

**Technical data****1560 kWel; 400 V, 50 Hz; Bio gas****Design conditions**

Inlet air temperature / rel. Humidity:	[°C] / [%]	27 / 50
Altitude:	[m]	950
Exhaust temp. after heat exchanger:	[°C]	180
NO <sub>x</sub> Emission (tolerance - 8%):	[mg/Nm <sup>3</sup> @5%O <sub>2</sub> ]	500

**Fuel gas data: 2)**

Methane number:	[-]	141
Lower calorific value:	[kWh/Nm <sup>3</sup> ]	5,48
Gas density:	[kg/Nm <sup>3</sup> ]	1,25
Standard gas:	Bio gas	
Analysis: CO <sub>2</sub>	[Vol%]	40,00
N <sub>2</sub>	[Vol%]	4,70
O <sub>2</sub>	[Vol%]	0,30
H <sub>2</sub>	[Vol%]	0,00
CO	[Vol%]	0,00
CH <sub>4</sub>	[Vol%]	55,00
C <sub>2</sub> H <sub>4</sub>	[Vol%]	0,00
C <sub>2</sub> H <sub>6</sub>	[Vol%]	0,00
C <sub>3</sub> H <sub>6</sub>	[Vol%]	0,00
C <sub>3</sub> H <sub>8</sub>	[Vol%]	0,00
C <sub>4</sub> H <sub>8</sub>	[Vol%]	0,00
C <sub>4</sub> H <sub>10</sub>	[Vol%]	0,00
C <sub>5</sub> H <sub>12</sub>	[Vol%]	0,00
C <sub>x</sub> H <sub>y</sub>	[Vol%]	0,00
H <sub>2</sub> S	[Vol%]	0,00
H <sub>2</sub> O	[Vol%]	0,00

**Genset:**

Engine:	<b>TCG 2020 V16</b>	
Configuration code:	[-]	X
Speed:	[1/min]	1500
Configuration / number of cylinders:	[-]	V / 16
Bore / Stroke / Displacement:	[mm]/[mm]/[dm <sup>3</sup> ]	170 / 195 / 71
Compression ratio:	[-]	14
Mean piston speed:	[m/s]	9,8
Mean lube oil consumption at full load:	[g/kWh]	0,15
Generator:	<b>Marelli MJB 500 LA4 or similar (*)</b>	
Voltage / voltage range / cos Phi:	[V] / [%] / [-]	400 / 10 / 1
Speed / frequency:	[1/min] / [Hz]	1500 / 50

\*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]	<b>1560</b>	<b>1170</b>	<b>780</b>
Engine jacket water heat:	[kW ±8%]	861	637	449
Intercooler LT heat:	[kW ±8%]	130	103	64
Lube oil heat:	[kW ±8%]			
Exhaust heat with temp. after heat exchanger:	[kW ±8%]	662	569	449
Exhaust temperature:	[°C ±25°C]	439	474	515
Exhaust mass flow, wet:	[kg/h]	8299	6235	4292
Combustion mass air flow:	[kg/h]	7461	5588	3834
Radiation heat engine / generator:	[kW ±8%]	54 / 46	52 / 37	49 / 30
Fuel consumption:	[kW+5%]	3683	2843	2011
Electrical / thermal efficiency:	[%]	42,4 / 41,3	41,1 / 42,4	38,8 / 44,6
Total efficiency:	[%]	83,7	83,5	83,4

**System parameters 1)**

Ventilation air flow (comb. air incl.) with ΔT = 15K	[kg/h]	39800
Combustion air temperature minimum / design:	[°C]	20 / 27
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 <sup>3)</sup> / 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 <sup>3</sup> ]	265 / -
Dry weight engine / genset:	[kg]	6090 / 13290

**Cooling system**

Glycol content engine jacket water / intercooler:	[% Vol.]	33 / 33
Water volume engine jacket / intercooler:	[dm <sup>3</sup> ]	151 / 14
KVS / Cv value engine jacket water / intercooler:	[m <sup>3</sup> /h]	42 / 46
Jacket water coolant temperature in / out:	[°C]	80 / 93
Intercooler coolant temperature in / out:	[°C]	50 / 53
Engine jacket water flow rate from / to:	[m <sup>3</sup> /h]	50 / 65
Water flow rate engine jacket water / intercooler:	[m <sup>3</sup> /h]	61 / 35
Water pressure loss engine jacket water / intercooler:	[bar]	2,1 / 0,6

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.

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 <sub>WA</sub> [dB(A)]	S [m <sup>2</sup> ]
	Air-borne noise 4) L <sub>W, Terz</sub> [dB(lin)]	90,6	92,5	95,5	96,7	100,1	107,4	109,9	111,9	109,8	114,4	115,9	114,5	111,5	113,0	112,3	112,7	113,1	112,0	112,7	113,4	112,5	109,8	108,2	105,2	113,9	106,0	103,8	113,4		
Exhaust noise 5) L <sub>W, Terz</sub> [dB(lin)]	118,7	119,6	121,7	121,1	122,6	127,4	126,3	137,6	123,6	124,8	122,4	122,3	124,0	123,6	123,2	122,8	121,7	120,4	120,0	120,0	118,6	118,6	118,0	117,2	116,9	115,8	115,7	115,0	113,6	132,3 ±3dB(A)	15,5 <sup>6)</sup>

4) DIN EN ISO 3746 (σ<sub>RD</sub>±4 dB)

5) Measured in exhaust pipe (f ≤ 250Hz: ±5dB; f &gt; 250Hz: ±3dB)

L<sub>W</sub>: Sound power levelS: Area of measurement surface (S<sub>D</sub>=1m<sup>2</sup>)

6) DIN 45635-11, Appendix A