PROJECT: CREASE DROVE, FINCHAM

CLIENT: ASHLEY KING DEVELOPMENTS LIMITED

PROJECT REFERENCE: PR10757

Issue	Revision Description	Date	Engineer	Approved
A	Initial Submission to Anglian Water for comment	15.11.2018	P. Warner	P. Warner
B	Real time control, inhibit and inhibit storage tank added at Anglian Water request with associated changes	03.01.2019	P. Warner	P. Warner
C	Cover levels at wet well and valve chamber altered with associated changes	03.01.2019	P. Warner	P. Warner
D	RCD labelled for socket outlet on wiring diagrams, manufacturers drawing of Weholite chamber added	14.01.2019	P. Warner	P. Warner

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1: Specification

Our proposal is based on equipment providing compliance with the Sewers for Adoption 6th Edition Specification as amended by the Anglian Water Version 1.3 addendum to this document dated November 2015 as obtained from the Anglian Water website at the time of this proposal. A copy of this is attached for your reference in Appendix G.

2: Design Overview

Anglian Water have requested a real time active control system (RTC) be installed to inhibit operation of the pump station when a downstream surcharge is detected, with between 12- and 24-hours additional storage in addition to normal emergency storage being provided at the pump station to accommodate this inhibit period.

Anglian Water have quantified the emergency storage required for the 12 to 24 hours as being between $10m^3$ and $17m^3$. A copy of the Anglian Water email confirming this is contained in Appendix C. This design incorporates the upper limit of $17m^3$ in addition to the normal emergency storage.

We understand Anglian Water will supply and install the level monitoring in the downstream system with a communication device to convey a signal on high surcharge level to the onsite pump station to inhibit pump discharge until the level subsides. We have allowed for installing a free issue receiver unit in the control panel kiosk. We assume commissioning and setting to work the unit will be undertaken by Anglian Water at a time to suit the site programme.

There could be extended down times of the system. From recent comments from Anglian Water on other similar schemes we understand a chemical dosing unit is not required by Anglian Water as the risk of septicity occurring during the inhibit period is assumed to be low.

The operating logic of the pump station is to provide a high-level override allowing the pumps to operate once the storage is breached.

The various sections below elaborate further on the proposed design to fulfil the above criteria.

3: Design Inflow and Proposed Discharge

The pump station is designed to deal with the foul water inflow from 94 domestic dwellings.

For reliability for this size of development we would suggest the utilisation of a minimum 110mm OD PE100 SDR11 rising main with 89.1mm bore. We understand Anglian Water have advised a discharge restriction of 3.8l/s which means this cannot be used as a self-cleansing velocity would not be attained. As such we are constrained to the rising main and pipework size dictated by the discharge restriction imposed by Anglian Water.

Based on the Anglian Water criteria of dry weather inflow equalling 125 litres per person with 2.35 persons per property plus a 25% allowance for infiltration we calculate the DWF per property to be 367.19 litres which for 94 properties equals 0.399l/s. Anglian Waters new required pump rate is 4 x DWF which equates to a minimum discharge rate of 1.600l/s.

To ensure a self-cleansing velocity is provided in the rising main we are proposing the use of a 90mm OD PE100 SDR17 rising main with a 78.7mm nominal bore and discharging at a minimum 3.8l/s.

We are proposing fixed speed pumps so there will be a variance in discharge across the operating range. We would refer you to Section 7 which details the actual discharge rate from the pumps at key operating levels. These provide the closest possible match to the restriction.

4: Emergency Storage

The Anglian Water design criteria requests the emergency storage be 4 hours at Dry Weather Flow. For 94 dwellings this equates to 5.753m^3.

As detailed above in addition to normal emergency storage Anglian Water have requested inhibit storage. We have allowed for accommodating the upper requirement of 17m^3 as advised by Anglian Water. This gives a total storage requirement of 22.753m^3.

Anglian Water recently have been requesting the storage in a combination of the wet well and incoming sewer network above high-level alarm and below level of the lowest private pipe entering the adoptable manhole system. This is likely to be at Manhole F9 at a level of -1.672.

To provide the storage we are proposing a 1.5m diameter Weholite storage tank with 150mm dry weather flow channel installed adjacent the compound as shown on our drawings in Appendix D.

We have attached storage calculations in Appendix C which shows the storage requirement is satisfied. A drawing of the Weholite chamber is also contained in Appendix C.

5: Rising Main and Surge Analysis

In order to accommodate the nominal discharge rate of 3.8l/s imposed by Anglian Water our proposal is based on the use of a 90mm OD PE100 SDR17 pressure pipe with a 78.7mm nominal bore.

The rising main is 341.8m long. As it is less than 500m we don't propose to prepare a surge analysis report in this instance.

The rising main has a high point at the valve chamber where an air valve would be installed. There is a low point on the rising main at a chainage of 50m where a washout chamber would be installed. Please refer to the drawing in Appendix D.

6: Retention Time

Our calculations indicate that with the development half completed the retention time in the system is 3.31 hours and when fully completed 1.65 Hours. Both are less than the 6-hour period after which septicity is considered to be an issue, so we don't intend to install any septicity suppression equipment on this site.

If problems are encountered with septicity in the early stages of the development, then they will be dealt with by temporary measures.

7: Pump Duty and Selection

From the information provided we calculate the pump duty to be a self-cleansing flow rate of 3.8l/s against a total head of 8.03m for which we have selected submersible sewage pumps from the Sulzer XFP80C VX range which are fitted with 2.95kW explosion-proof motors and designed to operate from a 400V, three phase and neutral power supply.

These pumps would provide the following theoretical discharge rates from key operating levels.

Operating Level	Discharge Rate (l/s)
Pump Stop	4.124
Mid Water Level	4.185
Duty Pump Start	4.249
Standby Pump Start	4.284
High Level Alarm	4.319
Inlet	4.893
Maximum Storage Level	4.903

These pumps as standard are fitted with a seal leakage detection system which would be monitored via relays in the control panel.

Both pumps would be supplied with the Anglian Water's approved nylon rope lifting system. One pump would be fitted with a Flush Valve.

We have attached our hydraulic calculations, system curves and pump performance details in Appendix B.

8: Pump Station Layout
The pumps, pipework and valves would be installed within concrete chambers constructed by others to a layout as shown on drawings PR10757-001 to 005. Please refer to Appendix D for drawings.

The non-return valves would be fitted with levers, weights and guards and the gate valves would be fitted with extension spindles.

The valve chamber forms an intermediate high point. A sewage rated, stub type double orifice air valve would be installed in the confines of the valve chamber complete with 80mm gate valve and bevel gearbox.

The pump station pipework would terminate a short distance outside the valve chamber in an 80mm nominal bore plain ended pipe from where provision of the rising main and connecting it to the pump station pipework would be the responsibility of others.

9: Pump and Level Control Cabling
Pumps and level controls would be wired back to the control panel via above an above ground termination box as shown on our attached drawings.

10: Control Equipment
Automatic Level Control would be via a Pulsar Ultralite ultrasonic level controller augmented by 2 separate float switches for high level and back up control, all wired back to a multi compartment control panel complying with the Anglian Water Addendum to the Sewers for Adoption 6th Edition Specification.

The control panel contains circuity to inhibit the system from operation on receiving a signal from a downstream sewer monitor. It is our understanding that Anglian Water are supplying and installing in its entirety the downstream monitor and communication device. We have allowed for installing a free issue receiver unit in the control panel kiosk.

The control panel would provide a high level over ride to recommence pumping should the allowed storage be exceeded.

The Control Panel would be installed within a roadside GRP kiosk of dimensions 2500mm wide x 750mm deep x 1750 high which would have a separate compartment to house the electricity board meters.

Please refer to Appendix E for wiring diagrams and kiosk layout.

11: Telemetry Equipment
Anglian Waters latest Telemetry Outstation would be installed prior to Adoption. Subject to a radio survey proving the use of this type of system is suitable for transmitting the alarms for this site it is proposed to install a 6m radio telemetry mast.

12: Access Covers
Steelway Prolift FACTA B access covers and frames would be provided for the wet well and valve chamber of the following sizes.

Chamber	Size
Wet Well	1500 x 900mm
Valve Chamber	2400 x 1800mm

13: Lifting Equipment
A Lloyds Rota type davit socket would be installed by others adjacent to the pump access opening. We do not propose to supply a dedicated Lloyds Rota davit for the site as we understand these are carried on Anglian Waters service vans.

14: Baffle Plate
A stainless steel baffle plate will be installed over the inlet sewer in the wet well.

15: Sludge Valve
An 80mm valve chamber drain would be installed with a sludge valve located over this within the valve chamber.

16: Valve Chamber Access Ladder
A stainless steel access ladder complete with retractable handhold would be installed in the valve chamber.

17: Floodlight
An energy efficient floodlight mounted on a 4m pole would be supplied and positioned as shown on our drawings. Please see Appendix F for details. We are proposing the floodlight pole would be of the hinged type to ease ongoing maintenance.

18: Services
It would be the responsibility of our client to provide a suitably rated 400 volt 3 Phase and neutral power supply to the control panel and a PSTN line for the telemetry outstation if the radio survey indicates a radio mast is not suitable for this site.

19: Appendices

Appendix A
Summary

Liquid Handled	Foul Water
Number of Pumps	2
Control Philosophy	Duty / Standby
Capacity per Pump (l/s)	3.80
Head Generated (m)	8.03
Pump Manufacturer	Sulzer
Pump Type	XFP80C VX.2
Impeller Type / Reference	Vortex / 196mm
Solids Handling (mm)	80
Hazardous Area Rating of Pump	EXP
Motor Rating (kw)	2.95
Speed (rpm)	1440
Electric Supply	230/400V 50Hz, 3 Phase
Full Load Current (Amps)	6.4
Method of Starting	Direct on Line
Length of Cables	20
Level Controls	Pulsar UltraLite Ultrasonic plus high level and back up float switches
Wet Well Diameter (mm)	2400
Wet Well Depth (m)	5.985
Station Pipes and Valves (mm)	80
Station Final Discharge Pipe (mm)	80
Pump Station Pipe Material	Ductile Iron
Rising Main (By Others)	90mm OD PE100 SDR17 (78.7mm Bore)
Access Covers (Supply Only)	Manufacturer: Steelway Prolift Rating: FACTA B Wet Well 1500 x 900mm Valve Chamber 2400 x 1800mm
Inlet Diameter (mm)	150
Penstock (Not Fitted)	Isolation of incoming sewers by others
General Arrangement Drawings	PR10757-001 to 005

Materials Specification

Pump Station Type	**Submersible – Guiderail Mounted Pumps**
Base Specification	**Sewers For Adoption 6th Edition**
Addendum	**Anglian Water Version 1.3 dated November 2015**

PUMP:
Single stage fully submersible pump with cast iron case and impeller, which is securely locked to the fully protected motor shaft extension. Impeller as data section.

SEAL CHAMBER:
Buffer chamber between pump and motor, charged with oil retained by opposing seals.

MOTOR:
Squirrel cage induction motor of watertight IP68 enclosure suitable for continuous service and having Klixon lock out circuit for over-temperature protection on Explosion Proof motors.

CABLE:
Suitable length(s) of multi-core VRI PCP sheathed flexible cable connected through watertight gland(s) to the motor windings.

DUCKFOOT:
Cast iron floor fixing duckfoot bend (or pedestal with elbow) incorporating guiderail socket(s) and self locating boltless pump quick release coupling.

GUIDERAILS:
Galvanised Mild Steel rail(s) for attachment to cover slab or ground level steelwork and extending to duckfoot sockets. Complete with necessary location brackets.

LIFTING LOCATION SYSTEM:
Nylon lifting rope for pulling into position certified lifting chains carried by Anglian Water personnel.

REFLUX VALVE:
Fullway pattern delivery non-return valve.

SLUICE VALVE:
Fullway pattern isolating sluice valve with non-rising spindle and cap top.

PIPES:
From duckfoot through to defined point for rising main connection, incorporating the valves and, in case of multi-pump system, an appropriately sized manifold. All fitting connections appropriate to materials employed.

LEVEL CONTROLS:
Pulsar Ultralite ultrasonic level control unit as data sheet complete with submersible transducer, bracket and cable to control panel, with float switches for ultrasonic backup control and high level alarm functions.

ACCESS COVERS: (Supply Only)
Steelway Prolift FACTA B Access Covers and Frames complete with safety grids and demountable barrier system.

Wet Well	1500 x 900mm clear opening
Valve Chamber	2400 x 1800mm clear opening

LIFTING EQUIPMENT: (Supply Only)
1 – Cast in Type Davit Socket and cover plate to suit Lloyds ROTA Davit for in situ casting by others.

KIOSK:
GRP, floor fixing, three roadside type weatherproof lockable enclosure in deep green textured finish, provisional dimensions 1750H x 2500W x 750D containing a full sized backboard on which would be mounted / provided:-

a) Anglian Water DOL Control panel as specified.
b) Anti condensation heater and thermostat.
c) Interior light and switch.
d) Set of suitably rated double insulated cable tails for connection to Electricity Board meters.
e) Space for the mounting of Electricity Board meters.
f) Telemetry
g) Space for Anglian Water Gateway Receiver

The whole of the above being suitably interconnected and earth bonded extended to all non-conductive steelwork within the pump station in 16mm^2 cable to provide a complete PME system.

GENERATOR EARTH:
Comprising a copper electrode to be driven into the ground adjacent to the control kiosk, a concrete inspection pit and interconnecting cable to the panel.

ANCILLARY EQUIPMENT:
1. 6m high radio mast subject to site survey
2. Lever arm and weights on non-return valves complete with guards
3. Pressure tappings on pump discharge leg non-return valves
4. 100mm female Bauer coupling on over pumping tee
5. Double orifice, stub type air valve with 80mm gate valve and bevel gearbox installed in valve chamber pipework
6. Weatherproof and lockable pump cable termination box
7. Rubber matting in control panel kiosk
8. Sign indicating pump station data fitted within the control kiosk
9. Supply only of a 500 watt energy efficient flood light mounted on a 4m high hinged lamp post complete with cabling back to the control panel a maximum 5m away
10. Stainless Steel Valve Chamber Access Ladder C/w Retractable Hand Hold.
11. Stainless Steel Baffle Plate for fixing over the 150mm inlet sewer.
12. Three copies of operating and maintenance manuals plus drawings or one electronic copy prepared in PDAS Ltd standard format

Appendix B
Hydraulic Calculations, System Curves and Performance Curves and Dimensional Data

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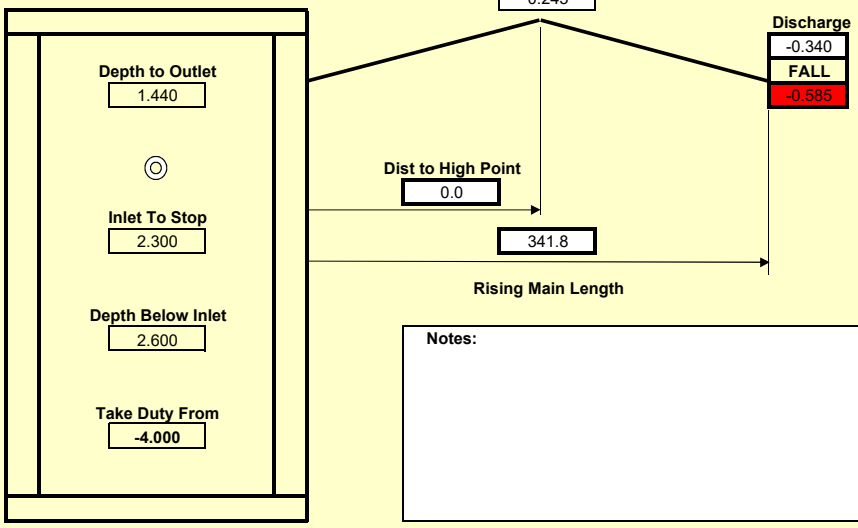
Quote Reference	Q11291
Date	03.01.2019
Project Reference	PR10757
Date	03.01.2019

Clients Name	Ashley King Developments Limited
Site Address	Crease Drove, Fincham

Adopting Authority	Anglian Water
Pump Station Type	Foul
Number of Dwellings	94
Non Domestic Area (m^2)	
Non Domestic Rate (L/s Hectare)	
Number of Pumps	2
Number of Duty Pumps	1

Design Flow / Rising Main		
Design Flow (& SFA 6 Discharge)	4.35	L/sec
Pump Discharge Rate AWA	1.60	L/sec
Pump Discharge Rate	3.8	L/sec
Rising Main Material	PE100	
Rising Main Pressure Rating	SDR17	
Rising Main O.D.	90	mm
Rising Main I.D	78.7	mm
Velocity in Main	0.78	m/sec
Surge Analysis	**NOT REQUIRED**	

Cover Level	1.685
VC Outlet	0.245
Max Storage	-1.672
Inlet	-1.700
HLA	-3.450
P2 Start	-3.550
P1 Start	-3.650
Mid Water	-3.825
Stop Level	-4.000
Dead Area	300
Base Level	-4.300



Notes:

Wet Well		
Wet Well Diameter	2400	mm
Calc Chamber Depth	5.424	m
Volume Per M	4,523.89	litres
Depth Between Starts	100	mm
Actual Chamber Depth	5.985	m
Theoretical Op Volume	456.00	litres
Actual Op Volume	714.88	litres
Max Theoretical Starts	7.50	
Actual Starts	5.19	

Retention Calculations		
Dwf Inflow Per Day	34,515.63	litres
Rising Main Volume	1,662.69	litres
Combined Main and Op Vol	2,377.57	litres
No. of Main Clears per Day	14.52	
Retention Full Usage	1.65	Hours
Retention Half Usage	3.31	Hours

Retention calcs assume ascending rising main

Storage		
Domestic @ AWA Rates	5.753	m^3
AW Inhibit Storage	17.000	m^3
Total Required Storage	22.753	m^3
Capacity in Gravity System	16.120	m^3
Capacity Max Storage - HLA	6,623.36	litres

	Rising Main	**Common 3**	**Common 2**	**Common 1**	**Individual 3**	**Individual 2**	**Individual 1**
Flow Rate (L/secec)	**3.80**	3.80	3.80	3.80	3.80	3.80	3.80
Static Head (M)	**3.66**						
Pipe Diameter (mm)	78.70	80	80	80	80	80	80
Velocity (M/sec)	0.78	0.76	0.76	0.76	0.76	0.76	0.76
Roughness Factor	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Pipe length (M)	341.8					**9**	
Duckfoot Bend							**1**
Short Radius Bends						**2**	
Long Radius Bends							
Tee Straight through		**1**				**2**	
Tee through branch							
Radial Tee thro Branch						**1**	
Sluice Valve						**1**	
Non Return Valve						**1**	
Bellmouth inlet							
Sharp Taper							
Standard Taper							
Equivalent Pipe Length (M)	341.800	0.880	0.000	0.000	0.000	22.120	2.720
Reynolds Number	5.4E+04	5.3E+04	5.3E+04	5.3E+04	5.3E+04	5.3E+04	5.3E+04
Darcy-Weisbach Friction Factor	0.0301	0.0300	0.0300	0.0300	0.0300	0.0300	0.0300
Velocity Head	0.031	0.029	0.029	0.029	0.029	0.029	0.029
Hydraulic (Piezometric) gradient	0.0119	0.0109	0.0109	0.0109	0.0109	0.0109	0.0109
Friction Head Loss	4.059	0.010	0.000	0.000	0.000	0.241	0.030

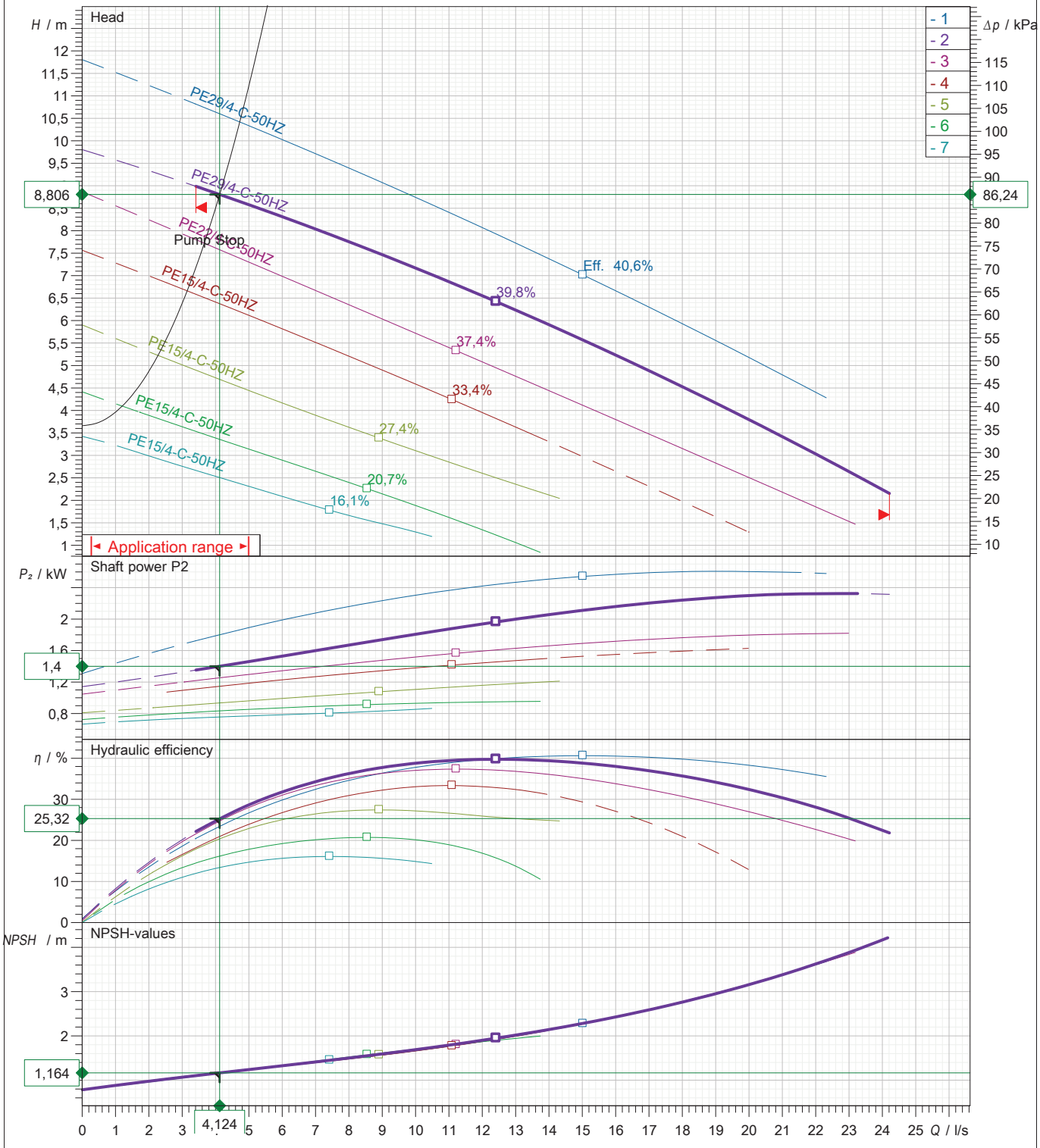
Calc Duty Point		
Flow	**3.80**	L/sec
Static Head	**3.66**	m
Total Head	**8.03**	m

Pump Selection	
Pump Type	XFP80C VX.2
Impeller	196
Kw Rating	2.95

Actual Duty		
Flow	**4.12**	L/sec
Head	**8.81**	m

Curve number	Pump performance curves	SULZER
Reference curve XFP80C-VX 50HZ	XFP 80C VX 50HZ	

				Discharge	Frequency
				DN80	50 Hz
Density	Viscosity	Testnorm		Rated speed	Date
998,3 kg/m³	1,005 mm²/s	ISO 9906: 2012, HI 11.6/14.6 ≤10kW		1473 1/min	2019-01-03
Flow	Head	Rated power	Power input	Hydraulic efficiency	NPSH
4,12 l/s	8,81 m	1,4 kW	1,69 kW	25,3 %	1,16 m



Impeller size	N° of vanes	Impeller	Solid size	Revision
196 mm	6	Vortex impeller	80 mm	

Sulzer reserves the right to change any data and dimensions without prior notice
and can not be held responsible for the use of information contained in this software.

