

Technical data TAD941GE – Preliminary

General

In-line four stroke diesel engine with direct injection. Rotation direction, anti-clockwise viewed towards flywheel. Turbocharged

| | | | |
|---------------------|---------------------------------------|-----------------|-------------|
| Number of cylinders | | | 6 |
| Displacement, total | | litre | 9,36 |
| | | in ³ | 571,4 |
| Firing order | | | 1-5-3-6-2-4 |
| Bore | | mm | 120 |
| | | in | 4,72 |
| Stroke | | mm | 138 |
| | | in | 5,43 |
| Compression ratio | | | 17,4 |
| Dry weight | Engine only, excluding cooling system | kg | 1015 |
| | | lb | 2238 |
| | GenPac | kg | 1354 |
| | | lb | 2985 |
| Wet weight | Engine only, excluding cooling system | kg | 1065 |
| | | lb | 2348 |
| | GenPac | kg | 1404 |
| | | lb | 3095 |

| Performance | | r/min | 1500 | 1800 |
|-----------------------------|---------------|--------|------|------|
| Standby Power | without fan | kW | 323 | 351 |
| | | hp | 439 | 477 |
| | with fan | kW | 308 | 326 |
| | | hp | 419 | 443 |
| Prime Power | without fan | kW | 295 | 321 |
| | | hp | 401 | 437 |
| | with fan | kW | 280 | 296 |
| | | hp | 381 | 403 |
| Torque at: | Standby Power | Nm | 2056 | 1862 |
| | | lbft | 1517 | 1373 |
| | Prime Power | Nm | 1878 | 1705 |
| | | lbft | 1385 | 1257 |
| Mean piston speed | | m/s | 6,9 | 8,3 |
| | | ft/sec | 22,7 | 27,2 |
| Effective mean pressure at: | Standby Power | MPa | 2,8 | 2,5 |
| | | psi | 400 | 362 |

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| | | | | |
|---------------------------------------|---------------|-------------------|-------|-------|
| Effective mean pressure at: | Prime Power | MPa | 2,5 | 2,3 |
| | | psi | 366 | 332 |
| Max combustion pressure at: | Standby Power | MPa | 19,1 | 19,1 |
| | | psi | 2770 | 2770 |
| Max combustion pressure at: | Prime Power | MPa | 17,5 | 17,7 |
| | | psi | 2538 | 2567 |
| Total mass moment of inertia, J (mR2) | | kgm ² | 2,60 | |
| | | lbft ² | 61,7 | |
| Degree of irregularity at: | Standby Power | | 0,5% | 0,5% |
| | Prime Power | | 0,5% | 0,5% |
| Friction Power | | kW | 28 | 38 |
| | | hp | 38,08 | 51,68 |

Engine noise emission

Test Standards: ISO 3744-1981 (E) sound power (without fan, intake and exhaust noise)

Tolerans ± 0.75 dB(A)

| | | r/min | 1500 | 1800 |
|---|---------------|-------|-------|-------|
| Measured sound power L _w | No load | dB(A) | 111,1 | 112,8 |
| | Standby Power | dB(A) | 113,7 | 115,7 |
| | Prime Power | dB(A) | | |
| Calculated sound pressure L _p at 1 m | No load | dB(A) | | |
| | Standby Power | dB(A) | | |
| | Prime Power | dB(A) | | |

Unsilenced exhaust noise

Data calculated as sound pressure L_p.

Assumed microphone distance 1 m

| | r/min | 1500 | 1800 |
|---------------|-------|------|------|
| Standby Power | dB(A) | 114 | 118 |
| Prime Power | dB(A) | 114 | 117 |

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Test conditions for load acceptance data

| | | | |
|--------------|-----------|---------|-------------|
| Warm engine. | Generator | Modell | Type of AVR |
| | Stamford | HCI444F | SX440 AVR |

Load acceptance performance can vary due to actual alternator inertia, voltage regulator, type of load and local ambient conditions.

Single step load performance at 1500 rpm

| Load (%) | Speed diff (%) | | Recovery time (s) | | Remaining load (%) | Speed diff (%) | | Recovery time (s) | |
|----------|----------------|---------|-------------------|---------|--------------------|----------------|---------|-------------------|---------|
| | Prime | Standby | Prime | Standby | | Prime | Standby | Prime | Standby |
| 0-20 | 2,5 | 2,5 | 1,5 | 1,5 | 20-100 | 24,5 | 31,5 | 3,5 | 3,6 |
| 0-40 | 4,0 | 4,3 | 1,2 | 1,5 | 40-100 | 10,2 | 12,8 | 2,3 | 2,2 |
| 0-50 | 5,5 | 5,5 | 1,8 | 1,8 | 50-100 | 6,0 | 8,6 | 1,8 | 2,1 |
| 0-60 | 12,0 | 16,7 | 2,5 | 2,8 | 60-100 | 3,8 | 4,2 | 1,6 | 1,3 |
| 0-x | | | | | x-100 | | | | |
| 0-x | | 7,0 | | | x-100 | | | | |
| 100-0 | 8,3 | 9,1 | 2,2 | 2,1 | | | | | |

Single step load performance at 1800 rpm

| Load (%) | Speed diff % | | Recovery time (s) | | Remaining load (%) | Speed diff (%) | | Recovery time (s) | |
|----------|--------------|---------|-------------------|---------|--------------------|----------------|---------|-------------------|---------|
| | Prime | Standby | Prime | Standby | | Prime | Standby | Prime | Standby |
| 0-20 | 2,0 | 1,9 | 1,4 | 1,6 | 20-100 | 6,6 | 8,2 | 1,8 | 3,3 |
| 0-40 | 2,7 | 3,2 | 1,6 | 1,7 | 40-100 | 3,9 | 4,7 | 1,5 | 1,0 |
| 0-60 | 5,0 | 6,3 | 0,8 | 1,2 | 60-100 | 2,2 | 2,3 | 1,7 | 2,0 |
| 0-80 | 9,4 | 14,7 | 2,6 | 3,0 | 80-100 | 1,5 | 1,1 | 2,1 | 1,8 |
| 0-65 | 6,7 | | 0,9 | | x-100 | 1,9 | | 1,8 | |
| 0-63 | | 7,0 | | 2,3 | x-100 | | 2,3 | | 1,9 |
| 100-0 | 4,3 | 6,3 | 1,6 | 1,6 | | | | | |

