

| | | |
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| | TAD1345VE | 21340729 |

General

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

| | | | |
|---------------------|-------------|-----------------|-------------|
| Number of cylinders | | | 6 |
| Displacement, total | | liters | 12,78 |
| | | in ³ | 780 |
| Firing order | | | 1-5-3-6-2-4 |
| Bore | | mm | 131 |
| | | in | 5,16 |
| Stroke | | mm | 158 |
| | | in | 6,22 |
| Compression ratio | | | 18.1:1 |
| Wet weight | Engine only | kg | 1325 |
| | | lb | 2921 |
| | Power pac | kg | 1790 |
| | | lb | 3946 |

| Performance | | | rpm | 1500 | 1800 | 2000 | 2100 |
|----------------------------|--------------------|--------|------------|-------------|-------------|-------------|-------------|
| IFN Power 394 kW | without fan | kW | 361 | 394 | 394 | 394 | 394 |
| | | hp | 491 | 536 | 536 | 536 | |
| | with fan 890 mm | kW | 352 | 377 | 372 | 368 | |
| | | hp | 479 | 513 | 506 | 500 | |
| IFN Power 394 kW | without fan | kW | 361 | 394 | | | |
| | | hp | 491 | 536 | | | |
| | with fan 890 mm | kW | 352 | 377 | | | |
| | | hp | 479 | 513 | | | |
| Torque at: | IFN Power 394 kW | Nm | 2298 | 2090 | 1881 | 1792 | |
| | | lbf ft | 1695 | 1542 | 1387 | 1321 | |
| | IFN Power 394 kW | Nm | 2298 | 2090 | | | |
| | | lbf ft | 1695 | 1542 | | | |
| Max torque at engine speed | 1260 rpm | Nm | 2325 | | | | |
| | | lbf ft | 1715 | | | | |
| Mean piston speed | | m/s | 7,9 | 9,5 | 10,5 | 11,1 | |
| | | ft/sec | 25,9 | 31,1 | 34,6 | 36,3 | |

| Performance | | | rpm | 1500 | 1800 | 2000 | 2100 |
|--|------------------|-------------------|------------|-------------|-------------|-------------|-------------|
| Effective mean pressure at: | IFN Power 394 kW | MPa | 2,26 | 2,06 | 1,85 | 1,76 | |
| | | psi | 328 | 298 | 268 | 255 | |
| | IFN Power 394 kW | MPa | 2,26 | 2,06 | | | |
| | | psi | 328 | 298 | | | |
| Max combustion pressure at: | IFN Power 394 kW | MPa | 16,7 | 16,1 | 15,2 | 15 | |
| | | psi | 2422 | 2335 | 2204 | 2175 | |
| | IFN Power 394 kW | MPa | 16,7 | 16,1 | | | |
| | | psi | 2422 | 2335 | | | |
| Total mass moment of inertia, J (mR ²) | | kgm ² | 3,43 | | | | |
| | | lbft ² | 81,4 | | | | |
| Friction Power | | kW | 30 | 43 | 54 | 60 | |
| | | hp | 41 | 58 | 73 | 82 | |
| Derating see Technical Diagrams | | | | | | | |

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Cold start performance

| | | | | |
|--|--|-----------------------------------|----------------------|--|
| *Cold start ambient temperature limit and time from start to no load speed | without starting aid | °C / sec. | 20 | 3s |
| | | °F / sec. | 68 | |
| | with manifold heater 4 kW | °C / sec. | -5 | 4s |
| | | °F / sec. | 23 | |
| | with manifold heater 4 kW and block heater | °C / sec. | -15 | 4,5s |
| | | °F / sec. | 5 | |
| *Specify oil and fuel quality | Mk1 fuel, VDS2 oil. 15w40 above -15°C, 10w30 below -15°C | | | |
| Usage of manifold heater: | Time preheating, minutes | Time post heating, minutes | | |
| Block heater type | Make | Power kW | Engaged hours | Cooling water temp engine block |
| | Volvo | 2 | 12 | 10°C 50°F |

* See also general section in the sales guide

Lubrication system

| | | | |
|--|------------------|----------|--------------------------------------|
| Lubricating oil consumption at max rpm at: | IFN Power 394 kW | liter/h | 0,02 |
| | | US gal/h | 0,005 |
| | IFN Power 394 kW | liter/h | 0,02 |
| | | US gal/h | 0,005 |
| Oil system capacity including filters | | liter | Std sump 36 / Aluminium sump 52 |
| | | US gal | Std sump 9,51 / Aluminium sump 13,74 |
| Plastic Oil sump capacity (Std): | Max | liter | 30 |
| | | US gal | 7,93 |
| | Min | liter | 19 |
| | | US gal | 5,02 |
| Aluminium Oil sump capacity: | Max | liter | 46 |
| | | US gal | 12,15 |
| | Min | liter | 36 |
| | | US gal | 9,51 |
| Oil change intervals/specifications | VDS 3 | h | 600 |
| | VDS 2 | h | 400 |
| | | h | |
| Engine angularity limits: | front up | ° | Std sump 11 / Aluminium sump 35 |
| | front down | ° | Std sump 11 / Aluminium sump 35 |
| | side tilt | ° | Std sump 11 / Aluminium sump 35 |
| Oil pressure at rated speed | | kPa | 300 - 650 |
| | | psi | 44 - 94 |
| Oil pressure shut down switch setting | | kPa | 130 |
| | | psi | 19 |

