PROCESS PIPE GUIDES AND ANCHORS

1. GENERAL

1.1 Description

.1 This section describes process pipeline guides and anchors to be installed integrally with the piping. These items are an integral component of the piping support system for which other requirements are described in Section 15050.

.2 Refer to the general piping requirements of Section 15050. Use the general requirements specified in this section and Section 15050 integrally with the more specific requirements listed in Section 15055.

1.2 Submittals

.1 Provide shop drawings, stamped and signed by a professional engineer, for each type of pipeline support and anchor in accordance with the requirements of Section 01300 and 15050.

.2 Show the materials of construction and illustrations of the method of installation.

.3 Refer to Section 15050 for requirements for submittals for the support system that incorporates the pipe guides and anchors.

.4 Provide evidence that the manufacturer has at least five installations of similar size and type in satisfactory service for a period of not less than five years.

1.3 Coordination

.1 Coordinate the guides and supports with the pipe support system. Ensure that the guides and supports are mounted in locations suitable for their intended function.

1.4 Quality Assurance

.1 Welding Requirements - refer to Section 15050 for welding quality assurance requirements.

.2 Alignment – For large diameter (500 mm and larger), thin walled (6.4 mm and less) stainless steel piping supports laser align such that lateral and vertical misalignments between three consecutive supports do not exceed the wall thickness.

1.5 Process Air Pipe Anchors and Guides

.1 The process air pipe anchor and guide manufacturer will be regularly engaged in the business of designing and fabricating pipe anchors and guides of the size and type specified and shown on the drawings.

PROCESS PIPE GUIDES AND ANCHORS

1.6 Shipment, Protection, and Storage

.1 Refer to Section 01600 and Section 15050 for Shipment and Storage.

2. PRODUCTS

2.1 Function

.1 Provide the pipe guides and anchors as described below, for the piping systems shown.

2.2 Pipe Guides and Anchors

.1 Pipe guides:

.1 Unless otherwise shown or specified, provide Spider type. After fabrication hot dip galvanize. Provide AISI 304 stainless steel for submerged locations. Refer to the following pages and detailed drawings for location.

.2 Acceptable manufacturers:

.1 Grinnel Fig. 256

.2 B-Line Series B3281

.2 Anchors:

.1 Unless otherwise shown or specified, provide steel to Section 05120, hot dip galvanized to Section 05120; concrete to Section 03300, reinforcement to Section 03200; and anchor bolts to Section 05120.

.2 Provide AISI type 304 stainless steel materials in submerged locations.

.3 Provide AISI Type 304 stainless steel nuts, bolts, and washers.

2.3 Process Air Pipe Guides and Anchors

.1 Provide PTFE (lower) bearing surfaces not less than 2.4 mm (3/32") thick of 100% virgin material in accordance with ASTM D1457 and with a 25% content of glass fiber filling.

.2 Provide PTFE (lower) bearing surfaces mechanically secured and bonded to a substrate made of 10 gauge or 3.2 mm (1/8") thick type 304 stainless steel with a 6.4 mm (1/4") welding lip all around.

.3 Provide PTFE with minimum 20 MPa tensile strength, tested in accordance with ASTM D638; 200% elongation minimum, tested in accordance with ASTM D638; and 216 ± 0.03 relative density, tested in accordance with ASTM D792.

PROCESS PIPE GUIDES AND ANCHORS

.4 Provide stainless steel components to ASTM A167; type 304.

.5 Provide stainless steel (upper) bearing surfaces with an annealed mirror finish in accordance with ASTM A480 and having a maximum surface roughness of 0.15 microns.

.6 Provide these filled Teflon to stainless steel slide bearings as manufactured by Amscot Structural Products, Piping Technology & Products, or approved equal, and with the dimensions shown on the drawings.

.7 Use welding procedures which minimize distortion of the pipe guides and anchors, and avoid damage to the finished work or bonded materials. Stitch weld thin stainless steel.

.8 Finish members true to line, free from twists, bends, open joints, sharp corners and sharp edges.

.9 Provide fabrication tolerances as follows:

.1 Overall dimensions to within 3 mm.

.2 Machined surfaces to within 0.4 mm.

.3 Backing plates for sliding surfaces to within 0.8 mm.

.4 Deviation from flatness of PTFE surfaces to 0.2 mm maximum.

.5 Deviation from flatness of stainless steel surfaces intended for contact with PTFE to 0.0003 LH maximum.

.6 PTFE thickness to ±10% of the specified thickness.

.7 Parallelism of one sliding surface with respect to the mating sliding surface, as datum, to 0.2% of the longer side, maximum.

