Technical Sales Document

- Product Data -

Name	10V1600G10F	**Speed [rpm]**	1500
Application Group	3B	**Nominal power [kW]**	407
Dataset	Ref. 25°C/- (1)	**Nominal power [bhp]**	546
		Nominal power [kVA]	-
		Nominal power [kWel]	-
		Frequency [Hz]	50
Exhaust Regulations	Indien ARAI/2004 Stage I; Fuel-consumption optimized; NEA Singapore for ORDE;		

Reference conditions

No.	Description	Index	Value	Unit
6	Intake air temperature		25	°C
8	Barometric pressure		1000	mbar
9	Site altitude above sea level		100	m

[BL] **Reference value: fuel stop power**
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[DL] **Reference value: continuous power**
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0. Data-relevant engine design configuration

No.	Description	Index	Value	Unit
8	Engine rated speed switchable (1500/1800 rpm)		-	-
13	Engine without sequential turbocharging (turbochargers without cut-in/cut-out control)		X	-
31	Engine with air-cooled charge air		X	-

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1. Power-related data

No.	Description	Index	Value	Unit
1	Engine rated speed	A	1500	rpm
3	Mean piston speed		7.5	m/s
4	Continuous power ISO 3046 (10% overload capability) (design power DIN 6280, ISO 8528)	A	407	kW
5	Fuel stop power ISO 3046	A	448	kW
8	Mean effective pressure (MEP) (Continuous power ISO 3046)		18.6	bar
9	Mean effective pressure (MEP) (Fuel stop power ISO 3046)		20.5	bar

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2. General Conditions (for maximum power)

No.	Description	Index	Value	Unit
1	Intake air depression (new filter)	A	25	mbar
2	Intake air depression, max.	L	50	mbar
3	Exhaust back pressure	A	85	mbar
4	Exhaust back pressure, max.	L	150	mbar
5	Fuel temperature at fuel feed connection	R	38	°C
9	Fuel temperature at fuel feed connection, max. (w/o power reduction)	L	60	°C
10	Fuel temperature at fuel feed connection, max.	L	70	°C
49	Max. ambient temperature in direct vicinity of vibration damper	L	55	°C

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3. Consumption

No.	Description	Index	Value	Unit
17	Specific fuel consumption (be) - 100 % CP (+ 5 %; EN 590; 42.8 MJ/kg)	R	191	g/kWh
18	Specific fuel consumption (be) - 75 % CP (+ 5 %; EN 590; 42.8 MJ/kg)	R	205	g/kWh
19	Specific fuel consumption (be) - 50 % CP (+ 5 %; EN 590; 42.8 MJ/kg)	R	220	g/kWh
20	Specific fuel consumption (be) - 25 % CP (+ 5 %; EN 590; 42.8 MJ/kg)	R	244	g/kWh
56	Specific fuel consumption (be) - 100 % FSP (+ 5 %; EN 590; 42.8 MJ/kg)	R	190	g/kWh
57	Specific fuel consumption (be) - 75 % FSP (+ 5 %; EN 590; 42.8 MJ/kg)	R	197	g/kWh
58	Specific fuel consumption (be) - 50 % FSP (+ 5 %; EN 590; 42.8 MJ/kg)	R	217	g/kWh
59	Specific fuel consumption (be) - 25 % FSP (+ 5 %; EN 590; 42.8 MJ/kg)	R	235	g/kWh
73	No-load fuel consumption	R	2.1	kg/h
61	Lube oil consumption after 100 h of operation (B = fuel consumption per hour)	R	<0.2	% of B
62	Lube oil consumption after 100 h of operation, max. (B = fuel consumption per hour)	L	<0.5	% of B

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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	-
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		10	-
7	Cylinder configuration: V angle		90	degrees (°)
10	Bore		122	mm
11	Stroke		150	mm
12	Displacement, cylinder		1.75	liter
13	Displacement, total		17.5	liter
14	Compression ratio		17.5	-
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	-
28	Standard flywheel housing flange (engine main PTO)		01	SAE
43	Flywheel interface (DISC)		14"	-

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Exhaust Regulations Indien ARAI/2004 Stage I; Fuel-consumption optimized; NEA Singapore for ORDE;

