Technical Sales Document

- Product Data -

Date 9/26/2013

Name	**12V2000G83**	**Speed[rpm]**	**1800**
Application Group	**3D**	**Rating[KW]**	**835**
Dataset	**Air charge air cooling; exhaust optimized (EPA Tier 1); ref. 25°C/- (33)**	**Rating[bhp]**	**1120**
		Frequency[Hz]	**60**
	US EPA Nonroad Tier 1 (40 CFR 89);		

Reference conditions

No.	Description	Index	Value	Unit
3	MTU data code		33	-
6	Intake air temperature		25	°C
7	Charge-air coolant temperature		-	°C
8	Barometric pressure		1000	mbar
9	Site altitude above sea level		100	m
10	Raw-water inlet temperature		-	°C

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0. Data-relevant engine design configuration

No.	Description	Index	Value	Unit
1	Fuel-consumption optimized		-	-
2	Exhaust-emissions optimized (limit values see Exhaust Emissions, Chapter 21)		X	-
16	Complies with: "TA-Luft" (Edition 1986) (German clean-air standard)		-	-
17	Complies with: Regulations for stationary power plants in France (arrêté du 25 Juillet 1997)		-	-
18	Complies with: US EPA, regulation for nonroad engines (40 CFR 89 - Tier 1 -)		X	-
25	Complies with: US EPA, regulation for nonroad engines (40 CFR 89 - Tier 2 -)		-	-
8	Engine rated speed switchable (1500/1800 rpm)		-	-
12	Engine with sequential turbocharging (turbochargers with cut-in/cut-out control)		-	-
13	Engine without sequential turbocharging (turbochargers without cut-in/cut-out control)		X	-
31	Engine with air-cooled charge air		X	-
32	Engine with water-cooled charge air (external)		-	-

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1. Power-related data (power ratings are net brake power to ISO 3046)

No.	Description	Index	Value	Unit
1	Engine rated speed	A	1800	rpm
3	Mean piston speed		9.0	m/s
5	Fuel stop power ISO 3046	A	835	kW
9	Mean effective pressure (MEP) (Fuel stop power ISO 3046)		23.3	bar

2. General Conditions (for maximum power)

No.	Description	Index	Value	Unit
1	Intake air depression (new filter)	A	30	mbar
2	Intake air depression, max.	L	50	mbar
3	Exhaust back pressure	A	50	mbar
4	Exhaust back pressure, max.	L	100	mbar
5	Fuel temperature at fuel feed connection	R	38	°C
10	Fuel temperature at fuel feed connection, max.	L	55	°C

3. Consumption

No.	Description	Index	Value	Unit
56	Specific fuel consumption (be) - 100 % FSP (+ 5 %; EN 590; 42.8 MJ/kg)	R	201	g/kWh
57	Specific fuel consumption (be) - 75 % FSP (+ 5 %; EN 590; 42.8 MJ/kg)	R	209	g/kWh
58	Specific fuel consumption (be) - 50 % FSP (+ 5 %; EN 590; 42.8 MJ/kg)	R	216	g/kWh
59	Specific fuel consumption (be) - 25 % FSP (+ 5 %; EN 590; 42.8 MJ/kg)	R	241	g/kWh
73	No-load fuel consumption	R	22	kg/h
61	Lube oil consumption after 100 h of operation (B = fuel consumption per hour)	R	0.5	% of B
62	Lube oil consumption after 100 h of operation, max. (B = fuel consumption per hour)	L	1.0	% of B

4. Model-related data (basic design)

No.	Description	Index	Value	Unit
3	Engine with exhaust turbocharger (ETC) and intercooler		X	-
4	Exhaust piping, non-cooled		X	-
5	Exhaust piping, liquid-cooled		-	-
33	Working method: four-cycle, diesel, single-acting		X	-
34	Combustion method: direct injection		X	-
36	Cooling system: conditioned water		X	-
37	Direction of rotation: c.c.w. (facing driving end)		X	-
6	Number of cylinders		12	-
7	Cylinder configuration: V angle		90	degrees (°)
10	Bore		130	mm
11	Stroke		150	mm
12	Displacement, cylinder		1.99	liter
13	Displacement, total		23.88	liter
14	Compression ratio		14	-
40	Cylinder heads: single-cylinder		X	-
41	Cylinder liners: wet, replaceable		X	-
24	Number of inlet valves, per cylinder		2	-
25	Number of exhaust valves, per cylinder		2	-
15	Number of turbochargers		2	-
18	Number of intercoolers		1	-
28	Standard flywheel housing flange (engine main PTO)		0	SAE
43	Flywheel interface (DISC)		18"	-
46	Engine mass diagram, drawing No.		N	-
47	Engine mass diagram, drawing No. (cont.)		N	-

