

APPENDIX A TECHNICAL SCHEDULES**A.1 WATER SUPPLY FACILITIES****TS 1 Gates****Gates for Intake Pump Station/Water Treatment Plant (Mechanical Work)**

Facility/Equipment	Tag No.	Size mm	Center to Floor (m)	Seat	Operation
W31 : Distribution Chamber					
Distribution Weir	W31 MG 11 to 31	3000 x 500	1.50	on	Electrically Operated
W32 : Receiving Well					
Inflow Gate	W32 MG 11 to 21	1000 x 1000	5.60	on	Electrically Operated
W33 : Receiving Well					
Inflow Gate	W33 MG 11 to 61	600 x 600	4.60	on	Electrically Operated
W34 : Rapid Sand Filter					
Effluent Gate	W34 HG 011 to 122	600 x 600	3.30	on	Handwheel, Manual
Effluent Weir	W34 HG 01 to 10	1500 x 600	0.90	on	Electrically Operated

TS 2 Valves**Valves for Intake Pump Station/Water Treatment Plant (Mechanical Work)**

Only major valves are listed below. The Contractor should design the facilities and provide all necessary valves, such as chemical piping, pressured air piping, vacuum piping etc, especially valves for surge control facilities, de-sludge facilities, rapid sand filters, and chemical dosing facilities.

Facility/Equipment	Valve No.	Q'ty	Type	Dia. (mm)	Pressure (MPa)	Purpose
W11 : Intake Pump Station						
Inflow Valve	W11 MV 01 to 03	3	Motorized Butterfly (Metal seated)	1500	0.98	Intake
Suction Valve A	W11 HV 11 to 61	6	Motorized Butterfly	500	0.98	Raw Water Pump
Suction Valve B	W11 HV 71 to 81	2	Manual Butterfly	500	0.98	Raw Water Pump
Discharge Valve A	W11 MV 12 to 62	6	Motorized Butterfly	500	0.98	Raw Water Pump
Discharge Valve B	W11 MV 72 to 82	2	Manual Butterfly	500	0.98	Raw Water Pump
Check Valve	W11 CV 11 to 61	6	Swing	500	0.98	Raw Water Pump
Isolation Valve	W11 MV 04/05	2	Motorized Butterfly	1400	0.98	Transmission
Check Valve	W11 CV 01/02	2	Swing	50	0.98	Sump Pump
Discharge Valve	W11 HV 01/02	2	Manual Sluice	50	0.98	Sump Pump
Air Valve	W11 AV 01/02	2	Air Valve	80	0.98	Header Pipe
W12 : Surge Control House						
Flow Control Valve	W12 MV 11	1	Motorized Toothed Butterfly	1100	0.98	Flow Control
Isolation Valve	W12 HV 12	1	Manual Butterfly	1100	0.98	Flow Control
Isolation Valve	W12 HV 01 to 02	2	Manual Butterfly	600	0.98	Surge Tank
W31 : Distribution Chamber						
Inflow Control Valve	W31 MV 11 to 21	2	Motorized Toothed Butterfly	1000	0.98	Pressure Control
Outflow Isolation Valve	W31 HV 11	1	Manual Butterfly	1200	0.98	Future Connection
Drain Valve	W31 HV 01	1	Manual Sluice	400	0.98	Drain

Facility/Equipment	Valve No.	Q'ty	Type	Dia. (mm)	Pressure (MPa)	Purpose
W32 : Receiving Well						
Inflow Valve	W32 MV 11 to 21	2	Motorized Butterfly	1100	0.98	Isolation
Drain Valve	W32 HV 11 to 21	2	Manual Sluice	200	0.98	De-sludge
W33 : Flocculation/Sedimentation Basin						
De-sludge Valve	W33 PV 11 to 64	24	Pneumatic Eccentric	200	0.98	De-sludge
De-sludge Hand Valve	W33 HV 11 to 64	24	Manual Sluice	200	0.98	De-sludge
Check Valve	W33 CV 01 to 04	4	Swing	50	0.98	Sump Pump
Discharge Valve	W33 HV 01 to 04	4	Manual Sluice	50	0.98	Sump Pump
Suction Valve	W33 FV 05	1	Foot	50	0.98	Sampling Pump
Check Valve	W33 CV 05	1	Swing	50	0.98	Sampling Pump
Discharge Valve	W33 HV 05	1	Manual Sluice	50	0.98	Sampling Pump
W34 : Rapid Sand Filter						
Drain Valve A	W34 HV 011 to 122	24	Manual Sluice with Floorstand	100	0.98	Filter Drain
Flat Bottom Drain Valve	W34 HV 053 to 123	4	Flat Bottom Valve	200	0.49	Filter Drain
Surface Wash Valve	W34 PV 011 to 121	12	Pneumatic Eccentric	300	0.98	Surface Wash
Drain Valve B	W34 HV 01 to 02	2	Manual Sluice with Floorstand	100	0.98	Filter Drain
Drain Valve C	W34 HV 03 to 04	2	Manual Sluice with Floorstand	100	0.98	Filter Drain
Air Vent	W34 HV 05 to 09	5	FRP Air Vent	250	-	Chlorination
Isolation Valve	W34 HV 11 to 14	4	Manual Sluice	350	0.98	Surface Wash
Flow Control Valve	W34 HV 15 to 16	2	Variable Orifice	350	0.98	Surface Wash
W35 : Distribution Pump Station						
Suction Valve 4/7/8	W35 MV 11 to 31	3	Motorized Butterfly	800	0.98	Distribution Pump
Discharge Valve 4/7	W35 MV 12 to 22	2	Motorized Butterfly	700	0.98	Distribution Pump
Discharge Valve 8	W35 MV 32	1	Motorized Butterfly	600	0.98	Distribution Pump
Check Valve	W35 CV 11 to 21	2	Swing	700	0.98	Distribution Pump
Check Valve	W35 CV 31	1	Swing	600	0.98	Distribution Pump
Check Valve	W35 CV 01/02	2	Swing	80	0.98	Sump Pump
Discharge Valve	W35 HV 06/07	2	Manual Sluice	80	0.98	Sump Pump
Pressure Control Valve	W35 HV 08	1	Hydraulically Automatic	450	0.98	Plant Water
W36 : Washing Drain Basin						
Inflow Valve	W36 HV 11 to 21	2	Manual Butterfly with Floorstand	1000	0.98	Inflow
Isolation Valve - W	W36 HV 12 to 22	2	Manual Sluice	500	0.98	Recovery Pump
Isolation Valve - S	W36 HV 41 to 52	2	Manual Sluice	200	0.98	Sludge Pump
Suction Valve - W	W36 HV 13 to 33	3	Manual Sluice	250	0.98	Recovery Pump
Suction Valve - S	W36 HV 43 to 53	2	Manual Sluice	150	0.98	Sludge Pump
Check Valve - W	W36 CV 11 to 31	3	Swing	250	0.98	Recovery Pump
Check Valve - S	W36 CV 41 to 51	2	Swing	150	0.98	Sludge Pump
Discharge Valve - W	W36 MV 14 to 34	3	Manual Sluice	250	0.98	Recovery Pump
Discharge Valve - S	W36 HV 44 to 54	2	Manual Sluice	150	0.98	Sludge Pump
Check Valve	W36 CV 01/02	2	Swing	50	0.98	Sump Pump
Discharge Valve	W36 HV 06/07	2	Manual Sluice	50	0.98	Sump Pump

Facility/Equipment	Valve No.	Q'ty	Type	Dia. (mm)	Pressure (MPa)	Purpose
W37 : Sludge Thickener						
Isolation Valve	W37 HV 01 to 03	3	Manual Sluice	200	0.98	De-sludge Pipe
Isolation Valve	W37 HV 04 to 06	3	Manual Sluice	100	0.98	Pipe Washing
Suction Valve	W37 HV 11 to 21	2	Manual Sluice	250	0.98	Sludge Pump
Check Valve	W37 CV 11 to 21	2	Swing	200	0.98	Sludge Pump
Discharge Valve	W37 HV 12 to 22	2	Manual Sluice	200	0.98	Sludge Pump
Check Valve	W37 CV 01 to 02	2	Swing	50	0.98	Sump Pump
Discharge Valve	W37 HV 07 to 08	2	Manual Sluice	50	0.98	Sump Pump
W38 : Sludge Drying Bed						
Inflow Valve	W38 HV 11 to 62	12	Manual Sluice with Floorstand	200	0.98	Inflow
Outflow Valve	W38 HV 13 to 64	12	Manual Sluice with Floorstand	200	0.98	Inflow
W40 : Discharge Pool						
Inflow Valve – A	W40 HV11 to 21	2	Manual Sluice with Floorstand	250	0.98	Inflow-Thickener
Inflow Valve – B	W40 HV12 to 22	2	Manual Sluice with Floorstand	200	0.98	Inflow-Drying Bed
Isolation Valve	W40 HV 13 to 23	2	Manual Sluice	200	0.98	Wastewater Pump
Suction Valve	W40 HV 14 to 24	2	Manual Sluice	200	0.98	Wastewater Pump
Check Valve	W40 CV 11 to 21	2	Swing	200	0.98	Wastewater Pump
Discharge Valve	W40 HV 15 to 25	2	Manual Sluice	200	0.98	Wastewater Pump
Check Valve	W40 CV 01 to 02	2	Swing	50	0.98	Sump Pump
Discharge Valve	W40 HV 01 to 02	2	Manual Sluice	50	0.98	Sump Pump

TS 3 Induction Motors (list excludes motorised valves and gates)

