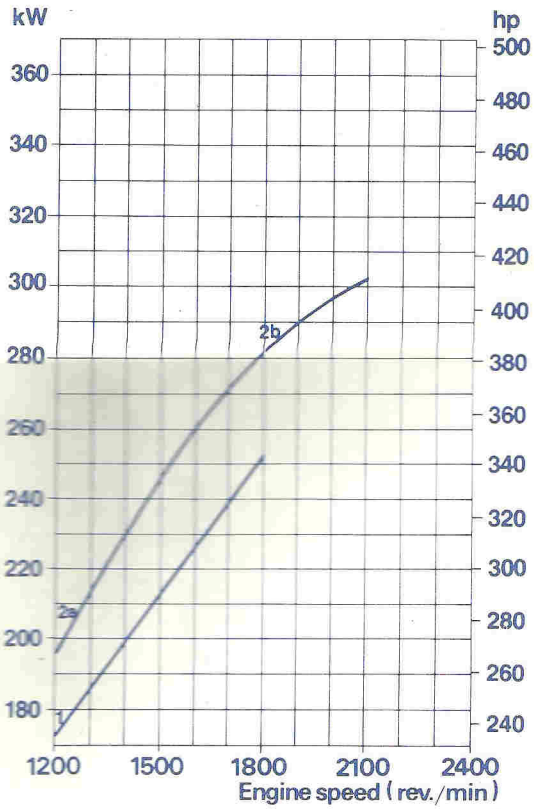
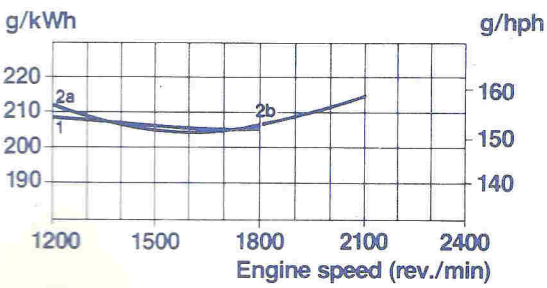
303 (412) MARINE ENGINE

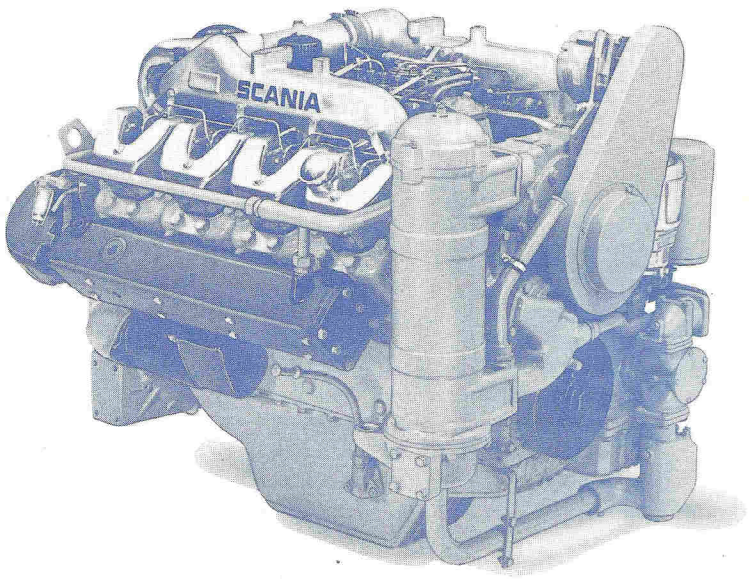
SCANIA DS14

Power



Specific fuel consumption





Basic data

DS 14 engine is a turbocharged, V-8, water-cooled, 4-stroke, direct injected diesel engine.

Number of cylinders		8 in 90°V
Displacement	dm^3	14.19
Bore	mm	127
Stroke	mm	140
Number of main bearings		5
Compression ratio		15.5:1
Direction of rotation, viewed from flywheel end: counter clockwise		
Moment of inertia, with industrial flywheel	kgm^2	3.03
Cyclic irregularity at full load, curve 1		1:250
Speed variation when taking off, or applying 100% load:		
All speed engine.	%	6-12
Lube oil capacity, standard sump.	dm^3	25
Time between lube oil changes, standard sump	h	200
Specific lube oil consumption at 100% load, curve 1, approx g/kWh (g/hph)		0.7 (0.5)
Cooling water temperature:		
Normal	°C	75-80
Max permitted, without pressure cap,	°C	90
Max permitted, with pressure cap,	°C	95
Weight (excl.oil and water)	kg	1250

Firing order 1-5-4-2-6-3-7-8

1	2	3	4
5	6	7	8

Test conditions

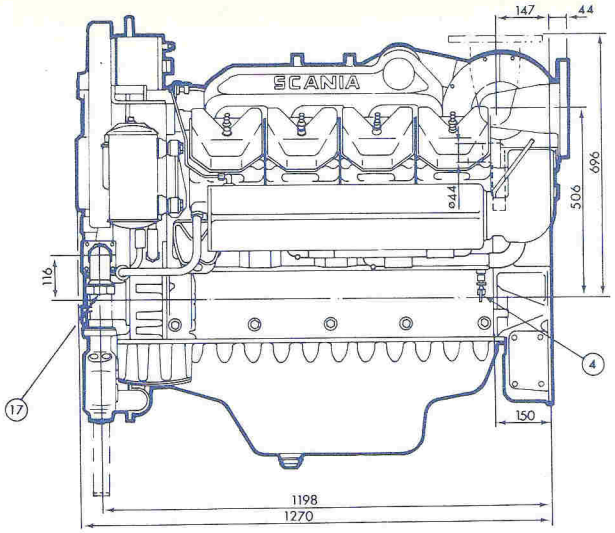
Ambient temperature	+ 27°C
Barometric pressure	100 kPa (750 mm Hg)
Humidity	60%
Power test codes, main:	ISO 3046
supplementary:	ISO 2534 DIN 6270 SAE J 1349 B.S. 5514