5. Combustion air / exhaust gas

No.	Description	Index	Value	Unit
39	Pressure differential in external air-to-air intercooler, max.	L	130	mbar
27	Charge-air pressure before cylinder - FSP	R	3.5	bar abs
10	Combustion air volume flow - FSP	R	1.0	m³/s
12	Exhaust volume flow (at exhaust temperature) - FSP	R	2.8	m³/s
16	Exhaust temperature after turbocharger - FSP	R	605	°C

6. Heat dissipation

No.	Description	Index	Value	Unit
16	Heat dissipated by engine coolant - FSP with oil heat, without charge-air heat	R	380	kW
27	Charge-air heat dissipation - FSP	R	190	kW
34	Radiation and convection heat, engine - FSP	R	45	kW

7. Coolant system (high-temperature circuit)

No.	Description	Index	Value	Unit
17	Coolant temperature (at engine outlet to cooling equipment)	A	95	°C
20	Coolant temperature after engine, alarm	R	97	°C
21	Coolant temperature after engine, shutdown	L	102	°C
25	Coolant antifreeze content, max.	L	50	%
30	Cooling equipment: coolant flow rate	A	58	m³/h
35	Coolant pump: inlet pressure, min.	L	0.4	bar
36	Coolant pump: inlet pressure, max.	L	1.52	bar
41	Pressure loss in off-engine cooling system, max.	L	0.7	bar
47	Breather valve (expansion tank) opening pressure (excess pressure)	R	N	bar
54	Cooling equipment: height above engine, max.	L	15.2	m
53	Cooling equipment: operating pressure	A	2.2	bar
74	Coolant level in expansion tank, below min. shutdown	L	X	-
48	Breather valve (expansion tank) opening pressure (depression)	R	N	bar
49	Pressure in cooling system, max.	L	N	bar

8. Coolant system (low-temperature circuit)

10. Lube oil system

No.	Description	Index	Value	Unit
1	Lube oil operating temp. before engine, from	R	88	°C
2	Lube oil operating temp. before engine, to	R	98	°C
5	Lube oil temperature before engine, alarm	R	103	°C
6	Lube oil temperature before engine, shutdown	L	-	°C
8	Lube oil operating press. bef. engine, from	R	6.5	bar
9	Lube oil operating press. bef. engine, to	R	7.8	bar
10	Lube oil pressure before engine, alarm	R	5.5	bar
11	Lube oil pressure before engine, shutdown	L	5.0	bar
19	Lube oil fine filter (main circuit): number of units		1	-
20	Lube oil fine filter (main circuit): number of elements per unit		2	-
21	Lube oil fine filter (main circuit): particle retention	R	0.009	mm
32	Lube oil fine filter (main circuit): pressure differential, max.	L	0.8	bar

11. Fuel system

No.	Description	Index	Value	Unit
1	Fuel pressure at fuel feed connection, min. (when engine is starting)	L	-0.3	bar
2	Fuel pressure at fuel feed connection, max. (when engine is starting)	L	+0.5	bar
37	Fuel supply flow, max.	A	7.5	liter/min
8	Fuel return flow, max.	A	3.5	liter/min
10	Fuel pressure at return connection on engine, max.	L	0.5	bar
12	Fuel temperature differential before/after engine	R	50	°C
15	Fuel prefilter: number of units	A	-	-
16	Fuel prefilter: number of elements per unit	A	-	-
17	Fuel prefilter: particle retention	A	-	mm
18	Fuel fine filter (main circuit): number of units	A	1	-
19	Fuel fine filter (main circuit): number of elements per unit	A	1	-
20	Fuel fine filter (main circuit): particle retention	A	0.005	mm
21	Fuel fine filter (main circuit): pressure differential, max.	L	1.0	bar