Cold start performance

| | | r/min | 1500 | 1800 |
|--|----|-------|------|------|
| Time from start to no load speed at ambient temperature: | °C | 20 | s | |
| | | 5 | s | |
| | | -8* | s | 9,0 |
| Time from start to stay within 0.5% of no load speed at ambient temperature: | °C | 20 | s | |
| | | 5 | s | |
| | | -15* | s | |

* With manifold heater 4 kW engaged, lubrication oil 15W/40 and block heater.

| | | | | |
|---------------------------|-----------------|------------------|---------------|---------------------------------|
| Usage of manifold heater: | Time preheating | Time postheating | | |
| | 25 sec | 100 sec | | |
| Block heater type | Make | Power kW | Engaged hours | Cooling water temp engine block |
| Block mounted | Calix | 1,5 kW | | |

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| Lubrication system | | r/min | 1500 | 1800 |
|--|----------------------------------|------------|-----------|-------|
| Lubricating oil consumption | Standby Power | liter/h | 0,04 | 0,04 |
| | | US gal/h | 0,010 | 0,011 |
| | Prime Power | liter/h | 0,04 | 0,04 |
| | | US gal/h | 0,009 | 0,010 |
| Oil system capacity including filters | | liter | 35 | |
| | | US gal | 9,2 | |
| Oil sump capacity: | | max | liter | 30 |
| | | | US gal | 7,9 |
| | | min | liter | 22 |
| | | | US gal | 5,8 |
| Oil change intervals/ specifications: | VDS-2* | | h | 600 |
| | VDS, ACEA, E3* | | h | 400 |
| | ACEA E2, API CD, CF, CF-4, CG-4* | | h | 250 |
| Engine angularity limits: | | front up | ° | 30 |
| | | front down | ° | 30 |
| | | side tilt | ° | 30 |
| Oil pressure at rated speed | | kPa | 350 - 600 | |
| | | psi | 51 - 87 | |
| Lubrication oil temperature in oil sump: | | max | °C | 125 |
| | | | °F | 257 |
| Oil filter micron size | | mm | 0,040 | |

* See also general section in the sales guide

| Fuel system | | r/min | 1500 | 1800 |
|-------------------------------|------|--------|-------|-------|
| Standby Power | | | | |
| Specific fuel consumption at: | 25% | g/kWh | 226 | 238 |
| | | lb/hph | 0,366 | 0,386 |
| | 50% | g/kWh | 205 | 210 |
| | | lb/hph | 0,332 | 0,340 |
| | 75% | g/kWh | 200 | 203 |
| | | lb/hph | 0,324 | 0,329 |
| | 100% | g/kWh | 204 | 207 |
| | | lb/hph | 0,331 | 0,336 |

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| Prime Power Specific fuel consumption at: | 25% | g/kWh | 230 | 242 |
|--|------|--------|-------|-------|
| | | lb/hph | 0,373 | 0,392 |
| | 50% | g/kWh | 208 | 214 |
| | | lb/hph | 0,337 | 0,347 |
| | 75% | g/kWh | 200 | 204 |
| | | lb/hph | 0,324 | 0,331 |
| | 100% | g/kWh | 202 | 205 |
| | | lb/hph | 0,327 | 0,332 |

| Fuel system | r/min | 1500 | 1800 |
|---|--|-------|------|
| Fuel to conform to | ASTM-D975-No1 and 2-D JIS KK 2204, EN 590 | | |
| System return flow | liter/h | 36 | |
| | US gal/h | 9,5 | |
| System supply flow at rated speed | liter/h | 108,0 | |
| | US gal/h | 28,5 | |
| Fuel supply line max restriction | kPa | 10,0 | |
| | psi | 1,5 | |
| Fuel supply line max pressure, engine stopped | kPa | 0,0 | |
| | psi | | |
| Fuel return line max restriction | kPa | 20,0 | |
| | psi | 2,9 | |
| Maximum allowable inlet fuel temp | °C | 50 | |
| | °F | 122 | |
| Prefilter / Water separator | mm | 0,005 | |
| Governor type/make, standard | Electronic / EMS2 | | |
| Injection pump type/make | Unit injector / Delphi | | |
| Injection timing std. | °B.T.D.C | | |
| Injection timing | °B.T.D.C | | |

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| Intake and exhaust system | | r/min | 1500 | 1800 |
|---|---------------|------------------------------|-------|-------|
| Air consumption at: | Standby Power | m ³ /min | 19,6 | 23,8 |
| | | cfm | 692 | 840 |
| | Prime Power | m ³ /min | 17,7 | 22 |
| | | cfm | 625 | 777 |
| Air intake restriction, clean filter(s) | | kPa | 2 | 2 |
| | | in wc | 8,0 | 8,0 |
| Max allowable air intake restriction | | kPa | 5 | 5 |
| | | in wc | 20,1 | 20,1 |
| Air filter type | | Single stage paper cartridge | | |
| Air filter cleaning efficiency | | % | 99,85 | |
| Heat rejection to exhaust at: | Standby Power | kW | 239 | 260 |
| | | BTU/min | 13592 | 14786 |
| | Prime Power | kW | 224 | 230 |
| | | BTU/min | 12739 | 13080 |
| Exhaust gas temperature after turbine at: | Standby Power | °C | 539 | 494 |
| | | °F | 1002 | 921 |
| | Prime Power | °C | 519 | 467 |
| | | °F | 966 | 873 |
| Max allowable back pressure in exhaust line | | kPa | 10 | 10 |
| | | In wc | 40,2 | 40,2 |
| Exhaust gas flow at: | Standby Power | m ³ /min | 52,2 | 59,2 |
| | | cfm | 1843 | 2091 |
| | Prime Power | m ³ /min | 46,5 | 53,1 |
| | | cfm | 1642 | 1875 |