.8 Matching holes for bolts to register so that a gauge 2 mm less in diameter than the holes will pass freely through the assembled members at right angles to such members.

.9 Finished bolt holes to not more than 2 mm in diameter larger than the bolt diameter.

.10 Centre-to-centre distances between bolt holes to within 1mm of the dimensioned distance.

.10 Drill or ream bolt holes.

.11 Provide vibration resistant type fasteners.

.12 Provide stainless steel sliding surfaces intended for contact with PTFE of one piece continuously welded around the perimeter to the back plate to prevent ingress of moisture.

Provide the weld clean, sound, smooth, uniform, without overlaps, properly fused, and located outside the area of contact with PTFE.

.13 Machine or fine grind metal-to-metal contact surfaces. Machine sliding metal contact surfaces in the principal direction of movement. Machine after welding whenever possible.

.14 Provide metal surfaces in contact with PTFE with no openings or discontinuities, and a maximum surface roughness of 3 microns.

.15 Remove abrasive materials from finished surfaces and clean with a degreasing agent.

.16 Protect finished surfaces from contamination and/or mechanical damage.

3. EXECUTION

3.1 Process Air Pipe Guides and Anchors

.1 The Contractor shall, at his own cost, employ a Structural Engineer to design pipe anchors to control piping expansion and contraction for the foul air and process air piping systems. Refer to Section 15050.

.2 Unless written permission has been obtained from the manufacturer and from the Engineer, do not dismantle the pipe guides after they have left the manufacturer's shop, in order to prevent contamination of the sliding surfaces.

.3 Use stainless steel shims to laser-align supports before installing the piping. Tighten J-bolts and grout using liquid, non-shrink, epoxy grout. Prevent ingress of grout into the annular space between the J-bolts and their pipe casing (the use of flexible sealant is allowed). Concrete base foundations for anchors and sliding supports shall be built with the top surface approximately 25 mm below aligned bottom of support plate. Allow for this much epoxy grout at each location. Preparation and grouting to be done according to structural specifications in Division 3.

.4 Construct of fabricate as indicated in the drawings or use approved commercial systems as indicated above.

END OF SECTION

PROCESS EXPANSION JOINTS

1. GENERAL

1.1 Description

.1 This section describes process expansion joint supply and methods for installation.

.2 Refer to the general piping requirements of Section 15050. Use the general requirements specified in this section and Section 15050 integrally with the more specific requirements listed in Section 15055.

.3 The number and location of expansion joints detailed on drawings is indicative only. Contractor to provide a complete piping system design as described in Section 15050.

1.2 Submittals

.1 With the submittals required in Section 15050, provide a listing of the expansion joints used in the performance of the work.

.2 Provide shop drawings showing expansion joint details including maximum allowable temperature and pressure rating, overall face-to-face length measured at 15°C, wall thickness, number of convolutions per joint, spring rate, maximum allowable axial, lateral and angular movement and materials of construction.

1.3 Coordination

.1 Coordinate the expansion joints with the piping requirements and ensure that the connection techniques match.

1.4 Quality Assurance

.1 Comply with the requirements of EJMA.

1.5 Shipment, Protection, and Storage

.1 Refer to Section 01600 and Section 15050 for Shipment and Storage.

.2 Provide shipping and installation blocking to prevent over-extension and deflection. Remove blocks prior to leak testing.

2. PRODUCTS

2.1 Function

.1 Expansion joints are used to compensate for thermal expansion and contraction in the piping system; to isolate equipment from stresses and vibration transmitted from the piping system; and to allow for seismic or long term settlement which could cause differential movement in adjacent piping or equipment.

.2 Design and fabricate expansion joints in accordance with EJMA standards and to meet the requirements of this Section.

.3 Provide expansion joints as necessary to allow for piping expansion and contraction. Unless otherwise specified provide elastomer, spherical moulded type expansion joints.

2.2 Elastomer Expansion Joints

.1 Select materials suitable for service commodity, temperature and pressure. Conform to the requirements of the Fluid Sealing Association, Rubber Expansion Joint Division. Process air may contain up to 20 ppm H_2S.

.2 Provide control rods on expansion joint connectors to prevent excessive axial elongation and to accept the static pressure thrust in the piping system. Manufacturer to determine number and sizes of control rods.

.3 Provide elastomer cover of the same material as the elastomer tube liner.

.1 For service temperatures between -40°C and 120°C, use EPDM for the elastomer tube.

.4 Elastomer, Spool Type

.1 Unless otherwise specified, provide spool, resilient arch type expansion joints.