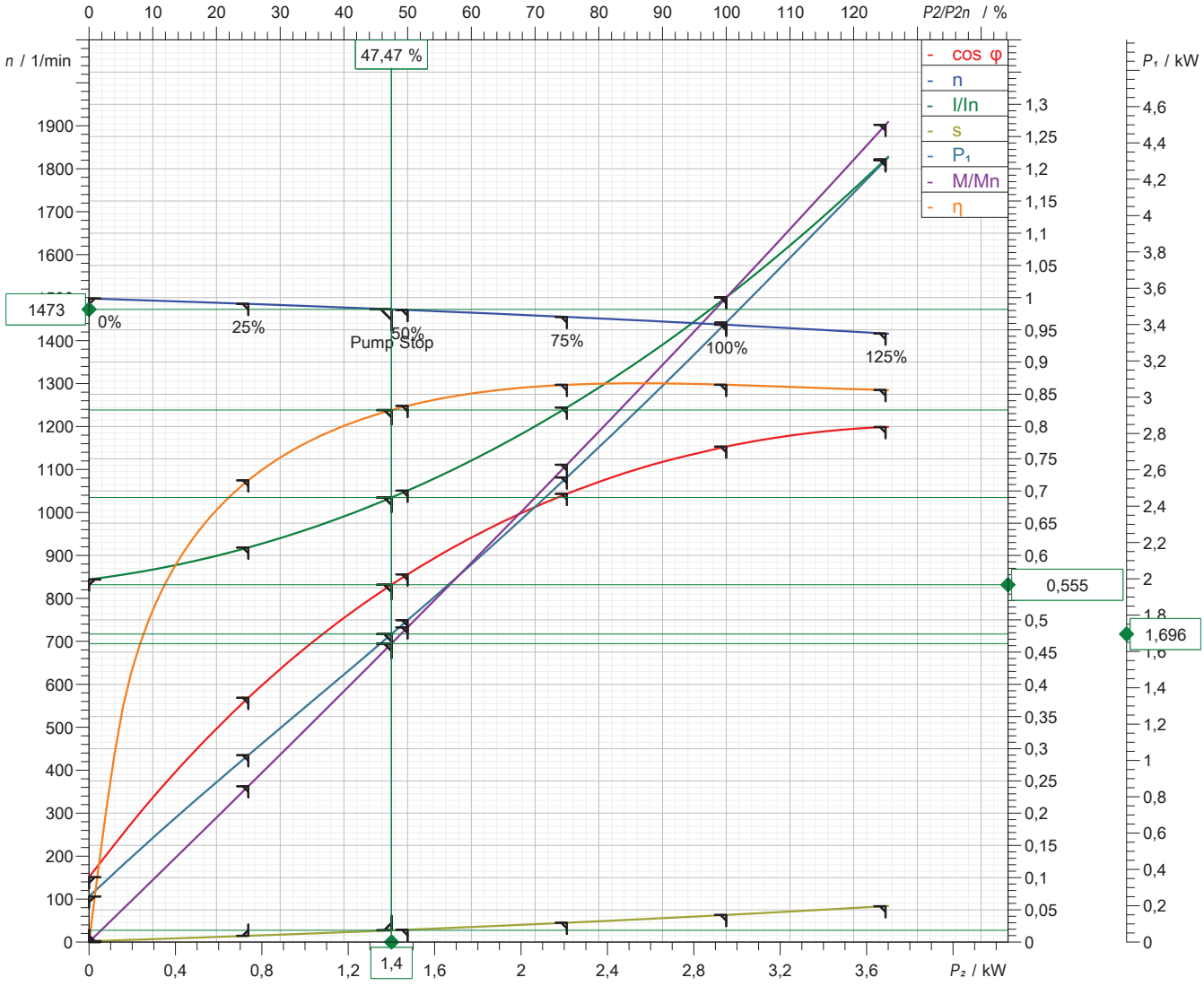
Frequency	PE1
50 Hz	

Motor performance curve

PE29/4-C-50HZ

SULZER

Rated power	Service factor	Nominal Speed	Number of poles	Rated voltage	Date
2,95 kW	1	1440 1/min	4	400 V	2019-01-03



Symbol	No loac	25 %	50 %	75 %	100 %	125 %
P_2 / kW	0	0,7375	1,475	2,212	2,95	3,688
P_1 / kW	0,251	1,029	1,772	2,559	3,411	4,305
η / %	0	71,66	83,22	86,48	86,48	85,66
n / 1/min	1498	1485	1471	1455	1437	1416
cos φ	0,1006	0,3791	0,5706	0,6956	0,7689	0,7993
I / A	3,601	3,919	4,484	5,309	6,404	7,774
s / %	0,1356	0,9685	1,92	2,997	4,211	5,573
M / Nm	0	4,741	9,574	14,52	19,61	24,86

Tolerance according to VDE 0530 T1 12.84 for rated power

Starting current	Starting torque	Moment of inertia	No. starts per hour
36 A	28,4 Nm	0,009 kg m²	15

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SULZER

Massblatt XFP 80C-VX Twin Guide Rail
Dimension Sheet XFP 80C-VX Twin Guide Rail
Dimensioni Installazione sommersa
Hoja de dimensiones instalacion sumergida
Plan d'encombrement Installation noyee

No: AN-M.22.610 - 03
Drawn: 11.08.10 / D.Whelan
Issue Date: 30/03/2011
Anderungen vorbehalten
Technical changes reserved
Con riserva di modifiche
Con reserva de modificaciones
Sous réserve de modification

50 Hz

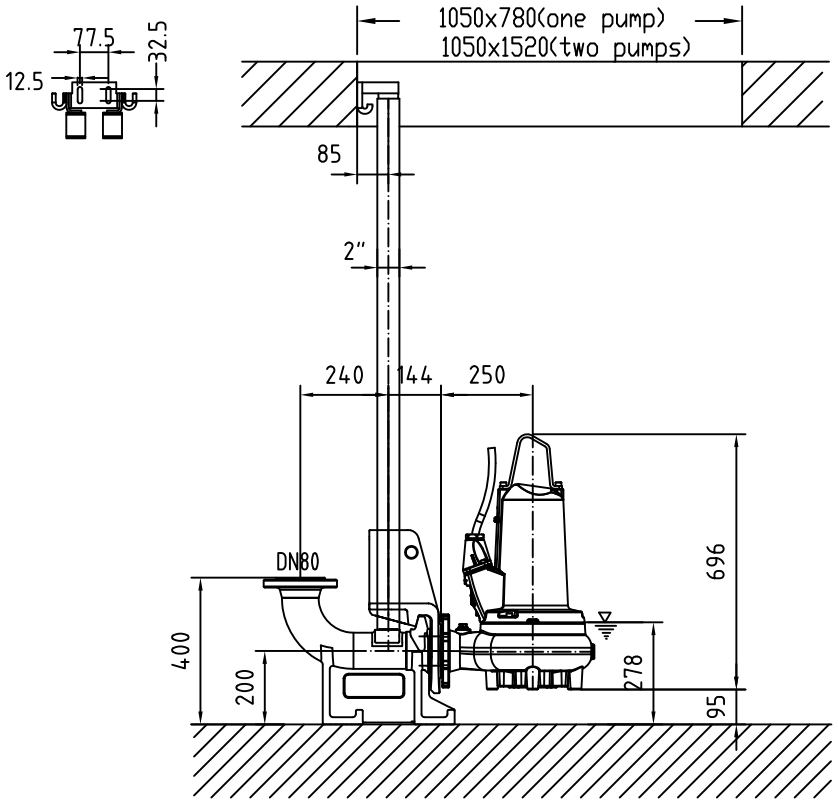
S.I.

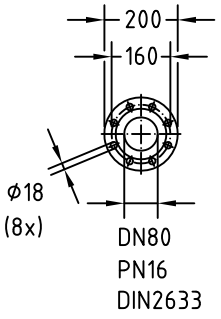
Typ Type Tipo	Gewicht Weight Poids Peso (kg)
PE 15/4	95.5
PE 22/4	97.5
PE 29/4	100.0

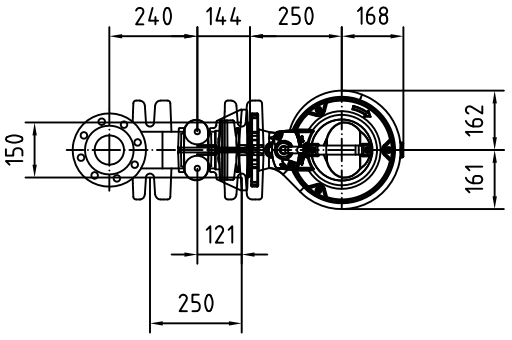
60 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (kg)
PE 18/4W	95.5
PE 22/4	97.5
PE 28/4W	97.5
PE 35/4	100.0

min. Schacht?ffnung
min. Sump opening
Dimensioni min. botola
min. apertura del pozo
Larqeur min. du puisard





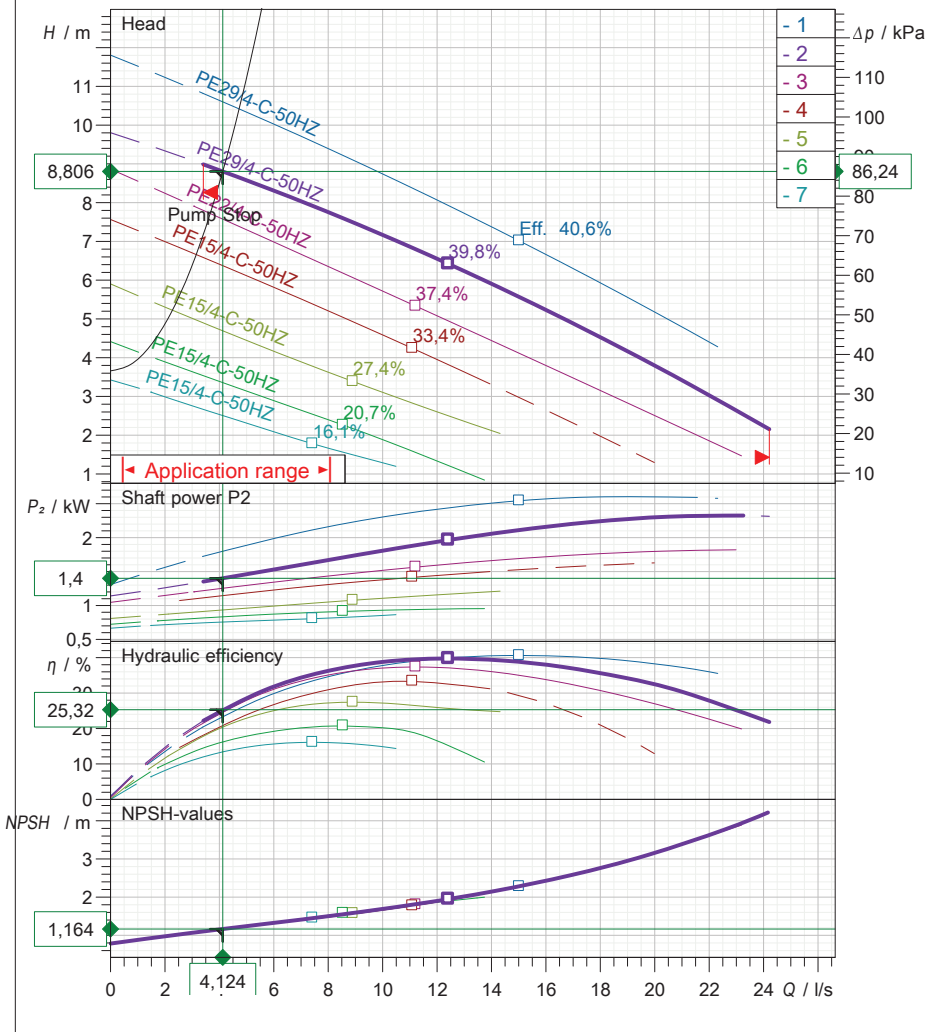


Gewicht: Beinhaltet Pumpe und Halterung
Weight: Includes pump and slider bracket
Il peso include il pezzo intermedio
Peso: Incluye bomba y una
Poids: Pompe et coulisseau

Guss-Allgemeintoleranzen nach DIN1680 - GTB16
General tolerances for castings in acc. to DIN1680-GTB16
Tolleranze generali delle fusioni secondo DIN1680-GTB16
Tolerancias generales para la fundición seg. de DIN1680-GTB16
Tolérance générale de la fonderie selon DIN1680-GTB16

XFP 80C VX 50HZ

Pump Stop



Testnorm

ISO 9906: 2012, HI 11.6/14.6 ≤10kW

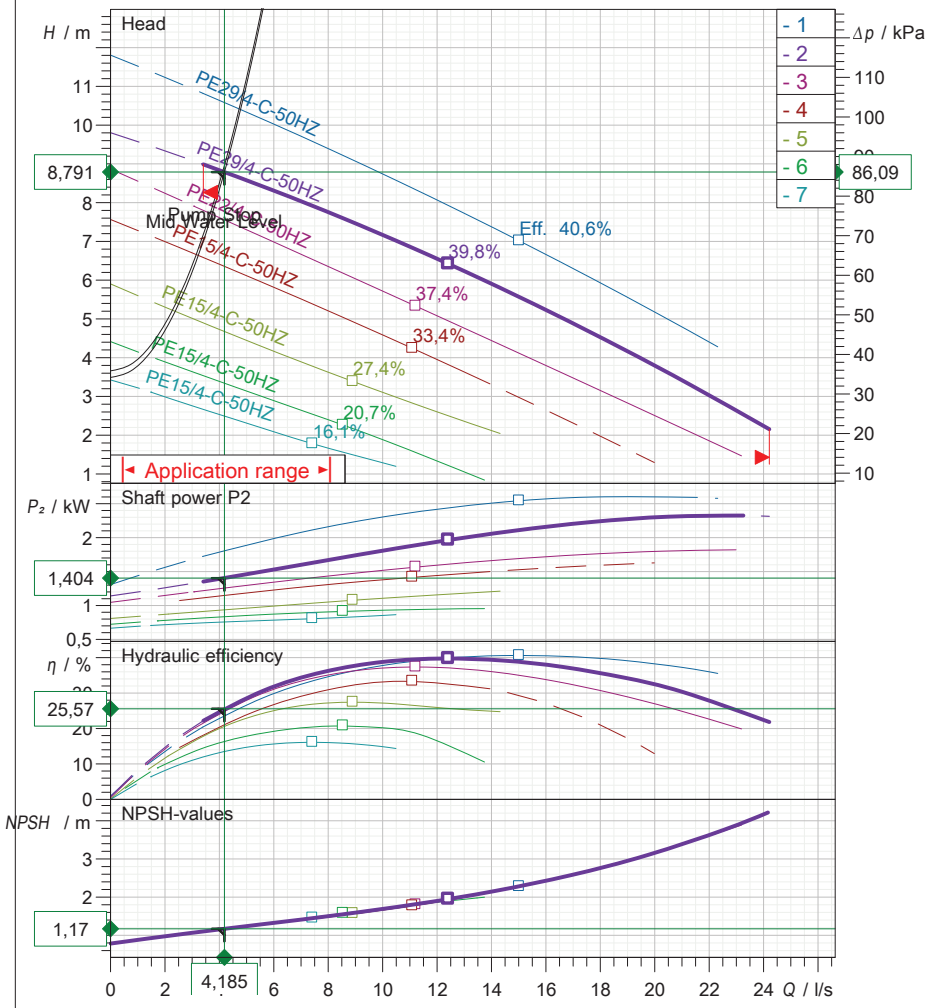
2019-01-03

Operating data specification			
Flow	4,12 l/s	Power input	1,69 kW
Efficiency	25,3 %	Head	8,81 m
NPSH	1,16 m	Rated power	1,4 kW
Temperature	20 °C	Fluid	Water
No. of pumps	1	Nature of system	Single head pump
Pump data			
Type	XFP 80C VX 50HZ	Make	SULZER
Series	XFP PE1-PE3	Impeller	Vortex impeller
N° of vanes	6	Impeller size	196 mm
Free passage	80 mm	Suction flange	DN80
Discharge flange	DN80	Type of installation	Wet Well installation with pedestal
Moment of inertia	0,0083 kg m²		
Motor data			
Rated voltage	400 V	Frequency	50 Hz
Rated power P2	2,95 kW	Nominal Speed	1440 1/min
Number of poles	4	Efficiency	87,8 %
Power factor	0,76	Rated current	6,4 A
Starting current	36 A	Rated torque	19,6 Nm
Starting torque	28,4 Nm	Degree of protection	IP 68
Insulation class	H	No. starts per hour	15

Sulzer reserves the right to change any data and dimensions without prior notice
and can not be held responsible for the use of information contained in this software.

XFP 80C VX 50HZ

Mid Water Level



Testnorm

ISO 9906: 2012, HI 11.6/14.6 ≤10kW

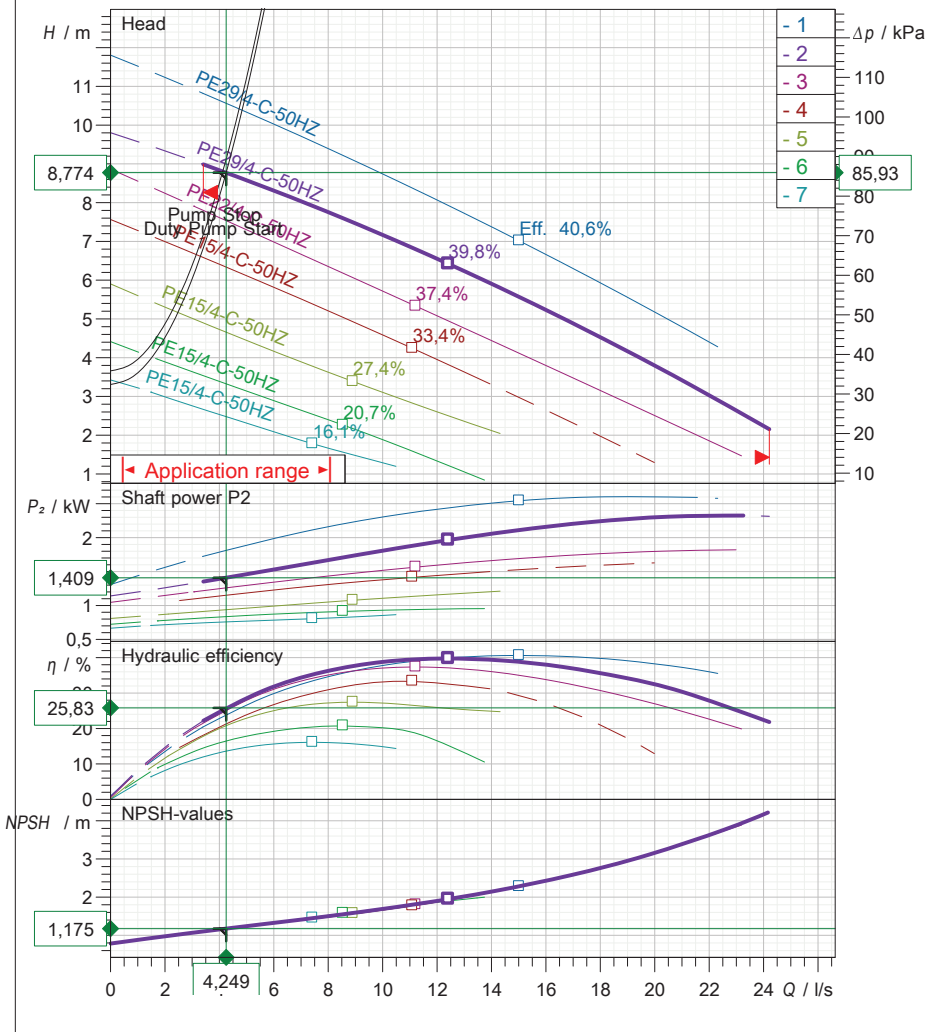
2019-01-03

Operating data specification			
Flow	4,19 l/s	Power input	1,7 kW
Efficiency	25,6 %	Head	8,79 m
NPSH	1,17 m	Rated power	1,4 kW
Temperature	20 °C	Fluid	Water
No. of pumps	1	Nature of system	Single head pump
Pump data			
Type	XFP 80C VX 50HZ	Make	SULZER
Series	XFP PE1-PE3	Impeller	Vortex impeller
N° of vanes	6	Impeller size	196 mm
Free passage	80 mm	Suction flange	DN80
Discharge flange	DN80	Type of installation	Wet Well installation with pedestal
Moment of inertia	0,0083 kg m²		
Motor data			
Rated voltage	400 V	Frequency	50 Hz
Rated power P2	2,95 kW	Nominal Speed	1440 1/min
Number of poles	4	Efficiency	87,8 %
Power factor	0,76	Rated current	6,4 A
Starting current	36 A	Rated torque	19,6 Nm
Starting torque	28,4 Nm	Degree of protection	IP 68
Insulation class	H	No. starts per hour	15

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and can not be held responsible for the use of information contained in this software.

