

01 July 2021

Mr. Andrew Clark

Anaergia
Unit 4 Spencer Court,
Howard Road,
Eaton Socon,
St Neots,
Cambs,
PE19 8E

Dear Andrew,

OUTLINE BUDGET PROPOSAL FOR ANAERGIA 2 X 1250KWE CHPS FOR AD PLANT

Further to the receipt of your enquiry and our recent on-going discussions, we are pleased to be able to provide a budget proposal for the design, supply, delivery, offloading, assembly, and commissioning for the two 1.25Mwe Caterpillar Bio Gas Generator Systems you require for the Anaergia, Anaerobic Digestion (AD) Plant in Nottingham.

At this stage, we have made an allowance for onsite delivery, offloading, positioning and assembly based on previous experiences and best practice, but this could change based on a detailed site survey.

The budget proposal is offered based on Finning Terms and Conditions of Sale; we will be happy to discuss a mutually acceptable construction contract should our offer be of interest.

We trust this budget proposal is of interest and look forward to developing the project with you soon.

Yours faithfully,



Scott Tamplin, Sales Manager – Gas Power Solutions

Finning (UK) Limited

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Web: www.finningpower.ie www.catgaspower.com

FINNING **CAT**

 **Anaergia**
Fueling a Sustainable World™

Budget Proposal for Anaergia 2 x 1250kWe CHPs for AD Plant



Finning (UK) Ltd

A subsidiary of Finning International Inc.

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EXECUTIVE SUMMARY

Finning Power Systems is delighted to be involved with the budget proposal for the 2 x 1250kWe CHPs for AD Plant.

Using our existing relationship as a strong foundation, including our recent appointment on a number of high prestige projects, we will engage with Anaergia and stakeholders to engender a collaborative environment to realise and achieve the 2 x 1250kWe CHPs for the AD Plant.

Key features of our proposal include:

- ✓ Full Design and engineering in accordance to Anaergia's requirements
- ✓ Design and interface with CATERPILLAR to offer complete solution required
- ✓ Bespoke full design, build, supply, deliver offload and commission
- ✓ Ongoing discussion to offer the required full maintenance and repair Customer Value Agreement (CVA) support contract from commissioning up to 15 years or where required.

Scott Tamplin

Finning Power Systems is eager to formalise and extend our working relationship with Anaergia through appointment and delivery of the 2 x 1250kWe CHPs for the AD Plant.

Through our shared vision and value of seeking success, improvement and added value I firmly believe there is a strong alignment between our organisations to develop and deliver this project.

On behalf of Finning Power Systems, I welcome further discussions to ensure we secure a place on these 2 x 1250kWe CHPs for AD Plant.

I.0 PRICING SCHEDULE



GRANVILLE ECOPARK CHP

I.0 Pricing Schedule

Item	Description	Price £	
1	Prelims, Design, Engineering and Project Management	£	56,600
2	2 No 1250 kWe Containerised and Packaged Biogas Units	£	1,256,300
3	Deliver to site, offload, position and site erection, CDM or H&S of the 2 Packaged CHP's	£	37,000
4	Initial Fill, Oil, lubricants, Glycol & Commissioning of both units	£	29,350
Total		£	1,379,250

2.0 SCOPE OF SUPPLY



BOSTON CHP

2.0 Scope of Supply

To supply, install, set to work and commission where required the following works:

- 2 No CGI70B-12 Generators, each rated at 1250 KWe and 415V, 50Hz, 250NOx.
- Packaging of the above generators. Details of the packaging are given in the Technical Section below.
- Delivery is to site including, offloading and positioning by a Finning appointed specialist.
- Flue exhaust system from the generators to rise vertically above the container to max 5m above FFL incorporating exhaust silencer.
- Cooling radiators positioned on the roof of the container including the interconnecting pipework.
- Generator main control panel and synchronisation.
- Local LV power cabling and containment within the containerised units only.
- G99 Testing.
- Dedicated project manager to oversee the project including client liaison, scheduling deliveries and general overview of the scheme.
- Commissioning. We have allowed 2-week commissioning per set connected to site loads only. Should load banks be required these will be charged at the time plus administration costs.
- IST and performance testing are not included, but prices are available on request.
- FAT is offered as an option if required

3.0 COMMERCIAL CONDITIONS



3.0 Commercial Conditions

Terms:	At this stage our proposal is based strictly in accordance with Finning standard Conditions of Contract; a copy of which can be supplied on request. Finning are willing to discuss and work to most recognised forms of Main Contract (subject to agreement on any project specific amendments).
Payment:	20% non-refundable deposit payable on order (14 days from date of invoice) 70% Finning confirmation readiness to despatch (14 days from date of invoice) 8% Completion of delivery of the containerised units (14 days from date of invoice) 2% completion of commissioning (14 days from date of invoice) Payment terms subject to agreed credit facilities and agreement of the contract terms and conditions. Bank guarantee, payment bond or other payment security may be required.
VAT:	All prices quoted are exclusive of VAT which will be charged at the rate ruling at the time of invoice and where applicable.
Currency:	All revenues and costs assumed to be in GBP £. unless otherwise agreed.
Validity:	This quotation is budgetary and subject to site surveys etc.
Liquidated Damages:	LAD's apply at a rate of £0. Finning do not accept performance based liquidated damages, and no performance guarantees are made.
Liability:	The following are all excluded: Indirect or consequential or special loss or damage; loss of profits; loss of contracts or business or goodwill; loss of data; damage to reputation or brand; loss of revenue or any financial or economic loss except to the extent that such losses arise as a result of death or personal injury arising as a result of our negligence. In all other events our liability for breach of contract or negligence shall be limited to 75% of Contract Price.
Delivery Lead Time	It is anticipated that delivery of packaged units can be on site between 34-38 weeks from receipt of deposit. This can be confirmed at time of order.