Tag Numbers	W11 RP 11 to61	W11 MH 01 to 02	W11 MH 03
Equipment	Raw Water Pumps	Overhead Hoists	Overhead Hoist
Type	totally enclosed, fan-cooled, squirrel cage	drip-proof, fan-cooled, squirrel cage	drip-proof, fan-cooled, squirrel cage
Min. rated output kW	280	9 + 0.75	9 + 0.75
Poles	6-P	4-P	4-P
Supply	6000 V	380 V	380 V
Enclosure	IP 44	IP 22	IP 22
Insulation	F	E	E
Rating	continuous	continuous	continuous
Starting	direct on line	direct on line	direct on line

Tag Numbers	W11 DP 01 to 02	W12 AC 01 to 02	W33 SC 11 to 61
Equipment	Sump Drainage Pumps	Air Compressors	Sludge Collectors
Type	submersible	drip-proof, fan-cooled, squirrel cage	drip-proof, fan-cooled, squirrel cage
Min. rated output kW	5.5	3.7	1.5
Poles	2-P	4-P	4-P
Supply	380 V	380 V	380 V
Enclosure	IP 68	IP 22	IP 22
Insulation	F	E	E
Rating	continuous	continuous	Continuous
Starting	direct on line	direct on line	VVVF

Tag Numbers	W33 DP 01 to 04	W33 MP 01	W34 MH 01 to 02
Equipment	Sump Drainage Pumps	Sampling Pump	Overhead Hoist
Type	submersible	drip-proof, fan-cooled, squirrel cage	drip-proof, fan-cooled, squirrel cage
Min. rated output kW	1.5	1.5	9 + 0.75
Poles	2-P	2-P	4-P
Supply	380 V	380 V	380 V
Enclosure	IP 68	IP 22	IP 22
Insulation	F	E	E
Rating	continuous	continuous	continuous
Starting	direct on line	direct on line	direct on line

Tag Numbers	W34 VP 01 to 02	W34 AC 01 to 02	W34 MP 01
Equipment	Vacuum Pumps	Air Compressors	Sampling Pump
Type	totally enclosed, fan-cooled, squirrel cage	drip-proof, fan-cooled, squirrel cage	drip-proof, fan-cooled, squirrel cage
Min. rated output kW	15	3.7	1.5
Poles	4-P	4-P	2-P
Supply	380 V	380 V	380 V
Enclosure	IP 44	IP 22	IP 22
Insulation	F	E	E
Rating	continuous	continuous	continuous
Starting	star delta	direct on line	direct on line

Tag Numbers	W35 WP 11	W35 WP 21	W35 WP 31
Equipment	Distribution Pump No. 4	Distribution Pump No. 7	Distribution Pump No. 8
Type	totally enclosed, fan-cooled, squirrel cage	totally enclosed, fan-cooled, squirrel cage	totally enclosed, fan-cooled, squirrel cage
Min. rated output kW	800	800	520
Poles	6-P	6-P	6-P
Supply	6000 V	6000 V	6000 V
Enclosure	IP 44	IP 44	IP 44
Insulation	F	F	F
Rating	continuous	continuous	continuous
Starting	VVVF	Reactor Starter	Reactor Starter

Tag Numbers	W35 DP 01 to 02	W35 MC 01	W3611 to 31
Equipment	Sump Drainage Pumps	Overhead Crane	Recovery Pumps
Type	submersible	drip-proof, fan-cooled, squirrel cage	totally enclosed, fan-cooled, squirrel cage
Min. rated output kW	2.2	$9 + 0.75 + 0.75 \times 2$	55
Poles	2-P	4-P	4-P
Supply	380 V	380 V	380 V
Enclosure	IP 68	IP 22	IP 44
Insulation	F	E	F
Rating	continuous	continuous	continuous
Starting	direct on line	direct on line	Auto-transformer

Tag Numbers	W36 SP 11 to 21	W36 DP 01 to 02	W37 ST 11 to 21
Equipment	Sludge Pumps	Sump Drainage Pumps	Sludge Thickeners
Type	totally enclosed, fan-cooled, squirrel cage	submersible	drip-proof, fan-cooled, squirrel cage
Min. rated output kW	5.5	1.5	1.5
Poles	4-P	2-P	4-P
Supply	380 V	380 V	380 V
Enclosure	IP 44	IP 68	IP 22
Insulation	F	F	E
Rating	continuous	continuous	Continuous
Starting	direct on line	direct on line	direct on line

Tag Numbers	W37 SP 11 to 21	W37 DP 01 to 02	W40 SP 11 to 21
Equipment	Sludge Pumps	Sump Drainage Pumps	Wastewater Pumps
Type	totally enclosed, fan-cooled, squirrel cage	submersible	drip-proof, fan-cooled, squirrel cage
Min. rated output kW	3.7	1.5	3.7
Poles	4-P	2-P	4-P
Supply	380 V	380 V	380 V
Enclosure	IP 44	IP 68	IP 22
Insulation	F	F	E
Rating	continuous	continuous	Continuous
Starting	direct on line	direct on line	direct on line

Tag Numbers	W40 DP 01 to 02	W45 CP 11 to 21	W45 CP 31 to 41
Equipment	Sump Drainage Pumps	Coagulant Transfer Pumps	Coagulant Pumps
Type	submersible	totally enclosed, fan-cooled, squirrel cage	totally enclosed, fan-cooled, squirrel cage
Min. rated output kW	1.5	5.5	2.2
Poles	2-P	4-P	4-P
Supply	380 V	380 V	380 V
Enclosure	IP 68	IP 44	IP 44
Insulation	F	F	F
Rating	continuous	continuous	continuous
Starting	direct on line	direct on line	direct on line

Tag Numbers	W45 CM 01	W45 CP 51 to 61	W45 AB 11 to 21
Equipment	Flocculant Mixer	Flocculant Pumps	A. C. Blowers
Type	drip-proof, fan- cooled, squirrel cage	totally enclosed, fan- cooled, squirrel cage	totally enclosed, fan- cooled, squirrel cage
Min. rated output kW	1.5	0.4	5.5
Poles	4-P	4-P	4-P
Supply	380 V	380 V	380 V
Enclosure	IP 22	IP 44	IP 22
Insulation	E	F	E
Rating	continuous	continuous	continuous
Starting	direct on line	direct on line	direct on line

Tag Numbers	W45 CP 71 to 81	W45 EF 11	W45 EV 11 to 21
Equipment	A. C. Pumps	Dust Extract Fan	Exhaust Fansr
Type	totally enclosed, fan- cooled, squirrel cage	drip-proof, fan- cooled, squirrel cage	drip-proof, fan- cooled, squirrel cage
Min. rated output kW	2.2	0.75	0.4
Poles	4-P	4-P	2-P
Supply	380 V	380 V	380 V
Enclosure	IP 44	IP 22	IP 44
Insulation	F	E	F
Rating	continuous	continuous	continuous
Starting	direct on line	direct on line	direct on line

TS 4 Piping

1. Water Supply

Service and Location	Nominal Dia. (ND)	Pipeline Material	Lining (L) and Coating (C)	Joints	Remarks
W10: Intake Facility					
a. Raw water transfer piping					
Buried	ND 1100 to 1400	SP	(L) JWWA K135 or AWWA C210 (C) JWWA K151 or AWWA C203	Flanged, Welded & SC	SC: Sleeve Coupling
Exposed	ND 500 to 2600	SP	(L) JWWA K135 or AWWA C210 (C) SYSTEM D2	Ditto	
b. Compressed air piping					
Exposed	ND 15 to 50	GSP	(L) None (C) SYSTEM F	Flanged, Screwed & SC	
c. Drainage piping					
Buried	ND 50 to 100	GSP	(L) None (C) SYSTEM F	Flanged, Screwed	
Exposed	ND 50 to 100	GSP	(L) None (C) SYSTEM F	Ditto	
Submerged	ND 50 to 100	GSP	(L) None (C) SYSTEM D1	Ditto	
W20: Raw Water Transmission Facility					
a. Raw water transfer piping					
Buried	ND 1000 to 1400	SP	(L) JWWA K135 or AWWA C210 (C) JWWA K151 or AWWA C203	Flanged, Welded & SC	SC: Sleeve Coupling
W30: Water Treatment Facility					
a. Raw water piping					
Buried	ND 1000 to 1200	SP	(L) JWWA K135 or AWWA C210 (C) JWWA K151 or AWWA C203	Flanged, Welded & SC	SC: Sleeve Coupling
Exposed	ND 1000 to 1200	SP	(L) JWWA K135 or AWWA C210 (C) SYSTEM D2	Ditto	
Submerged	ND 1000 to 1200	SP	(L) JWWA K135 or AWWA C210 (C) SYSTEM D1	Ditto	
b. Settled water piping					
Buried	ND 1000 to 1200	SP	(L) JWWA K135 or AWWA C210 (C) JWWA K151 or AWWA C203	Flanged, Welded & SC	SC: Sleeve Coupling
Exposed	ND 1000 to 1200	SP	(L) JWWA K135 or AWWA C210 (C) SYSTEM D2	Ditto	
Submerged	ND 1000 to 1200	SP	(L) JWWA K135 or AWWA C210 (C) SYSTEM D1	Ditto	