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Lubrication system

| | | | |
|--------------------------------------|-----|----|-----|
| Lubrication oil temperature in sump: | max | °C | 130 |
| | | °F | 266 |
| Oil filter micron size | | μ | 40 |

Fuel system

| | | rpm | 1500 | 1800 | 2000 | 2100 |
|---|------|-----------------|---|--------------|--------------|--------------|
| IFN Power 394 kW Specific fuel consumption at: | 25% | g/kWh lb/hph | 213 0,345 | 225 0,365 | 235 0,381 | 250 0,405 |
| | 50% | g/kWh lb/hph | 197 0,319 | 208 0,337 | 215 0,349 | 220 0,357 |
| | 75% | g/kWh lb/hph | 194 0,314 | 206 0,334 | 212 0,344 | 216 0,350 |
| | 100% | g/kWh lb/hph | 197 0,319 | 204 0,331 | 213 0,345 | 219 0,355 |
| ICFN Power 394 kW Specific fuel consumption at: | 25% | g/kWh lb/hph | 213 0,345 | 225 0,365 | | |
| | 50% | g/kWh lb/hph | 197 0,319 | 208 0,337 | | |
| | 75% | g/kWh lb/hph | 194 0,314 | 206 0,334 | | |
| | 100% | g/kWh lb/hph | 197 0,319 | 204 0,331 | | |
| Fuel to conform to | | | ASTM-D975-No1 and 2D JIS KK 2204, EN 590 | | | |

Fuel system

| | | |
|---|---------------------|-----------------|
| System supply flow at max. speed | liter/h US gal/h | 100 26,4 |
| Fuel supply line max. restriction (Measured at fuel inlet connection) | kPa psi | 10 1,5 |
| Fuel supply line max. pressure, engine stopped | kPa psi | 16,5 2,4 |
| System return flow at max. speed | liter/h US gal/h | 18,0 4,8 |
| Fuel return line max. restriction (Measured at fuel return connection) | kPa psi | 20 2,9 |
| Max. allowable inlet fuel temp (Measured at fuel inlet connection) | °C °F | 60 140 |
| Prefilter / Water separator micron size | μ | 10 |
| Fuel filter micron size | μ | 5 |
| Governor type/make, standard | | Volvo / EMS 2.2 |
| Injection pump type/make | | Delphi E3 |

Intake and exhaust system

| | Inlet air temp | rpm | 1500 | 1800 | 2000 | 2100 |
|---|----------------------------------|------------|-----------|-----------|-----------|-----------|
| Air consumption at: (+25°C and 100kPa) | IFN Power 394 kW 25°C 77°F | m³/min | 27 | 30 | 33 | 34 |
| | | cfm | 954 | 1059 | 1165 | 1201 |
| | IFN Power 394 kW 25°C 77°F | m³/min | 27 | 30 | | |
| | | cfm | 954 | 1059 | | |
| Max allowable air intake restriction including piping | | kPa psi | 5 0,7 | | | |
| Heat rejection to exhaust at: | IFN Power 394 kW | kW | 262 | 307 | 335 | 349 |
| | | BTU/min | 14900 | 17459 | 19051 | 19847 |
| | IFN Power 394 kW | kW | 262 | 307 | 335 | 349 |
| | | BTU/min | 14900 | 17459 | 19051 | 19847 |
| Exhaust gas temperature after turbine at: | IFN Power 394 kW | °C | 435 | 435 | 435 | 435 |
| | | °F | 815 | 815 | 815 | 815 |
| | IFN Power 394 kW | °C | 435 | 435 | | |
| | | °F | 815 | 815 | | |
| Max allowable back pressure in exhaust line | | kPa psi | 11 1,6 | 13 1,9 | 14 2,0 | 15 2,2 |
| Exhaust gas flow at: (temp and pressure after turbine at the corresponding power setting) | IFN Power 394 kW | m³/min | 60 | 69 | 77 | 81 |
| | | cfm | 2119 | 2437 | 2719 | 2861 |
| | IFN Power 394 kW | m³/min | 60 | 69 | | |
| | | cfm | 2119 | 2437 | | |
| Exhaust gas smoke | IFN Power 394 kW | *Bosch | 0,3 | 0,4 | 0,6 | 0,7 |
| | | Units | 0,3 | 0,4 | | |
| Heat rejection radiation from engine at: | IFN Power 394 kW | kW | 7 | 8 | 8 | 9 |
| | | BTU/min | 398 | 455 | 455 | 512 |
| | IFN Power 394 kW | kW | | | | |
| | | BTU/min | | | | |
| Heat rejection to coolant at: | IFN Power 394 kW | kW | 172 | 210 | 240 | 261 |
| | | BTU/min | 9781 | 11942 | 13649 | 14843 |
| | IFN Power 394 kW | kW | | | | |
| | | BTU/min | | | | |