.2 Construct of multiple plies of woven fabric impregnated with elastomer and reinforced with steel rings or wire embedded in the body.

.3 Provide backup or retaining rings of galvanized steel construction. Make retaining rings a nominal 10mm thick, split type.

.4 Use filled arch type expansion joints on all piping systems conveying fluids containing solids.

.5 Acceptable manufacturers:

.1 Senior Flexonics

.2 Garlock

.3 Mercer

.4 Techniquip

.5 Elastomer, Spherical Moulded Type

.1 Construct of multiple plies of nylon tire cord fabric and elastomer suitable for specified commodity, temperature and pressure.

.2 Provide steel floating flanges, such that no metal parts come in contact with the fluid.

.3 Acceptable manufacturers:

.1 Senior Flexonics

.2 Garlock

.3 Mercer

.4 Techniquip

.5 Proco

2.3 Sliding Joints - Liquid Service

.1 Provide single end type sliding expansion joints able to allow longitudinal movement and radial stresses while maintaining pipe alignment. Provide through rods where necessary to maintain alignment.

.2 Limit longitudinal separation of the two pipe sections to 50% of the manufacturer's recommended maximum by a restraining flange affixed to the slip pipe with the bolts extending through this flange.

.3 Use packing material suitable for the service conditions.

.4 Acceptable manufacturers:

.1 Dresser

.2 Ford Meter Box

.3 Robar

.4 Rockwell

2.4 Flexible Hose Connectors

.1 Where other types of flexible expansion joints are not shown or specified, provide flexible hose connectors within 2m pipe length of rotating equipment suction, discharge and ancillary service connection. Do not provide flexible connectors on sump pump connection piping.

.2 Provide flexible hose connectors with live lengths suitable for a line pressure equal to the test pressure of the pipe and for 12.5mm lateral movement each side of the pipe centerline.

.3 Provide one union for pipe diameters <65mm or floating flange for pipe diameter >65mm, per flexible connector as appropriate to minimize the possibility of torque damage during installation.

.4 Provide flexible hose connectors capable of minimum of 10,000 cycles at the manufacturer's published minimum intermittent centreline bend radius and maximum working pressure.

.5 The design standard for flexible hose connectors on piping systems up to and including 75mm diameter is Senior Flexonics Type UFBX annular corrugated hose connectors.

.6 Acceptable manufacturers for flexible hose connectors on piping systems up to and including 75mm diameter are:

.1 American BOA

.2 Flex-Weld

.3 Senior Flexonics

.7 The design standard for flexible hose connectors on piping systems larger than 75mm diameter is Senior Flexonics Type OF301 corrugated flexible metal hose connectors.

.8 Acceptable manufacturers for flexible connectors on piping systems larger than 75mm diameter are:

.1 American BOA

.2 Flex-Weld

.3 Senior Flexonics

3. EXECUTION

3.1 Expansion Joints

.1 Accurately align pipelines to receive expansion joints before installing the joint. Do not stretch, compress or offset the joint to fit the piping.

.2 Align and install each expansion joint in accordance with EJMA standards and with the manufacturer's written instruction; properly guide and anchor all expansion joints. No lateral movement is permitted on compensator type expansion joints.

.3 Pre-compress expansion joint as required depending on installation temperature.

.4 On rubber expansion joints, check bolt tightness, and tighten where necessary one week after commissioning.

3.2 Flexible Hose Connectors

.1 Accurately align pipelines to receive flexible connectors before installing the connectors. Do not stretch, compress, misalign or offset the connectors.

.2 Align and install each flexible connector in accordance with the manufacturer's instructions.

.3 Support, anchor and guide the piping so that the flexible connectors are not required to absorb any axial compression or elongation.

.4 Do not torque or twist the flexible connectors.

.5 Check bolt tightness and tighten where necessary, a maximum of one week after commissioning and periodically thereafter.

END OF SECTION

DETAILED PROCESS PIPING SPECIFICATION SHEETS

1. GENERAL

1.1 Work Included

.1 The piping specification sheets on the following pages detail the requirements for each type of process pipe included in the work.

.2 The piping materials are listed on the specification sheets.

