

ETAC CG170B-20 13.8kV

Technical data

2300 kWel, 13800 V, 60 Hz, Acc. to gas analysis



Design conditions

Inlet air temperature / rel. Humidity:	[°C] / [%]	35 / 60
Altitude:	[m]	200
Exhaust temp. after heat exchanger:	[°C]	120
NOx raw emissions genset (tolerance -8 %):	[mg/Nm ³ @5% O ₂]	500

Fuel gas data: ¹⁾

Methane number:	[-]	80
Lower calorific value:	[kWh/Nm ³]	10,17
Gas density:	[kg/Nm ³]	0,79
Acc. to gas analysis		
Analysis: CO ₂	[Vol%]	0,50
N ₂	[Vol%]	3,70
O ₂	[Vol%]	0,00
H ₂	[Vol%]	0,00
CO	[Vol%]	0,00
CH ₄	[Vol%]	90,65
C ₂ H ₄	[Vol%]	0,00
C ₂ H ₆	[Vol%]	3,00
C ₃ H ₆	[Vol%]	0,00
C ₃ H ₈	[Vol%]	1,60
C ₄ H ₈	[Vol%]	0,00
C ₄ H ₁₀	[Vol%]	0,50
C ₅ H ₁₂	[Vol%]	0,05
C _x H _y	[Vol%]	0,00
H ₂ S	[Vol%]	0,000
H ₂ O	[Vol%]	0,00

Genset:

Engine / Configuration code:	CG170B-20	R
Speed / Mean piston speed:	[1/min] / [m/s]	1500 / 9,8
Configuration / number of cylinders:	[-]	V / 20
Bore / Stroke / Displacement:	[mm] / [mm] / [dm ³]	170 / 195 / 88,5
Compression ratio:	[-]	13,0
Mean effective pressure:	[bar]	21,5
Mean lube oil consumption at full load:	[g/kWh]	0,15
Generator:	TDPS TD 100-V1 cUL or similar (*)	
Voltage / voltage range / cos Phi:	[V] / [%] / [-]	13800 / 10 / 1,00
Speed / frequency:	[1/min] / [Hz]	1800 / 60
Gear box:	Eisenbeiss GU 360	
Lube oil volume of gear box:	[dm ³]	51

*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]	2300	1725	1150
Engine jacket water heat:	[kW ±8%]	1337	984	696
Intercooler LT heat:	[kW ±8%]	172	131	79
Lube oil heat:	[kW ±8%]			
Exhaust heat with temp. after heat exchanger:	[kW ±8%]	1031	865	677
Exhaust temperature:	[°C ±25°C]	394	424	461
Exhaust mass flow wet / dry:	[kg/h]	12511 / 11394	9406 / 8551	6518 / 5915
Combustion mass air flow:	[kg/h]	12099	9089	6293
Radiation heat engine / generator:	[kW ±8%]	70 / 69	65 / 66	60 / 62
Fuel consumption:	[kW+5%]	5287	4067	2884
Electrical / thermal efficiency:	[%]	43,5 / 44,8	42,4 / 45,5	39,9 / 47,6
Total efficiency:	[%]	88,3	87,9	87,5

System parameters ²⁾

Ventilation air flow (comb. air incl.) with ΔT = 15K	[kg/h]	57800
Combustion air temperature minimum / design:	[°C]	5 / 35
Exhaust back pressure from / to:	[mbar]	30 / 50
Exhaust volume flow wet / dry:	[Nm ³ /h]	9682 / 8641
Maximum pressure loss in front of air cleaner:	[mbar]	5
Zero-pressure gas control unit selectable from / to: ¹⁾	[mbar]	20 ⁴⁾ / 200
Pre-pressure gas control unit selectable from / to: ¹⁾	[bar]	0,5 / 10
Starter battery 24V, capacity required:	[Ah]	430
Starter motor:	[kWel.] / [VDC]	18 / 24
Lube oil content engine / base frame ⁵⁾ :	[dm ³]	300 / 685
Dry weight engine / genset:	[kg]	8170 / 22380

Cooling system ³⁾

Glycol content engine jacket water / intercooler:	[% Vol.]	33 / 33
Water volume engine jacket / intercooler:	[dm ³]	210 / 22
KVS / Cv value engine jacket water / intercooler:	[m ³ /h]	47,3 / 58,3
Jacket water coolant temperature in / out:	[°C]	78 / 93
Intercooler coolant temperature in / out:	[°C]	48 / 52
Engine jacket water flow rate from / to:	[m ³ /h]	60 / 85
Water flow rate engine jacket water / intercooler:	[m ³ /h]	82 / 40
Water pressure loss engine jacket water / intercooler:	[bar]	3 / 0,5
Engine jacket water pressure outlet min / max:	[bar rel.]	2,2 / 2,5