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|------------------------------|--------|-------------------|----------------|--|
| Radiator cooling system type | | | Closed circuit | |
| Standard radiator core area | | m ² | 0,8 | |
| | | foot ² | 8,61 | |
| Fan diameter | 890 mm | mm | 890 | |
| | | in | 35,04 | |

| Cooling system | | rpm | 1500 | 1800 | 2000 | 2100 |
|---|--|-------------|---------------|------|------|------|
| Fan power consumption | 890 mm | kW | 9,0 | 17,0 | 22,0 | 26,0 |
| | | hp | 12 | 23 | 30 | 35 |
| Fan drive ratio | fan Ø890 | | 0,99 : 1 | | | |
| Coolant capacity: | engine | liter | 20 | | | |
| | | US gal | 5,3 | | | |
| | std. 0,8m ² radiator with hoses | liter | 24 | | | |
| | | US gal | 6,3 | | | |
| Coolant pump | | drive/ratio | Belt / 1.43:1 | | | |
| Coolant flow with standard system | | l/s | | | | |
| | | US gal/s | | | | |
| Minimum coolant flow | | l/s | 5,6 | 6,7 | 7,4 | 7,8 |
| | | US gal/s | 1,5 | 1,8 | 2,0 | 2,1 |
| Maximum outer circuit restriction incl. piping | | kPa | 55,0 | | | |
| | | psi | 8,0 | | | |
| 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 | | | |
| | | psi | 14,5 | | | |
| Minimum static pressure head (expansion tank height + pressure cap setting) | | kPa | 70 | | | |
| | | psi | 10,2 | | | |
| Standard pressure cap setting | | kPa | 70 | | | |
| | | psi | 10,2 | | | |
| Maximum top tank temperature | | °C | 107 | | | |
| | | °F | 225 | | | |
| Draw down capacity. The difference between min coolant level in the expansion tank and the lowest level where the engine's coolant system still are functioning | with std. 0,8 m ² radiator | liter | 1,8 | | | |
| | | US gal | 0,5 | | | |
| | | liter | | | | |
| | | US gal | | | | |

| Charge air cooler system | | rpm | 1500 | 1800 | 2000 | 2100 |
|--|------------------|-------------------|-------|------|------|------|
| Heat rejection to charge air cooler | IFN Power 394 kW | kW | | | | |
| | | BTU/min | | | | |
| | IFN Power 394 kW | kW | | | | |
| | | BTU/min | | | | |
| Charge air mass flow | IFN Power 394 kW | kg/s | 0,52 | 0,58 | 0,64 | 0,66 |
| | | kg/s | 0,52 | 0,58 | | |
| Charge air inlet temp. (Charge air temp after turbo compressor) | IFN Power 394 kW | °C | 188 | 178 | 187 | 189 |
| | | °F | 370 | 352 | 369 | 372 |
| | IFN Power 394 kW | °C | 188 | 178 | | |
| | | °F | 370 | 352 | | |
| Charge air outlet temp. (Charge air temp after charge air cooler) | IFN Power 394 kW | °C | 38 | 40 | 43 | 46 |
| | | °F | 100 | 104 | 109 | 115 |
| | IFN Power 394 kW | °C | 38 | 40 | | |
| | | °F | 100 | 104 | | |
| Maximum pressure drop over charge air cooler incl. piping | | kPa | 8 | | | |
| | | psi | 1,16 | | | |
| Charge air pressure (After charge air cooler) | | kPa | 191 | | | |
| | | psi | 27,70 | | | |
| Standard charge air cooler core area | | m ² | 0,8 | | | |
| | | foot ² | 8,61 | | | |

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Cooling performance: 0,8 m² radiator and 890 mm push fan

Cooling air flow and maximum additional external restriction at different radiator air temperatures based on 107°C TTT and 40% coolant. Valid at 1 atm.

| Engine speed rpm | Engine power kW hp | Air on temp °C °F | | IFN Power 352 kW | | | |
|---------------------|--------------------------|----------------------|-----|-------------------|--------------------|----------------------|-------|
| | | | | Air flow | | External restriction | |
| | | | | m ³ /s | ft ³ /s | Pa | psi |
| 2100 (STD 0,99) | | 57 | 135 | 7,6 | 268,4 | 650 | 0,094 |
| | | 59 | 138 | 8,2 | 289,6 | 400 | 0,058 |
| | | 62 | 144 | 9,1 | 321,4 | 0 | |
| 1800 (STD 0,99) | | 55 | 131 | 6,9 | 243,7 | 284 | 0,041 |
| | | 57 | 135 | 7,3 | 257,8 | 162 | 0,023 |
| | | 59 | 138 | 7,9 | 279,0 | 0 | |

Cooling performance: 0,8 m² radiator and 890 mm suct fan

Cooling air flow and maximum additional external restriction at different radiator air temperatures based on 107°C TTT and 40% coolant. Valid at 1 atm.

| Engine speed rpm | Engine power kW hp | Air on temp °C °F | | IFN Power 394 kW | | | |
|---------------------|--------------------------|----------------------|-----|-------------------|--------------------|----------------------|-------|
| | | | | Air flow | | External restriction | |
| | | | | m ³ /s | ft ³ /s | Pa | psi |
| 1800 (STD 0,99) | | 55 | 131 | 6,9 | 243,7 | 284 | 0,041 |
| | | 57 | 135 | 7,3 | 257,8 | 162 | 0,023 |
| | | 59 | 138 | 7,9 | 279,0 | 0 | |
| 1500 (STD 0,99) | | | | | | | |

Cooling performance: 0,73 m² radiator and 750 fan fan drive ratio 0.99:1**Radiator module 136232626 and kit 22113650 pusher**

