Technical Submittal Form

To: (Name)	Jayson Willey	**From:** (Name)	Adrian Wells
Company:	ISG	**Company:**	Michael J Lonsdale
Project Name:	UCL IoN and DRI	**Company Initials:**	MJL
Job No:	EN20019	**Role:**	E: Electrical Engineer
Submission Date:	2021-11-29	**Package Code:**	7350: Standby Generator
Date Approval is Required:	2021-12-27	**Revision:**	P01
Submittal No:	**BEMP-MJL-P1-XX-TS-E-00-0012**		

Description of Technical Submittal		
System Category	Group:	Electrical systems *(Ss_70)
	Subgroup:	Electrical power generation systems *(Ss_70_10)
	Section:	Fossil fuel power generation systems *(Ss_70_10_30)
	Object:	Reciprocating internal combustion engine driven alternating current generator system *(Ss_70_10_30_72)
Product Category	Group:	Services source products *(Pr_60)
	Subgroup:	Power supply products *(Pr_60_70)
	Section:	Power generators, engines and packaged combined heat and power (CHP) units *(Pr_60_70_65)
	Object:	Generator sets *(Pr_60_70_65_34)

Equipment Type (Fan Coil Unit, Radiator etc)	Standby Generator Set
System Abbreviation	SBG: Standby Generator
Manufacturer	F.G. WIlson
Model	F G Wilson P1500P3 Generator Set, Perkins 4012TAG2A Engine, FG Wilson LL8224N Alternator, Covrad GT CRDA1648-B4 Heat Exchanger, Com Ap InteliGen IG-NT GC Controller, Christie & Grey Vibration and Shock Control – ECS25/1200, Intake Attenuator – Allaway Acoustocs GH2Z313, Exhaust Attenuator – Allaway Acoustocs GH2Z321, Secondary Exhaust Attenuator – Allaway Acoustocs GH2, Primary Exhaust Silencer MA41, Flakt Woods Air Inlet Fans - AJXS-080-31-20-36 - 80JM/25/4/9/24 , BSB – FD Series Fire Damper Angle Frame, 6500L Bunded Mild Steel Fuel Tanks, Metcraft Fuel Polisher MET-60KFP, Landon Kingsway Freefall Fire Valve, Landon Kingsway Solenoid Quick Release MK II, Landon Kingsway Manuak Quick Release Mechanism, Metcraft Hydrostatic Tank Contents Gauge, Metcraft Multi-Channel Tank Alarm, Metcraft OLE C2020 Tank Gauge, Metcraft Duplex Basket Strainers – DN20/25, Gate Valve – 1”/1 1/4”, Secondary Exhaust Silencer – FP2
Drawing No	BEMP-HLEA-P1-XX-SM-E-610-0004 P03
Specification reference	BEMP-HLEA-P1-XX-SP-E-610-0001 P04

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Description or additional information: This submission covers the Generator Set engine, alternator, heat exchanger, control panel, fuel system, Exhaust Silencer and flue system. The following elements will be covered by further individual Technical Submissions. - PLC Equipment - PLC Cause & Effect - PLC Panel/Infrastructure Design

Is the proposal specification compliant?	Yes
Is the proposal an alternative to specification?	No
Is the proposal compliant with employer's requirements?	Yes
Details of reason for deviation from specification / alternative to specification:	
ISG / Consultant's comments:	

Designated Consultant to co-ordinate response from all parties

Organisation	Copied to	Comments

Consultant	Approval Status	Signed	Date
	A B C		

Supplier		
Supplier Name		Bells Power Solutions Ltd.
Supplier Telephone		020 32590100
Supplier Address	Building Name / №	70
	Street	Clifton Street
	Town	London
	County	Click here to enter text.
	Postcode	EC2A 4HB
	Country	England
Supplier Email		contact@bellspowersolutions.co.uk
Supplier Website		www.bellspowersolutions.co.uk

Warranty	
Manufacturer's Warranty Description	Defects in materials and workmanship
Manufacturer's Warranty Duration for Parts	1 Year
Manufacturer's Warranty Duration for Labour	1 Year

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Contractual Warranty Duration	1 Year
Estimated Life Expectancy	30 Years
Warranty Service Contractor Email	As above
Warranty Service Contractor Website	As above

Sustainability

The table below provides BREEAM & LEED prompts dependant on the item selected from the drop down menu. This table must be read alongside the package LEED/BREEAM scope. It is not an exhaustive list and as such it is up to the subcontractor to confirm ultimate compliance against their package scope.