12. General operating data

No.	Description	Index	Value	Unit
1	Cold start capability: air temperature (w/o starting aid, w/o preheating) - (case A)	R	0**	°C
2	Additional condition (to case A): engine coolant temperature	R	N	°C
3	Additional condition (to case A): lube oil temperature	R	10**	°C
4	Additional condition (to case A): lube oil viscosity	R	30**	SAE
9	Cold start capability: air temperature (w/o starting aid, w/ preheating) - (case C)	R	-10**	°C
10	Additional condition (to case C): engine coolant temperature	R	40**	°C
11	Additional condition (to case C): lube oil temperature	R	-5**	°C
12	Additional condition (to case C): lube oil viscosity	R	10W30	SAE
21	Coolant preheating, heater performance (standard)	R	3	kW
22	Coolant preheating, preheating temperature (min.)	R	32	°C
28	Breakaway torque (without driven machinery) coolant temperature +5°C	R	580	Nm
30	Breakaway torque (without driven machinery) coolant temperature +40°C	R	330*	Nm
29	Cranking torque at firing speed (without driven machinery) coolant temperature +5°C	R	380*	Nm
31	Cranking torque at firing speed (without driven machinery) coolant temperature +40°C	R	305*	Nm
96	Starting is blocked if the engine coolant temperature is below		5	°C
93	Run-up period to rated speed (with driven machinery) (* at general conditions)	R	N	s
37	High idling speed, max. (static)	L	1920	rpm
38	Limit speed for overspeed alarm / emergency shutdown	L	2100	rpm
42	Firing speed, from	R	100	rpm
43	Firing speed, to	R	120	rpm

44	Engine coolant temperature before starting full-load operation, recommended min. (for emergency/standby sets with coolant preheating: at least the preheating temperature)	L	60	°C
48	Minimum continuous load	R	20	%
49	Extended low or no-load operation possible (consultation required)		X	-
50	Engine mass moment of inertia (without flywheel)	R	1.12	kgm²
52	Standard flywheel mass moment of inertia	R	2.800	kgm²
51	Engine mass moment of inertia (with standard flywheel)	R	3.920	kgm²
69	Speed droop (with electronic governor) adjustable, from	R	0	%
70	Speed droop (with electronic governor) adjustable, to	R	4	%
95	Number of starter ring-gear teeth on engine flywheel		160	-

13. Starting (electric)

No.	Description	Index	Value	Unit
12	Starter, rated power (make DELCO) (standard design)	R	-	kW
2	Starter, rated voltage (standard design)	R	24	V=
14	Starter, power requirement max. (make DELCO)	R	1750	A
15	Starter, power requirement at firing speed (make DELCO)	R	800	A
16	Start attempt duration (engine preheated)	R	-	s
17	Start attempt duration (engine not preheated)	R	-	s
18	Start attempt duration, max.	L	6	s

15. Starting (pneumatic/oil pressure starter)

No.	Description	Index	Value	Unit
5	Starting air pressure before starter motor, min.	R	17	bar
6	Starting air pressure before starter motor, max.	R	N	bar
7	Starting air pressure before starter motor, min.	L	N	bar
8	Starting air pressure before starter motor, max.	L	N	bar
18	Start attempt duration (engine preheated)	R	N	s
19	Start attempt duration (engine not preheated)	R	N	s
20	Start attempt duration, max.	L	N	s
21	Air consumption/start attempt (engine preheated)	R	0.49	m^3n
23	Starting air tank for 3 start attempts (max. 40 bar) (engine preheated)	R	N	liter
24	Starting air tank for 3 start attempts (max. 30 bar) (engine preheated)	R	N	liter
25	Starting air tank for 6 start attempts (max. 40 bar) (engine preheated)	R	N	liter
26	Starting air tank for 6 start attempts (max. 30 bar) (engine preheated)	R	N	liter
27	Starting air tank for 10 start attempts (max. 40 bar) (engine preheated)	R	N	liter
28	Starting air tank for 10 start attempts (max. 30 bar) (engine preheated)	R	N	liter

16. Inclinations - standard oil system (ref.: waterline)

No.	Description	Index	Value	Unit
15	Longitudinal inclination, continuous max. driving end down (Option: max. operating inclinations)	L	5	degrees (°)
17	Longitudinal inclination, continuous max. driving end up (Option: max. operating inclinations)	L	5	degrees (°)
19	Transverse inclination, continuous max. (Option: max. operating inclinations)	L	10	degrees (°)

17. Inclinations - special oil system (ref.: waterline)

18. Capacities

No.	Description	Index	Value	Unit
1	Engine coolant capacity (without cooling equipment)	R	90	liter
11	On-engine fuel capacity	R	5	liter
14	Engine oil capacity, initial filling (standard oil system) (Option: max. operating inclinations)	R	77	liter
20	Oil change quantity, max. (standard oil system) (Option: max. operating inclinations)	R	74	liter
28	Oil pan capacity, dipstick mark min. (standard oil system) (Option: max. operating inclinations)	L	50	liter
29	Oil pan capacity, dipstick mark max. (standard oil system) (Option: max. operating inclinations)	L	67	liter