Cooling air flow and maximum additional external restriction at different radiator air temperatures based on 107°C TTT and 40% coolant. Valid at 1 atm.

| Engine speed rpm | Engine power hp | Air on temp °C °F | | | | | |
|---------------------|--------------------|----------------------|-----|-------------------|--------------------|----------------------|-------|
| | | | | Air flow | | External restriction | |
| | | | | m ³ /s | ft ³ /s | Pa | psi |
| 2100 (STD 0,99) | 394 536 | 67 | 153 | 8,8 | 310,8 | 0 | |
| | | 66 | 151 | 8,4 | 296,6 | 100 | 0,015 |
| | | 65 | 149 | 8,1 | 286,0 | 200 | 0,029 |
| | | 63 | 145 | 7,7 | 271,9 | 300 | 0,044 |
| | | 61 | 142 | 7,2 | 254,3 | 400 | 0,058 |
| 1800 (STD 0,99) | 394 536 | 67 | 153 | 7,6 | 268,4 | 0 | |
| | | 64 | 147 | 7,0 | 247,2 | 100 | 0,015 |
| | | 62 | 144 | 6,5 | 229,5 | 200 | 0,029 |
| | | 60 | 140 | 6,1 | 215,4 | 300 | 0,044 |
| | | 57 | 135 | 5,7 | 201,3 | 400 | 0,058 |

Cooling performance: 0,73 m² radiator and 750 fan fan drive ratio 0.99:1**Radiator module 136232627 and kit 22113651 suction**

Cooling air flow and maximum additional external restriction at different radiator air temperatures based on 107°C TTT and 40% coolant. Valid at 1 atm.

| Engine speed rpm | Engine power hp | Air on temp °C °F | | | | | |
|---------------------|--------------------|----------------------|-----|-------------------|--------------------|----------------------|-------|
| | | | | Air flow | | External restriction | |
| | | | | m ³ /s | ft ³ /s | Pa | psi |
| 2100 (STD 0,99) | 394 536 | 64 | 147 | 8,2 | 289,6 | 0 | |
| | | 63 | 145 | 7,9 | 279,0 | 100 | 0,015 |
| | | 61 | 142 | 7,5 | 264,9 | 200 | 0,029 |
| | | 59 | 138 | 7,1 | 250,7 | 300 | 0,044 |
| | | 57 | 135 | 6,8 | 240,1 | 400 | 0,058 |
| 1800 (STD 0,99) | 394 536 | 60 | 140 | 6,9 | 243,7 | 0 | |
| | | 58 | 136 | 6,5 | 229,5 | 100 | 0,015 |
| | | 56 | 133 | 6,1 | 215,4 | 200 | 0,029 |
| | | 54 | 129 | 5,8 | 204,8 | 300 | 0,044 |
| | | 51 | 124 | 5,4 | 190,7 | 400 | 0,058 |

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Engine management system

| Functionality | Alternatives | Default setting |
|---------------------|----------------------------------|-----------------|
| Governor mode | Isochronous / Droop | |
| Governor droop | 0-8 % | |
| Governor response | Adjustable PID-constants (VODIA) | Standard |
| Idle speed | 600-1200 | |
| Stop function | Energized to Run / Stop | |
| Preheating function | On / Off | |
| Lamp test | On / Off | |
| | | |

| Engine sensors and switch settings | | Alarm level | | Engine protection | | |
|------------------------------------|-------------|---------------------------|---------------------|-------------------|--|--------------------|
| Parameter | Unit | Setting range | Default setting | Level | Action, Default/Alternative | |
| Oil temp | °C | 120 - 130 | 125 | Setting +5 | Shut down. ON/OFF* | |
| Oil pressure | Low idle | kPa | - | 150 | -20 | Shut down. ON/OFF* |
| | Rated speed | kPa | - | 250 | -20 | Shut down. ON/OFF* |
| Oil level | | - | Min level | - | - | |
| Piston cooling pressure >1000 rpm | kPa | - | 150 | 150 | Shut down. ON/OFF* | |
| Coolant temp | °C | 95 - 102 | 102 | Setting +5 | Shut down. ON/OFF* | |
| Coolant level | | See cooling system | On | Low level | Shut down. ON/OFF* | |
| Fuel feed pressure | Low idle | kPa | - | 100 | - | - |
| | >1300 rpm | | - | 300 | - | - |
| Water in fuel | | - | High level | - | - | |
| Crank case pressure | kPa | - | - | Rapid pres inc | Shut down. ON/OFF* | |
| Air filter pressure drop | kPa | - | 5 | - | - | |
| Altitude, above sea | m | - | - | - | Automatic derating, see section derating | |
| Charge air temp | °C | - | 80 | 85 | Shut down. ON/OFF* | |
| Charge air pressure** | kPa | - | 310 | +10 | Shut down. ON/OFF* | |
| Engine speed | rpm | 100 - 120% of rated speed | 120% of rated speed | Alarm level | | |
| | | | | | | |

* Off means no shut down, alarm only

** Pabs, 2100 rpm at sea level.

| Parameter | Warning | Alarm | Derated 0% to engine protection map | Derated 100% to engine protection map | Fill in forced idle value | Fill in forced shut down value |
|-----------|---------|-------|-------------------------------------|---------------------------------------|---------------------------|--------------------------------|
| - | | | | | | |
| - | | | | | | |
| - | | | | | | |
| - | | | | | | |
| - | | | | | | |
| - | | | | | | |
| | | | | | | |
| | | | | | | |