2. PRODUCTS

2.1 Process Piping Commodity Summary

Table 1: Process Fluids and Pipe Materials

Abbreviation	Process Commodity	Pipe Material
CA	Compressed Air	Copper (L-hard)
CL	Sodium Hypochlorite	PVC Schedule 80
DR	Drain (DAF)	PVC Schedule 80
DWS	Dewatered Sludge (BFP)	Stainless Steel Duct
EW	Effluent Water	Mild Steel, CW or ERW; or PVC Schedule 80
FEW	Filtered Effluent Water	Mild Steel, CW or ERW; or PVC Schedule 80
FIL	Filtrate (BFP)	Mild Steel, CW or ERW; or PVC Schedule 80
FL	Flush Line	PVC Schedule 80
HFEW	Hot Filtered Effluent Water	Mild Steel, CW or ERW; or PVC Schedule 80
HL	Hydrated Lime	PVC Schedule 80
MLQ	Mixed Liquor	Mild Steel, CW or ERW
NMLQ	Nitrified Mixed Liquor	*Existing*
OF	Overflow (Primary Filter)	Mild Steel, CW or ERW; or PVC Schedule 80
PA	Process Air	Stainless Steel, Gauge (304L, Schedule 10)
PE	Primary Effluent	Mild Steel, CW or ERW; or PVC Schedule 80
POLY	Polymer (BFP)	PVC Schedule 80
RAS	Return Activated Sludge	Mild Steel, CW or ERW; or PVC Schedule 80
RCL	Recycle (DAF)	*By Dissolved Air Flotation Manufacturer*
RS	Raw Sewage	Mild Steel, CW or ERW; or PVC Schedule 80 (interior); and HDPE (exterior)
SCR	Screenings	Stainless Steel Duct
SE	Secondary Effluent	Mild Steel, CW or ERW; or PVC Schedule 80 (interior); and HDPE (exterior)
SL	Sample	PVC Schedule 80
SRS	Screened Raw Sewage	Mild Steel, CW or ERW
SUB	Subnatant	Mild Steel, CW or ERW; or PVC Schedule 80
TWAS	Thickened Waste Activated Sludge	Mild Steel, CW or ERW; or PVC Schedule 80
VAC	Vacuum	Mild Steel, CW or ERW
VNT	Vent	PVC Schedule 80
WAS	Waste Activated Sludge	Mild Steel, CW or ERW; or PVC Schedule 80

2.2 Schedule

.1 Pages 2 to 30 following.

DETAILED PROCESS PIPING SPECIFICATION SHEETS

CA

GENERAL

PROCESS FLUID	SYMBOL	OPERATING LIMITS		TEST CONDITIONS	
		PRESSURE (kPa)	TEMP. (°C)	PRESSURE (kPa)	DURATION
Compressed Air	CA	850	0-50	1275	120 min

PIPE

LOCATION	SIZE (mm)	MATERIAL	RATING	SPECIFICATIONS	REMARKS
Tunnels, Pumphouses, and Buildings	10 – 65	Copper	Type L, Hard	ASTM B88	

COATINGS

LOCATION	SIZE (mm)	MATERIAL	SPECIFICATIONS	REMARKS
Tunnels, Pumphouses, and Buildings	10 – 65	N/A		

LININGS

LOCATION	SIZE (mm)	MATERIAL	SPECIFICATIONS	REMARKS
Tunnels, Pumphouses, and Buildings	10 – 65	N/A		

JOINTS

LOCATION	SIZE (mm)	TYPE	MAXIMUM SPACING	SPECIFICATIONS	REMARKS
Tunnels, Pumphouses, and Buildings	10 – 65	Soldered Couplings Unions Butt Weld	N/A 12 m N/A	ANSI B16.22	

FITTINGS AND APPURTENANCES

ITEM	SIZE (mm)	MATERIAL	RATINGS	SPECIFICATIONS	REMARKS
Couplings, Unions ELL – Short Radius ELL – Long Radius, Tees, Reducers, Reducing Outlets, Laterals, and Caps	10 – 65	Bronze, Socket Welded Malleable Iron, Banded	Class 250 Class 150	ANSI B16.22 Material: ASTM A197 Dimensions: ANSI B16.3	
Flange Gaskets		Bl. Neoprene			

VALVES

TYPE	SIZE (mm)	SPECIFICATIONS	REMARKS
Ball	10 – 65	BV01	
Check	10 – 65	CV05	

NOTES

DETAILED PROCESS PIPING SPECIFICATION SHEETS

CL

GENERAL					
PROCESS FLUID	SYMBOL	MAXIMUM CONDITIONS		TEST CONDITIONS	
		PRESSURE (kPa)	TEMP. (°C)	PRESSURE (kPa)	DURATION (Min.)
Sodium Hypochlorite	CL	750	30	1000	120

PIPE					
LOCATION	SIZE (mm)	MATERIAL	RATING	SPECIFICATIONS	REMARKS
Tunnels, Pumphouses, and Buildings	<75	PVC	Schedule 80	CSA 137.3 ASTM D1785	

