

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

## Description:

Engine type	<b>TB 190 G5V TW 86 (Dwg. No. 7000 850/xx)</b>		
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 <sup>3</sup> ]
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)	191,3	X	[kW]
Peak torque	1218	X	[Nm]

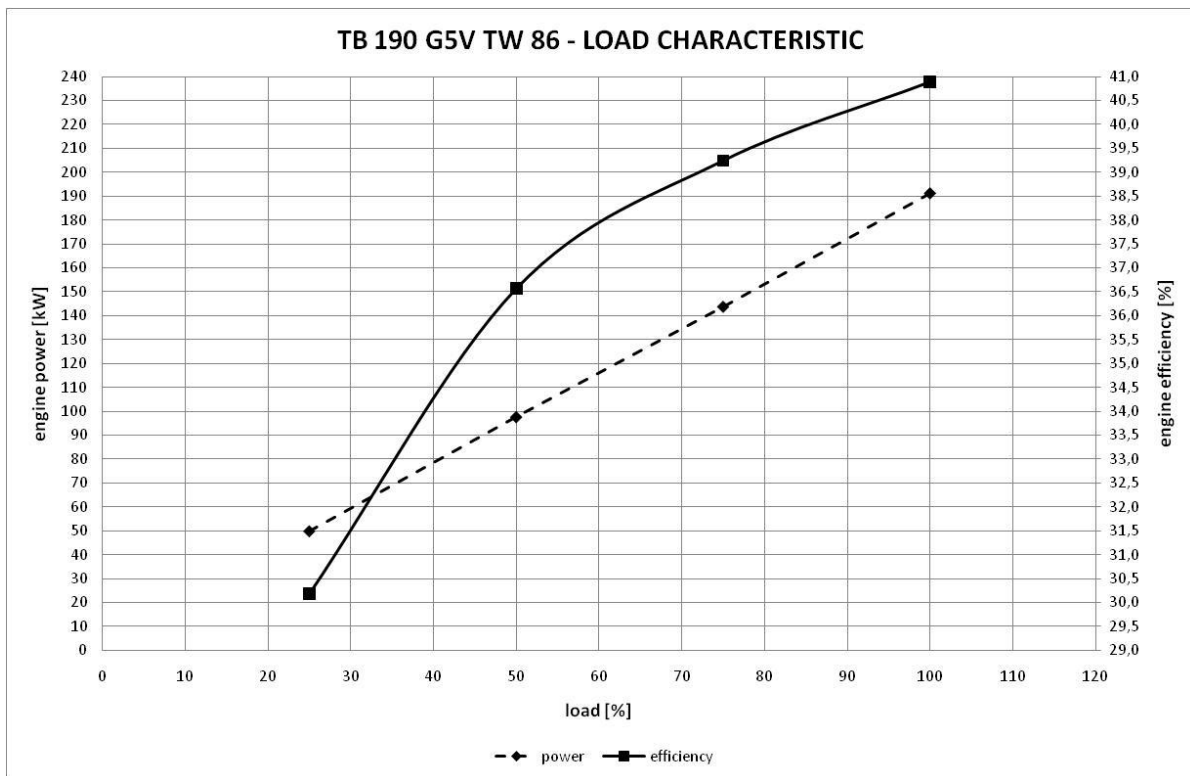
## Engine heat output:

COOLING CIRCUIT	PRIMARY	SECONDARY	
Coolant heat output (with 1st section intercooler)	108,6	X	[kW]
Exhaust gas heat output (cooled to 150 °C)	103,5	X	[kW]
Intercooler heat output (2nd section)	12,8	X	[kW]
Radiation heat power	16,0	X	[kW]

## Parameters under load:

COOLING CIRCUIT	PRIMARY	SECONDARY	PRIMARY			
Load	100	100	75	50	25	[%]
Fuel input power	467,8	X	365,6	261,6	158,5	[kW]
Efficiency	40,9	X	39,2	36,6	30,2	[%]
Fuel consumption	72,2	X	56,4	40,4	24,5	[m <sup>3</sup> .h <sup>-1</sup> ]

