

TECHNICAL SUBMISSION

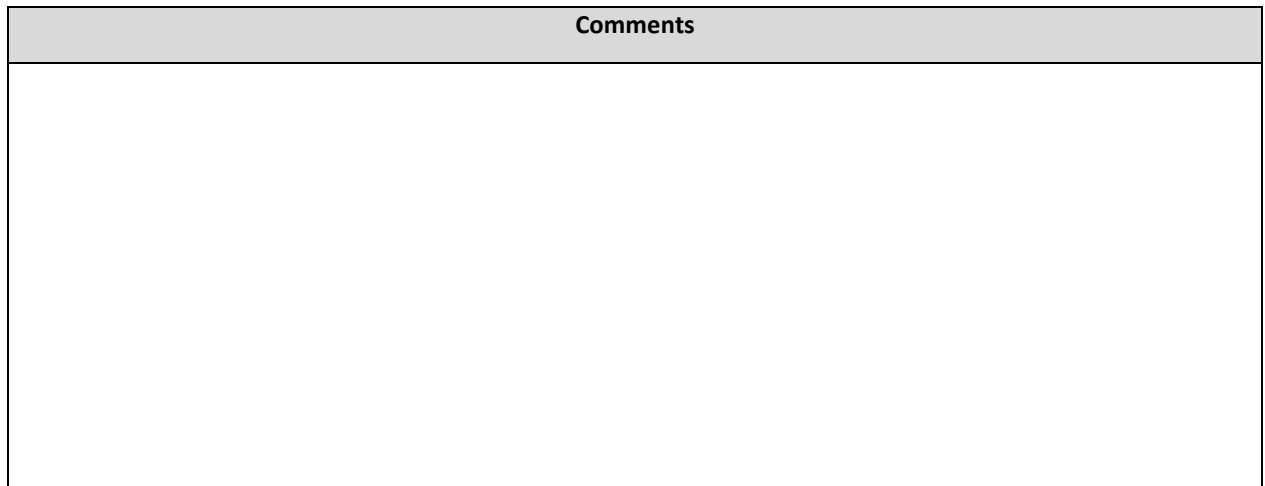
From: DCI Electrical Systems Ltd Unit 15, Wrotham Business Park Barnet Hertfordshire EN5 4SZ	Tecs Sub no: TH-IS-03-001-X-012922-60-923 REV: P01
	Date: 15/03/2022
To: HG Construction Ltd	Project: Tottenham Hale. Building 3

COMPLIANCE STATEMENT – DCI Electrical Systems have read the Employers Requirements and confirm our proposals set out below conform and comply with the current design proposals and manufactured products proposed will be installed to the manufactures guild lines and current BS standards

Description of Technical Submittal:

Subject: – Standby Generator Life Safety	Description: 550kVA Generator 400v
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Submission Particulars
• Model PHG550VoOS • Output of 550kVA • 400 Volts • 3 Phase • 0.8 Power Factor • 50Hz • 1500 rpm • 75dBA • Volvo TAD1641GE • Bulk Fuel Tank 2025 Litre • Fuel Transfer System 'Double Press' crimped pipe system • Carbon Steel Core Pipe, SS304 outer pipe (leak monitored) • Dimensions are 3300mm Length x 1300mm Width x 2350mm Height. • Weight is 3300Kg • Fuel capacity is 800 litres • Fuel consumption is 77 litres/hour @ 75% load • Autonomy is 10 hours @ 75% load



Approval Status: A – Approved with no comment B – Approved with comments to be incorporated C- Not Approved; to be resubmitted

2. Scope Of Supply

The following technical submittal is compiled of technical information, and scope of supply for the project that we have to date, it does not constitute a detailed design and information may be subject to change. Specific information and working drawings for approval will be issued during the detailed design phase of the project.

Equipment to be supplied:

One Shenton Group open set diesel generator, model PHG550VoOS producing a maximum standby output of 550kVA at 400 Volts, 3 phase, 0.8 power factor, 50Hz @ 1500rpm with a prime power output of 500kVA to BS5000 and BS5514 standard.

System Description

The Generator system shall be used in conjunction with the mains supply and shall provide a standby supply in the event of a mains failure.

On receipt of a start signal from the LV switchboard, the generator will start and run up to normal speed and voltage. After a pre-set time, a signal will be given to the LV switchboard that the generator is ready to accept load and initiate a change over from the mains supply to the generator.

On return of the mains supply the LV Panel will transfer the supply back to the mains supply and remove the run signal to the generator.

Attenuation

Plantroom Attenuation to achieve a noise level of 75dBA at 1m in assumed FFC from your Volvo TAD1641GE powered generator set (PHG550VoOS).

Mechanical Installation

Mechanical installation of generator set and associated attenuation equipment within the plant room including installation of silencer framework, exhaust system lagging and cladding, access equipment and plant hire, parking, accommodation, and subsistence.

Excluding builders works, building penetrations and making good.

Bulk Fuel Tank

2025 litre nominal bunded clean oil tank to BS 799-part 5 type J 2010.

Fuel Transfer System & Fill/Vent Line

We have proposed a double walled 'Double Press' crimped pipe system.

carbon steel core pipe, SS304 outer pipe (leak monitored) for fuel transfer pipework.

All pipework will be supported with Unistrut (or equivalent) containment materials throughout pipework route.

Our proposal considers a recessed fill point cabinet for fuel intake with internal / double walled pipework / isolation valves for fuel inlet connections on bulk tank, drop weight fire valve on fuel transfer line in tank room, motorised and isolation valves on fuel transfer line in generator room.

Our proposal considers supplying and installing control cable for interfacing the bulk tank level sensors to the associated fill point level gauges, and the control cables following fuel transfer line from bulk tank room to generator room for termination / connection by others to appropriate equipment.

We assume the following equipment is installed by the client/others:
control cables and containment / bulk tanks / fuel transfer pump set and controls (with associated cabling).

Delivery Only

Delivery of the generator to London by flatbed truck kerbside during normal working hours.
Not offloaded.

It is the customers' responsibility to ensure safe and adequate access for large lorries plus off-loading facilities at the delivery address.

Note: We have allowed 4 hours standing time during deliveries.

Any further standing hours will be chargeable.

`Timed` or 'Out of Hours' deliveries and/or any necessary positional skating etc. are available at extra cost upon request.

Commissioning (normal working hours)

Standard commissioning of the Generator by a Shenton Group trained engineer using on-site load. Please be aware this will involve a short-planned power outages (for a maximum of 20 seconds) in order, to test the changeover system.

Commissioning will be carried out during normal weekday working hours and assumes that all electrical installation work is fully completed.

We include for first fill of lubricating oil and anti-freeze.

Fuel for commissioning is not included.

First fill of fuel prior to commissioning is available from Shenton Group as an optional extra or should be provided by others.

Out of hours commissioning and load bank testing are available at an additional cost.

Training, if required, will be carried out during this period.

Applies to UK mainland only.

Factory Acceptance Test – Resistive load

Perform a factory test for client's representative(s) to witness the generator's operation in our purpose-built test cell prior to delivery to site.

The test includes a period of 2 hours operation under full load, plus an additional 1 hour at 110% of full load.

Demonstrate voltage and frequency regulation from full load to no load to full load and a 25% step load.

We also demonstrate all alarms, controls and instruments including accuracy of meters and full operation sequence from cold.

Provide resistive loadbank(s) capable of providing a load of 110% of full load for the generator.

In addition, record speed, oil temperature/ pressure, water temperature, battery charge rate and voltage, load current, kW output, frequency, and power factor.

Includes all fuel for testing, introduction to staff at Shenton House and lunch, if required, plus a Shenton Group Gift Pack.

Does not include travel and accommodation (available at extra cost).

For longer running periods and special test requirements – prices available on request.

Site Acceptance Test – Resistive load

Site acceptance testing of the generator to be witnessed by client's representative(s) using resistive loadbank.

Assumes ground level location, clear vehicular access, and sufficient ventilation for loadbank.

Includes 15 metres of interconnecting load cables and fuel for the 2-hour test.

Test as follows: - Check installation. Start set and run at 100% for 1-hour; 110% for 1 hour.

During this period record values for: -Engine water temperature; Oil pressure; Engine speed/ alternator frequency; Voltage; Current; Kwh; battery charge from engine charging alternator.

Carry out functional test of start-up, shutdown, under mains failure and mains reinstatement conditions.

Test all controls and alarms.

For longer running periods, various loads, and special test requirements - prices available on request.

PLEASE NOTE: We are assuming there is a ground floor loadbank connection panel with a separate breaker to enable us to connect cables to.

Spares Package

Onsite Spare package including air, oil, fuel filter along with controller and starter motor.

Exclusions: Electrical & Mechanical Installation

Unless specifically quoted for elsewhere, the following are excluded from our scope of supply: -

As part of our Project Liaison Service, we expect to provide information and guidance on these aspects, but the site work & materials are expected to be provided by your site installers.

Specifically (but not limited to) this exclusion covers supply and installation of: -

All electrical power/earth cables, including sizing, and final connections.

All cables for controls/BMS/SCADA/Comms, including sizing, and final connections.

All devices required by wiring regulations, such as local isolators etc.

All power and control cables between the Generator and any ancillaries such as LV switchgear/radiators/pumps/bulk fuel tanks/sensors etc other than what is stated in the main proposal.

All fire alarm and communication interfaces.

All containment & cable management other than what is stated.

Shutdowns and isolations of site electrical or controls circuits.

Electrical installation testing and certifying.

Lift and shift, placement, and handling, of the main plant items and all ancillaries.

Mechanical assembly of any components shipped to site loose, including roof mounted items for containerised units.

Access greater than 3m in height.

If in any doubt regarding the scope of your responsibilities, please discuss.
with us.