Defects & Warranty Period: 12 months after practical completion of our scope of works or the date when the client first has beneficial use of our works, whichever is the sooner.

Warranty is invalidated if non-genuine replacement parts or consumables are used during the warranty period.

Finning can offer extended warranties and service contracts for which we would be pleased to provide a separate quotation.

Site: All risks with regards to the site, and all costs associated with addressing such risks, remain with the client e.g. ground conditions, asbestos, access, utility supplies, road closures, etc.

Insurances: Finning holds the following standard insurances:

Professional Indemnity	£5,000,000 in aggregate
Public/Products Liability	CAD20,000,000
Employers Liability	£10,000,000
Erection All Risks	£1,000,000

Covid-19: As a result of the current coronavirus outbreak this proposal is made subject to the following conditions:

Coronavirus and its effects, including on supply chain, labour and raw materials shall be deemed a “Force Majeure Event”.

Product Lead Time: Delivery dates provided by Finning are estimates only and you accept that any delay in delivery of up to 90 days shall not entitle you to cancel the Order or make any claim for loss or damage arising from such delay.

Cancellation: A cancellation fee payable by you to Finning in the event that you cancel your Order, based on the sliding scale below you agree that this fee scale represents a fair and reasonable estimate of the likely costs to be incurred by Finning as a result of the cancellation, including administrative, storage and remarketing costs.

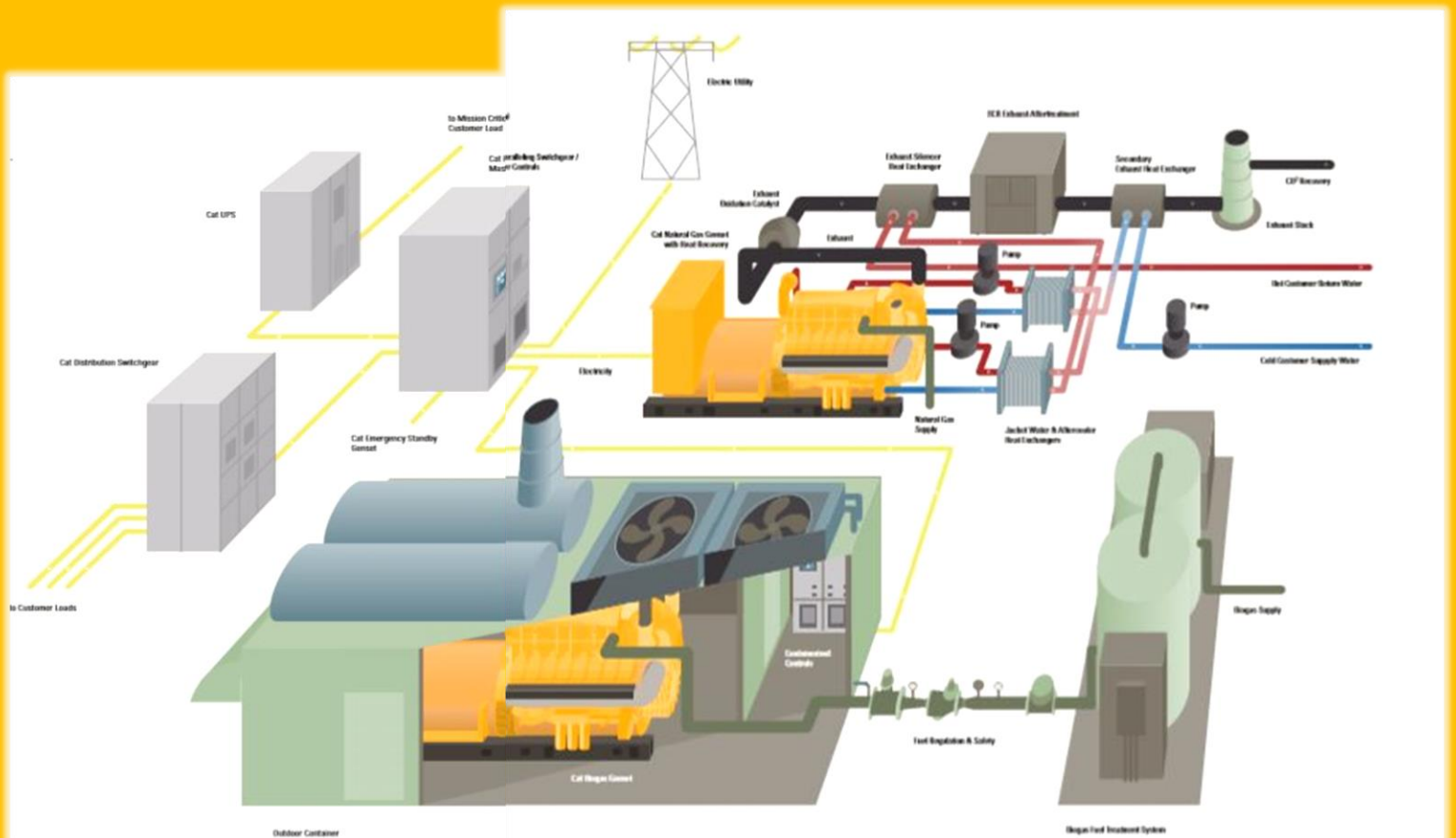
Cancellation Date	Cancellation Fee
Within 30 Days of Order Acknowledgement.	25% of sale price
31 – 60 Days from Date of Order Acknowledgement.	45% of Sale Price
More Than 60 Days from Date of Order Acknowledgement.	65% of Sale Price