c. Treated water piping					
Buried	ND 300 to 1200	SP	(L) JWWA K135 or AWWA C210 (C) JWWA K151 or AWWA C203	Flanged, Welded & SC	SC: Sleeve Coupling
Exposed	ND 300 to 1200	SP	(L) JWWA K135 or AWWA C210 (C) SYSTEM D2	Ditto	
Submerged	ND 300 to 1200	SP	(L) JWWA K135 or AWWA C210 (C) SYSTEM D1	Ditto	
Buried	ND 75 to 700	DIP	(L) JIS A5314 or ISO 4179 and epoxy lining for fittings (C) Epoxy Coating	Flanged, Push-on & SC	SC: Sleeve Coupling
Exposed	ND 75 to 700	DIP	(L) JIS A5314 or ISO 4179 and epoxy lining for fittings (C) SYSTEM D2	Ditto	
Submerged	ND 75 to 700	DIP	(L) JIS A5314 or ISO 4179 and epoxy lining for fittings (C) SYSTEM D1	Ditto	
d. Wash water recovery piping					
Buried	ND 600	DIP	(L) JIS A5314 or ISO 4179 and epoxy lining for fittings (C) Epoxy Coating	Flanged, Push-on & SC	SC: Sleeve Coupling
Exposed	ND 600	DIP	(L) JIS A5314 or ISO 4179 and epoxy lining for fittings (C) SYSTEM D2	Ditto	
Submerged	ND 600	DIP	(L) JIS A5314 or ISO 4179 and epoxy lining for fittings (C) SYSTEM D1	Ditto	
e. Coagulant piping					
Buried	ND 25 to 100	SP-VL	(L) PVC Lining (C) JWWA K151 or AWWA C203	Flanged & SC	SC: Sleeve Coupling
Exposed	ND 25 to 100	SP-VL	(L) PVC Lining (C) SYSTEM D2	Ditto	
Submerged	ND 25 to 100	SP-VL	(L) PVC Lining (C) SYSTEM D1	Ditto	
f. Flocculant piping					
Buried	ND 25 to 100	SP-VL	(L) PVC Lining (C) JWWA K151 or AWWA C203	Flanged & SC	SC: Sleeve Coupling
Exposed	ND 25 to 100	SP-VL	(L) PVC Lining (C) SYSTEM D2	Ditto	
Submerged	ND 25 to 100	SP-VL	(L) PVC Lining (C) SYSTEM D1	Ditto	
g. Activated carbon solution piping					
Buried	ND 25 to 100	SP-VL	(L) PVC Lining	Flanged & SC	SC: Sleeve

			(C) JWWA K151 or AWWA C203		Coupling
Exposed	ND 25 to 100	SP-VL	(L) PVC Lining (C) SYSTEM D2	Ditto	
Submerged	ND 25 to 100	SP-VL	(L) PVC Lining (C) SYSTEM D1	Ditto	
h. Chlorine solution piping					
Buried	ND 25 to 100	SP-VL	(L) PVC Lining (C) JWWA K151 or AWWA C203	Flanged & SC	SC: Sleeve Coupling
Exposed	ND 25 to 100	SP-VL	(L) PVC Lining (C) SYSTEM D2	Ditto	
Submerged	ND 25 to 100	SP-VL	(L) PVC Lining (C) SYSTEM D1	Ditto	
i. Chlorine gas/liquid piping					
Exposed	ND 200	SP	(L) None (C) SYSTEM D2	Flanged, Screwed & SC	
j. Compressed air piping					
Buried	ND 200	GSP	(L) None (C) None	Flanged, Screwed & SC	
Exposed	ND 200	GSP	(L) None (C) SYSTEM D2	Ditto	
k. Vacuum piping					
Exposed	ND 20 to 100	GSP	(L) None (C) SYSTEM D2	Flanged, Screwed & SC	
l. Sludge piping					
Buried	ND 150 to 250	DIP	(L) JIS A5314 or ISO 4179 and epoxy lining for fittings (C) Epoxy Coating	Flanged, Push-on & SC	SC: Sleeve Coupling
Exposed	ND 150 to 250	DIP	(L) JIS A5314 or ISO 4179 and epoxy lining for fittings (C) SYSTEM D2	Ditto	
Submerged	ND 150 to 250	DIP	(L) JIS A5314 or ISO 4179 and epoxy lining for fittings (C) SYSTEM D1	Ditto	
m. Sampling water piping					
Buried	ND 25 to 50	GSP	(L) None (C) JWWA K151 or AWWA C203	Flanged, Screwed & SC	
Exposed	ND 25 to 50	GSP	(L) None (C) SYSTEM D2	Ditto	
Submerged	ND 25 to 50	GSP	(L) None (C) SYSTEM D1	Ditto	
n. Drainage piping					
Buried	ND 25 to 50	GSP	(L) None (C) JWWA K151 or AWWA C203	Flanged, Screwed & SC	
Exposed	ND 25 to 50	GSP	(L) None (C) SYSTEM D2	Ditto	
Submerged	ND 25 to 50	GSP	(L) None (C) SYSTEM D1	Ditto	

o. Seal water piping					
Buried	ND 25 to 50	GSP	(L) None (C) JWWA K151 or AWWA C203	Flanged, Screwed & SC	
Exposed	ND 25 to 50	GSP	(L) None (C) SYSTEM D2	Ditto	
Submerged	ND 25 to 50	GSP	(L) None (C) SYSTEM D1	Ditto	
W100: Distribution Pipeline Facility					
a. Raw water transfer piping					
Buried	ND 75 to 800	DIP	(L) JIS A5314 or ISO 4179 and epoxy lining for fittings (C) Epoxy Coating	Flanged, Push-on & SC	SC: Sleeve Coupling
Buried	ND 900 to 1400	SP	(L) JWWA K135 or AWWA C210 (C) JWWA K151 or AWWA C203	Flanged, Welded & SC	SC: Sleeve Coupling

TS 5 Data for Surge Analysis

Raw Water Transmission Pipeline

Cumulative distance (m)	Single distance (m)	Pipeline Item		Invert depth (m)	Pipe Invert Level (m)	Ground Level (m)
0		A		4.00	405.00	409.00
280	280	B	D	3.00	403.27	406.27
780	500	B	D	3.00	403.27	406.27
1,180	400	B	D	3.00	396.40	399.40
3,436	2,256	B	D	3.00	383.04	386.04
3,880	444	B	D	3.02	385.83	388.85
4,683	803	B	D	3.00	381.86	384.86
5,980	1,297	B	D	3.00	385.97	388.97
8,180	2,200	B	D	3.00	396.30	399.30
8,660	480	B	D	3.00	406.55	409.55
9,280	620	B	D	3.00	379.85	382.85
10,280	1,000	B	D	3.00	377.80	380.80
10,806	526	B	D	3.00	396.86	399.86
11,296	490	B	D	3.00	380.01	383.01
11,803	507	B	D	3.00	387.31	390.31
11,980	177	B	D	3.00	376.90	379.90
13,280	1,300	B	D	3.00	375.05	378.05
14,162	882	B	D	3.00	372.35	375.35
15,880	1,718	B	D	3.00	372.35	375.35
16,344	464	B	D	3.00	373.55	376.55
17,330	986	C	D	3.00	375.48	378.48
19,280	1,950	C	D	3.00	370.80	373.80
20,580	1,300	C	D	3.00	365.83	368.83
21,586	1,006	C	D	3.00	365.18	368.18
22,070	484	C	D	4.17	365.00	369.17
23,017	947	C	D	3.00	363.30	366.30
23,437	420	C	D	3.00	373.85	376.85
25,980	2,543	C	D	3.00	363.07	366.07
26,880	900	C	D	3.00	359.25	362.25
27,862	982	C	D	3.00	360.60	363.60
28,593	731	C	D	3.00	363.00	366.00
28,853	260	C	D	3.00	358.70	361.70
29,967	1,114	C	D	3.82	358.50	362.32
30,485	518	C	D	3.00	358.10	361.10
31,365	880	C	D	3.00	362.00	365.00
32,128	763	C	D	3.00	364.10	367.10
32,624	496	C	D	3.00	361.80	364.80
33,618	994	C	D	2.30	366.95	369.25
34,419	801	C	D	3.00	361.75	364.75

Cumulative distance (m)	Single distance (m)	Pipeline Item		Invert depth (m)	Pipe Invert Level (m)	Ground Level (m)
35,592	1,173	C	D	3.00	365.10	368.10
36,056	464	C	D	3.00	362.90	365.90
36,275	219	C	D	3.00	362.95	365.95
38,010	1,735	C	D	3.00	356.70	359.70
38,319	309	C	D	3.00	358.50	361.50
39,350	1,031	C	D	3.00	356.17	359.17
39,958	608	C	D	3.00	354.80	357.80
41,278	1,320	C	D	3.00	358.50	361.50
43,278	2,000	C	D	3.00	364.45	367.45
44,575	1,297	C	D	3.00	372.80	375.80
44,880	305	C	D	3.00	371.20	374.20
45,927	1,047	C	E	3.00	380.30	383.30
46,524	597	C	E	3.00	369.05	372.05
46,980	456	C	E	3.00	364.83	367.83
48,153	1,173	C	E	3.00	356.55	359.55
48,536	383	C	E	4.90	356.40	361.30
49,827	1,291	C	E	3.00	355.40	358.40
51,175	1,348	C	E	3.00	353.20	356.20
51,280	105	C	E	3.00	350.72	353.72