3. Generator Specification

GENERATOR

One Shenton Group open set diesel generator, model PHG550VoOS producing a maximum standby output of 550kVA at 400 Volts, 3 phase, 0.8 power factor, 50Hz @ 1500rpm with a prime power output of 500kVA to BS5000 and BS5514 standard.

ENGINE

VOLVO TAD1641GE industrial diesel engine designed to comply with ISO3046, BS5514 and DIN6271, complete with water cooling system with temperate radiator, cooling fan, pulley guards, thermostatic control, and gear driven water pump.

Engine governing to Class A1. DC electric starting system with batteries, axial starter motor and regulated engine driven charging alternator.

Integrated DSE 7410 control panel for manual / automatic operation complete with engine protection system giving automatic shutdown for fault conditions of low oil pressure and high engine temperature.

Mains powered, automatic battery charger.

Water jacket heater.

Output rated ABB circuit breaker.

Stop solenoid energised to run.

Replaceable fuel, oil and air filter elements.

ALTERNATOR

The Mecc alte alternator is brushless, screen protected, revolving field and self-regulating to BS4999, VDE0530 and IEC34-1. IP21 protection and class H insulation/temperature rises.

Voltage accuracy to +1% in static load condition and any power factor between 0.8 and unity.

Permissible alternator overloads are 300% for 10 seconds, 50% for 2 minutes and 10% for 1 hour in every 12 hours. Radio suppression to BS800 and VDE0875, grade G.

BASE FRAME

Heavy duty fabricated steel base frame incorporating daily service base fuel tank, complete with contents indicator, fuel filter and flow and return lines.

Anti-vibration mounts fitted between the engine/alternator and base frame.

MECHANICAL DATA

Dimensions are 3300mm Length x 1300mm Width x 2350mm Height.

Weight is 3300Kg.

Fuel capacity is 800 litres.

Fuel consumption is 77 litres/hour @ 75% load.

Autonomy is 10 hours @ 75% load.

4. Generator Technical Data Sheet

Generator Technical Data Sheet for

Model: PHG550VoOS



GENERATORS AND UPS



- Intelligent Auto-Start Controller with Generator
- Monitoring and Protection Systems Suitable for Remote Starting or Connection with shentongroup AMF Panel
- Battery Trickle Charger
- Thermostatically controlled Engine Heater
- Long Range Bundled Base Fuel Tank
- Ability to be Customised to Specific Requirements
- Output Circuit Breaker

GENERAL

Shenton Group Generators range from 10 to 2500kVA, and are built to a world-class standard. These remarkably competitive standby generators provide the most cost-effective solution for 'standard package' requirements.

A first-class range of diesel-powered generators for prime and standby power application which feature reliable components from leading manufacturers, these are premium products upon which your company can build its reputation.

Model PHG550VoOS

Standby Power	kVA	550
	kW	440
Prime Power	kVA	500
	kW	400
Rated Speed	r.p.m	1500
Voltage	V	400/230
Rated Power Factor	Cos Phi	0,8
Data Sheet Number	PHG550VoOS NS Rev 4	

Prime: This rating is for the supply of continuous electrical power (at variable load) in lieu of commercially purchased power. There is no limitation on the annual hours of operation and 10% overload power can be supplied for one hour in twelve hours.

Standby: This rating is for the supply of continuous electrical power (at variable load) in the event of a utility power failure. No overload is permitted. Max rating is available for one in twelve hours

Note: Standard reference conditions: 25deg C (77deg F) air inlet temperature, 152.4m (500feet) above sea level, 60% relative humidity. All engine performance data based on the above mentioned maximum continuous ratings. Fuel consumption data at full load for diesel fuel with specific gravity of 0.85 and conforming to BS2869: 1998, class A2.

In line with our policy of continuous development, we reserve the right to change specification without notice.

Generator Technical Data Sheet for

Model: PHG550VoOS



GENERATORS AND UPS

VOLVO PENTA



ENGINE		
Rated Output	kWm	430
Manufacturer		Volvo
Model		TAD1641GE
Engine Type		Diesel 4 Strokes-Cycle
Aspiration Type		Turbo charged & intercooled
Cylinders Arrangement		Straight 6
Bore & Stroke	mm	144 x165
Displacement	L	16.12
Cooling System		Water
Compression Ratio		16.5:1
Fuel Consumption 100% PRP	l/h	104
Fuel Consumption 75% PRP	l/h	77
Fuel Consumption 50% PRP	l/h	52
Total Oil Capacity	L	42
Total Coolant Capacity	L	60
Governor	Type	Electronic
Air Filter	Type	Dry Paper Cartridge
Battery Capacity	Ah	2 x 200 Ah
Battery Voltage	V	24

Volvo Penta need no introduction as a world class industrial engine manufacturer, producing engines that are designed for high efficiency and exceptional reliability in the most demanding situations globally for maximum uptime. Volvo Penta engines have a proven track record that can comfortably be relied on.

Generator Technical Data Sheet for

Model: PHG550VoOS



GENERATORS AND UPS



ALTERNATOR		
Manufacturer		Mecc Alte
Model		ECO 40-3S/4
Poles		4
Frequency	Hz	50
Insulation Class		H
Efficiency at 75% load class H 400v	%	94,1
Reactance Xd''	%	18,3
Short Circuit Current Capacity	%	>300
Heat Dissipation 400v	W	25984
Radio Interference		EN50081-1, EN50082-1, VDE0875K
Waveform Distortion (THD) at Full Load	%	2.4
Enclosure (according IEC-34-5)		IP 21
Weight of Complete Generator	Kg	1171
Cooling Air Requirement	m3/min	54
Alternator Rating Overload	%	10% for 1 in 6 hours
Overload per 20 sec	%	300
Exciter System		Auxiliary winding
Voltage Regulator		UVR6
Voltage regulation Performance +/-	%	1
Coupling		Flexible Disk

Mecc Alte has sixty years of experience in the electromechanical field, and is today at its height in the world production of synchronous alternators. Committed daily to research, development and updating activities, Mecc Alte is a testimony to constant improvement in all areas such as technology, organisation and quality. The company has ISO 9001 certification, awarded in 1996 and ISO 14001 since 2010. With 54.000 square meters of factory area, almost 850 employees and a turnover of approximately 130 million euro, Mecc Alte is a well-established company ready to challenge the markets in every product sector.

Generator Technical Data Sheet for

Model: PHG550VoOS



GENERATORS AND UPS

APPLICATION DATA

Exhaust System		
Maximum Exhaust Temperature	°C	455
Exhaust Gas Flow	M3/min	92
Maximum Allowed Back Pressure	kPa	10

Air Flows		
Intake Air Flow	m3/h	2280
Cooling Air Flow	m3/s	5.5
Available Air Restriction	KPa	0.78

Fuel System		
Fuel Oil Spec		DIESEL
Fuel Tank Capacity	L	800
Autonomy @ 75% load	Hrs	10

Dimensions/Weight		
Length	mm	3300
Width	mm	1100
Height	mm	2359
Weight excluding fuel	Kg	3300
Sound Pressure Level @ 7 mtrs	dB(A)	-

Electrical		
Output Circuit Breaker	Type	MCCB
	Model	ABB T6N 800A
Full Load Current at 400V .8 p.f.	Amps	793.8

Generator Technical Data Sheet for

Model: PHG550VoOS



GENERATORS AND UPS



SG7410DS GENERATOR CONTROLLER

The SG7410DS is an Auto Start Control Module. Monitoring an extensive number of engine parameters, the modules will display warnings, shutdown and engine status information on the back-lit LCD screen, illuminated LEDs, remote PC. The modules include USB, RS232 and RS485 ports as well as dedicated DSENet[®] terminals for system expansion. The module is compatible with electronic (CAN) and non-electronic (magnetic pick up/alternator sensing) engines and offers an extensive number of flexible inputs, outputs and engine protections so the system can be easily adapted to meet the most demanding industry requirements. The full list of features includes enhanced event and performance monitoring, remote communications and dual mutual standby.

CONTROL PANEL DISPLAY FEATURES

Engine RPM	Generator Output Current
Engine Oil Pressure	Earth current
Coolant temperature	Output kW
Battery Volts	Load level %
Run Hours/ No of starts	Output kVA
Fuel level	Power factor
Generator output Voltage	Load kVAr
Frequency	kWh/kVAh/kVArh

SG7410DS is a branded Deep Sea Electronics controller, customized to shentonggroup's specific requirements. shentonggroup has a long history of collaboration with Deep Sea Electronics, and endorse their products with confidence. Our experience has proved this is the market-leading controller having a perfect mix of complex capability and user simplicity.