Brexit:

In the event that at any time there is a material adverse impact on Finning's ability to perform the contract in accordance with its terms and applicable laws, including by way of example a 2% or more increase to Finning's planned cost of performance, as a result of: duties or other costs levied against Finning in relation to importing goods from outside the UK, then Finning reserves the right to increase its pricing accordingly or to withdraw from the contract without cost.

Subject to the above, Finning Standard Conditions of Sale and Supply shall apply to any Order you place.

4.0 SITE SPECIFIC CLARIFICATIONS



4.0 Site Specific Clarifications

The following list of clarifications made in conjunction with this offer:

- ✓ This offer is made without sight of any planning conditions that may be imposed by the local planning authority. Should any conditions once received require us to alter the scope of design of any of the works then Finning will adjust the price accordingly and agree costs prior to commencing works.
- ✓ We have made no allowance for CCTV, site security installations and site lighting at this point.
- ✓ We require that the available gas at the connection to the sets
 - Is between 130 and 200 mbar without the need for gas governors or gas boost sets.
 - Gas pressure fluctuations are within +/-10% of the setting value.
 - Gas pressure fluctuations are less than 10 per hour.
 - Gas temperature is 10oC to 50oC.
 - Gas is free from contaminants
- ✓ All earthing by others.
- ✓ This site is cleared of all existing obstructions, equipment, bases and the like prior to us commencing works on site.
- ✓ We have assumed that all building structures and floor are sound and capable of carrying point loads required.
- ✓ Telephone connections are to be supplied by others to the control panels for remote monitoring if required.
- ✓ The following works are excluded from this offer:
 - Ground surveys/reports;
 - Builderswork;
 - Civil Works/trenching/bases;
 - Fencing;
 - Suitable crane hard standing, access and laydown areas;
 - Re-decoration of any surface;
 - Fire stopping;
 - All site mechanical and electrical works outside the packaged units;
 - All earthing;
 - Emission dispersion modelling/DI Calcs;
 - Non-contestable DNO works and metering;
 - Transformers;
 - CCTV, site security;
 - Site lighting – assume existing lighting is adequate for requirements;
 - Utility company works, liaison, fees and the like;
 - Local authority statutory fees;
 - Any additional works to discharge planning conditions.
 - Modifications to existing pathways or highways.

5.0 GENERAL SITE CLARIFICATIONS



5.0 General Site Clarifications

The following list points out our general working site aspirations and requirements:

- ✓ In compliance with the Control of Asbestos Regulations at Work 2002 we will require confirmation from the Client's competent person complying with ISO 17025 (competence of testing) that our work areas do not contain asbestos or the whereabouts of asbestos/asbestos based materials or any other health damaging contamination prior to commencing on site. If there is an absence of a survey, we must reserve the option of seeking professional advice/survey at the clients cost. We therefore exclude the cost of any work associated with asbestos based materials.
- ✓ Client must indemnify Finning, either through survey and or declaration that neither asbestos, legionella, nor any other health damaging contamination exists on site. If there is an absence of survey, we must reserve the option to seek professional advice in known high risk areas i.e. exhaust joints, lagging, dead leg pipework. This should be made clear that it is at the clients cost, where appropriate.
- ✓ All risks with regards to the site, and all costs associated with addressing such risks, remain with the client e.g. ground conditions, asbestos, access, utility supplies, road closures, etc.
- ✓ Those parts of the existing installation which are to be retained we assume to be sound, but we do not accept any responsibility for any defects therein, nor for the cost of rectifying them.
- ✓ Local power supplies will be provided free of charge to ourselves for the installation of the works.
- ✓ Unless otherwise specified the proposal, cost does not include commissioning and testing consumables. It is assumed that all fuel and a suitable form of loading/load banking to prove the solution, will be provided by the client.
- ✓ All liaison with local authorities and utility companies by others.
- ✓ The lifting operation is of special care and consideration and the following assumptions and clarifications are pointed out;
 - Assumed unhindered lifting process, with cleared and segregated lift areas
 - Assumes ground conditions are adequate and stable enough to complete the operation
 - Assumes all road closures, diversions, traffic marshalling and fencing are the client's responsibility
 - Any aborted lifts outside the control of Finning will be recharged including, however not exclusive the following: Weather, Delays by client or others, where cancellation costs occur, Deviation from lift plan submitted to client due to changes in site conditions or site restrictions and Any ground surveys must be completed by the client (accuracy at client's risk) or agreed to be paid for by the client as part of the lift and sub-contracted to the lifting company.
- ✓ Unless specified within client instructions or tender documents we must indicate that our costs include only for subcontract operations and prime contractor status is via prior arrangement and cost transfer. Within any undertaking the client must agree to either supply or assume it will be at his cost the following-
 - Site security;
 - Welfare and site office space or cabins;
 - Ablutions facilities;
 - Adequate provision for segregation (Physical and or site access rules);
 - Provision for firefighting, evacuation and fire muster point (If required);
 - Provision of waste disposal (including waste segregation facilities) in accordance with good industry practice.
- ✓ Documentation
I copy of the following documentation shall be issued for information and/or approval prior to manufacture of equipment:

- General arrangement drawings;
- Acoustic enclosure and control panel;
- Project specific installation drawings;
- Electrical and mechanical customer interface drawings;
- P&ID;

1 copy of a detailed O&M manual will be issued electronically for approval following completion of our works. Following approval, we have allowed for 1 copy of the O&M manuals in paper format and 1 No electronic copy

6.0 TERMINATION POINTS



6.0 Termination Points

Termination Points	Location
Gas supply	Flange connection on acoustic enclosure
Engine intercooler circuit	Flanged connections on acoustic enclosure and DAC
Engine heat recovery circuit (LTHW circuit)	Flanged connections on heat recovery skid and DAC
Engine heat recovery circuit (MTHW circuit)	Flanged connections on acoustic enclosure – <i>MTHW option only</i>
Cold water	Flanged connections on acoustic enclosure
Condensate	Connections on silencer/s as appropriate
Exhaust	Outlet flange on exhaust silencer
Lubricating oil	Fill and drain flanged connections on acoustic enclosure and oil storage tanks
Generator electrical	Outlet terminals of alternator
CHP LV Electrical Supply	CHP unit control panel isolator inlet terminals
DAC LV Electrical Supply	CHP unit control panel outlet terminals and DAC control panel isolator
Control Systems	CHP unit control panel and DAC control panel
Ventilation	Flanged connection on ventilation inlet and outlet attenuators

7.0 SCHEDULE OF FACILITIES, ATTENDANCES AND RESPONSIBILITIES



7.0 Schedule of Facilities, Attendances and Responsibilities

	Item	By Finning	By Client	Notes
1.	Provision of Shared Welfare Facilities		•	
2.	Craneage or Contract Lift Costs & Hoisting including Banksman	•		
3.	Free of charge water for the Works		•	
4.	Free of Charge Power for Site Cabins & Power for the works		•	
5.	General Safety Lighting		•	
6.	Task Lighting & Power Tools Inc Leads	•		
7.	Provision/taking of Site Dimensions		•	
8.	Base Drawings in Suitable Auto Cad Format		•	
9.	Production of Working/Detail Drawings	•		
10.	Marking out of Builders Work and setting out		•	
11.	Execution of Builders Work		•	
12.	Fire Stopping		•	
13.	Fuels for Testing/Commissioning		•	
14.	Protection of Unfinished/Finished work	•		
15.	Traffic Management		•	
16.	Provision and removal of Non Hazardous Waste Skips from Site and the provision and removal of Hazardous waste skips from site		•	
17.	Depositing of Non Hazardous Waste into Skip and depositing of Hazardous waste into skip		•	
18.	Any costs for or administration of Local Authorities incoming services		•	
19.	Site security during construction of the works		•	
20.	Removal of existing redundant equipment		•	

8.0 TECHNICAL INFORMATION



8.0 Technical Information

GENERATOR PACKAGING

This offer is for the design, manufacture and test of an enclosure Solution with sound performance 65dBA@10m to suit a natural gas CG 170B-12 genset 1250kW, 415V, 50 Hz,

Natural gas, MN=80, Operating 2500 hours per year, 0.5 hours to 4 hours per start

The following equipment and services are provided according to the requirements of this specification. All equipment is new, factory tested, installed in a container and delivered ready for operation.

- Installation of genset
- Gravity louvers inlet and outlet
- 100L lube oil top up tank
- Noise attenuation system. 65dBA@10m sound performance
- Inside container cooling piping and wiring, piping for roof or floor mounted radiator
- Inside container exhaust piping for roof mounted silencers
- Maintenance lifting beams / points
- Pipework pressure tests – gas and coolant
- Decals
- Factory Test
- Standard factory documentation including GA drawing, weight and packing list.