## Load Characteristics:



## Engine parameters and settings:

COOLING CIRCUIT	PRIMARY	SECONDARY	
Ignition advance	36	X	[°]
Coefficient of excess air $\lambda$	1,50	X	[-]
Exhaust gas temperature at the inlet to the turbocharger	598	X	[°C]
Exhaust gas temperature at the outlet from the turbocharger	513	X	[°C]
Combustion air flow	878	X	[kg.h <sup>-1</sup> ]
Exhaust gas flow	950	X	[kg.h <sup>-1</sup> ]
Max. exhaust back pressure for rated parameters (at output of the turbocharger)	4,5	X	[kPa]
Recommended exhaust gas temperature for warning signal (before turbocharger)	620	X	[°C]
Recommended exhaust gas temperature for stop signal (before turbocharger)	640	X	[°C]
Max. mixture temperature downstream intercooler for the nominal parameters	45	X	[°C]

## Technical and build-up parameters:

<b>REGIME OF THE ENGINE REVOLUTION</b>		
Overrun speed max. - gas cut-off	2100	[rpm]
Overrun speed max. - ignition deactivation	2100	[rpm]
<b>ENGINE LUBRICATION</b>		
Lubricating oil - total	56	[dm <sup>3</sup> ]
Lubricating oil - oil sump - max. mark	51	[dm <sup>3</sup> ]
Lubricating oil - between max. and min.	8	[dm <sup>3</sup> ]
Oil consumption	0,3-0,5	[g.kW <sup>-1</sup> .h <sup>-1</sup> ]
Min. operating oil pressure - rated speed (see Instruction handbook)	360	[kPag]
<b>ENGINE COOLING</b>		
Volume of coolant in engine, including 1st section intercooler	30,5	[dm <sup>3</sup> ]
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 <sup>3</sup> .min <sup>-1</sup> ]
Maximum cooling circuit pressure	260	[kPaa]
<b>OPERATING LIMITATIONS</b>		
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 <sup>3</sup> .min <sup>-1</sup> ]
Maximum temperature of the mixture entering the engine	80	[°C]
<b>OPERATING CLEARANCE</b>		
Cold valve clearance - intake valve	0,30	[mm]
Cold valve clearance - exhaust valve	0,55	[mm]

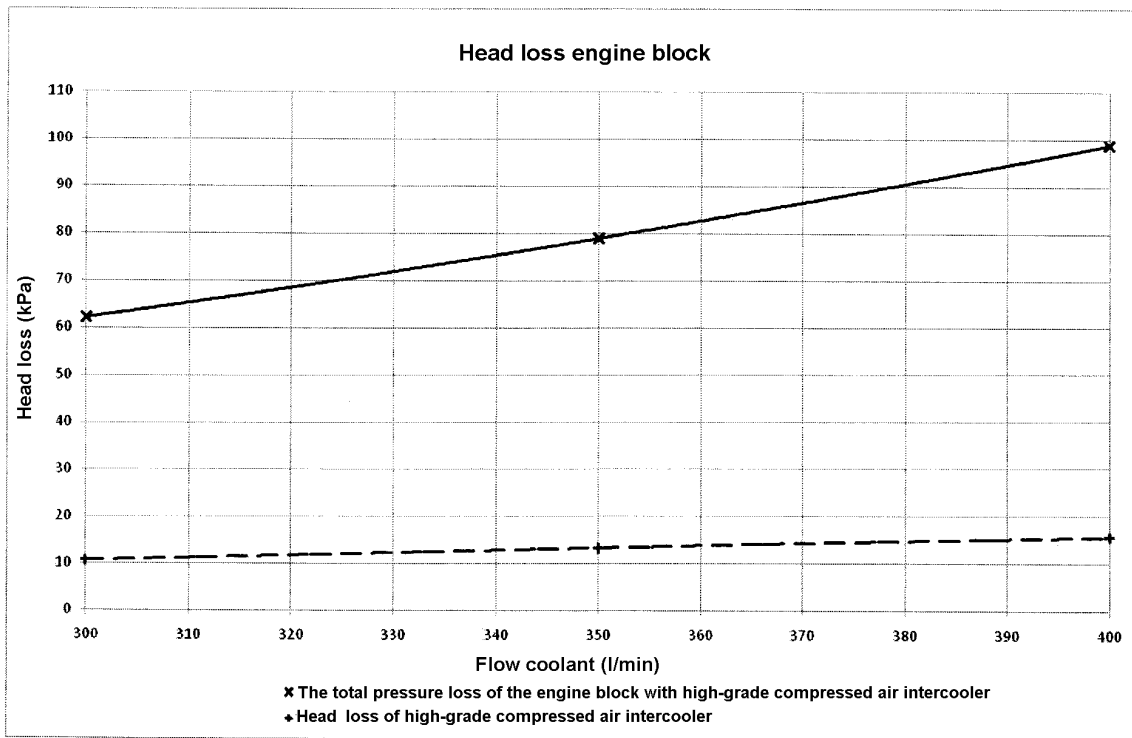
## Emissions:

Nitrogen oxides - NO <sub>x</sub>	< 500	[mg.m <sub>n</sub> <sup>-3</sup> ]
Carbon monoxide - CO	< 650	[mg.m <sub>n</sub> <sup>-3</sup> ]
Total hydrocarbons - HC	-	[mg.m <sub>n</sub> <sup>-3</sup> ]
Particulate - PM <sup>b</sup>	-	[mg.m <sub>n</sub> <sup>-3</sup> ]
Formaldehyde - HCHO	< 60	[mg.m <sub>n</sub> <sup>-3</sup> ]

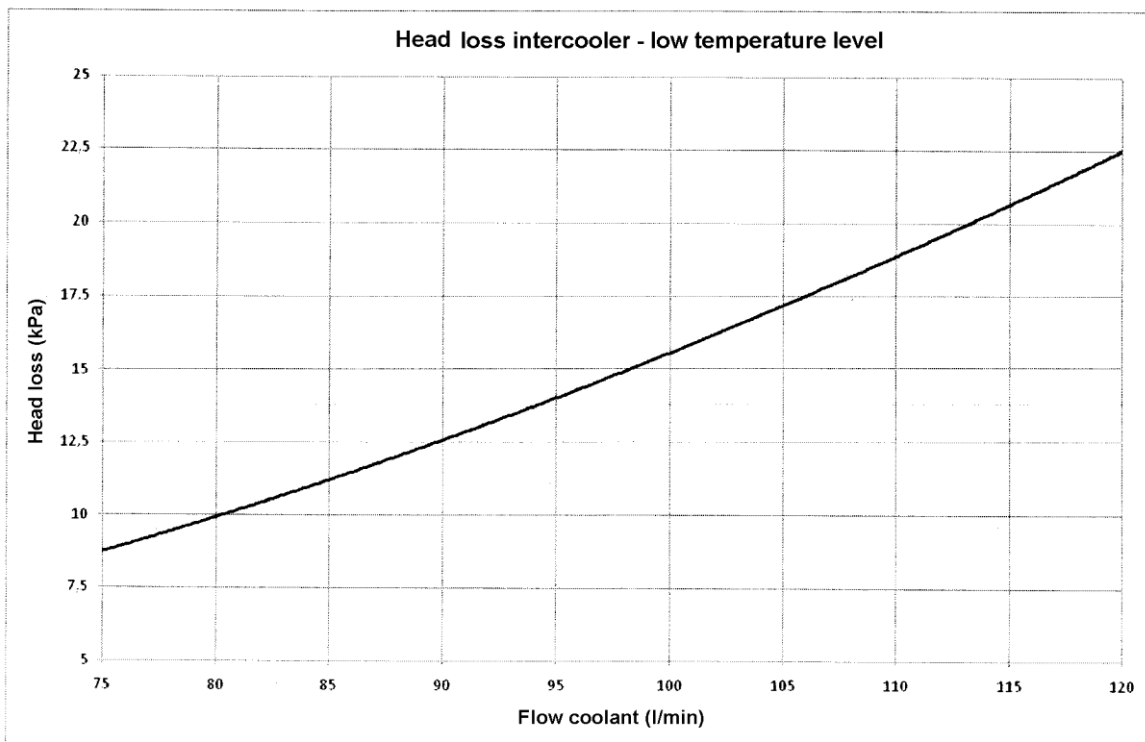
## Engine noise:

Sound pressure level	93	[dB(A)]
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## 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 - reference	101,325	[kPa]
Fuel temperature - reference	0	[°C]
Fuel Relative humidity	0	[%]
LHV	23,3	[MJ.m <sup>-3</sup> ]
CH <sub>4</sub> concentration (biogas engines)	65	[%]
CO <sub>2</sub> concentration (biogas engines)	35	[%]

