Tolerance values given in the specification is subject to internal regulation TEDOM: 61-0-0284.

Description:

Engine type	**TB 210 G5V TW 86 (Dwg. No. 7000 850/xx)**	
Fuel	biogas (according to TEDOM: 61-0-0282.1 regulation)	
Engine design	stationary	
Engine working cycle	four-stroke, spark ignited	
Design	in-line, vertical	
Number of cylinder	6	
Valve train	OHV	
Number of valves per cylinder	2	
Turbocharging	yes	
Intercooler	yes	
Mixture	lean	
Cooling	liquid	
Operation (looking at flywheel)	anticlockwise	
Displacement	11,946	[dm^3]
Bore	130	[mm]
Stroke	150	[mm]
Compression ratio	12:1	[-]
Firing order	1-5-3-6-2-4	[-]

Rated parameters at reference conditions:

COOLING CIRCUIT	**PRIMARY**	**SECONDARY**	
Rated speed	1500	X	[rpm]
Rated power output (continuous)	213,0	X	[kW]
Peak torque	1356	X	[Nm]

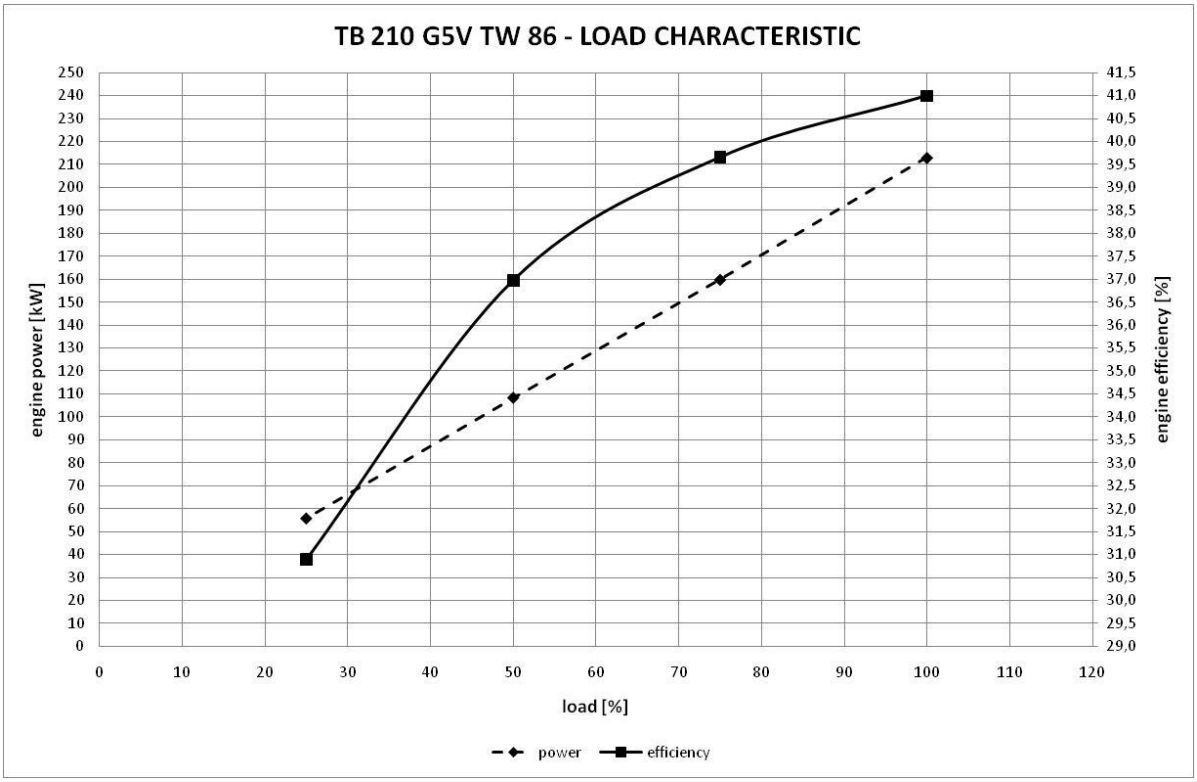
Engine heat output:

COOLING CIRCUIT	**PRIMARY**	**SECONDARY**	
Coolant heat output (with 1st section intercooler)	117,3	X	[kW]
Exhaust gas heat output (cooled to 150 °C)	117,5	X	[kW]
Intercooler heat output (2nd section)	14,9	X	[kW]
Radiation heat power	18,0	X	[kW]

Parameters under load:

COOLING CIRCUIT	**PRIMARY**	**SECONDARY**	**COOLING**			
Load	100	100	75	50	25	[%]
Fuel input power	519,6	X	402,8	288,0	172,3	[kW]
Efficiency	41,0	X	39,7	37,0	30,9	[%]
Fuel consumption	80,2	X	62,2	44,5	26,6	[$m_n^3.h^{-1}$]

Load Characteristics:



Engine parameters and settings:

COOLING CIRCUIT	PRIMARY	SECONDARY	
Ignition advance	36	X	[°]
Coefficient of excess air λ	1,48	X	[-]
Exhaust gas temperature at the inlet to the turbocharger	623	X	[°C]
Exhaust gas temperature at the outlet from the turbocharger	528	X	[°C]
Combustion air flow	956	X	[kg.h^{-1}]
Exhaust gas flow	1036	X	[kg.h^{-1}]
Max, exhaust back pressure for rated parameters (at output of the turbocharger)	4,9	X	[kPa]
Recommended exhaust gas temperature for warning signal (before turbocharger)	645	X	[°C]
Recommended exhaust gas temperature for stop signal (before turbocharger)	665	X	[°C]
Max. mixture temperature downstream intercooler for the nominal parameters	45	X	[°C]

Technical and build-up parameters:

REGIME OF THE ENGINE REVOLUTION		
Overrun speed max. - gas cut-off	2100	[rpm]
Overrun speed max. - ignition deactivation	2100	[rpm]
ENGINE LUBRICATION		
Lubricating oil - total	56	[dm^3]
Lubricating oil - oil sump - max. mark	51	[dm^3]
Lubricating oil - between max. and min.	8	[dm^3]
Oil consumption	0,3-0,5	[$g.kW^{-1}.h^{-1}$]
Min. operating oil pressure - rated speed (see Instruction handbook)	360	[kPag]
ENGINE COOLING		
Volume of coolant in engine, including 1st section intercooler	30,5	[dm^3]
Coolant temperature at the outlet from the engine	85-95	[°C]
Max. coolant temperature short time (1 hour)	100	[°C]
Min. coolant temperature for 100 % load	60	[°C]
Maximum load for the coolant temperature below 60 °C	25	[%]
Minimum coolant temperature for start	10	[°C]
Recommended power cooler	200	[kW]
Required engine coolant flow	300-400	[$dm^3.min^{-1}$]
Maximum cooling circuit pressure	260	[kPaa]
OPERATING LIMITATIONS		
Min. intake air temperature for start	10	[°C]
Intake air (mixture) temperature input before turbocharger for the nominal parameters	25	[°C]
Maximum temperature of the engine compartment during operation	80	[°C]
Allowed crankcase pressure range	-2/+1	[kPa]
Maximum coolant pressure in the low temperature stage intercooler	600	[kPag]
Recommended flow of coolant in the low temperature stage intercooler	75-120	[$dm^3.min^{-1}$]
Maximum temperature of the mixture entering the engine	80	[°C]
OPERATING CLEARANCE		
Cold valve clearance - intake valve	0,30	[mm]
Cold valve clearance - exhaust valve	0,55	[mm]