Site Conditions

Minimum ambient temperature -5°C

Maximum ambient temperature 33°C

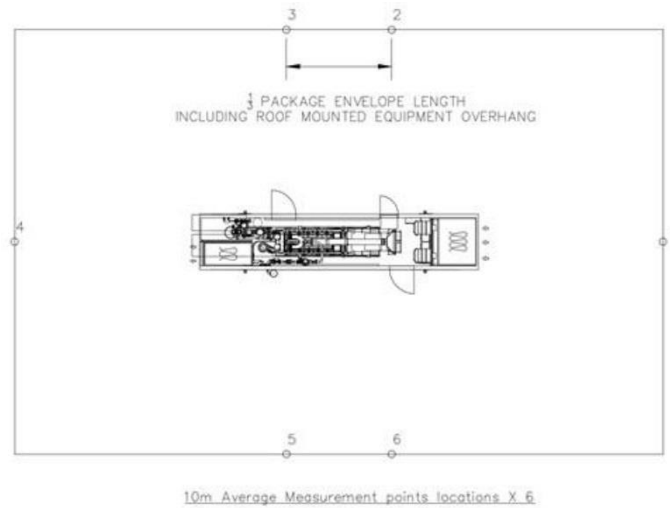
Altitude above sea level 100 metres

Higher altitude derates the system capabilities accordingly to Caterpillar rating guidelines for selected genset.

Noise Specification

The containers are designed to meet an average noise level of 65 dBA at 10 metre from the extremity of the exterior of the unit 1.5 metres above ground level, with the generator working on full load in free field conditions.

The overall average measurement is in according to ISO11203 and ISO3744 in free field conditions per unit LA90, taken as average value from 6 measurements around the package as per the figure below.



The measurements are taken at a distance of 10m and 1,5m height above ground level. Each point has a potential variance on each reading of +/- 2dB(A) meaning each of the points could be potentially measure between 63-67dB(A). The noise level stated is based on a design ambient of 30°C

9.0 DATA SHEETS

G20CM34 Natural Gas Genset

Electric Power Generation

Cost of fuel/energy

Low cost natural gas is the preferred fuel for the G20CM34. The genset is designed to run on natural gas, which is the most economical and cleanest burning fuel available. The genset is designed to run on natural gas, which is the most economical and cleanest burning fuel available.

Simple operation, transport and installation

The genset is designed for easy operation, transport and installation. The genset is designed for easy operation, transport and installation.

Wide range of power output

The genset is designed to provide a wide range of power output. The genset is designed to provide a wide range of power output.

Efficiency

The genset is designed for maximum efficiency. The genset is designed for maximum efficiency.

Reliability

The genset is designed for maximum reliability. The genset is designed for maximum reliability.

Wide range of power output

The genset is designed to provide a wide range of power output. The genset is designed to provide a wide range of power output.

VARIANTS OF OPTIMIZATION

The G20CM34 genset is available in several variants to meet different power requirements. The variants include different power ratings and configurations.

Key features

- Low cost natural gas fuel
- Simple operation, transport and installation
- Wide range of power output
- Maximum efficiency
- Maximum reliability

Model	Power (kW)	Power (kVA)	Efficiency (%)
G20CM34-100	100	125	40.0
G20CM34-150	150	187.5	40.0
G20CM34-200	200	250	40.0
G20CM34-250	250	312.5	40.0
G20CM34-300	300	375	40.0
G20CM34-350	350	437.5	40.0
G20CM34-400	400	500	40.0
G20CM34-450	450	562.5	40.0
G20CM34-500	500	625	40.0
G20CM34-550	550	687.5	40.0
G20CM34-600	600	750	40.0
G20CM34-650	650	812.5	40.0
G20CM34-700	700	875	40.0
G20CM34-750	750	937.5	40.0
G20CM34-800	800	1000	40.0
G20CM34-850	850	1062.5	40.0
G20CM34-900	900	1125	40.0
G20CM34-950	950	1187.5	40.0
G20CM34-1000	1000	1250	40.0

LET'S DO THE WORK.

G20CM34 Natural Gas Genset

Electric Power Generation

GENSET SPECIFICATION 4-stroke natural gas engine with 20 cylinders and an efficiency up to 40.0% at a full power output of 10,000 kW

G20CM34 Natural Gas Genset

Electric Power Generation

Reliability and maintenance

The genset is designed for maximum reliability and low maintenance. The genset is designed for maximum reliability and low maintenance.

Performance

The genset is designed for maximum performance. The genset is designed for maximum performance.

Wide range of power output

The genset is designed to provide a wide range of power output. The genset is designed to provide a wide range of power output.

Reliability

The genset is designed for maximum reliability. The genset is designed for maximum reliability.

Performance

The genset is designed for maximum performance. The genset is designed for maximum performance.

Wide range of power output

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- Simple operation, transport and installation
- Wide range of power output
- Maximum efficiency
- Maximum reliability

Model	Power (kW)	Power (kVA)	Efficiency (%)
G20CM34-100	100	125	40.0
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G20CM34-250	250	312.5	40.0
G20CM34-300	300	375	40.0
G20CM34-350	350	437.5	40.0
G20CM34-400	400	500	40.0
G20CM34-450	450	562.5	40.0
G20CM34-500	500	625	40.0
G20CM34-550	550	687.5	40.0
G20CM34-600	600	750	40.0
G20CM34-650	650	812.5	40.0
G20CM34-700	700	875	40.0
G20CM34-750	750	937.5	40.0
G20CM34-800	800	1000	40.0
G20CM34-850	850	1062.5	40.0
G20CM34-900	900	1125	40.0
G20CM34-950	950	1187.5	40.0
G20CM34-1000	1000	1250	40.0

LET'S DO THE WORK.