XFP 80C VX 50HZ

Duty Pump Start



Testnorm

ISO 9906: 2012, HI 11.6/14.6 ≤10kW

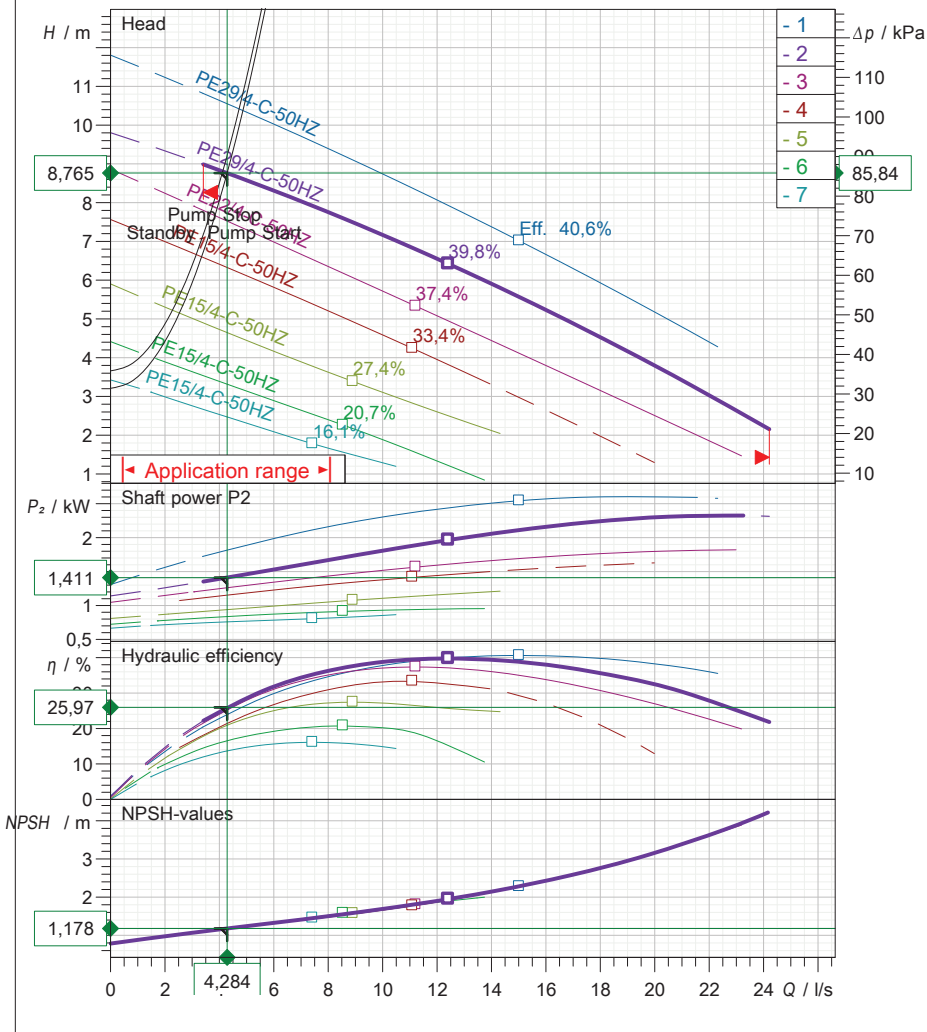
2019-01-03

Operating data specification			
Flow	4,25 l/s	Power input	1,7 kW
Efficiency	25,8 %	Head	8,77 m
NPSH	1,18 m	Rated power	1,41 kW
Temperature	20 °C	Fluid	Water
No. of pumps	1	Nature of system	Single head pump
Pump data			
Type	XFP 80C VX 50HZ	Make	SULZER
Series	XFP PE1-PE3	Impeller	Vortex impeller
N° of vanes	6	Impeller size	196 mm
Free passage	80 mm	Suction flange	DN80
Discharge flange	DN80	Type of installation	Wet Well installation with pedestal
Moment of inertia	0,0083 kg m²		
Motor data			
Rated voltage	400 V	Frequency	50 Hz
Rated power P2	2,95 kW	Nominal Speed	1440 1/min
Number of poles	4	Efficiency	87,8 %
Power factor	0,76	Rated current	6,4 A
Starting current	36 A	Rated torque	19,6 Nm
Starting torque	28,4 Nm	Degree of protection	IP 68
Insulation class	H	No. starts per hour	15

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XFP 80C VX 50HZ

Standby Pump Start



Testnorm

ISO 9906: 2012, HI 11.6/14.6 ≤10kW

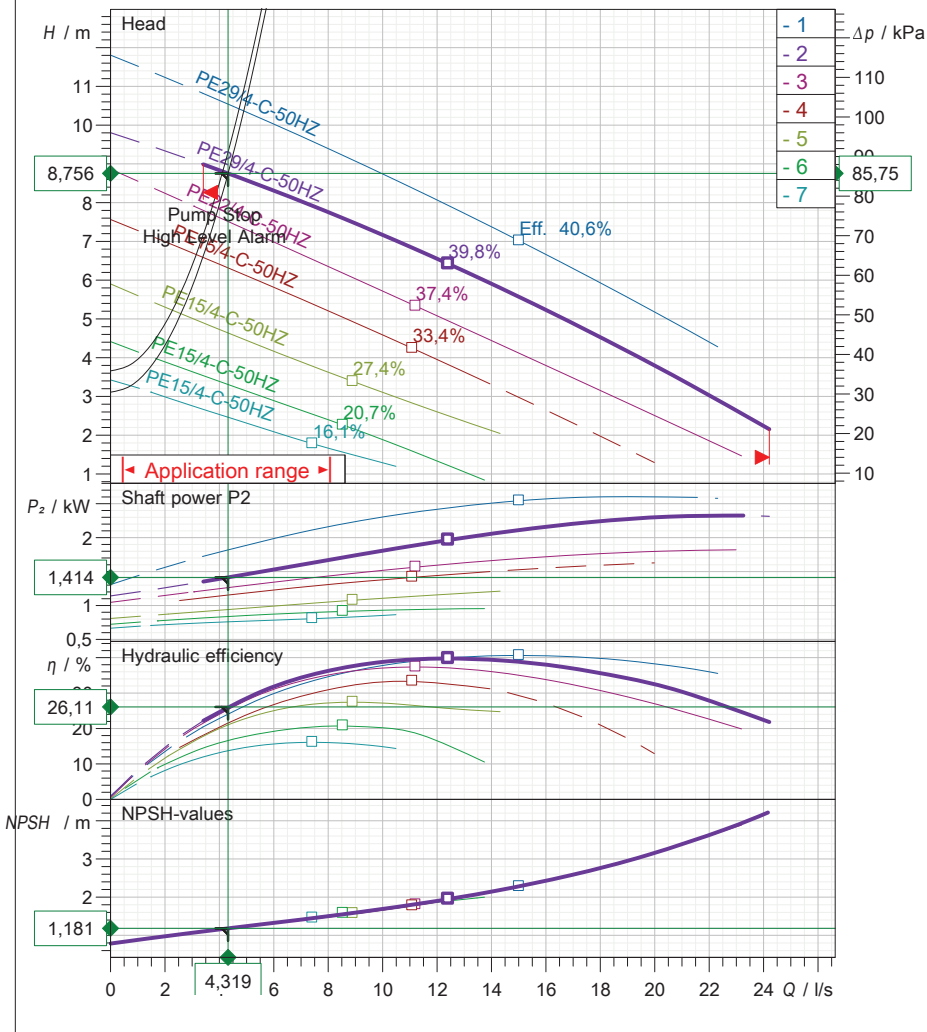
2019-01-03

Operating data specification			
Flow	4,28 l/s	Power input	1,71 kW
Efficiency	26 %	Head	8,77 m
NPSH	1,18 m	Rated power	1,41 kW
Temperature	20 °C	Fluid	Water
No. of pumps	1	Nature of system	Single head pump
Pump data			
Type	XFP 80C VX 50HZ	Make	SULZER
Series	XFP PE1-PE3	Impeller	Vortex impeller
N° of vanes	6	Impeller size	196 mm
Free passage	80 mm	Suction flange	DN80
Discharge flange	DN80	Type of installation	Wet Well installation with pedestal
Moment of inertia	0,0083 kg m²		
Motor data			
Rated voltage	400 V	Frequency	50 Hz
Rated power P2	2,95 kW	Nominal Speed	1440 1/min
Number of poles	4	Efficiency	87,8 %
Power factor	0,76	Rated current	6,4 A
Starting current	36 A	Rated torque	19,6 Nm
Starting torque	28,4 Nm	Degree of protection	IP 68
Insulation class	H	No. starts per hour	15

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XFP 80C VX 50HZ

High Level Alarm



Testnorm

ISO 9906: 2012, HI 11.6/14.6 ≤10kW

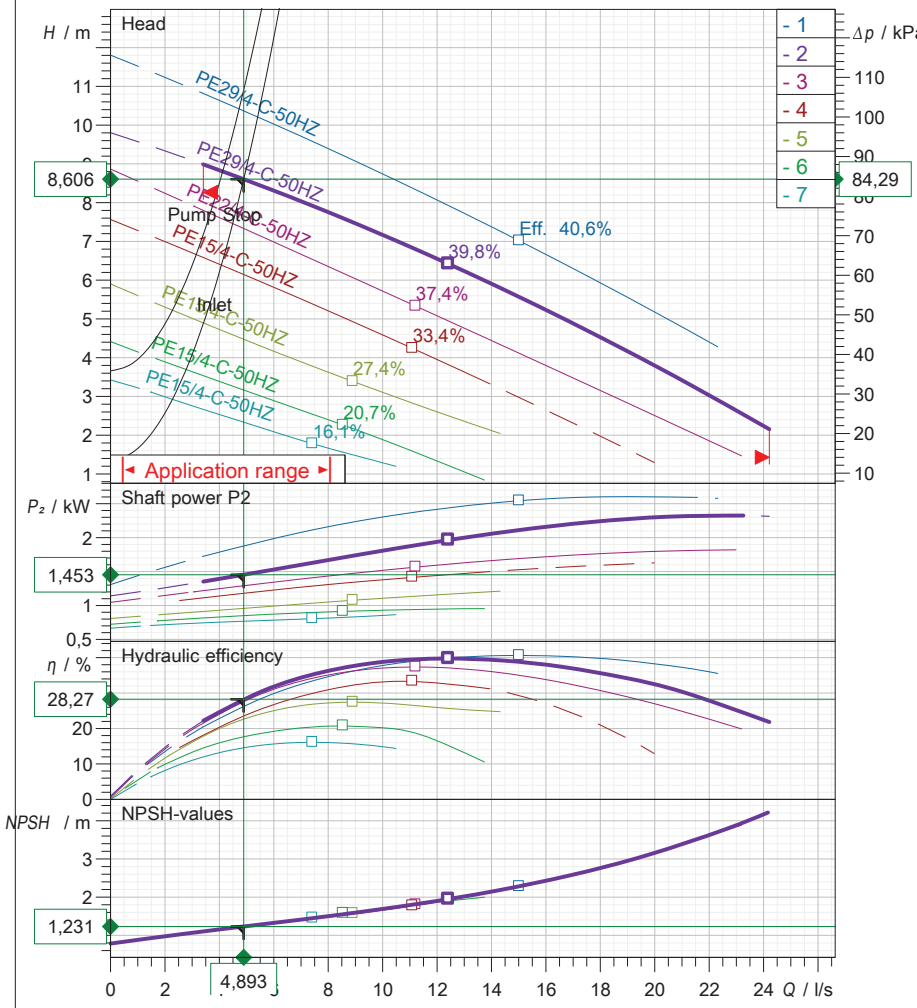
2019-01-03

Operating data specification			
Flow	4,32 l/s	Power input	1,71 kW
Efficiency	26,1 %	Head	8,76 m
NPSH	1,18 m	Rated power	1,41 kW
Temperature	20 °C	Fluid	Water
No. of pumps	1	Nature of system	Single head pump
Pump data			
Type	XFP 80C VX 50HZ	Make	SULZER
Series	XFP PE1-PE3	Impeller	Vortex impeller
N° of vanes	6	Impeller size	196 mm
Free passage	80 mm	Suction flange	DN80
Discharge flange	DN80	Type of installation	Wet Well installation with pedestal
Moment of inertia	0,0083 kg m²		
Motor data			
Rated voltage	400 V	Frequency	50 Hz
Rated power P2	2,95 kW	Nominal Speed	1440 1/min
Number of poles	4	Efficiency	87,8 %
Power factor	0,76	Rated current	6,4 A
Starting current	36 A	Rated torque	19,6 Nm
Starting torque	28,4 Nm	Degree of protection	IP 68
Insulation class	H	No. starts per hour	15

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XFP 80C VX 50HZ

Inlet



Testnorm

ISO 9906: 2012, HI 11.6/14.6 ≤10kW

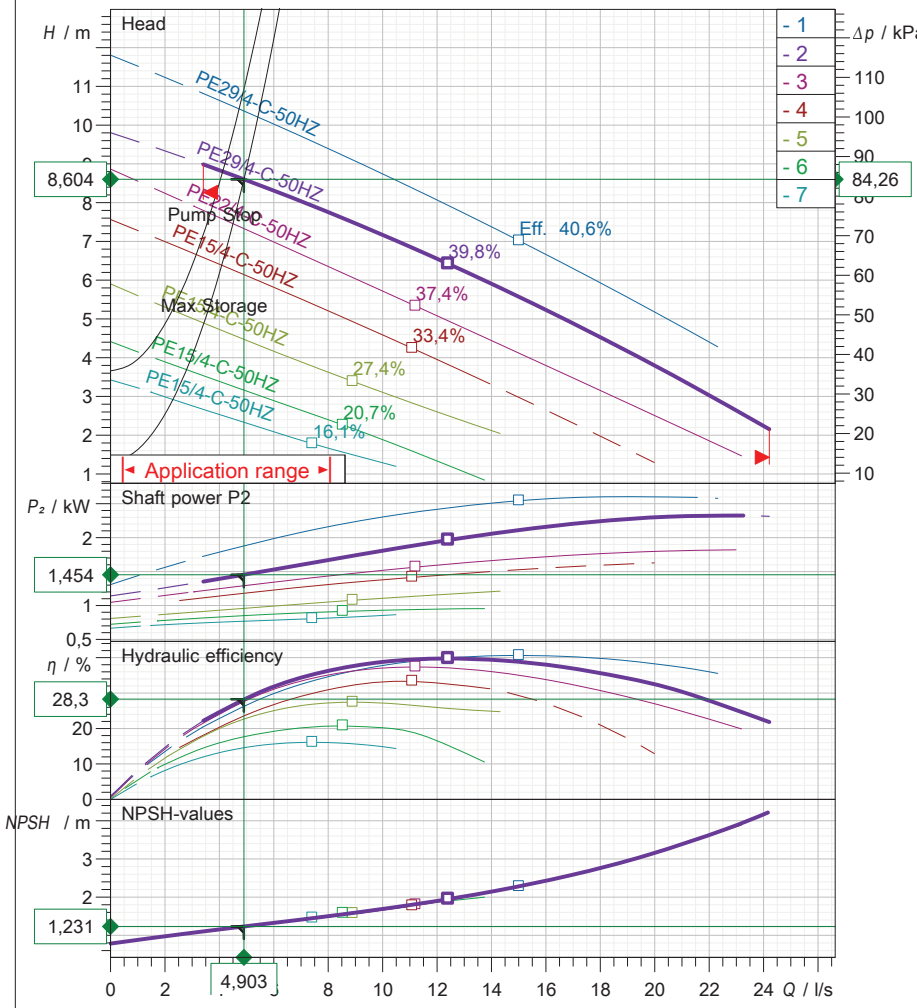
2019-01-03

Operating data specification			
Flow	4,89 l/s	Power input	1,75 kW
Efficiency	28,3 %	Head	8,61 m
NPSH	1,23 m	Rated power	1,45 kW
Temperature	20 °C	Fluid	Water
No. of pumps	1	Nature of system	Single head pump
Pump data			
Type	XFP 80C VX 50HZ	Make	SULZER
Series	XFP PE1-PE3	Impeller	Vortex impeller
N° of vanes	6	Impeller size	196 mm
Free passage	80 mm	Suction flange	DN80
Discharge flange	DN80	Type of installation	Wet Well installation with pedestal
Moment of inertia	0,0083 kg m²		
Motor data			
Rated voltage	400 V	Frequency	50 Hz
Rated power P2	2,95 kW	Nominal Speed	1440 1/min
Number of poles	4	Efficiency	87,8 %
Power factor	0,76	Rated current	6,4 A
Starting current	36 A	Rated torque	19,6 Nm
Starting torque	28,4 Nm	Degree of protection	IP 68
Insulation class	H	No. starts per hour	15

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XFP 80C VX 50HZ

Max Storage



Testnorm

ISO 9906: 2012, HI 11.6/14.6 ≤10kW

2019-01-03

Operating data specification			
Flow	4,9 l/s	Power input	1,75 kW
Efficiency	28,3 %	Head	8,6 m
NPSH	1,23 m	Rated power	1,45 kW
Temperature	20 °C	Fluid	Water
No. of pumps	1	Nature of system	Single head pump
Pump data			
Type	XFP 80C VX 50HZ	Make	SULZER
Series	XFP PE1-PE3	Impeller	Vortex impeller
N° of vanes	6	Impeller size	196 mm
Free passage	80 mm	Suction flange	DN80
Discharge flange	DN80	Type of installation	Wet Well installation with pedestal
Moment of inertia	0,0083 kg m²		
Motor data			
Rated voltage	400 V	Frequency	50 Hz
Rated power P2	2,95 kW	Nominal Speed	1440 1/min
Number of poles	4	Efficiency	87,8 %
Power factor	0,76	Rated current	6,4 A
Starting current	36 A	Rated torque	19,6 Nm
Starting torque	28,4 Nm	Degree of protection	IP 68
Insulation class	H	No. starts per hour	15

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Appendix C
Storage Calculations
and
Weholite Storage Tank Details

PDAS Ltd
Abbey House
282 Farnborough Road
Farnborough
Hampshire
GU14 7NA

Tel: 01256 638020

Email: info@pdasltd.co.uk

Quote Reference	Q11291
Date	03.01.2019
Project Reference	PR10757
Date	03.01.2019

Clients Name	Ashley King Developments Limited
Site Address	Crease Drove, Fincham

Storage Requirement		
Number of Dwellings	94	
Non Domestic Design Flow	0	L/sec
Domestic @ AWA Rates	5.753	m^3
Industrial 1 Hr @ Design Flow	17.000	m^3
Total Required Storage	22.753	m^3
Location of Lowest Private Manhole	0	
Invert Level of Lowest Private Manhole	-1.672	m

Notes:

Storage in Gravity Manholes

Manhole Reference	Manhole Diameter (mm)	Max Storage Level (m)	Cover Level (m)	Invert Level (m)	Storage Volume (m^3)
F9	1200	-1.672	1.400	-1.672	0.000
		-1.672			0.000
TURRET 1	1500	-1.672		-3.172	2.651
TURRET 2	1500	-1.672		-3.212	2.721
		-1.672			0.000
		-1.672			0.000
Total storage in manholes below detailed maximum storage level					**5.372**

Private Manhole Invert (m)
-1.672

Storage in Gravity Sewer Pipes

Sewer Pipe Run	Sewer Diameter (mm)	Max Storage Level (m)	Length (m)	Upper Invert (m)	Storage Volume (m^3)
T1-T2	1500	-1.672	6.000	-3.172	10.603
T2-WW	150	-1.672	8.183	-3.212	0.145
		-1.672			0.000
Total storage in sewers below detailed maximum storage level					**10.747**

Storage in Wet Well

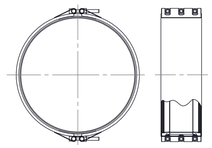
	Wet Well Diameter (mm)	Max Storage Level (m)		High Level Alarm (m)	Storage Volume (m^3)
Pump Station	2400	-1.672		-3.450	8.043
Total storage in wet well below detailed maximum storage level					**8.043**

Summary		
Manholes	5.372	m^3
Sewers	10.747	m^3
Pump Station	8.043	m^3
Total Provided	24.163	m^3
Total Required	22.753	m^3

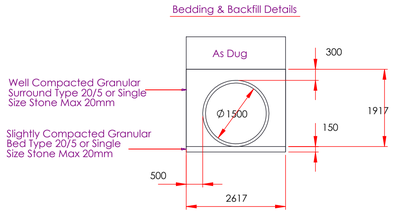
NB-H326-Crease Dove, Fincham

Flexseal Coupling

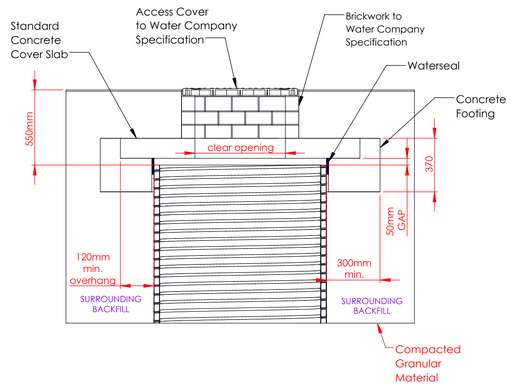
Refer to manufacturers Installation Guidelines

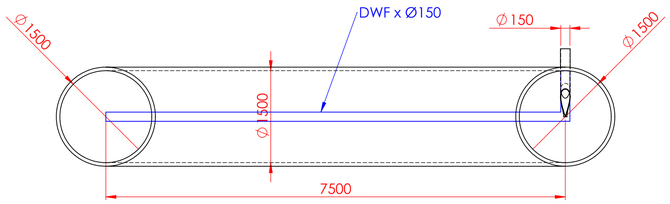


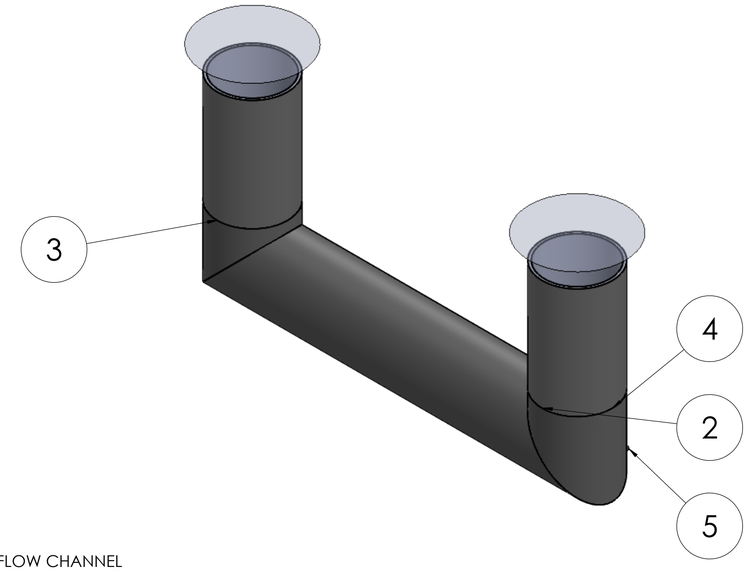
Bedding & Backfill Details

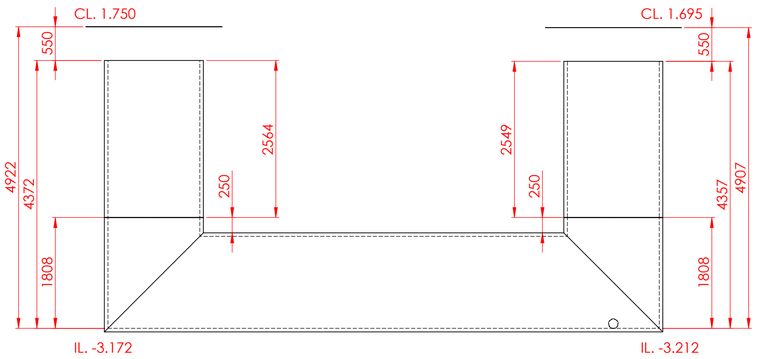


Manhole Detail

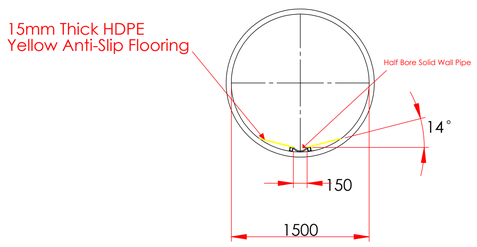








DRY WEATHER FLOW CHANNEL



2kN

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3. This drawing shall be read in conjuction with all related documentation and standard details.
4. Dimensions shall not be scaled from this drawing. All dimensions and levels to be checked and approved in writing by the contractor before manufacture.
5. All dimensions are subject to manufacturing tolerances.
6. All extrusion welding to DVS 2209.
7. Pipes become the responsibility of the contractor as offloading commences.

