

TECHNICAL SUBMISSION

PROJECT

Treetops Nurseries, Allington Lane

CLIENT

Vistry Southern

PROJECT REFERENCE

PR13435

ISSUE

E

Change History

Issue	Revision Description	Date	Engineer	Approved
A	Initial submission for comment	14.05.2021	P. Warner	P. Warner
B	Beacon added on top of kiosk as omitted in error	14.05.2021	P. Warner	P. Warner
C	Amended in line with a Southern Water adoptable style layout and equipment	11.10.2022	P. Warner	P. Warner
D	Compound shortened with corresponding reduction in tanker hardstanding length, change in chamber positions and drawings mods	24.03.2023	P. Warner	P. Warner
E	Compound arrangement altered inlet manhole removed, maximum storage level dropped, associated changes to chamber sizes to accommodate	09.05.2023	P. Warner	P. Warner

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1: Specification

Vistry Southern have confirmed that it is intended that the pump station will remain private although built as far as site constraints permit to an adoptable standard. These constraints have made it necessary to remove the inlet manhole and move the isolating penstock to the wet well. We have taken a hybrid approach to the pump station design within the constraints provided, however this does now mean that any future possibility of adoption by Southern Water is extremely unlikely.

The pump station design and layout within the constraints imposed is based on equipment providing compliance with the Design and Construction Guidance (DCG) Approved Version 2.2, dated 29th June 2022 document as amended by the Southern Water Local Practice MED4006 Issue 4 document dated May 2021 which was downloaded from the Water UK website at the time this submission. A copy of this addendum is attached in Appendix G for clarity.

We have allowed for emergency storage in line with the 2015 Building Regulations requirement of 150 litres per person.

2: Hazardous Area Applications

Application - Pumping Station

The pumping station is designed to serve the domestic foul inflow from 35 domestic dwellings.

Sewage enters the pump station wet well via a foul water gravity network as designed by PFA Consulting Engineers. Details of the foul water drainage including location of the foul water pumping station can be found on drainage layouts supplied under separate cover by them.

Surface water run-off from impermeable areas is being handled by a separate storm water drainage system.

The pumping station transfers the sewage/foul water via a rising main to the private foul water network on Phase 1 of the site.

The pumping station compound will have an area designed for the parking of maintenance vehicles/tankers. The pumping station hardstanding is designed to drain to the wet well.

Flammable atmospheres

Decomposition of raw sewage is not considered a source of explosive atmosphere. The worst-case flammable atmosphere that could possibly occur in a sewage pumping station is hydrocarbon contamination from industrial discharges or tanker spillages although the risk of this occurring is low. As the actual contaminant is not known the content of the flammable atmosphere cannot be specific but will typically be the lighter more volatile hydrocarbons such as pentane from petrol.

Hazardous area classification

Southern Water are requesting that pump stations are zoned in accordance with the requirements of DCG Clause D7.2 which details in sub section 3 that.

“Wet wells should be assumed to be a Zone 1 atmosphere, unless the risk assessment (taking into account any guidance from the sewerage company) shows that protection to a less hazardous zone is appropriate for compliance with the Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR)”.

The electrical equipment located in the chambers is as follows

- Pumps
- Ultrasonic Level Control Transducer
- Float Switches

All of these have a Zone 1 rating. See Appendix D

As the default standard of the equipment supplied is Zone 1 then compliance with the aforementioned DCG clause is provided and it is therefore not proposed to undertake a site specific DSEAR assessment to derate these areas.

As the wet well and valve chamber are linked via the drainpipe and can potentially share an atmosphere, we have also classified the valve chamber as a Zone 1 environment although there is no electrical equipment installed in this area.

A Zoning Plan is shown on drawing 1645-13435-006

Equipment Certification

As detailed above the station has been classified as a Zone 1 environment in line with the requirements of the DCG document.

All new equipment intended to be located in an area classified as zone 1, has to be certified as equipment **Group II category 2 G** equipment (or better). Please refer to Appendix D for the manufacturer's certificates for the equipment proposed within the Hazardous Area confirming they meet this requirement.

3: Design Inflow and Proposed Discharge

The pump station is dealing with the foul water inflow from 35 domestic dwellings.

Based on the 4000 litres per day per dwelling criteria detailed in the DCG specification we calculate the design flow from 35 dwellings to be 1.62l/s.

Clause D5.6 of the DCG specification details that the pump discharge rate is to be at least half the design flow (0.81l/s) or that to provide a self-cleansing velocity in the rising main whichever is the highest. We are proposing the rising main is a 110mm OD PE100 SDR11 pressure pipe with an 89.1mm bore through which a minimum 4.75l/s would be required. It is on this 4.75l/s self-cleansing rate that our duty calculations are prepared.

The actual discharges at key operating levels are detailed in the relevant section below which also show the velocities in the pump station pipework at the varying discharges all of which fall within the velocity range detailed in Clause D7.3 of the Southern Water Issue 4 Addendum to the DCG.

4: Rising Main and Surge Analysis

The use of a 110mm OD PE100 SDR11 pressure pipe with an 89.1mm bore is proposed.

The rising main is 109.8m long and fully ascending. As it is less than 500m we don't intend to prepare a surge analysis report for this station.

5: Emergency Storage

The emergency storage has been designed to comply with the 2015 Building Regulations which requires 150 litres per person. This is in excess of the 160 litres per dwelling as required by Southern Water and as such if the station were ever adopted by them it would comply with a betterment on storage.

The building regulations require 24 hours storage at 150 litres per person. We have based our assessment of the required storage on the first bedroom in each property having 2 persons and all remaining bedrooms having 1 person.

The following summary of accommodation has been provided by the client. Based on the above we calculate the emergency storage requirement as follows

Bedrooms	Persons per Property	Number of Properties	Total Persons
1	2	3	6
2	3	7	21
3	4	18	72
4	5	7	35
Total			134

We calculate a requirement of 20.100m³ of storage for 134 persons at 150 litres per person.

The Building Regulations are not 100% clear on the maximum storage level. We have provided all of the storage below the invert level of F6 which is the manhole immediately upstream and has a site-specific level of 22.630m.

Referring you to the storage calculations in Appendix C you will see there is actually 23.400m³ of storage available which is 16.41% more than required.

For reference Southern Water would require 5.600m³ of storage and would allow this up to the invert level of the lowest private manhole or in this instance the valve chamber base which in both cases are higher than the 22.630m level used. Southern Waters storage requirements would therefore be easily met.

6: Retention Time and Septicity Control Equipment

Our calculations indicate that with the development half completed the retention time in the system is 3.52 hours and when fully completed 1.76 Hours. Both of these are less than the 6-hour figure after which septicity is considered to be a problem, so we don't propose a chemical dosing system for this site.

Should problems be encountered with low flows leading to septicity during the early stages of the development they would be dealt with using temporary measures.

7: Pump Duty and Selection

From the site data available we calculate the pump duty from pump stop to be a self-cleansing discharge rate of 4.75l/s against a total head of 8.88m for which we have selected submersible sewage pumps from the Sulzer XFP80C CB1.3 range fitted with Contrablock Plus impellers capable of passing a 75mm solid and 2.95kw explosion proof motors.

The pumps would provide the following theoretical discharge rates from key operating levels all of which fall within the velocity range in the pump station pipework detailed in Clause D7.3 of the Southern Water Issue 4 Addendum to the DCG.

Operating Level	Discharge Rate (l/s)	Velocity in Pump Station Pipework (m/s)
Pump Stop	6.455	1.28
Mid Water Level	6.641	1.32
Duty Pump Start	6.823	1.36
Standby Pump Start	6.956	1.38
High Level Alarm (DCG High High Alarm)	7.044	1.40
Inlet	7.743	1.54
Maximum Storage Level (22.630m)	9.604	1.91

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

In the period leading up to any adoption the pumps would be fitted with galvanised mild steel lifting chains. If the station was adopted each pump would be provided with the SWS 6mm diameter nylon rope lifting system.

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 our drawings 1645-13435-001 to 006 contained in Appendix E.

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

The pump station pipework would terminate a short distance outside the valve chamber in a 100mm PN16 flange from where provision of the rising main and connecting it to the pump station pipework would be the responsibility of others.

A 100mm valve chamber drain would be installed with a flap valve over the pipe in the wet well to prevent reflux.

9: Pump and Level Control Cabling

Pumps would be wired back to the control panel via intermediate junction boxes housed within a floor fixing GRP Kiosk 750mm Wide x 400mm Deep x 1250mm High all as illustrated on our drawings.

We have allowed for sealing the two 150mm pump cable ducts at the junction box kiosk end only with a RISE cable transit system.

The levels controls would be wired back directly to the kiosk as requested within the Southern Water addendum clause F3.4.1.5.7. The 100mm level control cable duct would be sealed at the kiosk end with a RISE cable transit system.

10: Control Equipment

Automatic level control would be via a Siemens Hydromat 200 ultrasonic level controller augmented by 2 separate float switches for high level (high-high level if DCG terminology used) and back up control (high level if DCG terminology used), all wired back to a multi compartment control panel complying with the SWS MED4006 Issue 4 Local Practice Document to the DCG Specification.

The control panel would be installed within a floor fixing GRP kiosk of dimensions 2000mm wide x 1750mm high x 750mm deep. The GRP kiosk has a meter compartment with a separate lockable door. Please refer to Appendix F for wiring diagrams and kiosk layout.

A low energy floodlight would be installed on the kiosk. This would be switchable from its own circuit

As required on Vistry Sites a flashing beacon to indicate high level alarm would also be installed onto the kiosk

11: Telemetry Equipment

As the station is to initially remain private then we propose to fit a PDAS IMAS telemetry outstation which provides enhanced monitoring and control. This uses GSM / GPRS communications.

If adopted by Southern Water, at this point in time they would require a Seprol S2000 Telemetry Outstation be installed and would request ADSL communications for this. Configuration on to the Southern Water network would be organised by the developer, at their expense direct with Southern Water

To cover any future potential adoption we suggest you install ducting to an appropriate location to allow future installation of an ADSL line

12: Access Covers

We are proposing Steelway Stamp Lock Pro Lift Facta B access covers for the wet well and valve chamber.

The access covers have torsion spring assisted lift lids, internal safety grids for fall protection and demountable barriers and posts. The wet well cover would be of a Twin Lid design as preferred by Southern Water.

Sizes are as follows

Chamber	Size
Wet Well	1500 x 900mm (Twin Lid)
Valve Chamber	2400 x 1800mm (Multi Lid)

13: Lifting Equipment

We propose that a REID cast in type davit socket rated for 500kg SWL be installed in the position as shown on the PDAS drawings.

If adopted by Southern Water they are likely to require a dedicated REID Porta lifting davit be provided. This can be supplied in the future if needed.

14: Penstock Valve

A wall mounting penstock valve would be mounted in the wet well over the incoming 150mm foul sewer to the wet well. The penstock will be complete with a non-rising spindle, spindle support brackets, tee key and top box.

15: Baffle Plate

A galvanised steel baffle plate would be fitted over the 150mm diameter incoming sewer in the wet well

16: Services

It would be the responsibility of the developer to provide a suitably rated 400-volt 3 Phase and neutral power supply to the control panel.

The PDAS IMAS telemetry unit uses GSM/ GPRS communications. If the station were to be adopted in the future by Southern Water, at this point in time they would request ADSL communications. To cover any future potential adoption we suggest you install ducting to an appropriate location to allow future installation of an ADSL line

17: Appendices

Appendix A Summary

Data Summary

Liquid Handled	Foul Water
Number of Pumps	2
Control Philosophy	Duty / Standby
Capacity per Pump (l/s)	4.75
Head Generated (m)	8.88
Pump Manufacturer	Sulzer
Pump Type	XFP80C CB1.3
Impeller Type / Reference	Contrablock Plus / 185mm
Solids Handling (mm)	75
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	Siemens Hydromanager 200 HMI Ultrasonic plus high level and back up float switches
Wet Well Diameter (mm)	3000
Wet Well Depth (m)	6.500
Station Pipes and Valves (mm)	80
Station Final Discharge Pipe (mm)	80-100mm PN16 Flat Taper
Pump Station Pipe Material	Ductile Iron
Rising Main(By Others)	110mm OD PE100 SDR11 (89.1mm Bore)
Access Covers (Supply Only)	Manufacturer: Steelway Prolift Rating: FACTA B Wet Well 1500 x 900mm (Twin Lid) Valve Chamber 2400 x 1800mm (Multi Lid)
Inlet Diameter (mm)	150
Penstock (Supply Only)	150mm Cast Iron in inlet manhole
General Arrangement Drawings	1645-13435- 001 to 006

Materials Specification

Pump Station Type	Submersible – Guiderail Mounted Pumps
Base Specification	Design and Construction Guidance Approved Version 2.2 Dated 29.06.2022
Local Practice Document	Southern Water MED4006 Issue 4, May 2021

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:

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

LIFTING SYSTEM:

Galvanised mild lifting chain attached to pump and of length to reach and be hooked at floor level. If adopted these would be replaced with a Nylon lifting rope for pulling into position certified lifting chains carried by Southern 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:

Siemens Hydromat 200 HMI 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)

Pump Chamber – Steelway Stamp Lock Pro Lift Access Cover and Frame providing a clear opening of 1500mm x 900mm complete with torsion spring assisted lift galvanised TWIN steel lids, self-locating safety stays, recessed pad lock facility, 2 no turn catch locking devices, hinged internal safety grids for fall protection, demountable barriers and posts.

Valve Chamber – Steelway Stamp Lock Pro Lift Access Cover and Frame providing a clear opening of 2400mm x 1800mm complete with torsion spring assisted lift galvanised steel lids, self-locating safety stays, recessed pad lock facility, 2 no turn catch locking devices, hinged internal safety grids for fall protection, demountable barriers and posts.

LIFTING EQUIPMENT: (Supply Only)

- 1 - Reid davit socket to suit the above lifting davit

NOTE:

If lifting equipment is supplied site load testing of items cast into cover slab by ground-workers is excluded from our offer.

JUNCTION BOX KIOSK:

GRP, floor fixing, single door weatherproof lockable enclosure in deep green textured finish, provisional dimensions 1250H x 750W x 400D containing a full sized backboard on which would be mounted / provided:-

- a) Individual junction box for Pump 1
- b) Individual junction box for Pump 2

CONTROL PANEL KIOSK:

GRP, floor fixing three door weatherproof lockable enclosure in deep green textured finish, provisional dimensions 1750H x 2000W x 750D containing a full sized backboard on which would be mounted / provided:-

- c) Control panel as specified.
- d) Anti-condensation heater and thermostat.
- e) Interior light and switch.
- f) Set of suitably rated double insulated cable tails for connection to Electricity Board meters.
- g) Minimum 600 x 450 clear space for the mounting of Electricity Board meters.
- h) Low energy floodlight fitted to kiosk switchable from inside the kiosk on its own circuit
- i) Flashing beacon fitted to top of kiosk to indicate high level alarm
- j) IMAS Telemetry Outstation (Offered with Maintenance Package)

The whole of the above being suitably interconnected and earth bonded extended to all non-conductive steelwork within the pump station in 16mm² 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. Lever arm and weights on non-return valves
2. Guards on non-return valves
3. Pressure tappings on valve chamber pipe work
4. 100mm Bauer coupling on over pumping tee
5. 100mm valve chamber drain with flap valve in wet well
6. 150mm cast iron Inlet penstock valve c/w extension spindle, brackets, tee key and surface box.
7. 150mm MSG baffle plate
8. 3 Hard copies of operating and maintenance manuals or one electronic copy in PDAS Ltd standard format

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

PDAS Ltd
Building 4.6 HiTech
Frimley 4 Business Park
Frimley, Camberley
Surrey GU16 7SG



Tel: 01483 930520

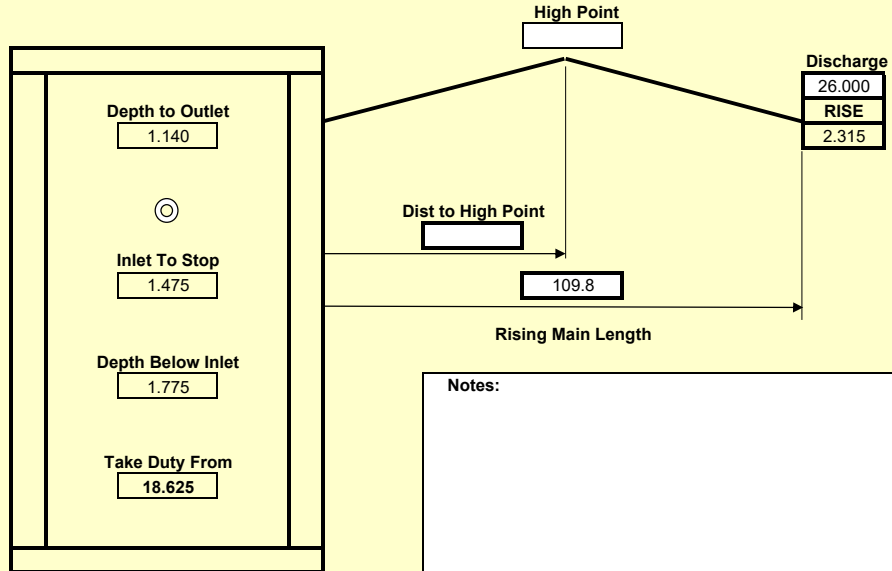
Site Reference	1645
Date	09.05.2023
Project Reference	PR13435
Date	09.05.2023

Clients Name	Vistry Southern
Site Address	Treetops Nurseries, Allington Lane, Fair Oak

Adopting Authority	Private
Pump Station Type	Foul
Number of Dwellings	35
Number of Persons	134
Non Domestic Rate (l/s Hectare)	
Number of Pumps	2
Number of Duty Pumps	1

Design Flow / Rising Main	
Design Flow (& SFA 6 Discharge)	1.62 l/s
Pump Discharge Rate 7th Edition	0.81 l/s
Pump Discharge Rate	4.75 l/s
Rising Main I.D	89.1 mm
Velocity in Main	0.76 m/sec
Surge Analysis	NOT REQUIRED

Cover Level	24.825
VC Outlet	23.685
Max Storage	22.630
Inlet	20.100
HLA	19.275
P2 Start	19.175
P1 Start	19.025
Mid Water	18.825
Stop Level	18.625
Dead Area	300
Base Level	18.325



Wet Well	
Wet Well Diameter	3000 mm
Calc Chamber Depth	5.619 m
Volume Per M	7,068.58 litres
Depth Between Starts	100 mm
Actual Chamber Depth	6.500 m
Theoretical Op Volume	570.00 litres
Actual Op Volume	788.17 litres
Max Theoretical Starts	7.50
Actual Starts	7.37

Retention Calculations	
Dwf Inflow Per Day	20,100.00 litres
Rising Main Volume	684.62 litres
Combined Main and Op Vol	1,472.79 litres
No. of Main Clears per Day	13.65
Retention Full Usage	1.76 Hours
Retention Half Usage	3.52 Hours

Retention calcs assume ascending rising main

Storage	
Domestic @ 150L / Person	20.100 m3
Industrial 1 Hr @ Design Flow	0.000 m3
Total Required Storage	20.100 m3
Capacity in Gravity System	0.000 m3
Capacity Max Storage - HLA	23.400 litres

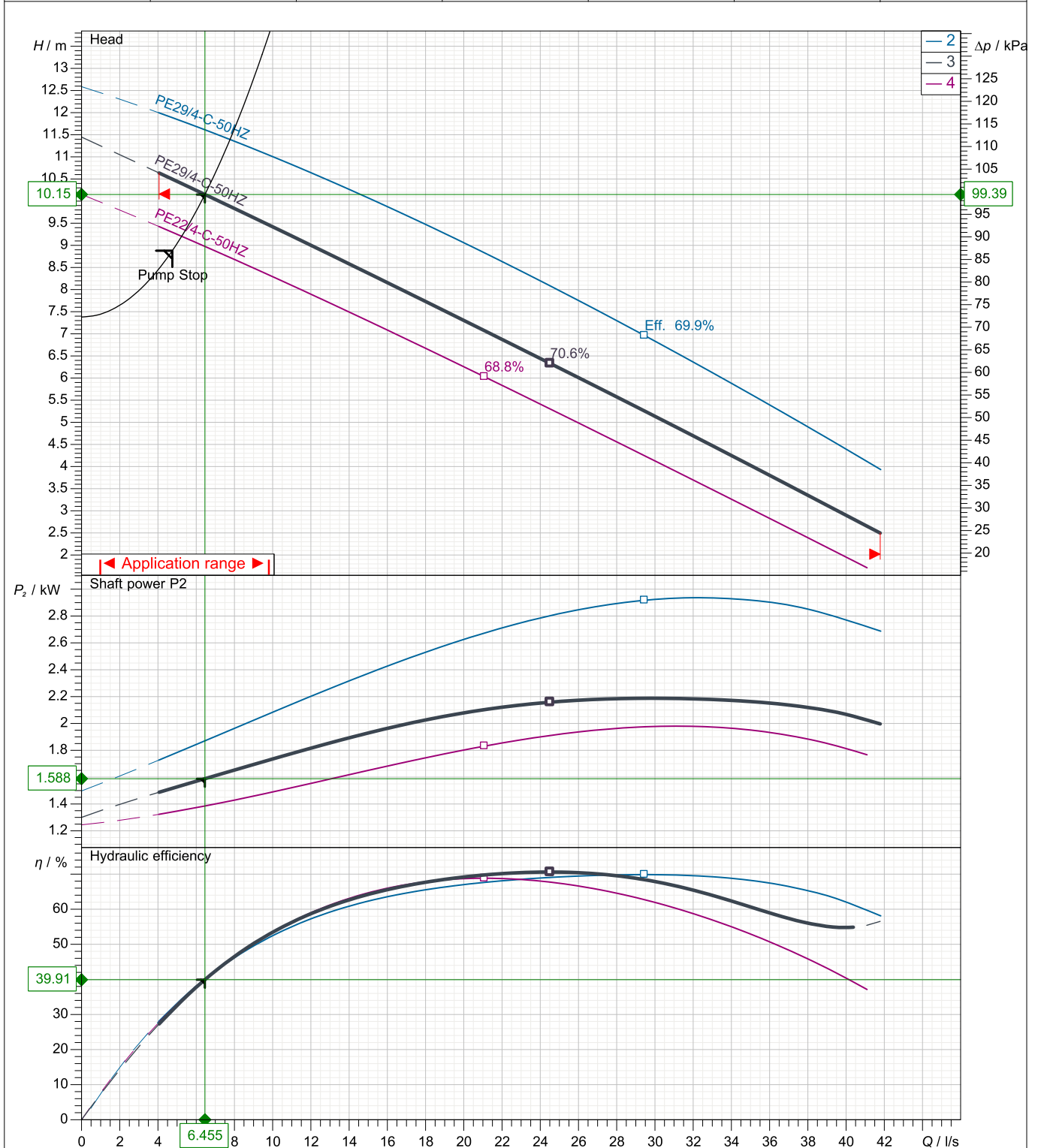
	Rising Main	Common 3	Common 2	Common 1	Individual 3	Individual 2	Individual 1
Flow Rate (l/sec)	4.75	4.75	4.75	4.75	4.75	4.75	4.75
Static Head (M)	7.38						
Pipe Diameter (mm)	89.10	80	80	80	80	80	80
Velocity (M/sec)	0.76	0.94	0.94	0.94	0.94	0.94	0.94
Roughness Factor	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Pipe length (M)	109.8					10	
Duckfoot Bend							1
Short Radius Bends						1	
Long Radius Bends						1	
Tee Straight through						2	
Tee through branch							
Radial Tee thro Branch							
Sluice Valve						1	
Non Return Valve						1	
Bellmouth inlet							
Sharp Taper							
Standard Taper						1	
Equivalent Pipe Length (M)	109.8	0	0	0	0	21.84	2.72
Reynolds Number	5.9E+04	6.6E+04	6.6E+04	6.6E+04	6.6E+04	6.6E+04	6.6E+04
Darcy-Weisbach Friction Factor	0.0290	0.0296	0.0296	0.0296	0.0296	0.0296	0.0296
Velocity Head	0.030	0.045	0.045	0.045	0.045	0.045	0.045
Hydraulic (Piezometric) gradient	0.0096	0.0168	0.0168	0.0168	0.0168	0.0168	0.0168
Friction Head Loss	1.058	0.000	0.000	0.000	0.000	0.368	0.046

Calc Duty Point	
Flow	4.75 l/s
Static Head	7.38 m
Total Head	8.88 m

Pump Selection	
Pump Type	XFP80C CB1.3
Impeller	185
Kw Rating	2.95

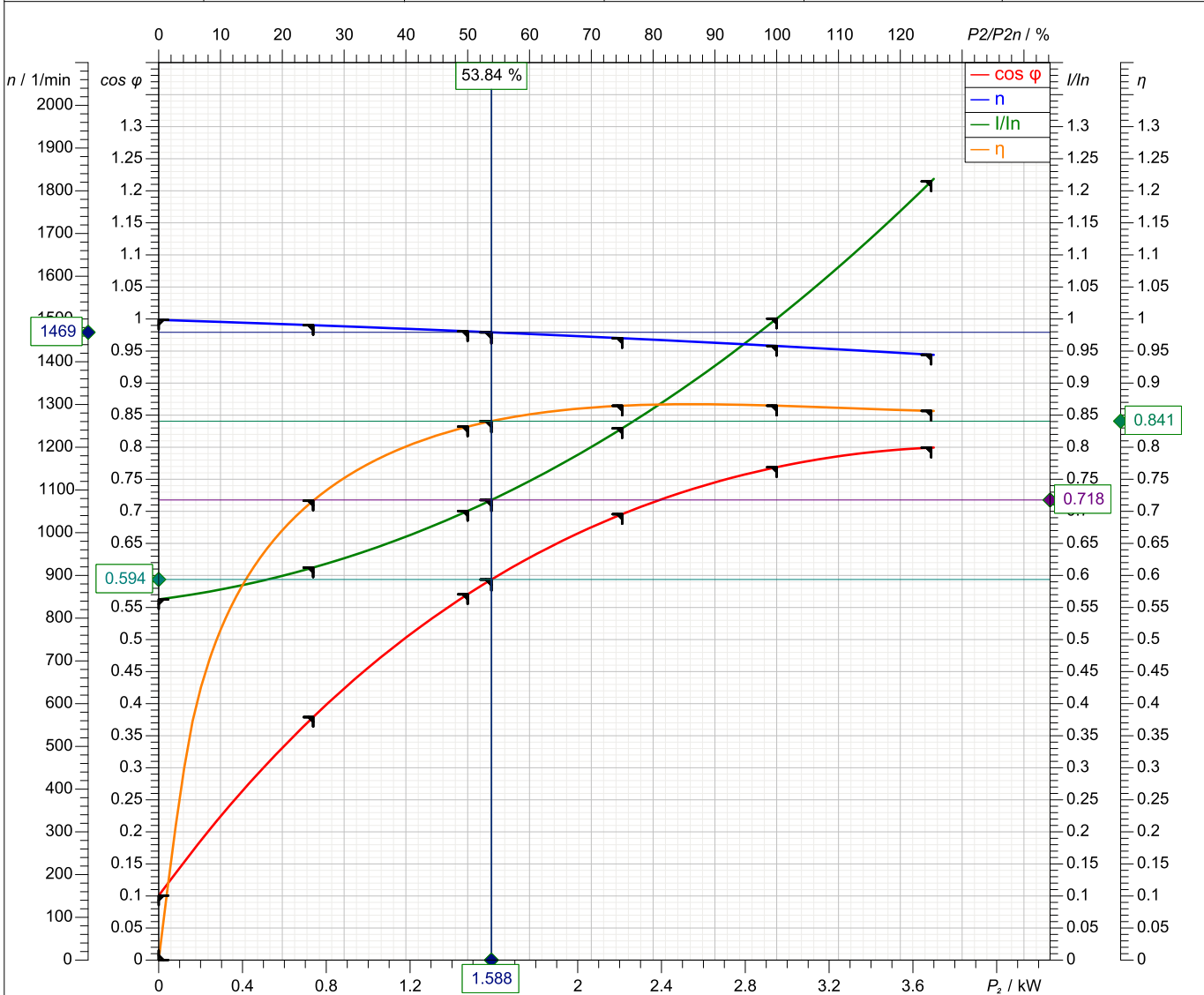
Actual Duty	
Flow	6.46 l/s
Head	10.15 m

Curve number		Pump performance curves XFP 80C CB1 50HZ				SULZER	
Reference curve XFP80C-CB							
					Discharge DN80	Frequency 50 Hz	
Density 998.2 kg/m³	Viscosity 1 mm²/s	Test Standard ISO 9906, HI 11.6/14.6≤10kW			Rated speed 1469 1/min	Date 2023-05-09	
Flow 6.455 l/s	Head 10.1 m	Shaft power 1.59 kW	Power input 1.89 kW	Rated power P2 2.95 kW	Hyd. efficiency 39.9 %	NPSH 1.13 m	