BREEAM

Is this technical submission for the following equipment / materials:	**If yes, please prove the following is met and provide auditable documentation:**	**Included?**	**Please explain where compliance is shown within the supplied documentation**
N/A	N/A	N/A	N/A
	N/A	N/A	N/A
Estimated annual CO_2 emissions ($kgCO_2$/year)		N/A	

LEED

Is this technical submission for the following equipment / materials:	**If yes, please prove the following is met and provide auditable documentation:**	**Included?**	**Please explain where compliance is shown within the supplied documentation**
N/A	N/A	N/A	N/A
	N/A	N/A	N/A
	N/A	N/A	N/A
	N/A	N/A	N/A
	N/A	N/A	N/A
	N/A	N/A	N/A
	N/A	N/A	N/A
	N/A	N/A	N/A
	N/A	N/A	N/A
	N/A	N/A	N/A
	N/A	N/A	N/A
	N/A	N/A	N/A

Maintenance Schedule	
Maintenance Action (per item)	**Frequency**
Visual inspection in line with the pre-start checks contained within O&M. To be carried out prior to starting.	Weekly
Operational check by starting and running the engine for 5 mins Bi-Weekly	Weekly
Perform an operational and load check on the generator set by starting and running the engine at least 50% load for 1 to 2 hours	Monthly

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Repeat the daily procedures plus the following: 1. Check all control system safety devices by electrically simulating faults 2. Clean all battery cap vents 3. Tighten all exhaust connections 4. Tighten all electrical connections 5. Perform other engine maintenance as specified in the engine manual 6. Start the engine and observe the instrument panel to ensure that all gauges and meters are operatingcorrectly 7. If a spark arrestor has been fitted, this should be removed and thoroughly cleaned to remove any carbonbuild-up	1 Year
	Choose an item.
	Choose an item.
	Choose an item.
	Choose an item.
	Choose an item.
	Choose an item.

Models / Types / Sub-models / Sizes			
1:	F G Wilson P1500P3 Generator Set	**16:**	Landon Kingsway Solenoid Quick Release MK II
2:	Perkins 4012TAG2A Engine	**17:**	Landon Kingsway Manuak Quick Release Mechanism
3:	FG Wilson LL8224N Alternator	**18:**	Metcraft Hydrostatic Tank Contents Gauge
4:	Covrad GT CRDA1648-B4 Heat Exchanger	**19:**	Metcraft Multi-Channel Tank Alarm
5:	Com Ap InteliGen IG-NT GC Controller	**20:**	Metcraft OLE C2020 Tank Gauge
6:	Christie & Grey Vibration and Shock Control – ECS25/1200	**21:**	Metcraft Duplex Basket Strainers – DN20/25
7:	Intake Attenuator – Allaway Acoustocs GH2Z313	**22:**	Gate Valve – 1”/1 1/4”
8:	Exhaust Attenuator – Allaway Acoustocs GH2Z321	**23:**	Secondary Exhaust Silencer – FP2
9:	Secondary Exhaust Attenuator – Allaway Acoustocs GH2	**24:**	
10:	Primary Exhaust Silencer MA41	**25:**	
11:	Flakt Woods Air Inlet Fans - AJXS-080-31-20-36 - 80JM/25/4/9/24	**26:**	
12:	BSB – FD Series Fire Damper Angle Frame	**27:**	
13:	6500L Bunded Mild Steel Fuel Tanks	**28:**	
14:	Metcraft Fuel Polisher MET-60KFP	**29:**	
15:	Landon Kingsway Freefall Fire Valve	**30:**	

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Technical Submittal Sheet

Contents

BEMP-MJL-P1-XX-TS-E-00-0012	Project: UCL IoN/DRI

Description	Yes/No	Document Reference
1. System Overview	No	
2. Manufacturers Literature	Yes	
3. Schedules	No	
4. Drawings	Yes	
5. Schematic	No	
6. Design Calculations	No	Included within Manufactures literature section for the acoustics

Technical Submittal Sheet

1 - System Overview

BEMP-MJL-P1-XX-TS-E-00-0012	**Project:** **UCL IoN/DRI**

N/A

Technical Submittal Sheet

2 - Manufacturers Literature

BEMP-MJL-P1-XX-TS-E-00-0012	Project: UCL IoN/DRI

This section contains manufacturers literature for the following:

- Generator Set
- Anti-Vibration Mounts
- Acoustic attenuation/silencing
- Fuel System
- Cooling System

Generator Technical Submittal
UCL IoN
Q4105

Bells Power Solutions Ltd
70 Clifton Street
London
EC2A 4HB

020 3259 0100
contact@bellspowersolutions.co.uk
www.bellspowersolutions.co.uk

Equipment Specifications

1500kVA Generating Set

Manufacturer: F.G.Wilson, Ireland

Model: P1500P3

Rating: PRP: 1500kVA, 1200KW
0.8 pf (415v / 50Hz / 3ph)

ESP: 1650kVA, 1320kW
0.8 pf (415v / 50Hz / 3ph)

Prime (PRP)
These ratings are applicable for supplying continuous electrical power (at variable load) in lieu of commercially purchased power. There is no limitation to the annual hours of operation and this model can supply 10% overload power for 1 hour in 12 hours.

Standby (ESP)
These ratings are applicable for supplying continuous electrical power (at variable load) in the event of a utility power failure. No overload is permitted on these ratings. The alternator on this mode is peak continuous rated (as defined in ISO 8528-3).

CE Certificated

Engine:

Manufacturer: Perkins, UK

Model: 4012TAG2A

Governor: Electronic Class: ISO 8528 G2

Class G2 – Transient
Class G3 – Steady State

Engine:
12 cylinder, 4 stroke, direct injection, compression ignition, continuously rated, water-cooled industrial diesel engine. Arranged for electric start and stop. Built to comply with BS5514 and capable of sustaining a 10% overload for one hour in a 12 hour running period. Complete with heat exchanger, lubricating oil filters, air cleaners, start motor, battery charging alternator or dynamo and regulator, multi cylinder, Woodward Proact 2 fuel injection governing, fuel control solenoid, fuel lift pump, engine speed adjustment. The engine will be fitted with a heavy dynamically balanced flywheel suitable for constant speed generator duty. An efficient approved engine speed governor is fitted to maintain engine speed at all conditions of load in line with the requirements of BS5514.

Cooling system:
A thermostatically controlled "stand still" heater will be fitted to aid cold starting. The heater will require a single phase AC supply and provision should be made for this in the generator plant room. All power supplies and wiring within the plant room is included in our offer. The cooling system will be charged with 50% anti-freeze. Our cooling systems use engine manufacturers recommended anti-freeze which contain water pump lubricants to help maintain the efficiency of the pump, rust inhibitors to keep unwanted deposits from forming and acid neutralizers to help protect the inside of the heat exchanger, heater core and hoses from corrosion.

Filtration System:
The engine will be fitted with dry type air filters with replaceable elements. The engine will be complete with fuel and lubricating oil filters with replaceable elements.

Oil Filters:
Engine oil will be filtered by canister type, spin-on lubrication filters in full flow, containing stainless steel wire cloth filters. A primary strainer is fitted to all engines, with some incorporating secondary filtration.

Fuel Filters:
Fuel will be filtered by canister type, spin-on, replaceable fuel filters in full flow, including contaminant collection bowls with self-venting valve.

Intercooling System:
Charge Air is force aspirated and connected to the CACW heat exchanger connection. Jacket water is cooled by heat exchanger JW connection. CACW and JW are combined via the plate heat exchanger and transferred into the remote cooling circuit.

Air Filters:
Air into the engine will be cleaned by pleated, cellulose filters, which are housed in a metal body coated with corrosion and chemical resistant, polymer paint. All critical sealing components are made from urethane to ensure positive sealing and all particulate matter extracted from first stage filtration is automatically discharged via an evacuator valve. The injection-moulded end cap is made of specially engineered resins for high strength and durability and operates as a service cover to access the elements. Optional pre-cleaners and internal safety elements provide additional heavy-duty filtration, whilst maintaining airflow and restriction indicators mounted on the unit indicate service requirements.

Starting System:
The engine will be electric start complete with a starter motor, and long life sealed lead acid batteries, battery racks and interconnecting cables.

Batteries
Heavy duty Sealed Lead Acid batteries are provided. The batteries are mounted on floor mounted stands and can be expected to last for approx. 5-10 years before needing replacement when operated in accordance with the Manufacturers recommendations. Batteries are supplied in V0 rated, flame retardant containers that combine high mechanical strength with excellent safety features. The robust construction and compact design make them ideal for installing alongside equipment where resistance to shock/vibration are essential.