### Allowed fuel characteristic:

Fuel efficiency (biogas engines)	14,4 – 23,3	[MJ. m <sup>-3</sup> ]
Minimum CH <sub>4</sub> 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:

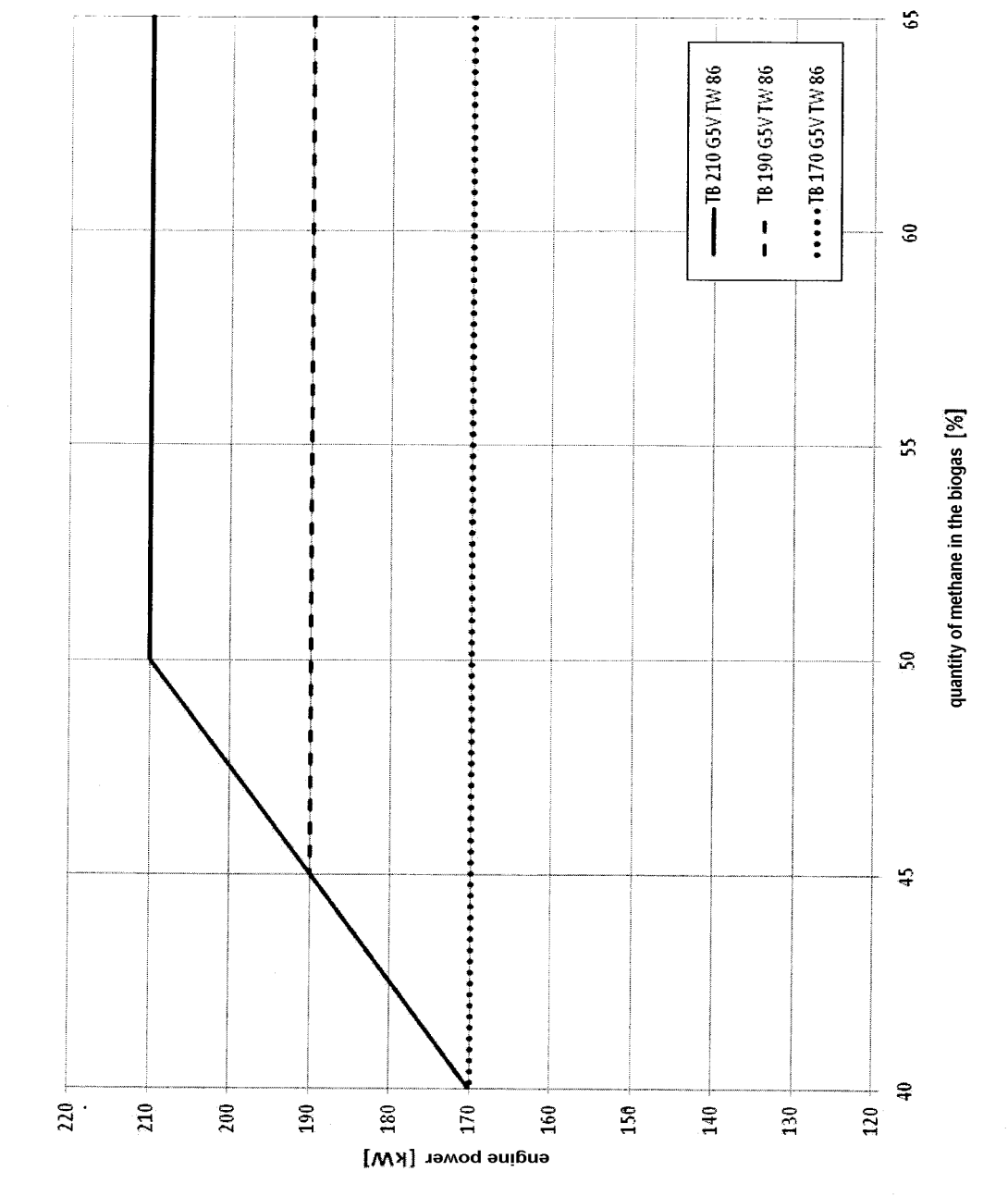
Engine power [%]	Runtime [min]
0 – 30	30*
31 - 50	120*
51 - 100	Continuous