Pipe Materials

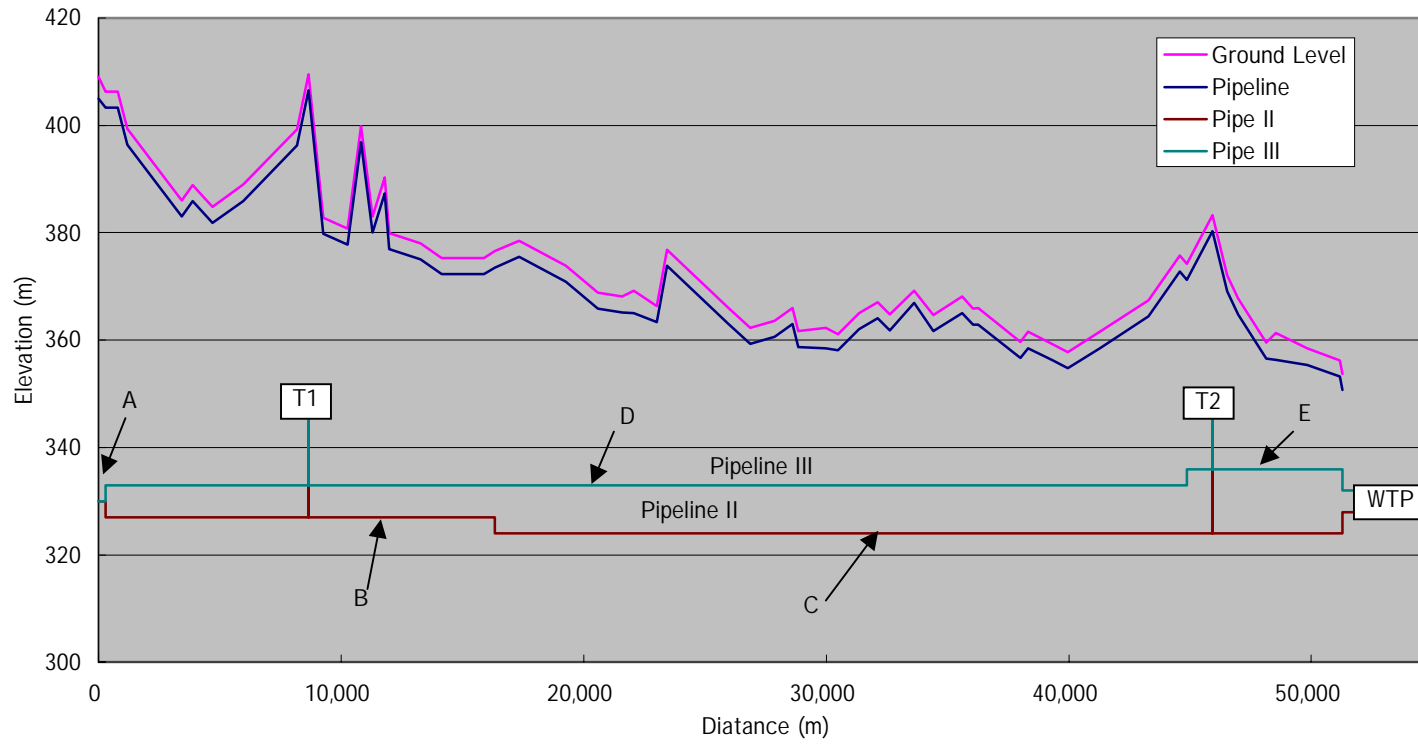
Item	Materials	Diameter	Thickness
A	Steel Pipe	1400 mm	10 mm
B	Steel Pipe	1000 mm	12 mm
C	Cast Iron Pipe	1000 mm	23 mm
D	Steel Pipe	1400 mm	10 mm
E	Steel Pipe	1000 mm	10 mm

One-way Surge Tank

Item	Location	Condition	Dimension (m)	HWL	LWL
T1	8,660	Proposed	23.3 x 11.3	(411.18)	(408.00)
T2	45,927	Existing	23.3 x 11.3	385.18	382.00

A1-14

Raw Water Transmission Pipeline



APPENDIX A TECHNICAL SCHEDULES**A.2 SEWERAGE FACILITIES****TS 1 Gates****Gates for Sewage Treatment Plant (Mechanical Work)**

Facility/Equipment	Tag No.	Size mm	Center to Floor (m)	Seat	Operation
S01 : Inlet Tank					
Inlet Chamber Gate	S01 MG 01	1400	4.95	on	Electrically Operated
Bypass Gate	S01 MG 02	2000	5.20	on	Electrically Operated
S02 : Influent Pump Station					
Channel Gate	S02 MG 11to31	1680 x 2000	1.00	on	Electrically Operated
S03 : Grit Chamber					
Inlet Gate	S03 MG 01/02	1200 x 1000	2.30	on	Electrically Operated
Bypass Gate	S03 MG 03	1500	4.70	on	Electrically Operated
Outlet Gate	S03 MG 04/05	1200	3.10	on	Electrically Operated
S05 : Primary Sedimentation Tank					
Distribution Tank Weir	S05 HW 01 to 08	900 x 900	-	on	Hand-wheel, Manual
S10 : Secondary Sedimentation Tank					
Return sludge Inlet Weir	S10 HW 01to12	600 x600	-	on	Hand-wheel, Manual
Distribution Tank Weir	S10 HW 13 to 24	900 x 900	-	on	Hand-wheel, Manual
S12 : Discharge pump Station					
Inlet Chamber Gate	S12 MG 01	1500	6.25	on	Electrically Operated
S21 : Gravity Thickener					
Inlet Weir	S21 HW 01/02	600 x600	-	on	Hand-wheel, Manual

TS 2 Valves**Valves for Sewage Treatment Plant (Mechanical Work)**

Only major valves are listed below. The Contractor should design the facilities and provide all necessary valves, such as chemical piping, drainage piping, pressured air piping.

Facility/Equipment	Tag No.	Q'ty	Type	Diameter (mm)	Pressure (MPa)	Purpose
S02 : Influent Pump Station						
Check Valve A	S02 CV 10 to 30	3	Swing	700	0.98	Influent Pump
Delivery Valve A	S02 MV 11 to 31	3	Motorized Butterfly	700	0.98	Influent Pump
Check Valve B	S02 CV 21 to 22	2	Swing	450	0.98	Influent Pump
Delivery Valve B	S02 MV 41 to 51	2	Motorized Butterfly	450	0.98	Influent Pump
Suction Valve A	S02 MV 12 to 32	3	Motorized Gate	800	0.98	Influent Pump
Suction Valve B	S02 MV 42/52	2	Motorized Gate	500	0.98	Influent Pump
Connection Valve	S02 MV 13/43	4	Motorized Gate	800	0.98	Influent Pump
Delivery Valve		3	Manual Ball	500	0.98	Temporary Pump
Check Valve		3	Swing	500	0.98	Temporary Pump
S03 : Grit Chamber						
Drain Valve		2	Manual Gate	150	0.98	Drain

Facility/Equipment	Tag No.	Q'ty	Type	Diameter (mm)	Pressure (MPa)	Purpose
Drain Valve		2	Manual Gate	100	0.98	Scum, Drain
Delivery Valve		2	Manual Gate	80	0.98	Grit Pump
S05 : Primary Sedimentation Tank						
Suction Sludge Valve	S05 MV 01to08	8	Motorized Eccentric	150	0.98	Flow Control
Delivery Valve	S05 MV 51/61	2	Motorized Gate	150	0.98	Flow Control
Suction Scum Valve	S05 MV 11/41	4	Motorized Eccentric	100	0.98	Scum Pump
Suction Valve		4	Manual Gate	150	0.98	Sludge
Delivery Valve		8	Manual Gate	100	0.98	Sludge
Delivery Valve		4	Manual Gate	80	0.98	Scum Pump
Check Valve		2	Swing	100	0.98	Sludge
Check Valve		2	Swing	80	0.98	Scum Pump
S08 : Blower House						
Delivery Valve	S08 MV 01 to 05	5	Motorized Gate	400	0.98	Blower
Suction Valve		5	Manual Butterfly	450	0.98	Blower
Check Valve		5	Swing	400	0.98	Blower
Clear Water Valve		1	Motorized Ball	80	0.98	Flow Control
Clear Water Valve		1	Manual Gate	80	0.98	Flow Control
Clear Water Valve		7	Manual Gate	65	0.98	Supply Pump
Clear Water Valve		2	Motorized Ball	65	0.98	Supply Pump
Check Valve		2	Swing	65	0.98	Supply Pump
S11 : Return Sludge Pump Station						
Delivery Valve	S11 MV 01 to 05	5	Motorized Gate	500	0.98	Return Sludge
Suction Valve	S11 MV 06 to 10	5	Motorized Gate	600	0.98	Return Sludge
Partition Valve	S11 MV 11 to 14	4	Motorized Butterfly	900	0.98	Return Sludge
Check Valve	S11 CV 01 to 05	5	Swing	500	0.98	Return Sludge
Connection Valve A	S11 MV 15/16	2	Motorized Gate	1100	0.98	Return Sludge
Connection Valve B	S11 MV 17	1	Motorized Gate	1200	0.98	Return Sludge
Suction Valve		2	Manual Gate	200	0.98	Waste Sludge
Delivery Valve		2	Manual Gate	200	0.98	Waste Sludge
Check Valve		2	Swing	200	0.98	Waste Sludge
S12 : Discharge Pump Station						
Suction Valve A	S12 MV 06 to 08	3	Motorized Gate	800	0.98	Discharge Pump
Suction Valve B	S12 MV 09/10	2	Motorized Gate	500	0.98	Discharge Pump
Check Valve	S12 CV 01 to 03	3	Swing	700	0.98	Discharge Pump
Check Valve	S12 CV 04/05	2	Swing	450	0.98	Discharge Pump
Delivery Valve A	S12 MV 01 to 03	3	Motorized Butterfly	700	0.98	Discharge Pump
Delivery Valve B	S12 MV 04 / 05	2	Motorized Butterfly	450	0.98	Discharge Pump
Connection Valve	S12 MV 11 to 14	4	Motorized Gate	800	0.98	Discharge Pump
Delivery Valve		3	Manual Ball	500	0.98	Temporary Pump
Check Valve		3	Swing	500	0.98	Temporary Pump
S21 : Gravity Thickener						
Suction Sludge Valve	S21 MV 01/02	2	Motorized Eccentric	150	0.98	Sludge Pump
Suction Sludge Valve		2	Manual Gate	150	0.98	Sludge Pump
Suction Sludge Valve		2	Manual Gate	100	0.98	Sludge Pump
Delivery Valve		2	Manual Gate	100	0.98	Sludge Pump
Check Valve		2	Swing	100	0.98	Sludge Pump
S23 : Digester & Pump House						