INSTALLATIONS GUIDELINES

Single Leg:-

1. Bedding and backfill as specified by Asset International.
2. Ensure no voids in surround under haunches.
3. Balance fill either side as fill commences.
4. Backfill in 250mm layers parrallel to structure, with correct compaction if compaction is required.
5. Care should always be taken when removing trench boxes/sheeting. Reference should be made to Design Manual for Roads and Bridges, Volume 4, Section 2, Part 5 HA 40/01 for the recommended procedure.
6. Do not allow construction equipment over the structure, without adequate protection for minimum 800mm of cover over the crown of the pipe and backfill area.
7. Pipes are subjected to a manufacturing tolerance of +/- 1% of total pipe length

Multi Leg:-

1. Bulk Excavation to formation.
2. Bedding to be specified by Asset International.
3. Asset recommends installation from interconnecting section first. Pipe placement can then commence.
4. Place line and level pipes tightening HDPE bands as you progress.
5. Commence the backfill operation starting at the interconnecting end progressing as evenly as possible along the structure.
6. Backfill as per recommending method in pipe laying section of manual.
7. Backfill of suitable material to final formation can then take place.
8. Do not allow construction equipment over the structure, without adequate protection or mininum 800mm of cover over the crown of the pipe and backfill area.
9. Pipes are subjected to a manufacturing tolerance of +/- 1% of total pipe length

Note:

Further advice can be obtained from Asset's engineering department.

RESIDUAL RISKS

1. The trench should be excavated to the specified line and levels and the contractor should take all precautions required by statutory regulations, or dictated by actual circumstances, to ensure the safety of the public and the pipe layers. The contractor should also avoid interrupting or damaging public or private utilities encountered during the course of the work.
2. Pipes should always be handled using nylon slings of the appropriate safe working load. Reference should always be made to the Health & Safety Guidelines Manual for information on deliveries and storage on site.
3. Where ground water levels are expected to be above the pipe invert, measures should be taken to maintain structural integrity and counter potential flotation.
4. Where construction traffic may impose loading, temporary or permanent measures should be taken to ensure that there is no detrimental effect on the pipe.
5. A permit to work procedure should always be in use for internal welding on site. Reference should always be made to the H&S Guidelines Manual for information.
5. Advise on site specific requirements should always be sought from Asset using the contact details below.

MODULAR FABRICATIONS

1. All dimensions are subject to manufacturing tolerances.
2. All dimensions and levels to be checked and approved in writing by the contractor before manufacture.
3. Modular Weholite panels are subject to a tolerance of +/- 15mm.

BILL OF MATERIALS

ITEM NO.	DIAMETER	DESCRIPTION	LENGTH	QTY.	End Prep
1	Ø150	DWF	8000		
2	ID 1500 (OD 1617)	Manhole	2549	1	
3	ID 1500 (OD 1617)	Manhole	2564	1	
4	ID 1500 (OD 1617)	Manifold	9616	1	
5	ID 150 (OD 160)	Stub	1110	1	

JOINTING DETAILS

Ø DIA	TYPE	QTY

Application:

REVISIONS			
REV.	DESCRIPTION	DATE	INITIALS

DELIVERY ADDRESS:	
SITE CONTACT: NUMBER:	
VEHICLE:	
DELIVERY DATE:	
PIPE SLUNG:	
AIR TESTING	
PIPE CLASS:	2kN
WELDED JOINTS:	
FLEXSEAL COUPLINGS:	
SEALED BOX SECTIONS:	
PLATED JOINTS:	

DRAWN BY	CHK'D	SCALE	PIPE CLASS	DATE
IN	IN	1:50	2kN	14/01/2019

TITLE: NB-H326-Crease Dove, Fincham

CLIENT:

WEHOLITE

ASSET INTERNATIONAL LTD
WATER MANAGEMENT SOLUTIONS

Stepehnson Street, Newport, South Wales, NP19 4XH

Web Site: www.weholite.co.uk Email: sales@weholite.co.uk
Tel: 01633 271906 Fax: 01633 290519

SHEET NUMBER: 1 OF 1

DWG NO: NB-H326-Crease Dove, Fincham REV:

DATE PRINTED: 14 January 2019

Paul Warner

From: George Boden <george@inspiredesigngroup.co.uk>
Sent: 05 December 2018 14:07
To: Paul Warner
Cc: barrie.gibson@ashwoodhomes.co; Craig Russell
Subject: FW: Crease Drove, Fincham Pumping Station

Hi Paul,

Please see below response from AW.

Kind Regards

George



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From: Manyumba Future [mailto:fManyumba2@anglianwater.co.uk]
Sent: 05 December 2018 14:01
To: George Boden
Subject: RE: Crease Drove, Fincham Pumping Station

Hi George,

The extra storage should be included in the onsite pumping station without producing a complex design of the onsite pumping station. Anglian water will install an inhibit system to attenuate flows during a storm event. This may happen during the construction of the pumping station or could be done at a future date.

We recommend a volume of between 12 and 24hrs at DWF. The actual volume as suggested above has to be something that can be easily accommodated in the main pumping station.

Hope this clarifies the issues raised.

Regards,

Future Manyumba
Pre-Development Senior Engineer
Developer Services

Anglian Water Services Limited
Thorpe Wood House, Thorpe Wood,
Peterborough, Cambridgeshire, PE3 6WT
Phone: 0345 60 66 087, Option 1



https://inflow.anglianwater.co.uk

From: George Boden [mailto:george@inspiredesigngroup.co.uk]
Sent: 04 December 2018 11:03
To: Manyumba Future
Subject: FW: Crease Drove, Fincham Pumping Station

EXTERNAL MAIL - Please be aware this mail is from an external sender - THINK BEFORE YOU CLICK

Hi Future,

Please see email below. Can you clarify?

Kind Regards

George

inspire DESIGN & DEVELOPMENT
www.inspiredesigngroup.co.uk
George Boden
Technician
01246 864467
George@inspiredesigngroup.co.uk
Unit 2A / Church View Business Park / Coney Green Road / Clay Cross / Chesterfield / S45 9HA

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From: Paul Warner [mailto:paul.warner@pdasltd.co.uk]
Sent: 04 December 2018 10:58
To: George Boden
Cc: Craig Russell; barrie.gibson@ashwoodhomes.co
Subject: RE: Crease Drove, Fincham Pumping Station

George

Are they requesting an inhibit system ?.

They normally request this additional storage when they have such a system otherwise there is no point in having the additional storage as it will pump and overwhelm the system whatever

I can do the calculation but the storage volume is normally something AW provide in this sort of scenario

It would be worth you clarifying this with them further

Regards

Paul Warner
Technical Director

Pump Design and Services Ltd
Unit 7 Stanhope Gate
Stanhope Road
Camberley
Surrey
GU15 3DW

Tel: 01483 930520 DD: 01483 930514 Mobile: 07747 513984
Email: paul.warner@pdasltd.co.uk
Website: www.pdasltd.co.uk

Registered office: 33 Grove End Road, Farnham, Surrey, GU9 8RD. Company Registration Number 9075338

From: George Boden <george@inspiredesigngroup.co.uk>
Sent: 04 December 2018 10:52
To: Paul Warner <paul.warner@pdasltd.co.uk>
Cc: Craig Russell <craig@inspiredesigngroup.co.uk>; barrie.gibson@ashwoodhomes.co
Subject: Crease Drove, Fincham Pumping Station

Hi Paul,

Anglian Water have said there is insufficient capacity in the existing sewer to accommodate flows from the site.

However, I have spoken with AW and they will accept the flow if we show additional storage (on top of the emergency storage) within the pumping station. They would like to see extra storage for half a day - 24 hour time period. They would like to see the difference between the emergency storage (Calculations you've already done) & how much extra storage is needed.

We need this ASAP so please could you give us a timescale of completion of the extra storage volume.

Kind Regards

George

George Boden
Technician
01246 864467
George@inspiredesigngroup.co.uk
www.inspiredesigngroup.co.uk
Unit 2A / Church View Business Park / Coney Green Road / Clay Cross / Chesterfield / S45 9HA

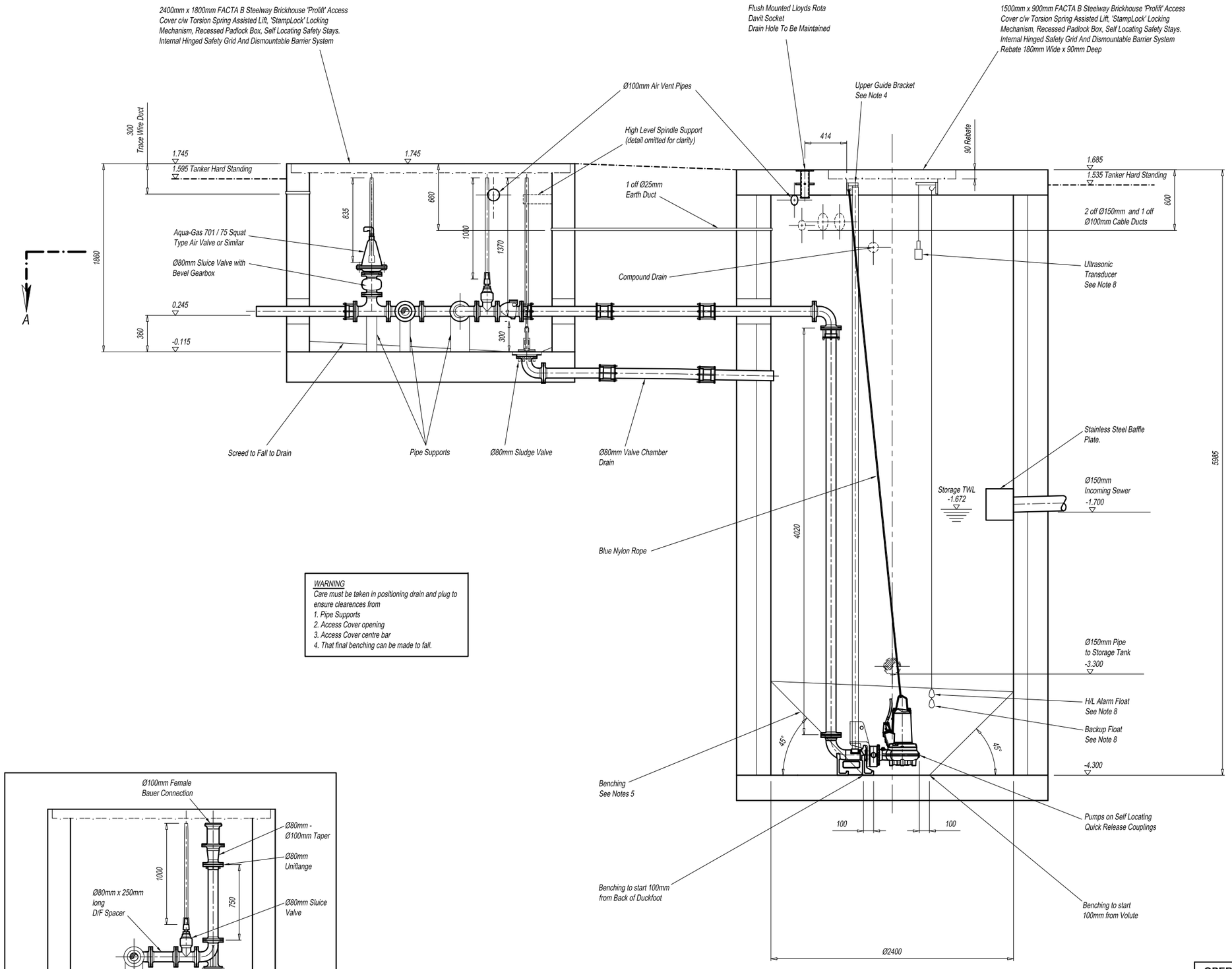
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Appendix D
Pump Station Drawings



WARNING
Care must be taken in positioning drain and plug to ensure clearences from
1. *Pipe Supports*
2. *Access Cover opening*
3. *Access Cover centre bar*
4. *That final benching can be made to fall.*

VIEW ON OVERPUMPING

VIEW ON SECTION B - B

NOTES

1. DO NOT SCALE.
2. UNLESS OTHERWISE STATED ALL DIMENSIONS ARE IN MILLIMETRES AND ALL INVERTS IN METRES AOD.
3. ALL CIVIL WORKS IS THE RESPONSIBILITY OF THE DEVELOPER OR CONTRACTOR INCLUDING FIXING OF STEELWORK SUCH AS ACCESS COVERS AND PENSTOCKS ETC. INSTALLATION OF CABLE DUCTS, BENCHING AND MAKING GOOD AROUND PIPES AFTER INSTALLATION.
4. REINFORCING BARS ARE TO BE A MINIMUM OF 75MM BELOW THE SURFACE. ANY STRUCTURAL DETAILING / CIVIL WORKS SHOWN SHOWN ON THIS DRAWING ARE ILLUSTRATIVE ONLY UNLESS OTHERWISE STATED AND SHOULD NOT BE USED FOR CONSTRUCTION.
5. BENCHING IS TO BE FORMED AFTER PUMP INSTALLATION AND TO BE IN ACCORDANCE WITH THE APPLICABLE SEWERS FOR ADOPTION AND ADOPTING AUTHORITY SPECIFICATION.
6. UNLESS OTHERWISE STATED, ALL DUCTS ARE TO BE Ø100MM AND BE COMPLETE WITH DRAW ROPES. SERVICE DUCTS TO BE TO THE UTILITY SUPPLIERS SPECIFICATION.
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8. LEVEL CONTROL POSITIONS ARE SHOWN DIAGRAMMATICALLY ONLY. THEY WILL BE POSITIONED AWAY FROM OBSTRUCTIONS AND BE READILY ADJUSTABLE AFTER INSTALLATION.

STATION INFORMATION

PUMP TYPE	SULZER	XFP80C VX.2
IMPELLER		196
MOTOR RATING		2.95 k.W.
FULL LOAD CURRENT		6.4 A FLC
ZONE RATING		EXP
DUTY FLOW		3.80 L/Sec
HEAD GENERATED		8.03m
LEVEL CONTROLS		PULSAR ULTRALITE ULTRASONIC C/C HIGH LEVEL ALARM AND BACK UP FLOAT SWITCHES
PIPE / VALVE SIZE		Ø80mm
FINAL DISCHARGE		
INTERNAL DIAMETER		Ø80mm
MATERIAL		DUCTILE IRON
TERMINATION		PLAIN ENDED
PIPE OD		Ø98mm
FLANGE DATA		N/A
RISING MAIN		BLACK 90mm OD PE100 SDR17 (78.7mm BORE)
RISING MAIN COUPLER		BY OTHERS

REV	DATE	DESCRIPTION	DR'n	CHK'd	APR'l
B	03/01/19	Levels and depth of Wet Well amended.	L.C.	-	P.W.
A	02/01/19	Ø150mm pipe to storage tank added. Wet well depth, levels & head generated amended.	E.W.	P.W.	P.W.

FOR APPROVAL

OPERATING LEVELS

MAXIMUM STORAGE LEVEL	-1.672
LOWEST INLET	-1.700
HIGH LEVEL ALARM	-3.450
STANDBY PUMP START	-3.550
DUTY PUMP START	-3.650
PUMP STOP	-4.000
WET WELL BASE	-4.300

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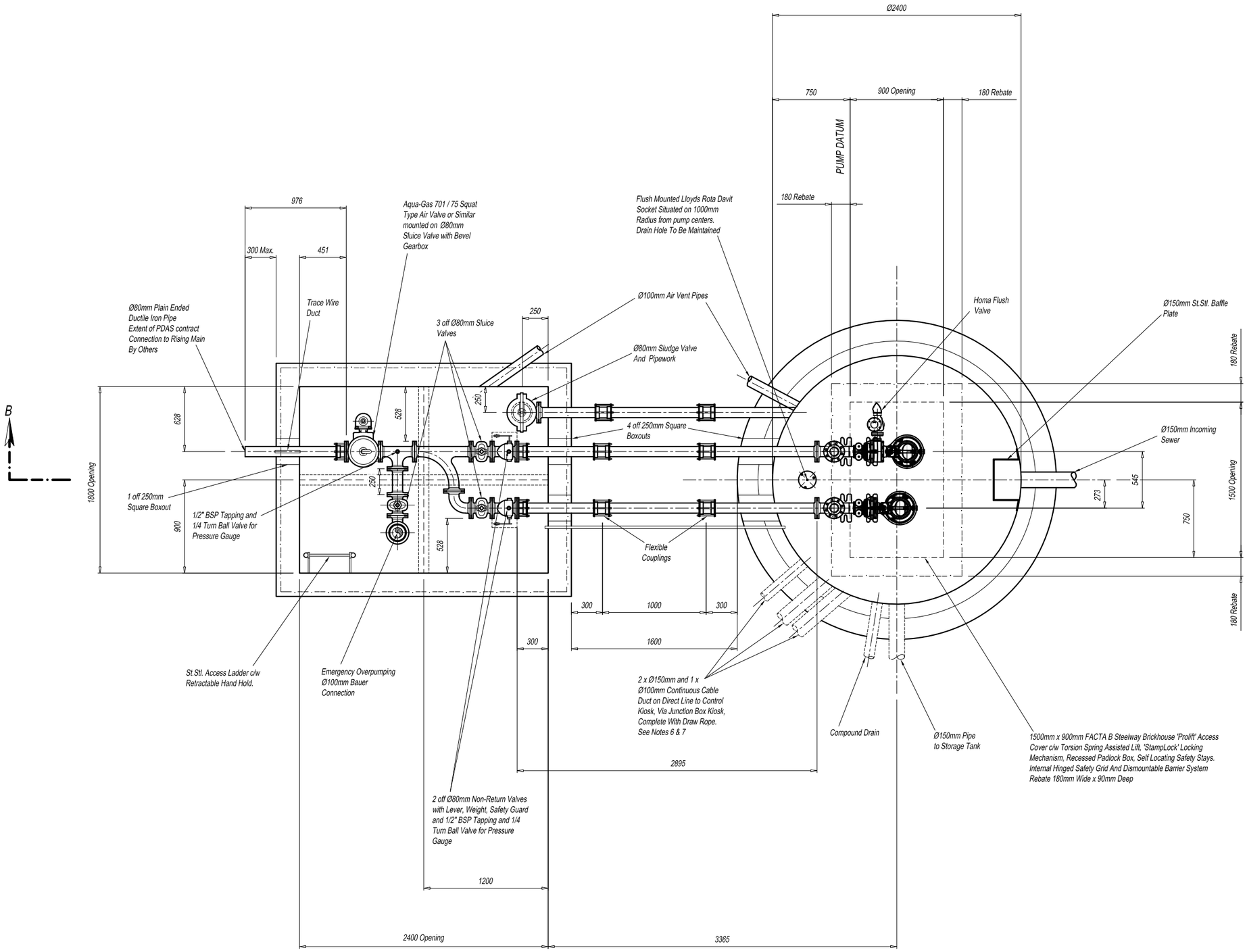
PROJECT: CREASE DROVE FINCHAM

TITLE: FOUL WATER PUMP STATION ELEVATION VIEW

CLIENT: ASHLEY KING DEVELOPMENTS

SCALE AT A1	1:20	SCALE AT A3	1:40
QUOTE NUMBER	Q11291	APR'l P.W.	DATE 15-11-2018
PROJECT REF.	PR10757	CHK'd L.C.	DATE 15-11-2018
DRAWING NUMBER	PR10757 - 001	DR'n L.C.	DATE 15-11-2018

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VIEW ON SECTION A - A

NOTES

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REV	DATE	DESCRIPTION	DR'n	CHK'd	APR'l
A	02/01/19	Ø150mm pipe to storage tank added.	E.W.	P.W.	P.W.

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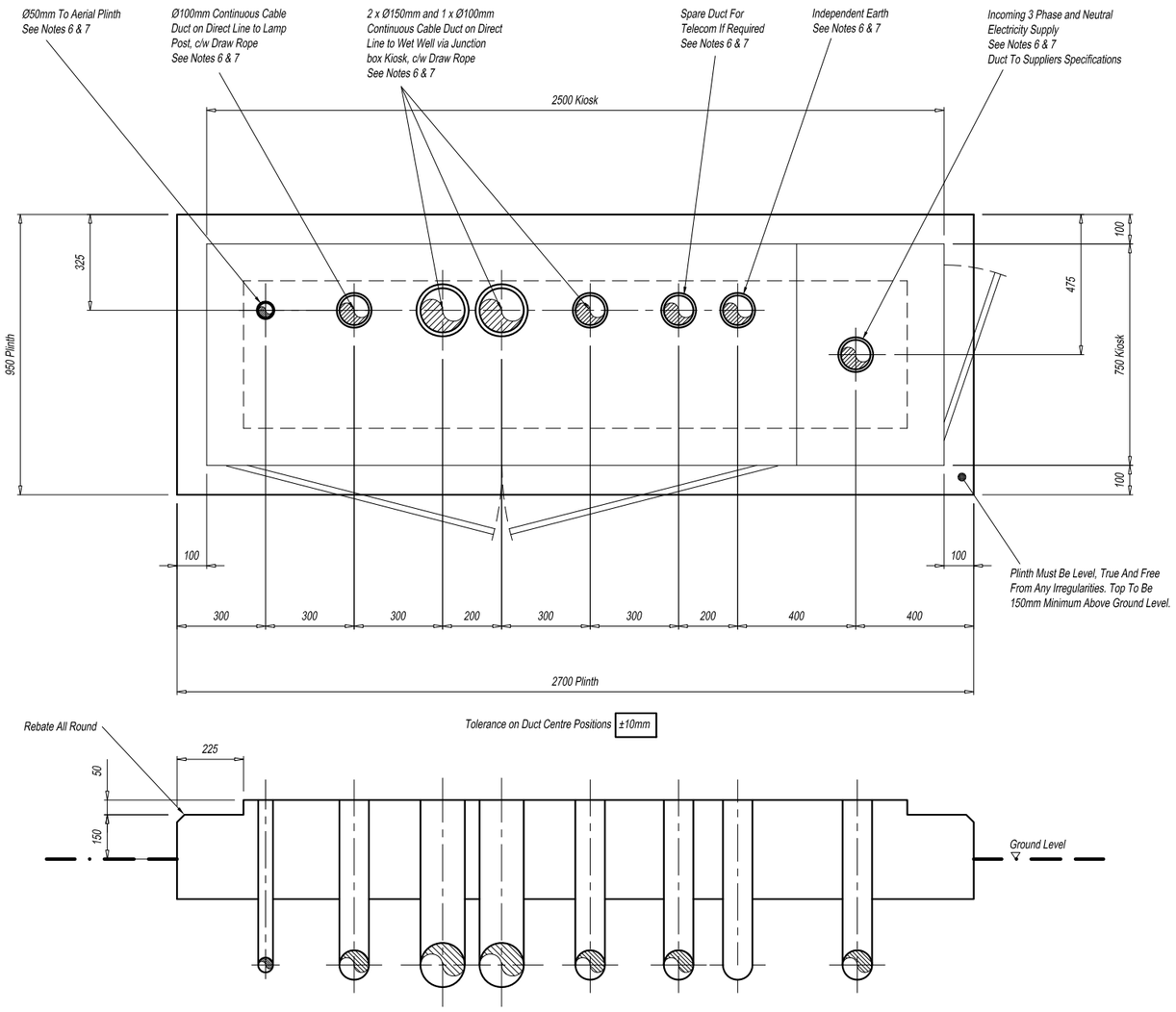
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OFFICE TEL No. (01483) 930520
WEBSITE WWW.PDASLTD.CO.UK