9.0 Data Sheets

45975R2 Anergia



Technical data
1250 kWel; 415 V, 50 Hz; Acc. to gas analysis

<i>Design conditions</i>			<i>Fuel gas data: 2)</i>		
Inlet air temperature / rel. Humidity:	[°C] / [%]	25 / 60	Methane number:	[-]	139
Altitude:	[m]	100	Lower calorific value:	[kWh/Nm ³]	5.98
Exhaust temp. after heat exchanger:	[°C]	180	Gas density:	[kg/Nm ³]	1.22
NO _x Emission (tolerance - 8%):	[mg/Nm ³ @5%O ₂]	250	<i>Acc. to gas analysis</i>		
Datasheet specification considers the grid codes EU 631/2016 (NC-RFG)			Analysis: CO ₂	[Vol%]	39.98
Genset:			N ₂	[Vol%]	0.00
Engine:	CG170B-12		O ₂	[Vol%]	0.00
Configuration code:	[-]	X	H ₂	[Vol%]	0.00
Speed:	[1/min]	1500	CO	[Vol%]	0.00
Configuration / number of cylinders:	[-]	V / 12	CH ₄	[Vol%]	60.00
Bore / Stroke / Displacement:	[mm]/[mm]/[dm ³]	170 / 195 / 53	C ₂ H ₄	[Vol%]	0.00
Compression ratio:	[-]	14	C ₂ H ₆	[Vol%]	0.00
Mean piston speed:	[m/s]	9.8	C ₃ H ₆	[Vol%]	0.00
Mean lube oil consumption at full load:	[g/kWh]	0.15	C ₃ H ₈	[Vol%]	0.00
Generator:	Marelli MJB 500 MB4 or similar (*)		C ₄ H ₆	[Vol%]	0.00
Voltage / voltage range / cos Phi:	[V] / [%] / [-]	415 / 10 / 1	C ₄ H ₁₀	[Vol%]	0.00
Speed / frequency:	[1/min] / [Hz]	1500 / 50	C ₂ H ₂	[Vol%]	0.00
			C ₂ H ₄	[Vol%]	0.00
			H ₂ S	[Vol%]	0.01
			H ₂ O	[Vol%]	0.00

*CES reserves the right to change the alternator supplier and type during offer period. The genset data may thereby change slightly. The power output will not change. CES will confirm the alternator type, brand and alternator data sheet with the order confirmation.

Energy balance

Load:	[%]	100	75	50
Electrical power COP acc. ISO 8528-1:	[kW]	1250	937	625
Engine jacket water heat:	[kW ±8%]	735	554	415
Intercooler LT heat:	[kW ±8%]	78	63	41
Lube oil heat:	[kW ±8%]			
Exhaust heat with temp. after heat exchanger:	[kW ±8%]	517	443	350
Exhaust temperature:	[°C ±25°C]	430	464	500
Exhaust mass flow, wet:	[kg/h]	6705	5025	3504
Combustion mass air flow:	[kg/h]	6101	4557	3169
Radiation heat engine / generator:	[kW ±8%]	41 / 34	40 / 28	26 / 24
Fuel consumption:	[kW±5%]	2958	2293	1639
Electrical / thermal efficiency:	[%]	42,3 / 42,3	40,9 / 43,5	38,1 / 46,6
Total efficiency:	[%]	84,6	84,4	84,7

System parameters 1)

Ventilation air flow (comb. air incl.) with ΔT = 15K	[kg/h]	31000
Combustion air temperature minimum / design:	[°C]	5 / 25
Exhaust back pressure from / to:	[mbar]	30 / 50
Maximum pressure loss in front of air cleaner:	[mbar]	5
Zero-pressure gas control unit selectable from / to: 2)	[mbar]	20 ³⁾ / 200
Pre-pressure gas control unit selectable from / to: 2)	[bar]	0,5 / 10
Starter battery 24V, capacity required:	[Ah]	430
Starter motor:	[kWel.]/ [VDC]	18 / 24
Lube oil content engine / base frame*:	[dm ³]	205 / 490*
Dry weight engine / genset:	[kg]	8400 / 15758

Cooling system

Glycol content engine jacket water / intercooler:	[% Vol.]	35 / 35
Water volume engine jacket / intercooler:	[dm ³]	111 / 22
KVS / Cv value engine jacket water / intercooler:	[m ³ /h]	43 / 58
Jacket water coolant temperature in / out:	[°C]	76 / 91
Intercooler coolant temperature in / out:	[°C]	50 / 52
Engine jacket water flow rate from / to:	[m ³ /h]	36 / 60
Water flow rate engine jacket water / intercooler:	[m ³ /h]	45 / 30
Water pressure loss engine jacket water / intercooler:	[bar]	1,1 / 0,3