Battery Charging Systems:
To maintain charge when the generator has not been running, a constant voltage battery charger is provided suitable for use with the battery type offered. The charger operates when the generator is not running and requires a single phase AC supply local to the generator. Charge on the batteries is maintained to the correct level by a voltage regulator. Solid state monitor devices switch the charger on and off to prevent over-charging.

Alternator:

FG Wilson Model: LL8224N

The FG Wilson alternator is manufactured exclusively by Leroy Somer to our stringent specifications. The alternator will be a brushless design, directly coupled to the engine.

The PMG system consists of a permanent magnet generator mounted on the non-drive end of the shaft, which provides the power to the automatic voltage regulator. The above excitation systems ensure an alternator short circuit capability of 3 times rated current for 10 seconds to enable protection schemes to operate reliably.

The AVR is built utilising transistor technology. The resin encapsulated module is mounted in the terminal box. The AVR has a voltage adjustment range of +/-5% and a steady state accuracy of +/-0.5%.

The alternator is sized for class H insulation and temperature rise. It is capable of sustaining a 10% overload for 1 hour in 12 without incurring damage. It uses an internal ventilation system (IC 01) consisting of a single centrifugal type fan mounted on the shaft at the drive end of the rotor. This draws cold air through the stator from the non-drive end and ejects it at the drive end. The screen protected enclosure has an IP rating of 23.

Each electrical element, the wound stator, the rotor and the exciter are dried to eliminate moisture before impregnation. The impregnation system is VPI (Vacuum and Pressure Impregnation) using an Epoxy resin for the low voltage elements and Polyester resin for the medium voltage elements of the alternator. This process guaranties that all air is extracted under vacuum from the winding before pressure then forces resin into every void within the assembly, thus ensuring global impregnation of the entire stator core assembly. Polymerisation of the resin harnesses the full electrical and mechanical potential of the system. Anti-flash paint applied onto the resin further protects it against mechanical aggression and industrial pollution.

Single Bearing:

A coupling flange will attach the alternator to the engine crankshaft, using the main bearing of the engine to help resist the static and dynamic loads of the alternator.

Coupling Arrangement:
The engine and alternator will be directly coupled by means of an SAE flange so that there is no possibility of misalignment being found after prolonged use. A flexible coupling is used in all cases and the coupling is completely guarded for safety purposes.

Mounting Arrangement:
The engine and alternator will be mounted as a whole on a heavy duty fabricated steel base frame constructed from folded channel sections. Crane lifting arrangement is included.

Anti-Vibration Mounting Pads:
Standard spring vibration isolators will be provided and will give up to 25mm static deflection, and all mounts are fitted with a built-in levelling device. The spring type AVM's have isolation efficiencies in the 95+% isolation range.

Electric Motor Driven Fuel Cooler:
A fuel cooler, with electric motor driven fan, will be installed in the fuel return line, from the engine to the day tank. The cooler element is constructed of aluminium fins and plates, which are separated by bars. Fuel which has spilled past the injectors from the fuel pump, is then used to cool the injectors in a simple exchange of heat. This pre-heated fuel spills back to the day tank via the fuel cooler.

Generator Control Panel: ComAp Intelligen STMP

Each generator set shall be provided with a local, set mounted ComAp Inteligen control panel to provide local manual control, instrumentation and protection functions.

The panel is suitable for automatic start, synchronising and load sharing of the generators across a common connection switchboard.

Panel Construction and Finish:

Components installed in a heavy duty sheet steel enclosure
Phosphate chemical pre-coating of steel provides corrosion resistant surface
Polyester composite powder topcoat forms high gloss and extremely durable finish
Lockable-hinged panel door provides easy component access

Instrumentation:

5.7” Colour TFT display with adjustable contrast and backlight with auto power off

Generator A.C. Metering:

Volts 3–phase (L-L & L-N)
Amps (per phase & average)
Frequency
kW
kVAR
Pf
kWh
kVARh

Mains A.C. Metering:

Volts 3–phase (L-L & L-N)
Amps (per phase & average)
Frequency
kW
kVAR
Pf

Generator D.C. Metering:

Battery Volts
Hours Run
Engine Jacket Water Temperature (in °C or °F)
Lube Oil Pressure (in psi, kPa or bar)
Engine Speed (RPM)

Controls:

Status Indicators
Run key, Auto key and Stop key with LED indicators
Lamp test key
Audible alarm
Alarm Acknowledge key
Menu navigation keys
Engine and AC metering shortcut keys
Control module keys with tactile feedback
Lock down emergency stop push button

Protection:

Fail to Start
Low Oil Pressure
High Engine Temperature
Under Speed, Over Speed
Under Volts, Over Volts
Under Hz, Over Hz
Overcurrent
Earth Fault
Loss of Engine Speed Detection
Low/High Battery Voltage
Battery Charger Failure

Fault Log (name of each event, time & engine hours at first occurrence of event, time & engine hours at latest occurrence of event, number of occurrences of event)

Communications:

Volt free contacts for generator running and common fault for connection to BMS (by others)
Modbus Communication and Ethernet to the common PLC control panel and BMS if required.

The panel would be complete with all necessary internal wiring, control circuit relays, control switches push buttons and terminals to provide a working system.

Remote Signals/Contacts

Terminals for Remote Emergency Stop and volt free contacts for common alarm and generator set running.

Audible Alarm:

A common audible alarm will be provided and will sound in the event of any of the above mentioned faults occurring. The alarm will remain in operation until manually reset by the operator after the fault condition has been corrected.

BMS:

The generator set will be equipped with a Modbus communications port for connection to the BMS (BMS is by others) utilizing the RS 422 communications protocol.

Finish:

The generator is thoroughly cleaned and primed with 2 coats of industrial primer and finished in 2 coats industrial high gloss paint.

Circuit Breaker:

The circuit breaker for the generator set is located at the side of the generator baseframe mounted directly adjacent to the set's control panel within a frame mounted panel complete with a gland plate beneath for external cable connection. The circuit breaker shall be a 3 Pole ABB ACB.

Finish:

For durability and corrosion resistance all sheet metal components are first treated with a phosphate chemical conversation coating, which provides an excellent corrosion resistant surface. These metal components are then painted by applying a polyester powder to melt and form a continuous high gloss and extremely durable coating. The engine and alternator are thoroughly cleaned and finished in temperature controlled ovens with industrial high gloss paint. All fasteners are electroplated.

Standards Applicable to All FG Wilson Product:

The following standards are applicable to FG Wilson generators.

1. BS 4999-0 – General requirements for rotating electrical machines

2. BS 4999-105 – General requirements for rotating electrical machines –classification of degrees of protection by enclosures (identical to BS EN IEC 60034-5)

3. BS 4999-140 – General requirements for rotating electrical machines – voltage regulation and parallel operation of ac synchronous machines

4. BS 4999-142 - General requirements for rotating electrical machines – vibration

5. BS 4999-143 – General requirements for rotating electrical machines – tests

6. BS 5000-99 – Rotating electrical machines of particular types or for particular applications – miscellaneous applications

7. BS 5514-1 – Reciprocating internal combustion engines – standard reference conditions, declarations of power, fuel and lubricating oil consumptions and test methods (identical to ISO 3046-1) 8. BS 7698-1 to –6, -9, -10 – Reciprocating internal combustion engine driven alternating current generating sets (identical to ISO 8528-1 to –6, -9, -10)

9. BS EN IEC 60034-1 – Rotating electrical machines – rating and performance

10. BS EN IEC 60034-22 – Rotating electrical machines – AC generators for reciprocating internal combustion driven generating sets

11. BSEN 292 – Safety of machinery – Basic concepts, general principles for design

12. BSEN 953 – Safety of machinery – Guards – General requirements for the design and construction of fixed and movable guards

13. BSEN 12601 – Reciprocating internal combustion engine driven generating sets - safety

14. BSEN 61000-6-3 & -4 – Electromagnetic compatibility – generic emission standard

15. BSEN 61000-6-1 & -2 – Electromagnetic compatibility – generic immunity standard

16. BSEN 60204-1 – Safety of machinery – electrical equipment of machines

17. BSEN 60439-1 – Low voltage switchgear and control gear assemblies

18. BSEN 60529 – Degrees of protection provided by enclosures

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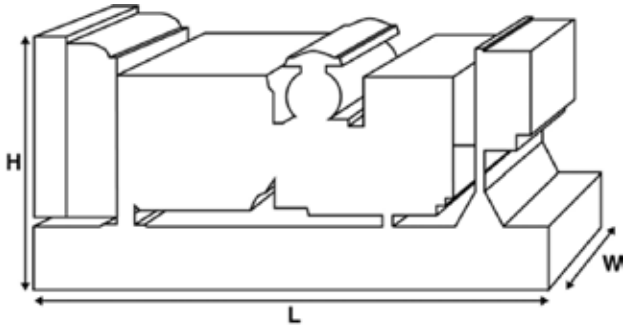
Output Ratings

Voltage, Frequency		Prime	Standby
400/230 V, 50 Hz	kVA	1500	1650
	kW	1200	1320
	kVA		
	kW		

Ratings at 0.8 power factor.
Please refer to the output ratings technical data section for specific generator set outputs per voltage.