PROJECT	CREASE DROVE FINCHAM
TITLE	FOUL WATER PUMP STATION PLAN VIEW
CLIENT	ASHLEY KING DEVELOPMENTS
SCALE AT A1	1:20
SCALE AT A3	1:40
QUOTE NUMBER	Q11291
APR'l	P.W.
DATE	15-11-2018
PROJECT REF.	PR10757
CHK'd	L.C.
DATE	15-11-2018
DRAWING NUMBER	PR10757 - 002
DR'n	L.C.
DATE	15-11-2018

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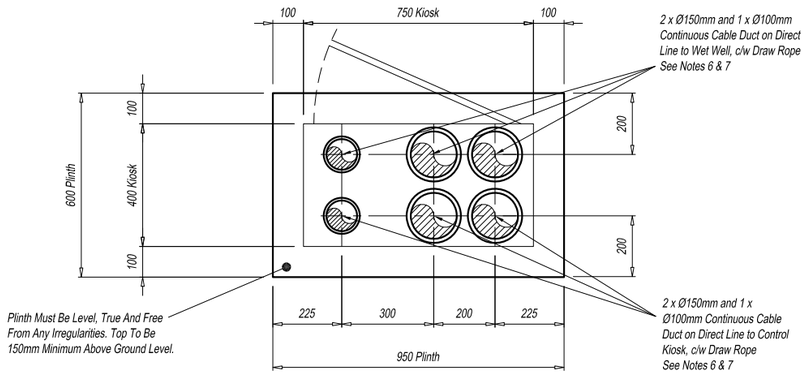
CONTROL KIOSK PLINTH DETAIL

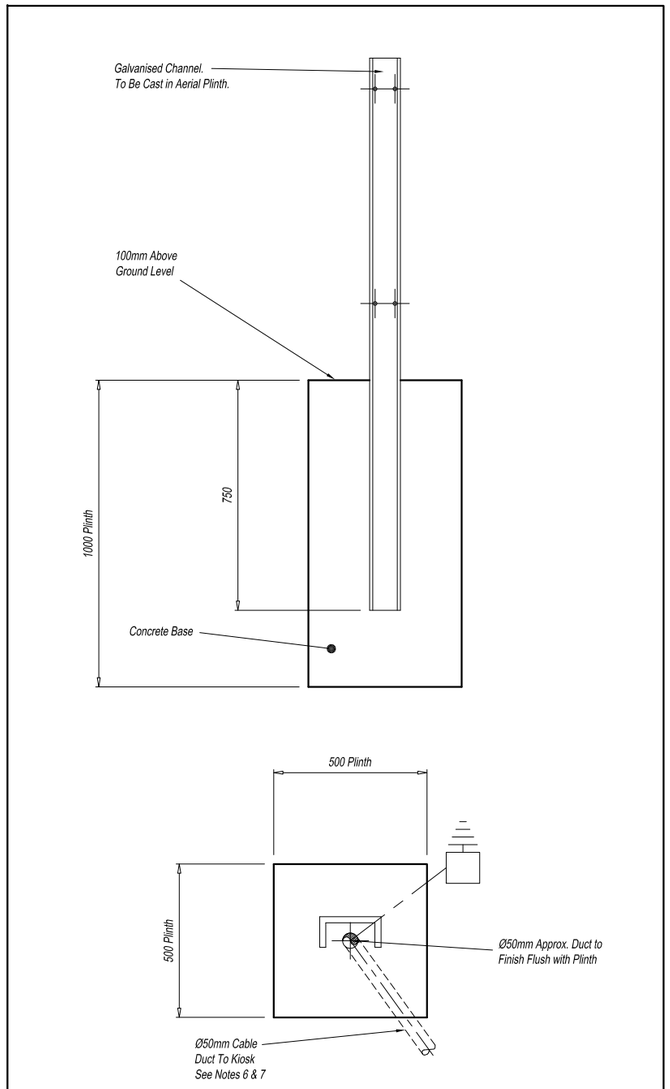
Kiosk Dimensions
1750mm High x 2500mm Wide x 750mm Deep



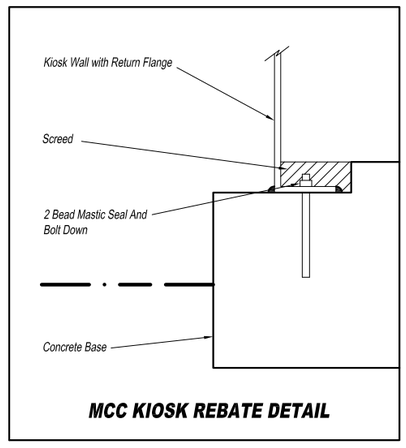
JUNCTION BOX KIOSK PLINTH DETAIL

Kiosk Dimensions
1250mm High x 750mm Wide x 400mm Deep





AERIAL PLINTH DETAIL



MCC KIOSK REBATE DETAIL

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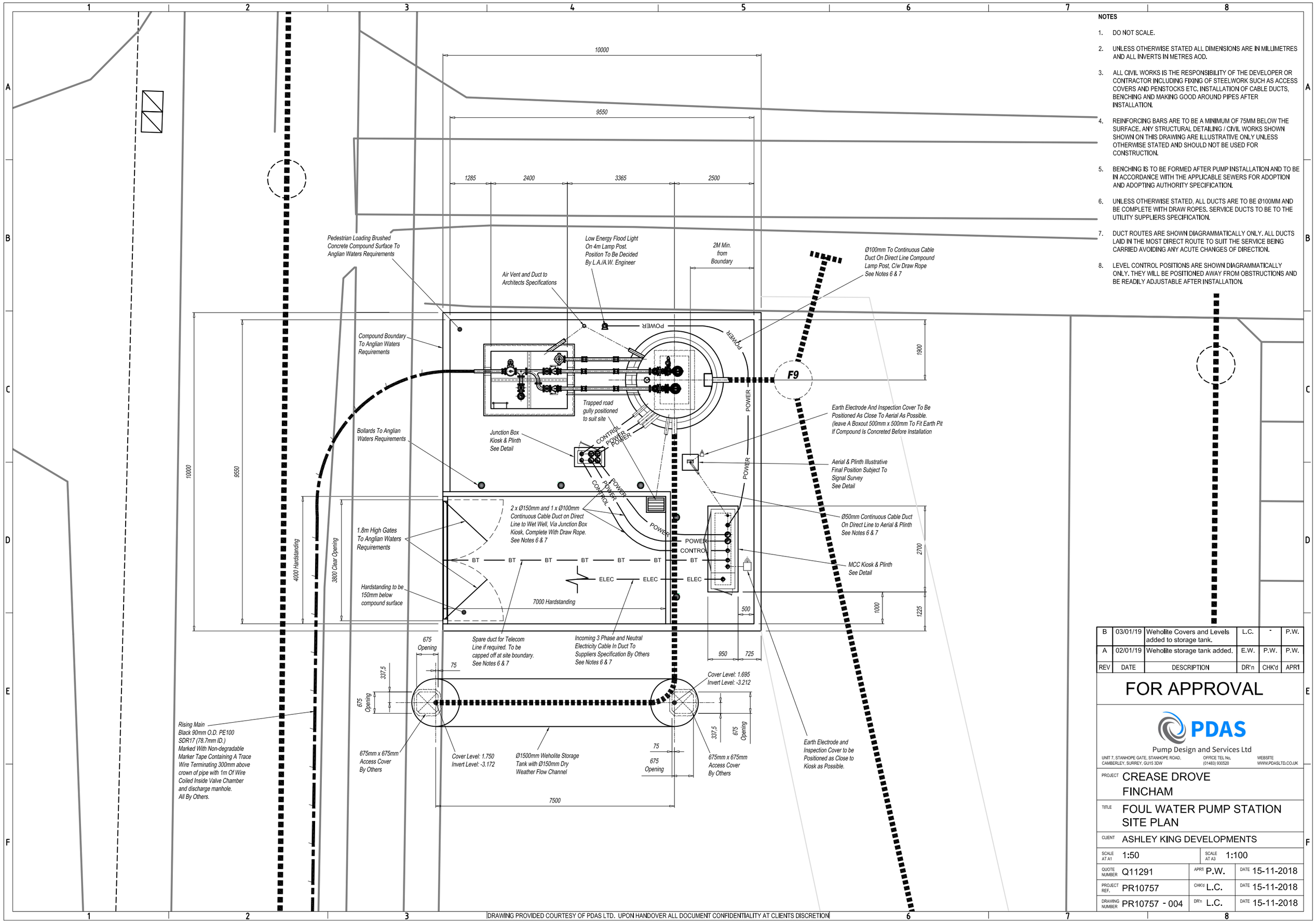
REV	DATE	DESCRIPTION	DR'n	CHK'd	APR'd

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PROJECT	CREASE DROVE FINCHAM
TITLE	FOUL WATER PUMP STATION KIOSK AND PLINTH DETAIL
CLIENT	ASHLEY KING DEVELOPMENTS
SCALE AT A1	1:10
SCALE AT A3	1:20
QUOTE NUMBER	Q11291
APR'd	P.W.
DATE	15-11-2018
PROJECT REF.	PR10757
CHK'd	L.C.
DATE	15-11-2018
DRAWING NUMBER	PR10757 - 003
DR'n	L.C.
DATE	15-11-2018

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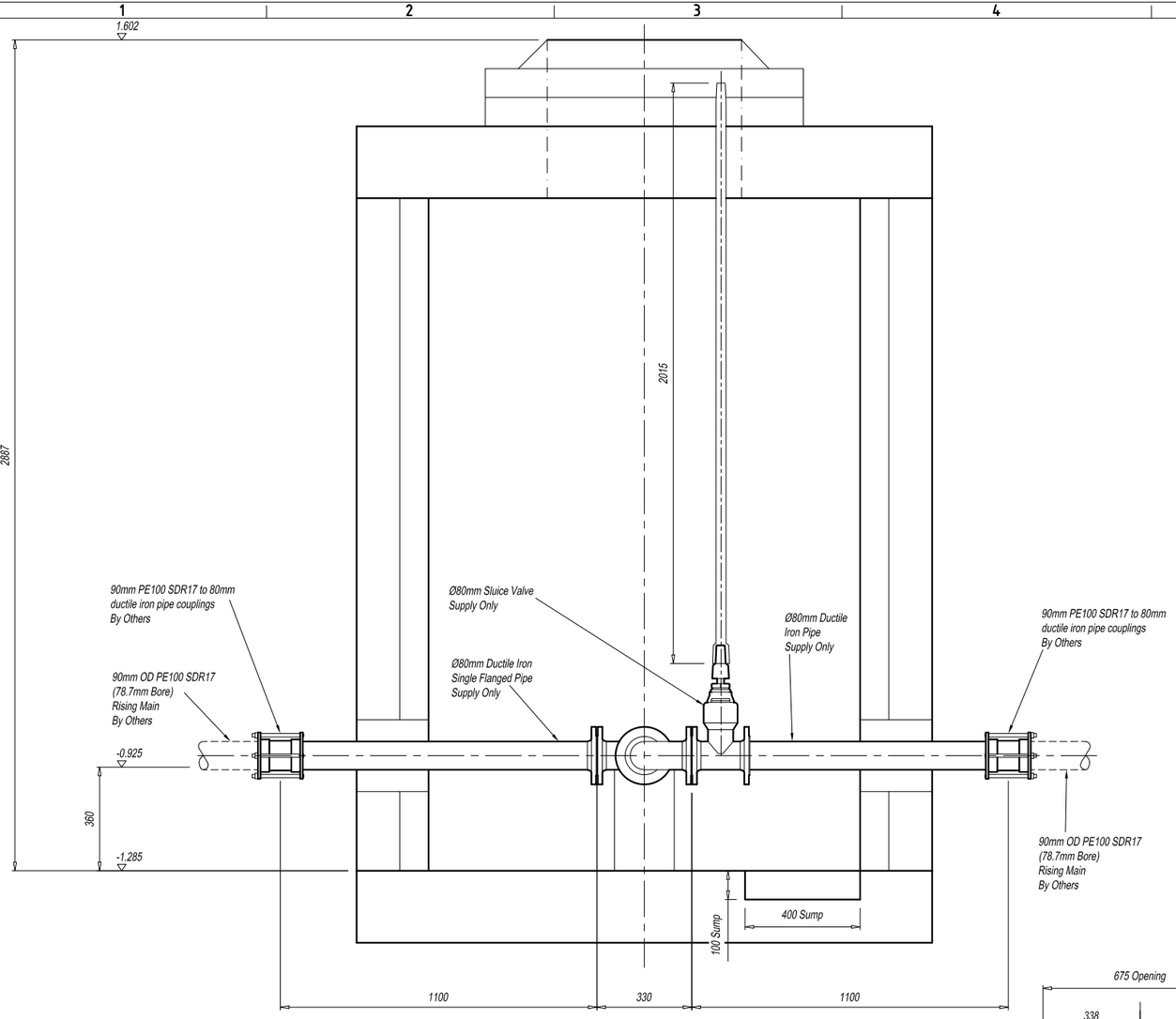
REV	DATE	DESCRIPTION	DR'n	CHK'd	APR'l
B	03/01/19	Weholite Covers and Levels added to storage tank.	L.C.	-	P.W.
A	02/01/19	Weholite storage tank added.	E.W.	P.W.	P.W.

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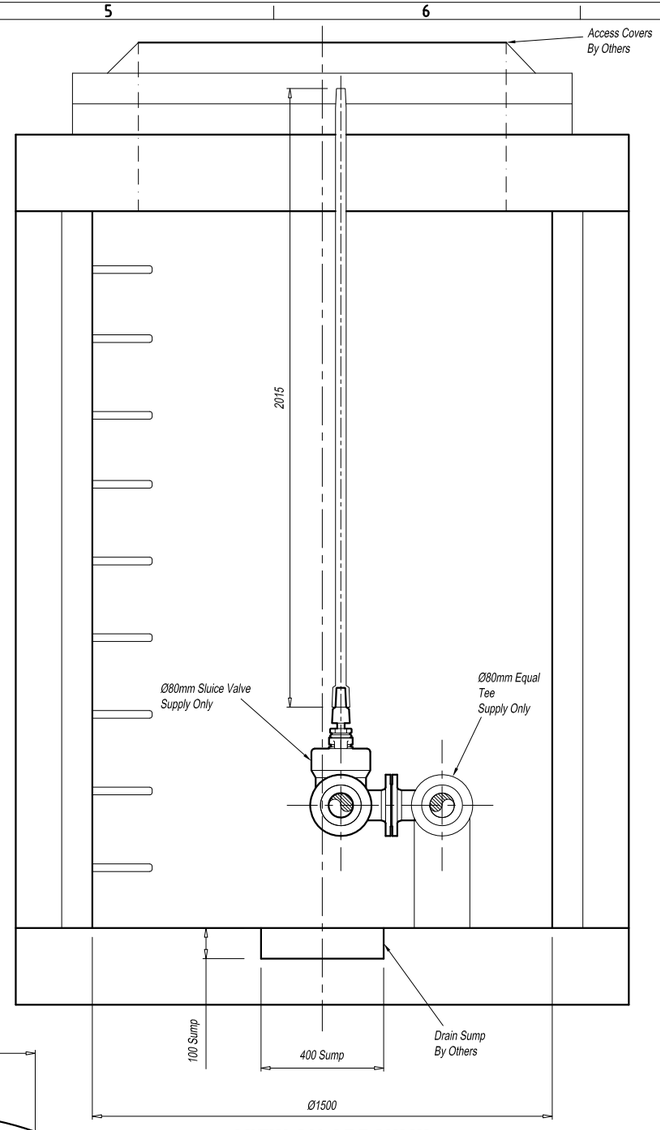
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WEBSITE WWW.PDASLTD.CO.UK

PROJECT	CREASE DROVE FINCHAM
TITLE	FOUL WATER PUMP STATION SITE PLAN
CLIENT	ASHLEY KING DEVELOPMENTS
SCALE AT A1	1:50
SCALE AT A3	1:100
QUOTE NUMBER	Q11291
APR'l	P.W.
DATE	15-11-2018
PROJECT REF.	PR10757
CHK'd	L.C.
DATE	15-11-2018
DRAWING NUMBER	PR10757 - 004
DR'n	L.C.
DATE	15-11-2018

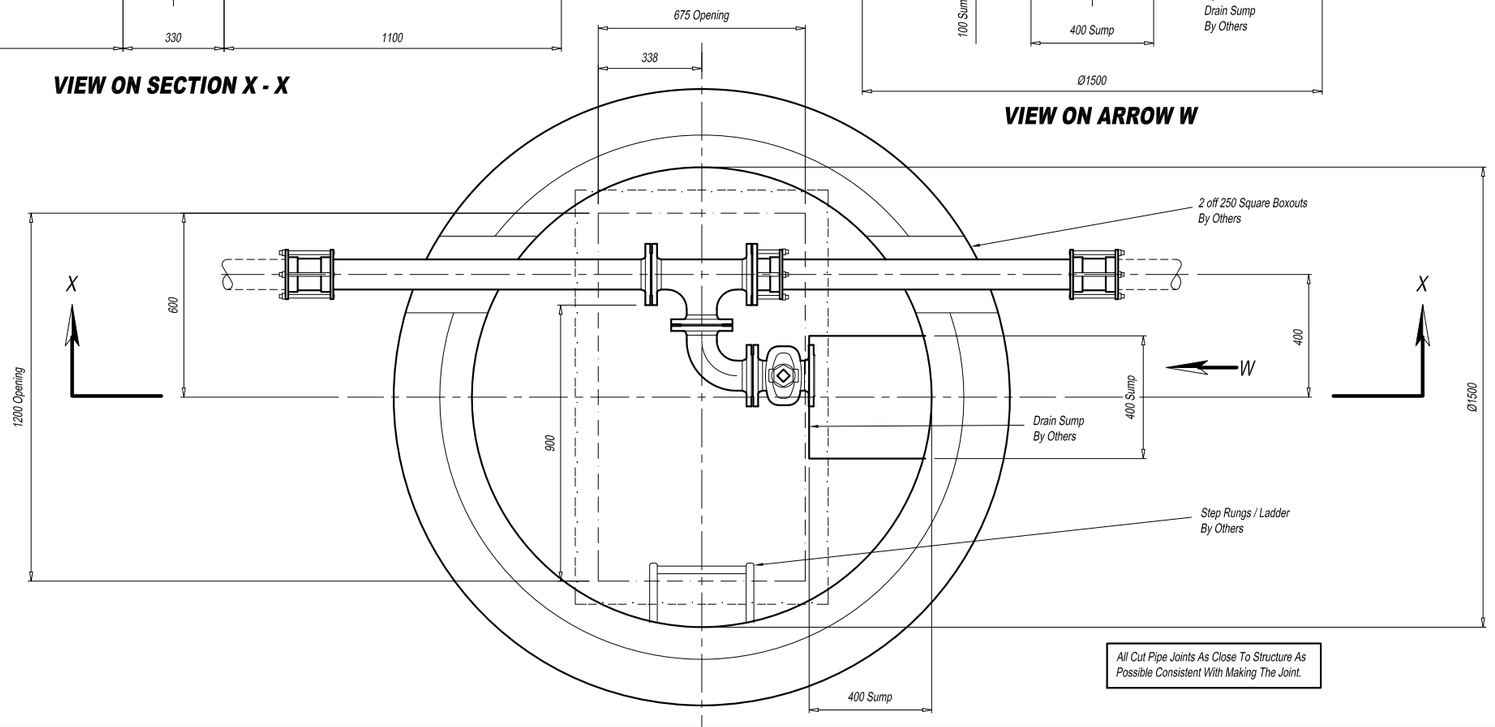
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VIEW ON SECTION X - X



VIEW ON ARROW W



All Cut Pipe Joints As Close To Structure As Possible Consistent With Making The Joint.

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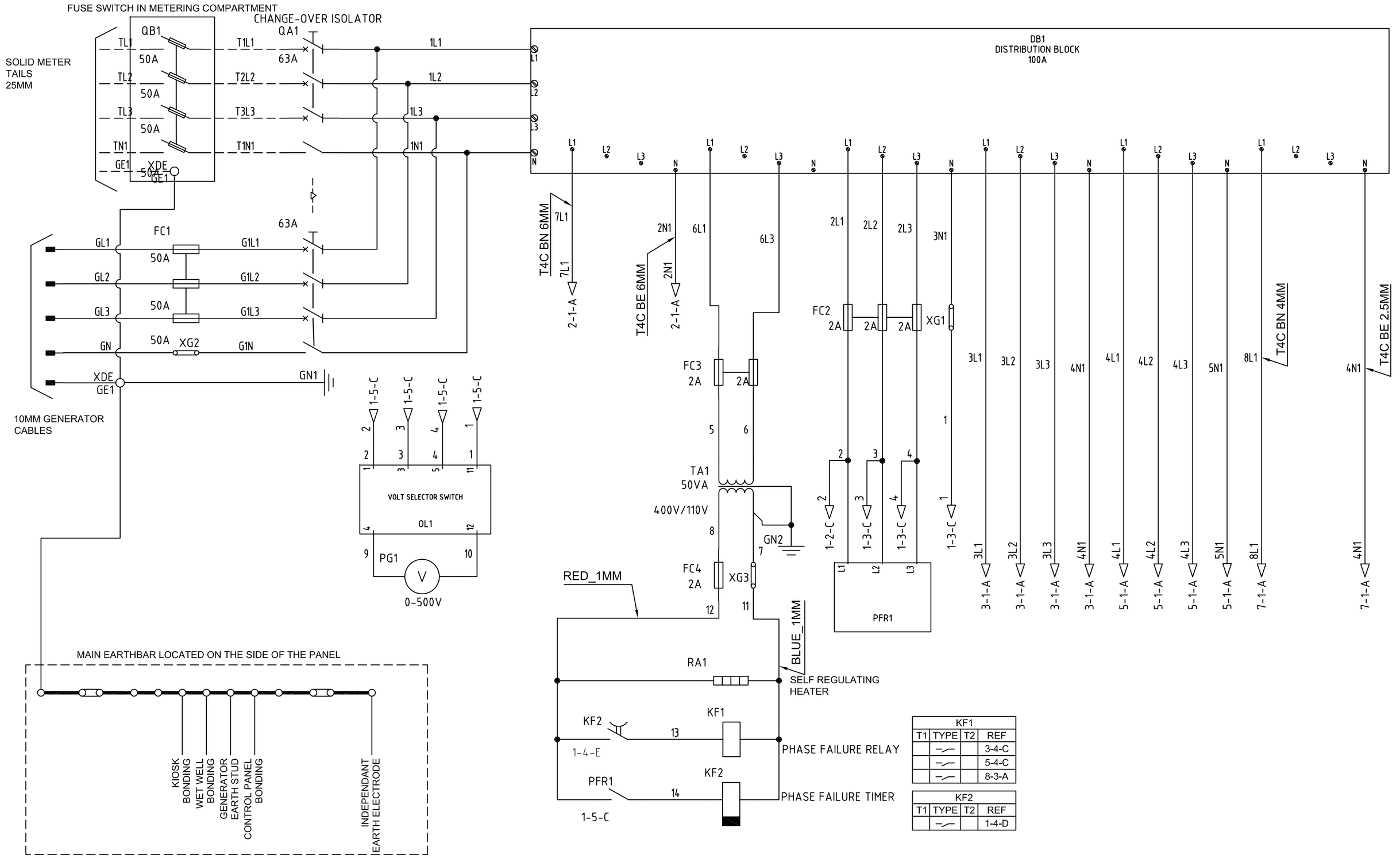
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PROJECT	CREASE DROVE FINCHAM
TITLE	FOUL WATER PUMP STATION WASHOUT CHAMBER AT CHAINAGE 50M
CLIENT	ASHLEY KING DEVELOPMENTS

