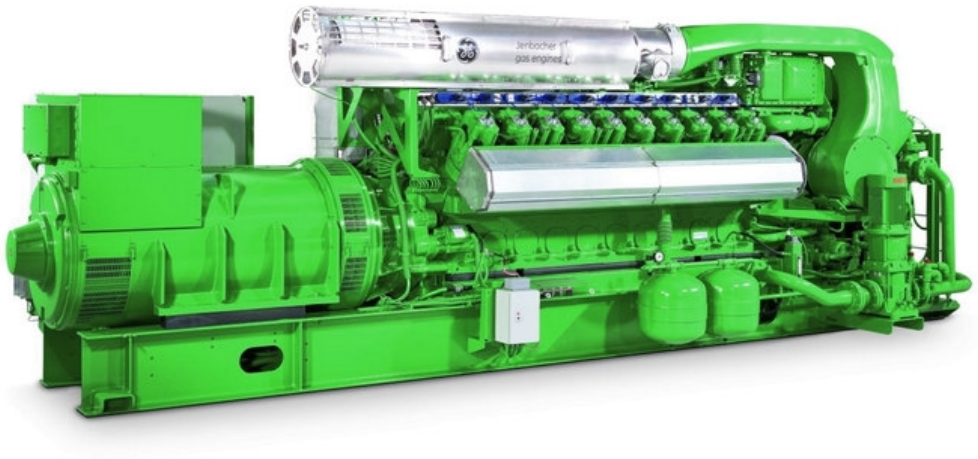
Technical Description

Genset-Container

JGC 420 GS-N.L – CMUK-D

dyn. Gridcode UK (G59/3)

Greenfrog



Electrical output **1272 kW el.**

Emission values
NOx < 500 mg/Nm³ (5% O2)

0.01 Technical Data (container)

Data at:				Full load	Part Load		
Fuel gas LHV		kWh/Nm³		9,5			
				100%	75%	min.	110%
Energy input		kW	[2]	2.999	2.321	1.888	3.299
Gas volume		Nm³/h	*)	316	244	199	347
Mechanical output		kW	[1]	1.306	979	770	1.449
Electrical output		kW el.	[4]	1.272	954	749	1.411
Heat to be dissipated			[5]				
~ Intercooler 1st stage (Engine jacket water cooling circuit)		kW		192			
~ Intercooler 2nd stage (Low temperature circuit)		kW		103			
~ Lube oil (Engine jacket water cooling circuit)		kW		182			
~ Jacket water		kW		358			
~ Surface heat	ca.	kW	[7]	118			
Spec. fuel consumption of engine electric		kWh/kWel.h	[2]	2,36	2,43	2,52	2,34
Spec. fuel consumption of engine		kWh/kWh	[2]	2,30	2,37	2,45	2,28
Lube oil consumption	ca.	kg/h	[3]	0,31	~	~	0,31
Electrical efficiency		%		42,4%	41,1%	39,7%	42,8%

*) approximate value for pipework dimensioning
[_] Explanations: see 0.10 - Technical parameters

All heat data is based on standard conditions according to attachment 0.10. Deviations from the standard conditions can result in a change of values within the heat balance, and must be taken into consideration in the layout of the cooling circuit/equipment (intercooler; emergency cooling; ...). In the specifications in addition to the general tolerance of ±8 % on the thermal output a further reserve of +5 % is recommended for the dimensioning of the cooling requirements.

Main dimensions and weights (container)

Length	mm	~ 12.200
Width	mm	~ 3.000
Height	mm	~ 2.600
Weight empty	kg	~ 36.900
Weight filled	kg	~ 38.800

Connections

Jacket water inlet and outlet	DN/PN	80/10
Exhaust gas outlet	DN/PN	300/10
Fuel gas connection (container)	mm	100/16
Fresh oil connection	G	28x2"
Waste oil connection	G	28x2"
Cable outlet	mm	800x400
Condensate drain	mm	18

Output / fuel consumption

ISO standard fuel stop power ICFN	kW	1.306
Mean effe. press. at stand. power and nom. speed	bar	17,11
Fuel gas type		Natural gas
Based on methane number | Min. methane number	MZ d)	94 | 75
Compression ratio	Epsilon	12,5
Min./Max. fuel gas pressure at inlet to gas train	mbar	120 - 200 c)
Allowed Fluctuation of fuel gas pressure	%	± 10
Max. rate of gas pressure fluctuation	mbar/sec	10
Maximum Intercooler 2nd stage inlet water temperature	°C	40
Spec. fuel consumption of engine	kWh/kWh	2,30
Specific lube oil consumption	g/kWh	0,20
Max. Oil temperature	°C	85
Jacket-water temperature max.	°C	95
Filling capacity lube oil (refill)	lit	~ 437

c) Lower gas pressures upon inquiry
d) based on methane number calculation software AVL 3.1 (calculated without N2 and CO2)