5. Combustion air / exhaust gas

No.	Description	Index	Value	Unit
19	Charge-air temperature before cylinder	A	50	°C
33	Charge-air flow through external air-to-air intercooler	A	0.25	m³/s
34	Charge-air temperature before external air-to-air intercooler	A	161	°C
35	Charge-air temperature after external air-to-air intercooler	A	50	°C
36	Charge-air temperature after external air-to-air intercooler, max.	L	65	°C
37	Charge-air temperature after external air-to-air intercooler, min.	L	-15	°C
39	Pressure differential in external air-to-air intercooler, max.	L	130	mbar
8	Charge-air pressure before cylinder - CP	R	2.30	bar abs
27	Charge-air pressure before cylinder - FSP	R	2.35	bar abs
9	Combustion air volume flow - CP	R	0.40	m³/s
10	Combustion air volume flow - FSP	R	0.45	m³/s
11	Exhaust volume flow (at exhaust temperature) - CP	R	1.14	m³/s
12	Exhaust volume flow (at exhaust temperature) - FSP	R	1.25	m³/s
15	Exhaust temperature after turbocharger - CP	R	549	°C
16	Exhaust temperature after turbocharger - FSP	R	520	°C

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Exhaust Regulations	Indien ARAI/2004 Stage I; Fuel-consumption optimized; NEA Singapore for ORDE;		

6. Heat dissipation

No.	Description	Index	Value	Unit
16	Heat dissipated by engine coolant - FSP with oil heat, without charge-air heat	R	216	kW
26	Charge-air heat dissipation - CP	R	47	kW
27	Charge-air heat dissipation - FSP	R	60	kW
31	Heat dissipated by return fuel flow - CP	R	3.8	kW
32	Heat dissipated by return fuel flow - FSP	R	3.7	kW
33	Radiation and convection heat, engine - CP	R	21	kW

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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, limit 1	L	105	°C
21	Coolant temperature after engine, limit 2	L	109	°C
25	Coolant antifreeze content, max.	L	50	%
30	Cooling equipment: coolant flow rate	A	23.3	m³/h
35	Coolant pump: inlet pressure, min.	L	1.4	bar
36	Coolant pump: inlet pressure, max.	L	3.5	bar
41	Pressure loss in off-engine cooling system, max.	L	0.7	bar
47	Breather valve (expansion tank) opening pressure (excess pressure)	R	1.0+0.3	bar
54	Cooling equipment: height above engine, max.	L	15	m
48	Breather valve (expansion tank) opening pressure (depression)	R	-0.2	bar
49	Pressure in cooling system, max.	L	5.0	bar

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10. Lube oil system

No.	Description	Index	Value	Unit
1	Lube oil operating temp. before engine, from	R	105	°C
2	Lube oil operating temp. before engine, to	R	115	°C
8	Lube oil operating press. bef. engine, from	R	4.5	bar
9	Lube oil operating press. bef. engine, to	R	5.5	bar
10	Lube oil pressure before engine, alarm	L	2.6	bar
11	Lube oil pressure before engine, shutdown	L	2.4	bar
19	Lube oil fine filter (main circuit): number of units		1	-
20	Lube oil fine filter (main circuit): number of elements per unit		4	-
56	Lube-oil fine filter (main flow), particle size 1		10	µm
57	Lube-oil fine filter (main flow), filtering efficiency re 1		26	%
58	Lube-oil fine filter (main flow), particle size 2		15	µm
59	Lube-oil fine filter (main flow), filtering efficiency re 2		50	%
60	Lube-oil fine filter (main flow), particle size 3		20	µm
61	Lube-oil fine filter (main flow), filtering efficiency re 3		75	%
32	Lube oil fine filter (main circuit): pressure differential, max.	L	2	bar

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11. Fuel system

No.	Description	Index	Value	Unit
1	Fuel pressure at fuel feed connection, min. (when engine is starting)	L	-0.5	bar
2	Fuel pressure at fuel feed connection, max. (when engine is starting)	L	0.5	bar
37	Fuel supply flow, max.	A	5.7	liter/min
8	Fuel return flow, max.	A	5.5	liter/min
10	Fuel pressure at return connection on engine, max.	L	<0.4	bar
18	Fuel fine filter (main circuit): number of units	A	1	-
19	Fuel fine filter (main circuit): number of elements per unit	A	1	-
68	Fuel fine filter, particle size 1		4	µm
69	Fuel fine filter, filtering efficiency re 1		99.5	%
70	Fuel fine filter, particle size 2		6	µm
71	Fuel fine filter, filtering efficiency re 2		99.8	%
72	Fuel fine filter, particle size 3		14	µm
73	Fuel fine filter, filtering efficiency re 3		99.8	%
21	Fuel fine filter (main circuit): pressure differential, max.	L	2	bar