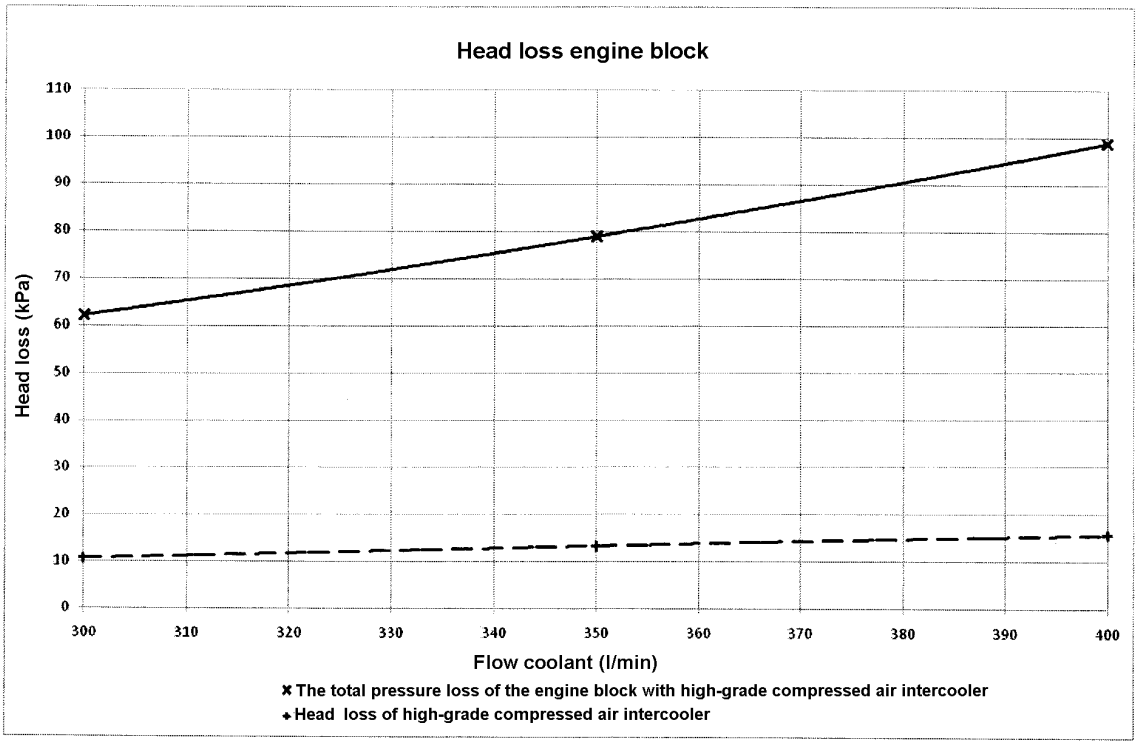
Emissions:

Nitrogen oxides - NO_x	< 500	[$mg.m_n^{-3}$]
Carbon monoxide - CO	< 650	[$mg.m_n^{-3}$]
Total hydrocarbons - HC	-	[$mg.m_n^{-3}$]
Particulate - PM^b	-	[$mg.m_n^{-3}$]
Formaldehyde - HCHO	< 60	[$mg.m_n^{-3}$]

