Thomas & Coffey	Date	Client	COMMENTS
SCOPE OF WORKS	Shop Drawings AS3500	• Check documents are current & for construction • Check scope of works • Check levels & falls	S	22-5-13	S			AS PER SKETCHES ORIGINALLY FOR BOOMAH -
SET OUT	Shop Drawings	• Follow survey pegs and building profiles • Follow surveyed building levels • Mark out pipe/pit locations and co-ordinate with other trades • Check documents are current & for construction	S	22-5-13	S	22/5/13		" "
EXCAVATION		• Excavate trenches to minimal size • Grade trenches to falls • Bed pipes on sand or blue metal	S	22-5-13	S			
PIPEWORK - 100 SN 10 PIPEWORK -: PE 100, 90, 110, 140 & 160 OD Pipe. Polytec Electrofusion Accreditation No- E 12228.	Drawings -: 486/5/5-0108-115, A 486/5/5-0108-116, O Drawings -: 486/5/5-0108-110 A 486/5/5-0108-111, A	• UPVC Pipe work up to100 &150 diameter) • Jointing methods as per specification – Solvent & • Rubber Ring Joint • Laid at min 1% gradient • Pipe work generally 150 mm PE 100 Pipe, 90 OD, 110 OD, 140 OD & 160 OD Joining of pipe by fusion welding as per the Electrofusion Welding of Polythene Pipe Polytec System All testing of pipes as per the certified system above.	S	22-5-13	S	22/5/13		
PIPEWORK TESTING	Testing for non pressure Pipeline will be low pressure air test as per AS 2566.2 Testing for pressure pipelines will be as per 2.13.5 WSA 01 to 1250 kpa	• As per manufactures specification • Test Results. • 90 OD, PE 100 • 110 OD, PE 100 • 140 OD, PE 100 • 160 OD, PE 100.	S		S			

PROJECT: Regional Lagoons Sewerage Treatment Plant
Boonah.

Trade Item:	**HYDRAULIC SERVICES** **Storm Water Pipe** **PE Polyethylene Pipe.**	**Contractor:** Flint Plumbing.	**Location:** **Forest Hill.**
Approved Thomas & Coffey Project Manager:		**Specification:** Specification: Hydraulics Services Shop drawings; notes & Scope .	**INSPECTIONS & VERIFICATION**

WORK ACTIVITY/ SEQUENCE	REFERENCE (ie Aus. Standard, Contract Clause and/or Dwg No)	ACCEPTANCE CRITERIA	S/Contractor	Date	Thomas & Coffey	Date	Client		COMMENTS
PITS - Types	Schedule on drawing	• Pre-cast concrete pit with grate covers in accordance with the specification. • Non trafficable areas wheel rated at 495Kg • Vehicular parking rated wheel load 1690 Kg • Truck manoeuvring rated wheel load 2450 Kg	S	22-5-0	S				
PITS - Installation	Drawing construction notes	• Bed pits on sand or blue metal • Install pit for correct IL • Top of pit covers, levels as per spec – paving flush; landscaping 25 mm below	S	22-5-13	S	22/5/13			
SUBSOIL DRAINAGE –	As above drawings for SN 10 PIPE	• Corrugated 100mm UPVC class 400, with filter sock • Bed and backfill agg line with 5 TO 7mm coarse aggregate bedding	S N/A		S	22/5/13			
BACKFILL COMPACTION	Service trenching	• Backfill pipe with coarse aggregate material then backfill with selected excavated material • Check backfill complete and carried out to Engineer's instruction	Note 5mm Drainage Gravel	22-5-0	Note	22/5/13			Sign off drawings for each section of work inspected. Record type of bedding material etc
DETECTABLE TAPE		• Detectable tape if required	S N/A	N/A	S				
LOCAL AUTHORITY APPROVAL		• Local Authority approval	S						
HYDROSTATIC TEST		• As per Urban Utilities Requirements	S		S				
			S		S				

Note: Signatures are required under "Verification" column. Do not just tick !

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PROJECT: Regional Lagoons Sewerage Treatment Plant
Boonah.