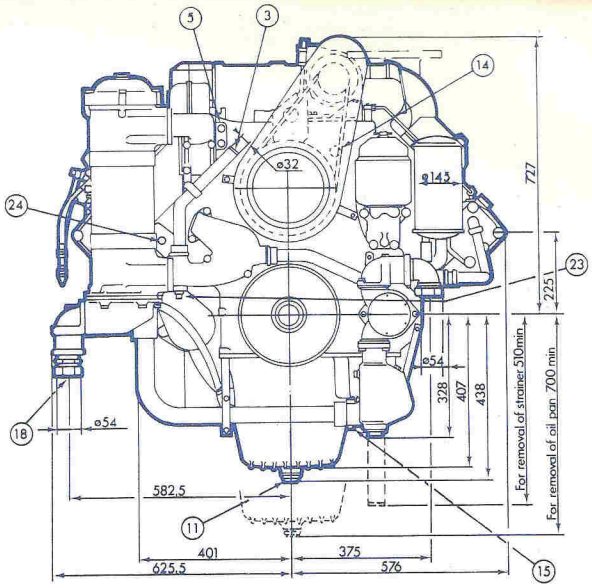
Power rating codes

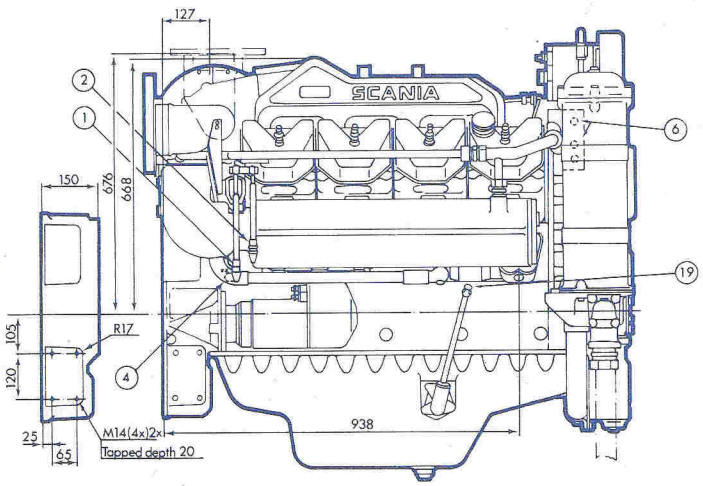
Curve 1 Continuous uninterrupted
Curve 2a Medium duty commercial
Curve 2b Light duty commercial

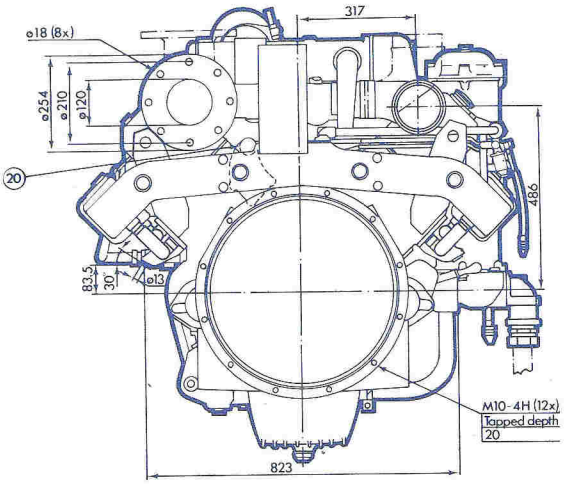
Diesel fuel according to	SIS 155432, or DIN 51601, ASTM-D975-No.2
Density of fuel	0,83 kg/dm^3
Calorific value of fuel	42700 kJ/kg (10200 kcal/kg)
Temperature of fuel	35°C

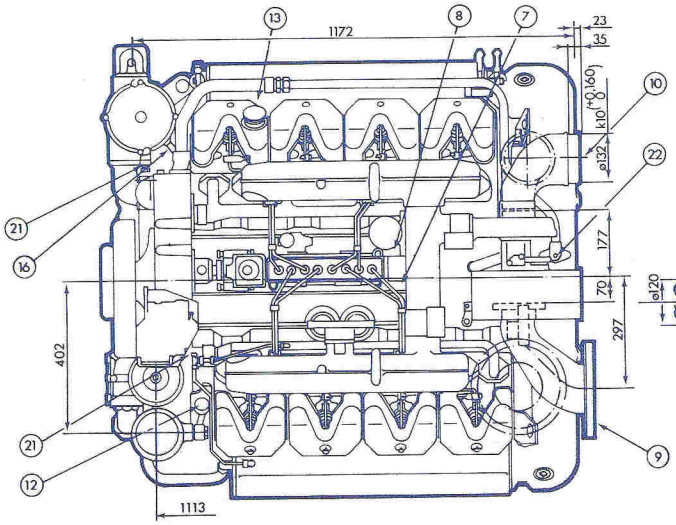
A new engine gives up to 3% lower power

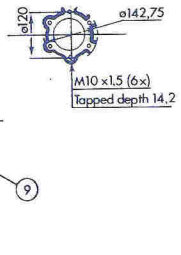


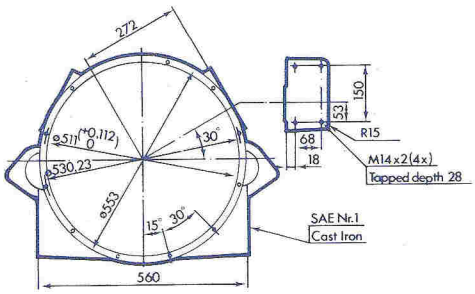












1. Fuel inlet (Pipe 10×1 alt 15×1.5)
2. Fuel return (Pipe 10×1)
3. Connection for expansion tank (Tube Ø 32)
4. Draintaps for fresh water
5. Connection for cooling water thermometer ½ – 14 NPTF(2×)
6. Connection for cooling water thermometer M 14×1.5(3×)
7. Speed control lever (with RSV governor)
8. Stop lever (with RSV governor)
9. Flange exhaust outlet
10. Air inlet for separate air cleaner
11. Drainplug for oil
12. Oil pressure switch
13. Cap for oil filling
14. Connection for tachometer acc. to DIN75532 form E2
15. Drainplug for seawater
16. Draintaps for fresh water
17. Sea water inlet
18. Sea water outlet
19. Oil dipstick
20. Breather housing
21. Venting, to expansion tank (Tube 6×1)
22. Plug for venting
23. Plug for fresh water draining or connection for water return from radiator heating (M14×1.5) (NPSF ¾"– 14)
24. Connection for radiator heating (¾"– 14 NPSF)

Scale 1:20

GENERAL DESCRIPTION

Cylinder block

The cylinders are placed 4 by 4 in 90° V-form. The cylinder block is integral with the upper half of the crankcase and is made in one piece of alloy cast iron. The main bearing caps are made of nodular cast-iron. Each main bearing cap is fixed on the block with 2 vertical and 2 horizontal bolts. The exchangeable wet-type cylinder liners (in direct contact with the coolant) are centrifugally cast of special cast-iron, and are flanged at the top for fitting into the cylinder block. Sealing between the coolant jacket and the crankcase is provided by rings of oil- and heat-resistant rubber.

Cylinder heads

The cylinder heads are made of alloy cast-iron. One cylinder head for each cylinder. Valves and injectors are mounted in the cylinder head. Each cylinder head is fastened with 8 bolts. The gas sealing between block and cylinder head is executed by a steel plate gasket. The sealing around cooling water and lube oil canals, between block and cylinder head is carried out with heavy duty rubber rings. Each head is easily removable. All valve seat inserts are made of a special alloy. The inlet port in the cylinder head is specially shaped to give the incoming air a swirl which improves engine function. This results in optimal combustion of the injected fuel, which to a large extent contributes to the low fuel consumption.