Facility/Equipment	Tag No.	Q'ty	Type	Diameter (mm)	Pressure (MPa)	Purpose
Sludge Valve	S23 MV 01 to 05	5	Motorized Gate	250	0.98	Sludge
Water Valve		1	Manual Gate	300	0.98	Desulfurizer
Sludge Valve		23	Manual Gate	250	0.98	Sludge
Check Valve		2	Swing	250	0.98	Sludge Pump
Gas Valve		1	Manual Gate	150	0.98	Gas
Gas Valve		2	Manual Gate	100	0.98	Gas
Sludge Valve		1	Manual Gate	150	0.98	Sludge
S24 : Sludge Treatment Building						
Treated Water Valve	S24 CV 01	1	Motorized Butterfly	400	0.98	Waste Water
Suction Sludge Valve		3	Manual Gate	300	0.98	Sludge Pump
Suction Sludge Valve		5	Manual Gate	250	0.98	Sludge Pump
Sludge Valve		13	Manual Gate	200	0.98	Sludge Pump
Sludge Valve		25	Manual Gate	150	0.98	Sludge Pump
Sludge Valve		8	Manual Gate	125	0.98	Sludge Pump
Sludge Valve		9	Manual Gate	100	0.98	Sludge Pump
Sludge Valve		1	Manual Gate	80	0.98	Sludge Pump
Water Valve		4	Manual Gate	400	0.98	Water
Water Valve		3	Manual Gate	300	0.98	Water
Water Valve		4	Manual Gate	250	0.98	Water
Water Valve		1	Manual Gate	200	0.98	Water
Water Valve		5	Manual Gate	150	0.98	Water
Water Valve		2	Manual Gate	100	0.98	Water
Water Valve		8	Manual Gate	80	0.98	Water
Water Valve		6	Manual Gate	65	0.98	Water
Water Valve		6	Manual Gate	50	0.98	Water
Check Valve		5	Swing	200	0.98	Sludge Pump
Check Valve		2	Swing	150	0.98	Sludge Pump
Check Valve		3	Swing	125	0.98	Sludge Pump
Check Valve		2	Swing	250	0.98	Water
Check Valve		2	Swing	150	0.98	Water
Check Valve		2	Swing	65	0.98	Water
Check Valve		2	Swing	50	0.98	Water

TS 3 Valves**Valves for Intermediate Pump Stations (Mechanical Work)**

Facility/Equipment	Tag No.	Q'ty	Type	Diameter (mm)	Pressure (MPa)	Purpose
No.1						
Inflow Valve	S51 MV 01	1	Motorized Gate	600	0.98	Sewage
No.3						
Inflow Valve	S53 MV 01/02	2	Motorized Gate	600	0.98	Sewage
No.4						
Inflow Valve	S54 MV 01	1	Motorized Gate	800	0.98	Sewage
No.6						
Inflow Valve	S55 MV 01/04	4	Motorized Gate	600	0.98	Sewage

Facility/Equipment	Tag No.	Q'ty	Type	Diameter (mm)	Pressure (MPa)	Purpose
No.7						
Inflow Valve	S56MV 01	1	Motorized Gate	1000	0.98	Sewage
Delivery Valve	S56MV 02/04	3	Motorized Gate	450	0.98	Sewage
Connection Valve	S56MV 05/06	2	Motorized Gate	800	0.98	Sewage
No.10						
Inflow Valve	S57MV 01	1	Motorized Gate	800	0.98	Sewage
Connection Valve	S57MV 02/05	4	Motorized Gate	600	0.98	Sewage

TS 4 Induction Motors for Sewage Treatment Plant (list excludes motorised valves and gates)

Tag Numbers	S02 MS 11 to 31	S02 IP 10 to 30	S02 IP 11/21
Equipment	Fine Screen	Influent Pump A	Influent Pump B
Type	Drip-proof, fan-cooled, squirrel cage	Totally enclosed, fan-cooled, squirrel cage	Totally enclosed, fan-cooled, squirrel cage
Min. rated output kW	0.75	200	110
Poles	-	6-P	6-P
Supply	380V	380 V	380 V
Enclosure	IP 22	IP 44	IP 44
Insulation	E	F	F
Rating	Continuous	Continuous	Continuous
Starting	Direct on line	Direct on line	Direct on line

Tag Numbers	S02 MC 01	S02 EF 01	S02 IF 01
Equipment	Bridge Crane	Exhaust Fan	Air Intake Fan (1)
Type	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage
Min. rated output kW	$4.6+0.75+0.4 \times 2$	0.75	0.75
Poles	4-P	6-P	6-P
Supply	380 V	380 V	380 V
Enclosure	IP 22	IP 22	IP 22
Insulation	E	E	E
Rating	Continuous	Continuous	Continuous
Starting	Direct on line	Direct on line	Direct on line

Tag Numbers	S02 IF 02	S02 IF 03	S03 GC 01/02
Equipment	Air Intake Fan (2)	Air Intake Fan (3)	Grit Collector
Type	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage
Min. rated output kW	3.7	0.75	1.5
Poles	8-P	6-P	-
Supply	380 V	380 V	380 V
Enclosure	IP 22	IP 22	IP 22
Insulation	E	E	E
Rating	Continuous	Continuous	Continuous
Starting	Direct on line	Direct on line	Direct on line

Tag Numbers	S03 GS 01	S03 SS 01	S05 SC 01/02
Equipment	Grit Scrubber	Scum screen	Sludge Collector
Type	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage
Min. rated output kW	1.5+2.2 × 2	0.4	1.5
Poles	-	-	-
Supply	380V	380 V	380 V
Enclosure	IP 22	IP 22	IP 22
Insulation	E	E	E
Rating	Continuous	Continuous	Continuous
Starting	Direct on line	Direct on line	Direct on line

Tag Numbers	S05 SP 01to04	S05 DP 01/02	S05 SP 05 to 08
Equipment	Primary Sludge Pump	Sump drainage Pump	Scum Pump
Type	Drip-proof, fan-cooled, squirrel cage	Submersible	Drip-proof, fan-cooled, squirrel cage
Min. rated output kW	5.5	0.75	3.7
Poles	4-P	2-P	4-P
Supply	380 V	380 V	380 V
Enclosure	IP 22	IP 68	IP 22
Insulation	E	F	E
Rating	Continuous	Continuous	Continuous
Starting	Direct on line	Direct on line	Direct on line

Tag Numbers	S05 EF 01/02	S08 AB 01to05	S08 AF 01/05
Equipment	Exhaust Fan	Air Blower	Air Filter
Type	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage
Min. rated output kW	0.2	315	0.2
Poles	4-P	2-P	4-P
Supply	380 V	6000 V	380 V
Enclosure	IP 22	IP 44	IP 22
Insulation	E	F	E
Rating	Continuous	Continuous	Continuous
Starting	Direct on line	Direct on line	Direct on line

Tag Numbers	S08 MC 01	S08 DP 01	S10 SC 01/02
Equipment	Hoist Block	Sump drainage Pump	Sludge Collector
Type	Drip-proof, fan-cooled, squirrel cage	Submersible	Drip-proof, fan-cooled, squirrel cage
Min. rated output kW	4.6+0.75+0.75 × 2	0.4	1.5
Poles	4-P	2-P	-
Supply	380V	380 V	380 V
Enclosure	IP 44	IP 68	IP 22
Insulation	E	E	E
Rating	Continuous	Continuous	Continuous
Starting	Direct on line	Direct on line	Direct on line

Tag Numbers	S11 SP 01to05	S11 SP 06/07	S11 MC 01
Equipment	Return Sludge Pump	Waste Sludge Pump	Bridge Crane
Type	Totally enclosed, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage
Min. rated output kW	55	22	4.6+0.75+0.4 × 2
Poles	10-P	6-P	4-P
Supply	380 V	380 V	380 V
Enclosure	IP 44	IP 22	IP 44
Insulation	F	E	E
Rating	Continuous	Continuous	Continuous
Starting	Direct on line	Direct on line	Direct on line

Tag Numbers	S11 DP 01/02	S12 CP 01to03	S12 CP 04/05
Equipment	Sump drainage Pump	Discharge Pump A	Discharge Pump B
Type	Submersible	Totally enclosed, fan-cooled, squirrel cage	Totally enclosed, fan-cooled, squirrel cage
Min. rated output kW	1.5	200	110
Poles	2-P	6-P	6-P
Supply	380 V	380 V	380 V
Enclosure	IP 68	IP 44	IP 44
Insulation	F	F	F
Rating	Continuous	Continuous	Continuous
Starting	Direct on line	Direct on line	Direct on line

Tag Numbers	S12 MC 01	S12 DP 01/02	S12 TP 01/03
Equipment	Bridge Crane	Sump drainage Pump	Temporary Pump
Type	Drip-proof, fan-cooled, squirrel cage	Submersible	Submersible
Min. rated output kW	4.6+0.75+0.4 × 2	0.75	110
Poles	4-P	2-P	8-P
Supply	380V	380 V	380 V
Enclosure	IP 44	IP 68	IP 68
Insulation	E	F	F
Rating	Continuous	Continuous	Continuous
Starting	Direct on line	Direct on line	Direct on line

Tag Numbers	S12 IF 01	S12 IF 02	S21 SP 01/02
Equipment	Air Intake Fan A	Air Intake Fan B	Thickened Sludge Pump
Type	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage
Min. rated output kW	3.7	0.75	3.7
Poles	8-P	6-P	-
Supply	380 V	380 V	380 V
Enclosure	IP 22	IP 22	IP 22
Insulation	E	E	E
Rating	Continuous	Continuous	Continuous
Starting	Direct on line	Direct on line	Direct on line