| Cooling system | | r/min | 1500 | 1800 |
|--|---|----------------|------|------|
| Heat rejection radiation from engine at: | Standby Power | kW | 10 | 13 |
| | | BTU/min | 569 | 739 |
| | Prime Power | kW | 9 | 12 |
| | | BTU/min | 512 | 682 |
| Heat rejection to coolant at: | Standby Power | kW | 137 | 141 |
| | | BTU/min | 7791 | 8019 |
| | Prime Power | kW | 129 | 132 |
| | | BTU/min | 7336 | 7507 |
| Coolant | Volvo coolant or Volvo anticorrosion additive together with clean fresh water | | | |
| Radiator cooling system type | | Closed circuit | | |

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| | | | | |
|--|-------------------------|--------------------------------------|-------------|------|
| Standard radiator core area | | m ² | 0,8 | |
| | | foot ² | 8,61 | |
| Standard radiator core thickness | | mm | 52 | |
| | | in | 2,05 | |
| Fan diameter | | mm | 890 | |
| | | in | 35,04 | |
| Fan power consumption | | kW | 15 | 25 |
| | | hp | 20 | 34 |
| Fan drive ratio | | | 1:1,08 | |
| Coolant capacity, | engine | liter | 17 | |
| | | US gal | 4,49 | |
| | std radiator with hoses | liter | 24 | |
| | | US gal | 6,34 | |
| Coolant pump | | drive/ratio | belt/1,50:1 | |
| Coolant flow with standard system | | l/s | 5,5 | 6,5 |
| | | US gal/s | 1,45 | 1,72 |
| Minimum coolant flow | | l/s | 5,3 | 6,2 |
| | | US gal/s | 1,40 | 1,64 |
| Maximum external coolant system restriction, including piping | | kPa | 50 | 55 |
| | | in wc | 201 | 221 |
| Thermostat | start to open | °C | 82 | |
| | | °F | 180 | |
| | fully open | °C | 92 | |
| | | °F | 198 | |
| Maximum static pressure head (expansion tank height + pressure cap setting) | | kPa | 100 | |
| | | in wc | 401 | |
| Minimum static pressure head (expansion tank height + pressure cap setting) | | kPa | 70 | |
| | | in wc | 281 | |
| Standard pressure cap setting | | kPa | 70 | |
| | | in wc | 281 | |
| Maximum top tank temperature | | °C | 103 | |
| | | °F | 217 | |
| Minimum temperature entering engine | | °C | 68 | |
| | | °F | 154 | |
| Draw down capacity | | 10% of total cooling system capacity | | |

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| Intercooler system | | r/min | 1500 | 1800 |
|---|---------------|-------------------|-------|------|
| Cooling power | Standby Power | kW | 62 | 77 |
| | | BTU/min | 3526 | 4379 |
| | Prime Power | kW | 53 | 68 |
| | | BTU/min | 3014 | 3867 |
| | | kW | | |
| | | BTU/min | | |
| Combustion air mass flow | Standby Power | kg/s | 0,39 | 0,47 |
| | Prime Power | kg/s | 0,36 | 0,45 |
| | | kg/s | | |
| Combustion air inlet temp. | Standby Power | °C | 208 | 215 |
| | | °F | 406 | 419 |
| | Prime Power | °C | 194 | 199 |
| | | °F | 381 | 390 |
| | | °C | | |
| | | °F | | |
| Combustion air outlet temp. | Standby Power | °C | 57 | 58 |
| | | °F | 135 | 136 |
| | Prime Power | °C | 54 | 55 |
| | | °F | 129 | 131 |
| Maximum pressure droop over intercooler, incl. piping | | kPa | 5 | |
| | | psi | 0,73 | |
| Boost pressure | | kPa | 250 | |
| | | psi | 36,26 | |
| Standard intercooler core area | | m ² | 0,89 | |
| | | foot ² | 9,58 | |
| Standard intercooler core thickness | | mm | 68 | |
| | | in | 2,68 | |

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Cooling performance Fan ratio 1:1,08

Cooling air flow and external restriction at different radiator air temperatures based on 103°C TTT and 50% antifreeze (radiator and cooling fan, see optional equipment)

| Engine speed rpm | Air on temp °C | PRIME POWER | | STANDBY POWER | |
|------------------|----------------|---------------|-------------------------|---------------|-------------------------|
| | | Air flow kg/s | External restriction Pa | Air flow kg/s | External restriction Pa |
| 1500 | 30 | 4,0 | 1410 | 4,3 | 1300 |
| | 40 | 4,5 | 1230 | 4,9 | 1090 |
| | 50 | 5,3 | 930 | 5,9 | 730 |
| | 55 | 5,9 | 710 | 6,5 | 460 |
| | 60 | 6,6 | 410 | 7,3 | 110 |
| | 61 | - | - | 7,6 | 0 |
| | 65 | 7,6 | 0 | | |
| 1800 | 30 | 4,5 | 2140 | 4,9 | 2010 |
| | 40 | 5,1 | 1920 | 5,5 | 1750 |
| | 50 | 5,9 | 1560 | 6,5 | 1320 |
| | 55 | 6,5 | 1300 | 7,2 | 1010 |
| | 60 | 7,3 | 950 | 8,1 | 590 |
| | 65 | - | - | 9,3 | 0 |
| | 68 | 9,3 | 0 | | |