5. Alternator Data Sheet



GENERATOR TYPE ECO 40-3S/4

Document : DS024A/1

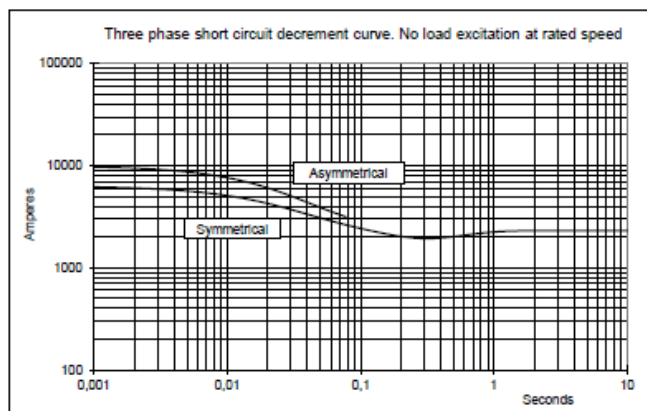
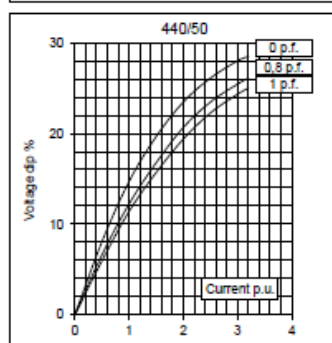
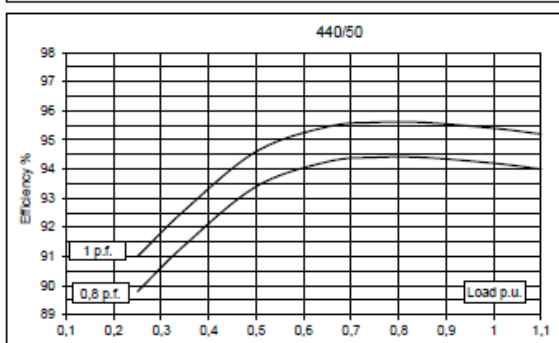
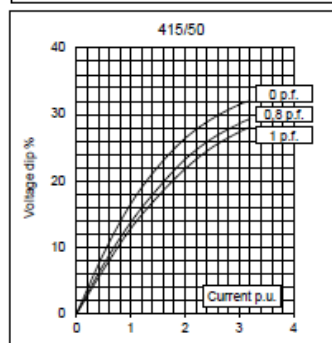
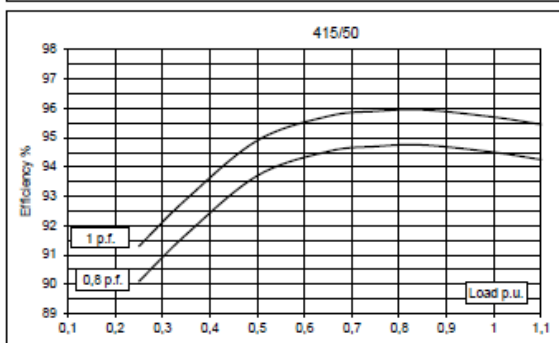
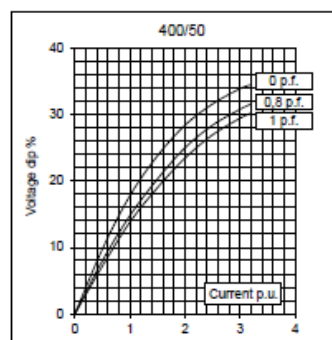
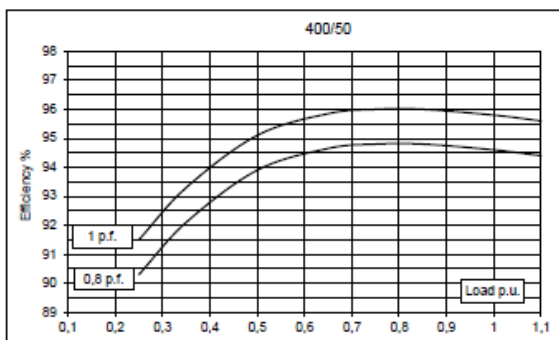
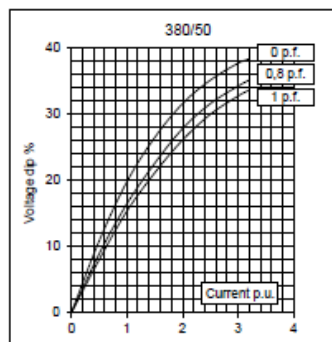
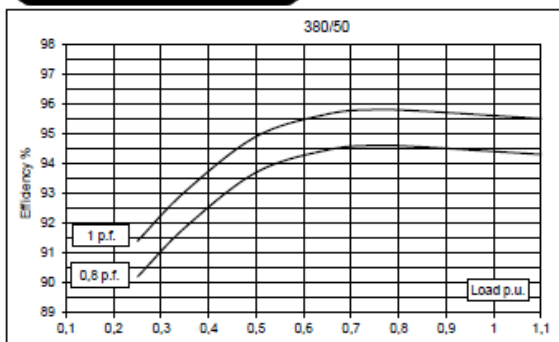
issue 010 date 21/03/2014

Electrical Characteristics										
Frequency		Hz	50				60			
Voltage (parallel star)		V	380	400	415	440	415	440	460	480
Rated power class H		kVA	500	500	500	460	540	580	600	600
		kW	400	400	400	368	432	464	480	480
Rated power class F		kVA	450	450	450	414	484	520	540	540
		kW	360	360	360	331	387	416	432	432
Regulation with		DER1	±1% with any power factor and speed variations between -5% +30%							
Insulation class			H							
Execution			Brushless							
Stator winding			12 ends (nameplate data : 800V-50Hz Series Star, 960V-60Hz Series Star)							
Rotor			with damping cage							
Efficiencies class H	4/4	%	94,4	94,6	94,5	94,2	95	95,3	95,5	95,6
(see graph. for details)	3/4	%	94,6	94,8	94,7	94,4	95,2	95,5	95,7	95,8
	2/4	%	93,7	93,9	93,7	93,4	93,9	94,5	94,7	94,9
	1/4	%	90,2	90,3	90,1	89,8	90,5	90,7	90,9	91,1
Reactances (f. l.c.l. F)	Xd	%	322	250	167	105	430	370	322	250
	Xd'	%	21,8	21	19,4	18,4	23,5	22,9	21,8	21
	Xd''	%	12,1	11,4	10,2	9,7	14,1	13,4	12,1	11,4
	Xq	%	122	108	102	92	145	136	122	108
	Xq'	%	122	108	102	92	145	136	122	108
	Xq''	%	27,7	26,4	25,8	24,3	29,5	28,6	27,7	26,4
	X ₂	%	18,4	16,7	15,7	13,8	20,2	19,4	18,4	16,7
	X ₀	%	3,2	3	2,7	2,5	3,8	3,6	3,2	3
Short Circuit Ratio	Kcc		0,31	0,40	0,60	0,96	0,23	0,27	0,31	0,40
Time Constants	Td'	sec.	0,14							
	Td''	sec.	0,021							
	Tdo'	sec.	2,80							
	Tα	sec.	0,031							
Short Circuit Current Capacity	%		>300				>350			
Excitation at no load	Amp.		0,6	0,7	1	1,2	0,4	0,5	0,6	0,7
Excitation at full load	Amp.		3,6	3,5	3,9	4	3	3,1	3,2	3,4
Overload (long-term)	%		1 hour in a 6 hours period 110% rated load							
Overload per 20 sec.	%		300							
Stator Winding Resistance (20°C)	Ω		0,0106							
Rotor Winding Resistance (20°C)	Ω		5,176							
Exciter Resistance (20 °C)	Ω		Rotor : 0,317				Stator : 8,85			
Heat dissipation at f.l.c.l.H	W		23729	22833	23280	22658	22737	22884	22618	22092
Telephone Interference			THF < 2%				TIF < 40			
Radio interference			EN61000-6-3, EN61000-6-2. For others standards apply to factory							
Waveform Distors.(THD) at f. load	LL/LN %		2,4 / 2,5							
Waveform Distors.(THD) at no load	LL/LN %		2,6 / 2,5							
Mechanical characteristics										
Protection			IP 21 (other protection on request)							
DE bearing			6322							
NDE bearing			6318.2RS							
Weight of wound stator assembly	kg		428							
Weight of wound rotor assembly	kg		274,6							
Weight of complete generator	kg		1171							
Maximun overspeed	rpm		2250							
Unbalanced magnetic pull at f.l.c.l.F	kN/mm		6,5							
Cooling air requirement	m³/min		54				64,8			
Inertia Constant (H)	sec.		0,175				0,210			
Noise level at 1m/7m	dB(A)		94 / 82				98 / 88			

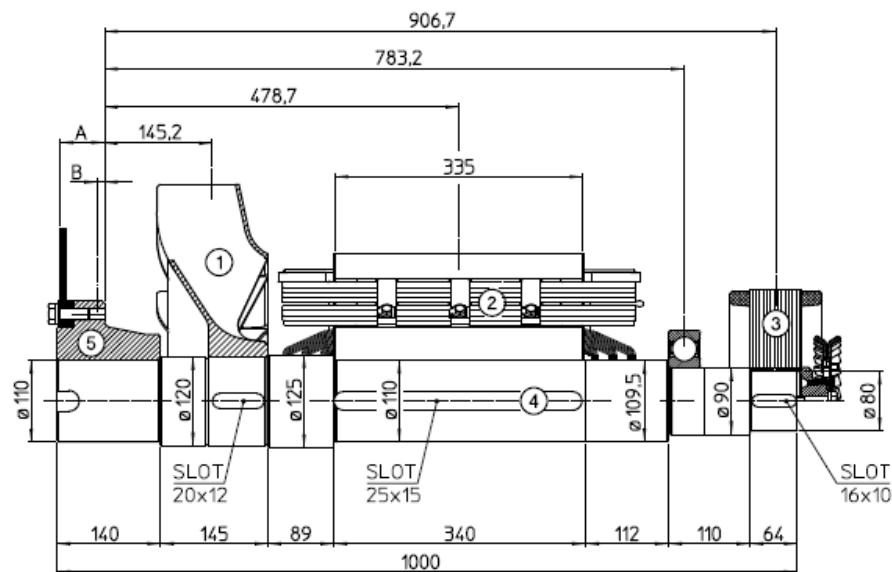
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50 Hz