Valves and valve mechanism

Both inlet and exhaust valves are made of heat-resistant steel and are stellite-faced. The inlet valves are mechanically rotated by means of a spring loaded device. The valve stems are chromium-plated and have exchangeable steel caps, against which the hardened thrust surfaces of the rocker arms act. Double springs on every valve. The valve clearance is adjusted with a hardened ball stud on the rocker arm. The pushrods, which rise against the rocker arm, are of steel tubing and are carried in cup type valve lifters of chill-hardened cast iron. The valve mechanism is protected by a light-alloy cover.

Camshaft

The camshaft is drop-forged of alloy steel with cams and journals hardened, ground and polished. It runs in bushings in the cylinder block. The axial thrust is taken up by a flange at the front bearing. The camshaft is driven from the crankshaft through silent-running helical gears.

Pistons

The pistons are made of a light alloy. The shape of the piston crown ensures optimum combustion. For the top compression ring there is a cast-iron insert to reduce the wear of the ring groove to a minimum. Compression rings and oil control ring of alloy cast-iron. Top compression ring of keystone type. The gudgeon pins are made of case-hardened chrome steel.
Piston cooled from inside by lubricating oil, sprayed from a nozzle in the crank case.

Connecting rods

The connecting rods are I-section dropforgings of alloy steel. The small end of the connecting rod is wedge shaped so that combustion pressure is taken up by a much larger area than otherwise, both in piston and connecting rod.
There is a bronze bushing for the gudgeon pin. The gudgeon pin is lubricated by lubricating oil, sprayed from a nozzle in the crankcase. Exchangeable big end bearings of the same type as the main bearings.

Crankshaft

The crankshaft is made of drop-forged alloy steel. It is substantially dimensioned and is dynamically balanced and Magnaflux tested like many other forged engine parts. It is mounted in sturdy main bearings with exchangeable bearing shells consisting of a steel plate with lead-bronze lining covered with lead-indium.
The bearing surfaces of the crankshaft are extra deep induction hardened, ground and polished. The hardening allows, if required, regrinding to 6 undersizes for which standard bearings can be obtained. The axial forces are taken up by thrust washers at the rear main bearing.
The crankshaft has a patented viscous-type vibration damper at the frontend.

Oil sump

The oil sump is cast in aluminium alloy and provided with a magnetic drain plug. The standard oil sump has the oil drain plug in the bottom of the sump. Handpump for oil draining is delivered loose with the engine.

Lubricating system

From a gear pump located in the front of the sump the oil is forced to the main bearings, big-end bearings, camshaft bushings, the bearings of the timing gears and the piston cooling nozzles. The pump capacity at 2,100 engine rev/min is 123 dm^3/min. By a special device at the first camshaft bearing the oil is fed intermittently to the rocker mechanism from which it runs off to lubricate the valve lifters.
The oil pressure is regulated by a pressure relief valve. Maximum oil pressure is set to 4.5–6 bar.
The lubricating system has a oil cooler of the heat exchanging type, connected to the engine cooling system.

Oil cleaner

The lubricating oil is cleaned prior to the oil pump by a strainer in the oil sump and after the oil pump by a patented cleaning arrangement consisting of a cyclone and a centrifugal type cleaner. An extra spin on type oil filter is cleaning the oil, lubricating the floating type bushing of the turbocharger.

Crankcase ventilation

The interior of the crankcase is ventilated by a breather pipe on the block, provided with an oil trap and a protection filter.

Fuel system

The fuel is drawn from the fuel tank through a prefilter by a feed pump. It is then forced through two parallelly connected fine filters to the injection pump. The injection pump forces the fuel through pressure pipes to the injectors. The pump is driven from the crankshaft through helical gears and an adjustable coupling. It is provided with a centrifugal governor which regulates the fuel charge according to the load of the engine.
The camshaft of the injection pump has a special design which prevents reverse running. The injectors have multi-

orifice nozzles and are furnished with edge-type filters. The opening pressure is set to 230 bar. Leak-off oil from the injectors is carried back to the tank. The cold-starting device facilitates starting at low temperatures. It gives additional fuel for starting and is then automatically cut out. The injection pump is lubricated from the engine lubricating system. The prefilter is a fine-mesh gauze filter. The fine filters have cartridges of specially impregnated paper.

Cooling system

The engine including exhaust manifold is fresh water cooled. The fresh water i cooled by a heat-exhanger mounted directly on the front of the engine.
The coolant is pumped from the radiator by a powerful pump lengthwise in a distribution canal in each cylinder row. Through these passages the coolant is led to and round the cylinder liners after which the coolant passes up to the cylinder heads. The coolant passages in the cylinder heads are so directed that the injectors and exhaust valves receive maximum cooling. From the cylinder heads the coolant is led through two canals (one for each cylinder row) provided with calibrated holes for exact cooling efficiency by direct cooling of each cylinder head. Then back to the heat-exhanger via two vax-thermostats. The thermostats do not open until the coolant has reached normal working temperature. At low temperature the coolant is led through a return passage in the transmission case straingt to the suction side of the coolant pump. Thus the coolant circulates only in the engine to reach working temperature quickly. The coolant pump is of centrifugal type. It is mounted on the front end of the cylinder block and is directdriven by the engine timing gears. The pump has a self-adjusting carbon seal. The pump shaft is of stainless steel and runs in sealed ball-bearings. The sea water pump is driven directly from the engine and gears.

Air intake manifold

Standard intake manifold is shown in the main drawing.

Exhaust manifold

Standard watercooled exhaust manifold is shown in the main drawing.

Turbocharger

The turbocharger consists of a single stage radial turbine and a single stage centrifugal compressor. The turbine utilizes the energy of the exhaust gases and supplies the engine with extra air for optimum combustion and higher output. Turbine and compressor wheels are individually balanced and are fitted on one shaft, which runs in a floating type bearing. The turbine blades are made of special heat-resistant material. The turbocharger is cooled and lubricated from the engine lubricating system. The turbocharger is provided with an insulation cover.

Flywheel housing and flywheel

Standard flywheel housing is made of nodular iron and has a SAE 1 connection flange. The flywheel housing have the possibility to mount double starter motors.
Standard flywheel is for reverse gear or industrial clutch.

Electrical system

The electrical system has a nominal voltage of 24 V. 2-pole 35 A 28 V alternator with relay and sending unit for tachometer. 2-pole starter motor rated 6.5 kW (9 hp).

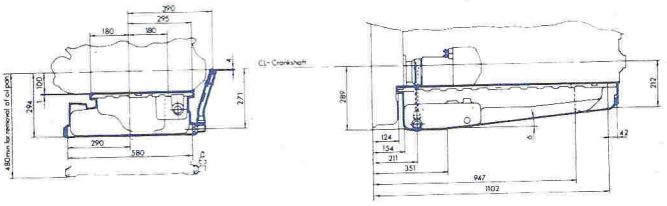
OPTIONAL EQUIPMENT

Crankshaft

For high output power take off from the crankshaft front end, a special crankshaft with polygon joint can be supplied.