COATINGS				
LOCATION	SIZE (mm)	MATERIAL	SPECIFICATIONS	REMARKS
Tunnels, Pumphouses, and Buildings	<75	N/A		

LININGS				
LOCATION	SIZE (mm)	MATERIAL	SPECIFICATIONS	REMARKS
Tunnels, Pumphouses, and Buildings	<75	N/A		

JOINTS					
LOCATION	SIZE (mm)	TYPE	MAXIMUM SPACING	SPECIFICATIONS	REMARKS
Tunnels, Pumphouses, and Buildings	<75	Solvent Weld Unions	N/A 12 m	ASTM D2467, D2564 ASTM D2467	

FITTINGS AND APPURTENANCES					
ITEM	SIZE (mm)	MATERIAL	RATING	SPECIFICATIONS	REMARKS
Flanges	<75	PVC	Schedule 80		
ELL - Short Radius ELL - Long Radius, Couplings, Tees, Reducers, Reducing Outlets, Plugs, Caps	<75	PVC	Schedule 80	ASTM D2467, Solvent Weld	
Flange Gaskets		Bl. Neoprene		ASTM F477	
PVC Solvent				ASTM D2564	

VALVES			
TYPE	SIZE (mm)	SPECIFICATIONS	REMARKS
Ball	<75	BV03	
Check	<75	CV06	

NOTES

DETAILED PROCESS PIPING SPECIFICATION SHEETS

DR

GENERAL

PROCESS FLUID	SYMBOL	OPERATING LIMITS		TEST CONDITIONS	
		PRESSURE (kPa)	TEMP. (°C)	PRESSURE (kPa)	DURATION (Min.)
Process Drainage	**DR**	0-250	0-100	375	120

PIPE

LOCATION	SIZE (mm)	MATERIAL	RATING	SPECIFICATIONS	REMARKS
Tunnels, Pumphouses, and Buildings	<75	PVC	Sch. 80	CSA 137.3, ASTM D1785	

COATINGS

LOCATION	SIZE (mm)	MATERIAL	SPECIFICATIONS	REMARKS
Tunnels, Pumphouses, and Buildings	<75	N/A		

LININGS

LOCATION	SIZE (mm)	MATERIAL	SPECIFICATIONS	REMARKS
Tunnels, Pumphouses, and Buildings	<75	N/A		

JOINTS

LOCATION	SIZE (mm)	TYPE	MAXIMUM SPACING	SPECIFICATIONS	REMARKS
Tunnels, Pumphouses, and Buildings	<75	Solvent Weld Unions	N/A 12 m	ASTM D2467, D2564 ASTM D2467	

FITTINGS AND APPURTENANCES

ITEM	SIZE (mm)	MATERIAL	RATING	SPECIFICATIONS	REMARKS
Flanges	<75	PVC	Schedule 80		
ELL - Short Radius ELL - Long Radius, Couplings, Tees, Reducers, Reducing Outlets, Plugs, Caps	<75	PVC	Schedule 80	ASTM D2467, Solvent Weld	
Flange Gaskets		Bl. Neoprene		ASTM F477	
PVC Solvent				ASTM D2564	

VALVES

Ball Valve	<75	BVO6		

NOTES

DETAILED PROCESS PIPING SPECIFICATION SHEETS

DWS

GENERAL					
PROCESS FLUID	SYMBOL				
Dewatered Sludge	**DWS**				
PIPE					
LOCATION	SIZE (mm)	MATERIAL	RATING	SPECIFICATIONS	REMARKS
Tunnels, Pumphouses, and Buildings	≥75	Stainless Steel Duct	4.7 mm thick, 7 gauge		
COATINGS					
LOCATION	SIZE (mm)	MATERIAL		SPECIFICATIONS	REMARKS
Tunnels, Pumphouses, and Buildings	≥75	N/A			
LININGS					
LOCATION	SIZE (mm)	MATERIAL		SPECIFICATIONS	REMARKS
Tunnels, Pumphouses, and Buildings	≥75	N/A			
JOINTS					
LOCATION	SIZE (mm)	TYPE	MAXIMUM SPACING	SPECIFICATIONS	REMARKS
Tunnels, Pumphouses, and Buildings	≥75	Flanged			
FITTINGS AND APPURTENANCES					
N/A					
VALVES					
N/A					
NOTES					