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Electrical system

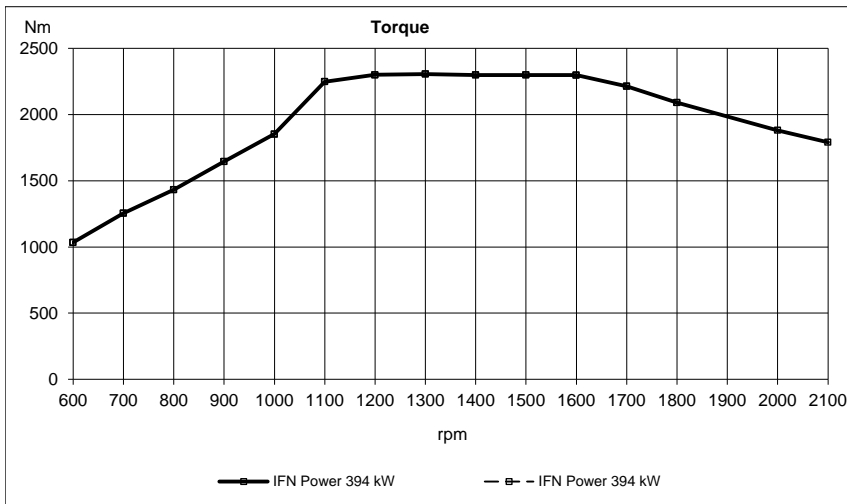
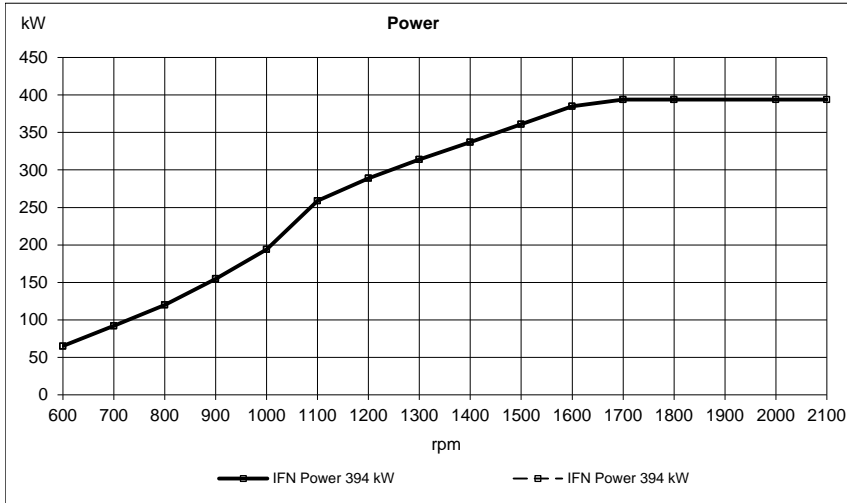
| | | | | | |
|---|--------------------|----------------------------|-----------|------------|------------|
| Voltage and type | | 24V / insulated from earth | | | |
| Alternator: | make | Bosch | | | |
| | output | 80 | | | |
| | tacho output | 6 | | | |
| | drive ratio | 5,3:1 | | | |
| Starter motor: | make | Melco | | | |
| | type | 105P70 | | | |
| | output | kW | 7 | | |
| | | hp | 9,5 | | |
| Number of teeth on: | flywheel | 153 | | | |
| | starter motor | 12 | | | |
| Inlet manifold heater (at 20 V) | | kW | 4 | | |
| Power relay for the manifold heater | | A | 1 | | |
| Conditions: (4 mΩ main circuit resistance@ 20°C) | Temperature | °C | 25 | 0 | -15 |
| | Battery | Ah / CCA | 140/800 | 140/800 | 145 / 1050 |
| Crank speed | rpm | 171 | 118 | 98 | |
| Crank current | A | 290 | 400 | 480 | |
| Starter input power during crank | kW | 6,2 | 7,5 | 7,7 | |
| Battery power during crank | kW | 6,5 | 8,1 | 8,5 | |
| Min battery | Ah / CCA | 120 / 700 | 140 / 800 | 145 / 1050 | |