Impeller size 185 mm	N° of vanes 1	Impeller Contrablock Plus impeller, 1 vane	Solid size 75 mm	Revision
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Rated power 2.95 kW	Service factor 1	Nominal Speed 1440 1/min	Number of poles 4	Rated voltage 400 V	Date 2023-05-09
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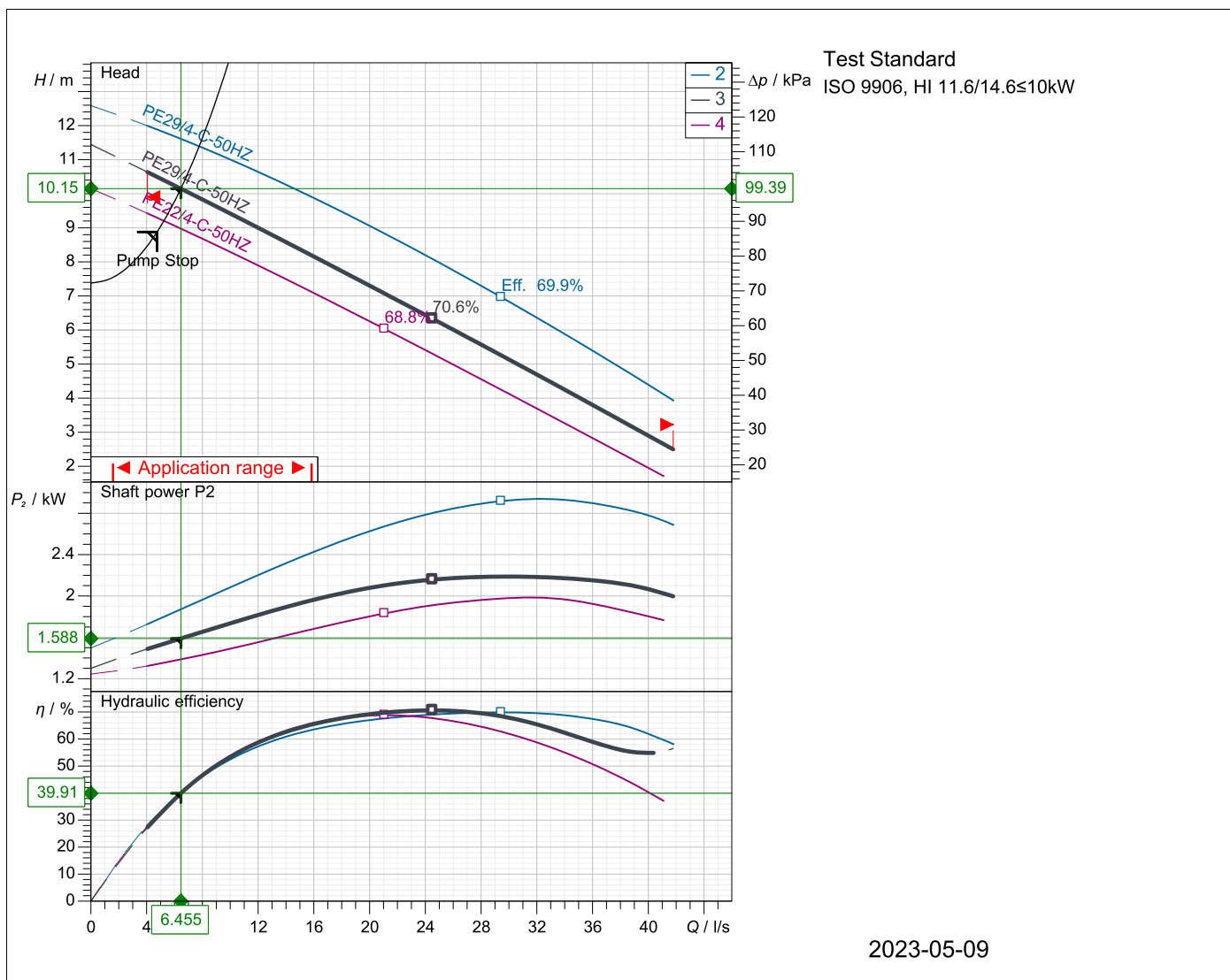


Symbol	No loac	25 %	50 %	75 %	100 %	125 %
P2/ kW	0	0.7375	1.475	2.212	2.95	3.688
P1/ kW	0.251	1.029	1.772	2.559	3.411	4.305
I / A	3.601	3.919	4.484	5.309	6.404	7.774
cos φ	0.1006	0.3791	0.5706	0.6956	0.7689	0.7993
n / 1/min	1498	1485	1471	1455	1437	1416
s / %	0.1356	0.9685	1.92	2.997	4.211	5.573
M / Nm	0	4.741	9.574	14.52	19.61	24.86
η / %	0	71.66	83.22	86.48	86.48	85.66

Tolerance according to VDE 0530 T1 12.84 for rated power

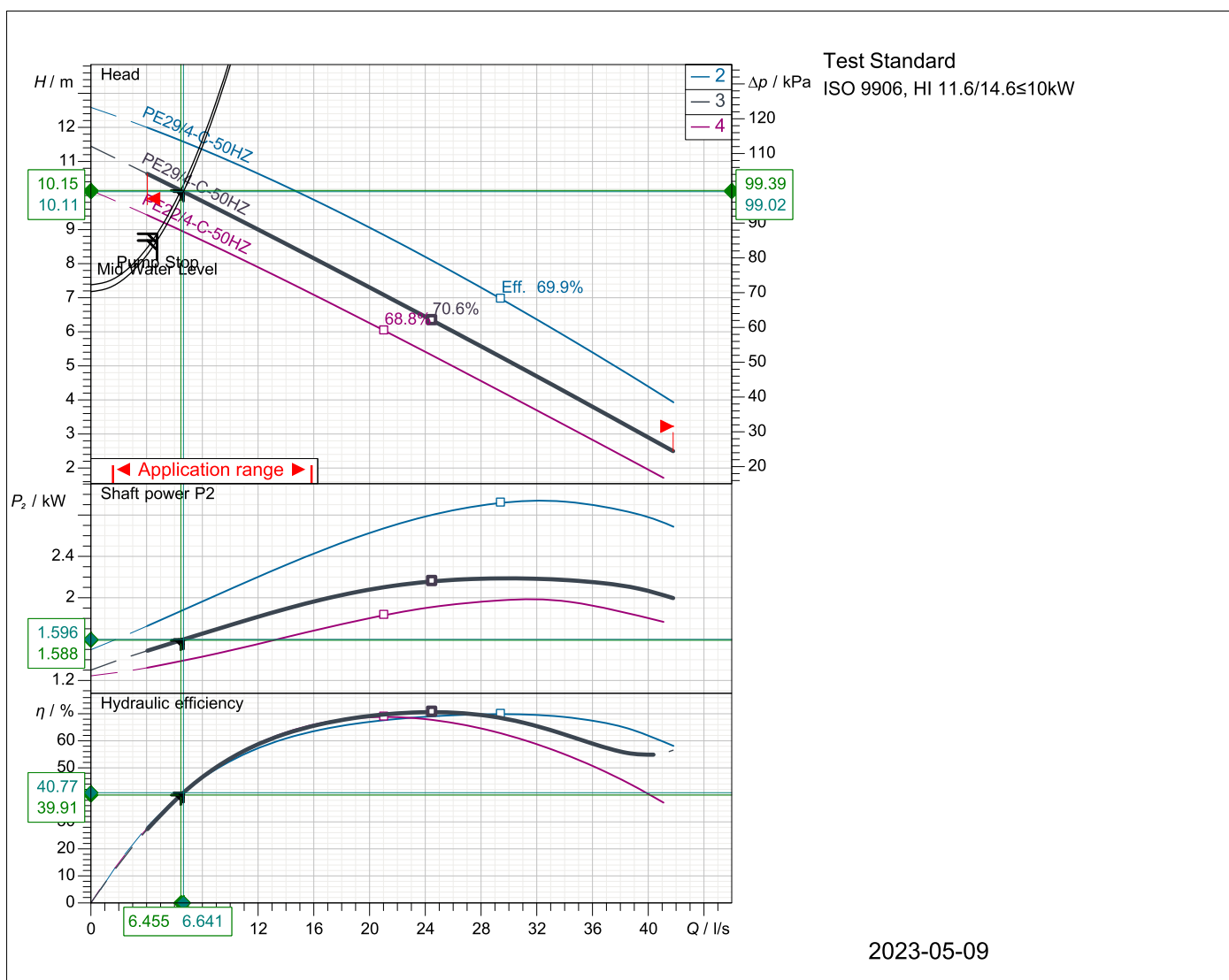
Starting current 36 A	Starting torque 28.4 Nm	Moment of inertia 0.009 kg m²	No. starts per hour 15	
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XFP 80C CB1 50HZ



Operating data specification		Power input		1.89 kW
Flow	6.455 l/s	Head		10.1 m
Efficiency	39.9 %	Shaft power		1.59 kW
NPSH	1.13 m	Fluid		Water
Temperature	20 °C	Nature of system		Single head pump
No. of pumps	1			
Pump data				
Type	XFP 80C CB1 50HZ	Make		SULZER
Series	XFP PE1-PE3	Impeller		Contrablock Plus impeller, 1 vane
N° of vanes	1	Impeller size		185 mm
Free passage	75 mm	Suction flange		DN100
Discharge flange	DN80	Type of installation		Wet well installation with pedestal
Moment of inertia	0.0142 kg m ²			
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

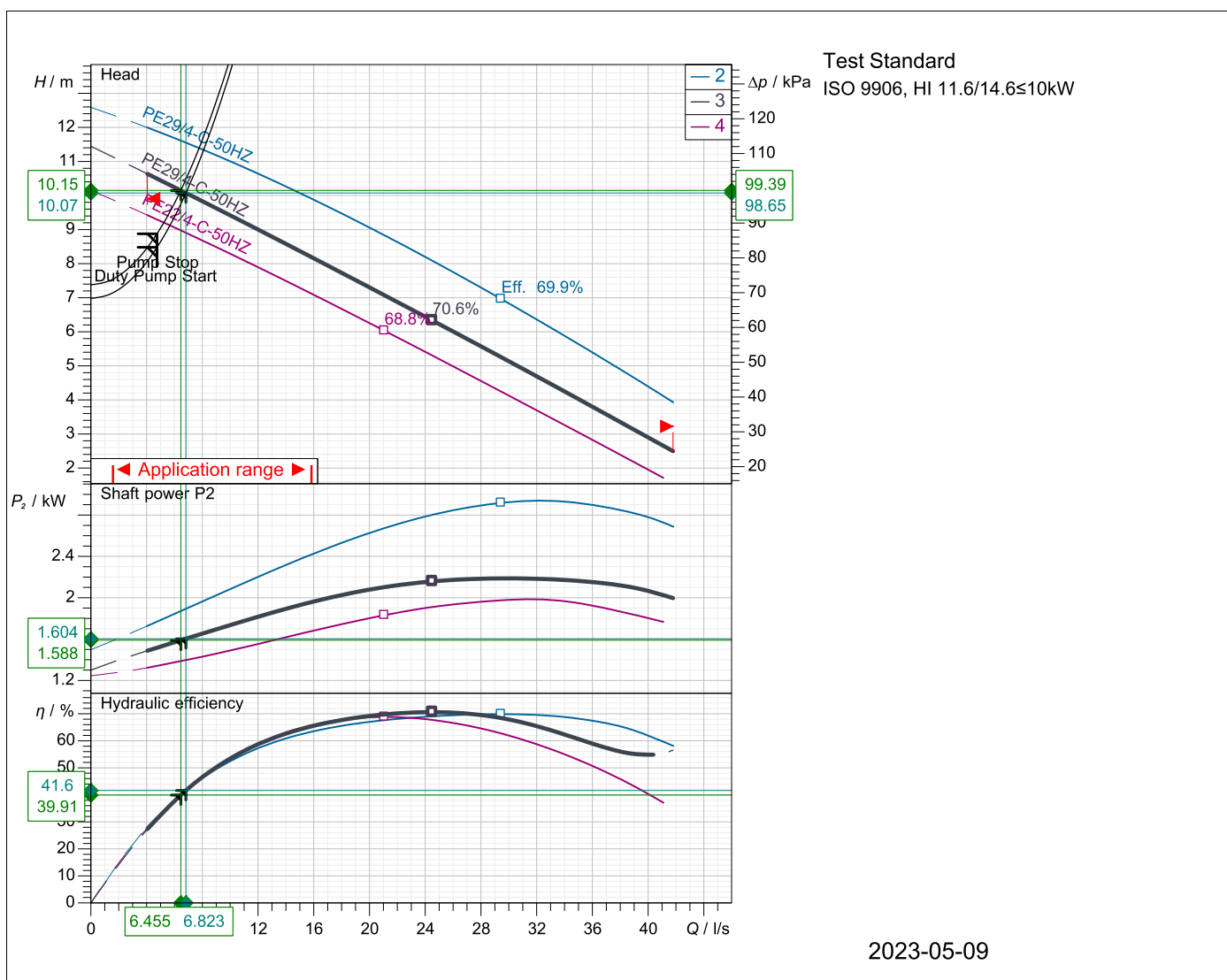
XFP 80C CB1 50HZ



Operating data specification		Power input		1.9 kW
Flow	6.641 l/s	Head		10.1 m
Efficiency	40.8 %	Shaft power		1.6 kW
NPSH	1.13 m	Fluid		Water
Temperature	20 °C	Nature of system		Single head pump
No. of pumps	1			
Pump data				
Type	XFP 80C CB1 50HZ	Make		SULZER
Series	XFP PE1-PE3	Impeller		Contrablock Plus impeller, 1 vane
N° of vanes	1	Impeller size		185 mm
Free passage	75 mm	Suction flange		DN100
Discharge flange	DN80	Type of installation		Wet well installation with pedestal
Moment of inertia	0.0142 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

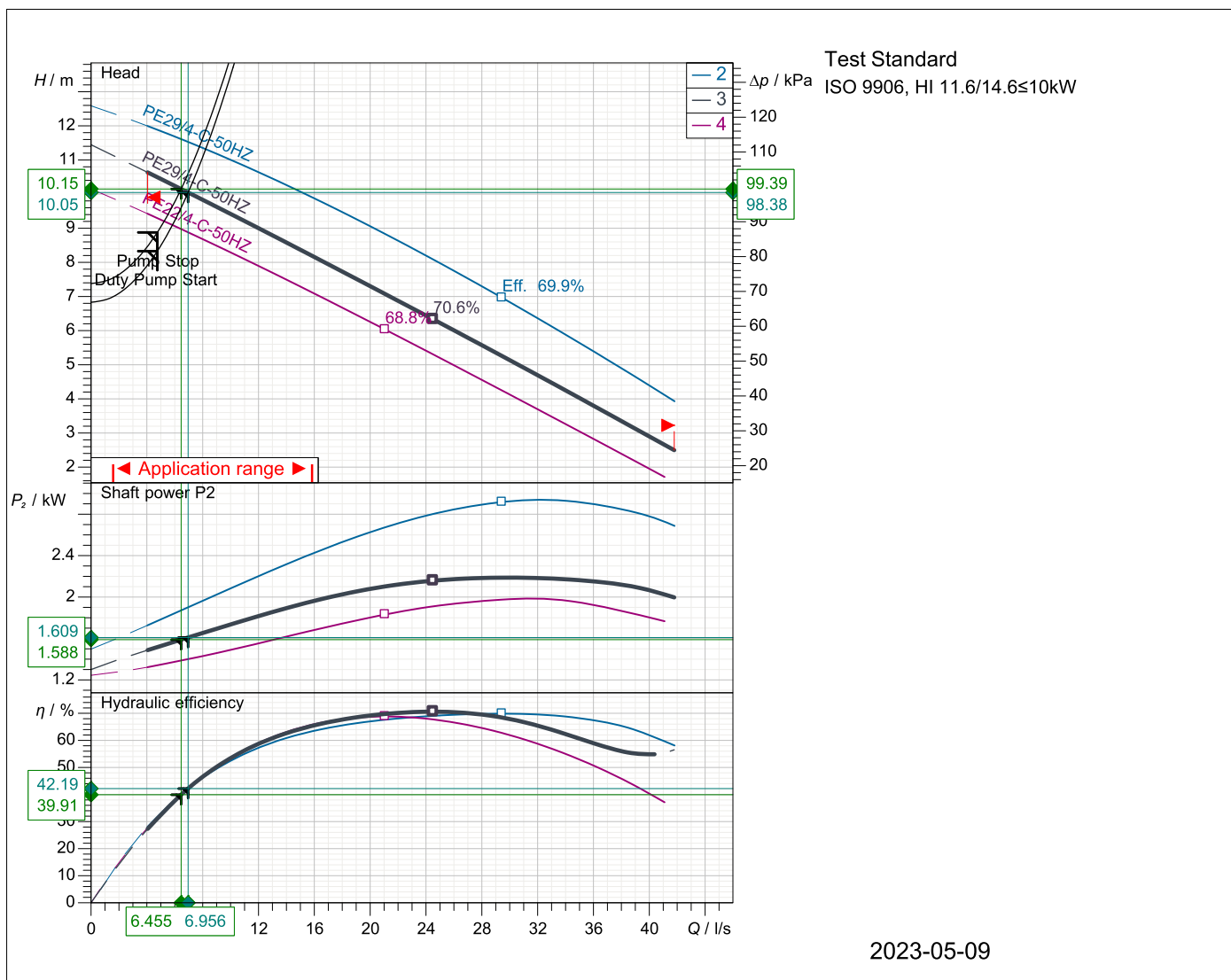
Duty Pump Start

XFP 80C CB1 50HZ



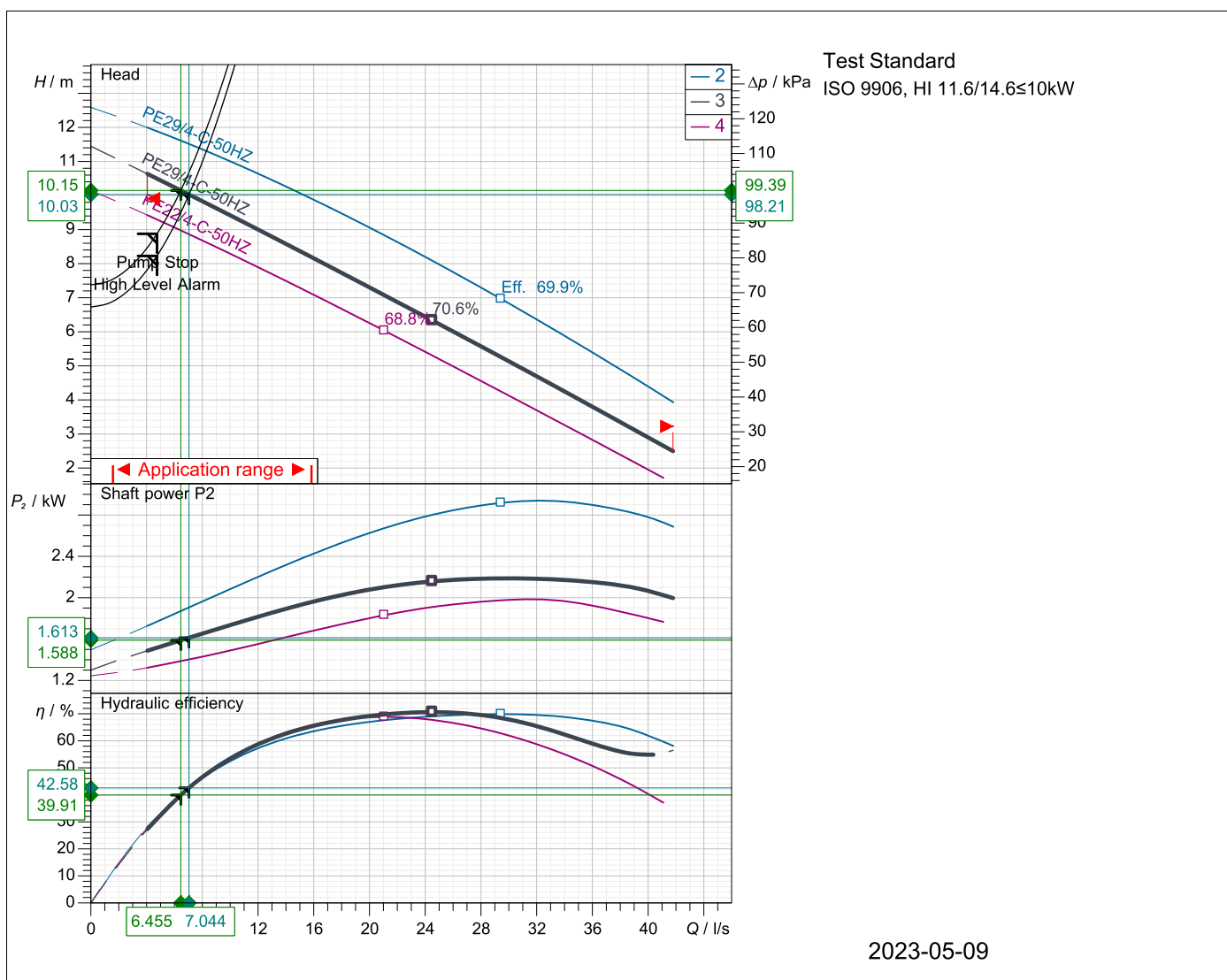
Operating data specification		Power input		1.9 kW
Flow	6.823 l/s	Head		10.1 m
Efficiency	41.6 %	Shaft power		1.6 kW
NPSH	1.13 m	Fluid		Water
Temperature	20 °C	Nature of system		Single head pump
No. of pumps	1			
Pump data				
Type	XFP 80C CB1 50HZ	Make		SULZER
Series	XFP PE1-PE3	Impeller		Contrablock Plus impeller, 1 vane
N° of vanes	1	Impeller size		185 mm
Free passage	75 mm	Suction flange		DN100
Discharge flange	DN80	Type of installation		Wet well installation with pedestal
Moment of inertia	0.0142 kg m ²			
Motor data				
Rated voltage	400 V	Frequency		50 Hz
Rated power P ₂	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

XFP 80C CB1 50HZ



Operating data specification		Power input		1.91 kW
Flow	6.956 l/s	Head		10 m
Efficiency	42.2 %	Shaft power		1.61 kW
NPSH	1.14 m	Fluid		Water
Temperature	20 °C	Nature of system		Single head pump
No. of pumps	1			
Pump data				
Type	XFP 80C CB1 50HZ	Make		SULZER
Series	XFP PE1-PE3	Impeller		Contrablock Plus impeller, 1 vane
N° of vanes	1	Impeller size		185 mm
Free passage	75 mm	Suction flange		DN100
Discharge flange	DN80	Type of installation		Wet well installation with pedestal
Moment of inertia	0.0142 kg m ²			
Motor data				
Rated voltage	400 V	Frequency		50 Hz
Rated power P ₂	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

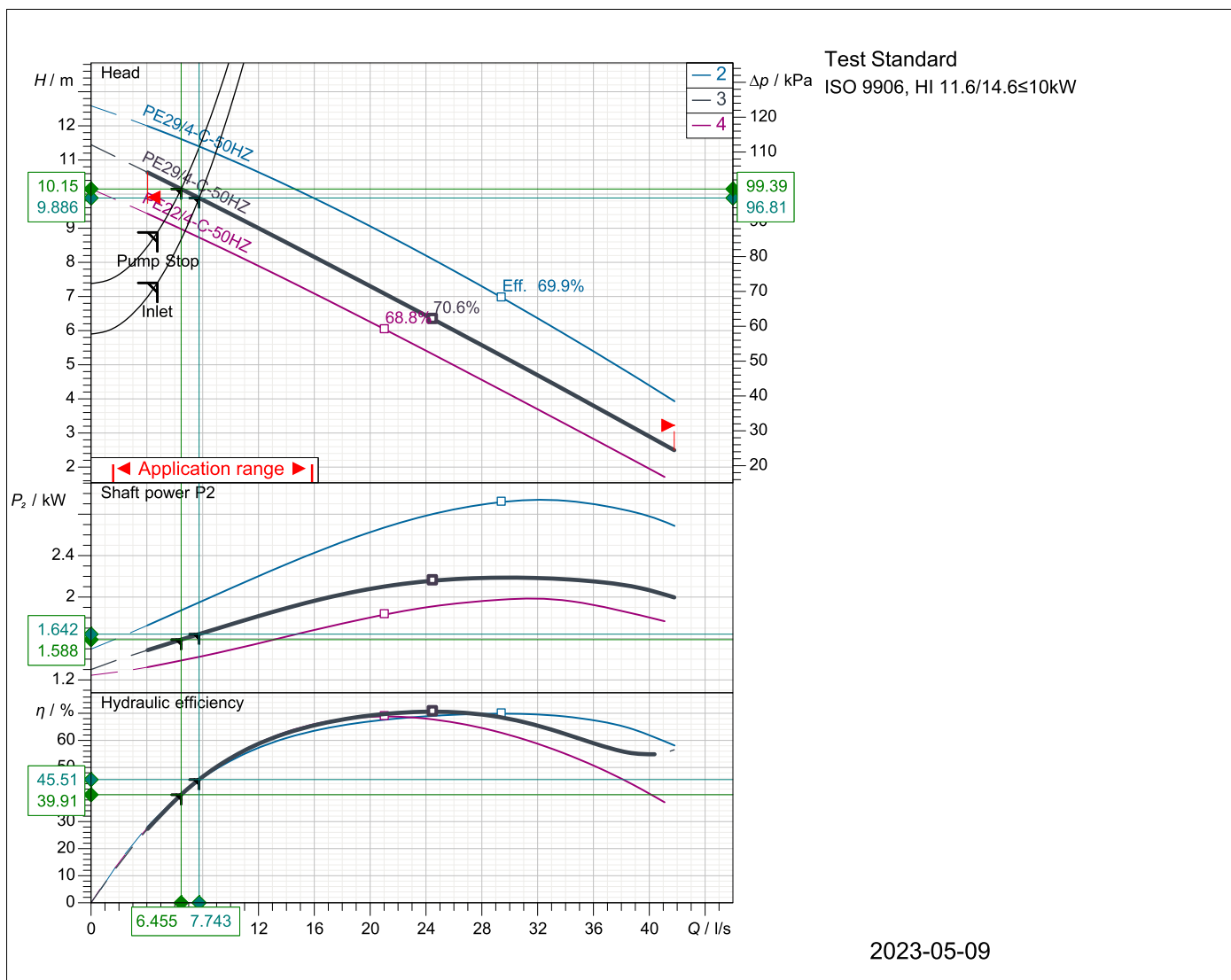
XFP 80C CB1 50HZ



Operating data specification		Power input		1.91 kW
Flow	7.044 l/s	Head		10 m
Efficiency	42.6 %	Shaft power		1.61 kW
NPSH	1.14 m	Fluid		Water
Temperature	20 °C	Nature of system		Single head pump
No. of pumps	1			
Pump data				
Type	XFP 80C CB1 50HZ	Make		SULZER
Series	XFP PE1-PE3	Impeller		Contrablock Plus impeller, 1 vane
N° of vanes	1	Impeller size		185 mm
Free passage	75 mm	Suction flange		DN100
Discharge flange	DN80	Type of installation		Wet well installation with pedestal
Moment of inertia	0.0142 kg m ²			
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

Inlet

XFP 80C CB1 50HZ

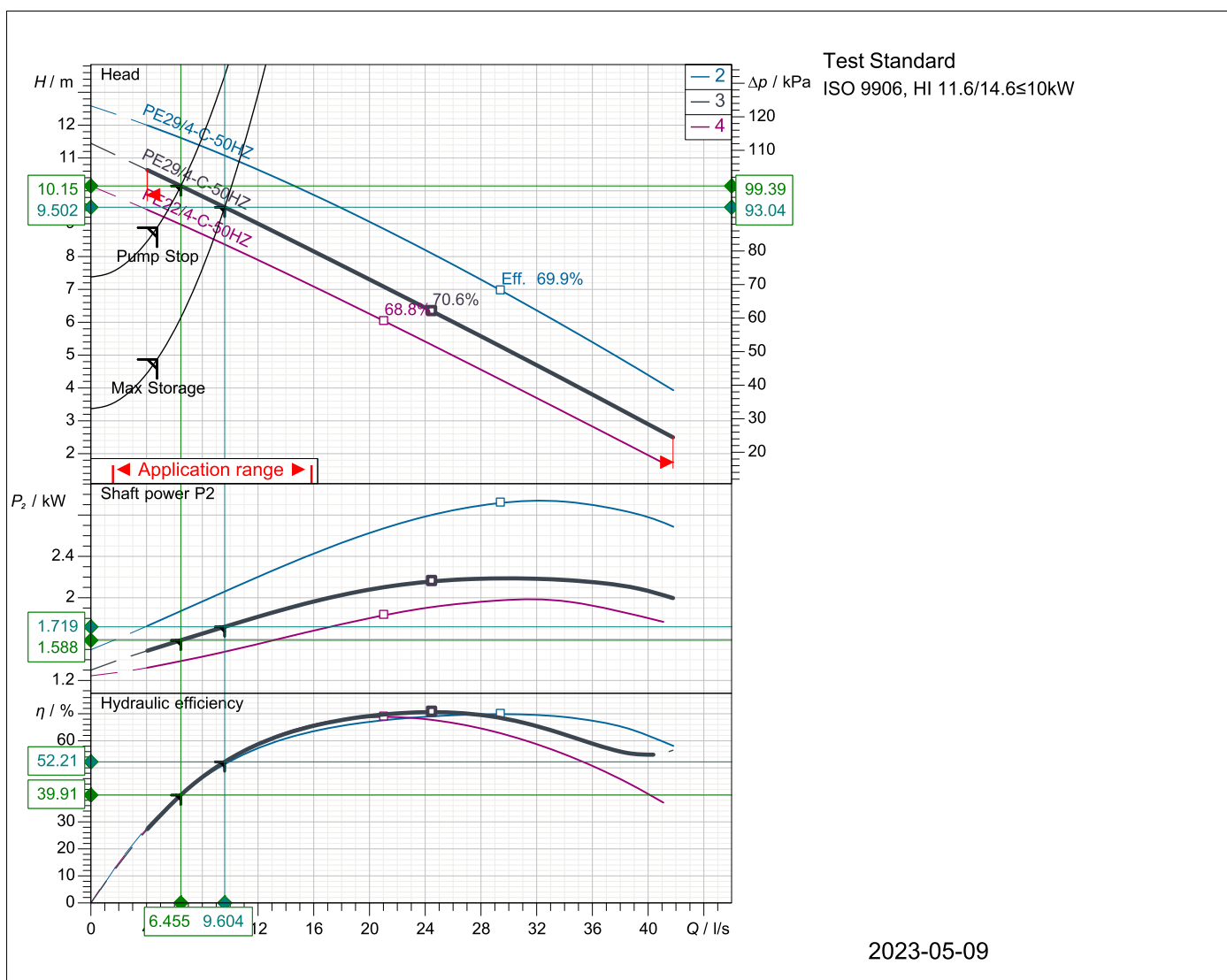


2023-05-09

Operating data specification		Power input		1.94 kW
Flow	7.743 l/s	Head		9.89 m
Efficiency	45.5 %	Shaft power		1.64 kW
NPSH	1.14 m	Fluid		Water
Temperature	20 °C	Nature of system		Single head pump
No. of pumps	1			
Pump data				
Type	XFP 80C CB1 50HZ	Make		SULZER
Series	XFP PE1-PE3	Impeller		Contrablock Plus impeller, 1 vane
N° of vanes	1	Impeller size		185 mm
Free passage	75 mm	Suction flange		DN100
Discharge flange	DN80	Type of installation		Wet well installation with pedestal
Moment of inertia	0.0142 kg m ²			
Motor data				
Rated voltage	400 V	Frequency		50 Hz
Rated power P ₂	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

XFP 80C CB1 50HZ

Maximum Storage Level 22.630m



Operating data specification		Power input		2.03 kW
Flow	9.604 l/s	Head		9.5 m
Efficiency	52.2 %	Shaft power		1.72 kW
NPSH	1.16 m	Fluid		Water
Temperature	20 °C	Nature of system		Single head pump
No. of pumps	1			
Pump data				
Type	XFP 80C CB1 50HZ	Make		SULZER
Series	XFP PE1-PE3	Impeller		Contrablock Plus impeller, 1 vane
N° of vanes	1	Impeller size		185 mm
Free passage	75 mm	Suction flange		DN100
Discharge flange	DN80	Type of installation		Wet well installation with pedestal
Moment of inertia	0.0142 kg m ²			
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

Massblatt XFP 80C-CB1 Twin Guide Rail

Dimension Sheet XFP 80C-CB1 Twin Guide Rail

Dimensioni Installazione sommersa

Hoja de dimensiones instalacion sumérgida

Plan d'encombrement Installation noyée

No: AN-M.22.578 -02

Drawn: 18.03.10 / D.Whelan

Issue Date: 29/03/2011

Anderungen vorbehalten

Technical changes reserved

Con riserva di modifiche

Con reserva de modificaciones

Sous réserve de modification

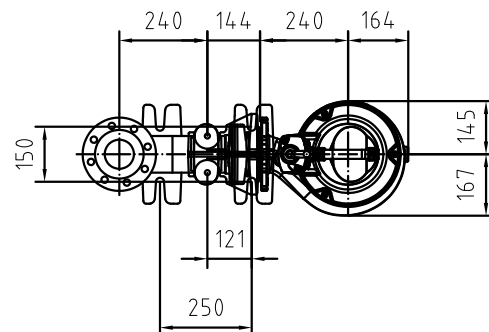
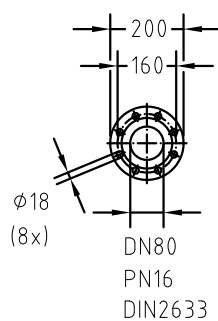
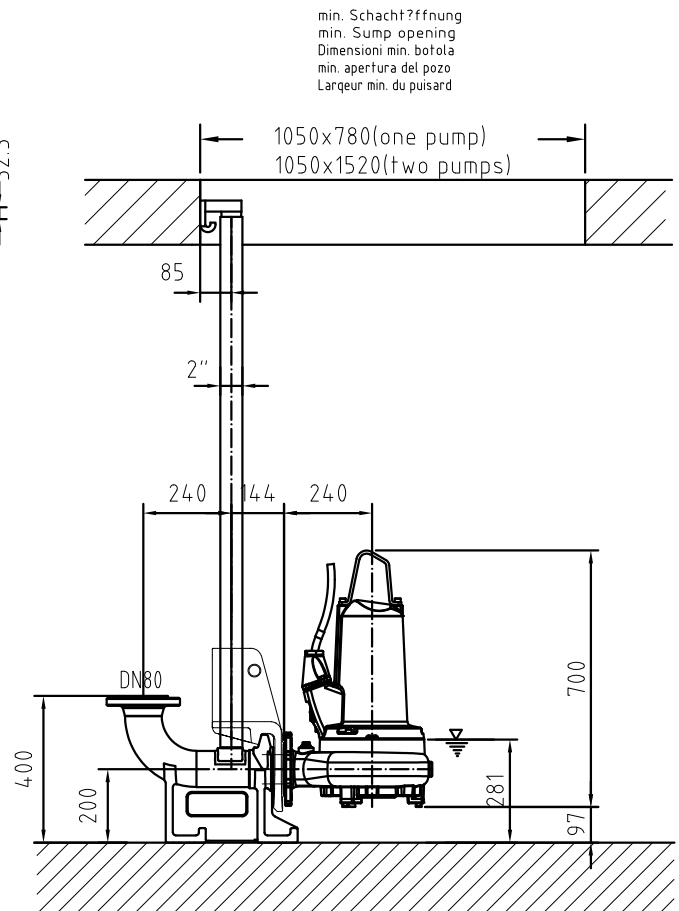
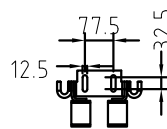
50 Hz

S.I.