0.02 Technical data of engine

Manufacturer		GE Jenbacher
Engine type		J 420 GS-B305
Working principle		4-Stroke
Configuration		V 70°
No. of cylinders		20
Bore	mm	145
Stroke	mm	185
Piston displacement	lit	61,10
Nominal speed	rpm	1.500
Mean piston speed	m/s	9,25
Length	mm	3.750
Width	mm	1.580
Height	mm	2.033
Weight dry	kg	7.200
Weight filled	kg	7.900
Moment of inertia	kgm²	11,64
Direction of rotation (from flywheel view)		left
Radio interference level to VDE 0875		N
Starter motor output	kW	13
Starter motor voltage	V	24

Thermal energy balance

Energy input	kW	2.999
Intercooler	kW	295
Lube oil	kW	182
Jacket water	kW	358
Exhaust gas cooled to 180 °C	kW	467
Exhaust gas cooled to 100 °C	kW	630
Surface heat	kW	71

Exhaust gas data

Exhaust gas temperature at full load	°C [8]	401
Exhaust gas temperature at bmep= 12,8 [bar]	°C	~ 421
Exhaust gas temperature at bmep= 10,1 [bar]	°C	~ 434
Exhaust gas mass flow rate, wet	kg/h	6.812
Exhaust gas mass flow rate, dry	kg/h	6.345
Exhaust gas volume, wet	Nm³/h	5.401
Exhaust gas volume, dry	Nm³/h	4.820
Max.admissible exhaust back pressure after engine	mbar	60

Combustion air data

Combustion air mass flow rate	kg/h	6.604
Combustion air volume	Nm³/h	5.110
Max. admissible pressure drop at air-intake filter	mbar	10

Sound pressure level

Aggregate a)	dB(A) re 20µPa	97
31,5 Hz	dB	79
63 Hz	dB	87
125 Hz	dB	98
250 Hz	dB	95
500 Hz	dB	91
1000 Hz	dB	86
2000 Hz	dB	88
4000 Hz	dB	92
8000 Hz	dB	89
Exhaust gas b)	dB(A) re 20µPa	115
31,5 Hz	dB	95
63 Hz	dB	117
125 Hz	dB	115
250 Hz	dB	113
500 Hz	dB	108
1000 Hz	dB	105
2000 Hz	dB	108
4000 Hz	dB	109
8000 Hz	dB	107

Sound power level

Aggregate	dB(A) re 1pW	117
Measurement surface	m²	110
Exhaust gas	dB(A) re 1pW	123
Measurement surface	m²	6,28

a) average sound pressure level on measurement surface in a distance of 1m (converted to free field) according to DIN 45635, precision class 3.
b) average sound pressure level on measurement surface in a distance of 1m according to DIN 45635, precision class 2.
The spectra are valid for aggregates up to bmep=20 bar. (for higher bmep add safety margin of 1dB to all values per increase of 1 bar pressure).
Engine tolerance ± 3 dB

0.03 Technical data of generator

Manufacturer		Leroy-Somer e)
Type		LSA 52.2 L70 e)
Type rating	kVA	1.935
Driving power	kW	1.306
Ratings at p.f. = 1,0	kW	1.272
Ratings at p.f. = 0,8	kW	1.258
Rated output at p.f. = 0,8	kVA	1.573
Rated reactive power at p.f. = 0,8	kVar	944
Rated current at p.f. = 0,8	A	2.188
Frequency	Hz	50
Voltage	V	415
Speed	rpm	1.500
Permissible overspeed	rpm	1.800
Power factor (lagging - leading)		0,8 - 0,95
Efficiency at p.f. = 1,0	%	97,4%
Efficiency at p.f. = 0,8	%	96,4%
Moment of inertia	kgm^2	52,50
Mass	kg	4.400
Radio interference level to EN 55011 Class A (EN 61000-6-4)		N
Ik" Initial symmetrical short-circuit current	kA	25,52
Is Peak current	kA	64,96
Insulation class		H
Temperature (rise at driving power)		F
Maximum ambient temperature	℃	40

Reactance and time constants (saturated)

xd direct axis synchronous reactance	p.u.	1,59
xd' direct axis transient reactance	p.u.	0,16
xd" direct axis sub transient reactance	p.u.	0,08
x2 negative sequence reactance	p.u.	0,09
Td" sub transient reactance time constant	ms	24
Ta Time constant direct-current	ms	45
Tdo' open circuit field time constant	s	3,23

e) GE Jenbacher reserves the right to change the generator supplier and the generator type. The contractual data of the generator may thereby change slightly. The contractual produced electrical power will not change.