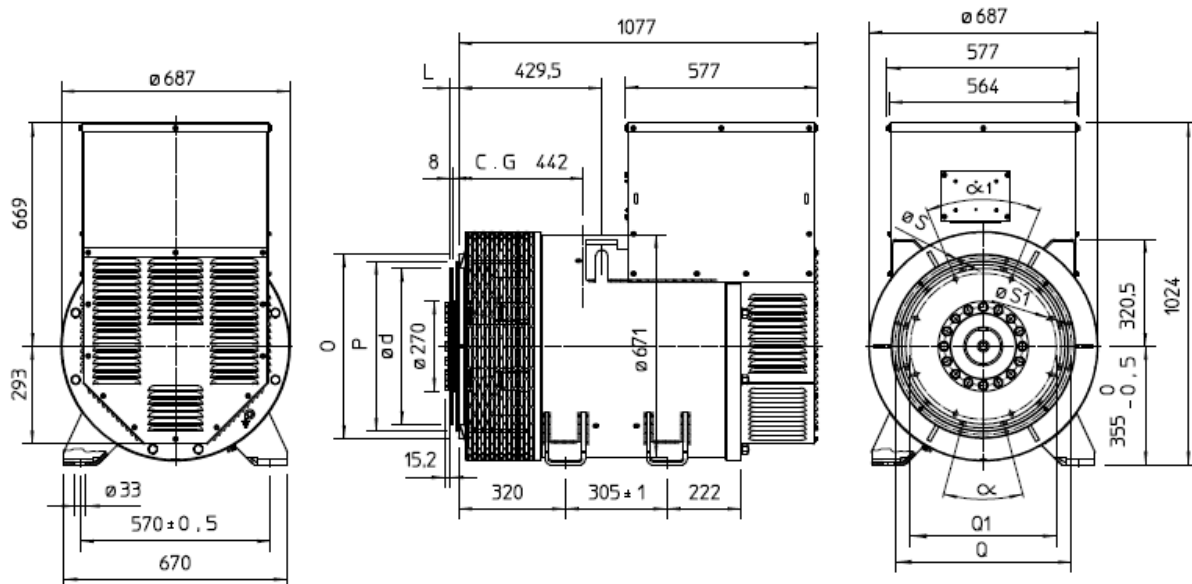
SINGLE BEARING MOMENTS OF INERTIA



	COMPONENT	WEIGHT kg	J kgm ²
1	FAN	10.2	0.335
2	MAIN ROTOR	274.6	5.846
3	EX. ROTOR	35	0.562
4	SHAFT	72	0.111
	TOTAL	391.8	6.854

Sae No	A	B	WEIGHT kg	J kgm ²
14	60	9.6	41.4	0.511
18	50	6.6	45.1	0.858

SINGLE BEARING DIMENSIONS



SAE N.	FLANGIA / FLANGE BRIDE / FLANSCH					
	O	P	Q	N _{FORI}	S	α
1	552	511.2	530.2	12	11	30°
1/2	648	584.2	619.1	12	14	30°
0	711	647.7	679.5	16	14	22.5°
00	883	787.4	850.9	16	14	22.5°

VOL. N.	GIUNTI A DISCHI / DISC COUPLING DISQUE DE MONOPALIER / SCHEIBENKUPPLUNG					
	L	d	Q1	N _{FORI}	S1	$\alpha 1$
14	25.4	466.72	438.15	8	14	45°
18	15.7	571.5	542.92	6	17	60°

C.G.= GRAVITY CENTER

6. Engine Data Sheet

VOLVO PENTA GENSET ENGINE

TAD1641GE

484 kW (658 hp) at 1500 rpm, 565 kW (768 hp) at 1800 rpm, acc. to ISO 3046

The TAD1641GE is a powerful, reliable and economical Generating Set Diesel Engine built on the dependable in-line six design.

Durability & low noise

Designed for easiest, fastest and most economical installation. Well-balanced to produce smooth and vibration-free operation with low noise level.

To maintain a controlled working temperature in cylinders and combustion chambers, the engine is equipped with piston cooling. The engine is also fitted with replaceable cylinder liners and valve seats/guides to ensure maximum durability and service life of the engine.

Low exhaust emission

The state of the art, high-tech injection and charging system with low internal losses contributes to excellent combustion and low fuel consumption.

The TAD1641GE complies with EU Stage 2 exhaust emission regulations.

Easy service & maintenance

Easily accessible service and maintenance points contribute to the ease of service of the engine.

Technical description

Engine and block

- Optimized cast iron cylinder block with optimum distribution of forces without the block being unnecessary heavy.
- Wet, replaceable cylinder liners
- Piston cooling for low thermal load on pistons and reduced ring temperature
- Tapered connecting rods to reduce risk of piston cracking
- Crankshaft induction hardened bearing surfaces and fillets with seven main bearings for moderate load on main and big-end bearings
- Nitrocarburized transmission gears for heavy duty operation
- Keystone top compression rings for long service life
- Viscous type crankshaft vibration damper
- Replaceable valve guides and valve seats
- Over head camshaft and four valves per cylinder equipped with camshaft damper to reduce noise and vibrations.

Lubrication system

- Full flow oil cooler
- Full flow disposable spin-on oil filters, for extra high filtration
- The lubricating oil level can be measured during operation (Standard dipstick only)
- Gear type lubricating oil pump, gear driven by the transmission



Features

- Maintained performance, air temp 40°C
- Cooling system (55°C)
- Fully electronic with Volvo Penta EMS 2
- Dual frequency switch (between 1500 rpm and 1800 rpm)
- High power density
- Emission compliant
- Low noise levels
- Gen Pac configuration

Fuel system

- Self de-aerating system. When replacing filters all fuel stays in the engine.
- Non-return fuel valve
- Electronic unit injectors
- Fuel prefilter with water separator and water-in-fuel indicator / alarm
- Gear driven low-pressure fuel pump
- Fine fuel filter with manual feed pump and fuel pressure switch
- Fuel shut-off valve, electrically operated

Cooling system

- Efficient cooling with accurate coolant control through a water distribution duct in the cylinder block. Reliable sleeve thermostat with minimum pressure drop
- Belt driven, maintenance-free coolant pump with high degree of efficiency

Turbo charger

- Efficient and reliable turbo charger
- Extra oil filter for the turbo charger

Electrical system

- Engine Management System 2 (EMS 2), an electronically controlled processing system which optimizes engine performance. It also includes advanced facilities for diagnostics and fault tracing
- The instruments and controls connect to the engine via the CAN SAE J1939 interface, either through the Control Interface Unit (CIU) or the Digital Control Unit (DCU). The CIU converts the digital CAN bus signal to an analog signal, making it possible to connect a variety of instruments. The DCU is a control panel with display, engine control, monitoring, alarm, parameter setting and diagnostic functions. The DCU also presents error codes in clear text.
- Sensors for oil pressure, oil temp, boost pressure, boost temp, coolant temp, fuel temp, water in fuel, fuel pressure and two speed sensors. Crank case pressure, piston cooling pressure, oil level and air filter pressure drop sensors.
- Alternator 24V / 80A

**VOLVO
PENTA**

TAD1641GE

Technical Data

General

Engine designation	TAD1641GE	
No. of cylinders and configuration	in-line 6	
Method of operation	4-stroke	
Bore, mm (in.)	144 (5.67)	
Stroke, mm (in.)	165 (6.50)	
Displacement, l (in ³)	16.12 (983.7)	
Compression ratio	16.5:1	
Dry weight, kg (lb)	1480 (3263)	
Dry weight with Gen Pac, kg (lb)	1910 (4211)	
Wet weight, kg (lb)	1550 (3417)	
Wet weight with Gen Pac, kg (lb)	2020 (4453)	

Performance	1500 rpm	1800 rpm
with fan, kW (hp) at:		
Prime Power	430 (585)	485 (660)
Max Standby Power	473 (643)	546 (743)

Lubrication system	1500 rpm	1800 rpm
Oil consumption, liter/h (US gal/h) at:		
Prime Power	0.10 (0.026)	0.11 (0.029)
Max Standby Power	0.10 (0.026)	0.12 (0.032)
Oil system capacity incl filters, liter	42	

Fuel system	1500 rpm	1800 rpm
Specific fuel consumption at:		
Prime Power, g/kWh (lb/hph)		
25 %	216 (0.350)	228 (0.369)
50 %	199 (0.322)	204 (0.331)
75 %	196 (0.318)	202 (0.328)
100 %	199 (0.322)	206 (0.334)
Max Standby Power, g/kWh (lb/hph)		
25 %	217 (0.351)	233 (0.370)
50 %	197 (0.320)	205 (0.332)
75 %	196 (0.318)	203 (0.330)
100 %	200 (0.324)	210 (0.340)

Intake and exhaust system	1500 rpm	1800 rpm
Air consumption, m ³ /min (cfm) at:		
Prime Power	35.5 (1254)	44.0 (1554)
Max Standby Power	38.0 (1342)	45.8 (1617)
Max allowable air intake restriction, kPa (In wc)	5 (20.1)	5 (20.1)
Heat rejection to exhaust, kW (BTU/min) at:		
Prime Power	326 (18539)	373 (21212)
Max Standby Power	356 (20245)	442 (25136)
Exhaust gas temperature after turbine, °C (°F) at:		
Prime Power	443 (829)	436 (817)
Max Standby Power	455 (851)	479 (893)
Max allowable back-pressure in exhaust line, kPa (In wc)	10 (40.2)	10 (40.2)
Exhaust gas flow, m ³ /min (cfm) at:		
Prime power	85.0 (3002)	100.6 (3553)
Max Standby Power	92.0 (3249)	110.4 (3899)

Cooling system	1500 rpm	1800 rpm
Heat rejection radiation from engine, kW (BTU/min) at:		
Prime Power	18 (1024)	22 (1251)
Max Standby Power	20 (1137)	24 (1365)
Heat rejection to coolant kW (BTU/min) at:		
Prime Power	170 (9668)	212 (12056)
Max Standby Power	184 (10464)	231 (13137)
Fan power consumption, kW (hp)	11 (15)	19 (26)