Typ Type Tipo	Gewicht Weight Poids Peso (kg)
PE 13/6	95.5
PE 22/4	97.5
PE 29/4	100

60 Hz

Typ Type Tipo	Gewicht Weight Poids Peso (kg)
PE 18/4	95.5
PE 28/4	97.5
PE 28/4W	97.5
PE 20/6	100
PE 20/6W	100
PE 35/4	100



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 fundicion seg. de DIN1680-GTB16
Tolérance générale de la fonderie selon DIN1680-GTB16

Appendix C

Storage Calculations

PDAS Ltd
Building 4.6 HiTech
Frimley 4 Business Park
Frimley, Camberley
Surrey GU16 7SG



Quote Reference	1645
Date	09.05.2023
Project Reference	PR13435
Date	09.05.2023

Clients Name	Vistry Southern
Site Address	Treetops Nurseries, Allington Lane, Fair Oak

Storage Requirement	
Number of Dwellings	35
Non Domestic Design Flow	0 l/s
Domestic @ 160L / Dwelling	20.100 m3
Industrial 1 Hr @ Design Flow	0.000 m3
Total Required Storage	20.100 m3
Location of Lowest Private Manhole	F06
Invert Level of Lowest Private Manhole	22.630 m

Notes:

Storage in Gravity Manholes					
Manhole Reference	Manhole Diameter (mm)	Max Storage Level (m)	Cover Level (m)	Invert Level (m)	Storage Volume (m3)
F06	1200	22.630	25.003	22.630	0.000
F05	1200	22.630	26.291	23.640	0.000
F04	1200	22.630	26.973	23.835	0.000
F03	1200	22.630	27.167	24.041	0.000
F02	1200	22.630	27.387	24.271	0.000
F01	1200	22.630	27.456	24.365	0.000
Total storage in manholes below detailed maximum storage level					0.000

Private Manhole Invert (m)
24.03
25.3
25.47
25.76
25.9
24.44

Storage in Gravity Sewer Pipes					
Sewer Pipe Run	Sewer Diameter (mm)	Max Storage Level (m)	Length (m)	Upper Invert (m)	Storage Volume (m3)
F01-F02	150	22.630	10.963	24.365	0.000
F02-F03	150	22.630	24.969	24.271	0.000
F03-F04	150	22.630	22.094	24.041	0.000
F04-F05	150	22.630	21.828	23.835	0.000
F05-F06	150	22.630	36.455	23.640	0.000
F06-WW	150	22.630	8.500	22.630	0.000
Total storage in sewers below detailed maximum storage level					0.000

Storage in Wet Well				
	Wet Well Diameter (mm)	Max Storage Level (m)	High Level Alarm (m)	Storage Volume (m3)
Pump Station	3000	22.630	19.275	23.400
Total storage in wet well below detailed maximum storage level				23.400

Summary	
Manholes	0.000 m3
Sewers	0.000 m3
Pump Station	23.400 m3
Total Provided	23.400 m3
Total Required	20.100 m3

Appendix D
Hazardous Area Certification



EC-TYPE-EXAMINATION CERTIFICATE

(Translation)



- (2) Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres - **Directive 94/9/EC**

- (3) EC-type-examination Certificate Number:

PTB 10 ATEX 1062 X

- (4) Equipment: Three-phase motor, types PE 1 and PE 2

- (5) Manufacturer: Cardo Flow Solutions AB

- (6) Address: Roskildevägen 1, SE-201 23 Malmö, Sweden

- (7) This equipment and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to.

- (8) The Physikalisch-Technische Bundesanstalt, notified body No. 0102 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II to the Directive.

The examination and test results are recorded in the confidential test report PTB Ex 10-19149.

- (9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 60079-0:2009

EN 60079-1:2007

- (10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

- (11) This EC-type-examination Certificate relates only to the design, examination and tests of the specified equipment in accordance to the Directive 94/9/EC. Further requirements of the Directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.

- (12) The marking of the equipment shall include the following:

 **II 2 G Ex d IIB T4 resp. T3 Gb**

schutz

Braunschweig, May 30, 2011

ZSEx10100e.dotm

SCHEDULE

(13)

(14) **EC-TYPE-EXAMINATION CERTIFICATE PTB 10 ATEX 1062 X**

(15) Description of equipment

The equipment is a rotating electrical machine. The machine enclosure is a cast construction. The shaft rotates in rolling bearings. Together with the end shield on the drive end it forms a flameproof shaft joint.

For operation in 'G' atmospheres (areas with potentially explosive gas, vapour, mist, air mixtures), the machine is designed to Flameproof Enclosure "d" type of protection.

Technical data

The concrete rated voltage, amperage, electrical performance or frequency values, duty types, liquid temperatures and temperature classes for the different motor series are defined by the manufacturer for the different electro-thermal design versions.

The motors may be connected to electrical low-voltage networks with voltage and frequency tolerances complying with the specifications in EN 60034-1. The "A" or "B" tolerance ranges, or tolerances deviating from these ranges, shall be considered with the temperature measurements that have to be performed by the manufacturer. Motor protection in compliance with the specifications in section 17 shall be provided.

(16) Assessment and Test Report PTB Ex 10-19149

(17) Special conditions for safe use

Repairs on flameproof joints may only be performed in accordance with the manufacturer's design specifications. Repair on the basis of the values in tables 1 and 2 of EN 60079-1 is not permitted.

Additional notes for safe operation:

Components attached or installed (terminal compartments, bushings, cable glands, connectors) shall be of a technical standard that complies with the specifications on the cover sheet. They shall be suited for the operating conditions and have a separate examination certificate. The special conditions specified for the components shall be complied with, and the components shall be included in the type test, if necessary. This equally applies to the components mentioned in the technical description.

With submersible-pump motors, a double-casing design may optionally be used to achieve the required cooling effect for the motor enclosure. With the version with cooling jacket, the stator housing is either cooled with a part stream of the medium that is tapped from the pump pressure compartment, or with a separate, closed cooling cycle and a heat exchanger. Measures must be taken to ensure that the required cooling medium is available (to be monitored, if necessary). This applies, in particular to the version with a closed cooling cycle.

The motors can optionally be operated with an anti-condensation heater, e.g. strip heaters in the winding overhang. Measures must be taken to ensure that the anti-condensation heater can only operate when the motor is at a standstill. The anti-condensation heater performance and its minimum ON period before motor start as a function of the ambient temperature shall be rated so that the entire motor enclosure will be safely heated to a surface temperature of at least -20 °C. The relevant specifications shall be included in the instructions for operation.

The connecting cable shall be of a quality that meets the thermal, chemical and mechanical requirements under field service conditions.

When pipelines are entered into the flameproof connection housing, the specifications in EN 60079-1, section 13.2, shall be observed.

Operation with frequency converter is possible, provided the manufacturer's specifications are complied with.

Compliance with the governing regulations shall be verified for each electro-thermal design of the motors in the form of a type test. In this connection, the requirements in the code of practice

"Merkblatt für die elektrische Auslegung und Prüfung von Motoren in der Zündschutzart Druckfeste Kapselung im Rahmen der EG-Baumusterprüfbescheinigung"

shall be observed. It is the manufacturer's responsibility to perform and log the type tests in compliance with the above code of practice, and to define the operating conditions and the temperature class for every type series.

The motors may be employed only for the duty type and at the ambient conditions for which they were type tested. This also applies to operation with frequency converter.

Temperature monitoring

Standard EN 60079-14, clause 7, allows **duty type S1** motors to be provided with an overcurrent protection device with inverse time-delay operation (motor protection switch) as the only overload protection, **or** a combined protection consisting of temperature sensors embedded in the winding (e.g. PTC resistors) and a tripping unit.

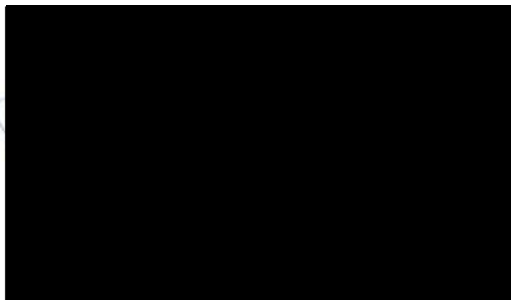
For motor operation with **duty types other than S1 and operation with frequency converter**, a combined protection consisting of temperature sensors embedded in the winding (e.g. PTC resistors) and a tripping unit is permitted as the only overload protection.

For the version with temperature sensors embedded in the winding, at least one sensor shall be provided for each phase.

Monitoring devices shall meet the requirements in Directive 94/9/EC and EN 1127-1. If non-approved monitoring devices are used, successful function testing shall be separately demonstrated and documented. The devices shall be included into the operating company's regular supervision programme. A note to this effect shall be included in the instructions for operation of the motor.

(18) Essential health and safety requirements

Met by compliance with the afore-mentioned Standards.



tz

Braunschweig, May 30, 2011



[13] Schedule

[14] **EU-TYPE EXAMINATION CERTIFICATE No** **Nemko 10ATEX1082** **Issue 5**

[15] **Description of Product**

ENM-10 is a level switch for use to control of pumps and valves. The regulator casing is made of conductive polypropylene with a maximum 50.2m permanently mounted cable.

Type Designations

ENM-10

Electrical Safety Parameters

Maximum input voltage:	Ui: 30V
Maximum input current:	Ii: 100mA
Maximum input power:	Pi : 1.2W
Maximum capacitance:	Ci: 4nF
Maximum inductance:	Li: 29µH

[16] **Report No. D0004032 rev.2**

Descriptive Documents

Number	Title	Rev	Date
5947910	Level switch unit ENM-10	11	2021-02-23
5947910X	Level switch unit ENM-10	5	2021-02-23
4668902	Marking tape	4	2020-06-02

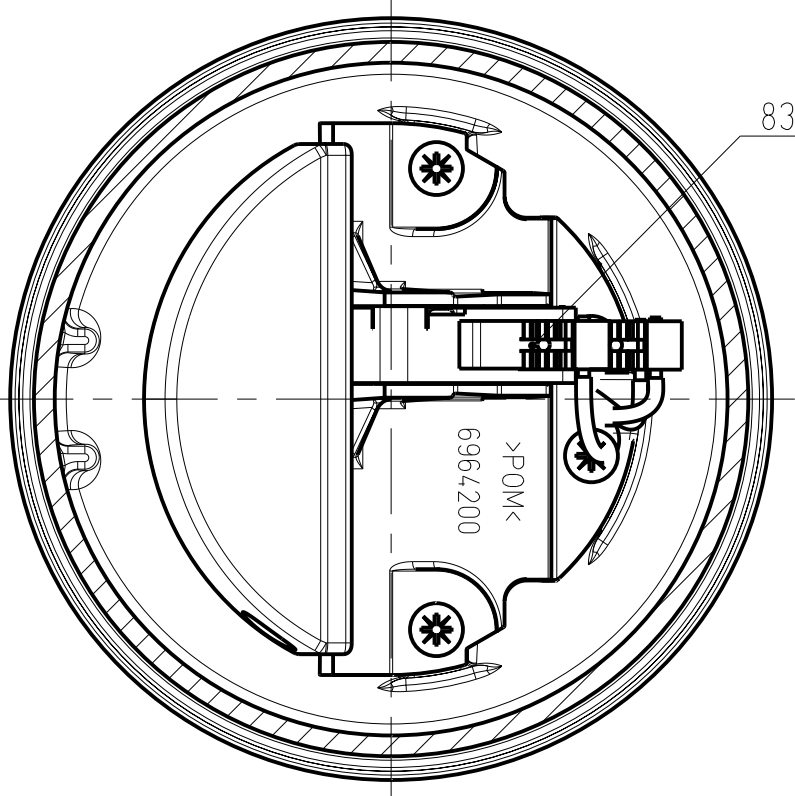
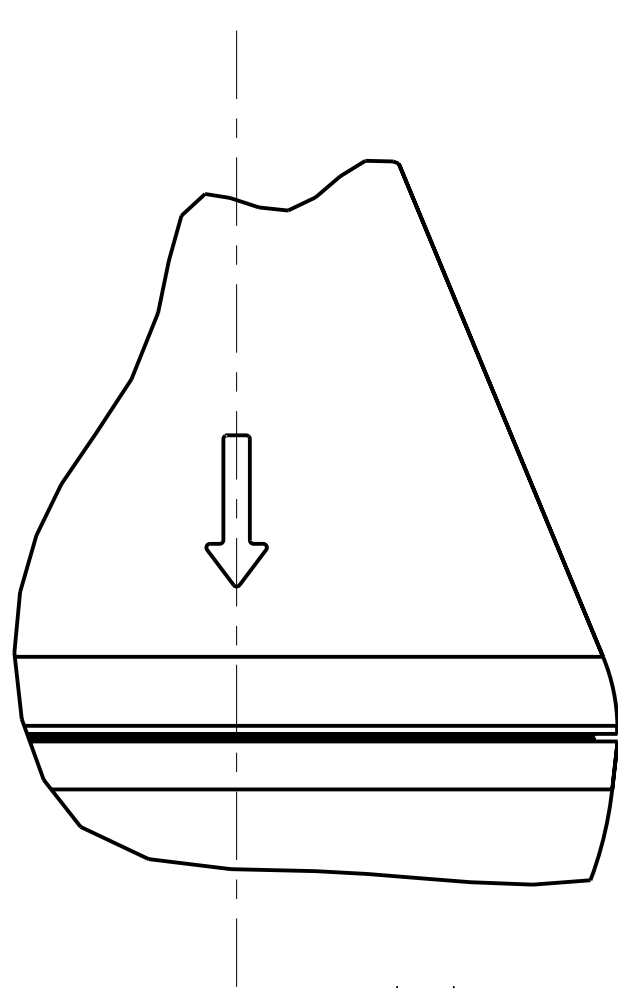
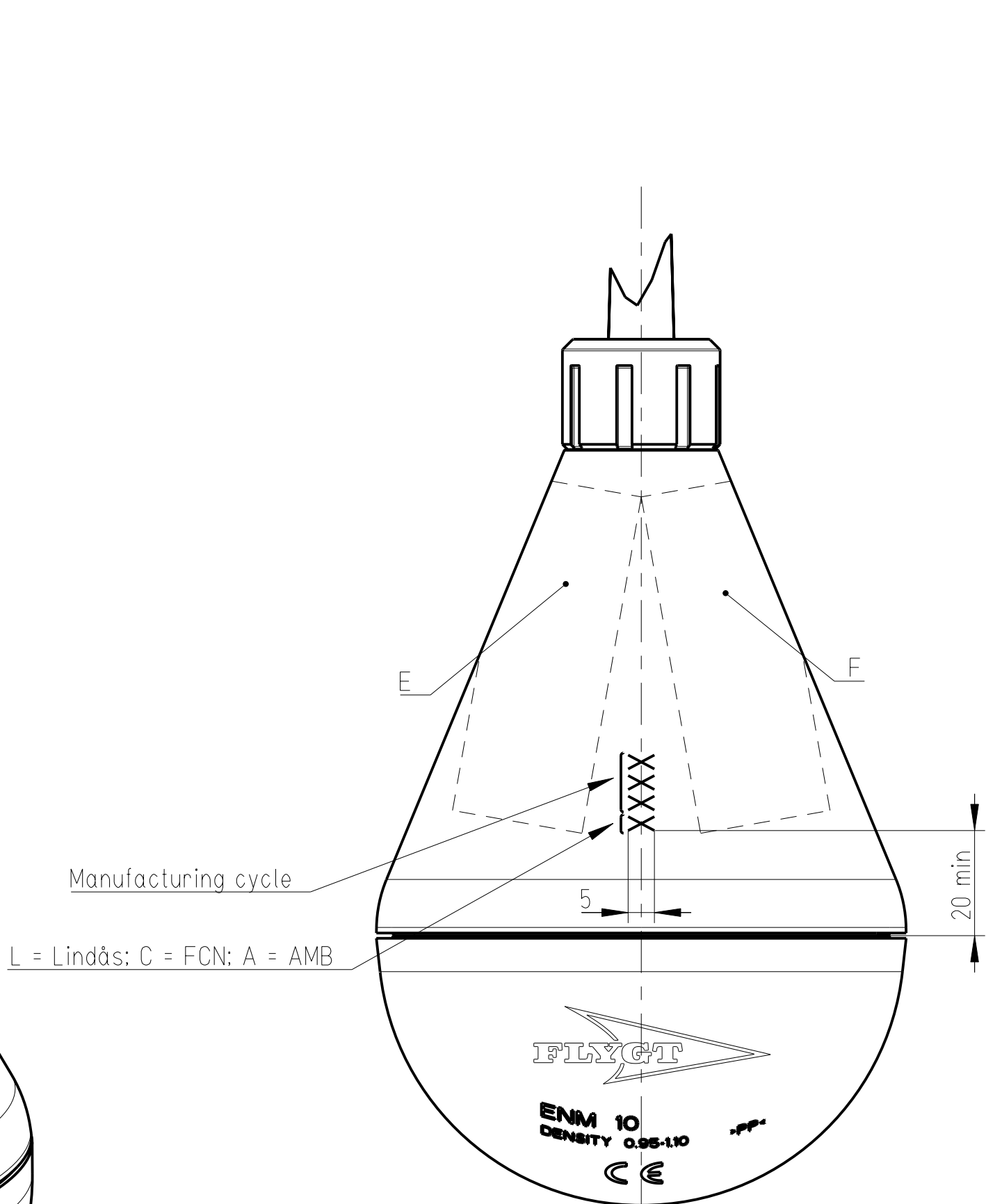
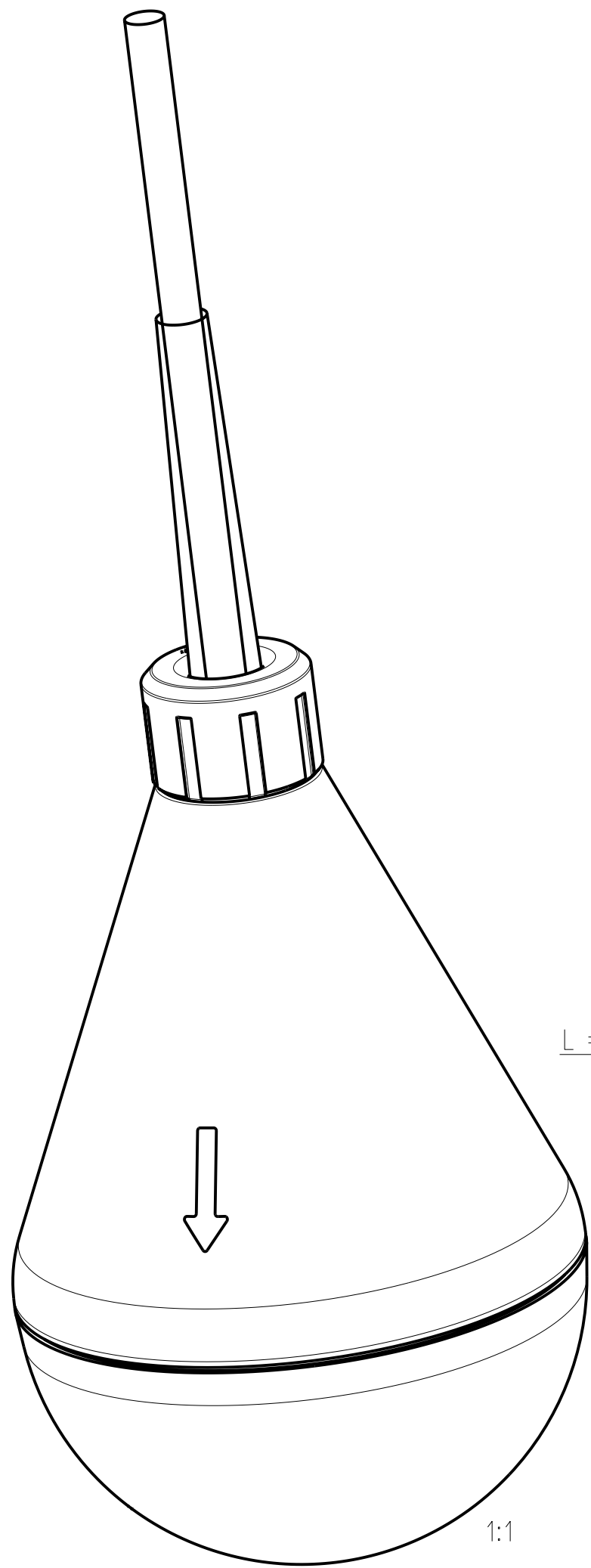
Certificate History and Associated Nemko Reports

Issue	Date	Report	Description
0	2010-05-05	124397	Prime Certificate released
1	2015-11-12	D0001769	Update to latest edition of standards EN60079-0:2012 and EN60079-11:2012 and change of company name.
2	2018-05-23	D0001769 rev.1	Descriptive documents revision update.
3	2019-10-08	D0004032	Change of microswitch component and descriptive documents revision update.
4	2020-06-18	D0004032 rev.1	Extended cable length from max. 20m to 50m and descriptive documents revision update.
5	2021-04-13	D0004032 rev.2	Upgrade to latest edition of standard EN IEC 60079-0:2018, and descriptive documents revision update.

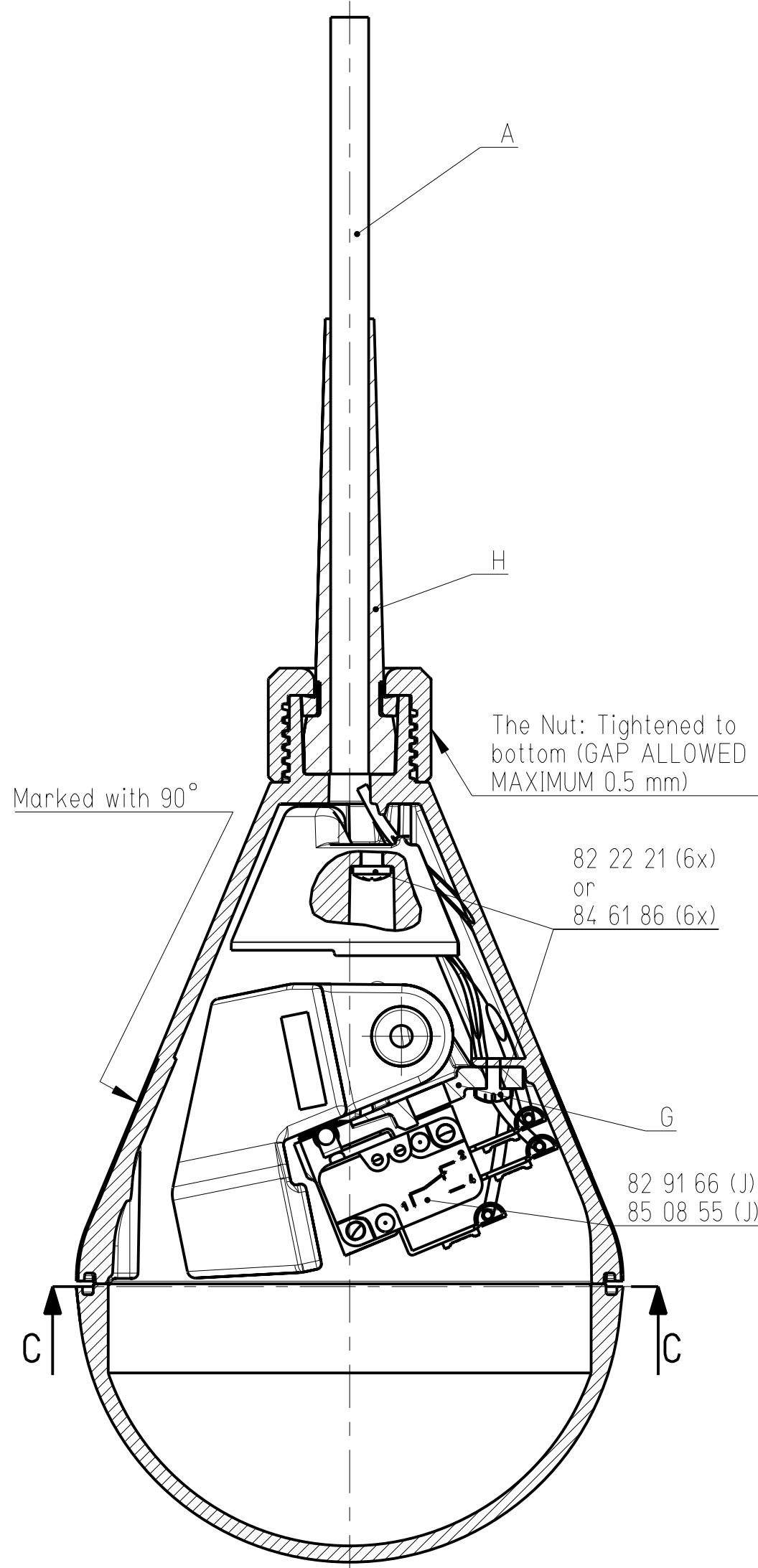
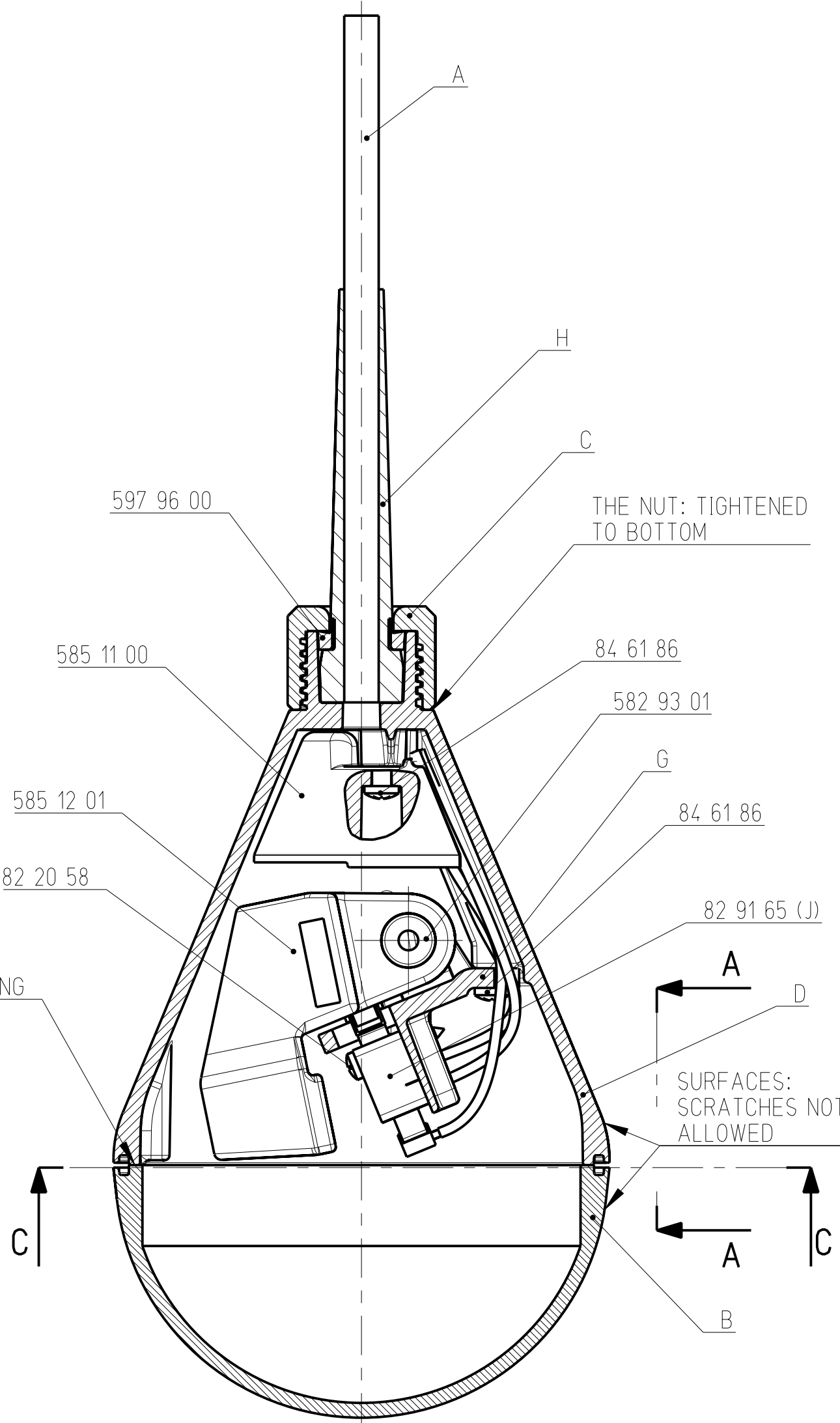
[17] **Specific Conditions of Use**
None