DETAILED PROCESS PIPING SPECIFICATION SHEETS

EW

GENERAL

PROCESS FLUID	SYMBOL	MAXIMUM CONDITIONS		TEST CONDITIONS	
		PRESSURE (kPa)	TEMP. (°C)	PRESSURE (kPa)	DURATION (Min.)
Effluent Water	EW	750	20	1000	120

PIPE

LOCATION	SIZE (mm)	MATERIAL	RATING	SPECIFICATIONS	REMARKS
Tunnels, Pumphouses, and Buildings	<75	PVC	Schedule 80	CSA 137.3, ASTM D1785	Note 1
	≥75	Mild Steel, CW or ERW	Std. Wt.	ASTM A53, Grade B	
		or			
		PVC	Schedule 80	CSA 137.3, ASTM D1785	

COATINGS

LOCATION	SIZE (mm)	MATERIAL	SPECIFICATIONS	REMARKS
Tunnels, Pumphouses, and Buildings	<75	N/A		
	≥75	Paint		
		N/A		

LININGS

LOCATION	SIZE (mm)	MATERIAL	SPECIFICATIONS	REMARKS
Tunnels, Pumphouses, and Buildings	<75	N/A		
	≥75	Epoxy, E2A	AWWA C210	
		N/A		

JOINTS

LOCATION	SIZE (mm)	TYPE	MAXIMUM SPACING	SPECIFICATIONS	REMARKS
Tunnels, Pumphouses, and Buildings	<75	Solvent Weld	N/A	ASTM D2467, D2564	Note 1
		Unions	12 m	ASTM D2467	
	≥75	Butt Weld	N/A		
		Grooved Joint	20 m	AWWA C606	
		Bell & Spigot	N/A	AWWA	

FITTINGS AND APPURTENANCES

ITEM	SIZE (mm)	MATERIAL	RATING	SPECIFICATIONS	REMARKS
Flanges	<75	PVC	Schedule 80		
	≥75	Mild Steel	Class 150	Material: ASTM A181, Gr. 1 Dimensions: ANSI B16.5 ANSI B16.9	
		PVC	Schedule 80		
ELL - Short Radius	<75	PVC	Schedule 80	ASTM D2467, Solvent Weld	
ELL - Long Radius, Couplings, Tees, Reducers, Reducing Outlets, Plugs, Caps	≥75	PVC	Schedule 80	ASTM D2467, Solvent Weld	
Flanged Adaptors	≥75	Same as Pipe	Same as Pipe	Flange: ANSI B16.5	
Flange Gaskets		Bl. Neoprene		ASTM F477	
PVC Solvent				ASTM D2564	

VALVES

TYPE	SIZE (mm)	SPECIFICATIONS	REMARKS
Butterfly	≥75	BF02	
Ball	<75	BV03	
Check	<75	CV01	

NOTES

1. Provide unions or flanges on either side of wall penetrations as shown on Drawings to allow for pipe disassembly.

DETAILED PROCESS PIPING SPECIFICATION SHEETS

FEW

GENERAL

PROCESS FLUID	SYMBOL	OPERATING LIMITS		TEST CONDITIONS	
		PRESSURE (kPa)	TEMP. (°C)	PRESSURE (kPa)	DURATION (Min.)
Filtered Effluent Water	**FEW**	0-750	5-30	1125	120

PIPE

LOCATION	SIZE (mm)	MATERIAL	RATING	SPECIFICATIONS	REMARKS
Tunnels, Pumphouses, and Buildings	<75	PVC	Schedule 80	CSA 137.3, ASTM D1785	Note 1
	≥75	Mild Steel, CW or ERW	Std. Wt.	ASTM A53, Grade B	
		or			
		PVC	Schedule 80	CSA 137.3, ASTM D1785	Note 1

COATINGS

LOCATION	SIZE (mm)	MATERIAL	SPECIFICATIONS	REMARKS
Tunnels, Pumphouses, and Buildings	<75	N/A		
	≥75	Paint		
		N/A		

LININGS

LOCATION	SIZE (mm)	MATERIAL	SPECIFICATIONS	REMARKS
Tunnels, Pumphouses, and Buildings	<75	N/A		
	≥75	Epoxy, E2A	AWWA C210	
		N/A		

JOINTS

LOCATION	SIZE (mm)	TYPE	MAXIMUM SPACING	SPECIFICATIONS	REMARKS
Tunnels, Pumphouses, and Buildings	<75	Soldered Couplings	N/A	ANSI B16.22	
		Unions	12 m	ASTM D2467	
	≥75	Butt Weld	N/A		
		Grooved Joint	20 m	AWWA C606	
		Bell & Spigot	N/A	AWWA	Note 1