Trade Item:	**HYDRAULIC SERVICES** **Storm Water Pipe** **PE Polyethylene Pipe.**	**Contractor:** Flint Plumbing.	**Location:** **Forest Hill.**
Approved Thomas & Coffey Project Manager:		**Specification:** Specification: Hydraulics Services Shop drawings, notes & Scope .	**INSPECTIONS & VERIFICATION**

WORK ACTIVITY/ SEQUENCE	REFERENCE (ie Aus. Standard, Contract Clause and/or Dwg No)	ACCEPTANCE CRITERIA	S/Contractor	Date	Thomas & Coffey	Date	Client		COMMENTS
STORMWATER TO M F BUILDING	MUST ME STANDARDS CONTRACT DRAWING	HYDRAULIC REQUIRED - SPECIFICATIONS	DA	22-5-13		22/5/15			
WORK AS EXECUTED		• PROGRESSIVE • Drawings are diagrammatic only	Note		Note				
FINAL TRIM/ CLEAN SITE		• Final clean and grade site area affected by the stormwater scope of works • Excess spoil spread on site, or removed	S		S				
FINAL INSPECTION	Verify all inspections complete & collate records	• All complete, check as builts are complete			S				

COMMENTS:

Note: Signatures are required under "Verification" column. Do not just tick !

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Flint Plumbing & Drainage Pty Ltd.
P.O. Box 458, Labrador Qld. 4215.
[illegible]
0411874246.
A.B.N. 53061178989.

PROJECT-: Regional Lagoons Sewerage Treatment Plant ~~Laidley~~ ~~Forest Hill~~ Rd
Date -: 10-5-2013

Inspection & Test Plan / Check List.

Trade **HYDRAULIC SERVICES** **Item:** **Storm Water Pipe** **PE Polyethylene Pipe.**	**Contractor:** Flint Plumbing.	**Location:** **Forest Hill.** 63 00 PE FILTRATE LINE + 32 00 DOMESTIC WATER LINE.	
Approved Thomas & Coffey Project Manager:	**Specification:** Specification: Hydraulics Services Shop drawings; notes & Scope .	INSPECTIONS & VERIFICATION	

WORK ACTIVITY/ SEQUENCE	REFERENCE (ie Aus. Standard, Contract Clause and/or Dwg No)	ACCEPTANCE CRITERIA	S/Contractor	Date	Thomas & Coffey	Date	Client	COMMENTS
SCOPE OF WORKS	Shop Drawings AS3500	• Check documents are current & for construction • Check scope of works • Check levels & falls	S	21-5-13	S	21/5/13		AS PER ON SITE WORKING DRAWINGS
SET OUT	Shop Drawings	• Follow survey pegs and building profiles • Follow surveyed building levels • Mark out pipe/pit locations and co-ordinate with other trades • Check documents are current & for construction	S	21-5-13	S	21/5/13		" "
EXCAVATION		• Excavate trenches to minimal size • Grade trenches to falls • Bed pipes on sand or blue metal	S	21-5-13	S	21/5/13		EXISTING SERVICES LOCATED.
PIPEWORK - 100 SN 10 PIPEWORK :- PE 100, 90 , 110, 140 & 160 OD Pipe Polytec Electrofusion Accreditation No- E 12228.	Drawings :- 486/5/5-0108-115, A 486/5/5-0108-116, O Drawings :- 486/5/5-0108-110 A 486/5/5-0108-111, A	• ~~UPVC~~ Pipe work up to100 &150 diameter) • Jointing methods as per specification – Solvent & • Rubber Ring Joint • Laid at min 1% gradient • Pipe work generally 150 mm PE 100 Pipe, 90 OD, 110 OD, 140 OD & 160 OD Jointing of pipe by fusion welding as per the Electrofusion Welding of Polythene Pipe Polytec System All testing of pipes as per the certified system above.	S	21-5-13	S	21/5/13		
PIPEWORK TESTING.	Testing for non pressure Pipeline will be low pressure air test as per AS 2566.2 Testing for pressure pipelines will be as per 2.13.5 WSA 01 to 1250 kpa.	• As per manufactures specification • Test Results. • 90 OD, PE 100 • 110 OD, PE 100 • 140 OD, PE 100 • 160 OD, PE 100.	S	21-5-13	S	21/5/13		

PROJECT: Regional Lagoons Sewerage Treatment Plant
Boonah.