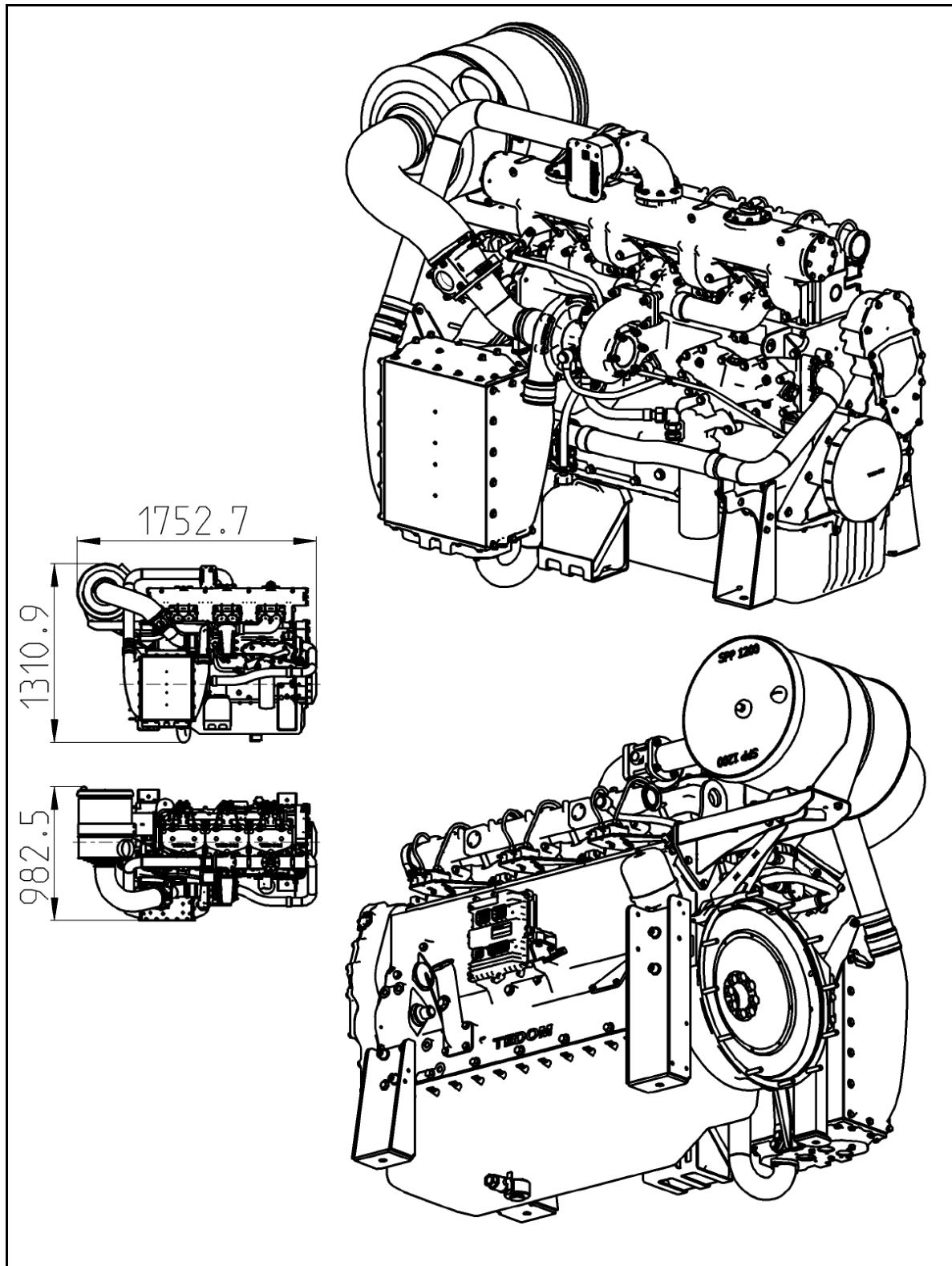
\* After allowed running time under 51 % of nominal power must follow min. 2 hours recovery run above 70 % of nominal engine power.

### 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]
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**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
21.5.2014	REVISION B	V. Gulova	Changing the ignition advance from 33° to 36°
8.12.2014	REVISION C	V. Gulova	Revision No. 558/14
4.11.2016	REVISION D	V. Gulova	Allowed crankcase pressure range Maximum coolant pressure in the low temperature stage intercooler
27.3.2019	REVISION E	V. Gulova	Revision No. 520/19
27.4.2020	REVISION F	V. Gulova	Revision No. 534/20