Power take off

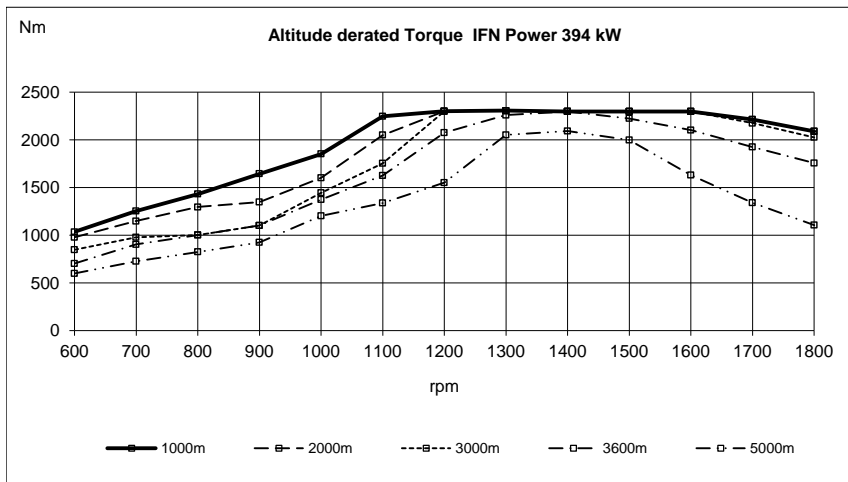
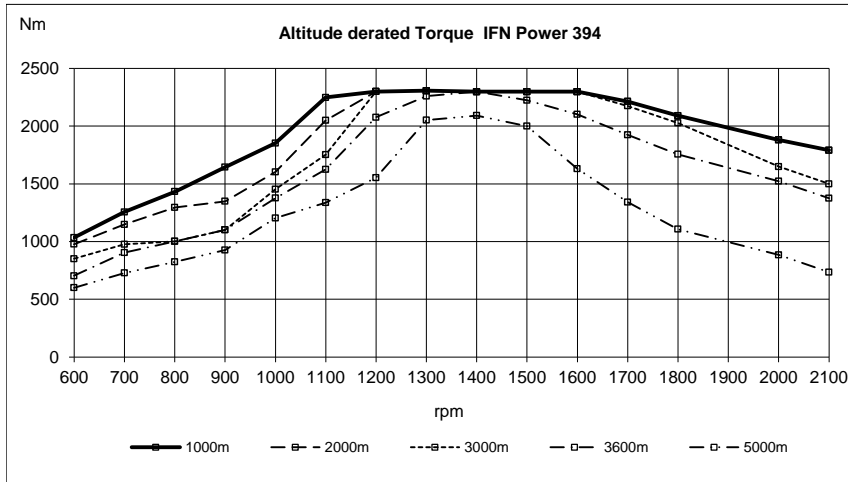
| | | rpm | 1500 | 1800 | 2000 | 2100 |
|--|-----------|--------------|----------------|------|------|------|
| Front end in line with crank shaft max: | | Nm lbf ft | TBD | | | |
| Front end belt pulley load. Direction of load viewed from flywheel side: | max left | kW hp | TBD | | | TBD |
| | max down | kW hp | | | | TBD |
| | max right | kW hp | | | | TBD |
| Continuous torque, Timing gear at compressor PTO: * | | Nm lbf ft | 300 221 | | | |
| Speed ratio direction of rotation viewed from flywheel side | | | 1,31:1 / ccw | | | |
| Timing gear at servo pump PTO max: * | | Nm lbf ft | 100 74 | | | |
| Speed ratio direction of rotation viewed from flywheel side | | | 1,75:1/ccw | | | |
| Max allowed bending moment in flywheel housing | | Nm lbf ft | 15000 11063 | | | |
| Max. rear main bearing load | | N lbf | 4000 899,2 | | | |

*Maximum allowed torque at individual PTO,s. If more than one PTO output is used simultaneously , calculations needs to be performed to determine maximum available torque, depending on application inertia.