FITTINGS AND APPURTENANCES

ITEM	SIZE (mm)	MATERIAL	RATING	SPECIFICATIONS	REMARKS
Flanges, FF or RF	≥75	Mild Steel	Class 150	Material: ASTM A181, Gr. 1 Dimensions: ANSI B16.5 ANSI B16.9	
		PVC	Schedule 80		
ELL – Short Radius	<75	PVC	Schedule 80	ASTM D2467, Solvent Weld	
ELL – Long Radius, Tees, Reducers,	≥75	Mild Steel, Seamless	Same as Pipe	Material: ASTM A234, WPB Dimensions: ANSI B16.9	
Reducing Outlets, Laterals and Caps		PVC	Schedule 80	ASTM D2467, Solvent Weld	
Plug	≥75	Mild Steel	Class 150 Blind Flange	Material: ASTM A181, Gr. 1 Dimensions: ANSI B16.5	
		PVC	Schedule 80	ASTM D2467, Solvent Weld	
Flanged Adaptors	≥75	Same as Pipe	Same as Pipe	Flange: ANSI B16.5	
Flanged Gaskets		Bl. Neoprene		ASTM F477	
Grooved Joint Gaskets	≥75			AWWA C606	
PVC Solvent				ASTM D2564	

VALVES

TYPE	SIZE (mm)	SPECIFICATIONS	REMARKS
Ball	<75	BV03	
Check	<75	CV01	
Needle	<75	NV01	

NOTES

1. Provide unions or flanges on either side of wall penetrations as shown on Drawings to allow for pipe disassembly.

DETAILED PROCESS PIPING SPECIFICATION SHEETS

FIL

GENERAL					
PROCESS FLUID	SYMBOL	MAXIMUM CONDITIONS		TEST CONDITIONS	
		PRESSURE (kPa)	TEMP. (°C)	PRESSURE (kPa)	DURATION (Min.)
Filtrate (Belt Filter Press)	**FIL**	750	20	1000	120

PIPE					
LOCATION	SIZE (mm)	MATERIAL	RATING	SPECIFICATIONS	REMARKS
Tunnels, Pumphouses, and Buildings	≥75	Mild Steel, CW or ERW or PVC	Std. Wt. Schedule 80	ASTM A53, Grade B CSA 137.3, ASTM D1785	 Note 1

COATINGS				
LOCATION	SIZE (mm)	MATERIAL	SPECIFICATIONS	REMARKS
Tunnels, Pumphouses, and Buildings	≥75	Paint N/A		

LININGS				
LOCATION	SIZE (mm)	MATERIAL	SPECIFICATIONS	REMARKS
Tunnels, Pumphouses, and Buildings	≥75	Epoxy, E2A N/A	AWWA C210	

JOINTS					
LOCATION	SIZE (mm)	TYPE	MAXIMUM SPACING	SPECIFICATIONS	REMARKS
Tunnels, Pumphouses, and Buildings	≥75	Butt Weld Grooved Joint Bell & Spigot	N/A 20 m N/A	 AWWA C606 AWWA	 Note 1

FITTINGS AND APPURTENANCES					
ITEM	SIZE (mm)	MATERIAL	RATING	SPECIFICATIONS	REMARKS
Flanges, FF or RF	≥75	Mild Steel PVC	Class 150 Schedule 80	Material: ASTM A181, Gr. 1 Dimensions: ANSI B16.5 ANSI B16.9	
ELL – Short Radius ELL – Long Radius, Tees, Reducers, Reducing Outlets, Laterals and Caps	≥75	Mild Steel, Seamless PVC	Same as Pipe Schedule 80	Material: ASTM A234, WPB Dimensions: ANSI B16.9 ASTM D2467, Solvent Weld	
Plug	≥75	Mild Steel PVC	Class 150 Blind Flange Schedule 80	Material: ASTM A181, Gr. 1 Dimensions: ANSI B16.5 ASTM D2467, Solvent Weld	
Flanged Adaptors	≥75	Same as Pipe	Same as Pipe	Flange: ANSI B16.5	
Flanged Gaskets		Bl. Neoprene		ASTM F477	
Grooved Joint Gaskets	≥75			AWWA C606	
PVC Solvent				ASTM D2564	

VALVES			
Butterfly Valves	≥75	BF02	

NOTES

1. Provide unions or flanges on either side of wall penetrations as shown on Drawings to allow for pipe disassembly.

DETAILED PROCESS PIPING SPECIFICATION SHEETS

FL

GENERAL					
PROCESS FLUID	SYMBOL	OPERATING LIMITS		TEST CONDITIONS	
		PRESSURE (kPa)	TEMP. (°C)	PRESSURE (kPa)	DURATION (Min.)
Flush Line	FL	0-35	5-30	55	60