Cooling performance Fan ratio 1:1,01

Cooling air flow and external restriction at different radiator air temperatures based on 103°C TTT and 50% antifreeze (radiator and cooling fan, see optional equipment)

| Engine speed rpm | Air on temp °C | PRIME POWER | | STANDBY POWER | |
|------------------|----------------|---------------|-------------------------|---------------|-------------------------|
| | | Air flow kg/s | External restriction Pa | Air flow kg/s | External restriction Pa |
| 1500 | 30 | 3,8 | 1180 | 4,2 | 1070 |
| | 40 | 4,4 | 1000 | 4,8 | 870 |
| | 50 | 5,2 | 720 | 5,7 | 510 |
| | 55 | 5,7 | 500 | 6,4 | 250 |
| | 59 | - | - | 7,0 | 0 |
| | 60 | 6,5 | 210 | | |
| | 63 | 7,0 | 0 | | |
| 1800 | 30 | 4,3 | 1800 | 4,7 | 1680 |
| | 40 | 4,9 | 1590 | 5,4 | 1420 |
| | 50 | 5,8 | 1240 | 6,4 | 1010 |
| | 55 | 6,4 | 990 | 7,1 | 710 |
| | 60 | 7,2 | 640 | 8,0 | 300 |
| | 63 | | - | 8,6 | 0 |
| | 66 | 8,6 | 0 | | |

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Engine management system

| Functionality | Alternatives | Default setting |
|-----------------------|--|-------------------------|
| Governor mode | Isochronous/droop Switchable during operation | Isochronous |
| Governor droop | 0 - 8% | 0 % (4 % when switched) |
| Governor response | NA | NA |
| Dual speed | 1500 / 1800 rpm | According to customer |
| Idle speed | 600 - 1200 rpm | 900 rpm |
| Fine speed adjustment | NA | ±120 rpm |
| Stop function | Energized to run / stop | Energized to stop |
| Preheating function | On ignition / Preheat on request | Preheat on request |
| Lamp test | ON/OFF | ON |

| Engine protection | | Alarm level | | Engine protection | |
|--------------------------------------|--------------|------------------------------|------------------------|--------------------|---|
| Parameter | Unit | Setting range | Default setting | Level | Action. Default/ Alternative |
| Oil temp | °C | 120 - 130 | 125 | Setting +3 | Shut down. ON/OFF |
| Oil pressure | Low idle | kPa | NA | 130 | Shut down. ON/OFF |
| | 1500 rpm | kPa | NA | 220 | Shut down. ON/OFF |
| | 1800 rpm | kPa | NA | 270 | Shut down. ON/OFF |
| Oil level | | NA | Low level | Low level | Shut down. ON/OFF |
| Piston cooling pressure >1000 rpm | kPa | NA | NA | NA | NA |
| Coolant temp | °C | 95 - 103 | 98 | Setting +5 | Shut down. ON/OFF |
| Coolant level | | NA | Low level | Low level | Shut down. ON/OFF |
| Fuel feed pressure | Low idle | kPa | NA | NA | NA |
| | >1400 rpm | | NA | 300 | NA |
| Water in fuel | | NA | Water in fuel | NA | NA |
| Crank case pressure | kPa | NA | Increased pressure | Increased pressure | Shut down. ON/OFF |
| Air filter pressure droop | kPa | NA | NA | NA | NA |
| Altitude, above sea | m | NA | | | Automatic derating, see section derating |
| Charge air temp | °C | NA | | | Shut down. ON/OFF |
| Charge air pressure | kPa | NA | 380 | 380 | Shut down. ON/OFF |
| Engine speed | rpm | 100 - 120% of rated speed | 120% of rated speed | Alarm level | Shut down. OFF/ON |
| | | | | | |

Derating NB! If applicable, describe derating according to the engine control system's functionality.