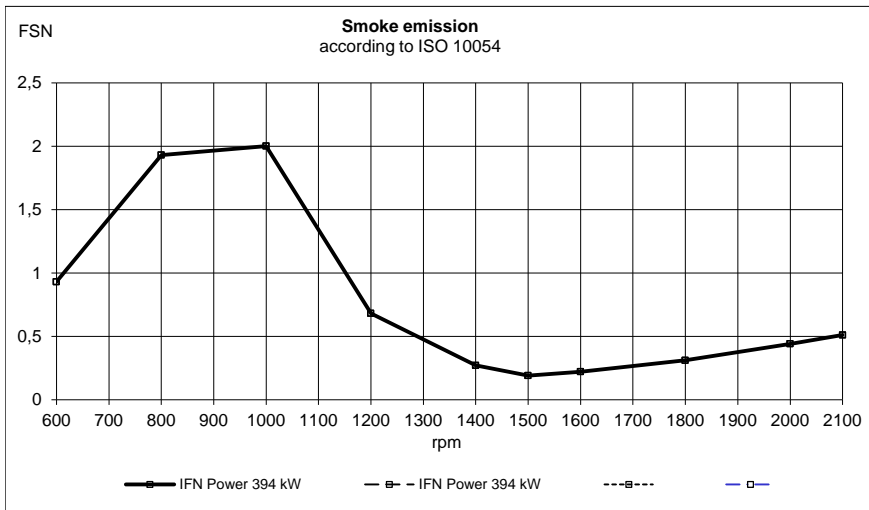
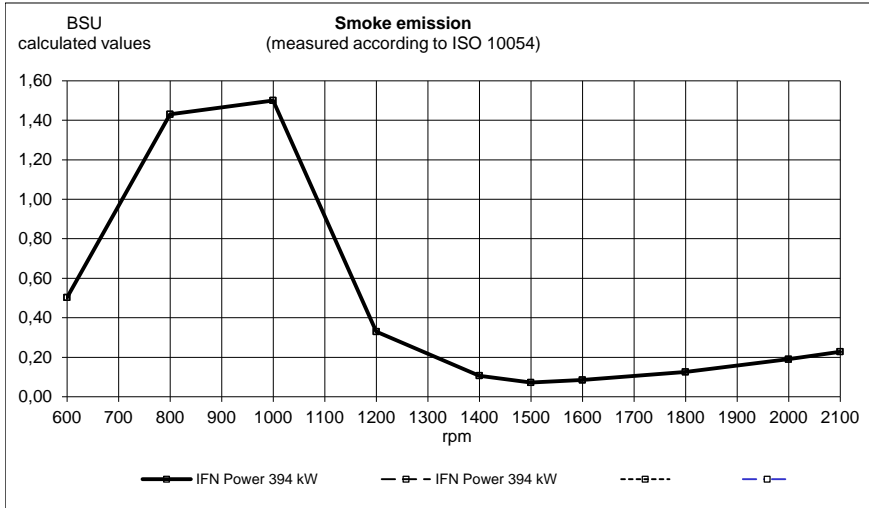
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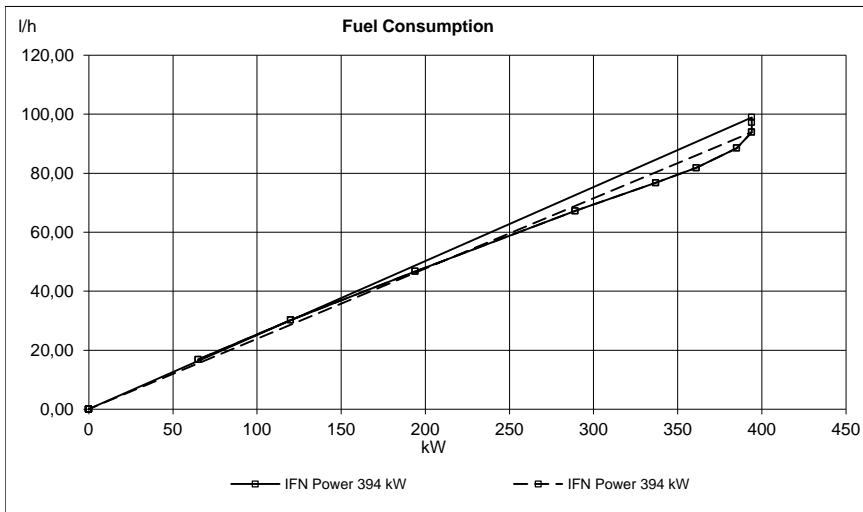
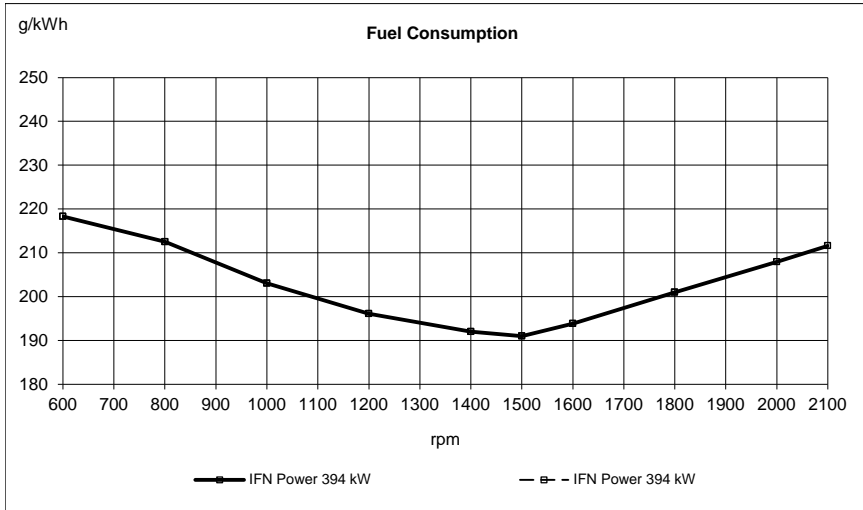
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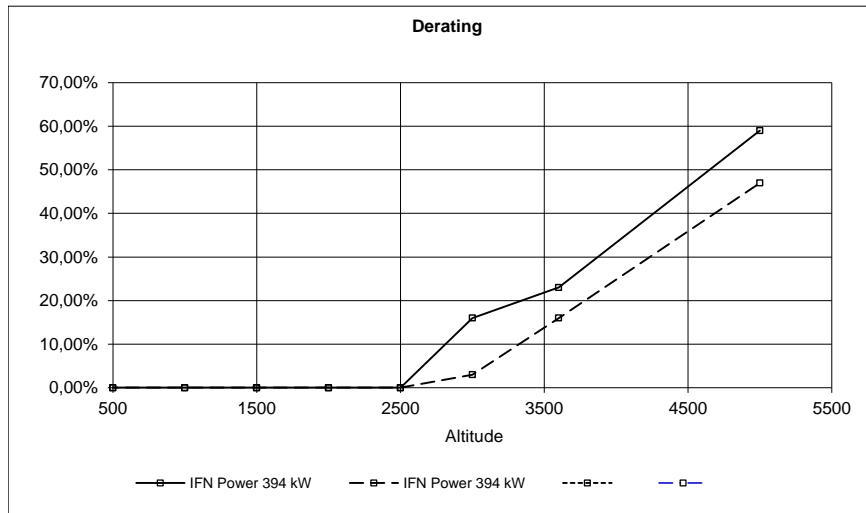