Oil sump

This lower oil sump have the oil draining plug on the right hand side and the dip-stick on the left hand side.



Flywheels

Flywheels are available for different types of industrial clutches, converters, reverse gears, flange mounted generators and for flexible couplings.

EXTRA EQUIPMENT

Engine mountings

Stiff and fixed suspensions are available in combinations with several different reverse gears.

Power take-offs

Several direct driven optionals can be connected to the crank shaft and the timing gear train. Air compressor, side or front mounted power take-offs, hydraulic pump etc.

Clutches, reverse gears and couplings

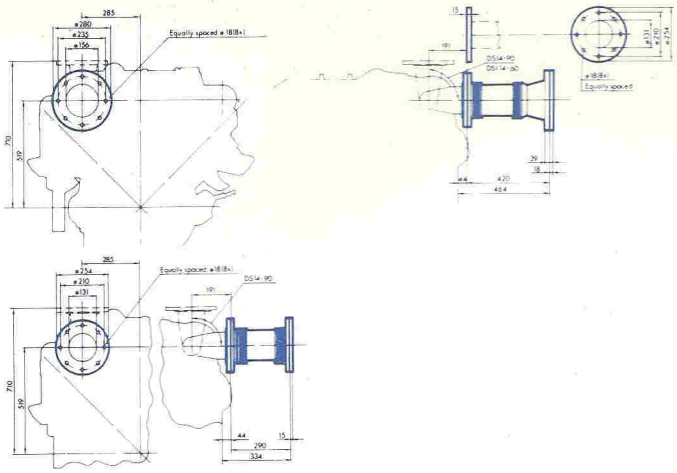
One 14" triple plate, industrial clutch is available.
Different types of reverse gears and flexible couplings can be supplied.
Single or double flexible couplings, flywheel mounted or shaft mounted.

Silencer

Silencers can be delivered in different executions.

Exhaust fittings

Following flexible exhaust connections can be delivered optionally.



Air cleaner

Two dry types are available: One with metal net and one with paper insert.

Instrumentation

Panel 285102, for propulsion engines with 2-pole electrical system.
Includes: Electrical tachometer with
revolution counter,
engine oil pressure and
water temperature gauges,
warning lamps for charging voltage,
water temperature and oil pressure,
starter push-botton, stopping push-botton,
ON/OFF-switch,
rheostat for instrument lighting and jointing cable 5 meters.
Manual stop in event of fault

To the instrument panel 285102 is a connection box on the engine, with relays for starting, stopping and alarm. In the connection box is a terminal board to which the lines from all the measuring and monitoring points are run.
The couplings consist of divisible, multi-pole pin connectors with a splashproof locking arrangement.
All connection cables are ready-made upon delivery.

Panel 335850 for engine with 1-pole electrical system
Includes: Electrical tachometer with hourmeter, engine oil pressure and water temerature gauges, rheostat for instrument lighting, key switch, interlock push-button, stopping push-button with warning lamp for battery charging, buzzer, alarm lamp and automatic stop at high coolant temperature and/or low oil pressure (the automatic stop can be disconnected), jointing cable 6 meters.

The complete instrumentation consists of instrument panel, jointing cable, cable bundle and a junction box with relays for starting/stopping and a automatic fuse.

SERVICE INSTRUMENT PANEL

Panel 218719,
Instrument panel without instruments. Can be equipped with three ∅ 60 mm instruments as required.

Additional equipment and classification

Different devices for accurate speed adjustment, engine heater, emergency starting equipment, protection covers for V-belts and pump couplings, tool kit, spare parts set etc, can be supplied.
The engine can be delivered with certificate from most classification societies.

Technical data, all speed engine.

Gross power:		Curve No.	Engine speed, rev./min. 1200	1500	1800	2100
1 h/2 h and max. 1,000 h/year	kW (hp)	2 b	–	–	282 (383)	303 (412)
8 h/24 h	kW (hp)	2 a	197 (268)	245 (333)	282 (383)	–
24 h/24 h	kW (hp)	1	173 (235)	213 (290)	252 (343)	–
Specific fuel consumption:						
4/4 load	g/kWh (g/hph)	2 a–2 b	211 (155)	205 (151)	207 (152)	216 (159)
3/4 load	g/kWh (g/hph)	2 a–2 b	206 (152)	206 (152)	206 (152)	215 (158)
1/2 load	g/kWh (g/hph)	2 a–2 b	210 (154)	212 (156)	215 (158)	228 (168)
4/4 load	g/kWh (g/hph)	1	208 (153)	206 (152)	206 (152)	
3/4 load	g/kWh (g/hph)	1	207 (152)	209 (154)	207 (152)	
1/2 load	g/kWh (g/hph)	1	216 (159)	216 (159)	220 (162)	
Specific heat rejection:						
to cooling water	kJ/kWh	2 a–2 b	3090	2830	2925	3110
to exhaust gas	kJ/kWh	2 a–2 b	2490	2400	2640	2920
to surrounding air	kJ/kWh	2 a–2 b	180	155	165	195
Air consumption	m^3/min	2 a–2 b	12	15	20	25
Exhaust flow	m^3/min	2 a–2 b	33	40	53	66
Exhaust temperature	°C	2 a–2 b	500	480	480	480
Permitted exhaust back pressure	mm w.c.		500	500	500	500
Permitted pressure drop in air intake line	mm w.c.		500	500	500	500

Single speed engine for Generating sets etc.

Gross power, at rating for:		Engine speed, rev./min.**) 1500	1800	2100
Stand by duty	kW (hp)	261 (355)	298 (405)	319 (434)
Stand by duty 10% overload ***)	kW (hp)	287 (390)	328 (446)	351 (477)
Prime duty	kW (hp)	223 (303)	256 (348)	–
Prime duty 10% overload	kW (hp)	245 (333)	282 (383)	–
Idle speed max.	rev./min.	1575	1890	2205
Specific fuel consumption:				
4/4 load Stand-by duty	g/kWh (g/hph)	205 (151)	208 (153)	215 (158)
3/4 load Stand-by duty	g/kWh (g/hph)	205 (151)	206 (152)	213 (157)
1/2 load Stand-by duty	g/kWh (g/hph)	210 (154)	216 (159)	226 (166)
4/4 load Prime duty	g/kWh (g/hph)	205 (151)	206 (152)	–
3/4 load Prime duty	g/kWh (g/hph)	207 (152)	207 (152)	–
1/2 load Prime duty	g/kWh (g/hph)	215 (158)	220 (162)	–
Specific heat rejection: Stand-by duty:				
to cooling water	kJ/kWh	2855	2925	3125
to exhaust gas	kJ/kWh	2410	2615	2925
to surrounding air	kJ/kWh	185	190	195
Air consumption	m^3/min	15	20	25
Exhaust flow	m^3/min	40	52	65
Exhaust temperature	°C	480	470	470
Specific heat rejection: Prime duty:				
to cooling water	kJ/kWh	2865	2915	–
to exhaust gas	kJ/kWh	2340	2560	–
to surrounding air	kJ/kWh	180	195	–
Air consumption	m^3/min	14	19	–
Exhaust flow	m^3/min	36	47	–
Exhaust temperature	°C	450	440	–

) Speed variation according to ISO 3046/IV, class A1. *) For transient loads only

Power conditions.
Prime duty: Intended for prime power, back up or peak shaving units.
Stand-by duty: Intended for emergency or stand-by units with a maximum total operating time of 300 h/year.

