ARUP

Equipment Data Sheet
Combined Heat and Power Plant

Job Title:	**UCLH**			Job Number:	**232426**
Job Stage:	**4a**	Status:	**Tender**	Made by:	**LM**
Revision:	**T01**	Date:	**22/01/2016**	Checked by:	**CB**
Revision Description:					

General Data

Reference	CHP/LB3/1
Location	Level B3 Boiler Room
Drawing Reference	
Number of Sets	1

The Tender shall include the tests scheduled above

Scope of work	Design, manufacture, works test, delivery to site, installation, commissioning, site test
Scope of supply	Refer to particular specification
Construction	Refer to particular specification
Enclosure	CHP Manufacturers External Enclosure

Application Criteria

Application	To provide all year round heating and electrical supply
Modes of start-up and control	Refer to particular specification

Generating Set Performance

Note: Performance figures refer to the finished installation, complete with all exhaust systems, cooling systems, silencers and acoustic treatment. Any power required to drive ancillary equipment such as fans and pumps shall be additional to the rated output.

	Required	Offered	
Rated voltage	400		V
Number of phases	3		
Frequency	50		Hz
Rated output @PF = 0.8	43		kW
Prospective fault current at point of installation (Mains parallel operation only)			kA

	Required	Offered	
Speed	1500		r/min
Performance class	H		
Ambient temperature (Min)	0		°C
Ambient temperature (Max)	30		°C
Altitude	<100		m

Heat output

	Required	Offered	
Engine Jacket & Oil Cooler	41		kW
Intercooler			kW
Exhaust system @ 120°C	24		kW
Radiation Losses	12		kW

Manufacturing Standards

	Required	Offered
Generating set	BS 7698 (ISO 8528)	
Engine (If generating set not manufactured		
Alternator to BS 7698 (ISO 8528))		
Silencer		
Bulk fuel tank		
Lead-acid batteries	BS EN 50342 & BS EN 60095	
Nickel-cadmium batteries	BS EN 60623	

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Engine Data

		Required	Offered
Fuel(s)		Natural Gas	
Overspeed device (to BS 5514 pt6)		Yes	
Lubricating oil system			
Electric oil heating (with indication)			
Sump drain pipe		Yes	
Cooling System			
Cooling medium		Ethylene Glycol 30%	
Electric water heating (with indication)			
Radiator			
Starting System			
Battery type		Sealed lead acid	
Battery mounting		Internal	
Engine driven charging alternator (with indication)			
Panel mounted static charger (with indication)		Yes	
Fuel System			
Fuel		Natural Gas	
CV	MJ/m3	38.6	
Gas pressure	mbar	18 mBar	
Fire protection shut-off system		Yes	

Alternator Data

Type		Self-regulating, self-excited, brushless	
Insulation class (Min)		H	
Degree of protection (Min)		F	
Anti-condensation heaters			
Special load conditions			
Skid Anti Vibration Mount Type		Damper	
Skid AVM Static Deflection	mm	20	

Controlgear and Switchgear

	Required	Offered
Engine controls and protection system	Set mounted	
Location of switchgear	Set mounted	
• Cable entry	Top	
• IP Rating (Min)	45	
• Lockable doors	Yes	
Dimensions of free-standing panel		
Alternator protective device type and rating	100A	
Alternator switchgear type (3/4 pole)	4 pole	
Location of alternator neutral-earth connection **	external	
Star-point contactor required		

** Where the neutral-earth connection is outside the scope of supply of this switchgear, the alternator star-point shall not be earthed to the generator frame.

Monitoring and Control Devices - Refer to CHP specification

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Ancillaries

Exhaust system

	Required	Offered
Normal industrial silencer		
Residential silencer	Yes	
(1m from the building façade)		

	Required	Offered
Lagging		
Cladding		

Performance Data

Flue Gas Data		Required	Offered	Required	Offered	Required	Offered	Required	Offered
Heat Transfer Fluid		Combustion Gas							
Heat Transfer Capacity	kW	24							
Fluid Flow Rate	kg/hr	159							
Entering Fluid Temperature	°C	600							
Leaving Fluid Temperature	°C	12							
Max Operating Temperature	°C	700							
Primary Side Pressure Drop	Pa								
Max Operating Pressure	bar (g)								
Test Pressure	bar (g)								
Fluid Density	kg/m³								
Fluid Specific Heat Capacity	kJ/kgK								
Hydraulic Data									
Heat Transfer Fluid		Water							
Fluid Flow Rate	kg/s	0.868							
Entering Fluid Temperature	°C	70							
Leaving Fluid Temperature	°C	90							
Max Operating Temperature	°C	95							
Tube Side Pressure Drop	kPa								
Max Operating Pressure	bar (g)	6							
Test Pressure	bar (g)	9							
Fluid Density	kg/m³								
Fluid Specific Heat Capacity	kJ/kgK								

Construction		Required	Offered	Required	Offered	Required	Offered	Required	Offered
Arrangement		Internal							
Material		Stainless							
Primary Connection Type		Flanged							
Primary Connection Size (Ø)	mm								
Secondary Connection Type		Flanged							
Secondary Connection Size (Ø)	mm								
Drain Connection Size (Ø)	mm	15							
Operating Weight	kg								

Dimensional Data

Overall Length	mm								
Overall Width	mm								
Overall Height	mm								
End Access	mm	1000							
Side Access	mm	1000							

Accessories

	Required	Offered		Required	Offered
Spare Set of Plates			Stainless Steel Guide Bars	✓	
Spare Set of Gaskets			Stainless Steel Tie Bolts	✓	