Tag Numbers	S21 DP 01	S21 EF 01	S23 SP 01/02
Equipment	Sump drainage Pump	Exhaust Fan	Sludge Pump
Type	Submersible	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage
Min. rated output kW	0.4	0.2	22
Poles	2-P	4-P	6-P
Supply	380 V	380 V	380 V
Enclosure	IP 68	IP 22	IP 22
Insulation	F	E	E
Rating	Continuous	Continuous	Continuous
Starting	Direct on line	Direct on line	Direct on line

Tag Numbers	S23 DP 01	S23 IF 01/04	S24 SM 01/02
Equipment	Sump drainage Pump	Inhalation Fan	Waste Sludge Mixer
Type	Submersible	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage
Min. rated output kW	1.5	1.5	7.5
Poles	2-P	4-P	4-P
Supply	380V	380 V	380 V
Enclosure	IP 68	IP 22	IP 22
Insulation	F	E	E
Rating	Continuous	Continuous	Continuous
Starting	Direct on line	Direct on line	Direct on line

Tag Numbers	S24 SP 03to05	S24 MT 01to03	S24 PF 01/02
Equipment	Waste Sludge Feed Pump	Mechanical Thickener	Polymer Feeder
Type	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage
Min. rated output kW	30	1.5+0.75+0.75	0.4
Poles	-	-	-
Supply	380 V	380 V	380 V
Enclosure	IP 22	IP 22	IP 22
Insulation	E	E	E
Rating	Continuous	Continuous	Continuous
Starting	Direct on line	Direct on line	Direct on line

Tag Numbers	S24 PT 01/02	S24 PP 01to03	S24 SM 03/04
Equipment	Polymer tank	Polymer Feed Pump	Thickened Sludge Mixer
Type	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage
Min. rated output kW	3.7	1.5	7.5
Poles	-	-	4-P
Supply	380 V	380 V	380 V
Enclosure	IP 22	IP 22	IP 22
Insulation	E	E	E
Rating	Continuous	Continuous	Continuous
Starting	Direct on line	Direct on line	Direct on line

Tag Numbers	S24 SP 01/02	S24 SG 01	S24 AC 01/02
Equipment	Thickened Sludge Pump	Sludge Grinder	Air Compressor
Type	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage
Min. rated output kW	11	3.7	5.5
Poles	4-P	-	-
Supply	380V	380 V	380 V
Enclosure	IP 22	IP 22	IP 22
Insulation	E	E	E
Rating	Continuous	Continuous	Continuous
Starting	Direct on line	Direct on line	Direct on line

Tag Numbers	S24 AD 01	S24 SM 05/06	S24 SP 06to08
Equipment	Air Dryer	Digested Sludge Mixer	Sludge Feed Pump
Type	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage
Min. rated output kW	0.2	7.5	7.5
Poles	-	4-P	-
Supply	380 V	380 V	380 V
Enclosure	IP 22	IP 22	IP 22
Insulation	E	E	E
Rating	Continuous	Continuous	Continuous
Starting	Direct on line	Direct on line	Direct on line

Tag Numbers	S24 DM 01to03	S24 PF 03/04	S24 PT 03/04
Equipment	Dewatering Machine	Polymer Feeder	Polymer Tank
Type	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage
Min. rated output kW	3.7	0.4	5.5
Poles	-	-	-
Supply	380 V	380 V	380 V
Enclosure	IP 22	IP 22	IP 22
Insulation	E	E	E
Rating	Continuous	Continuous	Continuous
Starting	Direct on line	Direct on line	Direct on line

Tag Numbers	S24 PP 04to06	S24 SM 07	S24 SP 09/10
Equipment	Polymer Feed Pump	Waste Water Mixer	Waste Water Pump
Type	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage
Min. rated output kW	2.2	7.5	22
Poles	-	4-P	4-P
Supply	380V	380 V	380 V
Enclosure	IP 22	IP 22	IP 22
Insulation	E	E	E
Rating	Continuous	Continuous	Continuous
Starting	Direct on line	Direct on line	Direct on line

Tag Numbers	S24 DP 01to04	S24 EX 01/02	S24 OP 01/02
Equipment	Sump Drainage Pump	Odor Fan	Water Elutriation Pump
Type	Submersible	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage
Min. rated output kW	1.5	5.5	3.7
Poles	2-P	6-P	4-P
Supply	380 V	380 V	380 V
Enclosure	IP 68	IP 22	IP 22
Insulation	F	E	E
Rating	Continuous	Continuous	Continuous
Starting	Direct on line	Direct on line	Direct on line

Tag Numbers	S24 SU 01/02	S24 VP 01/02	S24 SU 03/04
Equipment	Treated water Supply Unit	Desulfurizer Pump	Water supply Unit
Type	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage
Min. rated output kW	3.7	45	15
Poles	4-P	4-P	4-P
Supply	380 V	380 V	380 V
Enclosure	IP 22	IP 22	IP 22
Insulation	E	E	E
Rating	Continuous	Continuous	Continuous
Starting	Direct on line	Direct on line	Direct on line

Tag Numbers	S24 AS 01	S24 AS 02	S24 AS 03
Equipment	Strainer Odor Scrubber	Strainer Grit Scrubber	Strainer Desulfurizer
Type	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage
Min. rated output kW	0.4	0.4	0.4
Poles	-	-	-
Supply	380V	380 V	380 V
Enclosure	IP 22	IP 22	IP 22
Insulation	E	E	E
Rating	Continuous	Continuous	Continuous
Starting	Direct on line	Direct on line	Direct on line

Tag Numbers	S24 CC 01to03	S24 CH 01to06	S24 CT 01to03
Equipment	Cake Conveyor	Cake Hopper	Cake Tripper
Type	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage
Min. rated output kW	1.5	2.2	0.4
Poles	-	-	-
Supply	380 V	380 V	380 V
Enclosure	IP 22	IP 22	IP 22
Insulation	E	E	E
Rating	Continuous	Continuous	Continuous
Starting	Direct on line	Direct on line	Direct on line

TS 5 Induction Motors for Intermediate Pump Stations

(list excludes motorised valves and gates)

Tag Numbers	S51 MS 01	S51 SP 01to04	S51 SG 01
Equipment	Fine Screen	Sewage Pump	Screening Grinder
Type	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage
Min. rated output kW	1.5	45	7.5
Poles	-	4-P	-
Supply	380 V	380 V	380 V
Enclosure	IP 22	IP 44	IP 22
Insulation	E	F	E
Rating	Continuous	Continuous	Continuous
Starting	Direct on line	Direct on line	Direct on line

Tag Numbers	S51 DP 01/02	S51 EF 01	S51 IF 01
Equipment	Sump Drainage Pump	Exhaust Fan	Air Intake Fan
Type	Submersible	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage
Min. rated output kW	1.5	3.7	5.5
Poles	2-P	4-P	4-P
Supply	380V	380 V	380 V
Enclosure	IP 68	IP 22	IP 22
Insulation	F	E	E
Rating	Continuous	Continuous	Continuous
Starting	Direct on line	Direct on line	Direct on line

Tag Numbers	S52 SP 01to03	S52 SG 01	S52 DP 01
Equipment	Sewage Pump	Screening Grinder	Sump Drainage Pump
Type	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage	Submersible
Min. rated output kW	22	7.5	1.5
Poles	4-P	-	2-P
Supply	380 V	380 V	380 V
Enclosure	IP 44	IP 22	IP 68
Insulation	F	E	F
Rating	Continuous	Continuous	Continuous
Starting	Direct on line	Direct on line	Direct on line

Tag Numbers	S52 EF 01	S52 IF 01	S53 MS 01/02
Equipment	Exhaust Fan	Air Intake Fan	Fine Screen
Type	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage
Min. rated output kW	0.4	0.75	1.5
Poles	4-P	4-P	-
Supply	380 V	380 V	380 V
Enclosure	IP 22	IP 22	IP 22
Insulation	E	E	E
Rating	Continuous	Continuous	Continuous
Starting	Direct on line	Direct on line	Direct on line

Tag Numbers	S53 SP 01to05	S53 SG 01/02	S53 DP 01/02
Equipment	Sewage Pump	Screening Grinder	Sump Drainage Pump
Type	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage	Submersible
Min. rated output kW	37	7.5	1.5
Poles	4-P	-	2-P
Supply	380V	380 V	380 V
Enclosure	IP 44	IP 22	IP 68
Insulation	F	E	F
Rating	Continuous	Continuous	Continuous
Starting	Direct on line	Direct on line	Direct on line

Tag Numbers	S53 HH 01	S53 EF 01	S53 IF 01
Equipment	Hoist Block	Exhaust Fan	Air Intake Fan
Type	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage
Min. rated output kW	1.5	3.7	5.5
Poles	4-P	4-P	4-P
Supply	380 V	380 V	380 V
Enclosure	IP 22	IP 22	IP 22
Insulation	E	E	E
Rating	Continuous	Continuous	Continuous
Starting	Direct on line	Direct on line	Direct on line

Tag Numbers	S54 MS 01	S54 SP 01to03	S54 SG 01
Equipment	Fine Screen	Sewage Pump	Screening Grinder
Type	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage
Min. rated output kW	1.5	22	7.5
Poles	-	4-P	-
Supply	380 V	380 V	380 V
Enclosure	IP 22	IP 44	IP 22
Insulation	E	F	E
Rating	Continuous	Continuous	Continuous
Starting	Direct on line	Direct on line	Direct on line

Tag Numbers	S54 DP 01/02	S54 EF 01	S54 IF 01
Equipment	Sump Drainage Pump	Exhaust Fan	Air Intake Fan
Type	Submersible	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage
Min. rated output kW	1.5	0.75	1.5
Poles	2-P	4-P	4-P
Supply	380V	380 V	380 V
Enclosure	IP 68	IP 22	IP 22
Insulation	F	E	E
Rating	Continuous	Continuous	Continuous
Starting	Direct on line	Direct on line	Direct on line