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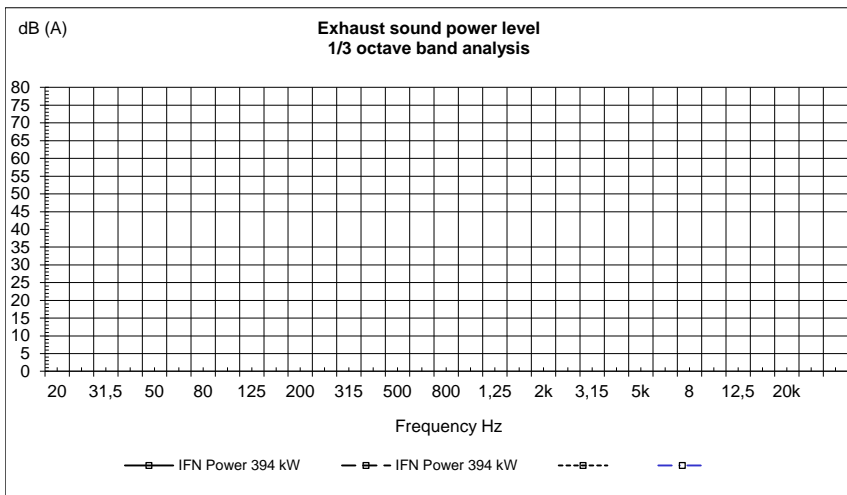
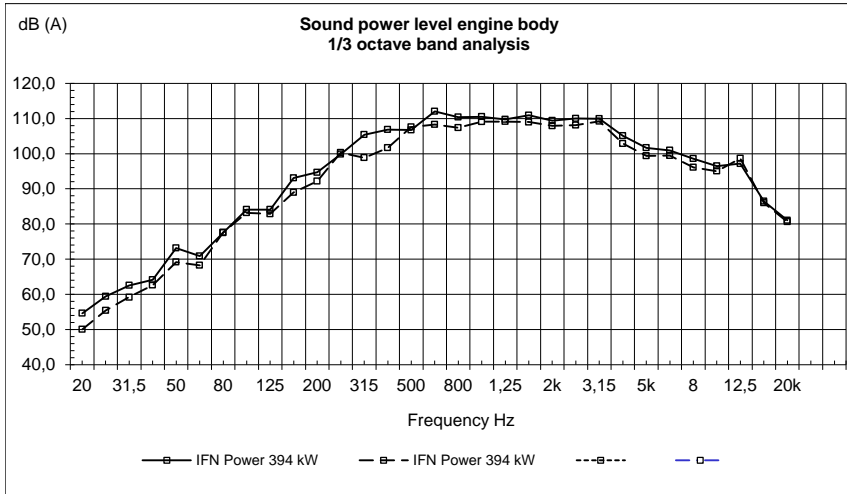
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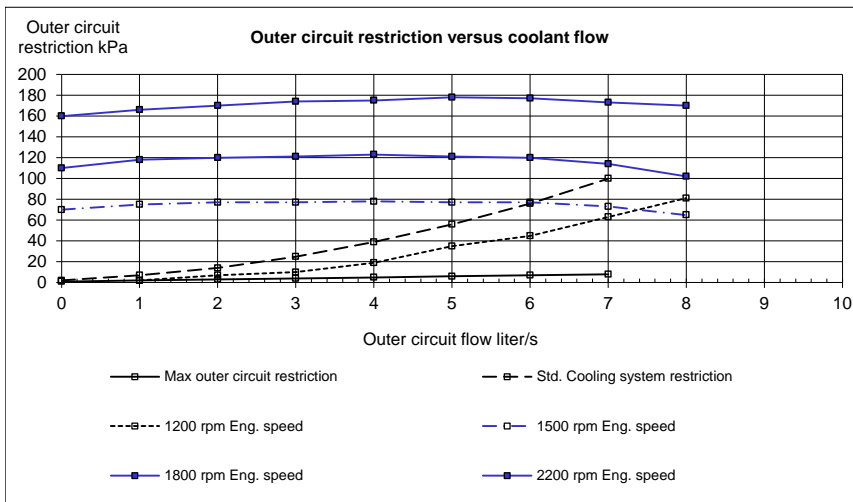
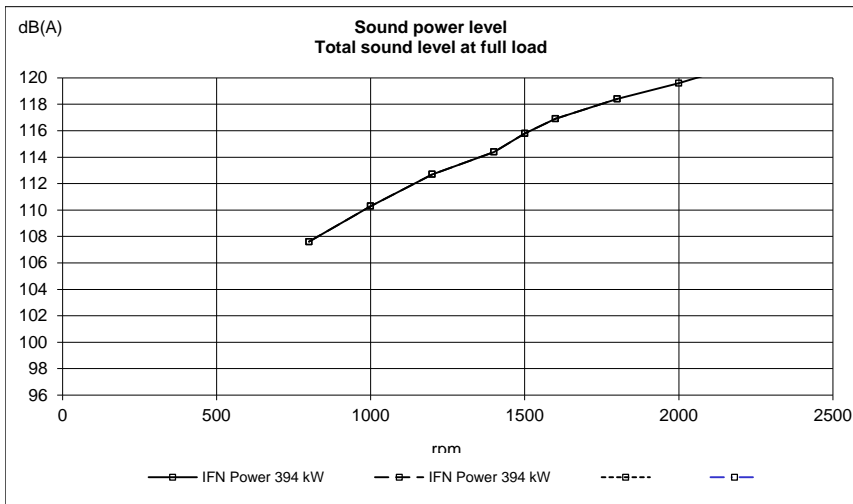
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