connection variant 1K

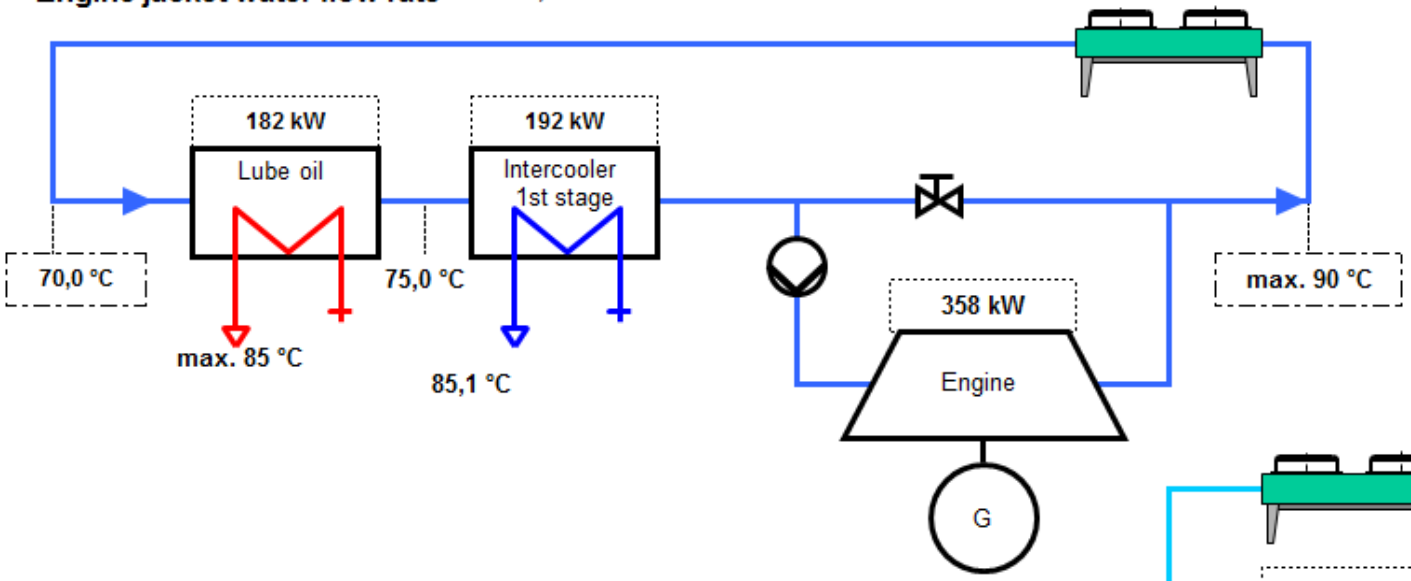
Greenfrog J 420 GS-B305

Engine jacket water cooling circuit (calculated with Glykol 37%)

Heat to be dissipated = 732 kW

(±8 % tolerance +5 % reserve for cooling requirements)

Engine jacket water flow rate = 35,2 m³/h

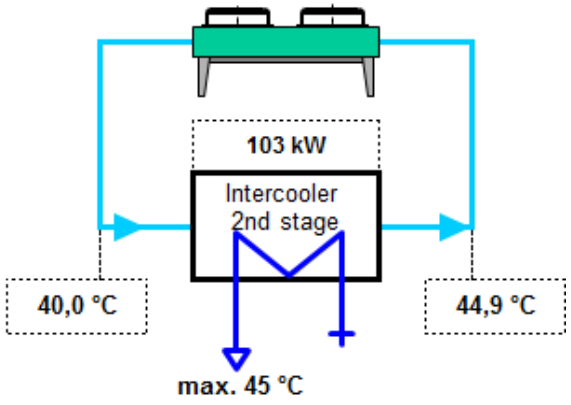


Low temperature circuit (calculated with Glykol 37%)

Heat to be dissipated = 103 kW

(±8 % tolerance +5 % reserve for cooling requirements)

Cooling water flow rate = 20,0 m³/h



0.05 Cooling water circuit

Oil - heat (Engine jacket water cooling circuit)

Nominal output	kW	182
Max. Oil temperature	°C	85
Loss of nominal pressure of engine jacket water	bar	0,50
Safety valve - max press. set point	bar	2,50

Engine jacket water - heat (Engine jacket water cooling circuit)

Nominal output	kW	358
Max. engine jacket water temperature (outlet engine)	°C	90
Engine jacket water flow rate	m³/h	35,2
Safety valve - max press. set point	bar	2,50

Mixture Intercooler (1st stage) (Engine jacket water cooling circuit)

Nominal output	kW	192
Max. inlet cooling water temp. (intercooler)	°C	75,0
Nominal pressure of cooling water / (max. operating pressure)	PN	10
Loss of nominal pressure of engine jacket water	bar	0,30
Safety valve - max press. set point	bar	2,50

Mixture Intercooler (2nd stage) (Low temperature circuit)

Nominal output	kW	103
Max. inlet cooling water temp. (intercooler)	°C	40
Aftercooler water flow rate	m³/h	20,0
Nominal pressure of cooling water / (max. operating pressure)	PN	10
Intercooler water pressure drop	bar	0,80
Safety valve - max press. set point	bar	2,50

The final pressure drop will be given after final order clarification and must be taken from the P&ID order documentation.