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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	-20	°C
2	Additional condition (to case A): engine coolant temperature	R	-20	°C
3	Additional condition (to case A): lube oil temperature	R	-20	°C
4	Additional condition (to case A): lube oil viscosity	R	10W40	SAE
9	Cold start capability: air temperature (w/o starting aid, w/ preheating) - (case C)	R	-40	°C
10	Additional condition (to case C): engine coolant temperature	R	-40	°C
11	Additional condition (to case C): lube oil temperature	R	-40	°C
12	Additional condition (to case C): lube oil viscosity	R	10W40	SAE
21	Coolant preheating, heater performance (standard)	R	3	kW
22	Coolant preheating, preheating temperature (min.)	L	32	°C
28	Breakaway torque (without driven machinery) coolant temperature +5°C	R	720	Nm
30	Breakaway torque (without driven machinery) coolant temperature +40°C	R	430	Nm
29	Cranking torque at firing speed (without driven machinery) coolant temperature +5°C	R	360	Nm
31	Cranking torque at firing speed (without driven machinery) coolant temperature +40°C	R	225	Nm
96	Starting is blocked if the engine coolant temperature is below		-20	°C
37	High idling speed, max. (static)	L	1560	rpm

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Technical Sales Document

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Name	10V1600G10F	**Speed [rpm]**	1500
Application Group	3B	**Nominal power [kW]**	407
Dataset	Ref. 25°C/- (1)	**Nominal power [bhp]**	546
		Nominal power [kVA]	-
		Nominal power [kWel]	-
		Frequency [Hz]	50

Exhaust Regulations Indien ARAI/2004 Stage I; Fuel-consumption optimized; NEA Singapore for ORDE;

38	Limit speed for overspeed alarm / emergency shutdown	L	1800	rpm
42	Firing speed, from	R	80	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)	R	60	°C
48	Minimum continuous load	R	20	%
50	Engine mass moment of inertia (without flywheel)	R	2.116	kgm²
52	Standard flywheel mass moment of inertia	R	1.44	kgm²
1982	Block bending moment - SAE 1	R	3	kNm
51	Engine mass moment of inertia (with standard flywheel)	R	3.556	kgm²
109	Speed droop (with electronic governor) adjustable P1	R	4	%
110	Speed droop (with electronic governor) adjustable P2	R	0.4	%
95	Number of starter ring-gear teeth on engine flywheel		157	-

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Exhaust Regulations Indien ARAI/2004 Stage I; Fuel-consumption optimized; NEA Singapore for ORDE;

13. Starting (electric)

No.	Description	Index	Value	Unit
2309	Manufacturer		Prestolite	-
2310	Number of starter		1	-
2312	Starter electrically redundant		-	-
2313	Rated power per starter	R	7.5	kW
2314	Starter, rated voltage	R	24	V=
2315	Rated short-circuit current per starter	L	1730	A
3000	Power consumption per starter (at an engine speed of 100 rpm, SAE0)	R	400	A
3002	Power consumption per starter (at an engine speed of 100 rpm, SAE1)	R	540	A
2317	Internal resistance of power supply + line resistance per starter	A	0.008	Ohm
2318	Manufacturer		Prestolite	-
2319	Number of starter		1	-
2320	Starter electrically redundant		X	-
2321	Rated power per starter	R	7.5	kW
2322	Starter, rated voltage	R	24	V=
2323	Rated short-circuit current per starter	L	1730	A
3001	Power consumption per starter (at an engine speed of 100 rpm, SAE0)	R	400	A
3003	Power consumption per starter (at an engine speed of 100 rpm, SAE1)	R	540	A
2325	Internal resistance of power supply + line resistance per starter	A	0.008	Ohm
2326	Manufacturer		Prestolite	-
2327	Number of starter		2	-
2328	Starter electrically redundant		-	-

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		Nominal power [kWel]	-
		Frequency [Hz]	50

Exhaust Regulations Indien ARAI/2004 Stage I; Fuel-consumption optimized; NEA Singapore for ORDE;

2329	Rated power per starter	R	7.5	kW
2330	Starter, rated voltage	R	24	V=
2331	Rated short-circuit current per starter	L	1730	A
3251	Power consumption per starter (at an engine speed of 100 rpm, SAE0)	R	400	A
3252	Power consumption per starter (at an engine speed of 100 rpm, SAE1)	R	540	A
2333	Internal resistance of power supply + line resistance per starter	A	0.008	Ohm
2347	Generally valid data for starter		X	-
2342	Rated starting-attempt Duration (at +20°C ambient temperature with battery full)	R	3	s
2343	Interval between starts (at rated starting-attempt duration)	R	5	s
2345	Maximum acceptable starting-attempt duration	L	15	s
2344	Interval between starts (when starting-attempt duration > rated starting-attempt duration)	R	60	s
2346	Starting attempts within 30 minutes (at +20°C ambient temperature with battery full)	R	6	-