Page 1 / 2

1) See also "Layout of power plants".	3) Minimum pressure may be higher, depending on project conditions.	* optional	3332444BA21476 45975																												
2) See also Techn. Circular 0199-98-3017																															
Frequency band f [Hz]	25	31,5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1k	1.25k	1.6k	2k	2.5k	3.15k	4k	5k	6.3k	8k	10k	12.5k	16k	L _{WA} [dB(A)]	S
Air-borne noise 4) L _{WA,T_{ref}} [dB(A)]	88,8	91,2	92,8	95,3	99,2	102,9	104,1	105,7	107,0	108,8	112,2	108,7	110,2	106,0	104,1	104,6	103,8	102,6	103,1	101,7	101,4	112,1	106,6	102,6	115,5	109,7	99,4	0,0	0,0	119,9 ±4dB(A)	106,5
Exhaust noise 5) L _{WA,T_{ref}} [dB(A)]	113,6	113,4	114,1	119,4	127,8	147,3	124,9	124,1	131,8	123,9	123,6	122,7	122,1	122,6	123,2	122,9	121,6	118,2	118,4	118,3	118,6	118,1	118,3	117,1	115,9	114,3	111,9	108,8	105,8	132,4 ±3dB(A)	115,5 ⁶⁾

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45975R2 Anergia



Technical data

1250 kWel; 415 V, 50 Hz; Acc. to gas analysis

Design conditions

Inlet air temperature / rel. Humidity:	[°C] / [%]	25 / 60
Altitude:	[m]	100
Exhaust temp. after heat exchanger:	[°C]	180
NO _x Emission (tolerance - 8%):	[mg/Nm ³ @5%O ₂]	250

Datasheet specification considers the grid codes EU 631/2016 (NC-RFG)

Notes for derating⁷⁾

	[°C]	inlet air temperature			max. inlet air temperature	
		+ 5 °C	+ 10 °C	max. w/o power derating	island mode ⁸⁾	grid parallel mode ⁹⁾
Inlet air temperature	[°C]	30	35	37	37	37
Load:	[%]	100	100	100	no rating	100
Electrical power COP acc. ISO 8528-1:	[kW]	1250	1250	1250	no rating	1250
Electrical / thermal efficiency:	[%]	42,2 / 42,6	42,2 / 42,9	42,1 / 43,1	no rating	42,1 / 43,1
Total efficiency:	[%]	84,8	85,1	85,2	no rating	85,2
Intercooler coolant temperature in / out:	[°C]	50 / 52	50 / 52	50 / 52	no rating	50 / 52

Notes:

- 1) See also "Layout of power plants":
- 2) See also Techn. Circular 0199-99-3017
- 3) Minimum pressure may be higher, depending on project conditions.
- 4) DIN EN ISO 3746 ($\sigma_{r0} = \pm 4$ dB)
- 5) Measured in exhaust pipe ($f \leq 250$ Hz: ± 5 dB; $f > 250$ Hz: ± 3 dB)
- 6) DIN 45635-11, Appendix A
- 7) The derate information shown does not take into account external cooling system capacity. It assumes that external cooling systems can maintain the specified cooling water temperatures at site conditions. Data table considers the grid codes EU 631/2016 (NC-RFG)
- 8) ISO 8528-1:2005-06, 6.3.1 a)
- 9) ISO 8528-1:2005-06, 6.3.1 b)

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10.0 ABOUT FINNING



TRUSTED

We act ethically and honour our commitments.



COLLABORATIVE

We build diverse and respectful partnerships.



INNOVATIVE

We look for new and better ways to serve our customers.



PASSIONATE

We are driven to safely deliver results.

About Finning

Finning (UK) Ltd and Finning (Ireland) Limited are divisions of Finning International Inc. one of the world's largest distributors of Caterpillar plant, complementary equipment and power systems.

Headquartered in Vancouver, Canada, and listed on the Toronto Stock Exchange, Finning has bases in the UK and Ireland (both the Republic of Ireland and Northern Ireland), Canada and South America (Chile, Argentina, Bolivia and Uruguay).

Worldwide our organisation represents excellence in innovation and technical expertise, backed by integrated support services. Since 1933, when Finning was first established in Canada by Earl B.

Finning, our name has conveyed integrity, reliability and resourcefulness; the company has grown as a result of a genuine commitment to customer satisfaction.



WHY FINNING

+ World class products

Designed to perform and keep on performing, even in the most diverse of conditions, the solutions we supply are based on equipment that has been tried, tested and proven in installations around the world.

+ Financial stability

Finning (UK) Ltd is the UK division of Finning International Inc. one of the world's largest distributors of Caterpillar plant, complementary equipment and power systems.

+ Exemplary safety record

We have committed to ensuring the personal health, safety and welfare of all exposed to risk associated with our solutions. As winner of RoSPA Sir George Earle Trophy, Finning is renowned for ensuring the safest working conditions in the diverse range of industries in which we work.

+ Over 30 years' experience

We have been supplying the power market with custom engineered solutions for every application for more than three decades.