Dimensions and Weights

Length	mm	5112 (201.3)
Width	mm	1908 (75.1)
Height	mm	2440 (96.1)
Weight (Dry)	kg	10181 (22445)
Weight (Wet)	kg	10388 (22902)

Ratings in accordance with ISO 8528, ISO 3046, IEC 60034, BS5000 and NEMA MG-1.22.
Generator set pictured may include optional accessories.

Prime Rating

These ratings are applicable for supplying continuous electrical power (at variable load) in lieu of commercially purchased power. There is no limitation to the annual hours of operation and this model can supply 10% overload power for 1 hour in 12 hours.

Standby Rating

These ratings are applicable for supplying continuous electrical power (at variable load) in the event of a utility power failure. No overload is permitted on these ratings. The alternator on this model is peak continuous rated (as defined in ISO 8528-3).

Standard Reference Conditions

Note: Standard reference conditions 25°C (77°F) Air Inlet Temp, 100m (328 ft) A.S.L. 30% relative humidity.
Fuel consumption data at full load with diesel fuel with specific gravity of 0.85 and conforming to BS2869: 1998, Class A2.

FG Wilson offer a range of optional features to allow you to tailor our generator sets to meet your power needs.
Options available include:

- Upgrade to CE Certification
- A wide range of Sound Attenuated Enclosures
- A variety of generator set control and synchronising panels
- Additional alarms and shutdowns
- A selection of exhaust silencer noise levels

For further information on all of the standard and optional features accompanying this product please contact your local Dealer or visit:

www.fgwilson.com

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Ratings and Performance Data

Engine Make		Perkins	
Engine Model:		4012-46TAG2A	
Alternator Make		Leroy Somer	
Alternator Model:		LL8224N	
Control Panel:		DSE7410	
Base Frame:		Heavy Duty Fabricated Steel	
Circuit Breaker Type:		Options Available	
Frequency:		50 HZ	60 HZ
Engine Speed: RPM	rpm	1500	
Fuel Tank Capacity:	litres (US gal)	N/A (N/A)	
Fuel Consumption Prime	litres (US gal)/hr	296.6 (78.4)	
Fuel Consumption Standby	litres (US gal)/hr	326.3 (86.2)	

Engine Technical Data

No. of Cylinders		12
Alignment		VEE
Cycle		4 STROKE
Bore	mm (in)	160 (6.3)
Stroke	mm (in)	190 (7.5)
Induction		TURBOCHARGED AIR TO AIR CHARGE COOLED
Cooling Method		WATER
Governing Type		ELECTRONIC
Governing Class		ISO 8528
Compression Ratio		13.0:1
Displacement	L (cu. in)	45.8 (2797.5)
Moment of Inertia:	kg m^2 (lb/in^2)	19.3 (65951)
Voltage		24
Ground		Negative
Battery Charger Amps		40
Engine Weight Dry	kg (lb)	4400 (9700)
Engine Weight Wet	kg (lb)	4604 (10150)

Engine Performance Data		50 Hz	60 Hz
Engine Speed	rpm	1500	
Gross Engine Power Prime	kW (hp)	1331 (1785)	
Gross Engine Power Standby	kW (hp)	1459 (1957)	
BMEP Prime	kPa (psi)	2323 (336.9)	
BMEP Standby	kPa (psi)	2546 (369.3)	

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Fuel System

Fuel Filter Type:			Replaceable Element		
Recommended Fuel:			Class A2 Diesel		
Fuel Consumption at		110 % Load	100 % Load	75 % Load	50 % Load
50 Hz Prime:	l/hr (US gal/hr)	326.3 (86.2)	296.6 (78.4)	225.7 (59.6)	159.8 (42.2)
50 Hz Standby	l/hr (US gal/hr)	-	326.3 (86.2)	246.4 (65.1)	172.6 (45.6)
60 Hz Prime	l/hr (US gal/hr)				
60 Hz Standby	l/hr (US gal/hr)	-			