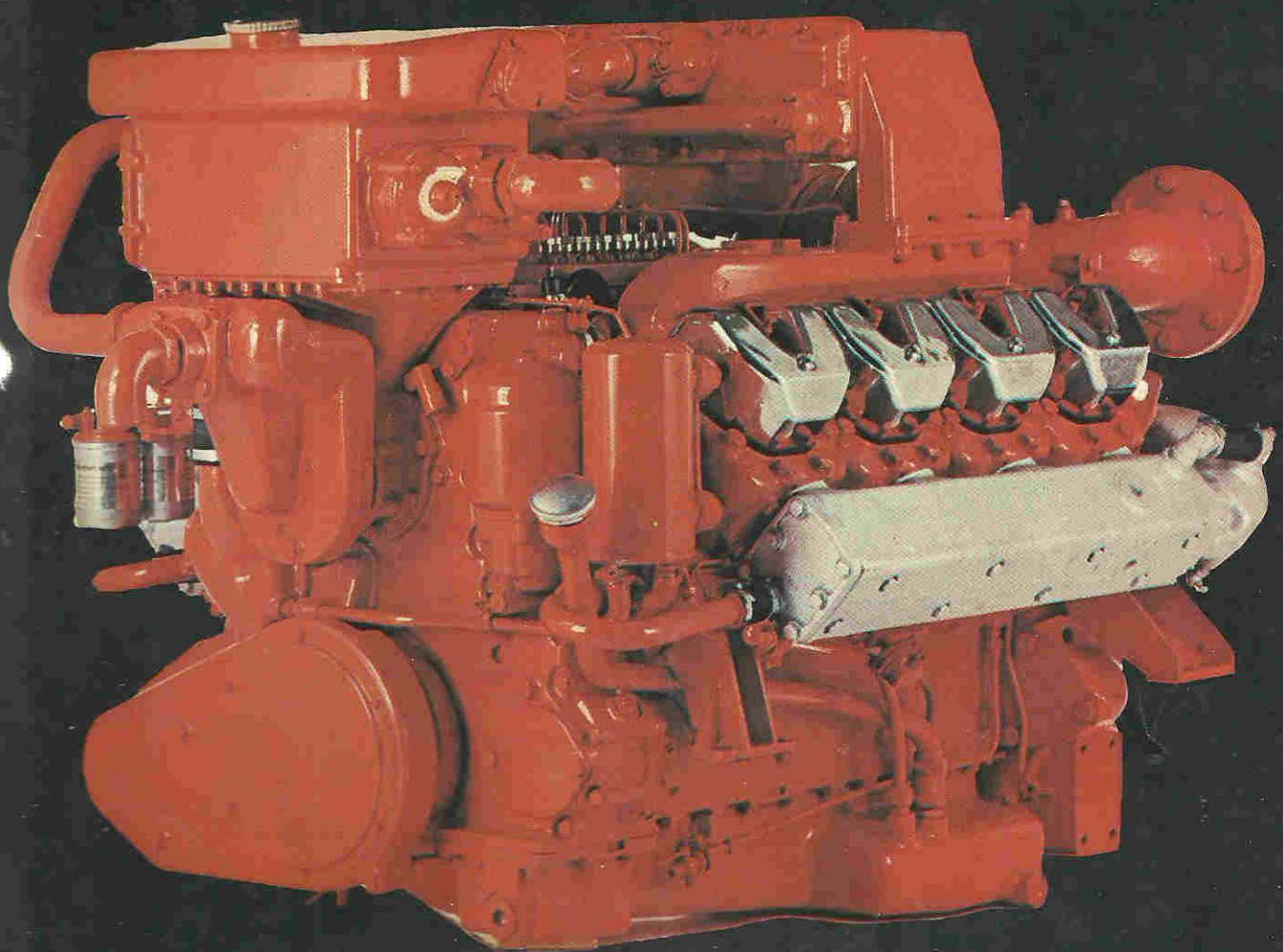
This specification may be rèviced without notice.