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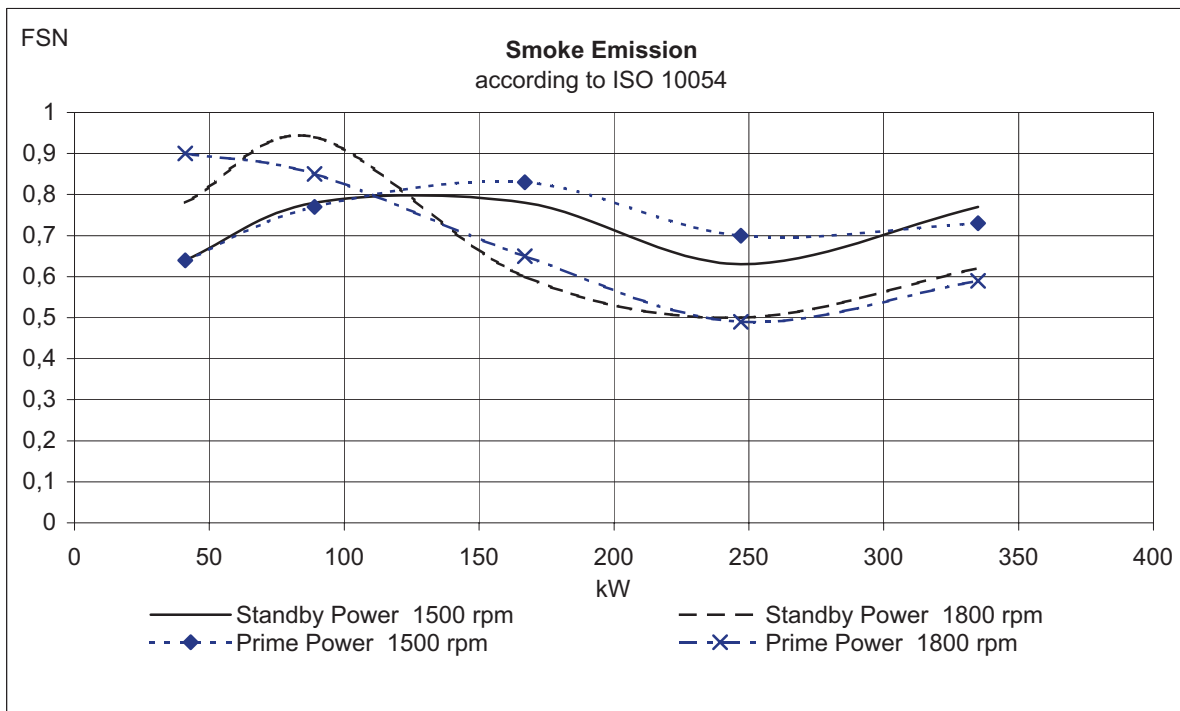
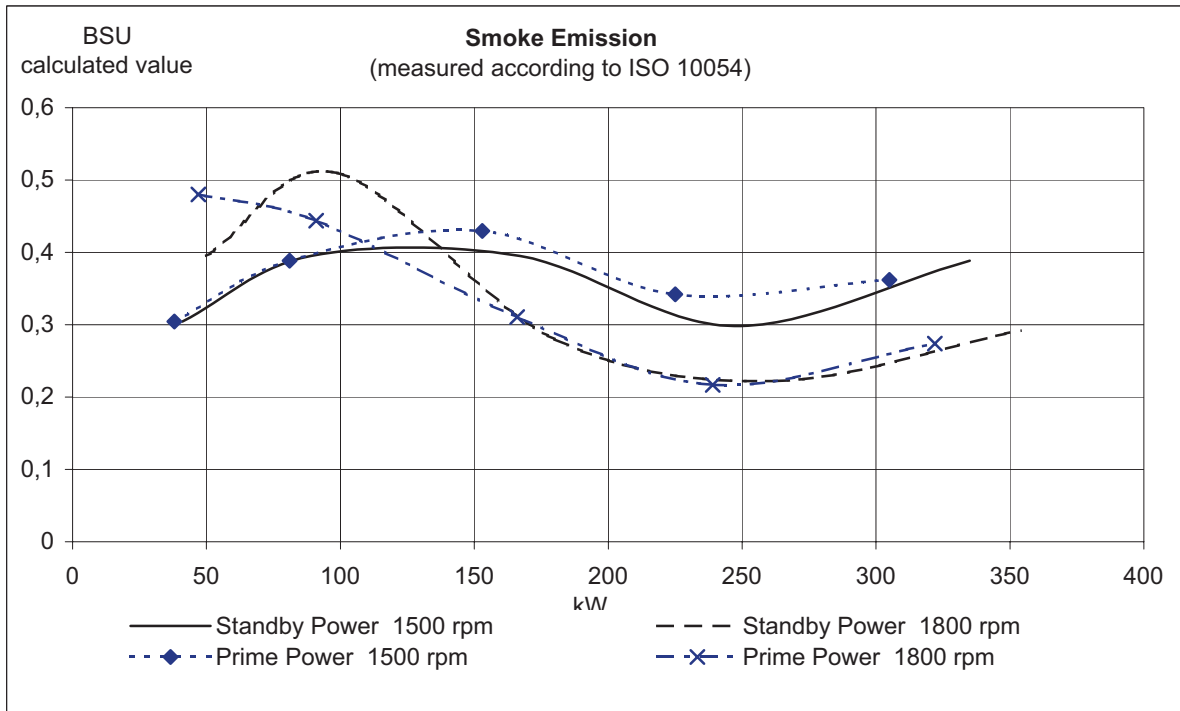
| Electrical system | | r/min | 1500 | 1800 |
|-------------------------------------|---------------|----------------------------|----------------|------|
| Voltage and type | | 24V / insulated from earth | | |
| Alternator: | make/output | Amp | Bosch/80 | |
| | tacho output | Hz/alt. Rev | 6 | |
| | drive ratio | | 4,5 | |
| Starter motor | | make | Melco | |
| | | type | 90P55 | |
| | | kW | 5,5 | |
| Starter motor solenoid, | pull current | Amp | N/A | |
| | hold current | Amp | 2 | |
| Number of teeth on: | flywheel | | 153 | |
| | starter motor | | 11 | |
| Inrush current at +20°C | | Amp | 1000 | |
| Cranking current at +20°C | | Amp | | |
| Crank engine speed at 20°C | | rpm | 140 | |
| Starter motor battery capacity: | max | Ah | 2x225 700A DIN | |
| | min at +5°C | Ah | 2x170 600A DIN | |
| Inlet manifold heater (at 20 V) | | kW | 4,0 | |
| Power relay for the manifold heater | | Amp | 1 | |

| Power take off | | r/min | 1500 | 1800 |
|--|-----------|------------------|---------------|------|
| Front end in line with crank shaft max: | | Nm lbft | TVC necessary | |
| Front end belt pulley load. Direction of load viewed from flywheel side: | max left | kW | 53 | 54 |
| | | hp | 72 | 73 |
| | max down | kW | 248 | 316 |
| | | hp | 337 | 430 |
| | max right | kW | 43 | 69 |
| | | hp | 58 | 94 |
| Timing gear at compressor PTO max: | | Nm lbft | 150 111 | |
| Speed ratio direction of rotation viewed from flywheel side | | 1,29:1/clockwise | | |
| Timing gear at servo pump PTO max: | | Nm lbft | | |
| Speed ratio direction of rotation viewed from flywheel side | | 1,58:1/clockwise | | |
| Timing gear at hydraulic pump PTO max: | | Nm lbft | | |
| Speed ratio direction of rotation viewed from flywheel side | | | | |