19. Weights / dimensions

No.	Description	Index	Value	Unit
9	Engine weight, dry (basic engine configuration acc. to scope of supply specification)	R	2490	kg
10	Engine weight, wet (basic engine configuration acc. to scope of supply specification)	R	2660	kg

20. Fan / fan cooler

No.	Description	Index	Value	Unit
3	Fan, pusher-type		X	-
18	Fan arrangement: vertical above crankshaft		X	-
9	Fan drive: mechanical via V-belt		X	-
13	Fan: speed	R	N	rpm
19	Standard fan cooler, supplied by MTU, design and specific data acc. to case A / B / C		N	-
21	(Case A) - fan cooler, designed for: - ambient temperature	A	N	°C
54	(Case A) - fan cooler, designed for: - site altitude, max.	A	N	m
22	(Case A) - fan cooler, designed for: - coolant antifreeze content, max.	A	N	%
55	(Case A) - fan: power consumption at 1 mbar / 100 Pa duct allowance (pressure and suction sides, total)	R	N	kW
56	(Case A) - fan: power consumption at 2 mbar / 200 Pa duct allowance (pressure and suction sides, total)	R	N	kW
57	(Case A) - fan: power consumption at 3 mbar / 300 Pa duct allowance (pressure and suction sides, total)	R	N	kW
27	(Case A) - cooling-air flow rate at 1 mbar / 100 Pa duct allowance (pressure and suction sides, total)	R	N	m³/s
28	(Case A) - cooling-air flow rate at 2 mbar / 200 Pa duct allowance (pressure and suction sides, total)	R	N	m³/s
29	(Case A) - cooling-air flow rate at 3 mbar / 300 Pa duct allowance (pressure and suction sides, total)	R	N	m³/s
58	(Case A) - fan: weight	R	N	kg
59	(Case A) - fan cooler: weight, dry (incl. pipework)	R	N	kg
31	(Case A) - fan cooler: coolant capacity	R	N	liter
32	(Case B) - fan cooler, designed for: - ambient temperature	A	N	°C
60	(Case B) - fan cooler, designed for: - site altitude, max.	A	N	m
33	(Case B) - fan cooler, designed for: - coolant antifreeze content, max.	A	N	%

61	(Case B) - fan: power consumption at 1 mbar / 100 Pa duct allowance (pressure and suction sides, total)	R	N	kW
62	(Case B) - fan: power consumption at 2 mbar / 200 Pa duct allowance (pressure and suction sides, total)	R	N	kW
63	(Case B) - fan: power consumption at 3 mbar / 300 Pa duct allowance (pressure and suction sides, total)	R	N	kW
38	(Case B) - cooling-air flow rate at 1 mbar / 100 Pa duct allowance (pressure and suction sides, total)	R	N	m³/s
39	(Case B) - cooling-air flow rate at 2 mbar / 200 Pa duct allowance (pressure and suction sides, total)	R	N	m³/s
40	(Case B) - cooling-air flow rate at 3 mbar / 300 Pa duct allowance (pressure and suction sides, total)	R	N	m³/s
64	(Case B) - fan: weight	R	N	kg
65	(Case B) - fan cooler: weight, dry (incl. pipework)	R	N	kg
42	(Case B) - fan cooler: coolant capacity	R	N	liter
43	(Case C) - fan cooler, designed for: - ambient temperature	A	N	°C
66	(Case C) - fan cooler, designed for: - site altitude, max.	A	N	m
44	(Case C) - fan cooler, designed for: - coolant antifreeze content, max.	A	N	%
67	(Case C) - fan: power consumption at 1 mbar / 100 Pa duct allowance (pressure and suction sides, total)	R	N	kW
68	(Case C) - fan: power consumption at 2 mbar / 200 Pa duct allowance (pressure and suction sides, total)	R	N	kW
69	(Case C) - fan: power consumption at 3 mbar / 300 Pa duct allowance (pressure and suction sides, total)	R	N	kW
49	(Case C) - cooling-air flow rate at 1 mbar / 100 Pa duct allowance (pressure and suction sides, total)	R	N	m³/s
50	(Case C) - cooling-air flow rate at 2 mbar / 200 Pa duct allowance (pressure and suction sides, total)	R	N	m³/s
51	(Case C) - cooling-air flow rate at 3 mbar / 300 Pa duct allowance (pressure and suction sides, total)	R	N	m³/s