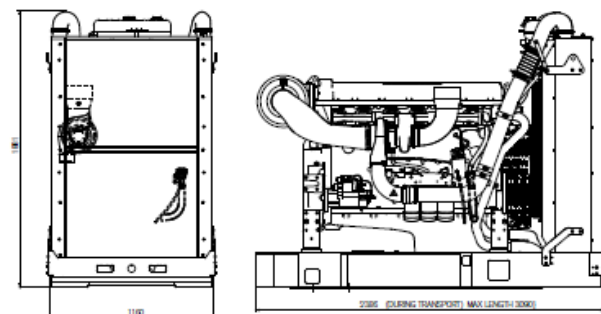
Standard equipment

	Engine	Gen Pac
Engine		
Automatic belt tensioner	•	•
Lift eyelets	•	•
Flywheel		
Flywheel housing with conn. acc. to SAE 1	•	•
Flywheel for 14" flex. plate and flexible coupling	•	•
Vibration dampers	•	•
Engine suspension		
Fixed front suspension	•	•
Lubrication system		
Oil dipstick	•	•
Full-flow oil filter of spin-on type	•	•
By-pass oil filter of spin-on type	•	•
Oil cooler, side mounted	•	•
Low noise oil sump	•	•
Fuel system		
Fuel filters of disposable type	•	•
Electronic unit injectors	•	•
Pre-filter with water separator	•	•
Intake and exhaust system		
Air filter with replaceable paper insert	•	•
Air restriction indicator	•	•
Air cooled exhaust manifold	•	•
Connecting flange for exhaust pipe	•	•
Exhaust flange with v-clamp	•	•
Turbo charger, low right side	•	•
Cooling system		
Radiator incl intercooler	• ¹⁾	•
Belt driven coolant pump	•	•
Fan hub	•	•
Thrust fan	• ¹⁾	•
Fan guard	—	•
Belt guard	—	•
Control system		
Engine Management System (EMS) with CAN-bus interface SAE J1939	•	•
CIU, Control Interface Unit	—	—
Alternator		
Alternator 80A / 24V	•	•
Starting system		
Starter motor, 7.0kW, 24V	•	•
Connection facility for extra starter motor	•	•
Instruments and senders		
Temp.- and oil pressure for automatic stop/alarm 103°C	•	•
Other equipment		
Expandable base frame	—	•
Engine Packing		
Plastic wrapping	•	•

¹⁾ must be ordered, see order specification
 — optional equipment or not applicable
 • included in standard specification

Dimensions TAD1641GE

Not for installation



Note! Not all models, standard equipment and accessories are available in all countries.
 All specifications are subject to change without notice.
 The engine illustrated may not be entirely identical to production standard engines.

Power Standards

The engine performance corresponds to ISO 3046, BS 5514 and DIN 6271. The technical data applies to an engine without cooling fan and operating on a fuel with calorific value of 42.7 MJ/kg (18360 BTU/lb) and a density of 0.84 kg/liter (7.01 lb/US gal), also where this involves a deviation from the standards. Power output guaranteed within 0 to +2% at rated ambient conditions at delivery. Ratings are based on ISO 8528. Engine speed governing in accordance with ISO 3046/IV, class A1 and ISO 8528-5 class G3.

Exhaust emissions

The engine complies with EU stage 2 emission legislation according to the Non Road Directive EU 97/68/EEC. The engine also complies with TA-luft-50% exhaust emission regulations.

Rating Guidelines

PRIME POWER rating corresponds to ISO Standard Power for continuous operation. It is applicable for supplying electrical power at variable load for an unlimited number of hours instead of commercially purchased power. A10 % overload capability for governing purpose is available for this rating.

MAXIMUM STANDBY POWER rating corresponds to ISO Standard Fuel Stop Power. It is applicable for supplying standby electrical power at variable load in areas with well established electrical networks in the event of normal utility power failure. No overload capability is available for this rating.

1 hp = 1 kW x 1.36

Information

For more technical data and information, please look in the Generating Set Engines Sales Guide.

VOLVO PENTA

AB Volvo Penta
 SE-405 08 Göteborg, Sweden
www.volvopenta.com

7. Control panel 7410



DSE7410/20

AUTO START & AUTO MAINS FAILURE MODULES

FEATURES



The DSE7410 is an Auto Start Control Module and the DSE7420 is an Auto Mains (Utility) Failure Control Module suitable for a wide variety of single, diesel or gas, gen-set applications.

A sophisticated module monitoring an extensive number of engine parameters, the DSE74xx will annunciate warnings, shutdown and engine status information on the back-lit LCD screen, illuminated LED, remote PC, and audible alarms. The module includes RS232, RS485 & Ethernet ports as well as dedicated terminals for system expansion.

The DSE7400 Series modules are compatible with electronic (CAN) and non-electronic (magnetic pick-up/alternator sensing) engines and offer a comprehensive number of flexible inputs, outputs and extensive engine protections so the system can be easily adapted to meet industry requirements.

The modules can be easily configured using the DSE Configuration Suite Software. Selected front panel editing is also available.

ENVIRONMENTAL TESTING STANDARDS

ELECTRO-MAGNETIC COMPATIBILITY

BS EN 61000-6-2
EMC Generic Immunity Standard for the Industrial Environment
BS EN 61000-6-4
EMC Generic Emission Standard for the Industrial Environment

ELECTRICAL SAFETY

BS EN 60950
Safety of Information Technology Equipment, including Electrical Business Equipment

TEMPERATURE

BS EN 60068-2-1
Ab/Ae Cold Test -30 °C
BS EN 60068-2-2
Bb/Be Dry Heat +70 °C

VIBRATION

BS EN 60068-2-6
Ten sweeps in each of three major axes
5 Hz to 8 Hz @ +/-7.5 mm,
8 Hz to 500 Hz @ 2 gn

HUMIDITY

BS EN 60068-2-30
Db Damp Heat Cyclic 20/55 °C
@ 95% RH 48 Hours
BS EN 60068-2-78
Cab Damp Heat Static 40 °C
@ 93% RH 48 Hours

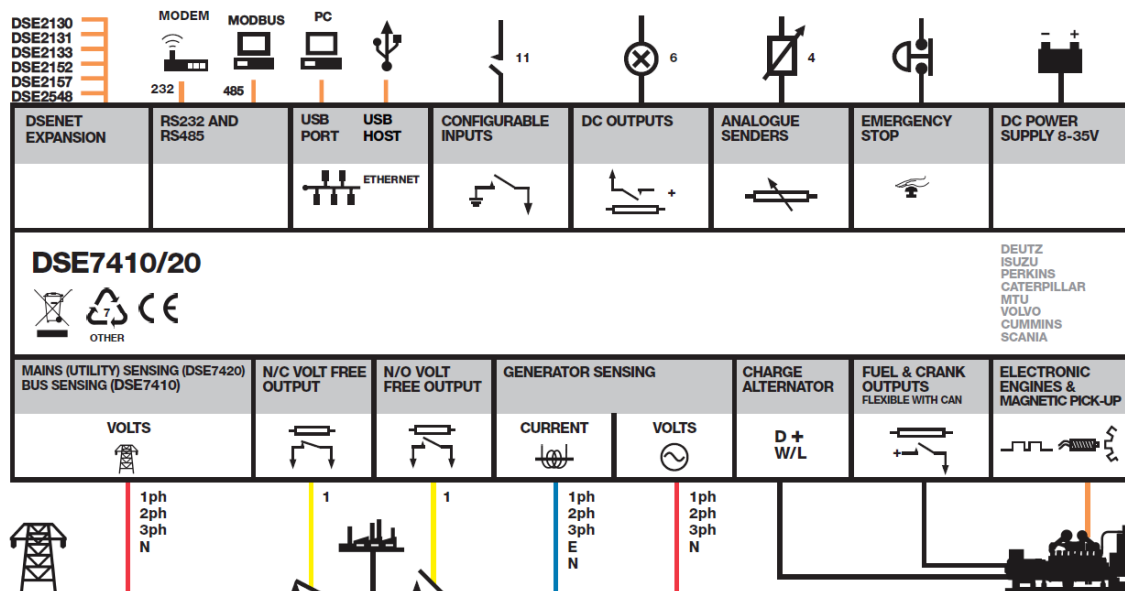
SHOCK

BS EN 60068-2-27
Three shocks in each of three major axes
15 gn in 11 ms

DEGREES OF PROTECTION PROVIDED BY ENCLOSURES

BS EN 60529
IP65 - Front of module when installed into the control panel with the supplied sealing gasket.

COMPREHENSIVE FEATURE LIST TO SUIT A WIDE VARIETY OF GEN-SET APPLICATIONS



ISSUE 1

DSE7410/20

AUTO START & AUTO MAINS FAILURE MODULES

FEATURES



DSE7420

DSE7410



KEY FEATURES

- 4-Line back-lit LCD text display
- Five key menu navigation
- Front panel editing with PIN protection
- Customisable status screens
- Power save mode
- 11 configurable inputs
- 8 configurable outputs
- Flexible sensor inputs
- Configurable timers and alarms
- 3 configurable maintenance alarms
- Multiple date and time scheduler
- Configurable event log (250)
- Tier 4 CAN engine support
- Integral PLC editor
- Easy access diagnostic page
- CAN and Magnetic Pick-up/Alt. sensing
- Fuel usage monitor and low fuel alarms
- Charge alternator failure alarm
- Manual speed control (on compatible CAN engines)
- Manual fuel pump control
- Engine exerciser
- "Protections disabled" feature
- kW protection
- Reverse power (kW) protection

- LED and LCD alarm indication
- Power monitoring (kW h, kV Ar, kV A h, kV Ar h)
- Load switching (load shedding and dummy load outputs)
- Automatic load transfer (DSE7420)
- Unbalanced load protection
- Independent Earth Fault trip
- USB connectivity
- Backed up real time clock
- Fully configurable via DSE Configuration Suite PC software
- Configurable display languages
- Remote SCADA monitoring via DSE Configuration Suite PC software
- User selectable simultaneous RS232, RS485 & Ethernet communications
- Configurable MODBUS pages
- MODBUS RTU & TCP support
- Advanced SMS messaging (additional external modem required)
- Additional display screens to help with modem diagnostics
- Idle control for starting
- DSENet® expansion compatible
- 20 parameter data logging