SCANIA
INDUSTRIAL & MARINE ENGINES, S-151 87 SÖDERTÄLJE, SWEDEN

E1423 – 8305 Tofters tryckeri ab, Östervåla 1983

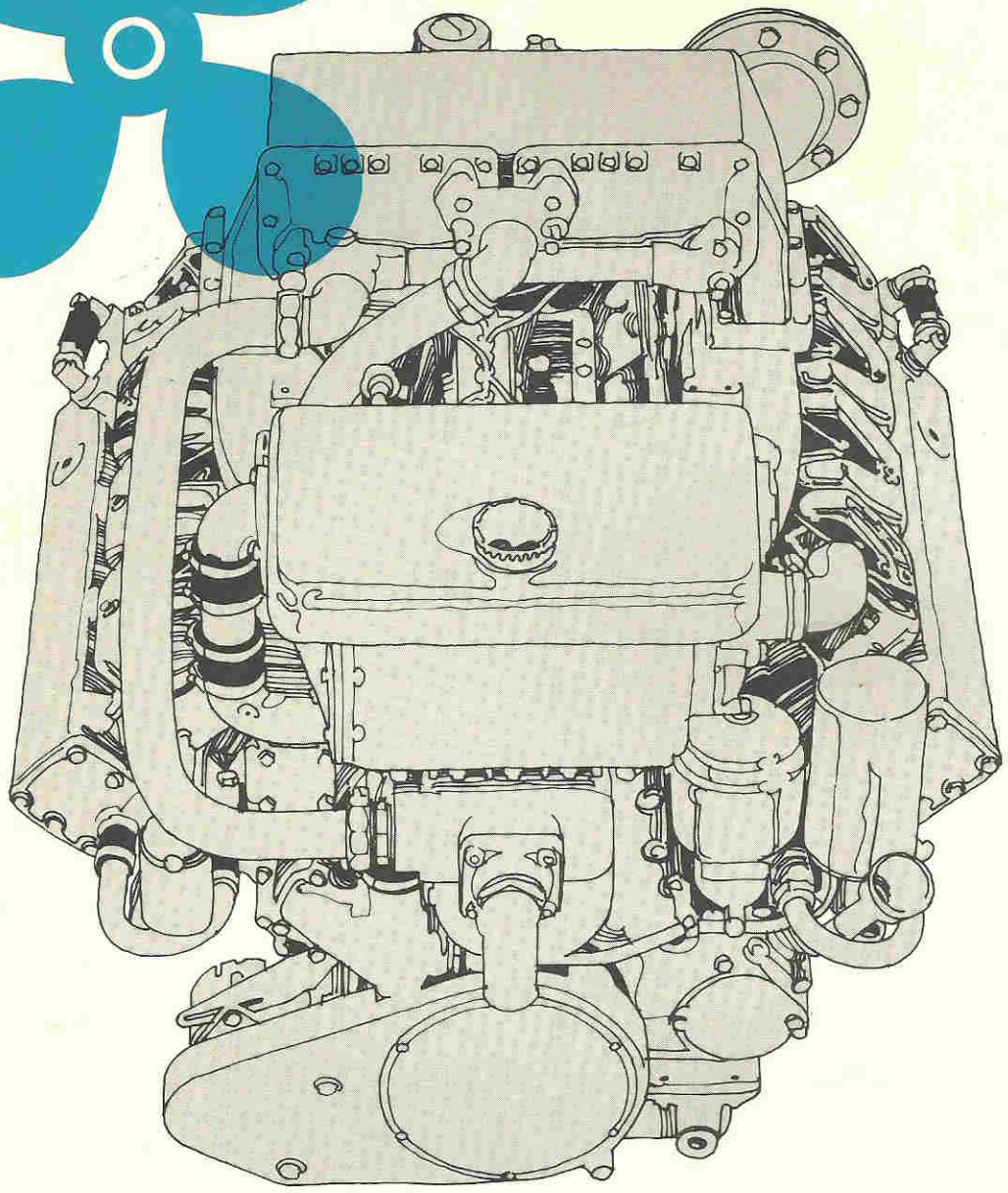
The Scania V8 marine engine -300 Horse Power* output week after week...

Scania now launches a turbo charged marine V8 engine. The DS 14 engine was thoroughly tested before release for more than three years in Scania trucks, with optimum results.



* At continious heavy load and 1800 r/m

For marine propulsion...

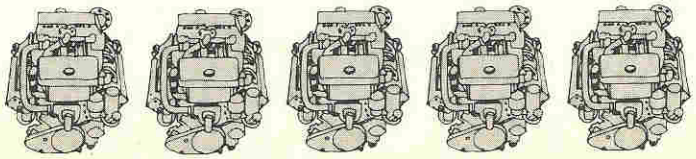


The DS14 engine has seen more than three years use in Scania trucks, generator units, snow-slinging equipment, and dump trucks, etc. with excellent results. It is a superbly robust engine giving maximum traction. Even with such characteristics Scania follows a traditional policy of under-rating marine engines. 300 HP on continuous heavy load with a 14.2 litre engine is a modest power demand, especially when comparing with our competitors. Scania has also limited the maximum speed for heavy marine propulsion engines to 1 800 r/m. Plenty of power reserve gives a uniquely robust and reliable unit.

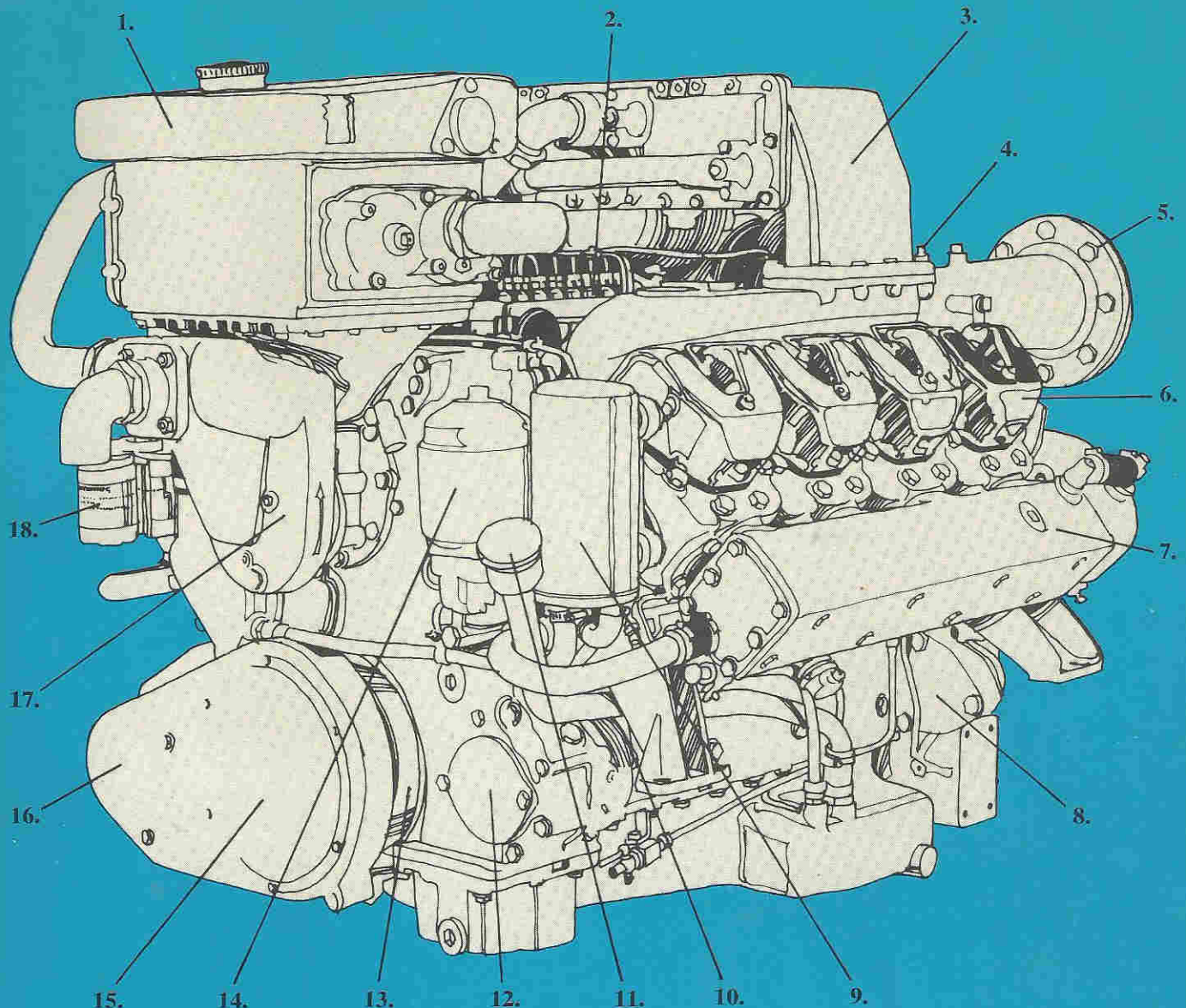
The V-cylinder design limits space requirements and makes the engine particularly suitable for use in multi-engine arrangements, and bow propulsion installations.