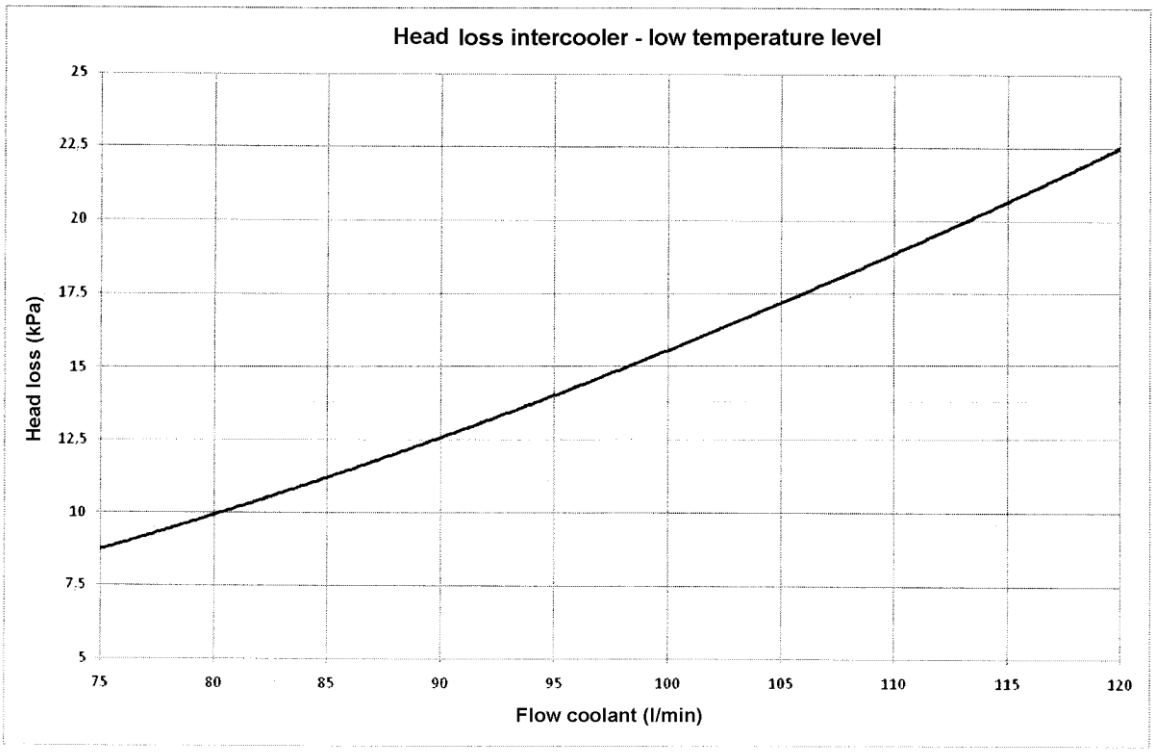
Engine noise:

Sound pressure level	94	[dB(A)]

Head loss engine block:



Head loss intercooler compressed air:



Reference ambient conditions:

Barometric pressure	100	[kPa]
Ambient temperature	25	[°C]
Relative air humidity	30	[%]

Fuel characteristic:

Fuel pressure	101,325	[kPa]
Fuel temperature	0	[°C]
Fuel relative humidity	0	[%]
LHV	23,3	[$MJ.m_n^{-3}$]
CH_4 concentration (biogas engines)	65	[%]
CO_2 concentration (biogas engines)	35	[%]

Allowed fuel characteristic:

Fuel efficiency (biogas engines)	14,4 – 23,3	[$MJ.m_n^{-3}$]
Minimum CH_4 concentration	40	[%]
Minimum methane number fuel	123	[-]
Maximum fuel moisture	35	[%]
Maximum fuel temperature	35	[°C]

Correction of power depending on the altitude:

Altitude	500	750	1000	1250	1500	[m a.s.l.]
Correction factor	1	0,96	0,93	0,89	0,85	[-]

Correction of power depending on the temperature of the fuel mixture sucked:

Mixture temperature	45	55	65	75	80	[°C]
Correction factor	1,00	0,92	0,83	0,74	0,70	[-]

Time limits for low load operation:

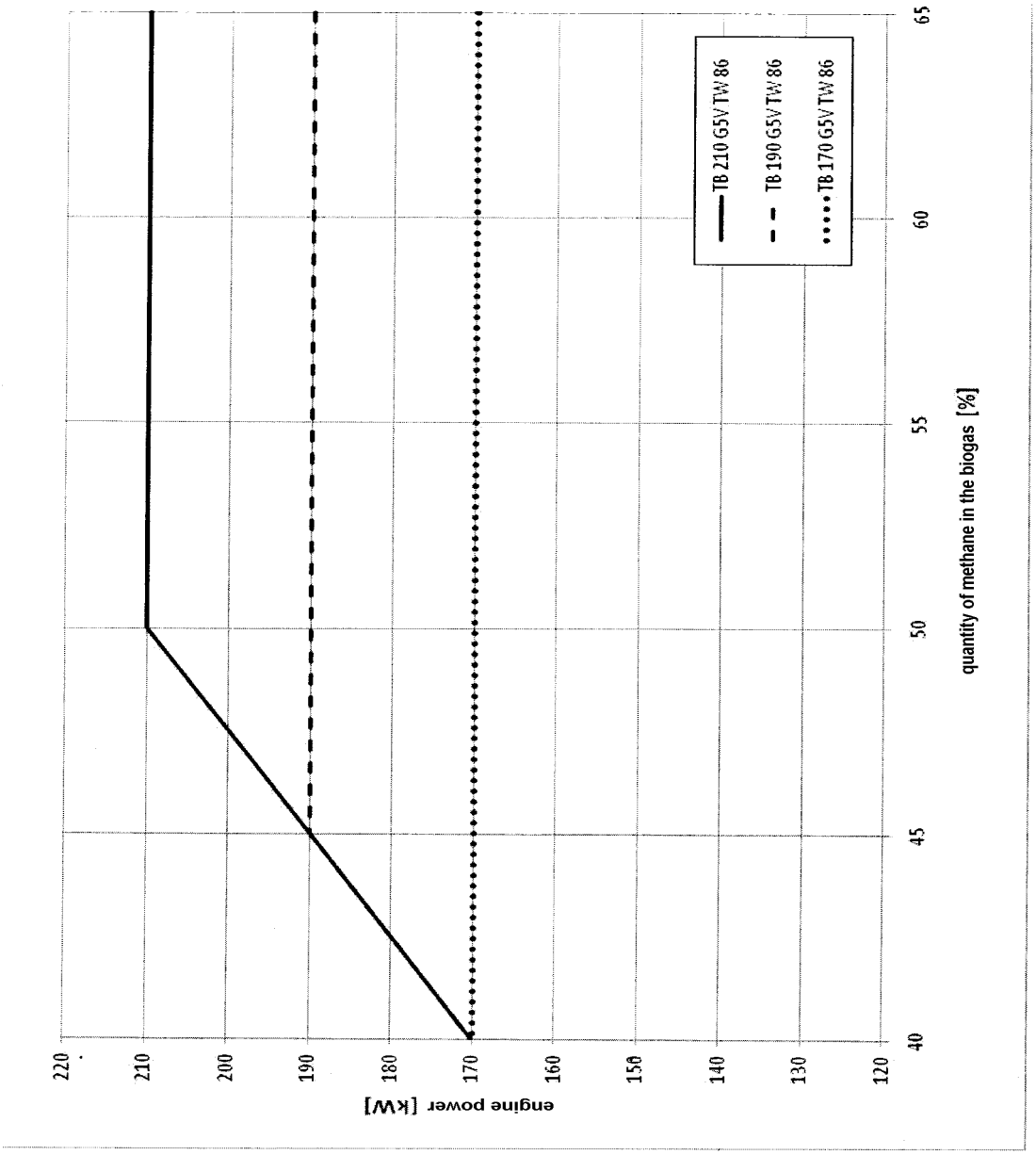
Engine power [%]	Runtime [min]
0 – 30	30*
31 - 50	120*
51 - 100	Continuous

* *After allowed running time under 51 % of nominal power must follow min. 2 hours recovery run above 70 % of nominal engine power.*