[18] **Essential Health and Safety Requirements**
Essential Health and Safety Requirements (EHSRs) are covered by the standards listed at item 9

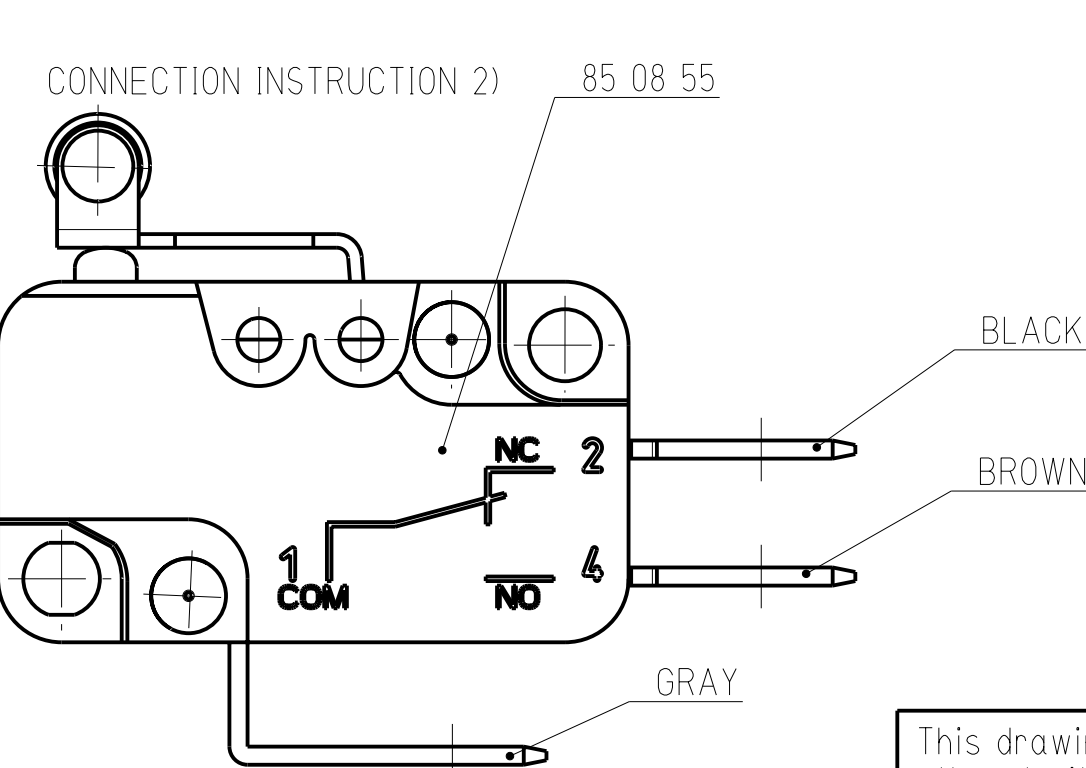
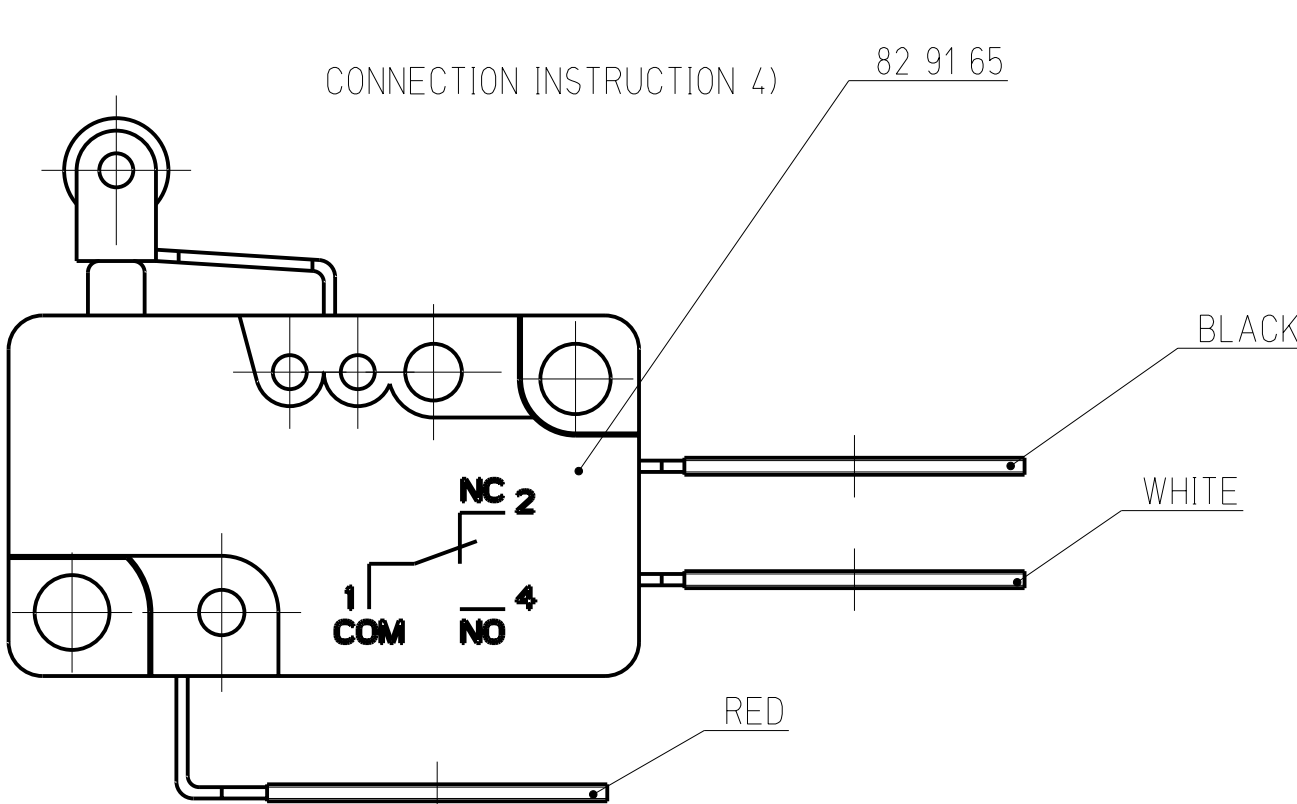
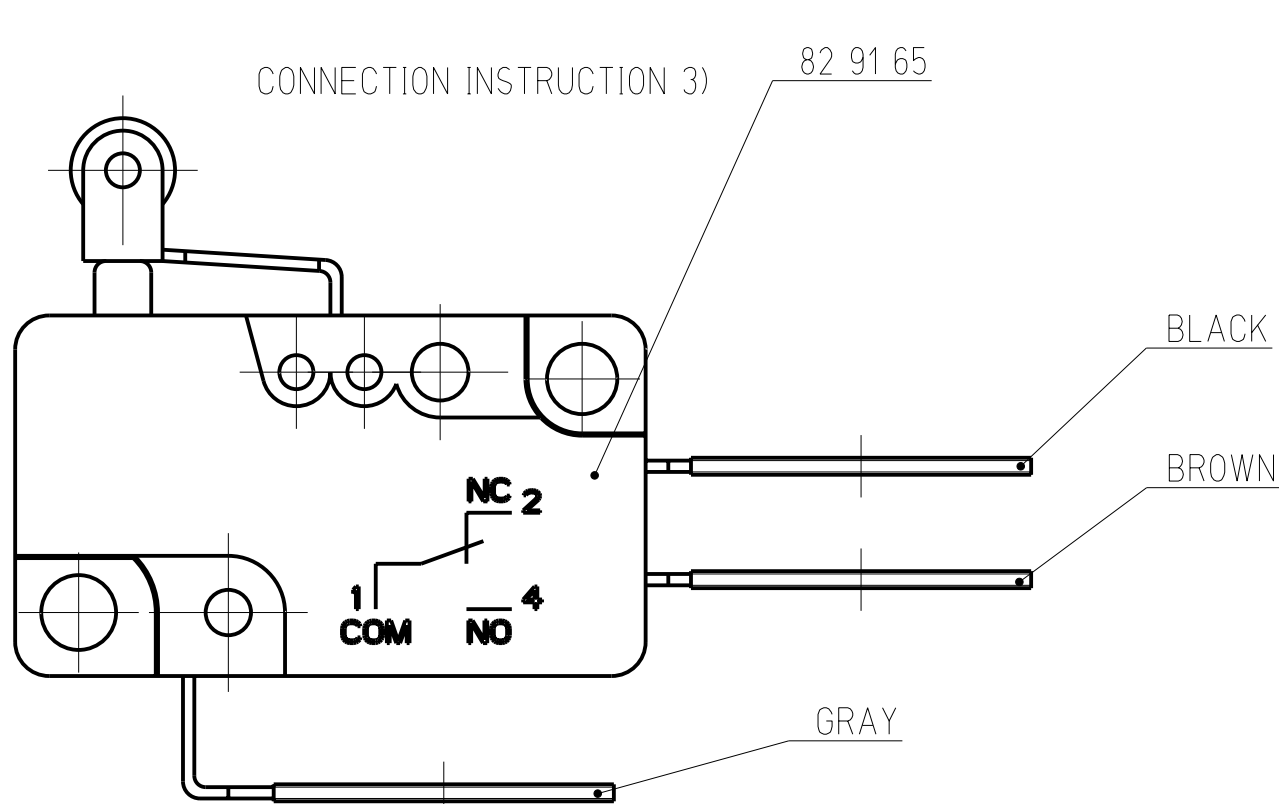
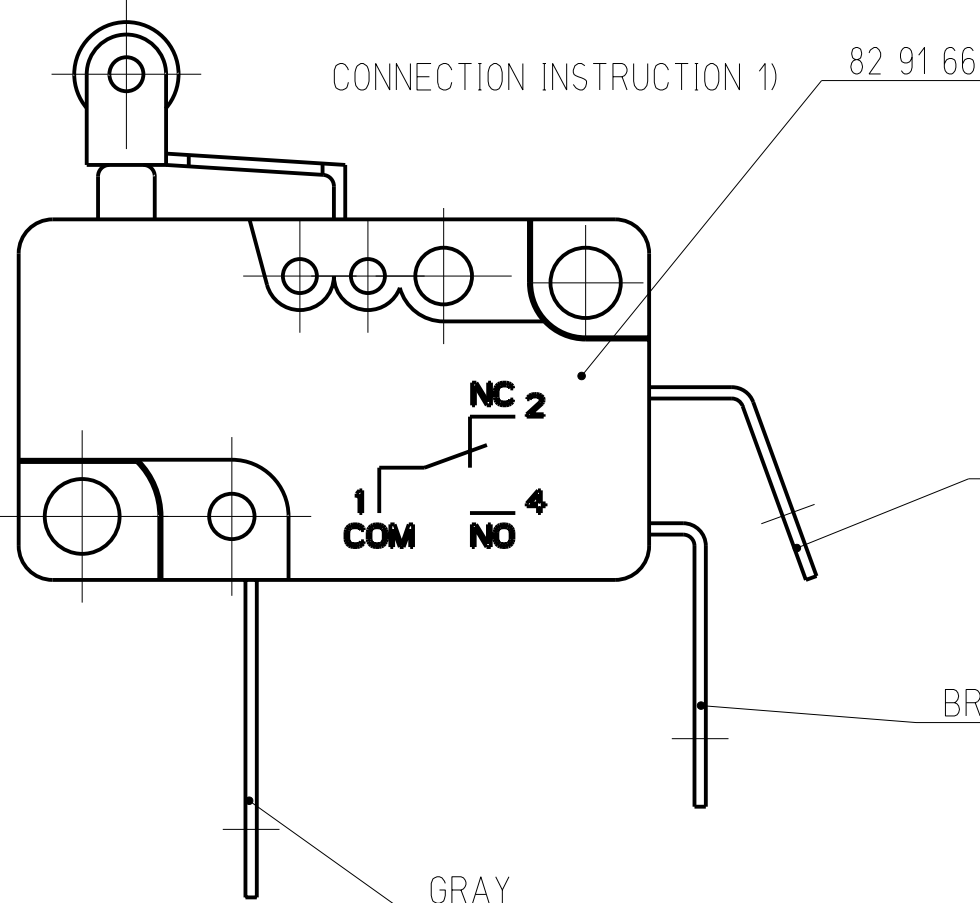
C-C


$$C - C$$

$$A - A$$

VIBRATION WELDED
ULTRASONIC WELDED
NO GAP ALLOWED AFTER WELDING



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Var: 594 79 19
      594 79 20
      594 79 21
      594 79 40
      594 79 41
      594 79 42
      594 79 49
      594 79 50
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MATERIAL:PLASTIC, SEE:FLYGT STD:A4090.01
*) SURFACES: 0.8/

This drawing may not be altered without permission of authorities listed below.

EN

Applicable to Approved Products

ENM 10

Material	—
M class	4300
Weight (Kg)	—
Treatment	(*)
Blank	—

94 20 30	NBR/PVC	H05RN-F 3x0,75 mm ² (Black)
94 16 89 S	PVC	NSC S2070-R80B (Blue) (RAL5002)
94 16 85	PVC	NSC S2070-R80B (Blue) (RAL5002)
A	Cable type	Colour of sheath

xylem

Denomination
Level switch unit ENM-10

Sheet 1 of 1

Drawing No. _____

Rev	
-----	--

Level Measurement

Continuous level measurement - Ultrasonic transducers

EchoMax XRS-5

Overview



EchoMax XRS-5 ultrasonic transducer provides reliable, continuous level monitoring of liquids and slurries in narrow lift stations/wet wells, flumes, weirs and filter beds using a beam angle of just 10° and a CSM rubber face.

Benefits

- Narrow beam angle of only 10°
- Chemically resistant PVDF copolymer enclosure and CSM rubber face
- Measuring range: 8 m (26 ft) for measurement of liquids and slurries
- Fully submersible: IP68 degree of protection
- Easy installation with 1" NPT or R 1" BSPT connection

Application

The XRS-5 is non-contacting with a measuring range from 0.3 ... 8 m (1 ... 26 ft). Advanced echo processing ensures reliable data even in conditions with obstructions, turbulence and foam.

The hermetically sealed CSM rubber face and the PVDF copolymer enclosure are designed for maximum resistance to methane, salt water, caustics and harsh chemicals common to wastewater installations. With an IP68 degree of protection, this rugged sensor is fully submersible in the event of flood conditions. Use a submergence shield if full submergence is possible in the application. A submergence shield will maintain a high level reading output during submerged conditions.

The low-cost XRS-5 transducer is compatible with a full range of Siemens controllers, from a basic system for high/low alarm or simple pump control, up to advanced control systems with communications, telemetry and SCADA integration capabilities.

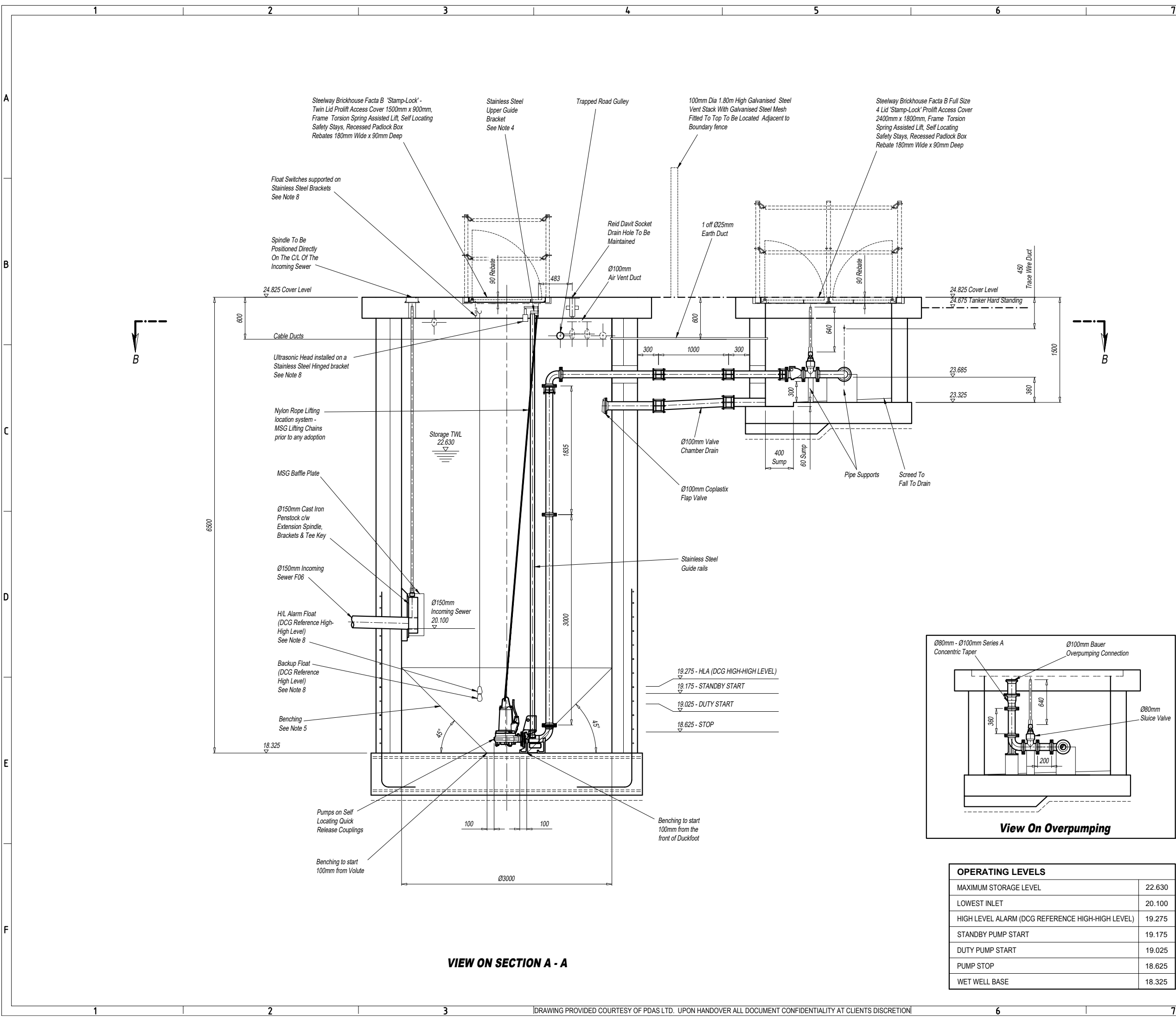
- Key Applications: wet wells, flumes, weirs, filter beds

Technical specifications

Mode of operation	
Measuring principle	Ultrasonic transducer
Input	
Measuring range	0.3 ... 8 m (1 ... 26 ft), dependent on application
Output	
Frequency	44 kHz
Beam angle	10°
Accuracy	
Temperature error	Compensated by integral temperature sensor
Rated operating conditions	
Vessel pressure	Normal atmospheric pressure
Ambient conditions	
• Ambient temperature	-20 ... +65 °C (-4 ... +149 ° F)
Design	
Weight (approximate shipping weight of sensor with standard cable length)	1.2 kg (2.6 lb)
Material (enclosure)	PVDF copolymer enclosure and CSM face
Process connection	1" NPT [(Taper), ANSI/ASME B1.20.1] or R 1" [(BSPT), EN 10226]
Degree of protection	IP65/IP68
Cable connection	2-core shielded/twisted, 0.5 mm ² (20 AWG), PVC sheath
Cable (max. length)	• 365 m (1 200 ft) with RG 62 A/U coaxial cable • 365 m (1 200 ft) with 2-core twisted pair, foil shield, 0.5 mm² (20 AWG), PVC sheath, only for MultiRanger 100/200
Options	
Flange version	Factory flange with PTFE face for ASME, EN or JIS configuration
Submergence shield	For applications with flooding possible
Certificates and approvals	
CE, RCM, KCC	
CSA Class I, Div. 2, Groups A,B,C,D, Class II, Div. 1 Groups E,F,G	
FM Class I, Zone 1, AEx m IIC, T6 Class II, III, Div. 1, Groups E,F,G T6	
ATEX II 2GD / IECEx / INMETRO Ex mb IIC T6 Gb, Ex tb IIIC T85 °C Db	

Appendix E

Pump Station Drawings



- NOTES**
- DO NOT SCALE.
 - UNLESS OTHERWISE STATED ALL DIMENSIONS ARE IN MILLIMETRES AND ALL INVERTS IN METRES AOD.
 - 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.
 - REINFORCING BARS ARE TO BE A MINIMUM OF 75MM BELOW THE SURFACE. ANY STRUCTURAL DETAILING / CIVIL WORKS SHOWN ON THIS DRAWING ARE ILLUSTRATIVE ONLY UNLESS OTHERWISE STATED AND SHOULD NOT BE USED FOR CONSTRUCTION.
 - BENCHING IS TO BE FORMED AFTER PUMP INSTALLATION AND TO BE IN ACCORDANCE WITH THE APPLICABLE DESIGN AND CONSTRUCTION GUIDANCE AND ADOPTING AUTHORITY SPECIFICATION.
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 - DUCT ROUTES ARE SHOWN DIAGRAMMATICALLY ONLY. ALL DUCTS LAID IN THE MOST DIRECT ROUTE TO SUIT THE SERVICE BEING CARRIED AVOIDING ANY ACUTE CHANGES OF DIRECTION.
 - 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	XFP 80C CB1.3
IMPELLER		185
MOTOR RATING		2.95
FULL LOAD CURRENT		6.4
ZONE RATING		NON EXP
DUTY FLOW		4.75 L/Sec
HEAD GENERATED		8.88m
LEVEL CONTROLS		SIEMENS HYDRORANGE 200 C/W HIGH LEVEL ALARM AND BACKUP FLOAT SWITCHES
PIPE / VALVE SIZE		Ø80mm

FINAL DISCHARGE		
INTERNAL DIAMETER	Ø80mm-Ø100mm FLAT TAPER	
MATERIAL	DUCTILE IRON	
TERMINATION	FLANGE ENDED	
PIPE OD	NA	
FLANGE DATA	Ø100mm PN16	
RISING MAIN	110mm OD PE100 SDR11 (89.1mm ID)	
RISING MAIN COUPLER	BY OTHERS	

C	09/05/23	Levels, pump specification, head generated and wet well depth updated and baffle plate detail added.	K.A.	-	P.W.
B	27/04/23	Redesign as per clients latest Site Plan	N.K.	-	P.W.
A	10/10/22	Redesign as per clients new site plan and to adoptable standard.	N.K.	-	P.W.
REV	DATE	DESCRIPTION	DR'n	CHK'd	APR'l

FOR APPROVAL



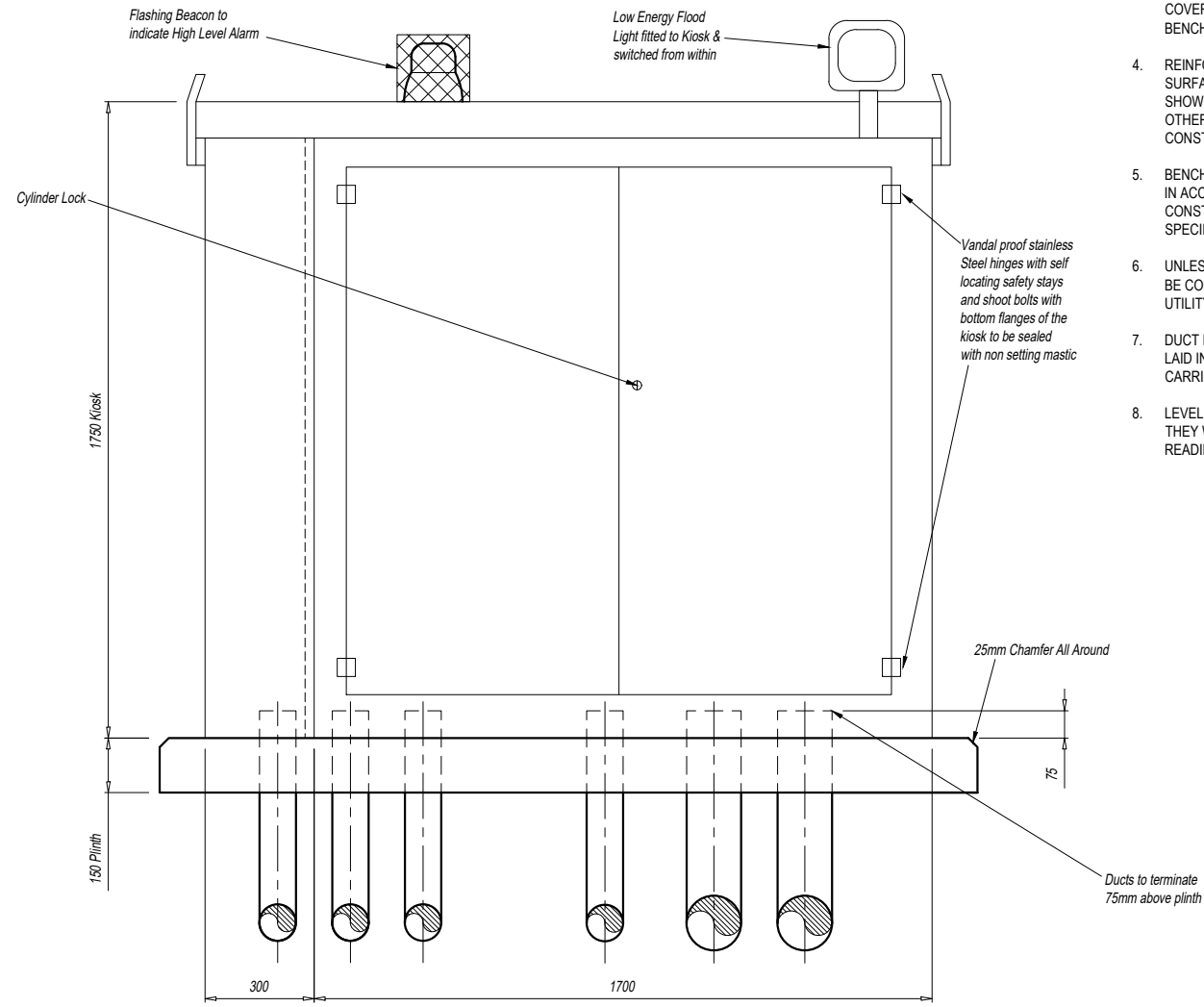
DESIGN
INSTALL
PROACTIVE

TOTAL WATER EXPERTISE

BUILDING 4 & 6, HITECH, FRIMLEY 4 BUSINESS PARK, FRIMLEY, CAMBERLEY, SURREY, GU16 7SG
OFFICE TEL No. (01483) 930520
WEBSITE WWW.PDASLTD.CO.UK

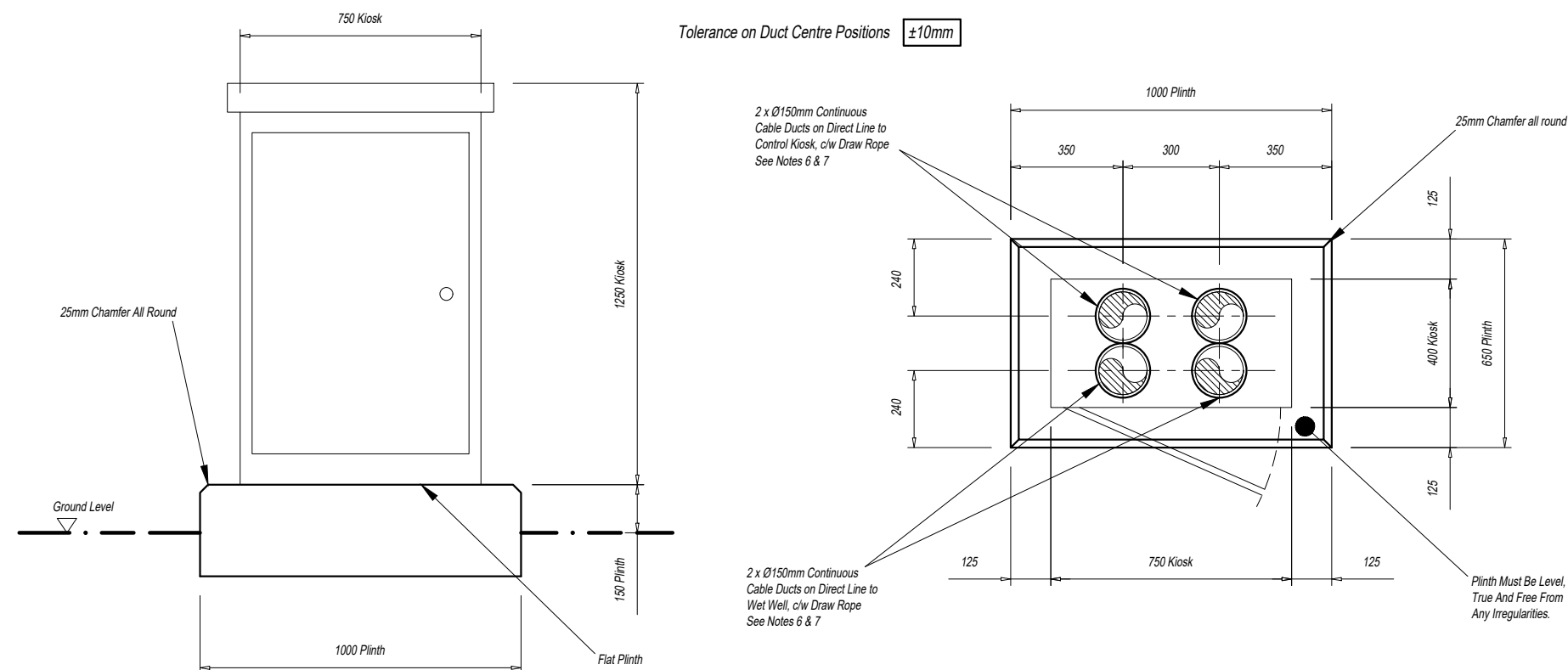
PROJECT	TREETOPS NURSERIES ALLINGTON LANE, FAIR OAK		
TITLE	FOUL WATER PUMP STATION ELEVATION VIEW		
CLIENT	VISTRY SOUTHERN		
SCALE AT A1	1:25	SCALE AT A3	1:50
SITE ID.	1645	APR'l	P.W. DATE 27-04-2023
JOB NO.	13435	CHK'd	P.W. DATE 27-04-2023
DRAWING NUMBER	1645-13435-001	DR'n	N.K. DATE 27-04-2023

NOTE: Ducts to terminate 75mm proud of plinth



- NOTES**
1. DO NOT SCALE.
 2. UNLESS OTHERWISE STATED ALL DIMENSIONS ARE IN MILLIMETRES AND ALL INVERTS IN METRES AOD.
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 5. BENCHING IS TO BE FORMED AFTER PUMP INSTALLATION AND TO BE IN ACCORDANCE WITH THE APPLICABLE DESIGN AND CONSTRUCTION GUIDANCE 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.
 7. DUCT ROUTES ARE SHOWN DIAGRAMMATICALLY ONLY. ALL DUCTS LAID IN THE MOST DIRECT ROUTE TO SUIT THE SERVICE BEING CARRIED AVOIDING ANY ACUTE CHANGES OF DIRECTION.
 8. LEVEL CONTROL POSITIONS ARE SHOWN DIAGRAMMATICALLY ONLY. THEY WILL BE POSITIONED AWAY FROM OBSTRUCTIONS AND BE READILY ADJUSTABLE AFTER INSTALLATION.