Notes:

- 1) See also Techn. Circular 0199-99-3017
- 2) See also "Layout of power plants"
- 3) 60 Hz only: Gear oil cooling within intercooler coolant circuit
- 4) Minimum pressure may be higher, depending on project conditions.
- 5) optional
- 6) DIN EN ISO 9614-2 (±4 dB)
- 7) Measured in exhaust pipe (f ≤ 250Hz: ±5dB f > 250Hz: ±3dB)
- 8) DIN 45635-11, Appendix A

Sound data

Frequency band	L _{WA}																S																				
	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							
f [Hz]																	[dB(A)]	[m ²]																			
Air-borne noise ⁶⁾	94,8	96,1	97,4	101	103,7	107,3		118,9	115,5	115,3	112,7	110,8	112,1	111,5	108,8	108,6	109,3	108,5								102,9	106,1	116,7	104,3							121,0	117,3
L _{W,Third} [dB(lin)]																	±4dB(A)																				
Exhaust noise ⁷⁾	117,7	117,3	120	124	125,4	126,5	130,7	142,5							125,6	126,4	125,1	124,5	123,8	124,3	124	122,7	122,3	119,8	118,5	116,8	115,4	115,2	113,1	110,7			135,6	15,5 ⁸⁾			
L _{W,Third} [dB(lin)]																	±3dB(A)																				

L_W: Sound power level

S: Area of measurement surface (S₀=1m²)



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NOx raw emissions genset (tolerance -8 %):	[mg/Nm ³ @5% O ₂]	500

Minimum loads⁹⁾

Minimum electrical load for short-term operation:	[kW]	700
Recommended minimum electrical load for continuous operation:	[kW]	1150

Notes for derating¹⁰⁾

	inlet air temperature	max. inlet air temperature		
		+ 5 K	+ 10 K	
		w/o power derating	grid parallel mode ¹¹⁾	island mode ¹²⁾
inlet air temperature [°C]	no rating	35	36	36
Load: [%]		100	99	99
Electrical power COP acc. ISO 8528-1: [kW]		2300	2280	2280
Electrical / thermal efficiency: [%]		43,5 / 44,8	43,5 / 44,9	43,5 / 44,9
Total efficiency: [%]		88,3	88,4	88,4
Intercooler coolant temperature in / out: [°C]		48 / 52	48 / 52	48 / 52

Methane number sensitivity:¹³⁾

	design	Methane number:		Minimum MN for full load
		-5	-10	
Methane number:	80	75	70	80
Load: [%]	100	93	86	
Intercooler coolant temperature in / out: [°C]	48	48	48	
Electrical power COP acc. ISO 8528-1: [kW]	2300	2148	1982	

Exhaust emission data at engine out^{14), 15)}

Electrical power COP acc. ISO 8528-1: [kW]	2300
NO _x (as NO ₂), dry [g/Nm ³ @5% O ₂]	0,50
CO, dry [g/Nm ³ @5% O ₂]	0,78
THC, dry ¹⁶⁾ [g/Nm ³ @5% O ₂]	0,84
NMHC, dry ^{16), 17)} [g/Nm ³ @5% O ₂]	0,05
NMNEHC, dry ^{16), 17)} [g/Nm ³ @5% O ₂]	0,02
HCHO (Formaldehyde), dry [g/Nm ³ @5% O ₂]	0,14
CH ₄ , dry ^{16), 17)} [g/Nm ³ @5% O ₂]	0,79
Exhaust mass flow CO ₂ : [kg/h +5%]	1071
CO ₂ , dry [%]	6,3
O ₂ , dry [%]	9,9

Notes:

- 9) See "Layout of power plants" ch. 4.4
- 10) 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.
- 11) ISO 8528-1:2005-06, 6.3.1 b)
- 12) ISO 8528-1:2005-06, 6.3.1 a)
- 18) To maintain a constant air-fuel-mixture inlet manifold temperature, as the inlet air temperature goes up, so must the heat rejection. The listed aftercooler coolant temperatures have been increased considering a limited capacity of the heat exchange circuit to reject heat to the atmosphere. Non standard applications, e.g. use of cooling towers are hereby not considered.
- 13) Deviation in fuel consumption possible. No statement for MN < 70 since control parameters may have to be changed.
- 14) Measured at engine exhaust flange prior to any aftertreatment. CO, Total Carbon, NMHC, NMNEHC and HCHO are the maximum values expected under steady state conditions.
- 15) Particles below 10 ppm.
- 16) Calculated with the density of C
- 17) The THC composition depends on the composition of hydrocarbons in the fuel gas.