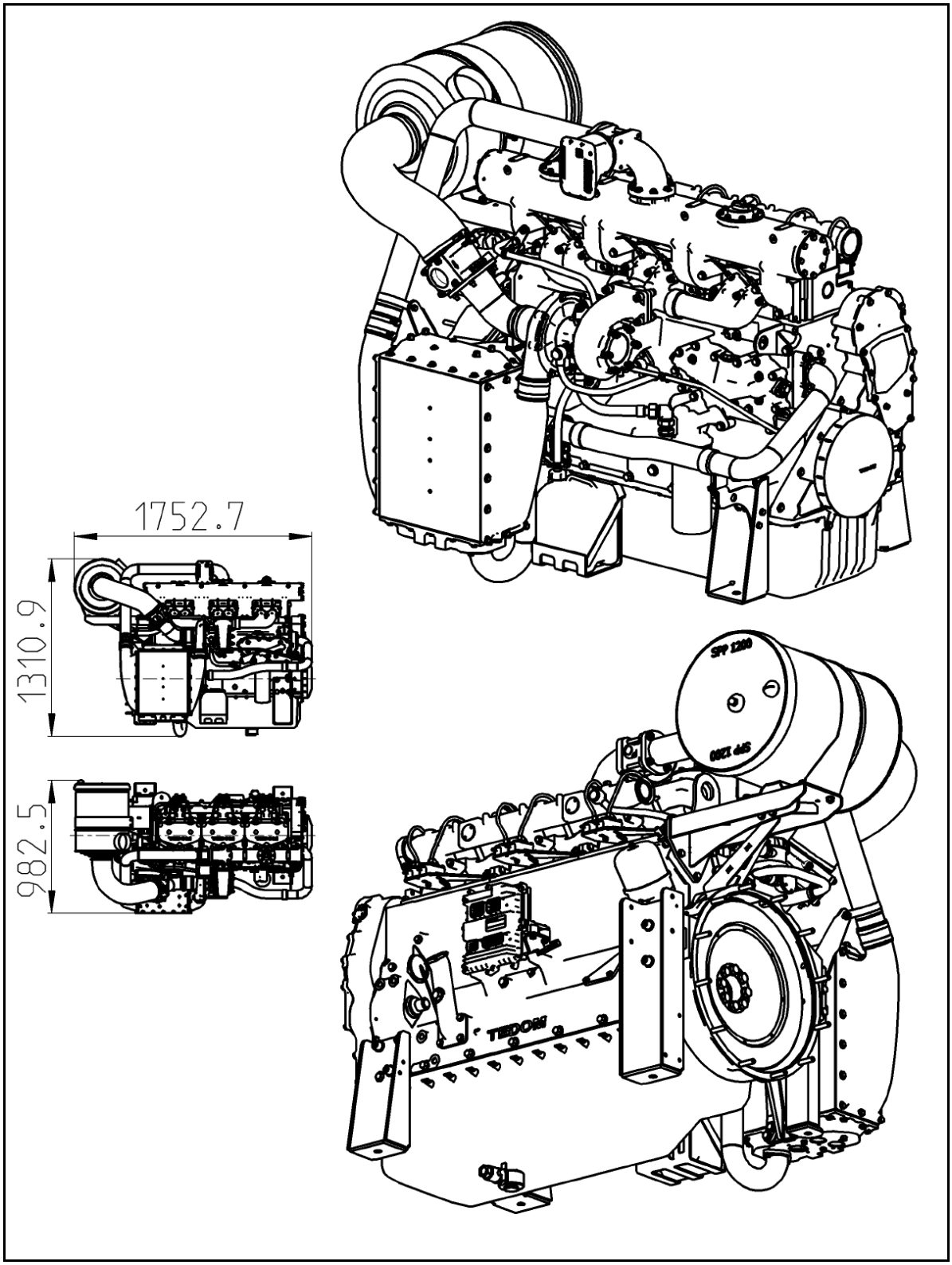
Other operating restrictions:

- Up to 4 Start per day are possible
- Minimum runtime 1 hour per Start
- Due to wear 1 start is equal 0,5 operating hours

Correction of engine power, depending on the amount of methane in biogas:



Outline dimensions of the engine:



Total engine weight:

Total engine weight	1050	[kg]

Fitting dimensions of the engine:

Flywheel housing	SAE 1 (alternator)
Engine block/ flywheel housing	SAE 1 (with rear brackets)
Engine block	4 x M16 (for front brackets)
Flywheel	SAE 11½ (or SAE 14)

Publication specification:

Date of specification:	Specification version:	Elaborated by:	Note:
22.2.2012	1st. edition	T. Hampl	
28.5.2012	REVISION A	T. Hampl	3 at 5
7.11.2012	REVISION B	V. Gulova	Changing the Ignition advance from 28° to 32°
21.5.2014	REVISION C	V. Gulova	Changing the ignition advance from 32° to 36°
8.12.2014	REVISION D	V. Gulova	Revision No. 558/14
4.11.2016	REVISION E	V. Gulova	Allowed crankcase pressure range Maximum coolant pressure in the low temperature stage intercooler
27.3.2019	REVISION F	V. Gulova	Revision No. 520/19
27.4.2020	REVISION G	V. Gulova	Revision No. 534/20