Tolerance on Duct Centre Positions $\pm 10\text{mm}$



B	27/04/23	Redesign as per clients latest Site Plan	N.K.	-	P.W.
A	11/10/22	Redesign as per clients new site plan and to adoptable standard.	N.K.	-	P.W.
REV	DATE	DESCRIPTION	DR'n	CHK'd	APR'l

FOR APPROVAL



BUILDING 4.6, HITECH, FRIMLEY 4 BUSINESS PARK, FRIMLEY, CAMBERLEY, SURREY, GU16 7SG	OFFICE TEL No. (01483) 930520	WEBSITE WWW.PDASLTD.CO.UK
--	----------------------------------	------------------------------

PROJECT **TREETOPS NURSERIES**
ALLINGTON LANE, FAIR OAK

TITLE	FOUL WATER PUMP STATION KIOSK AND PLINTH DETAIL
-------	--

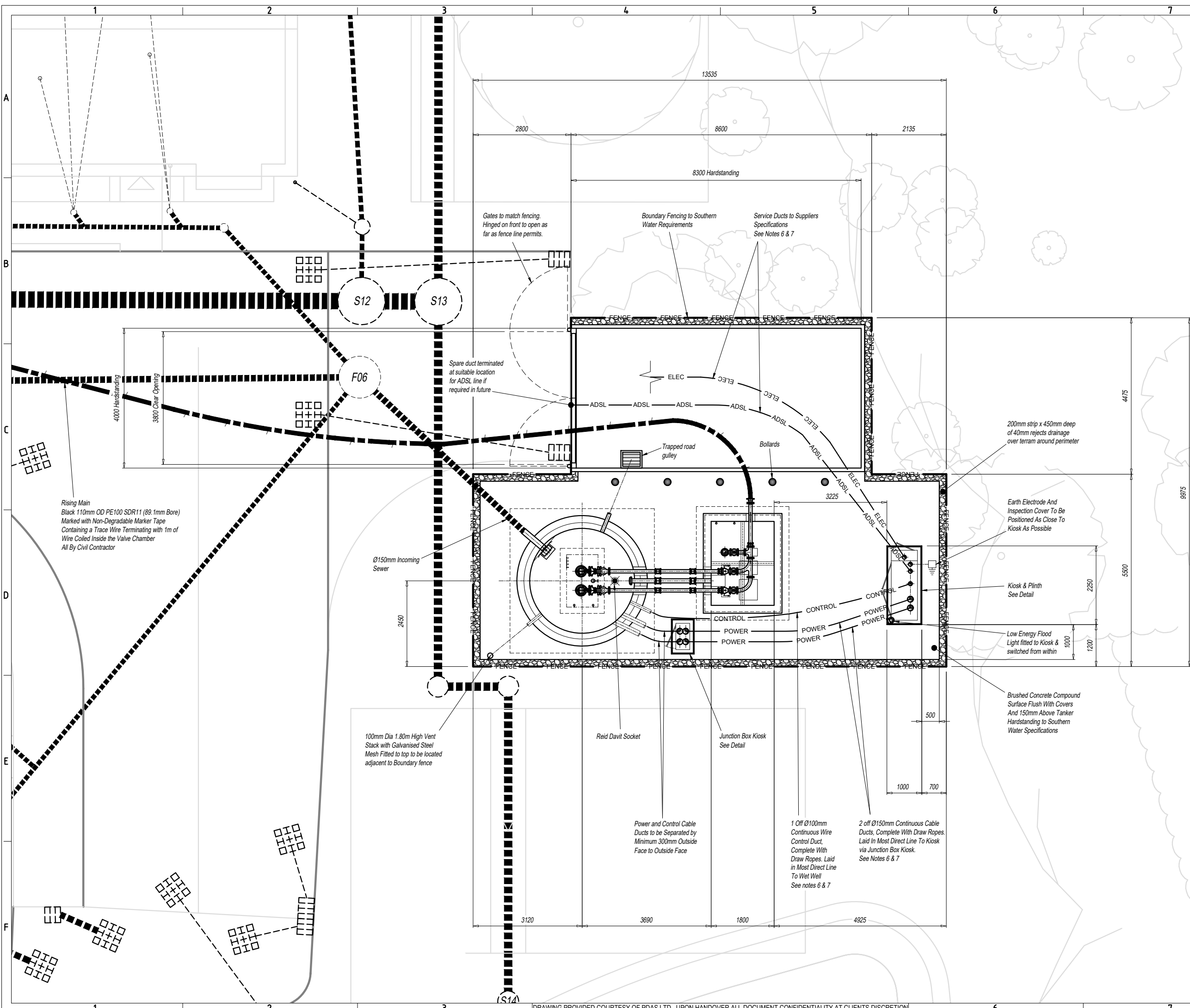
CLIENT	VISTRY SOUTHERN
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SCALE AT A1	1:10	SCALE AT A2	1:20
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SITE	1645	APR1	P.W.	DATE	27-04-2023
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JOB NO. 13435	CHK'd P.W.	DATE 27-04-2023
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DRAWING NUMBER	1645-13435-003	DR'n	N.K.	DATE	27-04-2023
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- NOTES**
- DO NOT SCALE.
 - UNLESS OTHERWISE STATED ALL DIMENSIONS ARE IN MILLIMETRES AND ALL INVERTS IN METRES AOD.
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D	09/05/23	Site detail updated to latest data.	K.A.	-	P.W.
C	27/04/23	Redesign as per clients latest Site Plan	N.K.	-	P.W.
B	22/02/23	Compound and Hardstanding length updated.	N.K.	-	P.W.
A	11/10/22	Redesign as per clients new site plan and to adoptable standard.	N.K.	-	P.W.
REV	DATE	DESCRIPTION	DR'n	CHK'd	APR'l

FOR APPROVAL

PDAS DESIGN
TOTAL WATER EXPERTISE INSTALL
PROACTIVE

BUILDING 4.6, HITECH, FRIMLEY 4 BUSINESS PARK, FRIMLEY, CAMBERLEY, SURREY, GU16 7SG OFFICE TEL No. (01483) 930520 WEBSITE WWW.PDASLTD.CO.UK

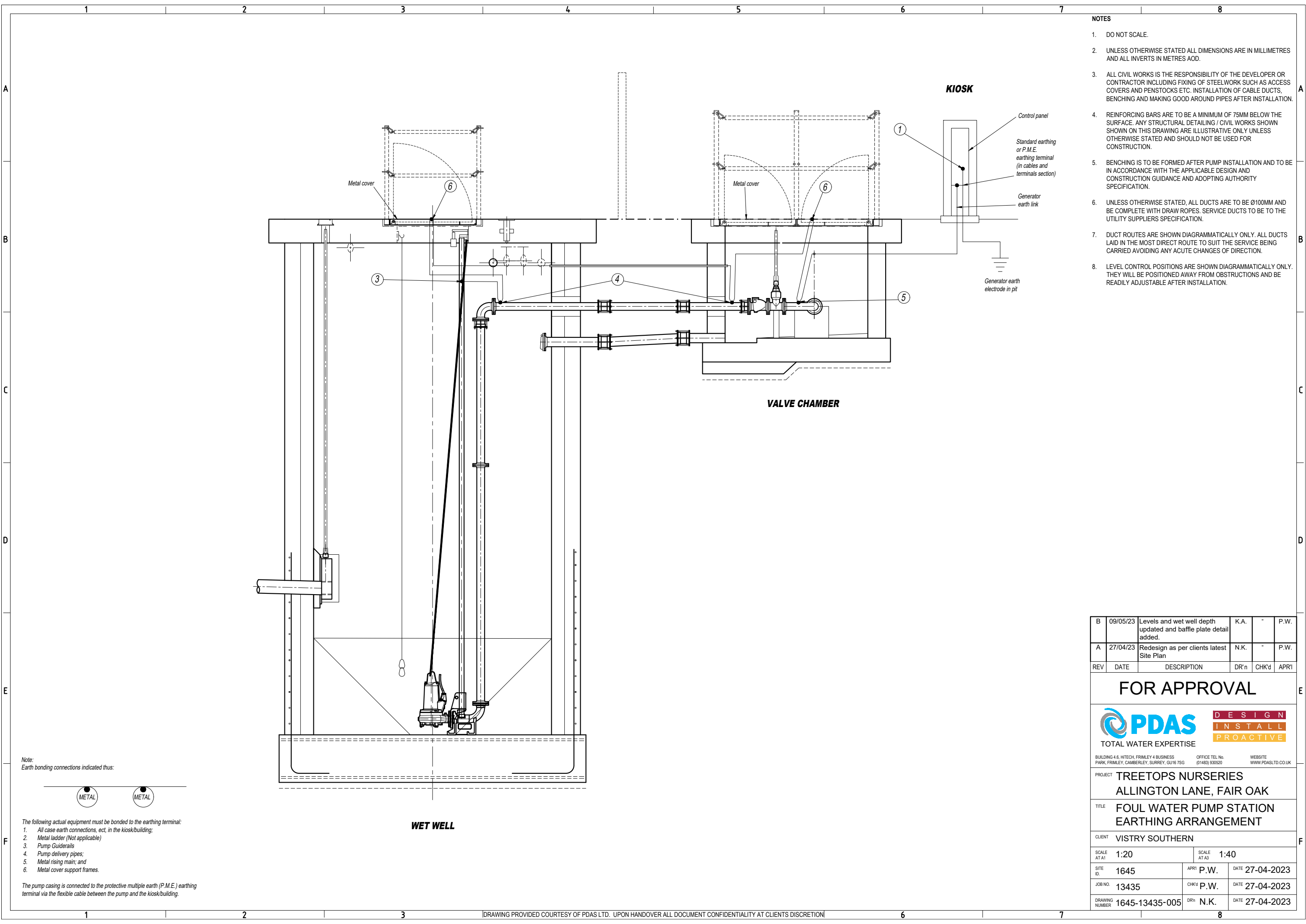
PROJECT **TREETOPS NURSERIES**
ALLINGTON LANE, FAIR OAK

TITLE **FOUL WATER PUMP STATION**
SITE PLAN

CLIENT **VISTRY SOUTHERN**

SCALE AT A1 **1:50** SCALE AT A3 **1:100**

SITE ID.	1645	APR'l	P.W.	DATE	10-10-2022
JOB NO.	13435	CHK'd	P.W.	DATE	10-10-2022
DRAWING NUMBER	1645-13435-004	DR'n	N.K.	DATE	10-10-2022



- NOTES**
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 - LEVEL CONTROL POSITIONS ARE SHOWN DIAGRAMMATICALLY ONLY. THEY WILL BE POSITIONED AWAY FROM OBSTRUCTIONS AND BE READILY ADJUSTABLE AFTER INSTALLATION.

B	09/05/23	Levels and wet well depth updated and baffle plate detail added.	K.A.	-	P.W.
A	27/04/23	Redesign as per clients latest Site Plan	N.K.	-	P.W.
REV	DATE	DESCRIPTION	DR'n	CHK'd	APR'l

FOR APPROVAL



BUILDING 4 & 5, HITECH, FRIMLEY 4 BUSINESS PARK, FRIMLEY, CAMBERLEY, SURREY, GU16 7SG OFFICE TEL No. (01483) 930520 WEBSITE WWW.PDASLTD.CO.UK

PROJECT **TREETOPS NURSERIES**
ALLINGTON LANE, FAIR OAK

TITLE **FOUL WATER PUMP STATION**
EARTHING ARRANGEMENT

CLIENT **VISTRY SOUTHERN**

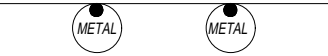
SCALE AT A1 **1:20** SCALE AT A3 **1:40**

SITE ID. **1645** APR'l **P.W.** DATE **27-04-2023**

JOB NO. **13435** CHK'd **P.W.** DATE **27-04-2023**

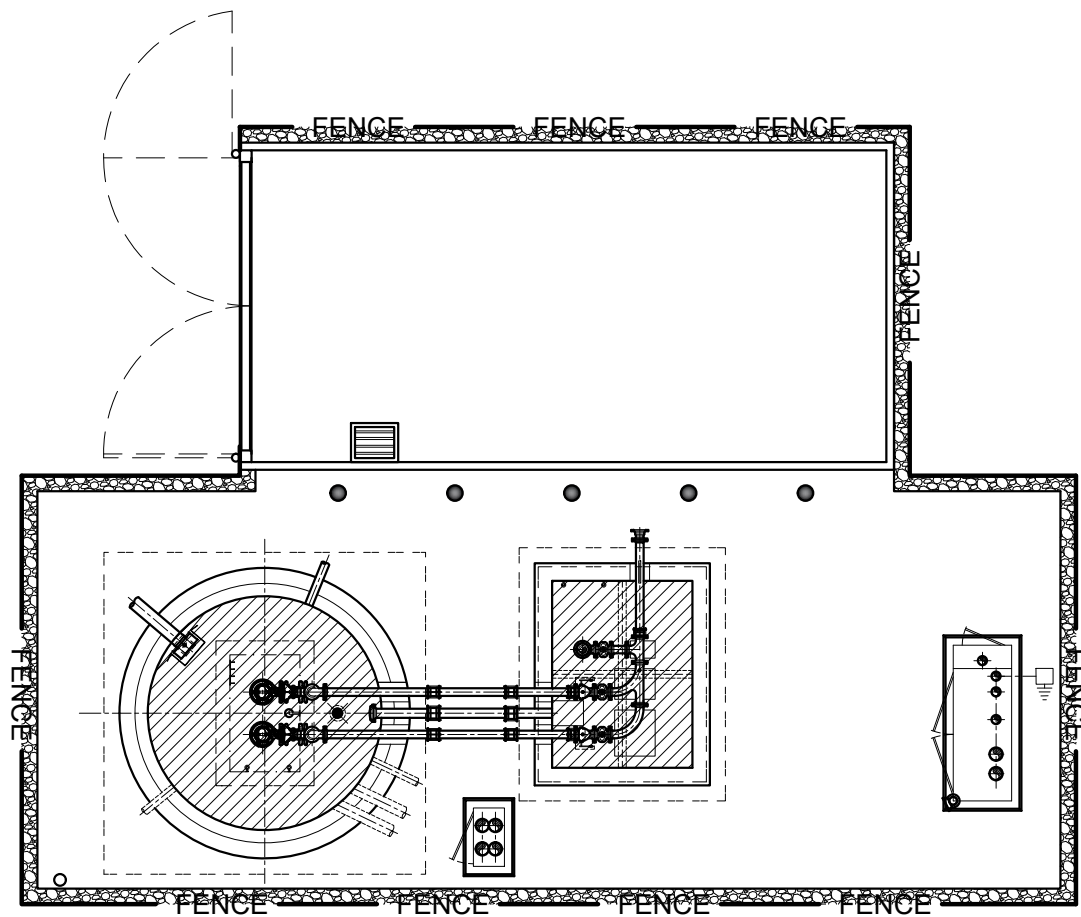
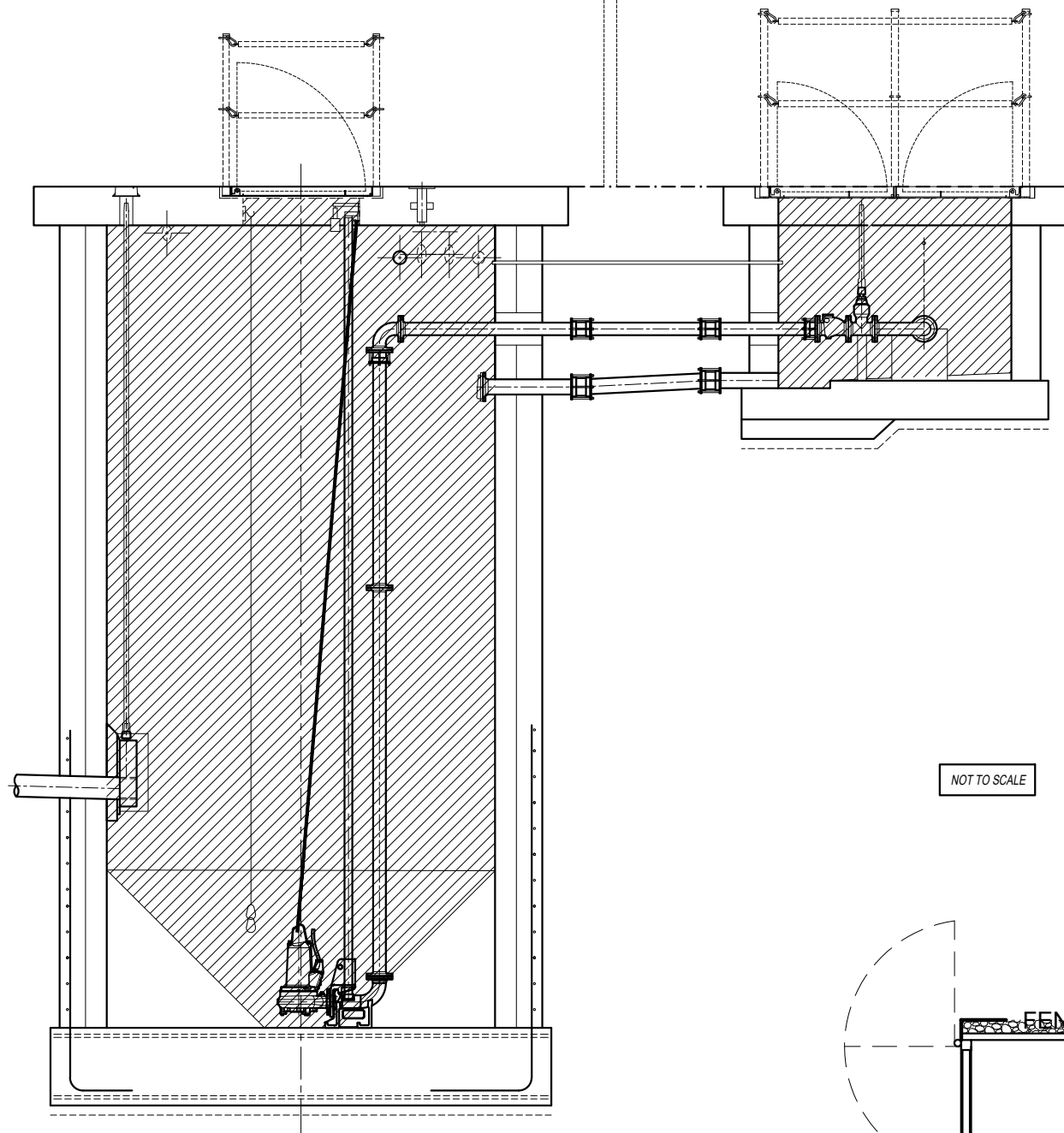
DRAWING NUMBER **1645-13435-005** DR'n **N.K.** DATE **27-04-2023**

Note:
Earth bonding connections indicated thus:



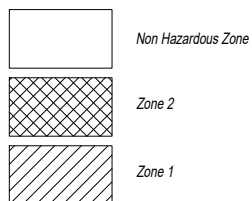
- The following actual equipment must be bonded to the earthing terminal:
- All case earth connections, ect, in the kiosk/building;
 - Metal ladder (Not applicable)
 - Pump Guiderails
 - Pump delivery pipes;
 - Metal rising main; and
 - Metal cover support frames.

The pump casing is connected to the protective multiple earth (P.M.E.) earthing terminal via the flexible cable between the pump and the kiosk/building.



Cable Ducts in accordance with DCG F.3.4.4 and BS EN 1401-01 & BS 4680 sealed with rise sealant system Gas + waterproof sealant system

LEGEND



NOTES

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C	09/05/23	Levels and wet well depth updated and baffle plate detail added.	K.A.	-	P.W.
B	27/04/23	Redesign as per clients latest Site Plan	N.K.	-	P.W.
A	22/10/23	Compound and Hardstanding length updated.	N.K.	-	P.W.
REV	DATE	DESCRIPTION	DR'n	CHK'd	APR'l

FOR APPROVAL



DESIGN
INSTALL
PROACTIVE

TOTAL WATER EXPERTISE

BUILDING 4 B, ITECH, FRIMLEY 4 BUSINESS PARK, FRIMLEY, CAMBERLEY, SURREY, GU16 7SG

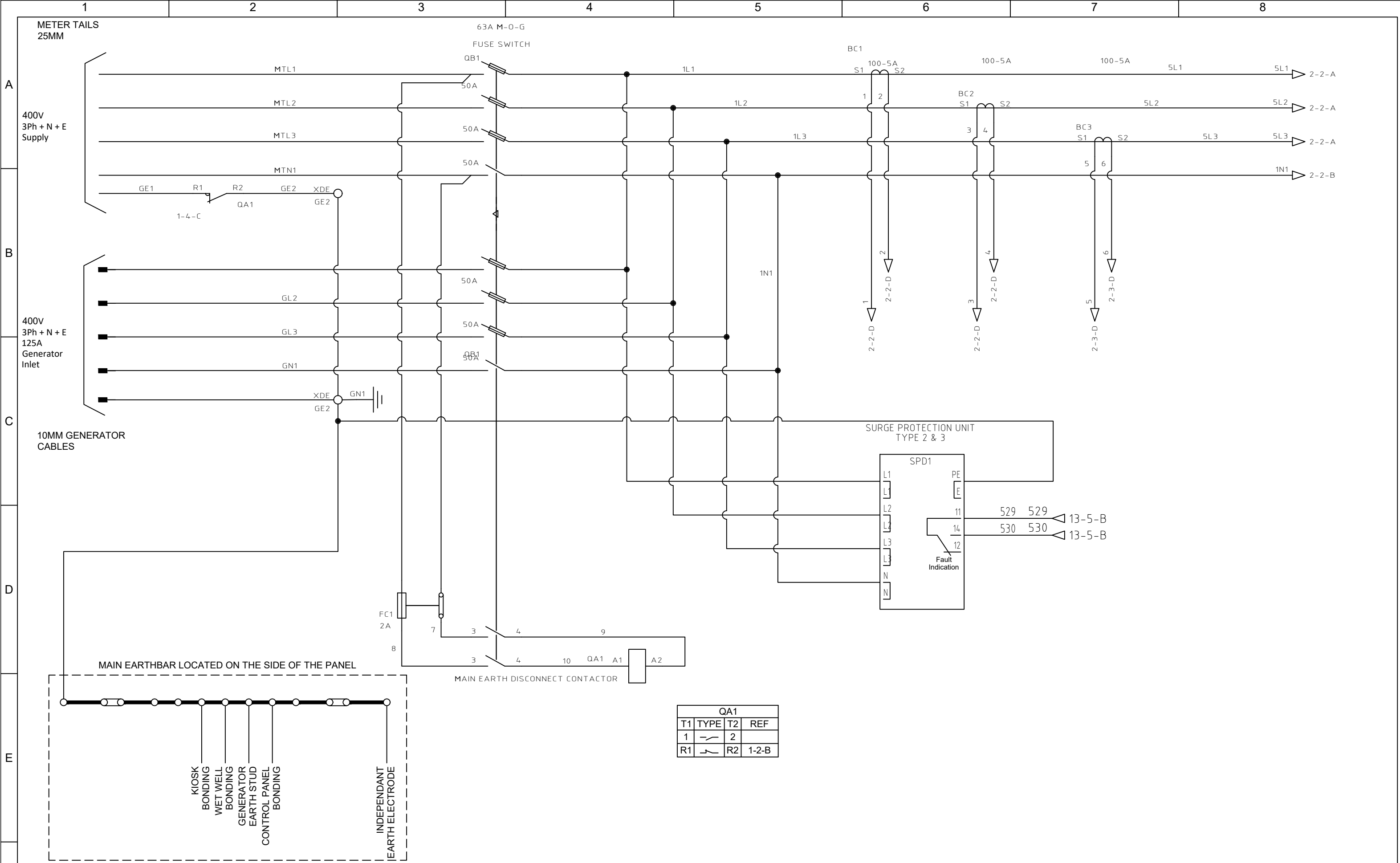
OFFICE TEL No. (01483) 930520

WEBSITE WWW.PDASLTD.CO.UK

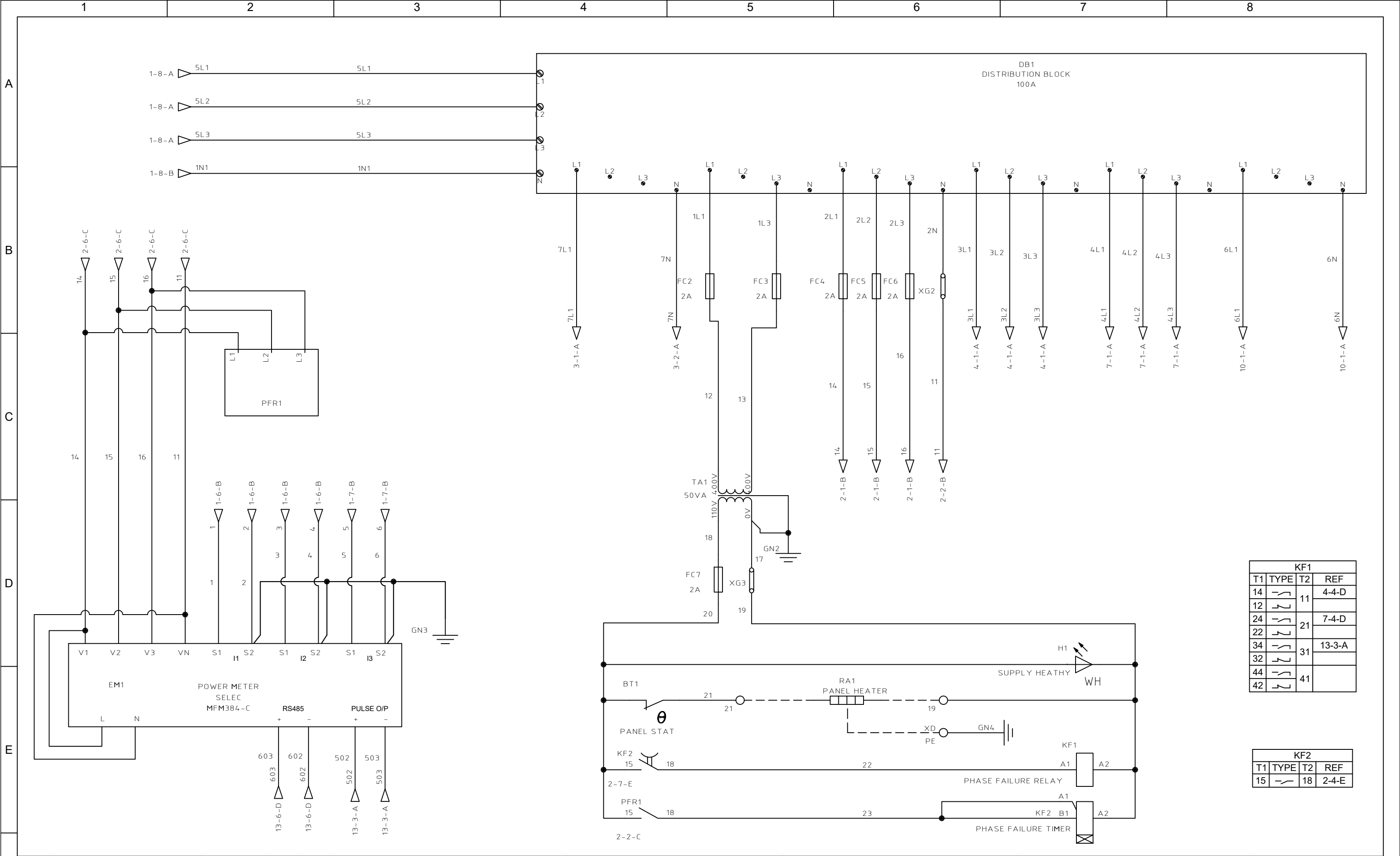
PROJECT	TREETOPS NURSERIES ALLINGTON LANE, FAIR OAK				
TITLE	FOUL WATER PUMP STATION HAZARDOUS ZONING				
CLIENT	VISTRY SOUTHERN				
SCALE AT A1	1:25	SCALE AT A3	1:50		
SITE ID.	1645	APR'l	P.W.	DATE	27-04-2023
JOB NO.	13435	CHK'd	P.W.	DATE	27-04-2023
DRAWING NUMBER	1645-13435-006	DR'n	N.K.	DATE	27-04-2023

Appendix F

Wiring Diagrams



F						Client Name Vistry Southern		 gemini control systems ltd designers and manufacturers	 APPROVED CONTRACTOR GEMINI CONTROL SYSTEMS LTD TEL: 0808 196 8770 FAX: 01782 659 465 WWW.GEMINI-CONTROLS.COM	 interface ISO 9001 CERTIFICATION  UKAS 4718	 PDAS TOTAL WATER EXPERTISE	 Sheet No 1 of 20
						Title DCG V2 + SW LOCAL PRACTICES DUAL DOL CONTROL PANEL INCOMER SECTION						
						Drawn By JH	Project Code PR13435					
	A	First Issue	11/10/22	JH	JH							
	Rev	Description	Date	Drn	Apprv	Drawing No PR13435						
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KF1			
T1	TYPE	T2	REF
14		11	4-4-D
12			
24		21	7-4-D
22			
34		31	13-3-A
32			
44		41	
42			

KF2			
T1	TYPE	T2	REF
15		18	2-4-E

					Client Name Vistry Southern
					Title DCG V2 + SW LOCAL PRACTICES DUAL DOL CONTROL PANEL INCOMER SECTION
					Drawn By JH
					Project Code PR13435
A	First Issue	11/10/22	JH	JH	
Rev	Description	Date	Drn	Apprv	Drawing No PR13435