(Based on diesel fuel with a specific gravity of 0.85 and conforming to BS2869, class A2

Air System		50 Hz	60 Hz
Air Filter Type:		Replaceable Element	
Combustion Air Flow Prime	m^3/min (cfm)	120 (4238)	
Combustion Air Flow Standby	m^3/min (cfm)	128 (4520)	
Max. Combustion Air Intake Restriction	kPa	4 (16.1)	

Cooling System		50 Hz	60 Hz
Cooling System Capacity	l (US gal)	207 (54.7)	
Water Pump Type:		Centrifugal	
Heat Rejected to Water & Lube Oil: Prime	kW (Btu/min)	428 (24340)	
Heat Rejected to Water & Lube Oil: Standby	kW (Btu/min)	485 (27581)	
Heat Radiation to Room*: Prime	kW (Btu/min)	150.5 (8559)	
Heat Radiation to Room*: Standby	kW (Btu/min)	171.6 (9759)	
Radiator Fan Load:	kW (hp)	42 (56.3)	
Radiator Cooling Airflow:	m^3/min (cfm)	1212 (42801)	
External Restriction to Cooling Airflow:	Pa (in H2O)	250 (1)	

*: Heat radiated from engine and alternator
Designed to operate in ambient conditions up to 50°C (122°F).
Contact your local FG Wilson Dealer for power ratings at specific site conditions.

Lubrication System

Oil Filter Type:		Spin-On, Full Flow
Total Oil Capacity:	l (US gal)	177 (46.8)
Oil Pan Capacity:	l (US gal)	159 (42)
Oil Type:		API CH4 15W-40
Oil Cooling Method:		WATER

Exhaust System		50 Hz	60 Hz
Maximum Allowable Back Pressure:	kPa (in Hg)	5 (1.5)	
Exhaust Gas Flow: Prime	m^3/min (cfm)	315 (11124)	
Exhaust Gas Flow: Standby	m^3/min (cfm)	315 (11124)	
Exhaust Gas Temperature: Prime	°C (°F)	450 (842)	
Exhaust Gas Temperature: Standby	°C (°F)	450 (842)	

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Alternator Physical Data

No. of Bearings:	1
Insulation Class:	H
Winding Pitch:	2/3
Winding Code	6S
Wires:	6
Ingress Protection Rating:	IP23
Excitation System:	AREP
AVR Model:	R450M

* dependant on voltage code selected

Alternator Operating Data

Overspeed: rpm		2250
Voltage Regulation: (Steady state)	%	+/- 0.5
Wave Form NEMA = TIF:		50
Wave Form IEC = THF:	%	2
Total Harmonic content LL/LN:	%	3.5
Radio Interference:		EN61000-6
Radiant Heat: 50 Hz	kW (Btu/min)	66.6 (3787)
Radiant Heat: 60 Hz	kW (Btu/min)	

Alternator Performance Data 50 Hz:

		415/240 V	400/230 V	380/220 V	
Voltage Code					
Motor Starting Capability*	kVA	3924	3658	3316	4385
Short Circuit Capacity**	%	300	300	300	300
Reactances	Xd	3.51	3.778	4.186	3.122
	X'd	0.226	0.244	0.27	0.201
	X"d	0.136	0.136	0.151	0.112

Alternator Performance Data 60 Hz

Voltage Code						
Motor Starting Capability*	kVA					
Short Circuit Capacity**	%	300	300	300	300	300
Reactances	Xd					
	X'd					
	X"d					

Reactances shown are applicable to prime ratings.

*Based on 30% voltage dip at 0.4 power factor.

** With optional independant excitation system (PMG / AUX winding)

P1500P3_P1650E3

Output Ratings 50 Hz

	Prime		Standby	
Voltage Code	kVA	kW	kVA	kW
415/240V	1500	1200	1650	1320
400/230V	1500	1200	1650	1320
380/220V	1500	1200	1650	1320
230/115V				
220/127V				
220/110V				
200/115V				
240V				
230V				
220V				

Output Ratings 60 Hz

	Prime		Standby	
Voltage Code	kVA	kW	kVA	kW
480/277V				
440/254V				
416/240V				
400/230V				
380/220V				
240/139V				
240/120V				
230/115V				
220/127V				
220/110V				
208/120V				
240/120				
220/110				