SCALE AT A1	1:10	SCALE AT A3	1:20		
QUOTE NUMBER	Q11291	APR'l	P.W.	DATE	15-11-2018
PROJECT REF.	PR10757	CHK'd	L.C.	DATE	15-11-2018
DRAWING NUMBER	PR10757 - 005	DR'n	L.C.	DATE	15-11-2018

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Appendix E
Wiring Diagrams



KF1			
T1	TYPE	T2	REF
	—/—		3-4-C
	—/—		5-4-C
	—/—		8-3-A

KF2			
T1	TYPE	T2	REF
	—/—		1-4-D

Rev	Description	Date	Drn	Apprv
C	RCD ID	11/01/19	JH	SH
B	INHIBIT CIRCUIT (GATEWAY)	02/01/18	JH	MP
A	FIRST ISSUE	14/11/18	JH	MP

Client Name
Ashley King Developments Limited

Title SFA6 & ANGLIAN WATER SPEC DUAL DOL CONTROL PANEL

Drawn By JH

Project Code PR10757

Drawing No PR10757

gemini control systems ltd
designers and manufacturers

GEMINI CONTROL SYSTEMS LTD
TEL: 0844 800 4250
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WWW.GEMINI-CONTROLS.COM

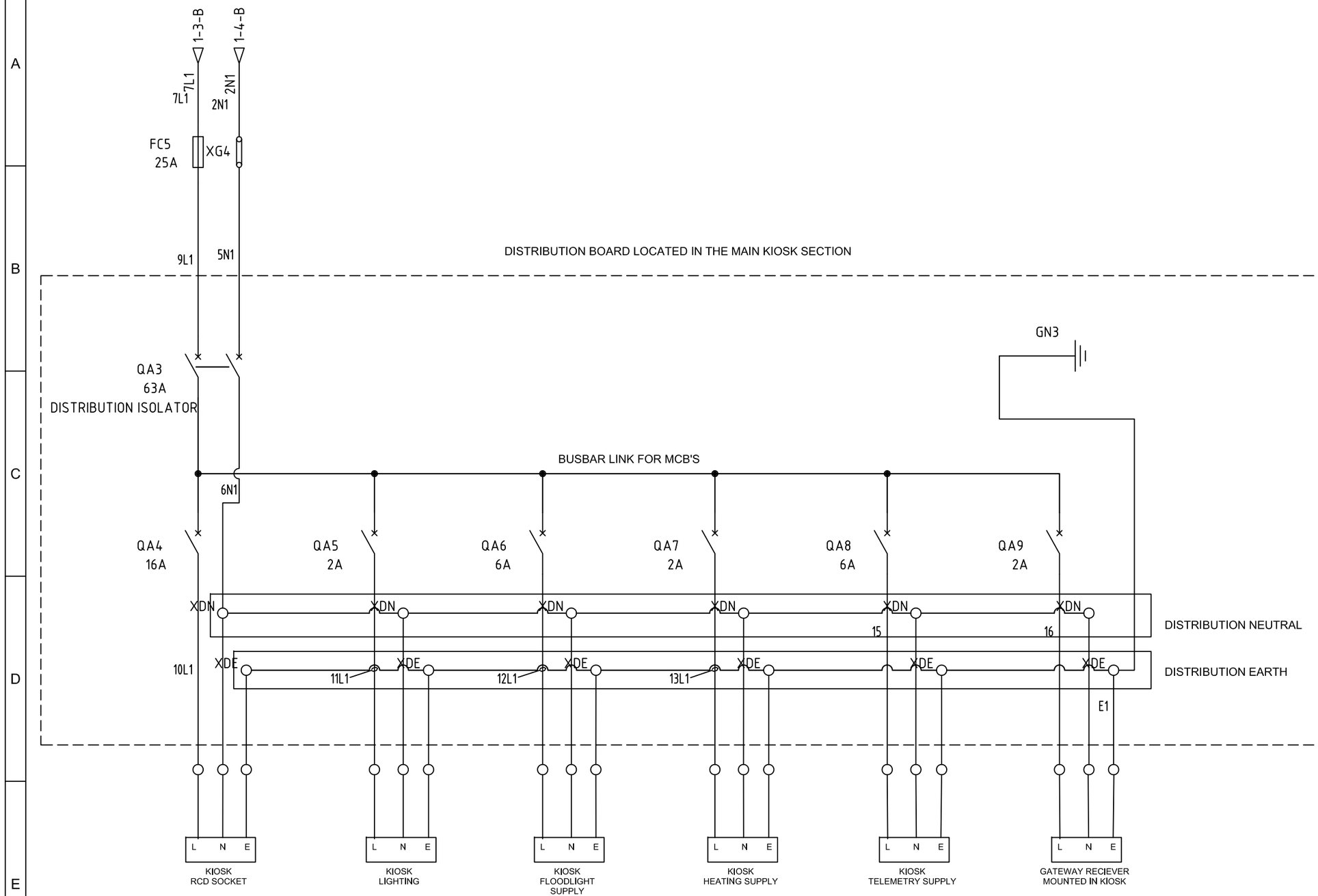
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A	FIRST ISSUE	14/11/18	JH	MP

Client Name
Ashley King Developments Limited

Title SFA6 & ANGLIAN WATER SPEC
DUAL DOL CONTROL PANEL

Drawn By
JH

Project Code
PR10757

Drawing No PR10757

gemini control systems ltd
designers and manufacturers

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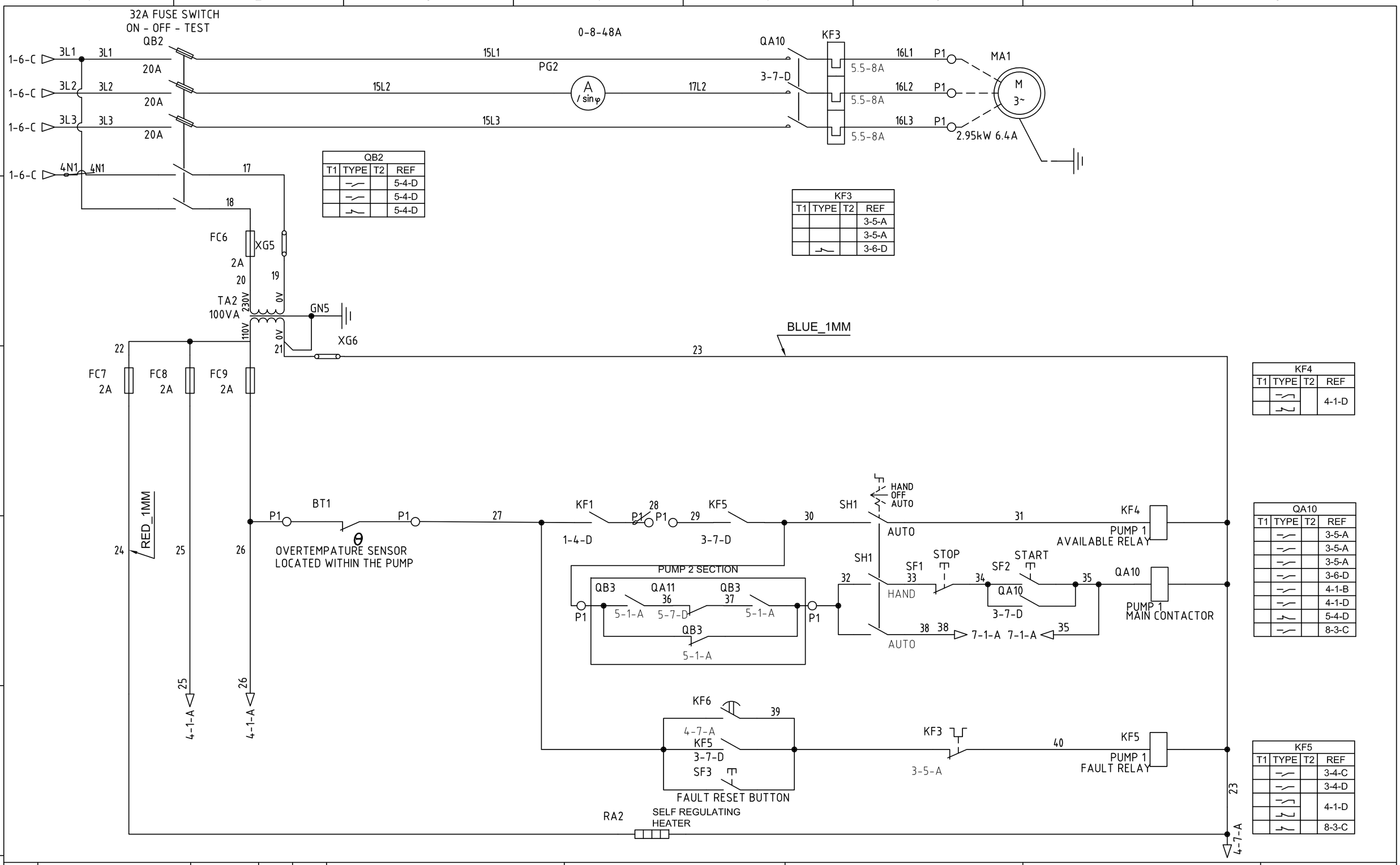
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QB2			
T1	TYPE	T2	REF
			5-4-D
			5-4-D
			5-4-D

KF3			
T1	TYPE	T2	REF
			3-5-A
			3-5-A
			3-6-D

KF4			
T1	TYPE	T2	REF
			4-1-D

QA10			
T1	TYPE	T2	REF
			3-5-A
			3-5-A
			3-5-A
			3-6-D
			4-1-B
			4-1-D
			5-4-D
			8-3-C

KF5			
T1	TYPE	T2	REF
			3-4-C
			3-4-D
			4-1-D
			8-3-C

Rev	Description	Date	Drn	Apprv
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B	INHIBIT CIRCUIT (GATEWAY)	02/01/18	JH	MP
A	FIRST ISSUE	14/11/18	JH	MP

Client Name
Ashley King Developments Limited

Title DUAL DOL CONTROL PANEL
SFA6 & ANGLIAN WATER SPEC

Drawn By: JH

Project Code: PR10757

Drawing No PR10757

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designers and manufacturers

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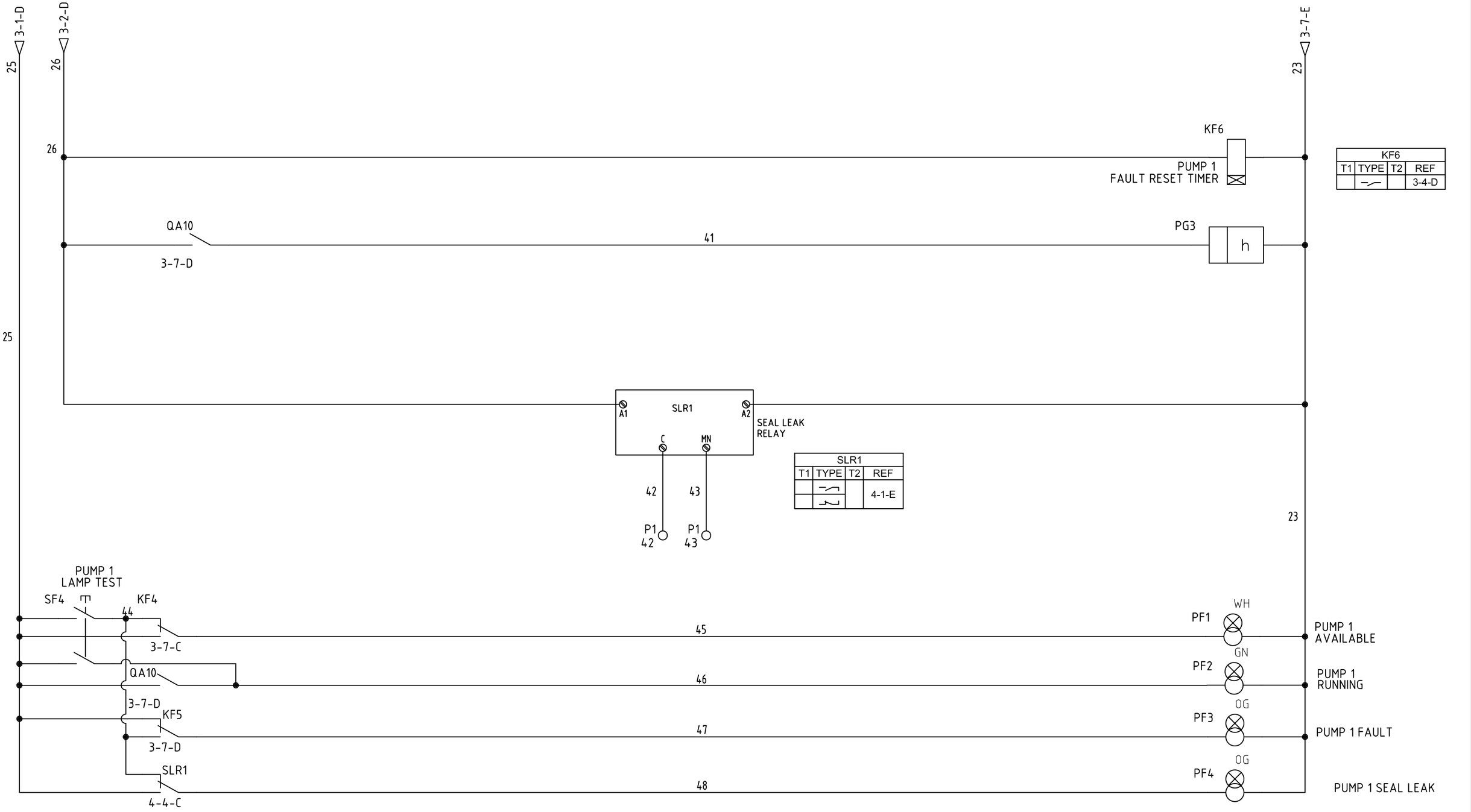
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A	FIRST ISSUE	14/11/18	JH	MP

Client Name
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Title SFA6 & ANGLIAN WATER SPEC
DUAL DOL CONTROL PANEL

Drawn By
JH

Project Code
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Drawing No PR10757

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designers and manufacturers

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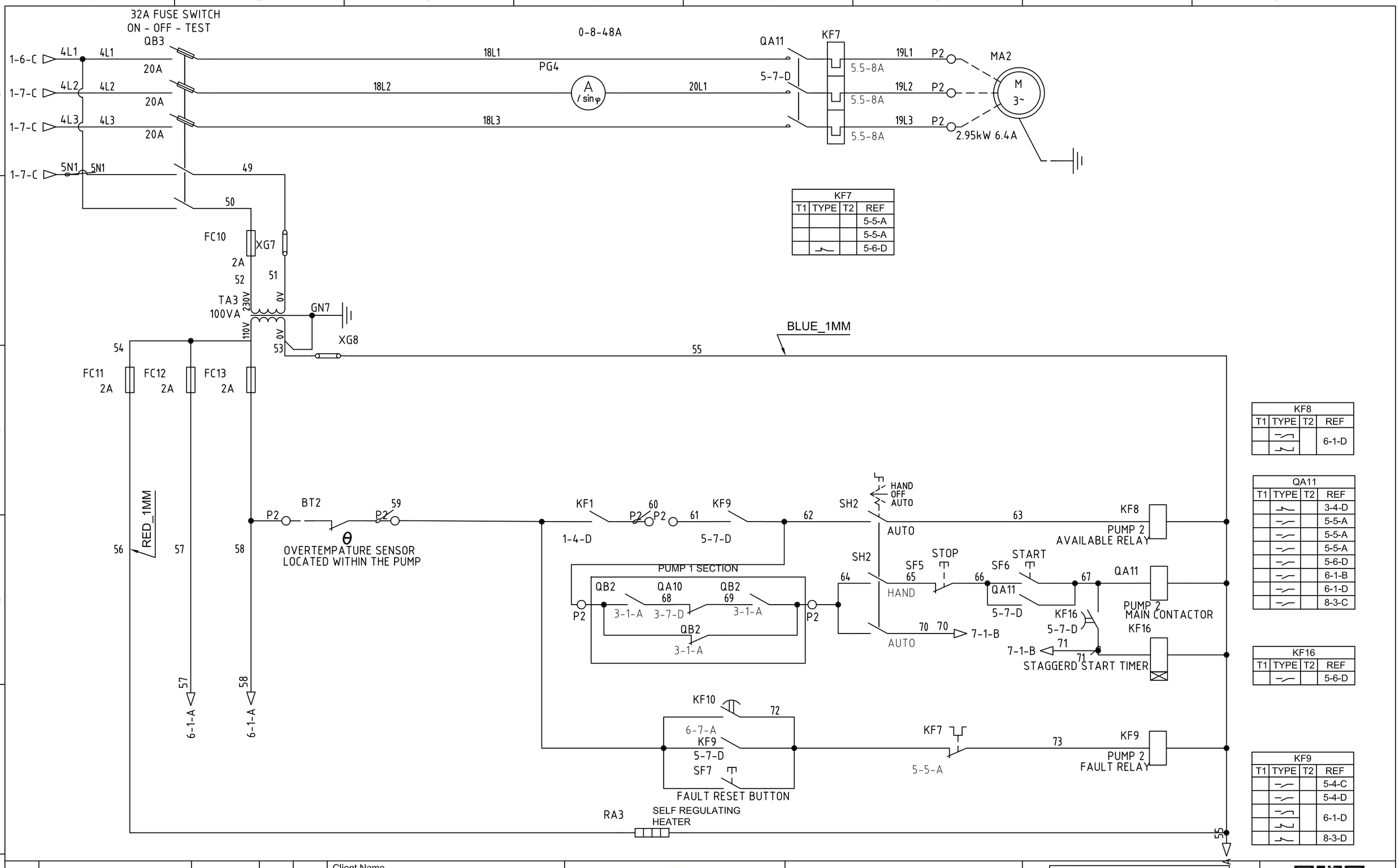
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KF7			
T1	TYPE	T2	REF
			5-5-A
			5-5-A
			5-6-D

KF8			
T1	TYPE	T2	REF
			6-1-D

QA11			
T1	TYPE	T2	REF
			3-4-D
			5-5-A
			5-5-A
			5-5-A
			5-6-D
			6-1-B
			6-1-D
			8-3-C

KF16			
T1	TYPE	T2	REF
			5-6-D

KF9			
T1	TYPE	T2	REF
			5-4-C
			5-4-D
			6-1-D
			8-3-D

Rev	Description	Date	Drn	Apprv
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A	FIRST ISSUE	14/11/18	JH	MP

Client Name
Ashley King Developments Limited

Title SFA6 & ANGLIAN WATER SPEC
DUAL DOL CONTROL PANEL

Drawn By: JH

Project Code: PR10757

Drawing No PR10757

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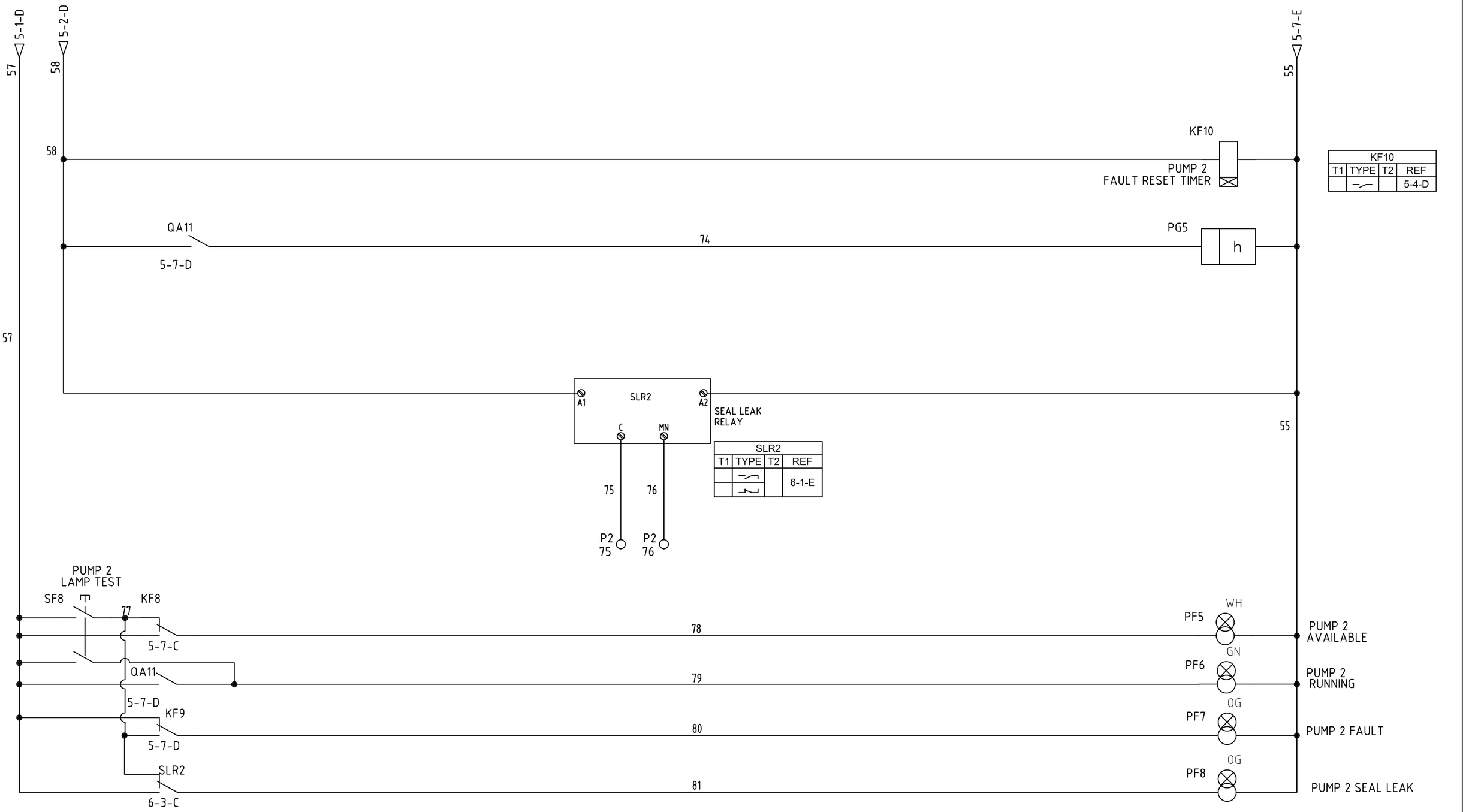
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B	INHIBIT CIRCUIT (GATEWAY)	02/01/18	JH	MP
A	FIRST ISSUE	14/11/18	JH	MP