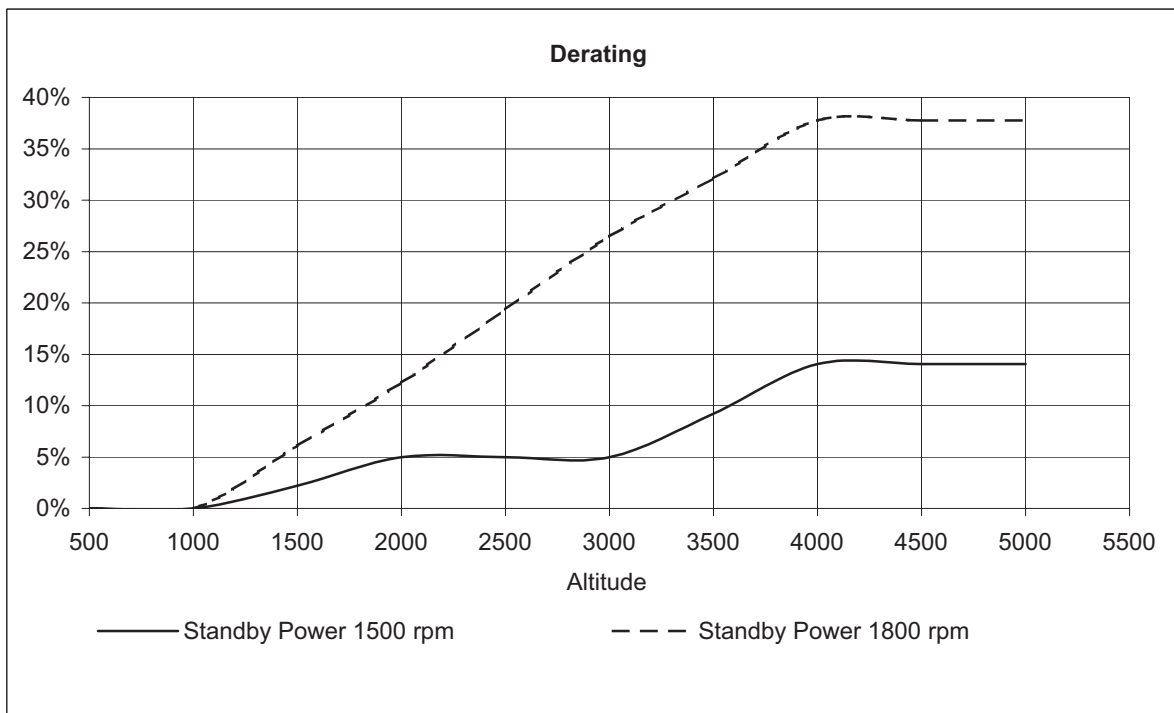
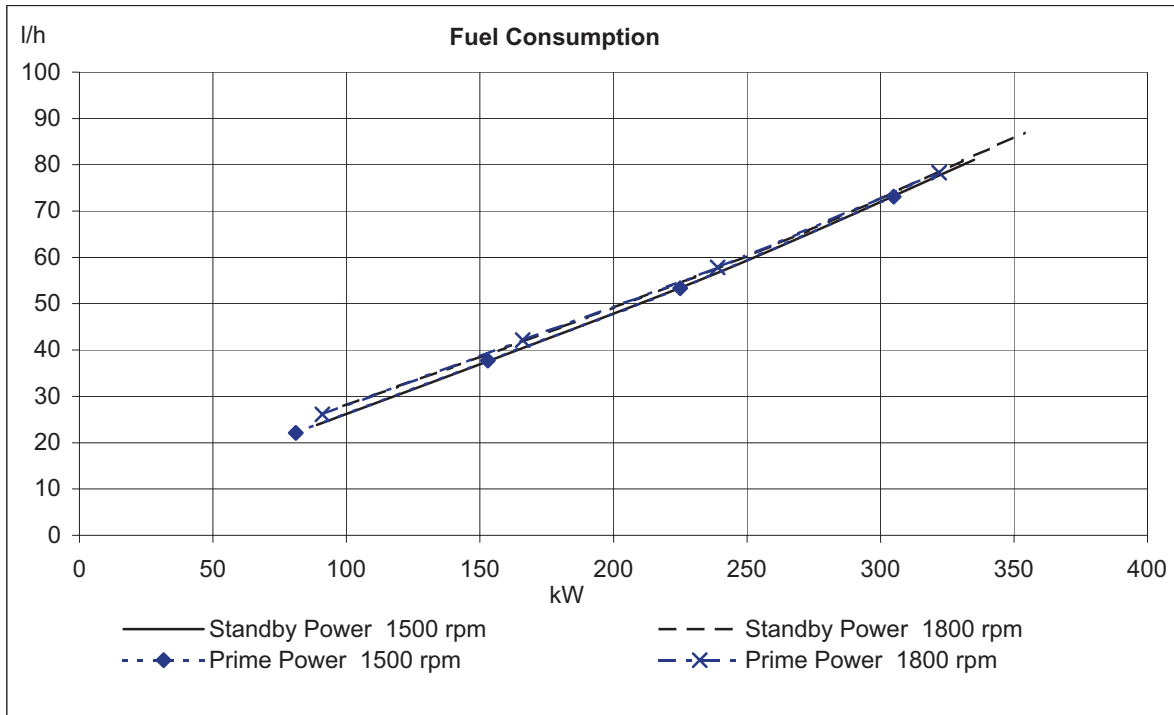
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| | | |
|--|------|--------|
| Max allowed bending torque in flywheel housing | Nm | 7000 |
| | lbft | 5163 |
| Max. rear main bearing load (0,1 m from center of bearing) Direction down | N | 18460 |
| | lbf | 4150,0 |