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Exhaust Regulations	Indien ARAI/2004 Stage I; Fuel-consumption optimized; NEA Singapore for ORDE;		

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	15	degrees (°)
17	Longitudinal inclination, continuous max. driving end up (Option: max. operating inclinations)	L	15	degrees (°)
19	Transverse inclination, continuous max. (Option: max. operating inclinations)	L	15	degrees (°)

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Exhaust Regulations	Indien ARAI/2004 Stage I; Fuel-consumption optimized; NEA Singapore for ORDE;		

18. Capacities

No.	Description	Index	Value	Unit
1	Engine coolant capacity (without cooling equipment)	R	60 *	liter
11	On-engine fuel capacity	R	3 *	liter
14	Engine oil capacity, initial filling (standard oil system) (Option: max. operating inclinations)	R	60.5	liter
20	Oil change quantity, max. (standard oil system) (Option: max. operating inclinations)	R	53	liter
28	Oil pan capacity, dipstick mark min. (standard oil system) (Option: max. operating inclinations)	L	46	liter
29	Oil pan capacity, dipstick mark max. (standard oil system) (Option: max. operating inclinations)	L	53	liter

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19. Weights / dimensions

No.	Description	Index	Value	Unit
7	Engine dry weight (with engine-mounted standard accessories, without coupling)	R	1694 *	kg
12	Engine weight, wet (with engine-mounted standard accessories, without coupling)	R	1752	kg

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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	1500	rpm

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		Nominal power [kVA]	-
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		Frequency [Hz]	50
Exhaust Regulations	Indien ARAI/2004 Stage I; Fuel-consumption optimized; NEA Singapore for ORDE;		

21. Exhaust emissions

No.	Description	Index	Value	Unit
2005	Emissions data sheet: NEA Singapore for ORDE		EDS16000124	-
1960	Emissions data sheet: India ARAI/2004 Stage I		EDS16000069	-
1972	Emissions data sheet: Fuel-consumption optimized		EDS16000070	-

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22. Acoustics

No.	Description	Index	Value	Unit
101	Exhaust noise, unsilenced - CP (free-field sound-pressure level Lp, 1m distance, ISO 6798, +3dB(A) tolerance)	R	109	dB(A)
201	Exhaust noise, unsilenced - CP (sound power level LW, ISO 6798, +3dB(A) tolerance)	R	121	dB(A)
102	Exhaust noise, unsilenced - FSP (free-field sound-pressure level Lp, 1m distance, ISO 6798, +3dB(A) tolerance)	R	109	dB(A)
202	Exhaust noise, unsilenced - FSP (sound power level LW, ISO 6798, +3dB(A) tolerance)	R	122	dB(A)
103	Exhaust noise, unsilenced - FSP (free-field sound-pressure level Lp, 1m distance, ISO 6798) Spectrum No.	R	N	-
203	Exhaust noise,unsilenced - CP (sound power level LW, ISO 6798) Spectrum No.	R	-	-
109	Engine surface noise with attenuated intake noise (filter) - CP (free-field sound-pressure level Lp, 1m distance, ISO 6798, +2dB(A) tolerance)	R	-	dB(A)
209	Engine surface noise with attenuated intake noise (filter) - CP (sound power level LW, ISO 6798, +2dB(A) tolerance)	R	-	dB(A)
111	Engine surface noise with attenuated intake noise (filter) - CP (free-field sound-pressure level Lp, 1m distance, ISO 6798) Spectrum No.	R	-	-

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Exhaust Regulations Indien ARAI/2004 Stage I; Fuel-consumption optimized; NEA Singapore for ORDE;

211	Engine surface noise with attenuated intake noise (filter) - CP (sound power level LW, ISO 6798) Spectrum No.	R	-	-
113	Engine surface noise with attenuated intake noise (intake silencer) - CP (free-field sound-pressure level Lp, 1m distance, ISO 6798, +2dB(A) tolerance)	R	100	dB(A)
114	Engine surface noise with attenuated intake noise (intake silencer) - FSP (free-field sound-pressure level Lp, 1m distance, ISO 6798, +2dB(A) tolerance)	R	101	dB(A)
125	Structure borne noise at engine mounting brackets in vertical direction above resilient engine mounts - CP Spectrum No.	R	-	-
126	Structure borne noise at engine mounting brackets in vertical direction above resilient engine mounts - FSP Spectrum No.	R	-	-

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