KEY BENEFITS

- 132 x 64 pixel ratio display for clarity
- Real-time clock provides accurate event logging
- Multiple date and time scheduler
- Set maintenance periods can be configured to maintain optimum engine performance
- Built in ethernet communications provides advanced remote monitoring
- Modules can be integrated into building management systems (BMS) using MODBUS
- Increased input and output expansion capability via DSENet®
- Licence-free PC software
- IP65 rating (with supplied gasket) offers increased resistance to water ingress
- PLC editor allows user configurable functions to meet specific application requirements
- Data logging to assist with fault finding

RELATED MATERIALS

TITLE

DSE7410 Installation Instructions
DSE7420 Installation Instructions
DSE74xx Quick Start Guide
DSE74xx Operator Manual
DSE74xx PC Configuration Suite Manual

PART NO'S

053-085
053-088
057-162
057-161
057-160

DEEP SEA ELECTRONICS PLC UK

Highfield House, Hunmanby Industrial Estate, Hunmanby YO14 0PH
TELEPHONE +44 (0) 1723 890099 **FACSIMILE** +44 (0) 1723 893303
EMAIL sales@deepseapl.com **WEBSITE** www.deepseapl.com

DEEP SEA ELECTRONICS INC USA

3230 Williams Avenue, Rockford, IL 61101-2668 USA
TELEPHONE +1 (815) 316 8706 **FACSIMILE** +1 (815) 316 8708
EMAIL sales@deepseausa.com **WEBSITE** www.deepseausa.com

SPECIFICATION

DC SUPPLY

CONTINUOUS VOLTAGE RATING
8 V to 35 V Continuous

CRANKING DROPOUTS

Able to survive 0 V for 50 ms, providing supply was at least 10 V before dropout and supply recovers to 5 V. This is achieved without the need for internal batteries

MAXIMUM OPERATING CURRENT

260 mA at 12 V, 130 mA at 24 V

MAXIMUM STANDBY CURRENT

120 mA at 12 V, 65 mA at 24 V

CHARGE FAIL/EXCITATION RANGE

0 V to 35 V

OUTPUTS

OUTPUT A (FUEL)

15 A DC at supply voltage

OUTPUT B (START)

15 A DC at supply voltage

OUTPUTS C & D

8 A AC at 250 V AC (Volt free)

AUXILIARY OUTPUTS E,F,G,H,I & J

2 A DC at supply voltage

GENERATOR

VOLTAGE RANGE

15 V to 333 V AC (L-N)

FREQUENCY RANGE

3.5 Hz to 75 Hz

MAINS (UTILITY) (DSE7420)

VOLTAGE RANGE

15 V to 333 V AC (L-N)

FREQUENCY RANGE

3.5 Hz to 75 Hz

BUS (DSE7410)

VOLTAGE RANGE

15 V to 333 V AC (L-N)

FREQUENCY RANGE

3.5 Hz to 75 Hz

MAGNETIC PICK UP

VOLTAGE RANGE

+/- 0.5 V to 70 V

FREQUENCY RANGE

10,000 Hz (max)

DIMENSIONS

OVERALL

240 mm x 181 mm x 42 mm
9.4" x 6.8" x 1.6"

PANEL CUTOUT

220 mm x 160 mm
8.7" x 6.3"

MAXIMUM PANEL THICKNESS

8 mm
0.3"

STORAGE TEMPERATURE RANGE

-40 °C to +85 °C
-40 °F to +185 °F

OPERATING TEMPERATURE RANGE

-30 °C to +70 °C
-22 °F to +158 °F

8. Attenuation

Plantroom Attenuation to achieve a noise level of 75dBA at 1m in assumed FFC from your Volvo TAD1641GE powered generator set (PHG550VoOS).

ATTENUATION SPECIFICATION

- 1 x Cooling air inlet attenuator supplied in galvanised sheet steel.
- 1 x Cooling air outlet attenuator supplied in galvanised sheet steel.
- Designed in accordance to meet the specified noise level requirement stated above.
- Comprising of flat sheet steel outer skin, acoustically rated inner lining and perforated sheet steel inner skin to both casing and internal splitters.

INLET DIMS (in mm) – 1200 L x 1620 W x 1950 H Approx. Weight – 600 kg

OUTLET DIMS (in mm) – 1200 L x 1530 W x 1950 H Approx. Weight – 575 kg

OUTLET DUCTWORK

- 1 x 90° duct work piece in unlined galvanised sheet steel.
- To turn hot discharge air from radiator 90° to side to enter attenuator.
- For connection between flexible canvas duct and outlet attenuator.

DUCTWORK 1300 D x 1330 W x 1950 H

WEATHER LOUVRES

- Inlet & Outlet weather louvres fitted with bird guard mesh screen to rear face.
- Supplied separately from attenuation for external wall mounting.
- Finish painted in 2 pack epoxy/acrylic to any colour from the RAL or BS4800 range.

Note – Excluding the use of metallic colours RAL 9006 & 9007.

INLET DIMS (in mm) – 150 D x 1620 W x 1950 H

OUTLET DIMS (in mm) – 150 D x 1530 W x 1950 H

FLEXIBLE DUCT

- 1 x Flexible canvas duct made from a flame retardant polyester material to comply with BS5867 Part 2 supplied between hot air outlet attenuator and engine radiator.

EXHAUST SILENCERS

- 2 x Mild steel silencers finish painted in heat resistant paint & terminating at flanged connections.

Primary: 8-inch nominal bore, 760 mm body diameter, 2085 mm overall length.

Secondary: 8-inch nominal bore, 410 mm body diameter, 1575 mm overall length.

Approx. Total Weight – 300 kg

COMMENTS AND ASSUMPTIONS

- 1) It is assumed that the plant room walls, ceiling and floor are of sufficiently substantial construction to match or better the performance of the above equipment.
 - 2) Acoustic Lineout of the plantroom may be required, depending upon room construction.
 - 3) No provision is made for either noise or cooling requirements of OTHER EQUIPMENT within the plantroom.
 - 4) All parts of the exhaust system within the plantroom are thermally treated.
- The high-pressure usage common with most Architectural louvres, significantly reduces the duct allowance available to us for the attenuator design and can adversely affect size and cost of our equipment.

9. Bulk Fuel Tank

2025 litre (usable) nominal bunded clean oil tank

Capacities: Maximum: 2025ltrs Usable: 1944ltrs Bund: 2343ltrs

Compliance: BS799 Part 5. PPG2, DSEAR 2002 Material: Steel to BS EN 10025-2:2004 S275JR Build Type: J

Max working head 0.5 above top of tank.

Tank plates fully welded internally & externally.

Internal tank bracing: In accordance with BS799

Skid mounted on 4 no 100 mm x 50 mm Channel Bearers.

Material - Tank and Bund: 5 mm sheet steel.

Complete with fuel fill and take off points, valves, gauges, and alarm probes, vents, and a fill point cabinet.

Supplied with Fuel Transfer system inbuilt into bunded area of the tank with duty/standby pumps, nr`v`s, gauges, filters and pipework, Control Panel.

Requires external power supply.

Name Plate & Signage.

Finish: De Grease, 1 coat primer, 2 coats air drying enamel in Brown. ISO 12944 C3 Compliant.

Dimensions and Weights:

Tank Size: 2200mm long x 1250mm wide x 1500mm high.

Unit Dry Weight: 947 KG

Unit Wet Weight: 1992 KG

10. Fuel Transfer System & Fill/Vent Line

We have proposed a double walled 'DoublePress' crimped pipe system; carbon steel core pipe, SS304 outer pipe (leak monitored) for fuel transfer pipework.

All pipework will be supported with Unistrut (or equivalent) containment materials throughout pipework route.

Our proposal considers a recessed fill point cabinet for fuel intake with internal / double walled pipework / isolation valves for fuel inlet connections on bulk tank, drop weight fire valve on fuel transfer line in tank room, motorised and isolation valves on fuel transfer line in generator room.

Our proposal considers supplying and installing control cable for interfacing the bulk tank level sensors to the associated fill point level gauges, and a control cable following fuel transfer line from bulk tank room to generator room for termination/connection by others to appropriate equipment.

We assume the following equipment is installed by the client/others:
pipework and control cable containment

Fuel Pipework

Fuel Fill Point to Bulk Tank (Fill and Vent – 15m route): -

30m x DN50 Double Press Pipework – CS core pipe/SS304 outer pipe.

20 x DN50 Double Press Bends.

4 x DN50 Double Press End Terminations Bulk Tank to Generator (Fuel Flow – 95m route).

95m x DN25 Double Press Pipework – CS core pipe/SS304 outer pipe.

15 x DN25 Double Press Bends.

2 x DN25 Double Press End Terminations.

Valves

2 x DN50 IV (Tank Inlet)

1 x DWFV & Manual Release Button (Tank Room)

1 x DN25 IV (Gen Room)

1 x DN25 MV (Gen Room)

Single walled pipe fittings included where connecting to valves/tank sockets.

PLEASE NOTE: All containment for pipework and control cable to be installed by others,

Pipe Leak Detection

SGB VLR410E (EN13160) Vacuum Leak Detection System c/w leak detection tubing and fittings to connect to double walled pipework.

2 Way Vacuum Leak Detection manifold

Remote Fuel Fill Point

1 x 2" Tanker Connection Assembly: IV, NRV, fill nipple and cap.

1 x Digital Tank Contents Gauge

1 x Overfill Alarm Unit

1 x BMS Junction Box

1 x Local Isolator

1 x Removable drip tray

All items housed in a mild steel lockable enclosure suitable for wall mounting.