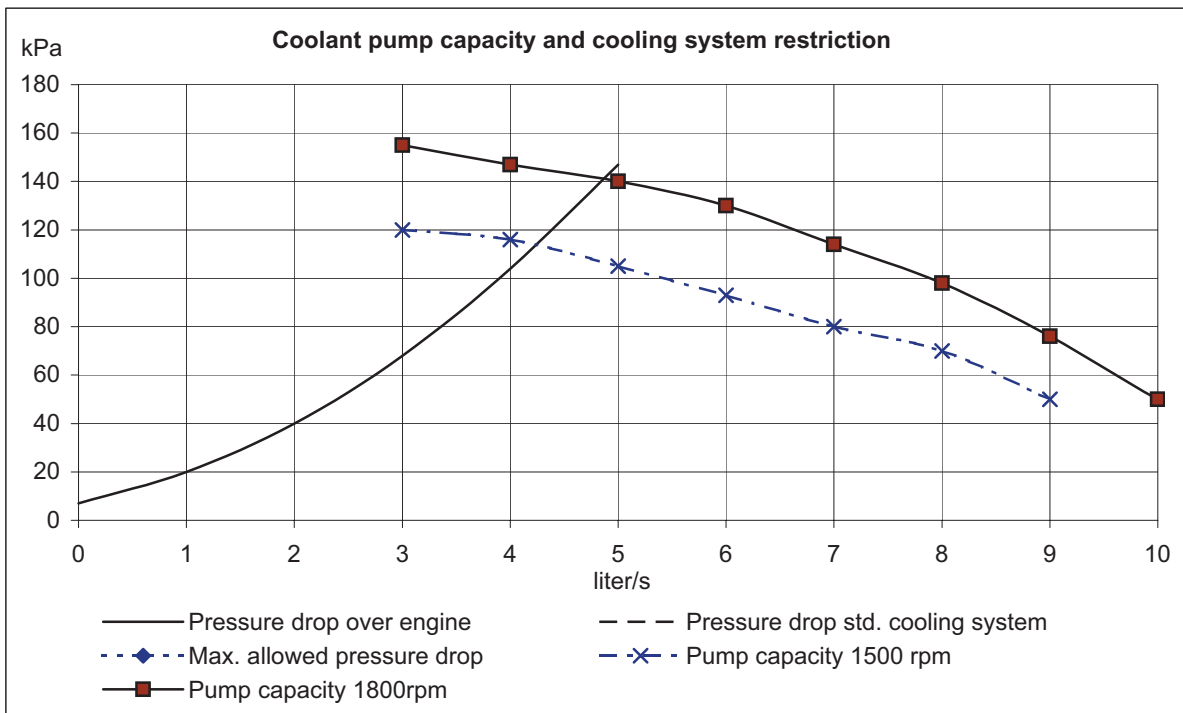
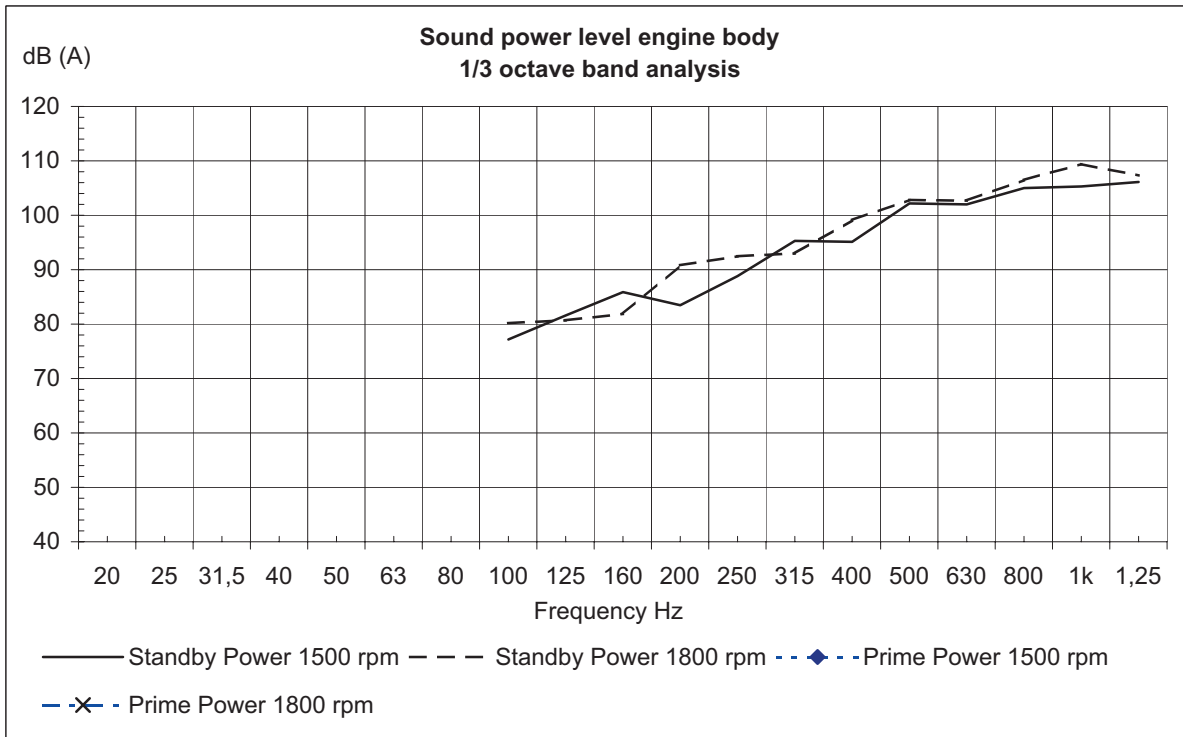
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