The DSI14 engine is economical; it is the most thrifty engine yet built by Scania. When determining operational costs enginge economy is of prime importance, particularly with marine engines running continuously at maximum output.

It naturally follows that Scania's well developed spare parts and service organization also plays a vital part in achieving maximum economy of operation.

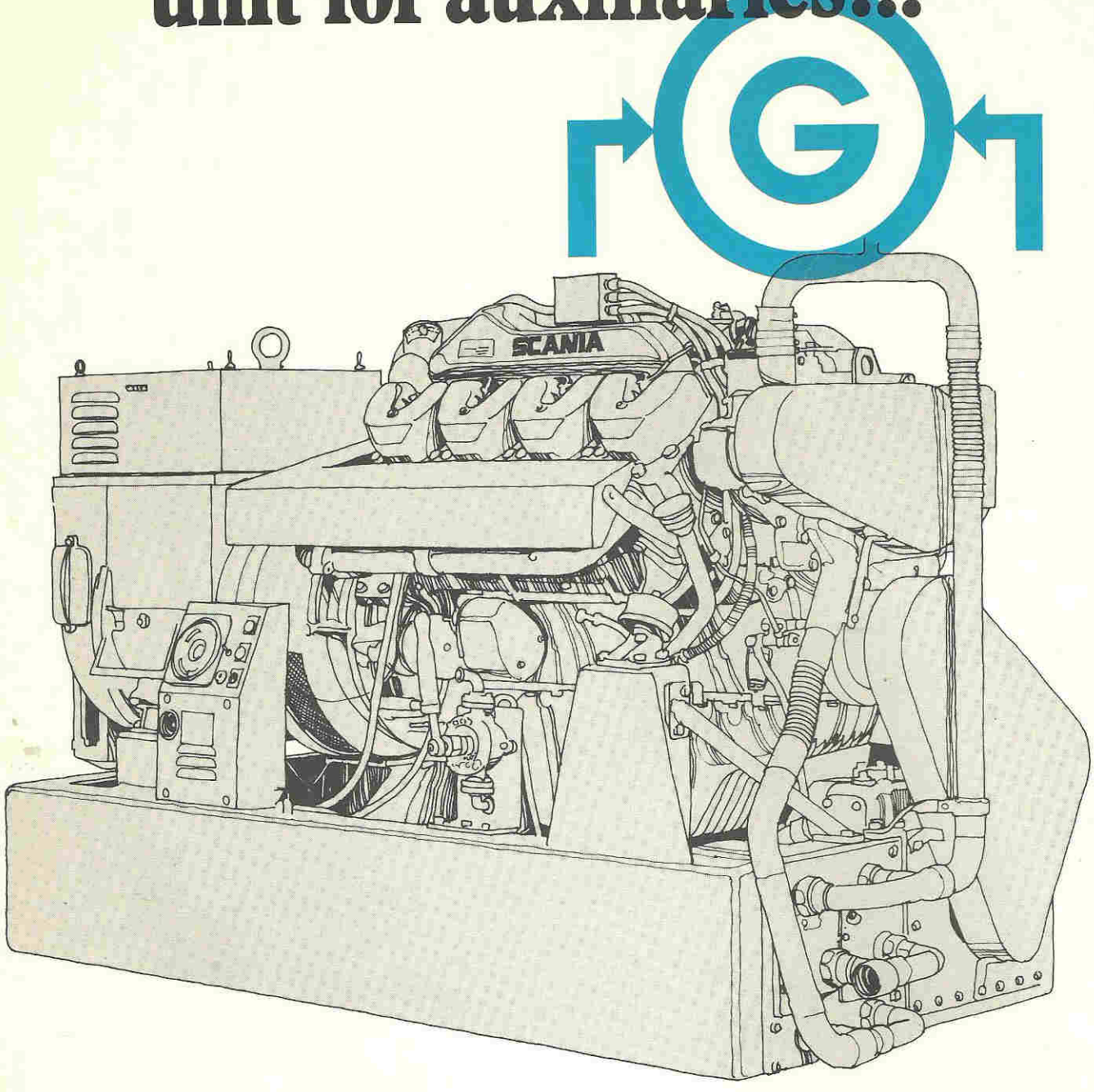


SCANIA
DSI 14



1. *Heat exchanger and expansion tank. (The fresh water coolant is cooled here by salt water.)*
2. *Pressure lubricated fuel injection pump.*
3. *Intercooler for reducing temperature of incoming air.*
4. *Water cooled turbo charger. (Not visible in illustration.)*
5. *Exhaust pipe flange.*
6. *One cylinder head for each cylinder (each with 8 bolts).*
7. *Water cooled exhaust manifold. (Each manifold branch is also water cooled.)*
8. *Mounting flange for auxiliary starter motor. (Either air or electrically powered.)*
9. *Lubricant cooler.*
10. *Side-mounted direct auxiliary power take-off.*
11. *Lubricant filler cap.*
12. *Power take-off for hydraulic pump etc.*
13. *Crankshaft vibration damper of viscous type. (Patented.)*
14. *Double-acting cyclone/centrifugal oil cleaner. (Patented.)*
15. *Crankshaft provided with polygonal high power take-off as standard.*
16. *35 ampere alternator. (Not visible in illustration.) Two may be fitted.*
17. *Sea water pump.*
18. *Fuel filter.*

As power unit for auxiliaries...