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designers and manufacturers



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UKAS

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FAX: 01782 659 465
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PDAS
TOTAL WATER EXPERTISE

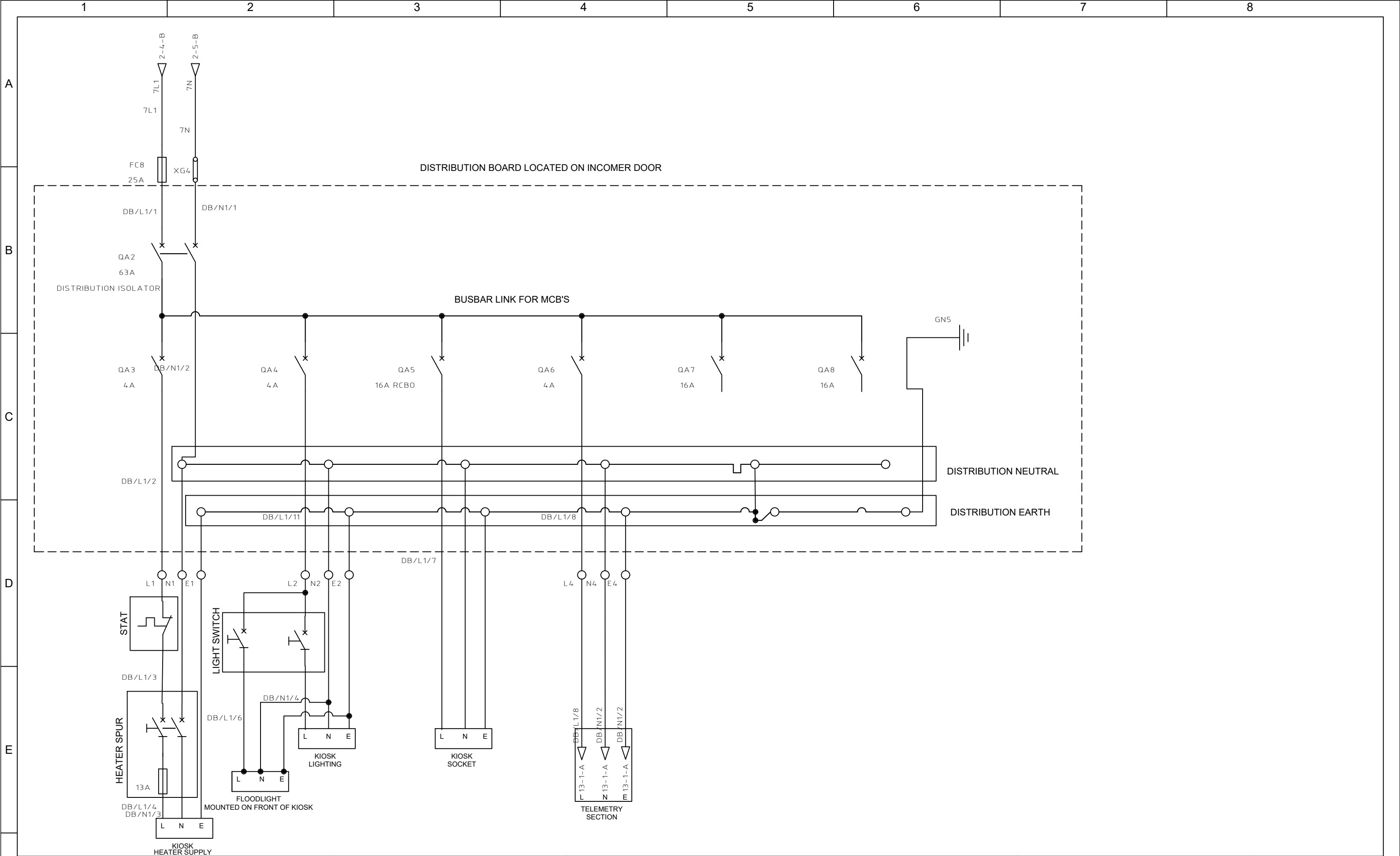


Sheet No

2 of 20

Site
Treetops Nurseries, Allington Lane, Fair Oak

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F					Client Name	Vistry Southern	
					Title	DCG V2 + SW LOCAL PRACTICES DUAL DOL CONTROL PANEL DISTRIBUTION SECTION	
					Drawn By	JH	Project Code PR13435
	Rev	Description	Date	Drn	Apprv	Drawing No PR13435	
A	First Issue	11/10/22	JH	JH			



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TOTAL WATER EXPERTISE

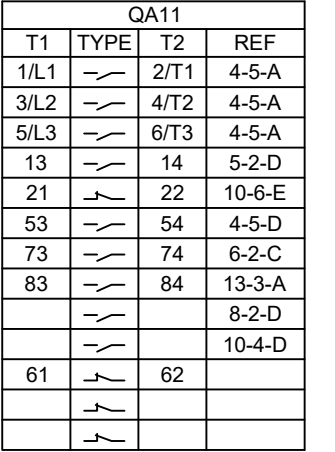


Sheet No

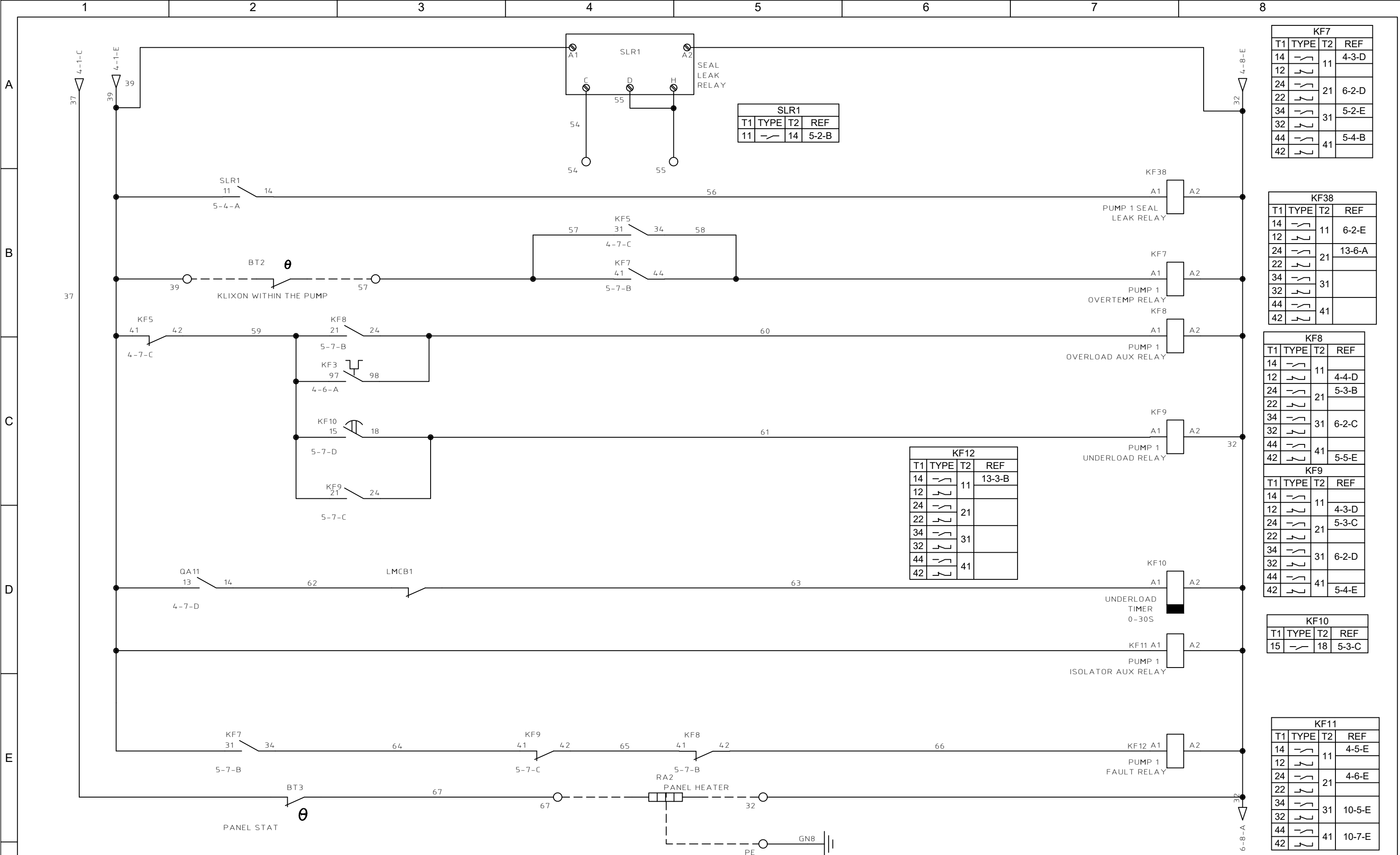
3 of 20

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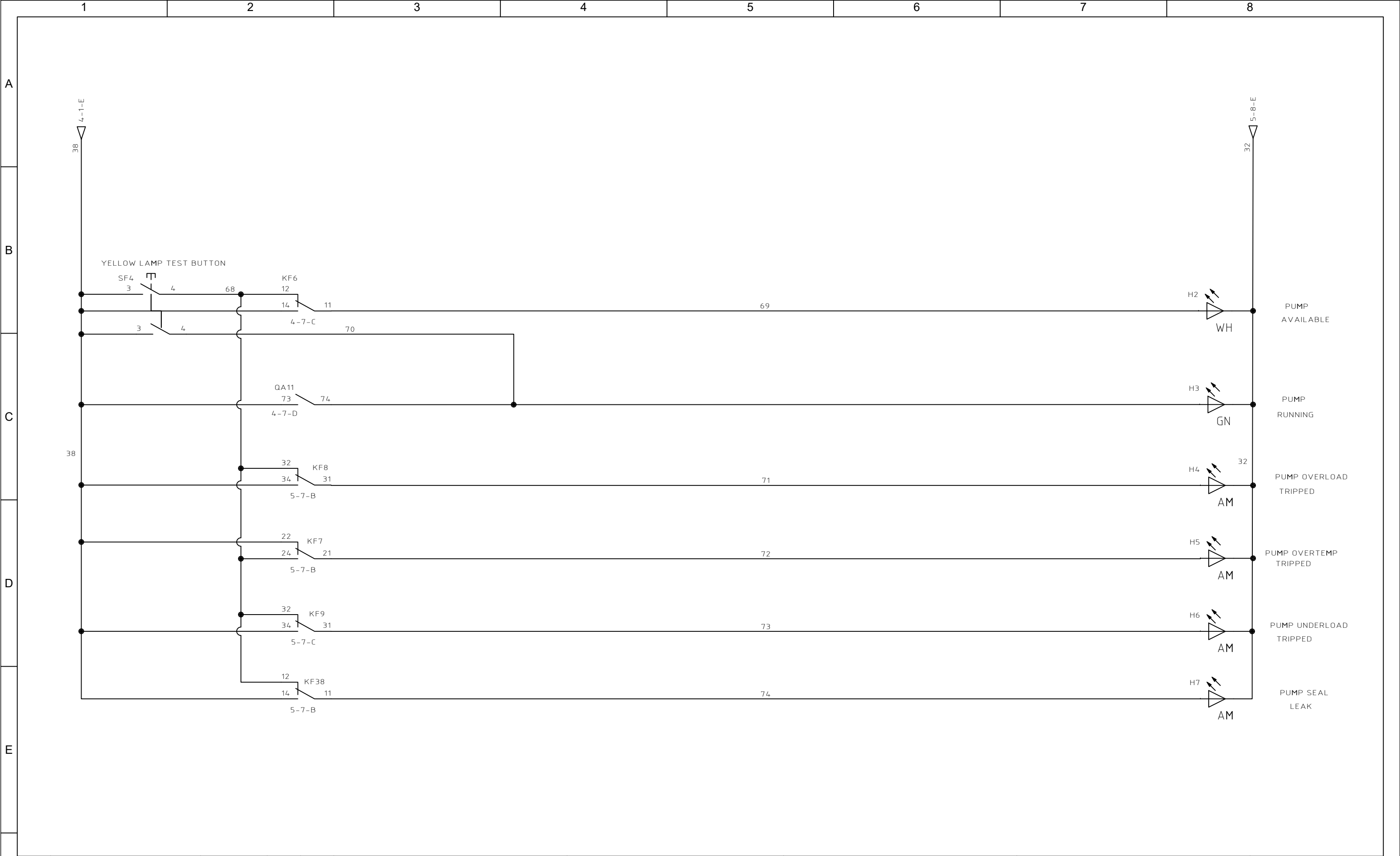


GCD0025/C - 11/1/19



					Client Name Vistry Southern			  		 Sheet No 5 of 20
					Title DCG V2 + SW LOCAL PRACTICES DUAL DOL CONTROL PANEL PUMP 1 STARTER					
					Drawn By JH	Project Code PR13435				
					Drawing No PR13435					
A	First Issue	11/10/22	JH	JH			Site Treetops Nurseries, Allington Lane, Fair Oak		This document may not, without our permission, be copied, shown or handed out to competitors or any other unauthorised persons Copyright Protected	
Rev	Description	Date	Drn	Apprv						

GCD0025/C - 11/1/19



F

					Client Name Vistry Southern	
					Title DCG V2 + SW LOCAL PRACTICES DUAL DOL CONTROL PANEL PUMP 1 STARTER	
					Drawn By JH	Project Code PR13435
A	First Issue	11/10/22	JH	JH		
Rev	Description	Date	Drn	Apprv	Drawing No PR13435	

total control panel solutions

gemini control systems ltd

designers and manufacturers

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WWW.GEMINI-CONTROLS.COM

Site
Treetops Nurseries, Allington Lane, Fair Oak

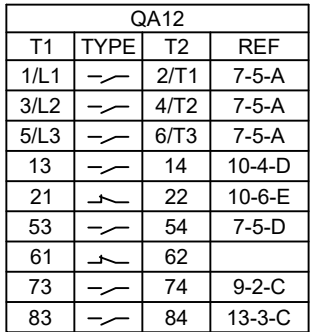
PDAS

TOTAL WATER EXPERTISE

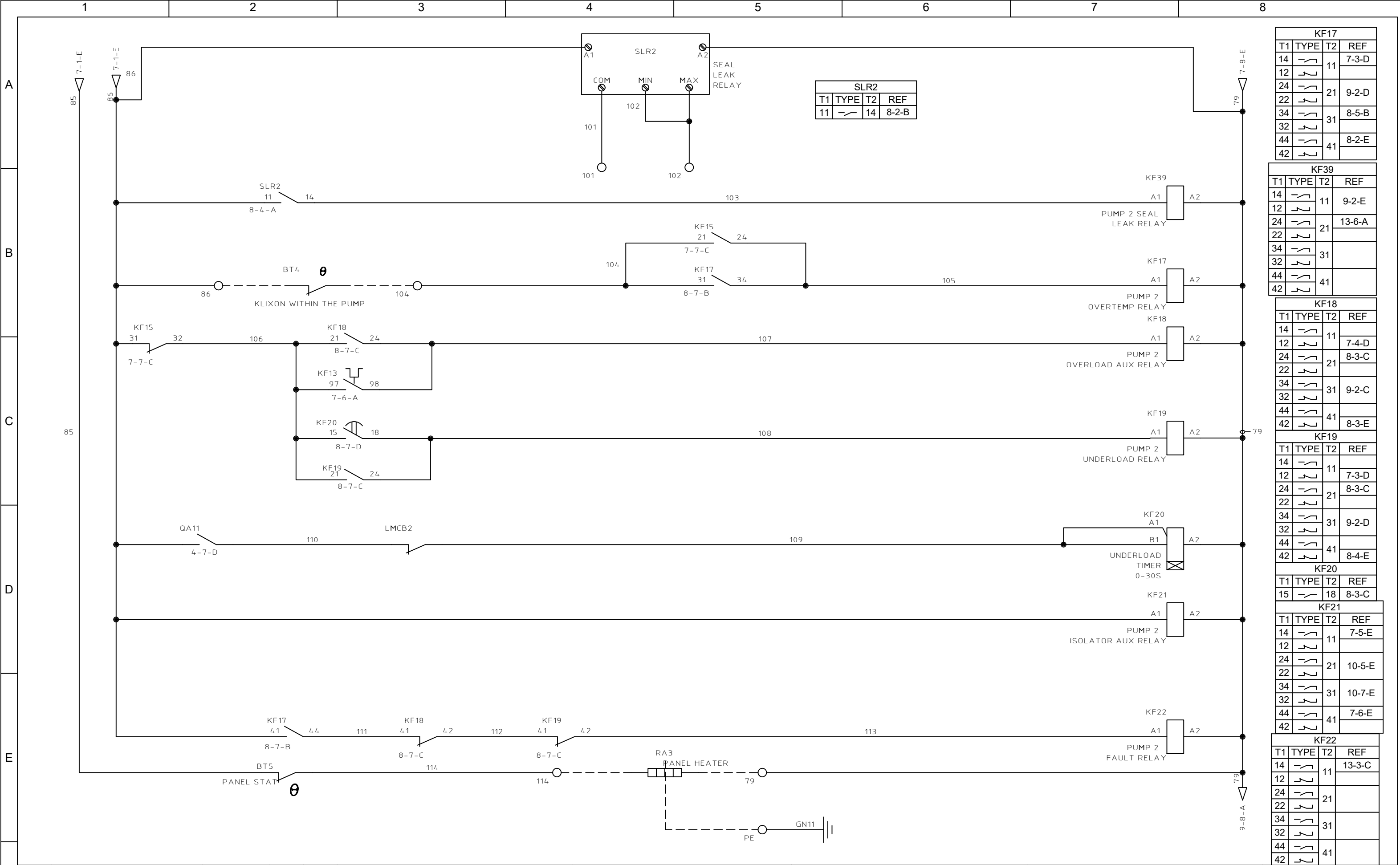
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Sheet No

6 of 20



QA12			
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1/L1		2/T1	7-5-A
3/L2		4/T2	7-5-A
5/L3		6/T3	7-5-A
13		14	10-4-D
21		22	10-6-E
53		54	7-5-D
61		62	
73		74	9-2-C
83		84	13-3-C



T1	TYPE	T2	REF
11	—/—	14	8-2-B

T1	TYPE	T2	REF
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12	—/—		
24	—/—	21	9-2-D
22	—/—		
34	—/—	31	8-5-B
32	—/—		
44	—/—	41	8-2-E
42	—/—		

T1	TYPE	T2	REF
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42	—/—		

T1	TYPE	T2	REF
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34	—/—	31	9-2-C
32	—/—		
44	—/—	41	8-3-E
42	—/—		

T1	TYPE	T2	REF
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12	—/—		
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22	—/—		
34	—/—	31	9-2-D
32	—/—		
44	—/—	41	8-4-E
42	—/—		

T1	TYPE	T2	REF
15	—/—	18	8-3-C

T1	TYPE	T2	REF
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42	—/—		

T1	TYPE	T2	REF
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42	—/—		

					Client Name Vistry Southern
					Title DCG V2 + SW LOCAL PRACTICES DUAL DOL CONTROL PANEL PUMP 2 STARTER
					Drawn By JH
					Project Code PR13435
A	First Issue	11/10/22	JH	JH	
Rev	Description	Date	Drn	Apprv	Drawing No PR13435



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WWW.GEMINI-CONTROLS.COM



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ISO 9001
CERTIFICATION



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Site
Treetops Nurseries, Allington Lane, Fair Oak

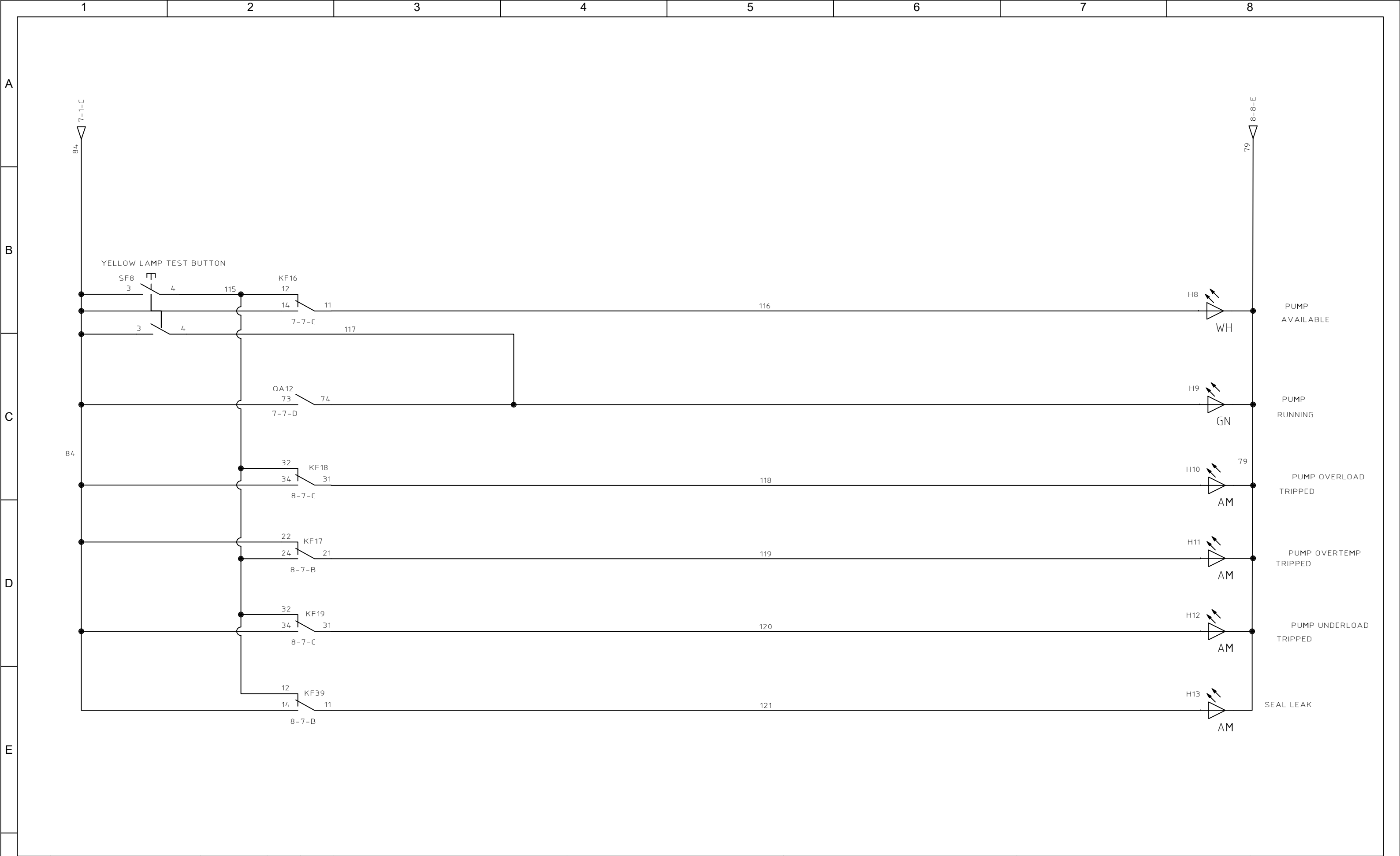


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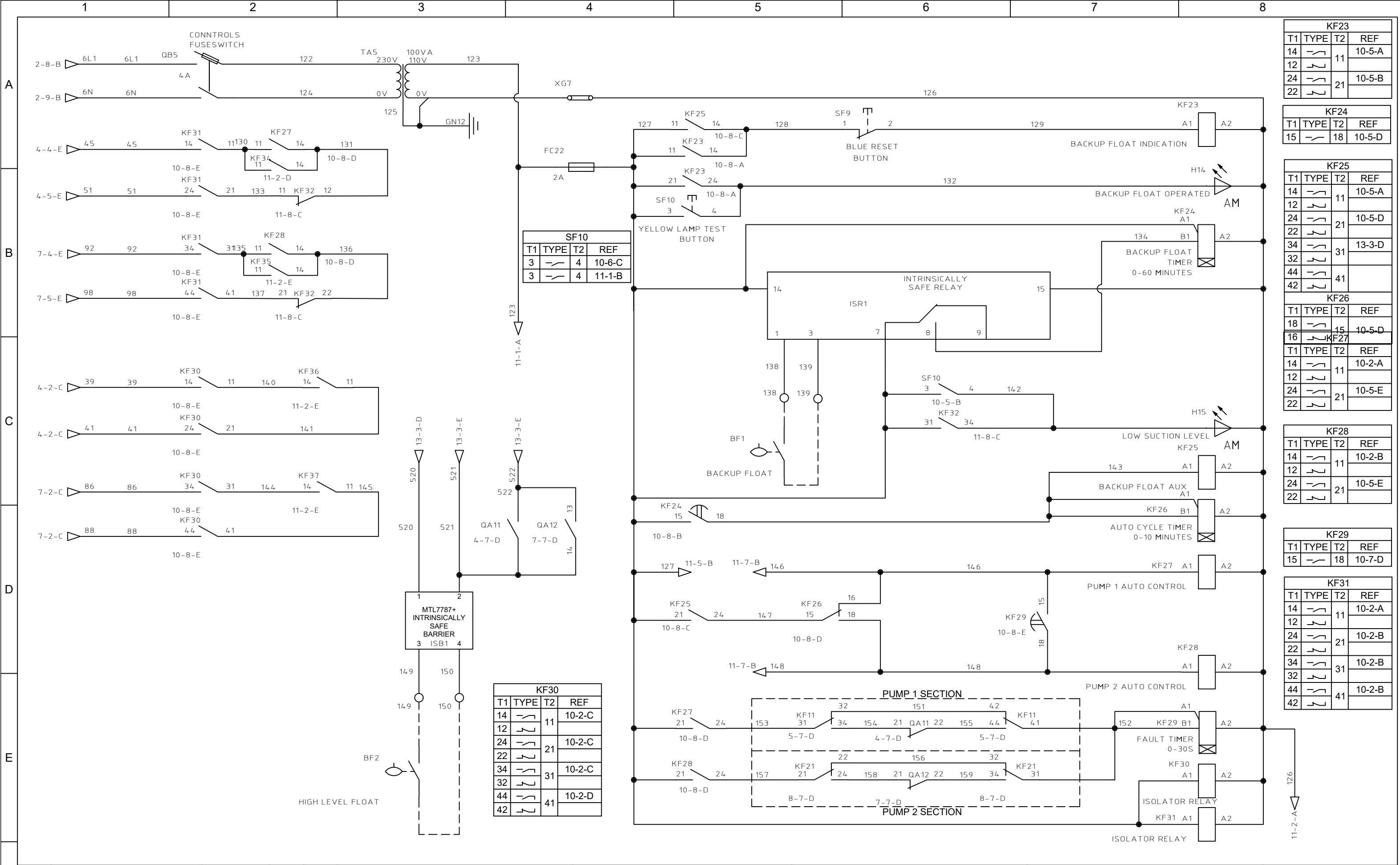
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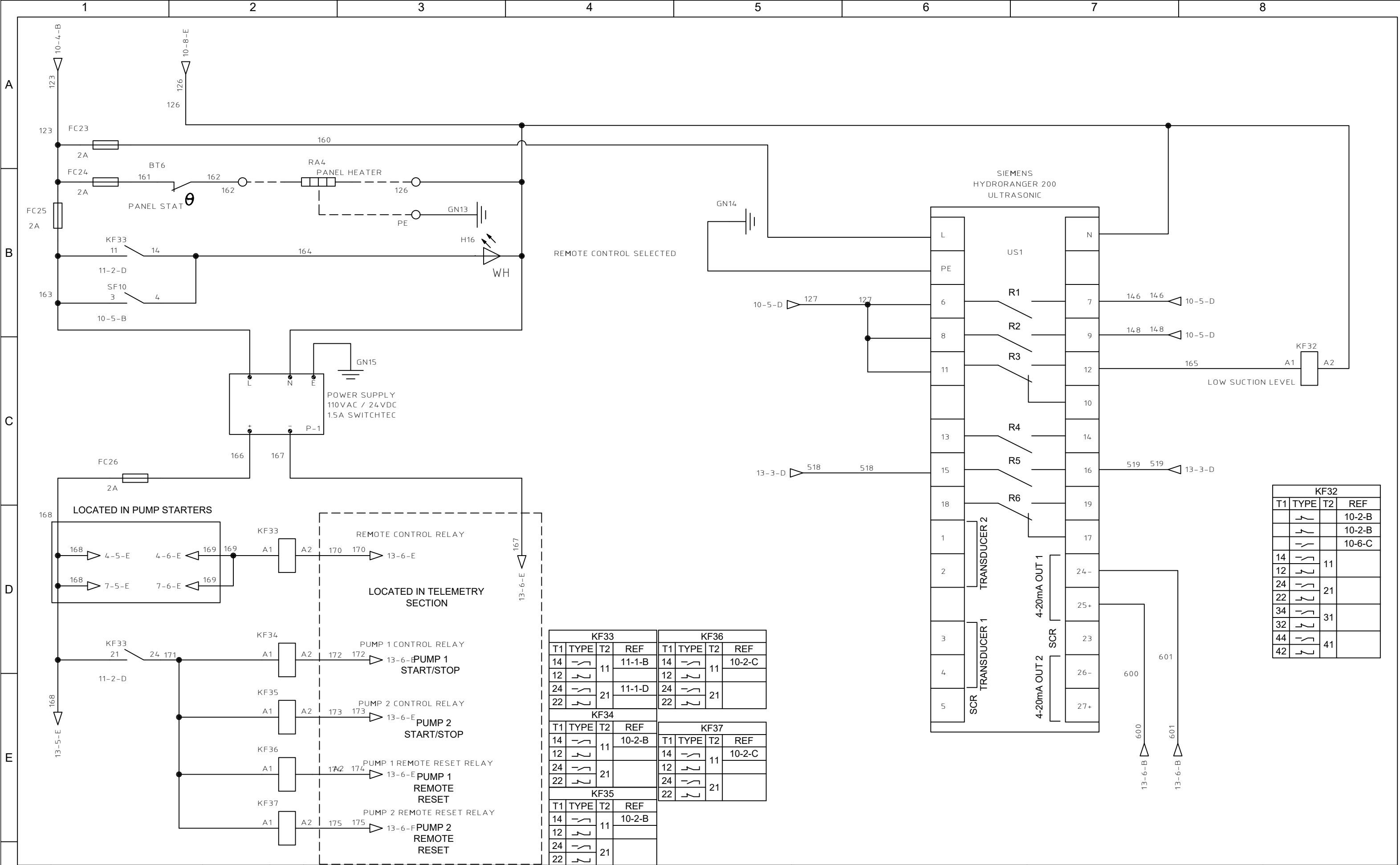