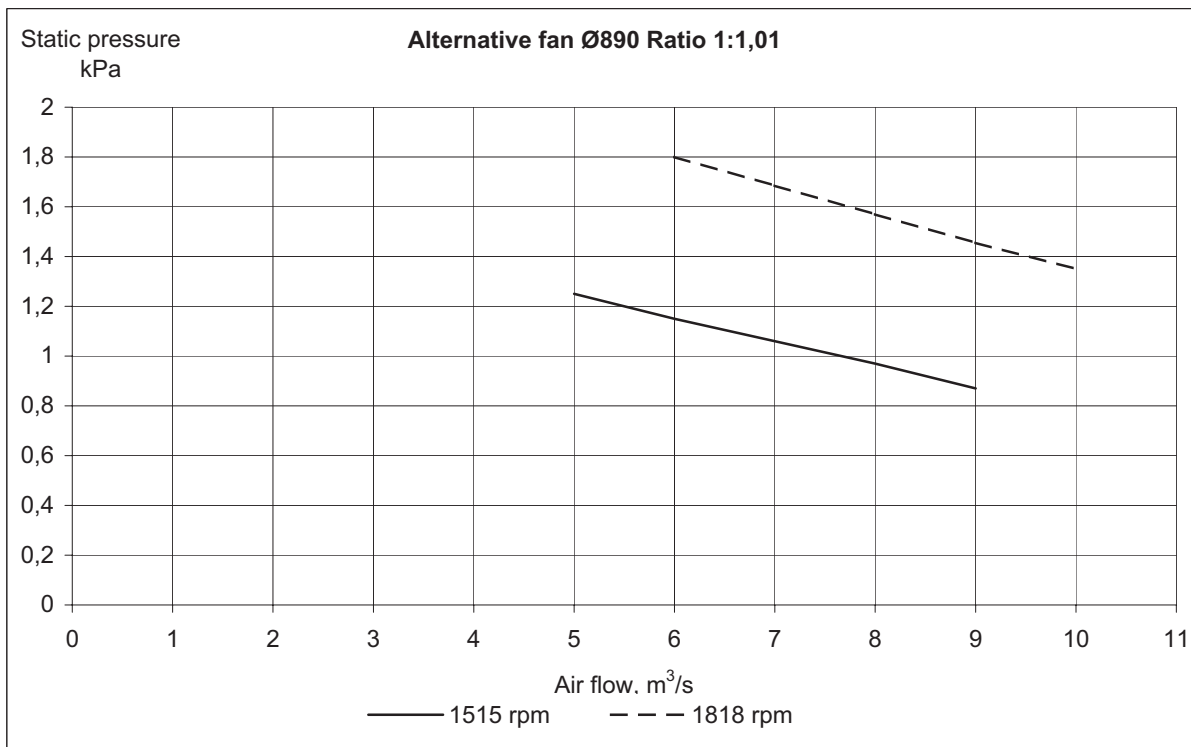
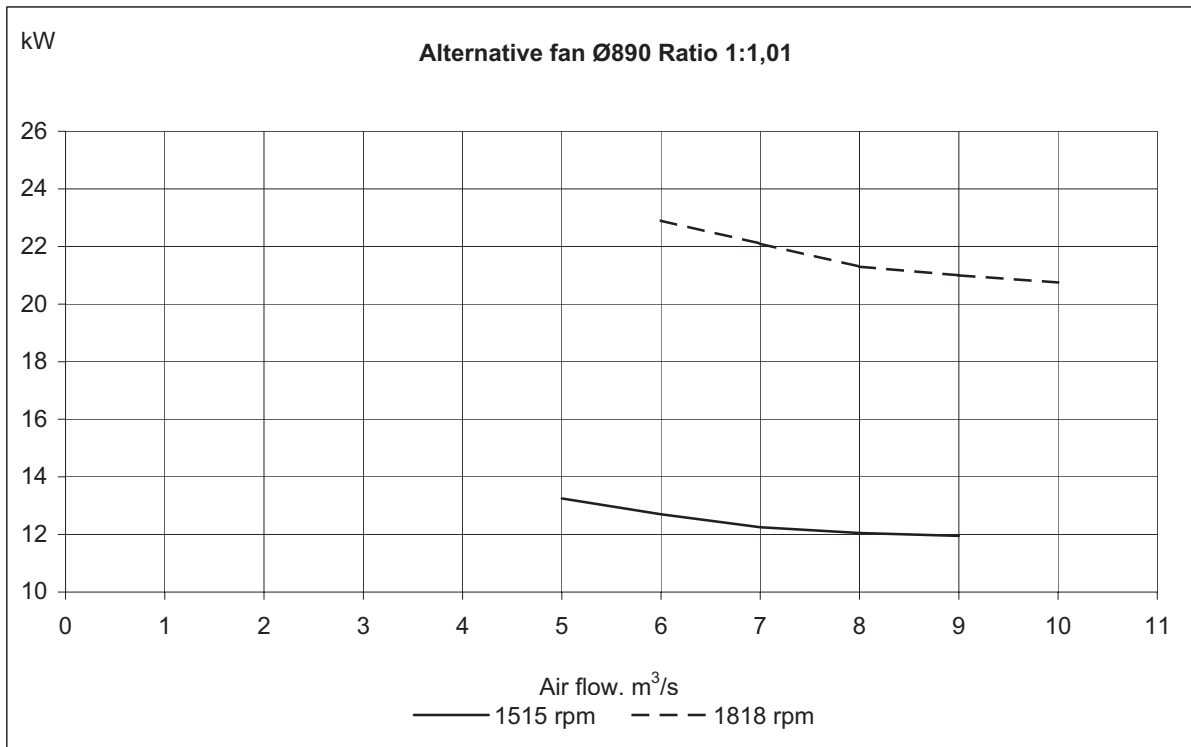
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