Dimensions 1000mm x 1000mm x 300mm.

Installation, Testing & Commissioning

Installation Supervising Engineer (SSSTS Certified) to control all site works.

Mechanical installation of all supplied equipment, Pressure testing of all Double Press pipework.

Install and commissioning of leak detection system.

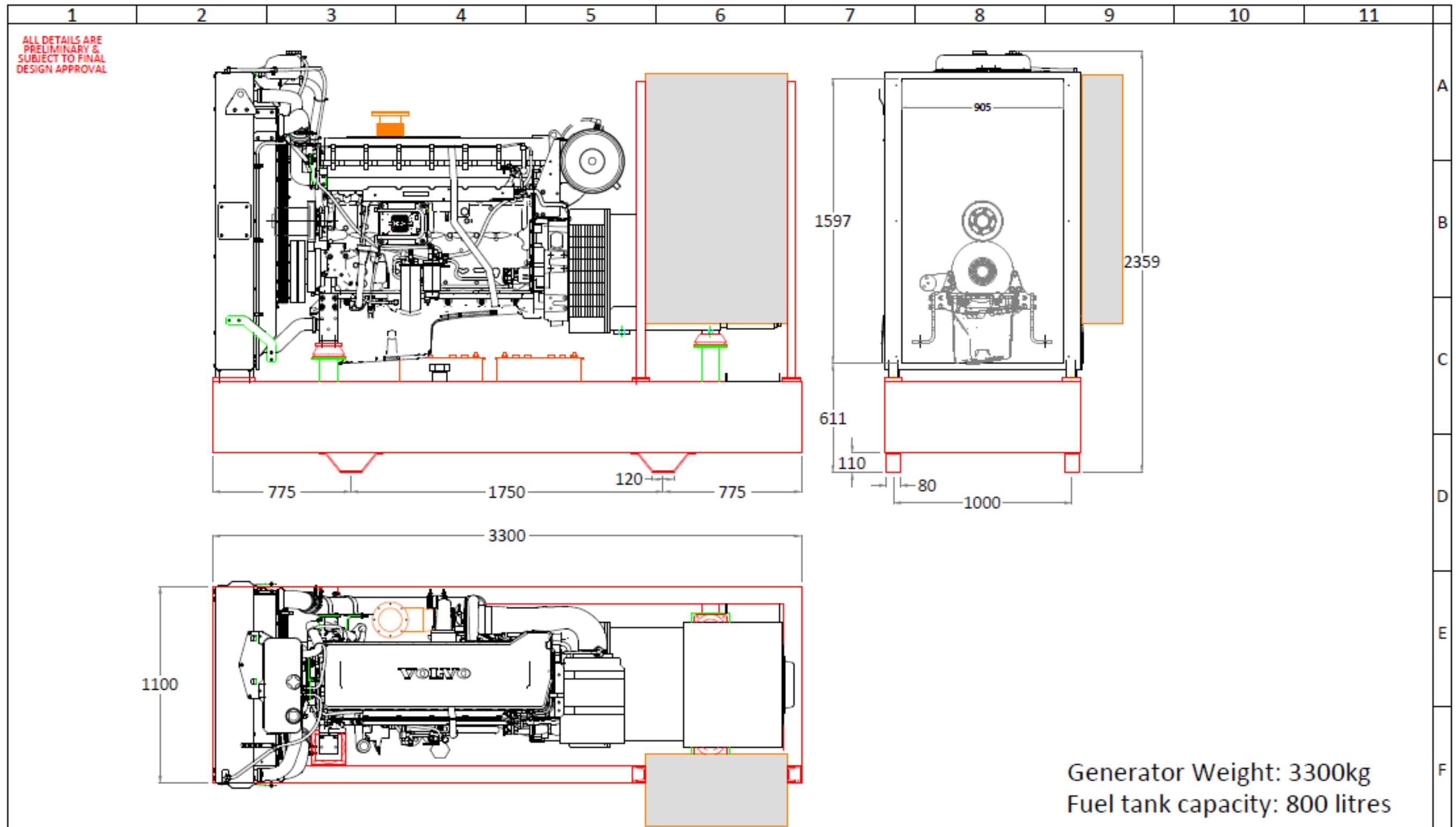
Mobile tower considered for internal works at height.

Supply and install of 2 x multi-core control cables; fill point to tank room, and tank room to gen room. Calibration and configuration of all fuel gauging equipment in fill point. Engineers' travel time & return mileage to site

Mid-week accommodation and subsistence in London considered in pricing.

PLEASE NOTE: Any Additional pipework lengths or bends other than stated above will incur additional costs.