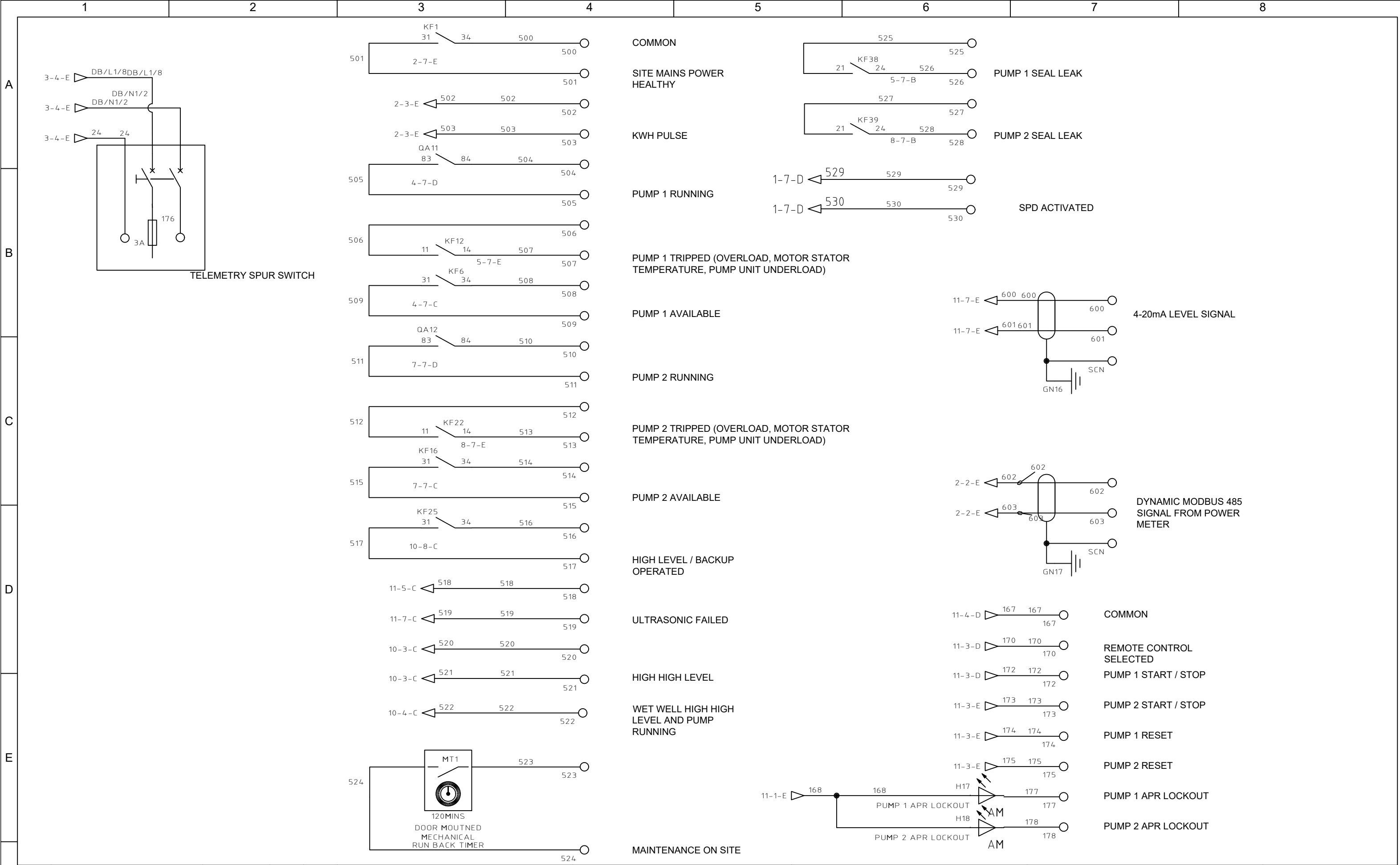
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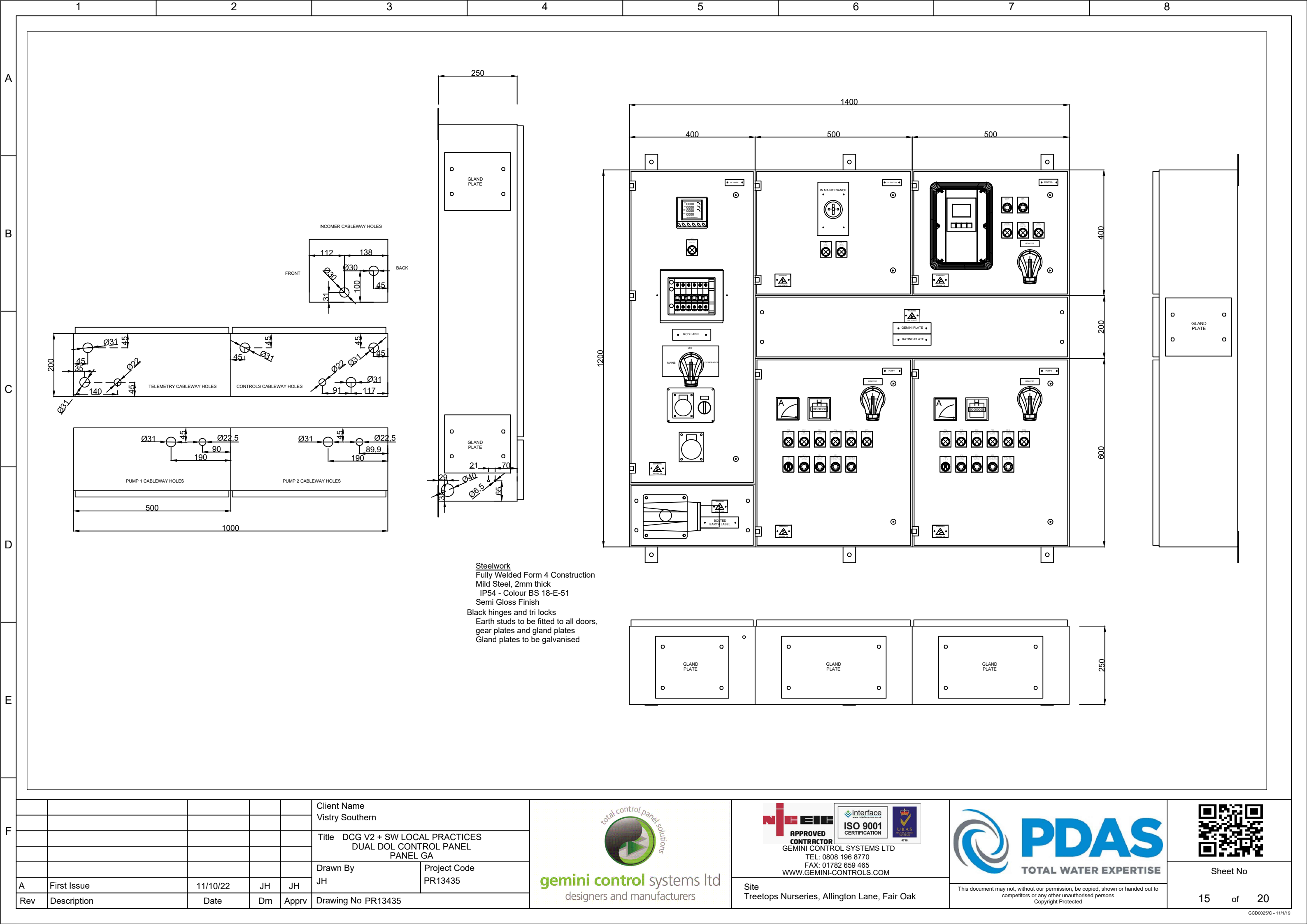






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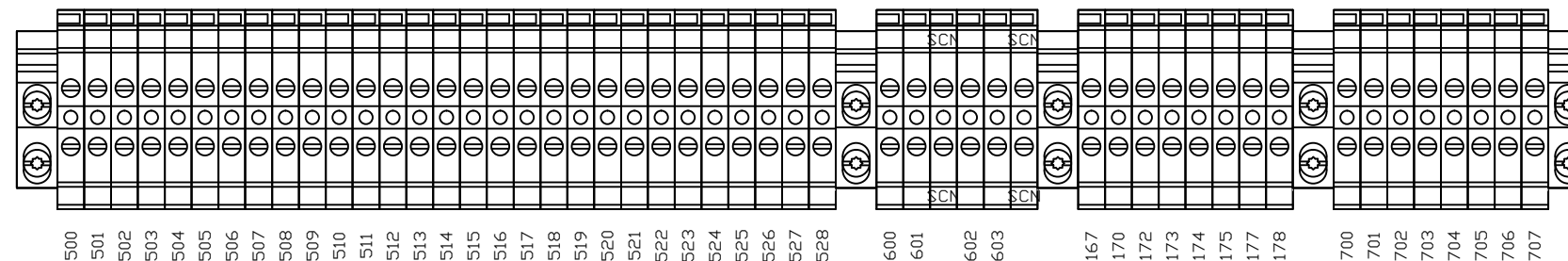
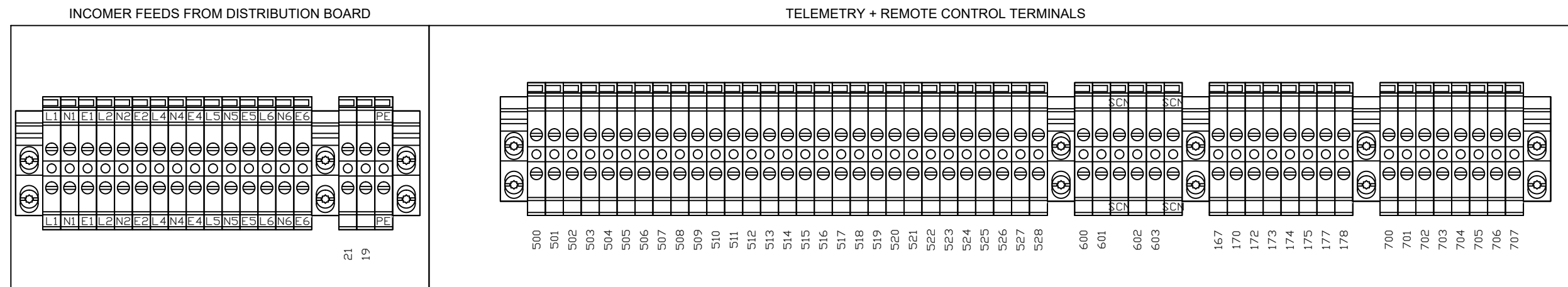
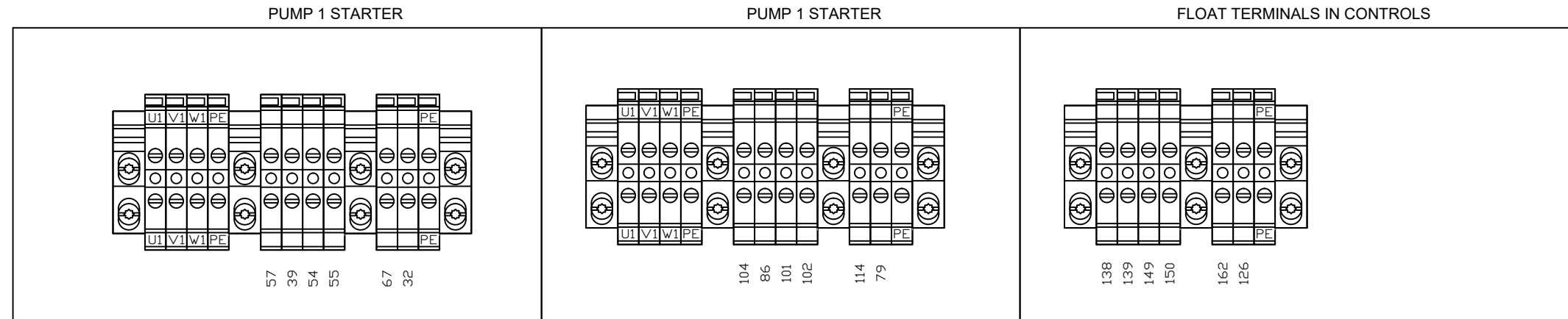
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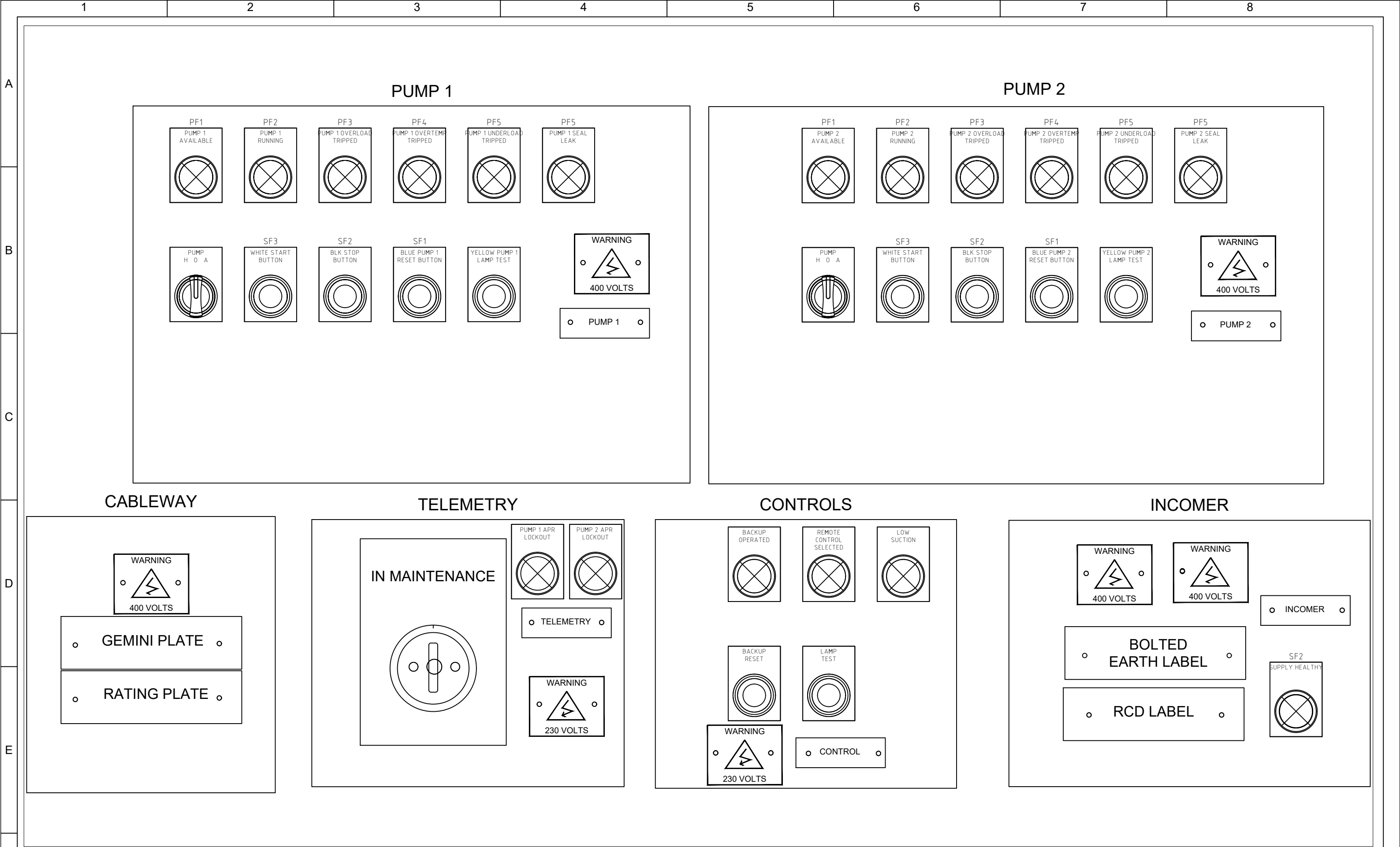
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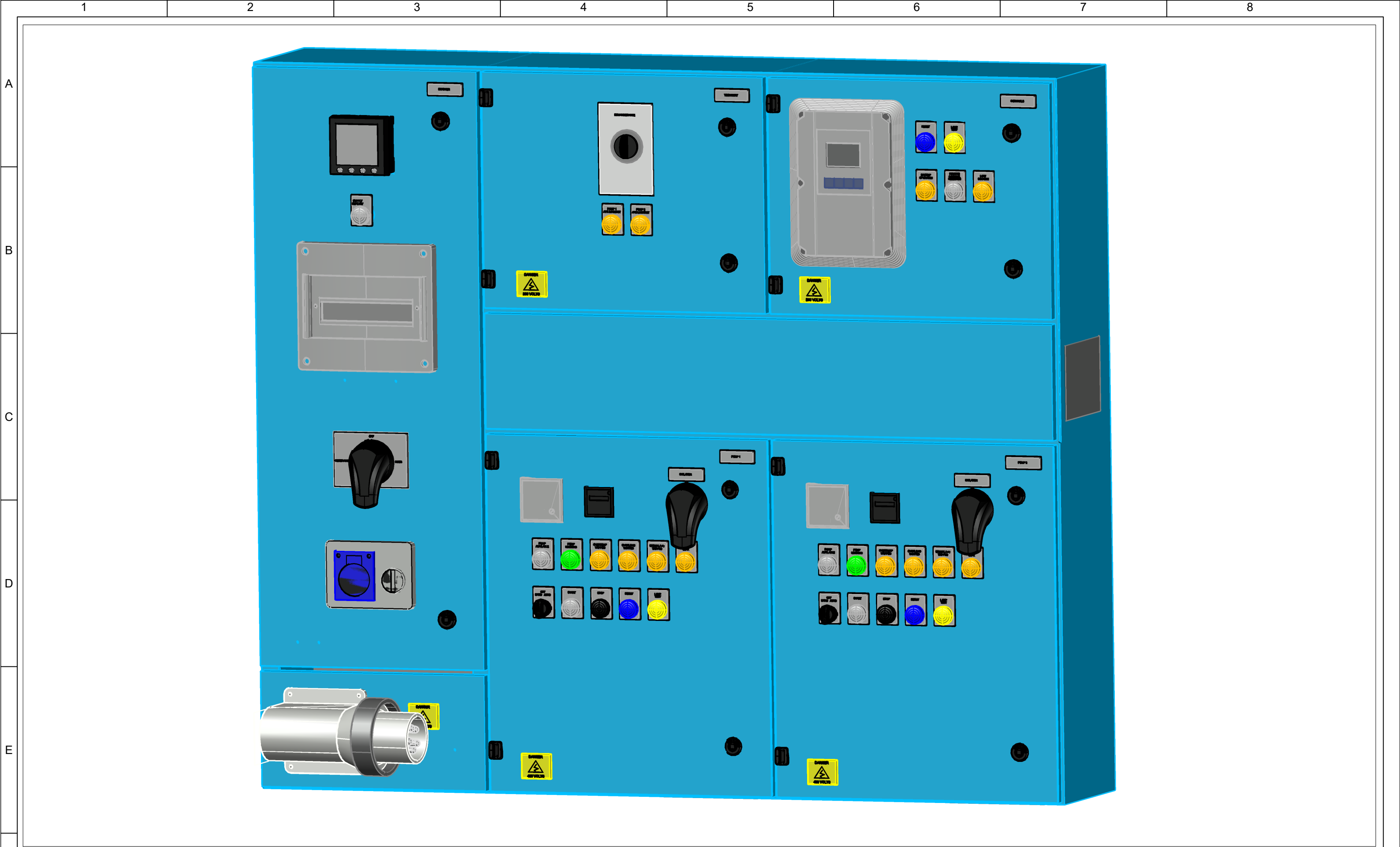


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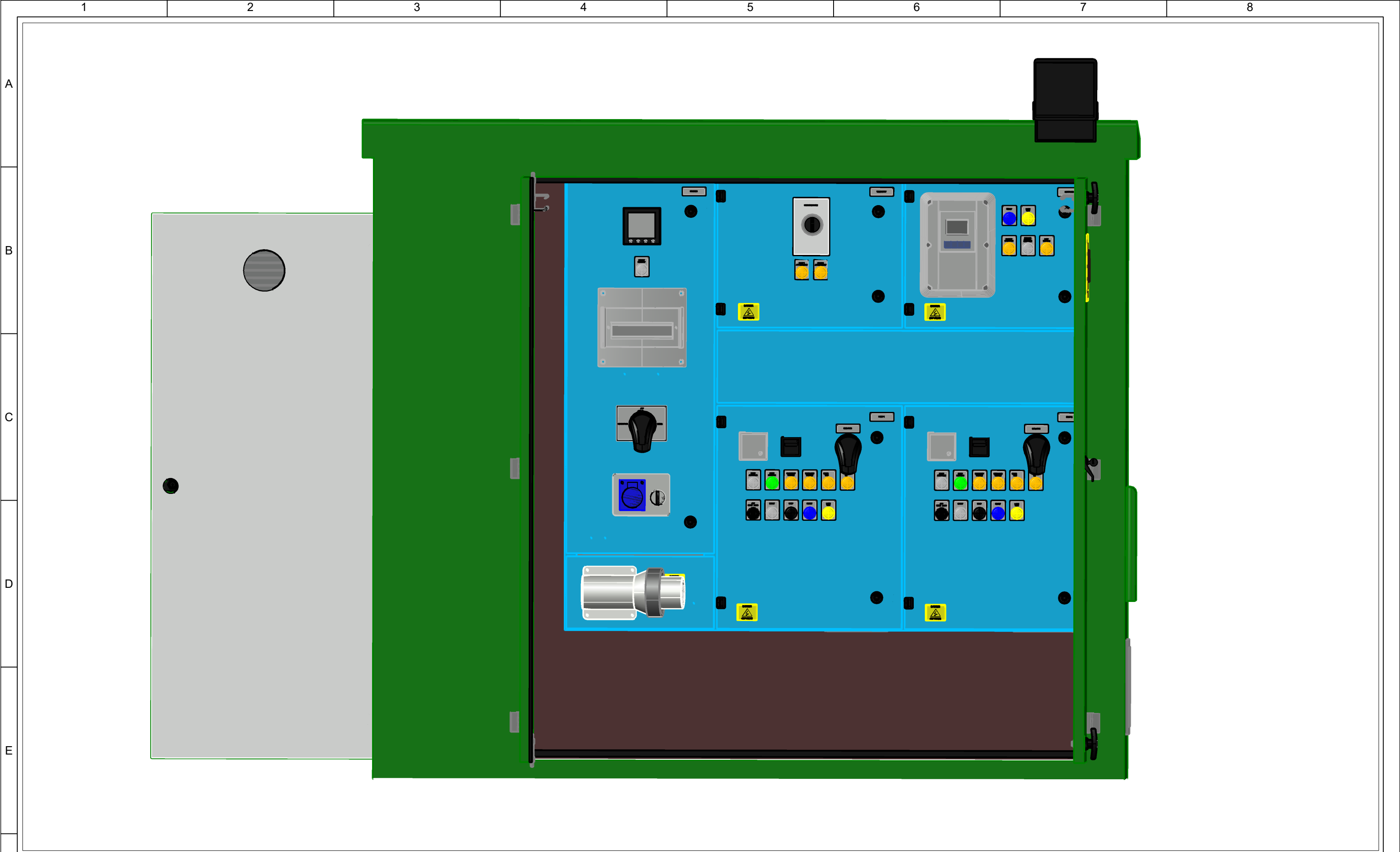

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Appendix G
Southern Water Addendum to DCG Issue 4, Dated May 2021

**SOUTHERN WATER
TECHNICAL SPECIFICATIONS MANUAL
MECHANICAL AND ELECTRICAL SPECIFICATIONS**

**SOUTHERN WATER SUPPLEMENTARY ADDENDUM
TO CODE FOR ADOPTION, SEWERAGE SECTOR GUIDANCE,
APPENDIX C – DESIGN AND CONSTRUCTION GUIDANCE
(DCG) VERSION 2.1**

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1. OBJECTIVE

This document is Southern Water's addendum to Parts D, E & F of Water UK's Code for Adoption, Sewerage Sector Guidance, Appendix C – Design and Construction Guidance (DCG) Version 2.1 DCG, and shall be read in conjunction with that publication.

2. GENERAL

Where conflict exists between DCG and this addendum, this document shall take precedence. Section/clause numbers used in this specification are those from DCG, except where further clauses are added and these use similar numbers added at the end of each DCG clause series.

Refer to the Purchaser's standard layout drawings.

The Developer shall ensure compliance with the latest versions of all appropriate legislation (including Construction, Design & Management Regulations), Codes of Practice etc., and ensure the installation is safe, serviceable and fit for purpose.

3. PART D – PUMPING STATIONS

D5 PROVISION OF PUMPING STATIONS

D5.2 Site Access

D5.2.4 Access shall allow for a minimum tanker size of 9000 litres (2000 gallons).

D5.3 Site Layout

D5.3.4 The need for a fenced compound, and its type shall be agreed with the Undertaker and local planning authority. Generally a fenced compound shall be provided for Type 2 & 3 pumping stations.

D5.3.5 Where security fencing is deemed necessary, the type of fencing shall be one of the following:

- 1.8m high galvanised chain link, topped with 3 strands of barbed wire, set on concrete posts in accordance with BS1722: Part 1, GLC 108c
- 1.8m high close boarded morticed fencing, set in concrete posts, with concrete gravel boards, in accordance with BS1722: Part 5, PCR 180B
- 1.8m high brick wall to match surroundings
- 2.4m high palisade fencing, in accordance with BS 1722-12
- Gate posts shall be steel

D5.3.9 Where permeable hardstanding is shingle, it shall consist of 100mm depth of 20 mm clean shingle laid on geotextile membrane.

D5.3.11 Impermeable hardstandings should be laid to falls such that surface water cannot pond.

D5.5 Storage

D5.5.5 [N] An emergency overflow shall only be provided where agreed by the Undertaker and the Environment Agency. Any overflow shall not operate until all of the storage volume specified has been fully utilised.

D5.7 Pumping Station Design

D5.7.1 Pumping station design shall be as follows:

Design	Type 1	Type 2	Type 3	Type 4
Package pumping station in dry chamber	√			
Package pumping station with wet well	√	√	√	
Bespoke pumping station	√	√	√	
Undertaker's specification pumping station				√

- Package pumping stations in dry chambers, shall comply with the Undertaker's specification MED 4142, available from the Undertaker's Policies & Standards Team
- Package pumping stations with wet wells, shall comply with this specification and not WIS 4-04-2
- Bespoke pumping stations, shall comply with Section D7 and Part F of DCG with the relevant Undertaker's addendum as per this specification
- Undertaker's specification pumping stations, shall comply with the Undertaker's Technical Specifications Manual, Commissioning Manual and Works Operating & Maintenance Manual. These manuals are available from the Undertaker's Policies & Standards Team

D6 RISING MAINS**D6.3 Hydraulic Design**

D6.3.3.c Air valves shall comply with the Undertaker's air valve specification contained within standard MED 4100, and shall be installed in accordance with CED 4010, both available from the Undertaker's Policies & Standards Team. Generally they shall be of the double orifice type, fitted with an auxiliary float chamber.

D6.5 Materials for Rising Main

D6.5.2 [N] Rising Mains shall be constructed from Polyethylene to Clause E 2.23 with jointing to Clause E5.5; other materials are not permitted. Rising Mains shall be connected as close as physically possible to pumping station structures and other ancillaries.

D7 DESIGN OF PUMPING STATIONS**D7.2 Hazardous Areas**

D7.2.1 For the Undertaker's hazardous zone classification requirements refer to the Undertaker's specification MED 4004 and the following clauses:

Equipment used in classified areas under DSEAR shall be selected in accordance with Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 1996 (or later as amended).

Electrical equipment and systems shall comply with all relevant parts of BS EN 60079 & BS EN 61241 and shall be certified for use in the appropriate zone and for the intended application.

Non-electrical equipment and systems shall comply with all relevant parts of BS EN 13463 and shall be certified for use in the appropriate zone and for the intended application.

If a motor certified for use in a classified area is to be supplied for use with variable speed or other electronic equipment, then it shall be confirmed that the motor certification remains suitable for the application.

Certification information for Hazardous Area equipment shall be clearly presented on a manufacturer's nameplate on the equipment. Where certified equipment as part of a system is not individually identifiable by an existing label (e.g. submersible pumps) an additional label shall be provided to enable identification and tracking for maintenance purposes.

D7.3 Wet Well General

D7.3.10 [N] Velocities within the wet well and valve chamber pipework, shall be as follows:

DN	V _{min}	Suction		Discharge	
		V _{design}	V _{max}	V _{design}	V _{max} *
50	0.30	0.40	1.20	0.50	2.00
75	0.40	0.50	1.20	0.60	2.25
100	0.50	0.60	1.30	0.70	2.50
150	0.60	0.80	1.40	0.90	2.50
200	0.70	0.90	1.50	1.10	2.50
250	0.80	1.10	1.60	1.20	2.50

D7.4 Wet Well Structural Design

D7.4.7 [N] All chambers shall withstand all necessary loads in accordance with BS EN 1990, including the following loads:

- Internal hydrostatic pressure
- External hydrostatic pressure from groundwater up to the finished ground level
- External ground pressure
- External imposed loads

D7.4.8 [N] Where a wet well comprises a prefabricated impermeable liner with in-situ mass/reinforced concrete, it shall be capable of withstanding hydrostatic pressure equal to depth, regardless of any provision of concrete surround.

D7.4.9 [N] Pumping stations shall incorporate fixing devices to prevent rotation or flotation of the empty structures when subject to groundwater pressure up to the finished ground level.

D7.4.10 [N] Type testing of prefabricated impermeable liner wells shall involve the following:

- An internal water pressure test shall be carried out in accordance with BS EN 12050 Part 1 Clause 5.2.1. If there is no visible leakage from the pumping station during the test, it shall be considered to have passed the test
- The pumping station shall be able to withstand up to 4 m of groundwater pressure, or the equivalent mechanical load, without distortion and without the provision of a concrete surround. If there is no visible leakage, or damage sufficient to cause leakage, in the pumping station during the test, it shall be considered to have passed the test
- A discharge pipe connection test shall be carried out in accordance with BS EN 12050 Part 1 Clause 5.2.3. If there is no visible leakage of water from the discharge pipe during the test, it shall be considered to have passed the test
- A structural behaviour test shall be carried out in accordance with BS EN 12566 Part 1 Annex D Clause D.6. For a pumping station made of concrete or GRP, if there is no structural failure during the test and no lack of watertightness is recorded, it shall be considered to have passed the test
- Self cleaning test in accordance with WIS 4-04-02 clause 12.1.9

D7.5 Valve Chamber

- D7.5.2 For Type 1, 2 & 3 pumping stations, where the rising main is horizontally less than or equal to 20 metres in length and has a permanent free discharge (with no risk of surcharge), then the isolation valves, non-return valves and Bauer coupling can be omitted and dual rising mains installed.
- D7.5.3.c The Bauer coupling shall be installed such that the connection of a flexible hose can be made without entry to the valve chamber.
- D7.5.4 The discharge point of the gravity drain shall be fitted with a plastic flap valve having a stainless steel pin. A hand-operated valve within the gravity drain is not required.