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LTHW Pumps

Performance Data

		Required							
Configuration		CHP Duty	Vessel Duty						
Flow Rate	kg/s	0.890	0.890						
Total Pump Pressure	kPa								
Minimum Flow Rate	kg/s								
Pressure @ Min Flow	kPa								
Inlet Pressure	bar (g)								
% Glycol									
Pump Efficiency	%								
Pump Speed	rpm								
Max Operating Temperature	°C								
Max Inlet Pressure	bar (g)								
NPSH Required	kPa								
Bearing Design Life	L10 Hrs								

Electrical Data

Electrical Supply	V/Ø/Hz	400-3-50							
Drive Efficiency	%								
Motor Efficiency	%								
Absorbed Power	kW								
Motor Rating	kW								
Motor Type									
Motor Speed	rpm								
Starting Method		VSD	VSD						
Starting Current	A								
Full Load Running Current	A								
Power Source									
Unit Reference									

Dimensional Data

		Required	Offered	Required	Offered	Required	Offered	Required	Offered
Impeller Size (Ø)	mm								
Suction Connection (Ø)	mm								
Discharge Connection (Ø)	mm								
Overall Length	mm								
Overall Width	mm								
Overall Height	mm								
Operating Weight	kg								
Mounting Method									

Noise & Vibration Data

Anti Vibration Mount (AVM) Type		Damper							
Min AVM Static Deflection	mm								
Noise Level (Lp) @ 3m	dB(A)								

BMS/PMS Outputs	Required	Offered
CHP Run Status Volt Free Contact		
Common Alarm Volt Free Contact		
Refer to particular specification	✓	

BMS/PMS Inputs	Required	Offered
Refer to particular specification	✓	
CHP Temperature Reset (0-10VDC)		
Power Demand Limit Control		

Serial Data Link Protocol		
	Required	BACnet, Modbus (coordinate with TP6000)
	Offered	

Accessories

	Required	Offered		Required	Offered

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Vinyl Coated Fins	☐	☐	Fan Guards	✓	☐
CU/Cu Electrotinned Coils	☐	☐	Ducted Axial Fans	☐	☐
Extended Mounting Legs	✓	☐	Sequence Control	☐	☐
Coil Cleaning Ports	☐	☐			

BMS/PMS Outputs	**Required**	**Offered**	**BMS/PMS Inputs**	**Required**	**Offered**
Common Alarm Volt Free Contact	☐	☐	Fan Command	☐	☐
Refer to particular spec	✓	☐	Fan Speed Control (0-10VDC)	☐	☐
			Refer to particular spec	✓	☐

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Maintainability

	Required	Offered
Manufacturer can provide engineering assistance on site within 4 hrs	✓	
The Manufacturer holds spare parts in the UK	✓	

Manufacturer

	Preferred	Equal and Agreed	Equal and Agreed
Manufacturer	Hoval	FG Wilsons	ENERG/Deutz
Contact Name	Stuart Hartley		
Telephone Number	07792401516		
Fax Number			
E-mail Address	stuart.hartley@hoval.co.uk		
Internet Address	www.hoval.co.uk		

Works Testing

	Required	Offered		Required	Offered
Works Tests to BS ISO 8528:Pt 6			Number of persons attending		
• ISO standard functional test	Yes		Days notice required		
• ISO standard acceptance test	Yes		Power factor(s) for load tests	0.8	
• Tests as specified Schedule	Yes		Transient recorder printouts		
Calibrated test instruments to be provided by generator manufacturer				Yes	

Site Testing

	Required	Offered		Required	Offered
Works Tests to BS ISO 8528:Pt 6			Number of persons attending		
• ISO standard functional test	Yes		Days notice required		
• ISO standard acceptance test	Yes		Power factor(s) for load tests	0.8	
• Tests as specified Schedule	Yes		Transient recorder printouts		
Calibrated test instruments to be provided by generator manufacturer					

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Additional Requirements

1 *These Data Sheets shall be read in conjunction with all relevant sections of the Specification including: Technical Preliminaries Drawings*

2 ***The Contractor*** *shall complete these Data Sheets, including blank 'data cells', to confirm details of the equipment being 'offered' .*

3 *Equipment offered for any alternative Manufacturers shall be equivalent to that offered by the Preferred Manufacturer. Any deviation shall be identified .*

4 *All special tools required for the operation, maintenance and repair of the equipment shall be identified and included .*

5 *Generator sets shall have means for lifting and moving the set into position.*

6 *Flexible cables shall be used for final connection to generator set. A local terminal box shall be used if required. Cables shall be oil and fuel resistant*

7 *Flexible piping or bellows shall be provided between the engine and the exhaust system.*

8 *All inputs/outputs to be wired to numbered terminals within the control panel.*

9 *All alarm volt free contacts shall be fail safe. Contacts shall be normally open, closed when healthy, open on alarm or loss of power.*

10 *All volt free contacts to be rated at 3A inductive at 230 VAC.*

11 *To come complete with a catalytic convertor*

12 *NOX levels to be less than in specification*

13 *Duties are typical. CHP manufacturer to complete during detailed design.*

14 *Noise data to be confirmed by manufactuerer. Further attenuation may be required.*

15

16 *Access platform to be provided for flue gas heat exchanger.*

17 *CHP* ***sub-contractor*** *to co-ordinate with chimney* ***sub-contractor***

18 *Details of all pumps and pressurization units to be provided.*

19 *All VSDs shall include RFI filters to meet the 1st environment of EN61800-3 and Class 1A of 6100-6-3.*

20 *The frequency inverter shall be CE marked in accordance with European Council Directives 73/23/EEC (Low Voltage Directive) and 89/336/EEC amended by 92/31/EEC (EMC Directives) and all other current European standards relevant to drives.*

21 *All VSDs shall include RFI filters to meet the 1st environment of EN61800-3 and Class 1A of 6100-6-3.*