Trade Item: HYDRAULIC SERVICES **Storm Water Pipe** **PE Polyethylene Pipe.**	**Contractor:** Flint Plumbing.	**Location:** Forest Hill.	
Approved Thomas & Coffey Project Manager:	**Specification:** Specification: Hydraulics Services Shop drawings; notes & Scope	INSPECTIONS & VERIFICATION	

WORK ACTIVITY/ SEQUENCE	REFERENCE (ie Aus. Standard, Contract Clause and/or Dwg No)	ACCEPTANCE CRITERIA	S/Contractor	Date	Thomas & Coffey	Date	Client		COMMENTS
PITS - Types	Schedule on drawing	• Pre-cast concrete pit with grate covers in accordance with the specification. • Non trafficable areas wheel rated at 495Kg • Vehicular parking rated wheel load 1690 Kg • Truck manoeuvring rated wheel load 2450 Kg	S		S				
PITS - Installation	Drawing construction notes	• Bed pits on sand or blue metal • Install pit for correct IL • Top of pit covers levels as per spec – paving flush, landscaping 25 mm below	S		S				
SUBSOIL DRAINAGE –	As above drawings for SN 10 PIPE	• Corrugated 100mm UPVC class 400, with filter sock • Bed and backfill agg line with 5 TO 7mm coarse aggregate bedding	S		S				
BACKFILL COMPACTION	Service trenching	• Backfill pipe with coarse aggregate material then backfill with selected excavated material • Check backfill complete and carried out to Engineer's instruction	Note DA	21-5-13	Note				Sign off drawings for each section of work inspected. Record type of bedding material etc
DETECTABLE TAPE		• Detectable tape if required	S DA	21-5-13	S	5/12			TAPE LAID 300mm ABOVE SERVICES
LOCAL AUTHORITY APPROVAL		• Local Authority approval	S			5/12			
HYDROSTATIC TEST		• As per Urban Utilities Requirements	S DA	21-5-13	S	5/12			63 OD PE TEST 1250KPA 3200 WATER 1500 KPA
			S		S				

Note: Signatures are required under "Verification" column. Do not just tick !

H = Hold W = Witness S =Sign-off

PROJECT: Regional Lagoons Sewerage Treatment Plant
Boonah.

Trade Item: **HYDRAULIC SERVICES** **Storm Water Pipe** **PE Polyethylene Pipe.**		**Contractor:** Flint Plumbing.	**Location:** **Forest Hill.**
Approved Thomas & Coffey Project Manager:		**Specification:** Specification: Hydraulics Services Shop drawings: notes & Scope .	INSPECTIONS & VERIFICATION

WORK ACTIVITY/ SEQUENCE	REFERENCE (ie Aus. Standard, Contract Clause and/or Dwg No)	ACCEPTANCE CRITERIA	S/Contractor	Date	Thomas & Coffey	Date	Client		COMMENTS
63 00 PE + 32 00 PC PIPE WORK	AUS N'Z STANDARDS CONTRACT DRAWINGS	SPECS + HYDRAULICS DRAWING	RA	21-5-13		21/5/13			
WORK AS EXECUTED		• PROGRESSIVE • Drawings are diagrammatic only	Note		Note				
FINAL TRIM/ CLEAN SITE		• Final clean and grade site area affected by the stormwater scope of works • Excess spoil spread on site, or removed	S		S				
FINAL INSPECTION	Verify all inspections complete & collate records	• All complete, check as builts are complete			S				

COMMENTS:

Note: Signatures are required under "Verification" column. Do not just tick !

H = Hold W = Witness S =Sign-off

Help & Contact

Flint Plumbing

Trade or Product: Hydraulic Services

Contact & Address Details:

PO Box 458, Labrador QLD 4215

Phone: 07 5571 6633

Fax: 07 5571 6633

Mobile: 0411 874 246 (Russell Flint)

email: flintplumbing@bigpond.com

Pentair Water

Trade or Product: Cast Iron Pipe, fittings and Values

Contact & Address Details:

PO Box 150, Currumbin QLD 4223

Phone: 07 5589 4400

Fax: 07 5534 7079

Plumbers Supply CO-OP

Trade or Product: Pipe, fittings and Values

Contact & Address Details:

Private Mail Bag 3004 Burwood NSW 1805

Phone: 02 9741 8999

Fax: 02 9741 8988

www.pscoop.com.au

Tellam Civil Products

Trade or Product: Cast Iron covers and Frames plus head walls

Contact & Address Details:

28 Jade Drive Molendinar QLD

Phone: 07 5597 6966

As Built Drawings

As-constructed drawings

Site: (ST052) Forest Hill

Please refer to the As-Constructed drawings contained in Thomas & Coffey section of the manual.