D7.6 Flow Metering

- D7.6.1 The Undertaker's clarification of this requirement is: where the individual pump rating is equal-to or above 22kW, a suitable electromagnetic flowmeter shall be installed downstream of the valves in a chamber.

D7.7 Access into Wet Well, Valve Chamber, Carbon Filter and Flowmeter Chambers

- D7.7.2.a Where the pumping station is located within 500 metres of a coastline or estuary, covers shall be fabricated from mild steel galvanised to BS EN 1461, with a minimum galvanise thickness dependent on Corrosivity Category (refer to WIMES 8.03). Non slip surface shall be achieved via a surface coating.
- D7.7.2.b Facilities for opening the covers shall be provided, such as eyeholes for standard lifting keys or flush mounted integral handles.
- D7.7.2.c Assistance to ensure a lifting effort not exceeding 25 kgF shall be via spring and not gas struts.
- D7.7.3.b Holes/slots drilled in the chequer plate or open mesh flooring are not permitted as a ventilation option.

- D7.7.4 Where the pumping station and vent stack may cause an odour nuisance in a public area or private residential area, a passive activated carbon filter shall be installed between the vent pipe and the vent stack. The activated carbon filter shall be contained in an underground chamber fitted with a drain and manhole cover for access.

D7.9 Davit Sockets

- D7.9.2 The davit socket shall comply with the following additional clauses:
- Lifting test certificate/report shall be submitted in compliance with the Undertaker's M&E 3015 document, available from the Undertaker's Policies & Standards Team. Where the certificate/report has less than 6 month until its next inspection at the time of Adoption, then a further examination shall be undertaken.
 - The socket shall be stamped with the following:
 - CE Marking
 - Safe Working Load
 - Serial Number
 - Undertaker's Asset Number, available from the Undertaker's Asset Information Team

D7.10 Kiosk

- D7.10.1e For socket details refer to clause F3.4.1.2.

D7.11 Kiosk Construction

- D7.11.14 Where double hinged doors are utilised, these shall include shoot bolts fitted to the top and bottom of the left-hand door (when facing the doors from the outside). The right-hand door shall incorporate top and bottom T type handles complete with clamp latches compressing the seal and a cylinder type night latch lock. The lock barrel shall be compatible with the Undertaker's standard access keys for operational sites in that area. Where a single door is utilised then the door shall comply with the right-hand door as above.
- D7.11.15 The kiosk security requirement is normally Class C (SR2) when sited within a fenced compound; however this shall be increased to Class B (SR3) if there are any particular security issues (e.g. no fenced compound).
- D7.11.16f The site information plate shall include the Undertaker's site reference 'Catalogue' number, available from the Undertaker's Asset Information Team.

4. PART E

Introduction

E Intro Where additional CESWI Clauses are utilised, these shall be read in conjunction with Southern Water Supplementary Clauses, available from the Undertaker's Policies and Standards Team.

E1 General

E1.3.3 [N] All gravity pipework up to and including 300mm shall be certified by a recognised third party test body as proven to withstand a jetting pressure of 2600 psi (180bar). All ancillary equipment made of plastic materials and elements in association

with such pipework must be similarly proven to withstand jetting pressure of 2600 psi (180bar).

5. PART F

F1.2 Operation and Maintenance Documentation

F1.2.1 The primary purpose of Operation and Maintenance documentation (O&M) is | to convey information on safe operation of the site, its equipment and systems. The O&M shall comply with the following:

- Shall be designed to provide details of all installed equipment, describe how the pumping station will operate and how it is to be maintained
- Where the site has an overflow, emergency storage capacity or any other unusual system this shall be included in the manual with an explanation of how the system is integrated with the pumping station
- One paper copy of the O & M must be submitted to the Undertaker on issue of the provisional certificate for approval
- Once approved a further two copies of the O&M including all in-date certificates, and one CD copy, must be submitted to the Undertaker one month prior to the pumping station being handed over
- Paper copies should be in an A4 folder or similar. The CD shall contain fully editable files in standard software, e.g. Word, Excel, Autocad
- Manuals shall be produced in accordance with the Undertaker's Works Operation and Maintenance manual (WOM), which is available from the Undertaker's Policies & Standards Team
- The manual shall contain the following sections:
 - Site Health and Safety
 - Overview of pumping station design and site operation
 - Site generator or mobile unit and changeover procedures
 - Maintenance procedures and manufacturers' documentation
 - Ultrasonic level controller configuration (setup) list
 - Flowmeter configuration (where fitted)
 - Telemetry configuration list
 - Pump unit label data and pump system curve
 - Utility account numbers, utility supplier and site telephone number
 - Hazardous Area classification assessment
 - Certificates
 - Drawings and schematic diagrams
 - Asbestos free certificate
 - Phase 1 contaminated land report

F2.2 Performance Requirements and Information

F2.2.1 Pump units shall be capable of being reversed up to 100% of the normal forward running speed.

F2.2.2 Each pump unit shall be capable of pumping the design flow rate when the sewage level is at the mid-point of the start and stop levels in the wet well, plus an additional 5% flow to take account of fall-off in performance due to wear.

F2.3.2 External Corrosion Protection

F2.3.2.1 Where applicable, all corrosion protection shall be in accordance with WIMES 4.01.

F2.3.4.2 Auto-coupling System (ACS)

F2.3.4.2.1 The ACS shall be manufactured from cast iron and coated in accordance with WIMES 4.01. The effective sealing between pump and ACS shall not rely on rubber seals, o-rings, etc.

F2.3.10 Motors

F2.3.10.6 The minimum insulation class shall be Class H with a Class B temperature rise.

F2.3.11 Information Plate

F2.3.11.1 The pump unit information plate shall additionally have a 'CE' mark.

F2.3.14.3 Lifting Chains

F2.3.14.3 Pump unit lifting chains are not permitted; a lifting location system as described in the DCG shall be safely utilised.

F2.3.15 Cable Support System

F2.3.15 Pump flexible cables shall be supported in the wet well by cable socks.

F3 Electrical Specification Scope

F3.1e For the Undertaker's telemetry outstation requirements refer to clause F3.3.9.1.

F3.2.1 General

F3.2.1.1 Where downstream requirements suggest variable speed drives may be required, the design shall be submitted to the Undertaker for approval before construction.

Where electronic starters (variable speed, soft start) are employed, the installation shall comply with the planning levels of Energy Networks Association (ENA) Recommendation G.5/4 (or later as amended) and evidence in the form of detailed calculations and/or test certificate from a certified instrument shall be provided to the Undertaker.

F3.2.1.5 The electrical installation contractor shall be currently enrolled in an approved scheme for electrical installations in hazardous areas, e.g. NICEIC Hazardous Area scheme.

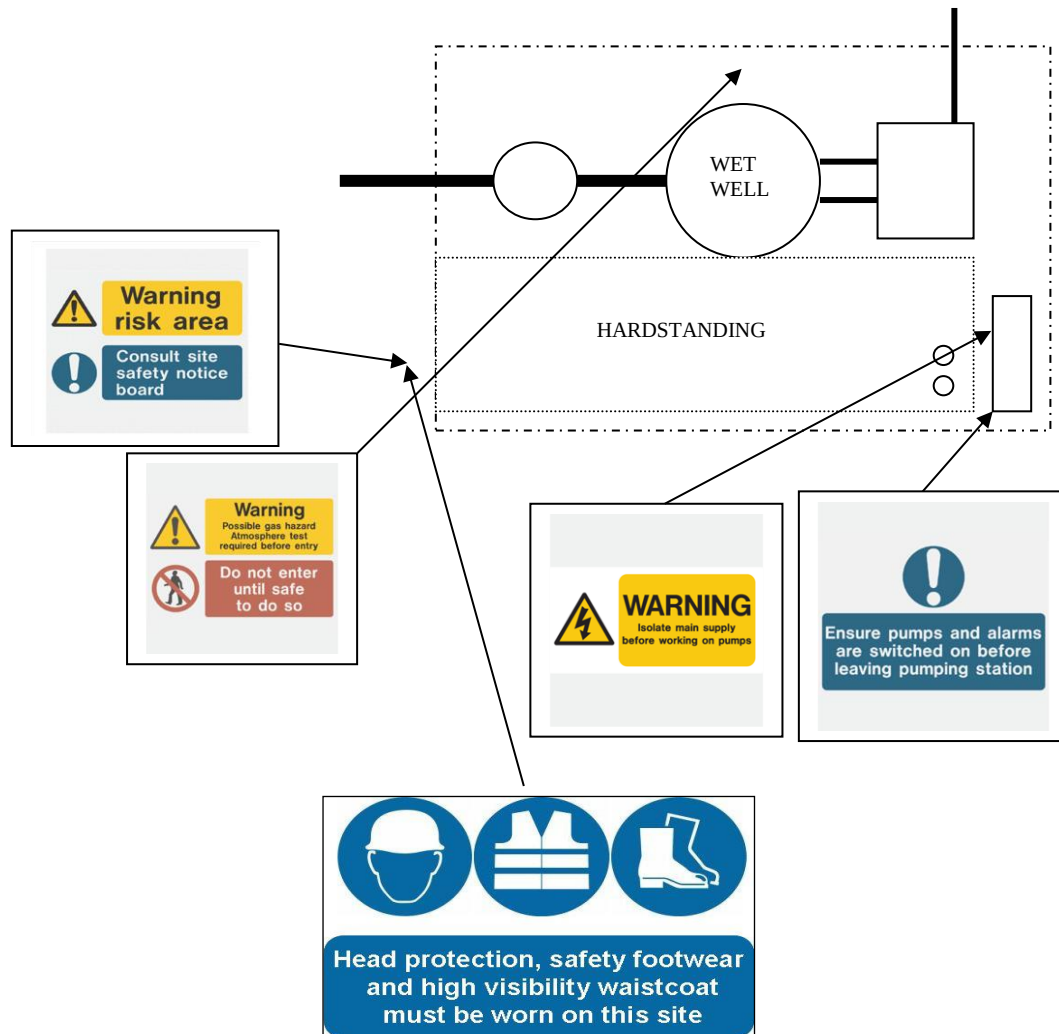
F3.2.1.9 Evidence shall be supplied to the Undertaker that the installation complies with The Electricity Safety, Quality and Continuity Regulations 2002 (or later as amended) and BS EN 50160 regarding supply flicker, i.e. proof of compliance in the form of a test certificate from a certified instrument.

F3.2.1.10 The Developer shall be liable for all remedial works where non-compliance with The Electricity Safety, Quality and Continuity Regulations, BS EN 50160 and/or ENA Recommendation G.5/4 (or later as amended) is proven by the Distribution Network Operator, for a period of 2 years from the date of handover to the Undertaker, provided no material changes have been made to

the installation by the Undertaker during that period that may affect this compliance.

F3.2.2 Labels and Safety Signs

The Undertaker requires additional safety signs as shown below.



Signs shall be manufactured from UV stable semi-rigid plastic. The lettering shall be of a size suitable for the application, but not be less than 6mm high.

Warning Risk Area (150mm x 100mm Landscape) and **Head Protection** (400mm x 300mm Landscape) signs shall be positioned externally on the gates.

Warning Possible Gas Hazard (400mm x 270mm Landscape) shall be positioned internally adjacent to the wet well valve chamber.

Warning Isolate Main Supply (150mm x 75mm) shall be positioned on the control panel inside kiosk.

Ensure Pumps (300mm x 200mm) shall be positioned externally on the kiosk doors.

In addition to the above signs a document pouch shall be fixed inside the kiosk for safety information.

F3.3 Electrical Assembly

F3.3.1 General

F3.3.1.2 For sites that come under the scope of MED 4006, the Undertaker has 2 No. Form 2 two pump control panel designs and 1 No. Form 4 two pump control panel design. The Form 2 control panel designs are detailed in the Wastewater Pumping Station (WPS) Standard Panel Drawings (SPD) Design B 2 Pump Control Panel – up to 15kW and Design C 2 Pump VSD Control Panel – up to 7.5kW. The Form 4 control panel is detailed in the Wastewater Pumping Station (WPS) Standard Panel Drawings (SPD) Standard 2 Pump Panel. All control panel drawings are located in the Design Drawing Manual (DDM). Table 2 – Typical Configuration Of Wastewater Pumping Station (WPS) in MED 4001_B details the form of separation which can be employed at the different pumping station types (DCG, Type 1, 2, 3 or 4)

The Undertaker's preference is for the Developer to utilise the Design C 2 Pump VSD Control Panel (up to 7.5kW). This provides a cost effective solution that has the benefit of providing energy savings, pump blockage protection, pipe flushing, wet well cleaning within a small footprint. The Developer shall seek approval from the Undertaker for the proposed design of the control panel if different from the standard designs outlined above.

F3.3.3 Assembly Construction

F3.3.3.4.3 A triangular key type lock is required on the electrical assembly doors.

F3.3.6 Indicator Lamps, Push-Buttons and Selector Switches

Indicator lamps shall not form part of a push button or switch. A lamp test facility shall be provided.

The Undertaker's lamp/button standard colours differ from DCG document, hence for safety reasons the Developer shall conform to the following:

F3.3.6.2

Indicator Lamp Colour	Application
Red	Hazardous or dangerous condition, zoned area ventilation failure, gas detected, over pressure, or emergency stop operated
Green	Normal condition, motor running, valve operating, or on
Yellow/Amber	Machine tripped or overloaded, slow rotation, seal leakage, low flow, or level alarm
White	Available, off, heater on, stopped, or valve fully open/closed or duty or standby level reached. Supply On (where fitted)

F3.3.6.3

Push Button Colour	Application
Red	Emergency stop
White	Start/on/inch
White	Valve open/close
Black	Stop/off
Yellow	Lamp test
Blue	Reset

F3.3.7 Connection of a Mobile Generator

3. Where site-specific requirements indicate a fixed standby generator, contact the Undertaker's Telemetry Team for additional telemetry requirements.

4. Where a mobile generator connection point is provided, an earth electrode system for the mobile generator shall be provided and connected to the main earth bar of the assembly. This means there is a permanent earth system in place for the generator and appropriate signage shall be provided.

F3.3.8 Abnormal Operation

F3.3.8.2.1 All Pump Protection shall operate in AUTOMATIC, HAND, and BACKUP modes.

F3.3.8.2.1d The hardwired suction protection device used in the Wastewater Pumping Station (WPS) Design B 2 Pump Control Panel (Form 2), Design C 2 Pump VSD Control Panel (Form 2) and the Standard 2 Pump Panel (Form 4), to prevent 'snoring', shall utilise a load/power monitoring device (in motor starter, appropriate to motor rating, capable of reliably detecting transient conditions when pump begins to draw air). Where the pump is installed in a Zoned area then the monitoring device shall trip the pump within 3 seconds, or faster if required by the pump manufacturer's Potentially Explosive Atmospheres approval.

F3.3.8.2.1e Low flow protection signal shall be derived from the pump low flow cut-off signal.

F3.3.8.2.1f Pump unit bearing vibration and temperature protection shall be used only with pumps rated at 55kW or above. Pumps of this rating would only be used in DCG Type 4 pumping stations (where the pump units exceed 30kW).

F3.3.9 Telemetry Signals

F3.3.9.1 The Undertaker's communication standard for telemetry is ADSL lines. Alternatives to ADSL shall be used only where specifically agreed with the Undertaker on a site-by-site basis.

PSTN lines will be withdrawn from service in December 2025 and thus No new PSTN lines shall be installed.

Where no existing communication line is available the Developer shall liaise with the Undertaker's IT Department for installation of the new line.

On sites where an existing PSTN line exists and is being considered for use for telemetry then it shall be upgraded to an ADSL line as part of the works. The Developer shall liaise with the Undertakers I.T. Department for this upgrade.

The incoming ADSL line shall be provided with a lightning protection unit (LPU). The LPU shall be installed next to the telemetry outstation and connected to earth in accordance with the LPU manufacturer's recommendations.

The Developer shall provide and install a telemetry outstation with type determined by the Undertaker's OT and Telemetry Team. The telemetry system shall be configured at the Developer's expense and commissioned with the assistance of the Undertaker. This will include Developer participation in point-to-point Input/Output testing to demonstrate the satisfactory operation of the integrated system.

The Developer can obtain further information and a quotation for this work by contacting the Undertaker's OT and Telemetry Team, e-mail address: MailBxTELENQ@southernwater.co.uk

TableF.3 For provision of the 'Maintenance in Progress' signal, an 'Engineer-on-Site' switch shall be provided by the Developer. This switch shall be independent of an external power source, using a mechanical run-down timer allowing the engineer to select any 'ON' period of up to 120 minutes. When in use the switch provides a status signal to the outstation which will report and inhibit alarms for the selected period of time.

TableF.3 A 'Rising Main Delivery flow' telemetry signal shall also be provided for Type 2, as **derived**-flow pulsed inputs from the level controller.

TableF.3 The Undertaker does not require a 'Rising Main Delivery Pressure' signal.

TableF.4 Remote control select signal shall be set to OFF, except where agreed & enabled by the Undertaker's OT and Telemetry Team.

TableF.5 Pump unit underload signal shall be from suction protection, see F3.3.8.2.1d.

Table F.5 Note 2 shall be 'Only required if each pump unit is rated at or above 55kW'.

The pumping Station shall have the facility to automatically reset the pumps via the Telemetry Outstation. The Automatic Pump Reset (APR) function is detailed in clause 7.2 of MED 4408.

F3.3.9.6 Pulsed inputs for high-frequency operation (e.g. derived-flow) shall be solid-state electronic type.

F3.3.10 Ultrasonic Level Controller Specification

F3.3.10.1 The Undertaker envisages that the technical standard adopted by the Developer for ultrasonic level controllers will be compatible with that used

by the Undertaker (so as to secure compatibility, and to avoid other substantive functionality issues). At the date of this publication this standard is Siemens Process Instruments' HydroRanger 200 Therefore any proposal for use of alternatives shall be submitted to the Undertaker for prior acceptance.

F3.3.11 Functional Units – Form 4 Assemblies

- F3.3.11.4.9 Where a fixed speed pump is assessed as likely to block, a system to monitor the pump motor load/torque and reverse the pump as appropriate shall be installed. In defining the specification for the detection of blockage and unblocking cycle the pump manufacturer shall be consulted, as not all pumps are suitable for reversing.

F3.3.12 Functional Units – Form 2 Assemblies

F3.3.12.3 Incomer

- F3.3.12.3.2a The Wastewater Pumping Station (WPS) Design B 2 Pump Control Panel and Design C 2 Pump VSD Control Panel shall incorporate a 125A 4 pole fuse switch, with 'Mains – Off – Generator' positions, with suitably rated fuses. The Design B 2 Pump Control Panel and Design C 2 Pump VSD Control Panel shall incorporate a control circuit test facility as detailed in the Wastewater Pumping Station (WPS) Standard Panel Drawings (SPD) Design B 2 Pump Control Panel.
- F3.3.12.3.2c The phase failure relay shall be fed via an MCB. The Wastewater Pumping Station (WPS) Design B 2 Pump Control Panel and Design C 2 Pump VSD Control Panel shall incorporate a mains supply monitor.
- F3.3.12.3.3a The operating handle for the control panel fuse switch shall be padlockable in the 'OFF' position.
- F3.3.12.3.3b &
F3.3.12.3.3d &
F3.3.12.3.4 The Wastewater Pumping Station (WPS) Design B 2 Pump Control Panel and Design C 2 Pump VSD Control Panel shall incorporate MCB fed circuits as per the Wastewater Pumping Station (WPS) Standard Panel Drawings (SPD) Design B 2 Pump Control Panel and Design C 2 Pump VSD Control Panel, in the DDM.

F3.3.12.4 Control Circuit Supplies

- F3.3.12.4.6 The control circuit transformer (CCT) for The Wastewater Pumping Station (WPS) Design B 2 Pump Control Panel and Design C 2 Pump VSD Control Panel shall have a 230V primary winding and a 110V or 24V secondary winding with one side earthed.

F3.3.12.5 Motor Starters

The Developer, in accordance with BS EN ISO 12100 shall assess the requirement for emergency stop equipment. Measures taken shall be justified by risk assessment of the hazards involved and recorded.

Typical Installation – the following guidelines for submersible pumps lay down the minimum standards to which the Developer shall work when

considering the use of emergency stop devices. They form the basis of the risk assessment which is the responsibility of the designer:-

- a. Under normal circumstances there should be no requirement for an emergency stop
- b. Electrical supply must be isolated and locked off at the isolator before the pump is lifted
- c. Pump rotational checks shall normally be carried out from the pump starter control panel: where this is not practicable consideration shall be given to a local 'hold-to-run' push button which shall be justified by a Risk Assessment submitted to and agreed with the Project Manager

Where fitted, emergency stop devices if required shall override all controls whatever their function and cut off the power supply to the drive. The device shall comply with BS EN 418 and shall be of the mushroom headed stay put type with break before latch mechanism, and twist or pull to release. Release of the mechanical latch shall not permit the plant to restart without appropriate resetting at the controlling Assembly.

F3.3.12.5.2 The Wastewater Pumping Station (WPS) Design B 2 Pump Control Panel and Design C 2 Pump VSD Control Panel shall incorporate the following additional motor protection:

- Motor over-temperature protection
- Seal leakage protection
- Dry run protection

F3.3.12.5.4 The equipment mounted on the door of the Wastewater Pumping Station (WPS) Design B 2 Pump Control Panel and Design C 2 Pump VSD Control Panel, shall be as per Wastewater

Pumping Station (WPS) Standard Panel Drawings (SPD) Design B 2 Pump Control Panel and Design C 2 Pump VSD Control Panel– Portrait (Hinged LHS) General Arrangement – SW Drawing No. JN.900002.0E3231 & Portrait (Hinged RHS) General Arrangement – SW Drawing No. JN.900002.0E3251. Both drawings are available in the DDM.

F3.3.12.6 Common Control Section

F3.3.12.6.1d The Wastewater Pumping Station (WPS) Design B 2 Pump Control Panel and Design C 2 Pump VSD Control Panel shall utilise a back-up float switch system.

F3.3.12.6.3 The Wastewater Pumping Station (WPS) Design B 2 Pump Control Panel and Design C 2 Pump VSD Control Panel shall utilise an ultrasonic level controller and a back-up float switch system.

F3.4 Pumping Station Electrical Installation**F3.4.1 Electrical Components and Equipment (excluding the electrical assembly and cables)****F3.4.1.2 Socket Outlet**

F3.4.1.2.1 A 13A, 230V, RCD protected socket outlet shall be mounted on the control panel, as per Wastewater Pumping Station (WPS) Standard Panel Drawings (SPD) Design B 2 Pump Control Panel and Design C 2 Pump VSD Control Panel– Portrait (Hinged LHS) General Arrangement – SW Drawing No. JN.900002.0E3231 & Portrait (Hinged RHS) General Arrangement – SW Drawing No. JN.900002.0E3251. All drawings are available in the DDM.

F3.4.1.3 Luminaries

F3.4.1.3.1 All kiosks shall be provided with internal lighting. This lighting shall be provided in accordance with the Form 2 Wastewater Pumping Station (WPS) Design B 2 Pump Control Panel, the Design C 2 Pump VSD Control Panel and the Form 4 Wastewater Pumping Station (WPS) Standard 2 Pump Panel. External working areas with pumps and motor drives (including wet wells), in automatic control shall have an Illumination Level of 100 LUX and a CIE Colour Rendering Index of 2. Special care shall be taken to prevent stroboscopic effects. The internal and external lighting shall be controlled from a single switch located within the Kiosk. This is to ensure that it is obvious that the lighting is on and needs to be switched off before personnel leave the site. All lighting and luminaries shall be provided in accordance with MED 4318 and WIMES 3.02.

F3.4.1.4 Anti-Condensation Heaters

F3.4.1.4.1 Kiosk heating shall be provided for kiosks containing the Form 2 Wastewater Pumping Station (WPS) Design B 2 Pump Control Panel, the Design C 2 Pump VSD Control Panel and the Form 4 Wastewater Pumping Station (WPS) Standard 2 Pump Panel. The heaters shall be suitably rated, tubular, anti-condensation heaters, controlled tamperproof thermostats.

F3.4.1.5 Junction Boxes

F3.4.1.5.7 The normal connection arrangement for pump flexible cables (power & protection, not instrumentation) shall be a separate weatherproof junction box (IP 65 minimum) per pump unit, outside the well, suitable for the hazardous area classification of the area. Cables shall be suitably glanded at the junction box. Disconnection of cables from the junction box shall be possible without entry into the wet well or valve chamber. The junction box shall be at waist height and associated supports shall not obstruct removal of the pump or cause a trip hazard. Junction boxes with doors shall be triangular key lockable, and all junction boxes shall have a label permanently fixed stating:

DANGER – LIVE TERMINALS

Do not test from this point

Voltage bands shall be segregated. Ultrasonic level sensor and float switch cables shall be cabled directly to the electrical assembly. Marshalling of cable terminations shall be logical from each duct.

F3.4.4 Installation of Cables

F3.4.4.13 Cable ducts from the junction box to the control panel shall be sealed at both ends against moisture and explosive/corrosive gas. The type of sealing system used shall be suitable for the assessed risk, prevent the migration of gases and be compliant with WIMES 3.02. Expanding foam shall not be used.

F3.4.4.16 If the installation is a pumping station not located in a secure compound, to mitigate risk of damage/vandalism each pump unit cable shall be directly cabled to the control panel kiosk via the duct provided. Ducts direct from the wet well shall be sealed against moisture and explosive/corrosive gas at the control panel end. If the wet well is designated as a hazardous area, a label shall be fixed adjacent to the duct(s) at the control panel end as follows:

HAZARDOUS AREA DUCT

Duct Sealing System to be retained at all times

A means of retaining the seal shall be provided for when cables are removed.

F3.6 Telemetry Outstation

F3.6.1b The following telemetry outstations shall be provided:

- Wastewater Pumping Station (WPS) Design B 2 Pump Control Panel – Servelec Systems S2000 micro or S2000. The telemetry outstation shall be mounted on the control panel as per the Wastewater Pumping Station (WPS) Standard Panel Drawings (SPD) Design B 2 Pump Control Panel – Portrait (Hinged LHS) General Arrangement – SW Drawing No. JN.900002.0E3231 & Portrait (Hinged RHS) General Arrangement – SW Drawing No. JN.900002.0E3251
- Wastewater Pumping Station (WPS) Design C 2 Pump VSD Control Panel - Servelec Systems S2000 micro or S2000. The telemetry outstation shall be wall mounted within as per the Wastewater Pumping Station (WPS) Standard Panel Drawings (SPD) Design C 2 Pump VSD Control Panel – Portrait (Hinged LHS) General Arrangement – SW Drawing No. JN.900002.0E3231 & Portrait (Hinged RHS) General Arrangement – SW Drawing No. JN.900002.0E3251
- Wastewater Pumping Station (WPS) Standard 2 Pump Panel (Form 4) – Servelec Systems S2000 micro or S2000.

F4.1 Gate (Sluice) Valves

F4.1.3 Valves shall additionally comply with the following:

- O-ring sealed
- Resilient seated
- Stainless steel shafts and fasteners

- Paint spec to WIMES 4.01
- Suitable for long periods (> 12 months) of idleness without seizing
- Marked with direction of closure
- Individually tightness tested in accordance with BS EN 12266-1

F4.2 Check (Reflux) Valves

F4.2.4 Add sentence: 'The half-inch BSP plugged tappings shall be fitted with stainless steel quarter-turn ball valves.'

F4.4 Miscellaneous

F4.4.1 Add sentence: 'The half-inch BSP plugged tappings shall be installed on the horizontal centreline and fitted with stainless steel quarter-turn ball valves.'

F4.5 Isolation

For the purposes of Baseline Mechanical Isolation (in accordance with HSG 253 Safe Isolation of Plant and Equipment), the following shall be applied to achieve Proved Isolation of the Single Block and Bleed:

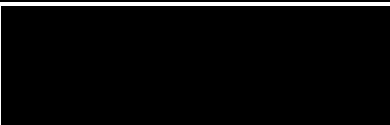
- NRV: Downstream isolation valve fitted and Bleed (test point) fitted to downstream part of NRV.
- Pumps: Downstream isolation valve fitted and Bleed (test point) fitted to downstream part of NRV. Note pumps and associated pipework are self-draining.
- Rising main, common manifold and flowmeter (where fitted): Drained through Bauer connection and Bleed (test point) fitted to common manifold.
- Wet well: Upstream isolation valve with Bleed via visual leakage into wet well. Final Isolation by temporary means as per task specific risk assessment.

APPENDIX VII ASSOCIATED SOUTHERN WATER STANDARDS

<u>TSM</u>	Technical Specifications Manual, including:-
<u>MED 4001</u>	Mechanical and Electrical General Specification
<u>MED 4003</u>	Condition Monitoring
<u>MED 4004</u>	Hazardous Area Classification
<u>MED 4100</u>	Valves
<u>MED 4131</u>	Ventilation Systems
<u>MED 4138</u>	Lifting Equipment
<u>MED 4140</u>	Mixed Flow Volute Submersible Sewage and Sludge Pumpsets
<u>MED 4142</u>	Micro Pumping Stations
<u>MED 4301</u>	Package Plant and Control Panels rated up to 100 Amps
<u>MED 4408</u>	Telemetry
<u>MED 4415</u>	Liquid Flow Metering
<u>MED 4417</u>	Control of Pumps
<u>MED 4433</u>	Liquid Level Measurement
<u>CED 4001</u>	Hydraulic Design Requirements
<u>CED 4010</u>	Pressure Pipelines and Rising Mains
<u>CED 4019</u>	Fibre Reinforced Plastic Kiosks
<u>CED 4023</u>	CESWI Amended and Supplementary Clauses
<u>PSWWT 4022</u>	Odour Control – Load Assessment and Dispersion Modelling
<u>COM</u>	Commissioning Manual
<u>WOM</u>	Works Operation & Maintenance Manual
<u>M&E 3015</u>	Procedure for Inspection of Lifting Equipment
RD.000000.0Z3901	2 Submersible Pump - Network with valve chamber
RD.000000.0Z3926	2 Submersible Package Pumping Station - (Network & Site)
RD.000000.0Z3931	Micro Pumping Station

6. DETAILS OF CHANGE HISTORY**Issue 4**

Section No.	Paragraph No.	Change	Rational for Change
1.0	All	Design and Construction Guidance (DCG) changed from Version 1.0 to 2.1	Change of DCG from V1.0 to 2.1 – though amendment in V2.1 has no impact in current MED.
Misc	Misc	Change reference from SFA to DCG	SFA now called DCG
Misc	Misc	Change from ATEX to Potentially Explosive Atmospheres Regulations 1996	BREXIT
D7.7.	2a	Requirement for Manhole covers near coastal regions changed from stainless steel to galv	To align with WIMES 8.03

Authorised by.....Mike Kay

Signature

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