Tag Numbers	S55 SF 01to04	S55 DP 01/.02	S55 HH 01
Equipment	Sewage Pump	Sump Drainage Pump	Hoist Block
Type	Drip-proof, fan-cooled, squirrel cage	Submersible	Drip-proof, fan-cooled, squirrel cage
Min. rated output kW	75	1.5	5.5
Poles	6-P	2-P	4-P
Supply	380 V	380 V	380 V
Enclosure	IP 44	IP 68	IP 22
Insulation	F	F	E
Rating	Continuous	Continuous	Continuous
Starting	Direct on line	Direct on line	Direct on line

Tag Numbers	S55 EF 01	S55 IF 01	S56 MS 01/02
Equipment	Exhaust Fan	Air Intake Fan	Fine Screen
Type	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage
Min. rated output kW	0.75	1.5	1.5
Poles	4-P	4-P	-
Supply	380 V	380 V	380 V
Enclosure	IP 22	IP 22	IP 22
Insulation	E	E	E
Rating	Continuous	Continuous	Continuous
Starting	Direct on line	Direct on line	Direct on line

Tag Numbers	S56 SP 01/02	S56 SP 03/04	S56 SP 05/06
Equipment	Sewage Pump	Sewage Pump	Sewage Pump
Type	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage
Min. rated output kW	75	45	30
Poles	4-P	4-P	4-P
Supply	380V	380 V	380 V
Enclosure	IP 44	IP 44	IP 44
Insulation	F	F	F
Rating	Continuous	Continuous	Continuous
Starting	Direct on line	Direct on line	Direct on line

Tag Numbers	S56 SG 01/02	S56 DP 01/02	S56 MC 01
Equipment	Screening Grinder	Sump Drainage Pump	Bridge Crane
Type	Drip-proof, fan-cooled, squirrel cage	Submersible	Drip-proof, fan-cooled, squirrel cage
Min. rated output kW	7.5	1.5	4.6+0.75+0.4 × 2
Poles	-	2-P	4-P
Supply	380 V	380 V	380 V
Enclosure	IP 22	IP 68	IP 22
Insulation	E	F	E
Rating	Continuous	Continuous	Continuous
Starting	Direct on line	Direct on line	Direct on line

Tag Numbers	S56 EF 01	S56 IF 01	S56 IF 02
Equipment	Exhaust Fan	Air Intake Fan	Air Intake Fan
Type	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage
Min. rated output kW	0.75	0.75	3.7
Poles	4-P	4-P	4-P
Supply	380 V	380 V	380 V
Enclosure	IP 22	IP 22	IP 22
Insulation	E	E	E
Rating	Continuous	Continuous	Continuous
Starting	Direct on line	Direct on line	Direct on line

Tag Numbers	S56 IF 03	S57 MS 01	S57 SP 01/05
Equipment	Air Intake Fan	Fine Screen	Sewage Pump
Type	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage
Min. rated output kW	0.75	1.5	30
Poles	4-P	-	4-P
Supply	380V	380 V	380 V
Enclosure	IP 22	IP 22	IP 44
Insulation	E	E	F
Rating	Continuous	Continuous	Continuous
Starting	Direct on line	Direct on line	Direct on line

Tag Numbers	S57 SG 01	S57 DP 01/02	S57 EF 01
Equipment	Screening Grinder	Sump Drainage Pump	Exhaust Fan
Type	Drip-proof, fan-cooled, squirrel cage	Submersible	Drip-proof, fan-cooled, squirrel cage
Min. rated output kW	7.5	1.5	3.7
Poles	-	2-P	4-P
Supply	380 V	380 V	380 V
Enclosure	IP 22	IP 68	IP 22
Insulation	E	F	E
Rating	Continuous	Continuous	Continuous
Starting	Direct on line	Direct on line	Direct on line

Tag Numbers	S57 IF 01	S58 SP 01to03	S58 EF 01
Equipment	Air Intake Fan	Sewage Pump	Exhaust Fan
Type	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage
Min. rated output kW	5.5	11	0.4
Poles	4-P	4-P	4-P
Supply	380 V	380 V	380 V
Enclosure	IP 22	IP 44	IP 22
Insulation	E	F	E
Rating	Continuous	Continuous	Continuous
Starting	Direct on line	Direct on line	Direct on line

Tag Numbers	S58 IF 01	S59 SP 01to03	S59 EF 01
Equipment	Air Intake Fan	Sewage Pump	Exhaust Fan
Type	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage
Min. rated output kW	0.4	18.5	0.4
Poles	4-P	4-P	4-P
Supply	380V	380 V	380 V
Enclosure	IP 22	IP 44	IP 22
Insulation	E	F	E
Rating	Continuous	Continuous	Continuous
Starting	Direct on line	Direct on line	Direct on line

Tag Numbers	S59 IF 01	S60 SP 01to03	S60 EF 01
Equipment	Air Intake Fan	Sewage Pump	Exhaust Fan
Type	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage
Min. rated output kW	0.4	15	0.4
Poles	4-P	4-P	4-P
Supply	380 V	380 V	380 V
Enclosure	IP 22	IP 44	IP 22
Insulation	E	F	E
Rating	Continuous	Continuous	Continuous
Starting	Direct on line	Direct on line	Direct on line

Tag Numbers	S60 IF 01	S61 SP 01/02	S61 EF 01
Equipment	Air Intake Fan	Sewage Pump	Exhaust Fan
Type	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage
Min. rated output kW	0.4	30	0.2
Poles	4-P	8-P	4-P
Supply	380 V	380 V	380 V
Enclosure	IP 22	IP 44	IP 22
Insulation	E	F	E
Rating	Continuous	Continuous	Continuous
Starting	Direct on line	Direct on line	Direct on line

Tag Numbers	S61 IF 01	S62 SP 01/02	S62 DP 01
Equipment	Air Intake Fan	Sewage Pump	Sump drainage Pump
Type	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage	Submersible
Min. rated output kW	0.2	30	1.5
Poles	4-P	6-P	2-P
Supply	380V	380 V	380 V
Enclosure	IP 22	IP 44	IP 68
Insulation	E	F	F
Rating	Continuous	Continuous	Continuous
Starting	Direct on line	Direct on line	Direct on line

Tag Numbers	S62 EF 01	S62 IF 01	S63 SP 01/02
Equipment	Exhaust Fan	Air Intake Fan	Sewage Pump
Type	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage
Min. rated output kW	0.4	0.4	11
Poles	4-P	4-P	4-P
Supply	380 V	380 V	380 V
Enclosure	IP 22	IP 22	IP 44
Insulation	E	E	F
Rating	Continuous	Continuous	Continuous
Starting	Direct on line	Direct on line	Direct on line

Tag Numbers	S63 EF 01	S63 IF 01	S64 SP 01/02
Equipment	Exhaust Fan	Air Intake Fan	Sewage Pump
Type	Drip-proof, fan-cooled, squirrel cage	Drip-proof, fan-cooled, squirrel cage	Submersible
Min. rated output kW	0.2	0.2	22
Poles	4-P	4-P	4-P
Supply	380 V	380 V	380 V
Enclosure	IP 22	IP 22	IP 68
Insulation	E	E	F
Rating	Continuous	Continuous	Continuous
Starting	Direct on line	Direct on line	Direct on line

Tag Numbers	S65 SP 01/02	S66 SP 01/02	S67 SP 01/02
Equipment	Sewage Pump	Sewage Pump	Sewage Pump
Type	Submersible	Submersible	Submersible
Min. rated output kW	7.5	18.5	7.5
Poles	4-P	4-P	4-P
Supply	380V	380 V	380 V
Enclosure	IP 68	IP 68	IP 68
Insulation	F	F	F
Rating	Continuous	Continuous	Continuous
Starting	Direct on line	Direct on line	Direct on line

TS 6 Piping

1) Sewage Treatment Plant

Service and Location	Nominal Dia. (ND)	Pipeline Material	Lining (L) and Coating (C)	Joints	Remarks
S02: Influent Pump Station					
a. Water supply piping					
Exposed indoor	ND 25 to 50	GSP	(L) None (C) SYSTEM F	Flanged, Screwed & SC	SC: Sleeve Coupling
b. Pressure pipeline piping					
Exposed indoor	ND 450 to 800	SP	(L) None (C) SYSTEM D2	Flanged, Welded & SC	
c. Drainage piping					
Exposed indoor	ND 65	DIP	(L) JIS A5314 or ISO 4179 and epoxy lining for fittings (C) SYSTEM D2	Flanged, Push-on & SC	
d. Temporary Pressure pipeline piping					
Submerged indoor	ND 400	DIP	(L) JIS A5314 or ISO 4179 and epoxy lining for fittings (C) SYSTEM D2	Flanged, Push-on & SC	
S03: Grit Chamber					
a. Water supply piping					
Exposed indoor	ND 25 to 65	GSP	(L) None (C) SYSTEM F	Flanged, Screwed & SC	SC: Sleeve Coupling
b. Drainage piping					
Exposed indoor	ND 100	DIP	(L) JIS A5314 or ISO 4179 and epoxy lining for fittings (C) SYSTEM D2	Flanged, Push-on & SC	
c. Sediment piping					
Exposed and submerged	ND 80	DIP	(L) JIS A5314 or ISO 4179 and epoxy	Flanged, Push-on & SC	