0.10 Technical parameters

All data in the technical specification are based on engine full load (unless stated otherwise) at specified temperatures and the methane number and subject to technical development and modifications.

All pressure indications are to be measured and read with pressure gauges (psi.g.).

(1) At nominal speed and standard reference conditions ICFN according to DIN-ISO 3046 and DIN 6271, respectively
(2) According to DIN-ISO 3046 and DIN 6271, respectively, with a tolerance of +5 %.
Efficiency performance is based on a new unit (immediately upon commissioning).Effects of degradation during normal operation can be mitigated through regular service and maintenance work.
(3) Average value between oil change intervals according to maintenance schedule, without oil change amount
(4) At p. f. = 1.0 according to VDE 0530 REM / IEC 34.1 with relative tolerances
(5) Total output with a tolerance of ±8 %
(6) According to above parameters (1) through (5)
(7) Only valid for engine and generator; module and peripheral equipment not considered (at p. f. = 0,8)
(8) Exhaust temperature with a tolerance of ±8 %

Radio interference level
The ignition system of the gas engines complies the radio interference levels of CISPR 12 and EN 55011 class B, (30-75 MHz, 75-400 MHz, 400-1000 MHz) and (30-230 MHz, 230-1000 MHz), respectively.

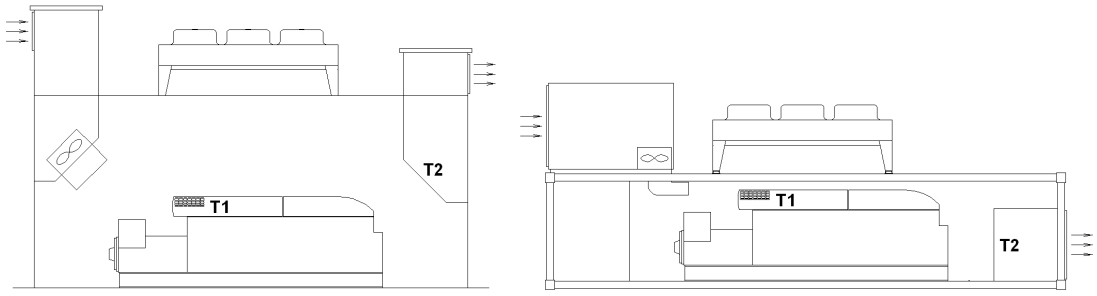
Definition of output
- ISO-ICFN continuous rated power:
  Net break power that the engine manufacturer declares an engine is capable of delivering continuously, at stated speed, between the normal maintenance intervals and overhauls as required by the manufacturer. Power determined under the operating conditions of the manufacturer's test bench and adjusted to the standard reference conditions.
- Standard reference conditions:

Barometric pressure:	1000 mbar (14.5 psi) or 100 m (328 ft) above sea level
Air temperature:	25°C (77°F) or 298 K
Relative humidity:	30 %

- Volume values at standard conditions (fuel gas, combustion air, exhaust gas)

Pressure:	1013 mbar (14.7 psi)
Temperature:	0°C (32°F) or 273 K

Output adjustment for turbo charged engines
Standard rating of the engines is for an installation at an altitude ≤ **0 m** and combustion air temperature ≤ **35 °C** (T1)
Engine room outlet temperature: **50°C** (T2) -> engine stop



If the actual methane number is lower than the specified, the knock control responds. First the ignition timing is changed at full rated power. Secondly the rated power is reduced. These functions are carried out by the engine management system.
Exceedance of the voltage and frequency limits for generators according to IEC 60034-1 Zone A will lead to a derate in output.

Parameters for the operation of GE Jenbacher gas engines
The genset fulfils the limits for mechanical vibrations according to ISO 8528-9.
The following "Technical Instruction of GE JENBACHER" forms an integral part of a contract and must be strictly observed: **TA 1000-0004, TA 1100 0110, TA 1100-0111**, and **TA 1100-0112.**
Transport by rail should be avoided. See **TA 1000-0046** for further details

Failure to adhere to the requirements of the above mentioned TA documents can lead to engine damage and may result in loss of warranty coverage.

Parameters for the operation of control unit and the electrical equipment
Relative humidity 50% by maximum temperature of 40°C.
Altitude up to 2000m above the sea level.