70	(Case C) - fan: weight	R	N	kg
71	(Case C) - fan cooler: weight, dry (incl. pipework)	R	N	kg
53	(Case C) - fan cooler: coolant capacity	R	N	liter

21. Exhaust emissions

No.	Description	Index	Value	Unit
350	Regulation: "TA-Luft" (Edition 1986) - FSP Nitric oxide (NOx) (5% O2)	R	-	mg/m³n
351	Regulation: "TA-Luft" (Edition 1986) - FSP Carbon monoxide (CO) (5% O2)	R	-	mg/m³n
352	Regulation: "TA-Luft" (Edition 1986) - FSP Unburned hydrocarbons (HC)	R	-	mg/m³n
353	Regulation: "TA-Luft" (Edition 1986) - FSP Dust (5% O2)	R	-	mg/m³n
367	Regulation: "TA-Luft" (Edition 1986) - FSP Formaldehyde (5% O2)	R	-	mg/m³n
354	Regulation: stationary power plants in France - FSP Nitric oxide (NOx) (5% O2)	R	-	mg/m³n
355	Regulation: stationary power plants in France - FSP Carbon monoxide (CO) (5% O2)	R	-	mg/m³n
356	Regulation: stationary power plants in France - FSP Unburned hydrocarbons (NMHC)	R	-	mg/m³n
357	Regulation: stationary power plants in France - FSP Dust / particulates (5% O2)	R	-	mg/m³n
316	Regulation: US EPA "Nonroad" (40 CFR 89 - Tier 1 -) Nitric oxide (NOx)	R	9.2	g/kWh
317	Regulation: US EPA "Nonroad" (40 CFR 89 - Tier 1 -) Carbon monoxide (CO)	R	11.4	g/kWh
318	Regulation: US EPA "Nonroad" (40 CFR 89 - Tier 1 -) Unburned hydrocarbons (HC)	R	1.3	g/kWh
319	Regulation: US EPA "Nonroad" (40 CFR 89 - Tier 1 -) Particulates	R	0.54	g/kWh
320	Regulation: US EPA "Nonroad" (40 CFR 89 - Tier 2 -) Nitric oxide (NOx) + unburned hydrocarbons (HC)	R	-	g/kWh
321	Regulation: US EPA "Nonroad" (40 CFR 89 - Tier 2 -) Carbon monoxide (CO)	R	-	g/kWh

323	Regulation: US EPA "Nonroad" (40 CFR 89 - Tier 2 -) Particulates	R	-	g/kWh
152	Exhaust volume flow, dry - FSP (standard conditions)	R	N	m³/h
154	Exhaust mass flow - FSP (reference conditions)	R	N	kg/h
155	Residual oxygen content (O2) in dry exhaust - FSP (standard conditions)	R	N	% (vol.)
156	Total combustion calorific value - FSP	R	N	kW

22. Acoustics

No.	Description	Index	Value	Unit
102	Exhaust noise, unsilenced - FSP (free-field sound-pressure level Lp, 1m distance, ISO 6798, +3dB(A) tolerance)	R	116	dB(A)
202	Exhaust noise, unsilenced - FSP (sound power level LW, ISO 6798, +3dB(A) tolerance)	R	129	dB(A)
104	Exhaust noise, unsilenced - FSP (free-field sound-pressure level Lp, 1m distance, ISO 6798) Spectrum No.	R	N	-
204	Exhaust noise,unsilenced - FSP (sound power level LW, ISO 6798) Spectrum No.	R	732842	-
110	Engine surface noise with attenuated intake noise (filter) - FSP (free-field sound-pressure level Lp, 1m distance, ISO 6798, +2dB(A) tolerance)	R	-	dB(A)
210	Engine surface noise with attenuated intake noise (filter) - FSP (sound power level LW, ISO 6798, +2dB(A) tolerance)	R	-	dB(A)
112	Engine surface noise with attenuated intake noise (filter) - FSP (free-field sound-pressure level Lp, 1m distance, ISO 6798) Spectrum No.	R	-	-
212	Engine surface noise with attenuated intake noise (filter) - FSP (sound power level LW, ISO 6798) Spectrum No.	R	-	-
129	Test stand impedance spectrum, Diagram No.		N	-
130	Test stand impedance spectrum, Diagram No. (cont.)		N	-

23. TBO and load profile (case A)

Description:

CP = Ref. value: Continuous power

FSP = Ref. value: Fuel stop power

A = Design value

R = Guideline value

L = limit value

N = Not yet defined value

- = Not applicable

X = Applicable