+ Industry leading expertise

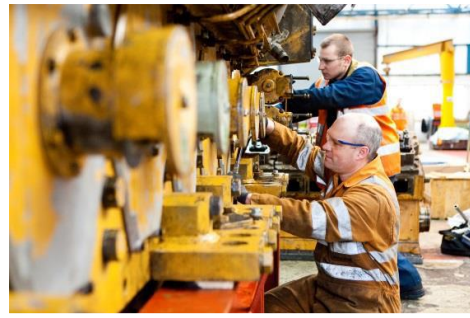
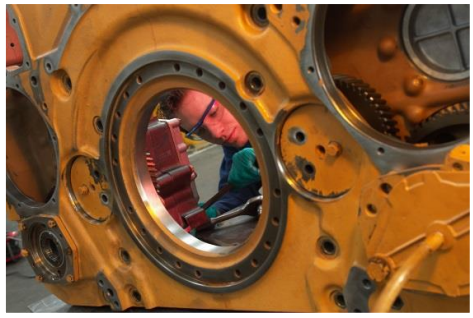
Our knowledge extends across all aspects of the power industry including mission critical power, combined heat and power and anaerobic digestion and biogas.

+ Environmental performance

We are committed to ensuring that the principles of sustainable procurement are applied to our suppliers who are vetted for their environmental performance. This is part of our continuous improvement strategy to deal with the challenges of climate change and is a key requirement of our ISO 14001 environmental certification.



Component Rebuild



Designed for long, hard and reliable service, even the toughest Cat will eventually wear out. The cost of replacing a complete engine can be prohibitive, so rebuilding a Cat engine at a fraction of the cost is a serious alternative.

The Component Rebuild Centre (CRC) in Leeds is dedicated to doing just this. We offer full engine and component rebuilds to a wide and diverse range of applications including construction, power generation, industrial, marine and offshore. Components are stripped, washed, batch labelled and moved through the rebuild assembly process in a contamination-controlled environment.

When a fast turnaround is essential, our service exchange facility provides you with an off-the-shelf option for your power train components that minimises your machine downtime. You can exchange your engine for a remanufactured one, resulting in fast turnaround and increased productivity for your equipment.

BENEFITS OF COMPONENT REBUILD

+ Value for money

The CRC provides customers with the quality, performance and reliability that is expected from Cat, but with cost savings of up to 60% when compared to buying a new engine.

+ Highly trained engineers

Our technicians are experts in component rebuild, from larger projects such as whole engines to smaller jobs such as injector sets. All are Cat trained, fully skilled engineers so you can trust in our breadth of knowledge and expertise.

+ Rapid response and convenience

Recognising how important productivity is to you, we offer rapid turnaround times, and for convenience we can collect and return the unit to your local branch.

+ Contamination control

The CRC workshop is one of the few facilities to be granted a Caterpillar Five Star contamination control rating. Contamination control is an essential element of maintenance practices to extend the life of your component.

+ Quality

A rebuild engine comes with a full parts and labour warranty.



Fluid Analysis



The Finning fluid analysis laboratory, based in Leeds, is one of the largest and most sophisticated facilities of its kind in the UK and caters for customers across the globe.

Every year we test over 215,000 fluid samples from all makes and models of equipment, employed in mission critical applications across a diverse range of markets.

Carrying out tests on a regular basis and comparing results with historical data enables us to make proactive recommendations, so action can be taken before failure occurs.

48 hour response. Real time reporting.

The whole process is very quick and simple. Customers are provided with a kit so they can take their own samples. These are then sent to us by post. Testing takes place within 24 hours and results are available online, via our industry leading InfoTrack software, within 48 hours (24 hours on request).

BENEFITS OF FLUID ANALYSIS

- + Reduce maintenance costs
- + Optimise equipment life
- + Schedule repairs and maintenance
- + Minimise the risk of serious accidents
- + Reduce waste and environmental impact
- + Extend oil life

TESTING AND ANALYSIS SERVICES

- + Oil
- + Coolant
- + Fuel
- + Diesel exhaust fluid (AdBlue)
- + Transformer oil



Remanufactured Parts



Cat® Reman parts and components provide same-as-new performance and reliability at a fraction of the cost of new parts-while reducing the negative impact on the environment.

The remanufacturing program is based on an exchange system whereby you return a used component (core) in return for our remanufactured products. Reman options are one more way we support your equipment and help you lower owning and operating costs.

WHY CHOOSE REMAN PARTS

+ Faster installation delivers reduction in costs

Reman parts are fully assembled and ready to install to reduce turnaround time and deliver more options at overhaul time. The result? Maximum productivity and lower costs.

+ As new warranty

The difference between genuine Cat Reman parts and will-fit alternatives is in performance and reliability... not price. They come with the same-as new warranty at a fraction of the cost and they offer the quality and precision of new Cat parts at a lower cost.

+ Tough and durable

Reman parts are fully machined to Caterpillar's rigid design tolerances and standards to ensure a perfect fit and provide maximum reliability.

Individual components are also upgraded with critical engineering improvements – delivering like new performance and a longer life.

+ Sustainable

Because we are in the business of returning end-of-life components to same-as-new condition, we reduce waste and minimise the need for raw material to produce new parts.

+ Designed to work together

Cat parts are designed to work together as a system, so replacing just one component with a cheaper alternative is a risk we don't want you to take.

+ Even better value

Right now, you'll pay less because we've reduced our prices on many remanufactured components to make them even better value.



11.0 APPENDICES



12.0 NOTES



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