indoor			lining for fittings (C) SYSTEM D2		
d. Scum piping					
Exposed	ND 100	DIP	(L) JIS A5314 or ISO 4179 and epoxy lining for fittings (C) SYSTEM D2	Flanged, Push-on & SC	
S05: Primary Sedimentation Tank					
a. Inlet Piping					
Buried	ND 500	SP	(L) JWWA K135 or AWWA C210 (C) SYSTEM D2	Flanged, Welded & SC	
b. Sludge Piping in Tank					
Buried	ND 200	SP	(L) JWWA K135 or AWWA C210 (C) SYSTEM D2	Flanged, Welded & SC	
c. Scum Piping					
Buried	ND 200	DIP	(L) JIS A5314 or ISO 4179 and epoxy lining for fittings (C) SYSTEM D2	Flanged, Push-on & SC	
d. Outlet Piping					
Buried	ND 800	SP	(L) JWWA K135 or AWWA C210 (C) SYSTEM D2	Flanged, Welded & SC	
e. Sludge Piping in Pump House					
Exposed indoor	ND 100 to 150	DIP	(L) JIS A5314 or ISO 4179 and epoxy lining for fittings (C) SYSTEM D2	Flanged, Push-on & SC	
f. Drainage Piping in Pump House					
Exposed indoor	ND 65	DIP	(L) JIS A5314 or ISO 4179 and epoxy lining for fittings (C) SYSTEM D2	Flanged, Push-on & SC	
S08: Blower House					
a. Air Piping					
Exposed indoor	ND 400 to 450	SP	(L) JWWA K135 or AWWA C210 (C) JWWA K151 or AWWA C203	Flanged, Welded & SC	
b. Clear Water Piping					
Exposed indoor	ND 65	GSP	(L) None (C) SYSTEM F	Flanged, Screwed & SC	
c. Drainage Piping					
Exposed indoor	ND 65	DIP	(L) JIS A5314 or ISO 4179 and epoxy lining for fittings (C) SYSTEM D2	Flanged, Push-on & SC	
S10: Secondary Sedimentation Tank					
a. Inlet Piping					

Buried	ND 1200	SP	(L) JWWA K135 or AWWA C210 (C) SYSTEM D2	Flanged, Welded & SC	
b. Outlet Piping					
Buried	ND 800	SP	(L) JWWA K135 or AWWA C210 (C) SYSTEM D2	Flanged, Welded & SC	
c. Sludge Piping					
Buried	ND 500	DIP	(L) JIS A5314 or ISO 4179 and epoxy lining for fittings (C) SYSTEM D2	Flanged, Push-on & SC	
S11: Return Sludge Pump House					
a. Sludge Piping					
Exposed indoor	ND 250 to 1200	DIP	(L) JIS A5314 or ISO 4179 and epoxy lining for fittings (C) SYSTEM D2	Flanged, Push-on & SC	
b. Drainage Piping					
Exposed indoor	ND 65	DIP	(L) JIS A5314 or ISO 4179 and epoxy lining for fittings (C) SYSTEM D2	Flanged, Push-on & SC	
S12: Discharge Pump Station					
a. Discharge Piping					
Exposed indoor	ND 450 to 800	DIP	(L) JIS A5314 or ISO 4179 and epoxy lining for fittings (C) SYSTEM D2	Flanged, Push-on & SC	
b. Water Supply piping					
Exposed indoor	ND 25 to 50	GSP	(L) None (C) SYSTEM F	Flanged, Screwed & SC	SC: Sleeve Coupling
c. Drainage Piping					
Exposed indoor	ND 65	DIP	(L) JIS A5314 or ISO 4179 and epoxy lining for fittings (C) SYSTEM D2	Flanged, Push-on & SC	
d. Temporary discharge piping					
Exposed, submerged	ND 600 to 1200	SP	(L) JWWA K135 or AWWA C210 (C) SYSTEM D2	Flanged, Welded & SC	
S21: Gravity Thickener					
a. Sludge Piping					
Buried	ND 150	DIP	(L) JIS A5314 or ISO 4179 and epoxy lining for fittings (C) SYSTEM D2	Flanged, Push-on & SC	
b. Drainage Piping					
Exposed indoor	ND 65	DIP	(L) JIS A5314 or ISO 4179 and epoxy	Flanged, Push-on & SC	

			lining for fittings (C) SYSTEM D2		
S23: Digester and Digester Pump House					
a. Sludge Piping					
Exposed indoor	ND 250	DIP	(L) JIS A5314 or ISO 4179 and epoxy lining for fittings (C) SYSTEM D2	Flanged, Push-on & SC	
b. Steam Piping					
Exposed indoor	ND 100 to 250	DIP with lagging	(L) JIS A5314 or ISO 4179 and epoxy lining for fittings (C) SYSTEM D2 + lagging	Flanged, Push-on & SC	
c. Digested Gas Piping					
Exposed indoor	ND 100 to 150	SP	(L) JWWA K135 or AWWA C210 (C) SYSTEM D2	Flanged, Welded & SC	
d. Drainage Piping					
Exposed indoor	ND 65	DIP	(L) JIS A5314 or ISO 4179 and epoxy lining for fittings (C) SYSTEM D2	Flanged, Push-on & SC	
S24: Sludge Treatment Building					
a. Water Supply piping					
Exposed indoor	ND 25 to 100	GSP	(L) None (C) SYSTEM F	Flanged, Screwed & SC	SC: Sleeve Coupling
b. Strainer Water piping					
Exposed indoor	ND 80 to 200	GSP	(L) None (C) SYSTEM F	Flanged, Screwed & SC	
c. Drainage piping					
Exposed indoor	ND 65	DIP	(L) JIS A5314 or ISO 4179 and epoxy lining for fittings (C) SYSTEM D2	Flanged, Push-on & SC	
d. Chemical piping					
Exposed indoor	ND 80 to 100	SP	(L) JWWA K135 or AWWA C210 (C) SYSTEM D2	Flanged, Welded & SC	
e. Air Piping					
Exposed indoor	ND 20 to 25	SP	(L) JWWA K135 or AWWA C210 (C) SYSTEM D2	Flanged, Welded & SC	
S25: Hopper					
a. Water Supply piping					
Exposed indoor	ND 25	GSP	(L) None (C) SYSTEM F	Flanged, Screwed & SC	
S26: Gas Holder					
a. Gas Piping					

Exposed indoor	ND 150	SP	(L) JWWA K135 or AWWA C210 (C) SYSTEM D2	Flanged, Welded & SC	
S27: Boiler House					
a. Clear water piping					
Exposed indoor	ND 25 to 50	GSP	(L) None (C) SYSTEM F	Flanged, Screwed & SC	
b. Hot water piping					
Exposed indoor	ND 25 to 50	DIP with lagging	(L) JIS A5314 or ISO 4179 and epoxy lining for fittings (C) SYSTEM D2 + lagging	Flanged, Push-on & SC	
c. Steam piping					
Exposed indoor	ND 25 to 100	DIP with lagging	(L) JIS A5314 or ISO 4179 and epoxy lining for fittings (C) SYSTEM D2 + lagging	Flanged, Push-on & SC	
S33: In-plant Pipe (All the piping outside the buildings or structures)					
a. Sewage Piping 1: Inflow, Gravity Flow Conduit					
Buried	ND 1400 to 2000	RC Pipe	(L) None (C) Asphalt coating	Push-on & SC	
b. Sewage Piping 2: Pressured Conduit dia. 800mm and over					
Buried and exposed	ND 800 to 1800	SP (with concrete cover when exposed)	(L) None (C) Concrete cover, asphalt coating where buried	Flanged, Welded & SC	
c. Sewage and sludge Piping: Pressured Conduit under dia. 800mm including supernatant					
Buried	ND 250 to 600	DIP	(L) JIS A5314 or ISO 4179 and epoxy lining for fittings (C) SYSTEM D2	Flanged, Push-on & SC	
d. Hot Water piping					
Exposed	ND 50	DIP with lagging	(L) JIS A5314 or ISO 4179 and epoxy lining for fittings (C) SYSTEM D2 + lagging	Flanged, Push-on & SC	
e. Water Supply piping					
Buried	ND 50 to 300	SP	(L) JWWA K135 or AWWA C210 (C) JWWA K151 or AWWA C203	Flanged, Welded & SC	
f. Gas Piping					
Exposed	ND 150 to 200	SP with lagging	(L) None (C) SYSTEM D2 +lagging	Flanged, Welded & SC	
g. Odor gas Piping					
Exposed	ND 150 to 300	PVC with lagging	(L) None (C) lagging	Flanged, Welded & SC	
h. Steam Piping					

Exposed	ND 50 to 100	SP with lagging	(L) JWWA K135 or AWWA C210 (C) SYSTEM D2 +lagging	Flanged, Welded & SC	
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2) Intermediate Pumping Station

Service and Location	Nominal Dia. (ND)	Pipeline Material	Lining (L) and Coating (C)	Joints	Remarks
S51 to S63: Intermediate Pump Station					
a. Pressure, drainage piping					
Exposed	ND 50 to 700	DIP	(L) JIS A5314 or ISO 4179 and epoxy lining for fittings (C) SYSTEM D2	Flanged, Push-on & SC	
b. Pressure piping					
Exposed	ND 800 to 1000	SP	(L) JWWA K135 or AWWA C210 (C) JWWA K151 or AWWA C203	Flanged, Welded & SC	

3) Sewers

Service and Location	Nominal Dia. (ND)	Pipeline Material	Lining (L) and Coating (C)	Joints	Remarks
S81 to S96: Sewers					
a. Pressure piping					
Buried	ND 50 to 700	CIP	(L) None (C) Asphalt coating	Flanged, Push-on & SC	
b. Gravity piping					
Buried	ND 800 to 1000	CIP	(L) None (C) Asphalt coating	Flanged, Push-on & SC	
c. Casing pipe for rail/river crossing					
Buried	ND 300 to 800	SP	(L)None (C)None	Flanged, Welded & SC	
d. Pressure piping for route 10 jacking					
Buried	ND 500	SP	(L) None (C) Asphalt	Flanged, Welded & SC	