Client Name
Ashley King Developments Limited

Title SFA6 & ANGLIAN WATER SPEC
DUAL DOL CONTROL PANEL

Drawn By
JH

Project Code
PR10757

Drawing No PR10757

gemini control systems ltd
designers and manufacturers

GEMINI CONTROL SYSTEMS LTD
TEL: 0844 800 4250
FAX: 0844 800 4251
WWW.GEMINI-CONTROLS.COM

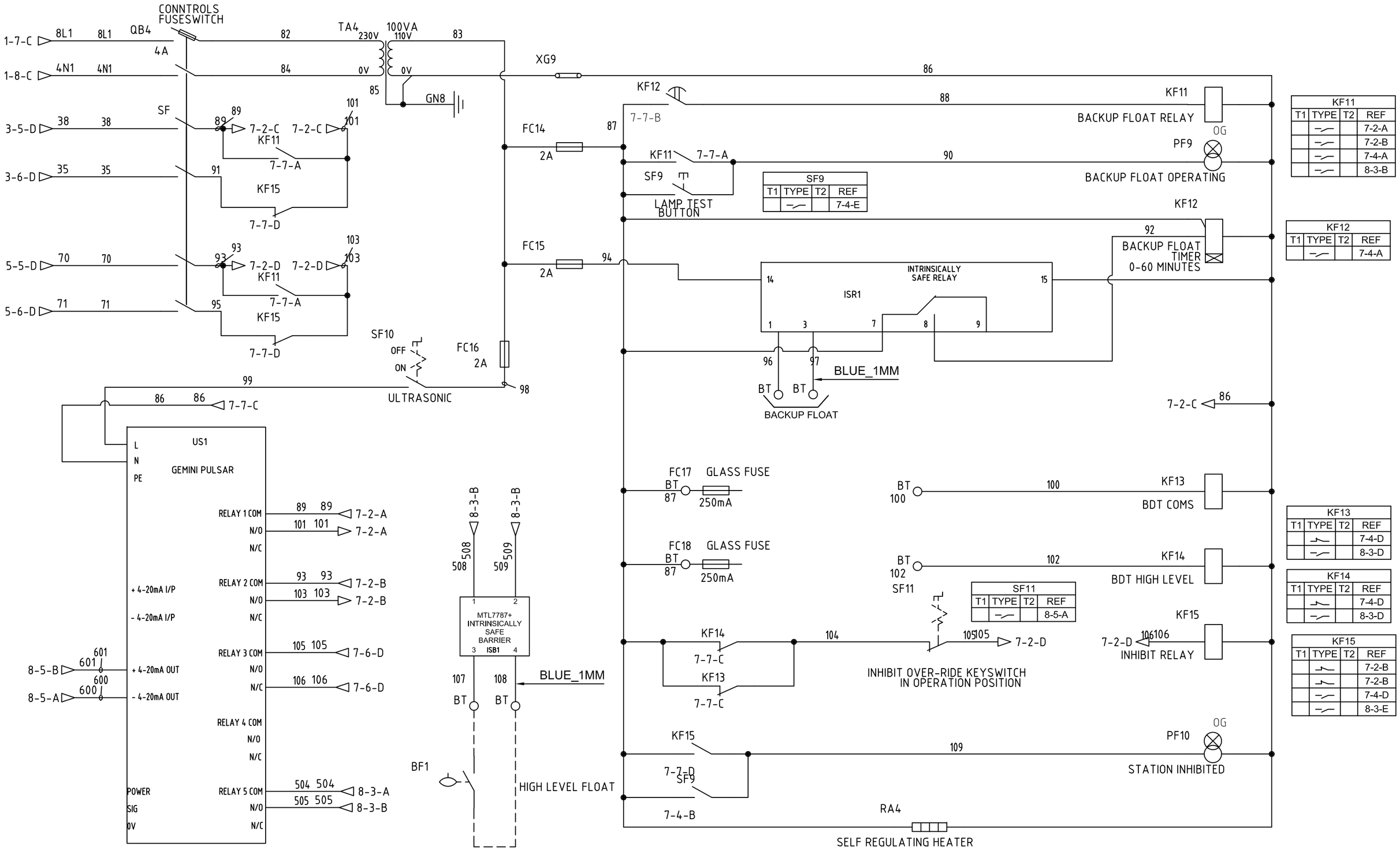
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Site
Crease Drove, Fincham

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					Title: SFA6 & ANGLIAN WATER SPEC DUAL DOL CONTROL PANEL
C	RCD ID	11/01/19	JH	SH	
B	INHIBIT CIRCUIT (GATEWAY)	02/01/18	JH	MP	Drawn By: JH
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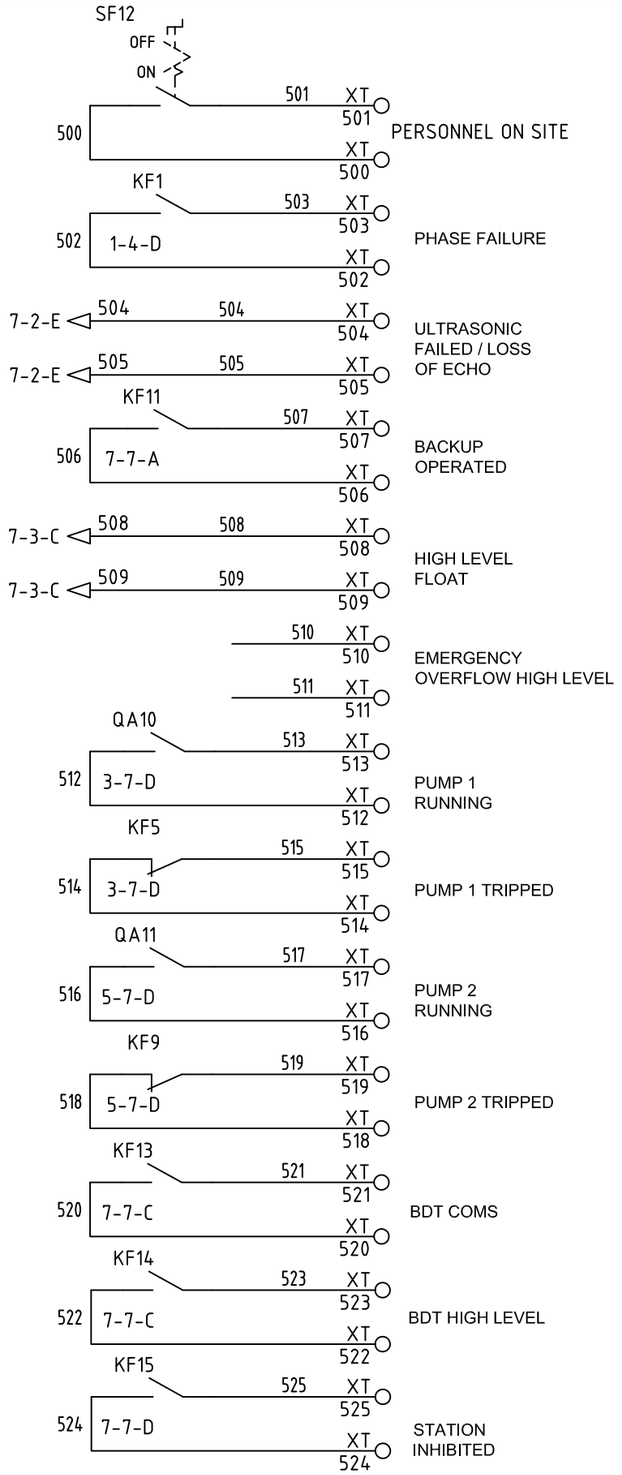
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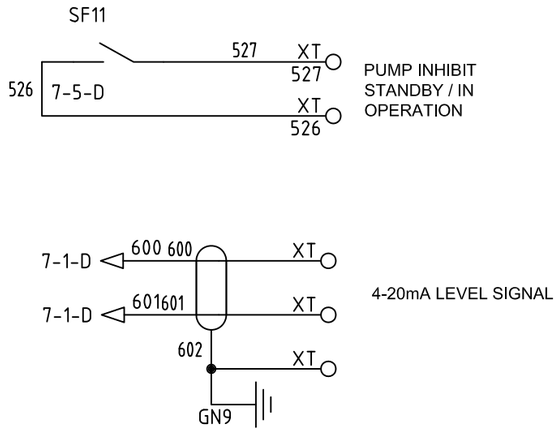
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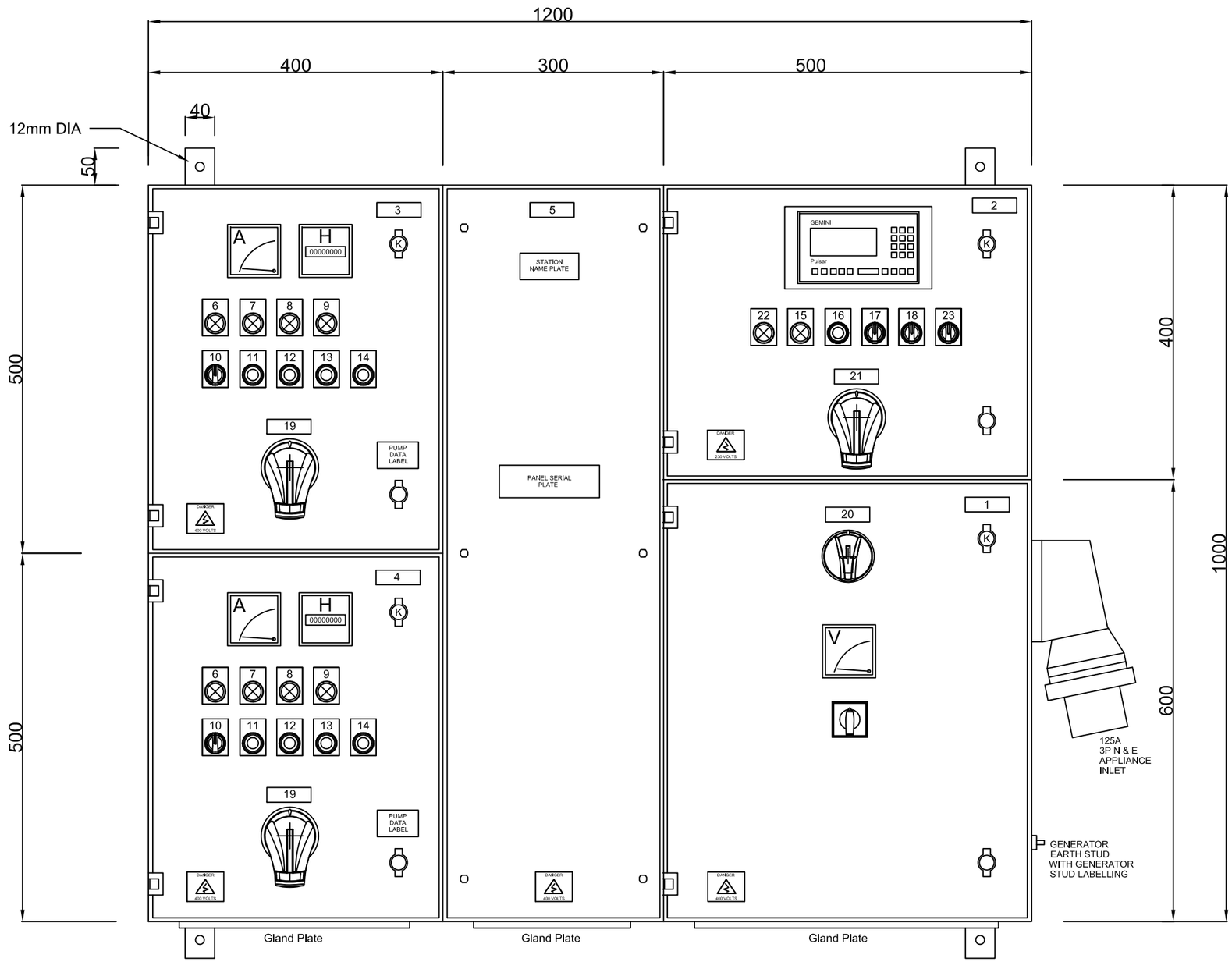
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NOTE: PERSONNEL ON/OFF SITE IS NOT A KEY SWITCH

Label Inscriptions

1 Incomer
2 Control
3 Pump 1
4 Pump 2
5 Cableway / Telemtry Marshalling
6 Auto Available
7 Pump Running
8 Pump Fault
9 Seal Leak
10 Run Off Auto
11 Start
12 Stop
13 Reset
14 Lamp Test
15 Backup Float
16 Lamp Test
17 Personnel Off / On
18 Ultrasonic Off / On
19 Pump Isolator On / Off / Test
20 Mains Off Generator
21 Controls Isolator On / Off
22 Station Inhibited
23 Station Inhibit override keyswitch

Control Panel

Fully Welded Form 4 Construction
Mild Steel, 2mm thick
IP55 - Colour, BS4800 14-C-35, semi gloss finish
Black hinges and T type wing locks,
1 lockable per door
Earth studs to be fitted to all doors,
gear plates and gland plates
Gland plates to be galvanised

All lamps to be LED cluster type

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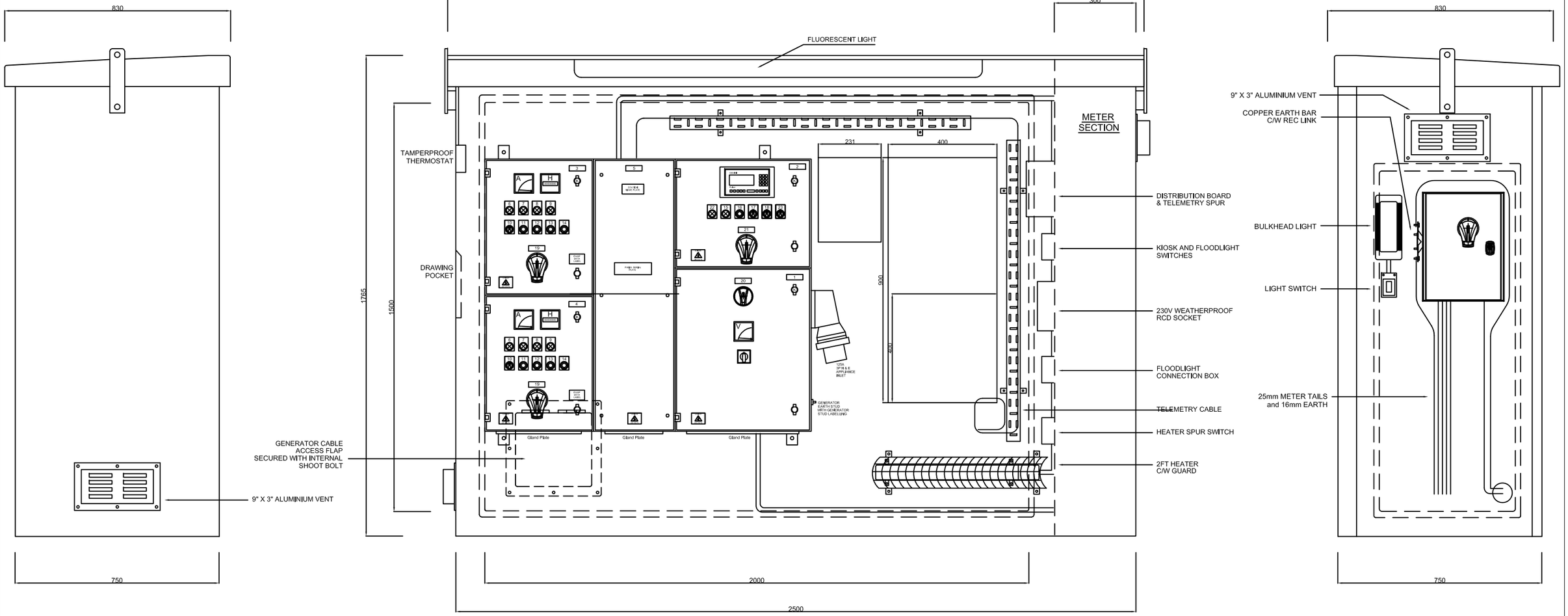
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FRONT VIEW SHOWN WITH DOORS REMOVED



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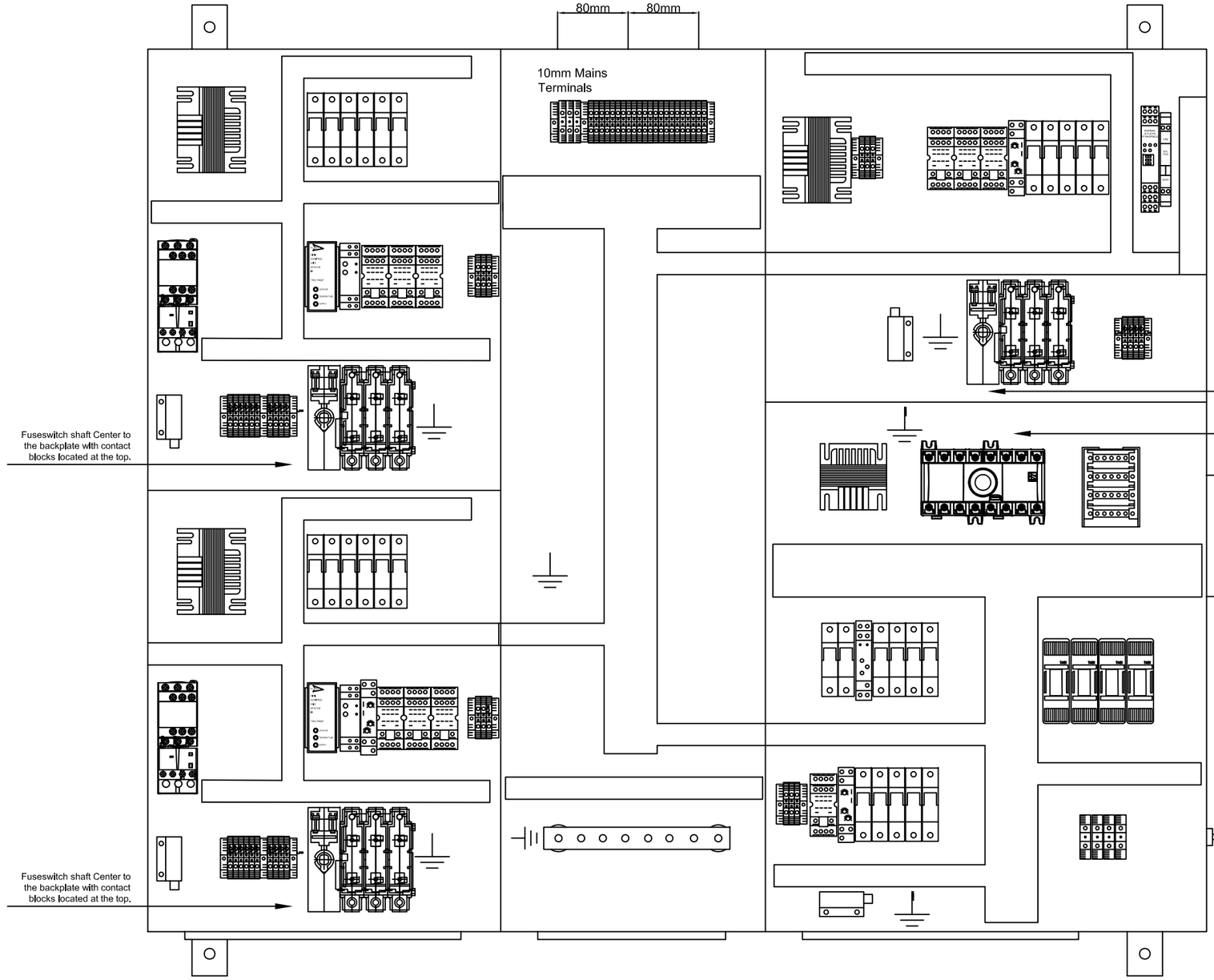
interface ISO 9001 CERTIFICATION

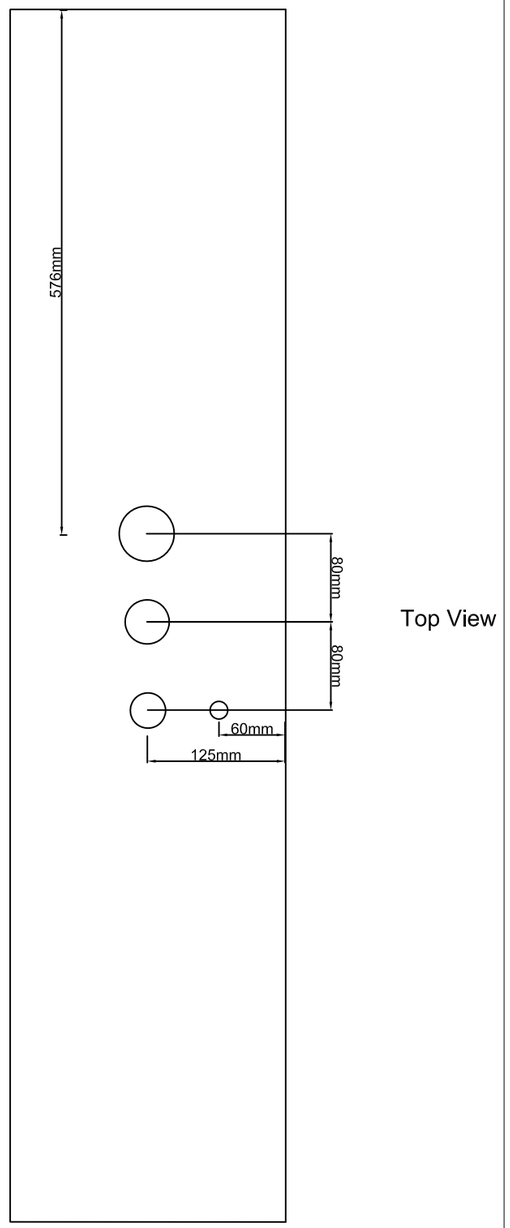
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Appendix F
Floodlight

Kingfisher Lighting

Datasheet



Columns

A comprehensive range of tubular, conical and hinged columns, for road & transport, car parks, residential and urban landscapes.

Experts in columns

- Over 25 years' experience
- Lighting design facility to help you specify
- Support to match the columns with luminaires & brackets

Maintained stock levels

- Extensive stock of most columns held at our warehouse
- In-house fabrication and finishing options

Nation-wide delivery

- Hi-ab equipment to enable fast and safe off-loading
- Fleet fitted with trackers to monitor deliveries
- Helpful drivers who handle the on-site deliveries
- Free delivery on orders over £300 within mainland GB

High quality standards

- Designed in accordance with BS EN40
- Manufactured from steel tube to either EN10210 or EN10219

What to consider when designing with columns

BS EN40 provides a detailed framework for the design of a lighting column and provides key considerations when designing an exterior lighting scheme to ensure the structural integrity of the column.

A lighting column design must take into account (in relationship to mounting height):

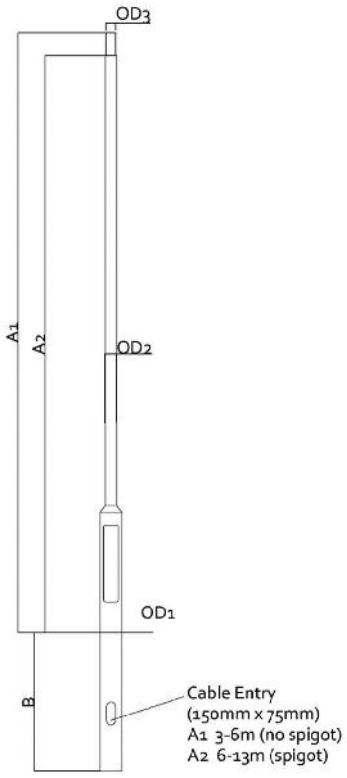
- Weight and windage of the luminaire and bracket
- Wind speed
- Site altitude
- Site terrain and topography

When this information is not readily available, PD 5647:2004 may be used for guidance. This document contains informative data relating to the administrative areas of the UK, providing a rationalised wind loading factor (RWF) for each location. Please contact us for more information.