11. Generator GA

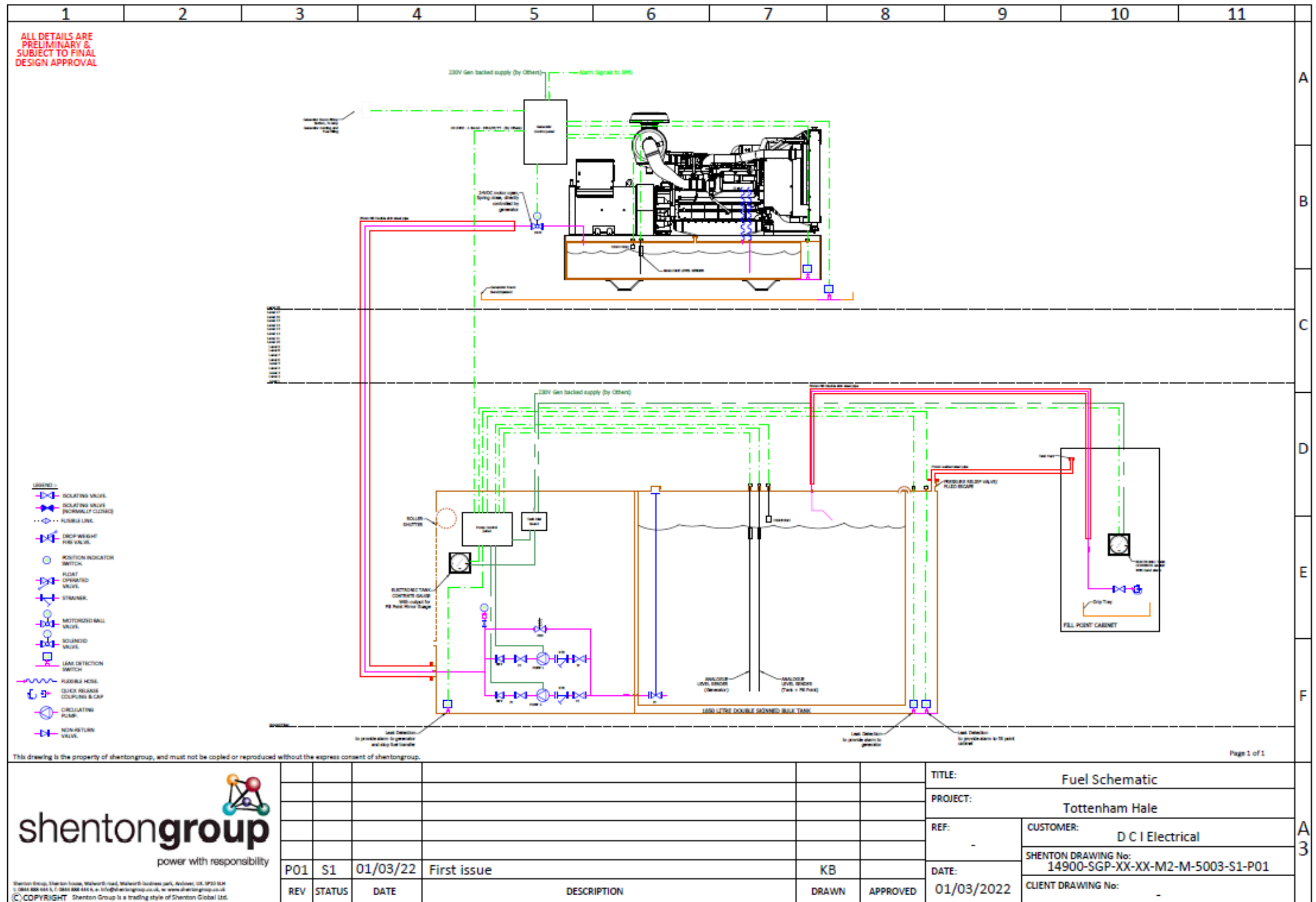


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							PROJECT: Tottenham Hale		
							REF: -	CUSTOMER: D C I Electrical	
								SHENTON DRAWING No: 14900-SGP-XX-XX-M2-M-2000-S1-P01	
							DATE: 01/03/2022	CLIENT DRAWING No: -	
P01	S1	01/03/22	First issue	KB					
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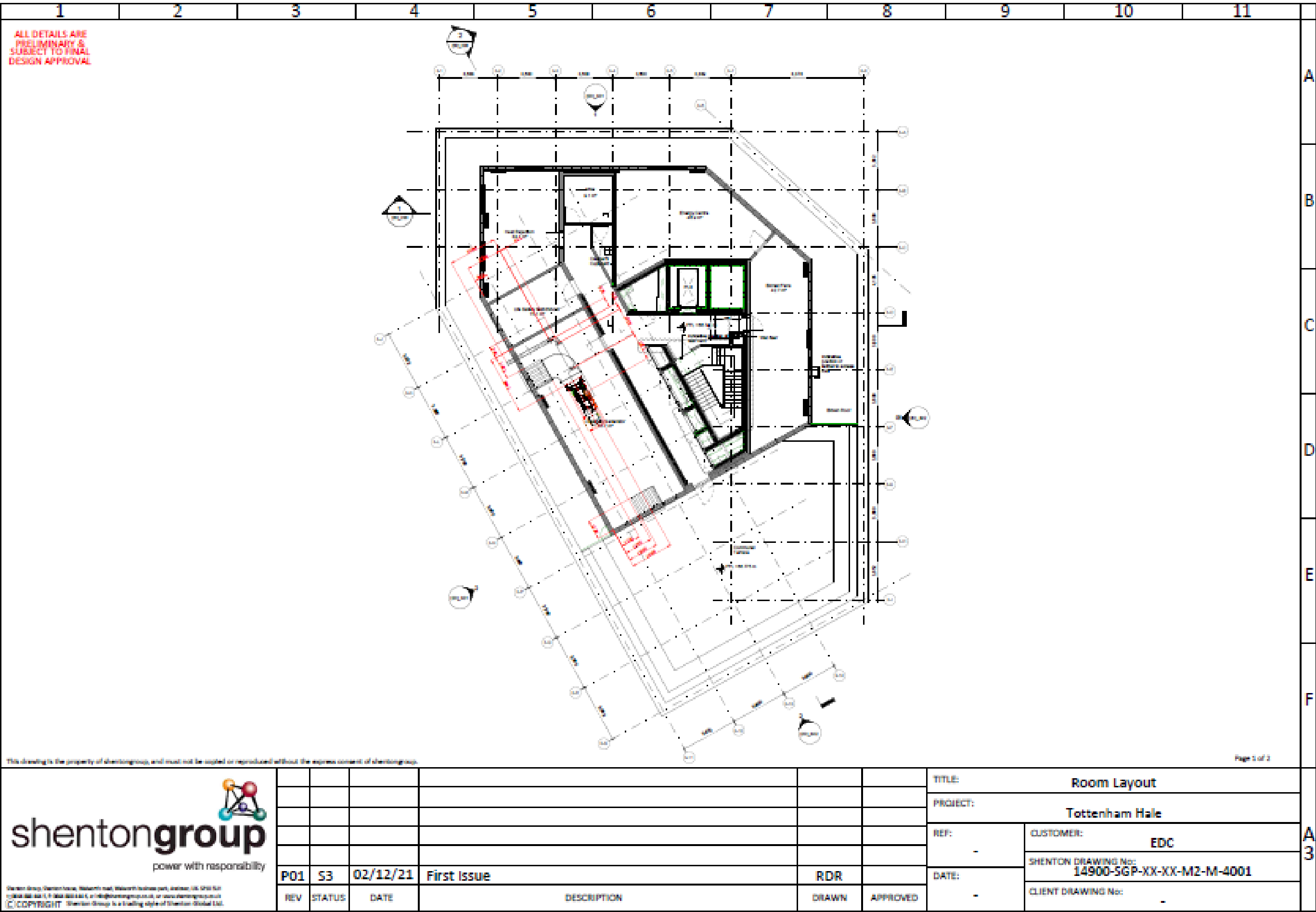
12. Fuel Schematic

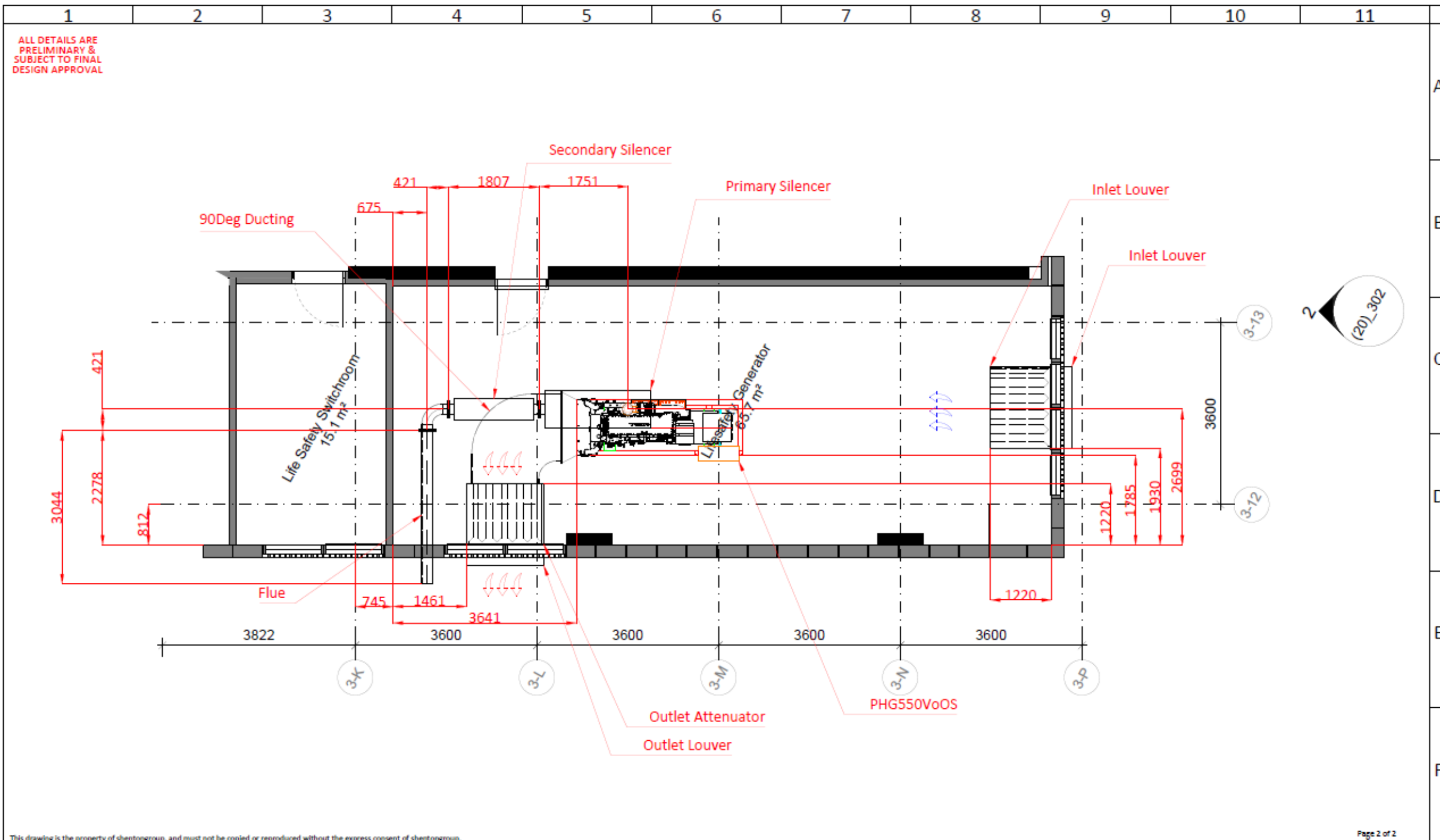


13. 2025Ltr ROLLER SHUTTER BULK FUEL TANK

	1	2	3	4	5	6	7	8	9	10	11		
	ALL DETAILS ARE PRELIMINARY & SUBJECT TO FINAL DESIGN APPROVAL NOTES:- 2025 litre (usable)nominal bunded clean oil tank. Capacities: Maximum: 2025ltrs Usable: 1944ltrs Bund: 2343ltrs Compliance: BS799 Part 5. PPG2, DSEAR 2002 Material: Steel to BS EN 10025-2:2004 S275JR Build Type: J Max working head 0.5 above top of tank. Tank plates fully welded internally & externally. Internal tank bracing: In accordance with BS799 Skid mounted on 4 no 100 mm x 50 mm Channel Bearers. Material - Tank and Bund: 5 mm sheet steel. Complete with fuel fill and take off points, valves, gauges, and alarm probes, vents, and a fill point cabinet. Supplied with Fuel Transfer system inbuilt into bunded area of the tank with duty/standby pumps, nrv`s, gauges, filters and pipework, Control Panel. Requires external power supply. Name Plate & Signage. Finish: De Grease, 1 coat primer, 2 coats air drying enamel in Brown. ISO 12944 C3 Compliant. Dimensions and Weights: Tank Size: 2200mm long x 1250mm wide x 1500mm high. Unit Dry Weight: 947 KG Unit Wet Weight: 1992 KG											A	
	ISOMETRIC VIEW											B	
												C	
	1500,00 1612,00											D	
												E	
												F	
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shentongroup power with responsibility Shenton Group, Shenton House, Walsworth road, Walsworth business park, Andover, UK. SP20 5JH t: 01464 888 441 f: 01464 888 0416, e: info@shentongroup.co.uk, w: www.shentongroup.co.uk ©COPYRIGHT Shenton Group is a trading style of Shenton Global Ltd.									TITLE: 1850Ltr ROLLER SHUTTER BULK FUEL TANK PROJECT: Tottenham Hale REF: CUSTOMER: D C I Electrical DATE: 11/03/2022 SHENTON DRAWING No: 14900-SGP-XX-XX-MS-M-5000 CLIENT DRAWING No: -			A	
	P02	S3	14/03/22	Tank Size Changed		RDR							3
	P01	S3	11/03/22	FIRST ISSUE		RDR							
	REV	STATUS	DATE	DESCRIPTION		DRAWN	APPROVED						

14. Generator Room Layout





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 power with responsibility Shenton Group, Shenton house, Walworth road, Walworth business park, Andover, UK, SP10 5JH t: 0844 888 444 5, f: 0844 888 444 6, e: info@shentongroup.co.uk, w: www.shentongroup.co.uk © COPYRIGHT Shenton Group is a trading style of Shenton Global Ltd.							TITLE: Room Layout	
							PROJECT: Tottenham Hale	
							REF: -	CUSTOMER: EDC
							DATE: -	SHENTON DRAWING No: 14900-SGP-XX-XX-M2-M-4001
								CLIENT DRAWING No: -
P01	S3	02/12/21	First Issue		RDR			
REV	STATUS	DATE	DESCRIPTION		DRAWN	APPROVED		