PIPE					
LOCATION	SIZE (mm)	MATERIAL	RATING	SPECIFICATIONS	REMARKS
Tunnels, Pumphouses, and Buildings	<75	PVC	Sch. 80	CSA 137.3, ASTM D1785	Note 2
Submerged	<75	PVC	Sch. 80	CSA 137.3, ASTM D1785	Note 2

COATINGS				
LOCATION	SIZE (mm)	MATERIAL	SPECIFICATIONS	REMARKS
Tunnels, Pumphouses, and Buildings	<75	N/A		
Submerged	<75	N/A		

LININGS				
LOCATION	SIZE (mm)	MATERIAL	SPECIFICATIONS	REMARKS
Tunnels, Pumphouses, and Buildings	<75	N/A		
Submerged	<75	N/A		

JOINTS					
LOCATION	SIZE (mm)	TYPE	MAXIMUM SPACING	SPECIFICATIONS	REMARKS
Tunnels, Pumphouses, and Buildings	<75	Solvent Weld Unions	N/A 12 m	ASTM D2467, D2564 ASTM D2467	Note 2
Submerged	<75	Threaded Couplings Unions	N/A 12 m	ASTM A197, ANSI B16.3 ASTM D2467	Note 2

FITTINGS AND APPURTENANCES					
ITEM	SIZE (mm)	MATERIAL	RATING	SPECIFICATIONS	REMARKS
Flanges,	<75	PVC	Sch. 80		
ELL - Short Radius, ELL - Long Radius, Tees, Reducers, Reducing Outlets, Laterals and Caps	<75	PVC	Sch. 80	ASTM D2467, Solvent Weld	
Plug	<75	PVC	Sch. 80	ASTM D2467, Solvent Weld	
Flange Gaskets		Bl. Neoprene		ASTM F477	
PVC Solvent	<75			ASTM D2564	

VALVES			
TYPE	SIZE (mm)	SPECIFICATION	REMARKS
Ball	<75	BV03	

NOTES

1. Where pipe crosses a structural joint, install at the joint location an EPDM lined elastomer spherical moulded type expansion joint capable of 0.25 degrees angular movement and ± 20 mm axial movement.
2. Provide unions or flanges on either side of wall penetrations to allow for pipe disassembly.

DETAILED PROCESS PIPING SPECIFICATION SHEETS

HFEW

GENERAL					
PROCESS FLUID	SYMBOL	OPERATING LIMITS		TEST CONDITIONS	
		PRESSURE (kPa)	TEMP. (°C)	PRESSURE (kPa)	DURATION (Min.)
Hot Filtered Effluent Water	**FEW**	0-750	5-30	1125	120

PIPE					
LOCATION	SIZE (mm)	MATERIAL	RATING	SPECIFICATIONS	REMARKS
Tunnels, Pumphouses, and Buildings	<75	PVC	Schedule 80	CSA 137.3, ASTM D1785	Note 1

COATINGS				
LOCATION	SIZE (mm)	MATERIAL	SPECIFICATIONS	REMARKS
Tunnels, Pumphouses, and Buildings	<75	N/A		

LININGS				
LOCATION	SIZE (mm)	MATERIAL	SPECIFICATIONS	REMARKS
Tunnels, Pumphouses, and Buildings	<75	N/A		

JOINTS					
LOCATION	SIZE (mm)	TYPE	MAXIMUM SPACING	SPECIFICATIONS	REMARKS
Tunnels, Pumphouses, and Buildings	<75	Soldered Couplings Unions	N/A 12 m	ANSI B16.22 ASTM D2467	

FITTINGS AND APPURTENANCES					
ITEM	SIZE (mm)	MATERIAL	RATING	SPECIFICATIONS	REMARKS
Flanges	<75	PVC	Schedule 80		
ELL - Short Radius ELL - Long Radius, Couplings, Tees, Reducers, Reducing Outlets, Plugs, Caps	<75	PVC	Schedule 80	ASTM D2467, Solvent Weld	
Flange Gaskets		Bl. Neoprene		ASTM F477	
PVC Solvent				ASTM D2564	

VALVES			
TYPE	SIZE (mm)	SPECIFICATIONS	REMARKS
Ball	<75	BV03	

NOTES

1. Provide unions or flanges on either side of wall penetrations as shown on Drawings to allow for pipe disassembly.