Tubular columns (3m - 12m)

A range of tubular lighting columns suitable for road, residential and general amenity areas. Available root mounted or flange plated.

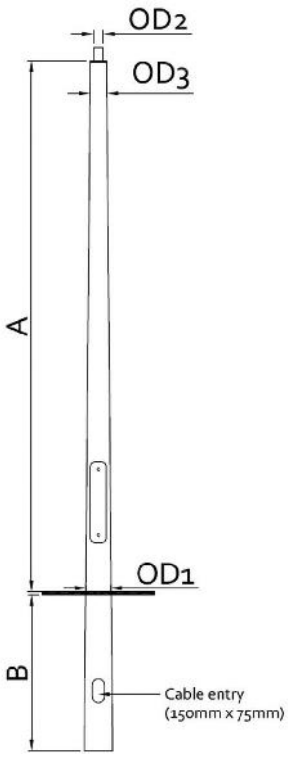
Tubular



Conical lighting columns (4m - 8m)

An aesthetic range of conical lighting columns suitable for residential and amenity areas. Available root mounted or flange plated.

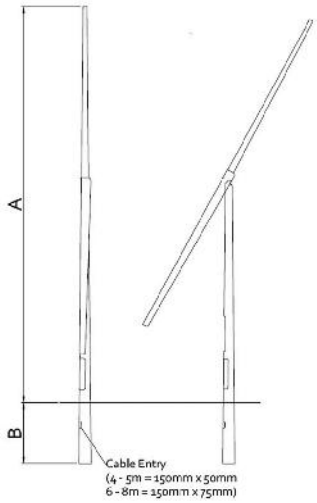
Conical



Mid-hinged columns (4m - 15m)

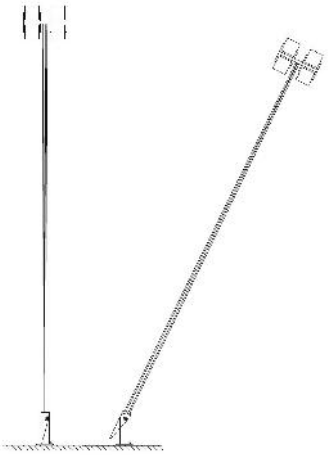
An easy–access range of mid-hinged columns suitable for residential, amenity, rail and industrial areas where conventional access platforms are unsafe or unsuitable. Available root mounted or flange plated. When installing mid-hinged columns, minimum head load is required for the column to hinge.

Mid-Hinged



Base-hinged columns

Base-hinged columns are an option for cost effective, safe and easy maintenance. The lowering of the column is done quickly and safely using a raising and lowering tool specific to the column. This lowers the column to ground level for easy access to the luminaire. Base-hinged columns are best suited to sites with tight access and where mobile platforms cannot be used such as sports facilities, car parks and footpaths.



Tubular columns (3–12m)

A range of tubular lighting columns suitable for road, residential and general amenity areas. Available root mounted or flange plated.

Tubular columns (root mounted)

Code	A	OD1	OD2	OD3	Door Openings	B	Terrain Category	Max Head Load
3CT76	3m	Ø140	Ø76	N/A	500 x 100	800	3	50kg/0.90m²
4CT76	4m	Ø140	Ø76	N/A	500 x 100	800	3	50kg/0.50m²
5CT76	5m	Ø140	Ø76	N/A	500 x 100	800	3	50kg/0.50m²
6CT76	6m	Ø140	Ø76	N/A	500 x 100	1000	3	50kg/0.50m²
6CTH89	6m	Ø168	Ø89	Ø76	600 x 115	1000	3	50kg/0.75m²
8CT89	8m	Ø168	Ø89	Ø76	600 x 115	1200	2	50kg/0.36m²
8CTM114	8m	Ø168	Ø114	Ø101	600 x 115	1200	2	60kg/0.55m²
10CT114	10m	Ø168	Ø114	Ø101	600 x 115	1500	2	50kg/0.50m²
10CTH140	10m	Ø192	Ø140	Ø127	600 x 115	1500	2	80kg/1.00m²
12CTHB140	12m	Ø192	Ø140	Ø127	600 x 115	1700	2	70kg/0.85m²

Tubular columns (flange plated)

Code	A	OD1	OD2	OD3	Door Openings	Terrain Category	Max Head Load	Hole Centres C	Slot Size H	Bolt Code
3CT76FP	3m	Ø140	Ø76	N/A	500 x 100	3	50kg/0.90m²	200	20 x 50	FB001
4CT76FP	4m	Ø140	Ø76	N/A	500 x 100	3	50kg/0.50m²	200	20 x 50	FB001
5CT76FP	5m	Ø140	Ø76	N/A	500 x 100	3	50kg/0.50m²	200	20 x 50	FB001
6CT76FP	6m	Ø140	Ø76	N/A	500 x 100	3	50kg/0.50m²	200	20 x 50	FB001
6CTH89FP	6m	Ø168	Ø89	Ø76	600 x 115	3	50kg/0.75m²	200	24 x 50	FB007
8CT89FP	8m	Ø168	Ø89	Ø76	600 x 115	2	50kg/0.36m²	300	29 x 64	FB004
8CTM114FP	8m	Ø168	Ø114	Ø101	600 x 115	2	60kg/0.55m²	300	29 x 64	FB004
10CT114FP	10m	Ø168	Ø114	Ø101	600 x 115	2	50kg/0.50m²	300	29 x 64	FB004
10CTH140FP	10m	Ø192	Ø140	Ø127	600 x 115	2	80kg/1.00m²	300	29 x 64	FB004
12CTHB140FP	12m	Ø192	Ø140	Ø127	600 x 115	2	70kg/0.85m²	300	29 x 64	FB004

Conical lighting columns (4–6m)

An aesthetic range of conical lighting columns suitable for residential and amenity areas. Available root mounted.

Code	A	B	OD1	OD2	OD3	Door Size	Terrain Category	Max Head Load	Max Windage
4CCS60L	4m	800mm	133mm	60mm	60 x 85	500 x 100	3	30kg	0.5m²
5CCS60L	5m	800mm	145mm	60mm	60 x 85	500 x 100	3	35kg	0.5m²
6CCS60L	6m	800mm	157mm	60mm	60 x 85	500 x 100	3	40kg	0.5m²
8CCS60L	8m	1200mm	168mm	60mm	76mm	500 x 100	2	40kg	0.45m²

Mid-hinged columns (4–8m)

An easy–access range of mid-hinged columns suitable for residential, amenity, rail and industrial areas where conventional access platforms are unsafe or unsuitable for use. Available root mounted or flange plated.

Code	A	Description - Mid hinged octagonal	B	Max Head Load *	Max Windage	Hole Size L	Flange Size/ Code	Bolt Code	Bolt	Winch
	Rope Operated									
4MHRL	4m	Root mounted	800	20kg	0.5m²					Rope
4MHFPL	4m	Flange plated		20kg	0.5m²	200	300mm/18mm	M16 x 500	FB001	Rope
5MHRL	5m	Root mounted	800	20kg	0.5m²					Rope
5MHFPL	5m	Flange plated		20kg	0.5m²	200	300mm/18mm	M16 x 500	FB001	Rope
6MHRL	6m	Root mounted	1000	20kg	0.5m²					Rope
6MHFPL	6m	Flange plated		20kg	0.5m²	200	300mm/18mm	M16 x 500	FB001	Rope
	Winch Operated									
4MHRL	4m	Root mounted	800	35kg	0.5m²					KLWINCHL
4MHFPL	4m	Flange plated		35kg	0.5m²	200	300mm/18mm	M16 x 500	FB001	KLWINCHL
5MHRL	5m	Root mounted	800	35kg	0.5m²					KLWINCHL
5MHFPL	5m	Flange plated		35kg	0.5m²	200	300mm/18mm	M16 x 500	FB001	KLWINCHL
6MHRL	6m	Root mounted	1000	35kg	0.5m²					KLWINCHL
6MHFPL	6m	Flange plated		35kg	0.5m²	200	300mm/18mm	M16 x 500	FB001	KLWINCHL
8MHF1	8m	Flange plated		70kg	0.98m²	300	420mm/25mm	M24 x 820	FB004	KLWINCHSHD
8MHRL1	8m	Rooted mounted	1200	135kg	0.70m²					KLWINCHSHD <100kg KLWINCHSHD2 >100kg

Above weight and windage area figures are based on a medium terrain category. Other sizes & variations available on request.

*Please note maximum carrying weight of a 4m - 6m mid - hinged column is 20kg with a rope or 35kg with a winch

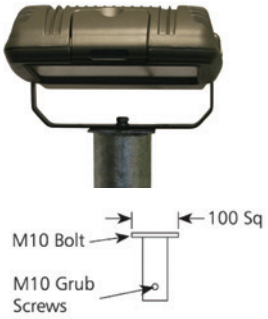
Kingfisher Lighting

Datasheet

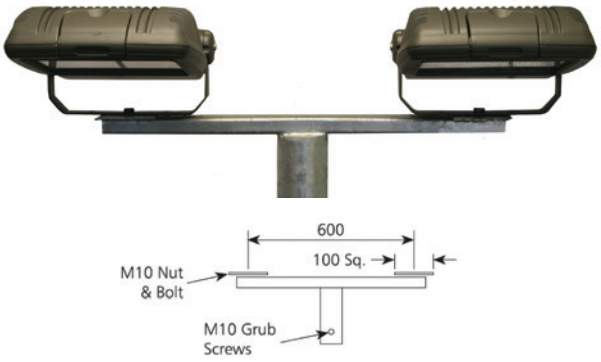
Floodlight Brackets

Our floodlight brackets ensure your floodlight is securely mounted onto the column. Each bracket has a top plate of 100mm square with a M10 zinc plated bolt, allowing full orientation of the floodlight. All brackets are supplied in a hot dip galvanised finish and are complete with the necessary bolts for mounting to the column.

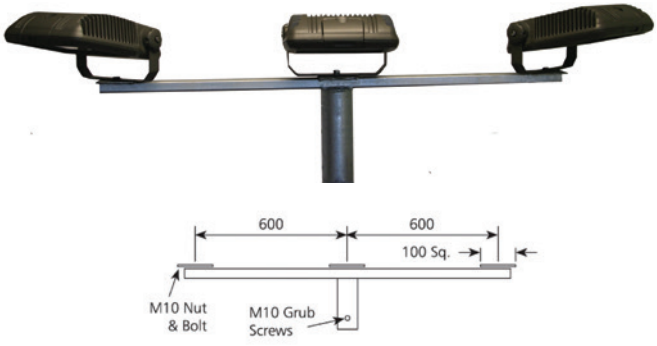
STM1 Single floodlight mounting bracket



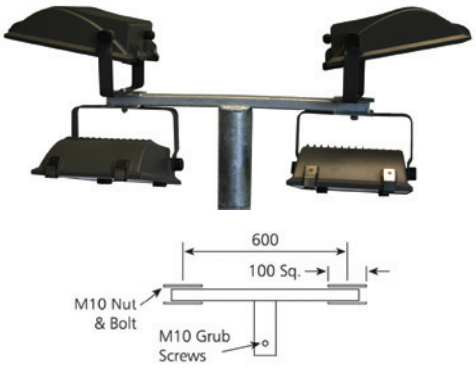
STM2 Twin floodlight mounting bracket



STM3 Triple floodlight mounting bracket



STM4 Four floodlight mounting bracket



Code	Luminaire Type
Single floodlight mounting bracket	
STM176	To over fit a column with a 60mm dia spigot/shaft
STM189	To over fit a column with a 76mm dia spigot/shaft
STM1114	To over fit a column with a 89 or 101mm dia spigot/shaft
STM1140	To over fit a column with a 127mm dia spigot/shaft
Twin floodlight mounting bracket	
STM276	To over fit a column with a 60mm dia spigot/shaft
STM289	To over fit a column with a 76mm dia spigot/shaft
STM2114	To over fit a column with a 89 or 101mm dia spigot/shaft
STM2140	To over fit a column with a 127mm dia spigot/shaft

Code	Luminaire Type
Triple floodlight mounting bracket	
STM376	To over fit a column with a 60mm dia spigot/shaft
STM389	To over fit a column with a 76mm dia spigot/shaft
STM3114	To over fit a column with a 89 or 101mm dia spigot/shaft
STM3140	To over fit a column with a 127mm dia spigot/shaft
Four floodlight mounting bracket	
STM476	To over fit a column with a 60mm dia spigot/shaft
STM489	To over fit a column with a 76mm dia spigot/shaft
STM4114	To over fit a column with a 89 or 101mm dia spigot/shaft
STM4140	To over fit a column with a 127mm dia spigot/shaft

Most columns of 8 metres and above have a column spigot; we will ensure that the brackets ordered will fit your columns. Where brackets are purchased alone for existing columns please indicate the diameter of the column spigot. The four-way brackets are to mount two floodlights on top of the cross arm and two underneath using the same bolts. Fittings to fix at the same level above the cross arm facing North, South, East, West are also available, add suffix NSEW to STM4 reference. These brackets are only suitable for mounting flood lights up to 400W. For 1000W and above suffix with 'H' for heavy duty e.g STM2H89.

Mira LED Floodlight

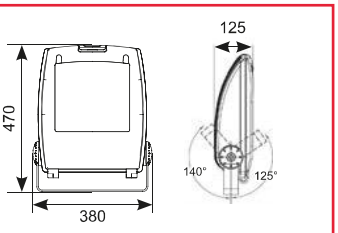
Supplied c/w Integral Driver

- *Architectural slim die-cast LED floodlight*
- *100W LED exceeds performance of 150W HQI*
- *200W LED comparable performance to 400W HQI*
- *Optically textured glass for enhanced light output*
- *Heat sink design provides optimum LED life*
- *Graphite textured paint finish*
- *Pre-wired with 1 metre of rubber insulated cable for ease of installation*
- *PIR versions complete with manual override facility*
- *LED lifespan L70 50,000 hours*
- *Non-dimmable*

- *Note: 100W and 200W versions are not suitable for interior use*



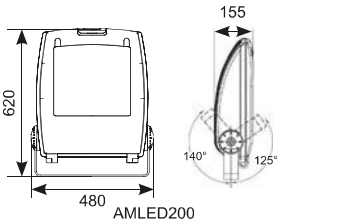
AMLED100



AMLED100



AMLED200



AMLED200

LED Information

Total (Watts)	*100W*
	200W
Lumens Delivered	
100W	*7850lm*
200W	*17380lm*
Lm/W 100W	*78lm*
Lm/W 200W	*87lm*
CRI	*Ra 70*
CCT	*4750K*
Input	*230V*

CE IP65

	Code	Lamp	Description	Windage
	AMLED100	LED	100W - Cool White	0.18
	AMLED200	LED	200W - Cool White	0.30
Options	**/PC**	Electronic Photocell		

Warrington: *+44 (0) 1942 433333*
Belfast: *+44 (0) 2890 773750*

Appendix G
Anglian Water Adoptable Pump Station Design Criteria

APPENDIX TO SEWERS FOR ADOPTION – 6TH EDITION
ADDENDUM TO PUMPING STATIONS

This document sets out specific requirements where there is a need for guidance which is outside the scope of Sewers for Adoption 6th Edition. The page numbers and references shown below refer to the relevant sections of the Sewers for Adoption 6th Edition. Additional clauses are shown in *italics*.

Pump station design criteria

In order to achieve consistency between flow assessments made as part of our pre-planning process and adoptable pumping stations delivered by developers, the following actual water consumption figures should be used to calculate the dry weather flow:

- 2.35 persons per property
- 125 litres per head per day
- 25% infiltration

The use of realistic criteria also leads to smaller pumps and reduced power costs, smaller rising mains and a lower emergency storage requirement.

- Pump rate = 4 x DWF (increased if necessary to achieve velocity between 0.75-1.8m/s)
- Emergency storage is 4 hours at 1DWF
- The peak inflow is considered to be 2.12 x DWF

General notes:

Vesting: Anglian Water promotes the policy that the adoption process, where possible, is completed within the timescales given in the national document. Should the developer fail to complete the Agreement within the timescales AW may complete the works and charge all costs to the developer or where applicable recover costs from the bond. Once completed, the works will be Vested and a Vesting declaration completed.

Surety: The Surety will be reduced on pumping stations to 15% of the value of the pumping station upon issue of the Provisional Certificate.

Fees: Anglian Water will produce annually a schedule of rates to be used to calculate the costs of the works. If the submission/construction of the works is not of a conventional nature or changes are made to the design/layout of the site and re-checking/re-inspections are required, additional charges may be made in accordance with our current charges document.

Additional Services: Anglian Water can provide monitoring of the pumping station via telemetry. Please liaise with our Telemetry Coordinator at the appropriate time who can confirm monitoring costs.

Acknowledgements: This appendix has been produced by the Developer Services Drainage Team. If you have any questions relating to the content, please contact us on 03456 066087.

Page	Clause	Description
30	*2.16.5*	*The use of staged start and stop routines on the motor drives should be explored to avoid high surge pressures on long rising mains.*
41	2.17.2	Surface water pumping stations should only be used where there is no other practicable method of surface water drainage and an exceedance flood route is provided in the event of failure of the pumping station.
41	2.17.7	Emergency storage for domestic foul flows should be calculated as per 'pump station design criteria' shown on Page 1 of this document.
41	2.17.8	For surface water pumping stations, 125m^3 of additional storage should be provided above that required for the critical 1in30yr storm event, per hectare of impermeable surface drainage to the pumping station.
41	*2.17.10*	*All pipework within the pumping station and valve chamber shall be ductile iron and the preferred material for the rising main shall be black polyethylene.*
41	*2.17.11*	*Arrangements need to be made to transfer the energy supplier to AW's supplier at the time of vesting.*
42	2.18.2	The hard standing areas shall be concrete slab or tarmac. The tanker hard standing should drain to the wet well.
42	*2.18.6*	*Secure Sites: Unless otherwise agreed the site should have a boundary brick wall with a minimum height of 1.8m, 225mm width and have an Engineering Brick DPC. The type of brick shall be matched to the surround buildings. The gates should be clear 3.8m opening with galvanised mild steel vertical bars 1.8m high or match the height of the boundary wall.* *Open sites: (special circumstances only or where local planning restrictions are imposed, subject to agreement with AW) The size and layout shall be similar to that shown for secure sites and demarcated.*
42	*2.18.7*	*The station compound, primarily the wet well/valve chamber shall be illuminated with an energy efficient floodlight (5,000 lumen minimum) mounted on a pole, that can be lowered for maintenance purposes, from an approximate height of 4m above the working area.*

Page	Clause	Description
43	2.21.3	A hand-operated gate or plug valve with extension spindle is required.
43	2.21.5	The depth of the valve chamber should not exceed 2.0m. The type of cover should be as per 2.22.3 or galvanised mild steel interlocking open mesh with hinged sections to provide access and holes/slots to allow operation of valves from ground level (to be agreed in discussion with the Engineer). Covers to be flush with a recessed 14mm padlock. Where the valve chamber depth is 1.5m or more and has mesh covers, permanent or temporary hand railing must be provided, where practicable. Hand railing must be a minimum height of 1100mm with no gaps greater than 470mm between the top rail, intermediate rail and platform. Access should be via a stainless steel ladder with retractable top section (or using hand railing in place of top section).
44	2.22.4	The venting arrangement shall be type (c) positioned adjacent the compound wall at a height no greater than the compound wall.
		Part 3 – M&E Specification for Small Pumping Stations:
57	3.3.11	The wet well flushing device shall be type b) a hydraulically actuated valve fitted to one of the pumpsets.
57	3.3.13	A synthetic (non corrosive and smooth) loop of line/rope shall be fitted to all pumps and terminate on wall mounted hooks accessible at the cover level. Pumps shall have a minimum-lifting loop of 120mm diameter to facilitate the use of this lifting methodology.
58	3.4.1	Pumps of any KW rating shall have the motor protection fitted as recommended by the pumpset manufacturer
59	3.8.3.4	Pump cables shall terminate in a weatherproof (see clause 3.8.3.4 (b)) and lockable pump cable termination junction box above ground at the wellhead, with facilities for glanding incoming and outgoing cables. The outgoing cable ducts shall be sealed with foam after installation of the cables. A notice shall be fixed to the front of the door stating, "Isolate elsewhere before opening". Ensure cross-ventilation as per clause 3.11.2.10.
61	3.10.1.2	>4kw DOL and above 4kw star delta or other method as required i.e. inverter drive
63	3.10.3	2 copies (1 paper copy and 1 electronic) of Operation and Maintenance manuals shall be provided during the maintenance period including an inventory of all electrical and mechanical items installed together with 2 sets of keys.
63	3.11.2.4	A separate compartment but within the main kiosk construction shall be provided with external access for the regional electricity supplier's meter, fuses etc.

Page	Clause	Description
64	3.11.2.12	All doors shall be fitted with Abloy locks.
64	3.11.3.1	The kiosk should be mounted on a re-batted concrete plinth.
65	3.11.7	Telemetry shall be in accordance with Anglian Water's manual of telemetry and process control. No part of the aerial installed within the compound may extend beyond the boundary of the compound.
70	3.13.1.3(a)	The switch shall be interlocked in the 'off' position and the compartment remain closed when secured by means of a padlock.
71	3.13.2.2	Lamps shall be LED with integral lamp test facility.
71	3.13.3.3(b)	With auto available lamp.
72	3.13.3.8	Emergency Stopping devices are not required.
72	3.13.4.1(c)	The ultra sonic level controller mounted on the front of the common control compartment/fixed to the back board and the transducer mounted on flexible conduit easily accessible for maintenance/cleaning within the wet well and shall comply with the following (for small pumping stations):-

(i) Operating minimum range of 0.30-15 metres. The developer to select the appropriate transducer for the duty required.
(ii) The controller to have a real time clock with facility to automatically correct for GMT/BST and clear visual display of settings and conditions using standard engineering units. The display must be visible during times of low light (e.g. by means of a back light.)
(iii) Capable of accurately gathering total pumped volume data efficiency, hours run, starts, etc.
(iv) Controller suitable for rack, panel and wall mounted applications. Wall mounted version to be enclosed to I.P. 65 standards. Transducer to be IP 68 ingress protection.
(v) Enable restricted access only to parameter settings (e.g. by means of password protection).
(vi) Continually monitor pumps performance and alarm deterioration.
(vii) Capable of switching to a second pump after a predetermined period regardless of the liquid level being at the off position to provide even pump wear.
(viii) Level control system to be Zone 1 hazardous area with the option of Zone 0 where a risk assessment deems necessary.
(ix) Output from controller to be 4-20mA as standard with options for additional outputs, where required.
(x) On storm/surface water pumping stations the controller shall have the facility to start a pump during long periods of dry weather or inactivity to check pump operation provided a selected minimum head is available and alarm on failure.

Page	Clause	Description
		Part 4 – M&E Specification for Micro Pumping Stations: as per 'Part 3' above with the addition of:-
83	4.2.1	The maximum operating speed shall be 2900 rpm.
89	4.7.2	The electrical supply may be 230v single phase where applicable.
91	*4.9.1(h)*	*A separate distribution board after the incoming supply to feed the control panel, telemetry and other services i.e. lighting, heating, 13amp socket.*
101	4.13.4.1(c)	As clause 3.13.4.1(c) but delete (ii), (iii), (vi), (vii) & (x)
		Part 5 – Civil Engineering Specification:
142	5.7.9.8 & 5.7.10.2	Pumping mains are to be subjected to and pass a 10-bar Type 2 water pressure test.