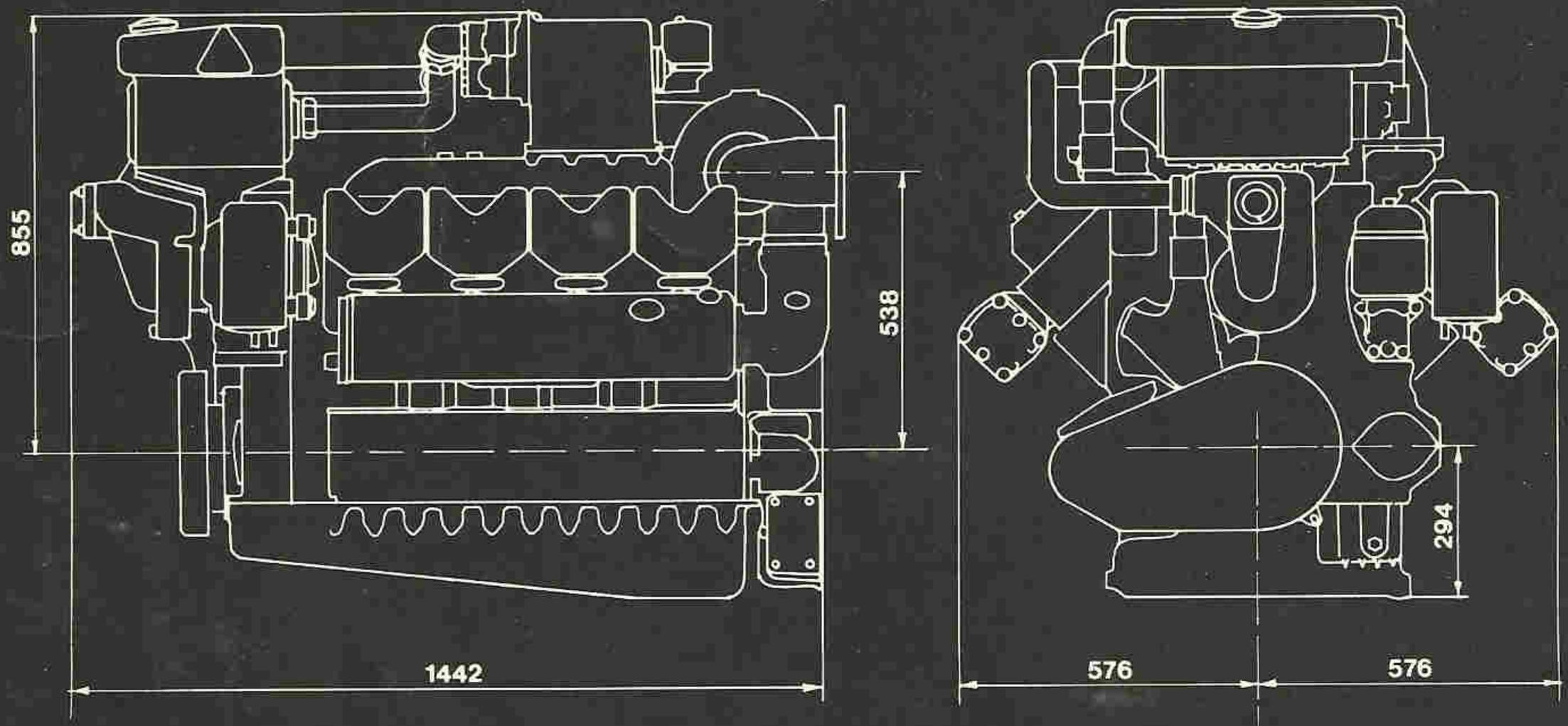
Engine selection is of prime importance when determining the reliability and economy of auxiliary units. The high demands placed on modern auxiliary or emergency power units apply in particular to the engine which is technically the most complicated component.

Scania diesels are a byword for reliability. The DSI14 engine is a welcome complement to the Scania range in the 210—250 kVA generator class. Generator units working in parallel groups of two or three often offer economic advantages, especially where varying loads occur and when only units corresponding to actual load conditions need be run. Where servicing is required power close-down is avoided.

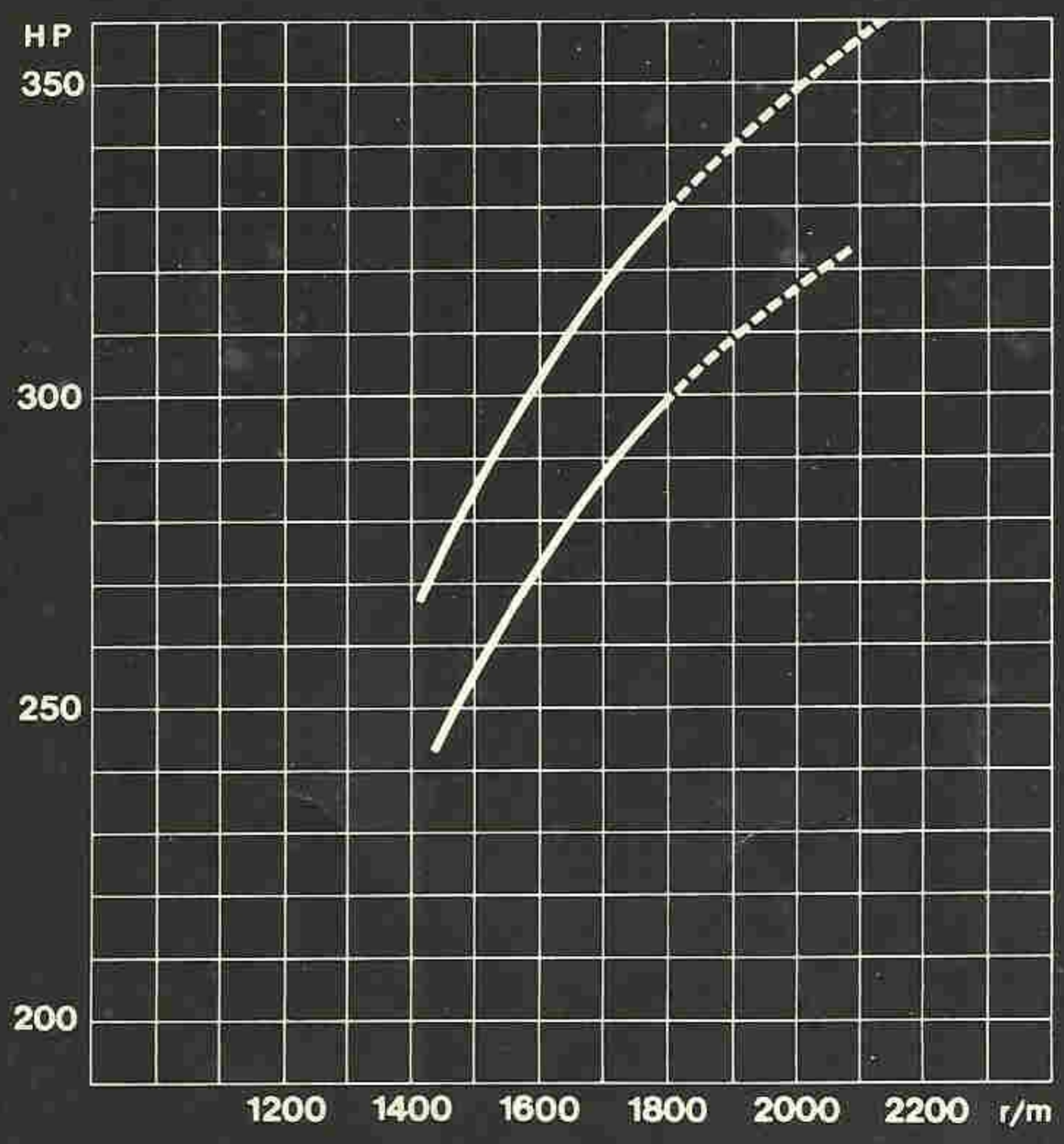
The smaller installation volume required by the compact V-8 engine makes it highly suitable for use in bow propulsion configurations, pumps, deck cranes, and hydraulic pump installations etc.

Specification

Dimensions



Power curves



Engine specification

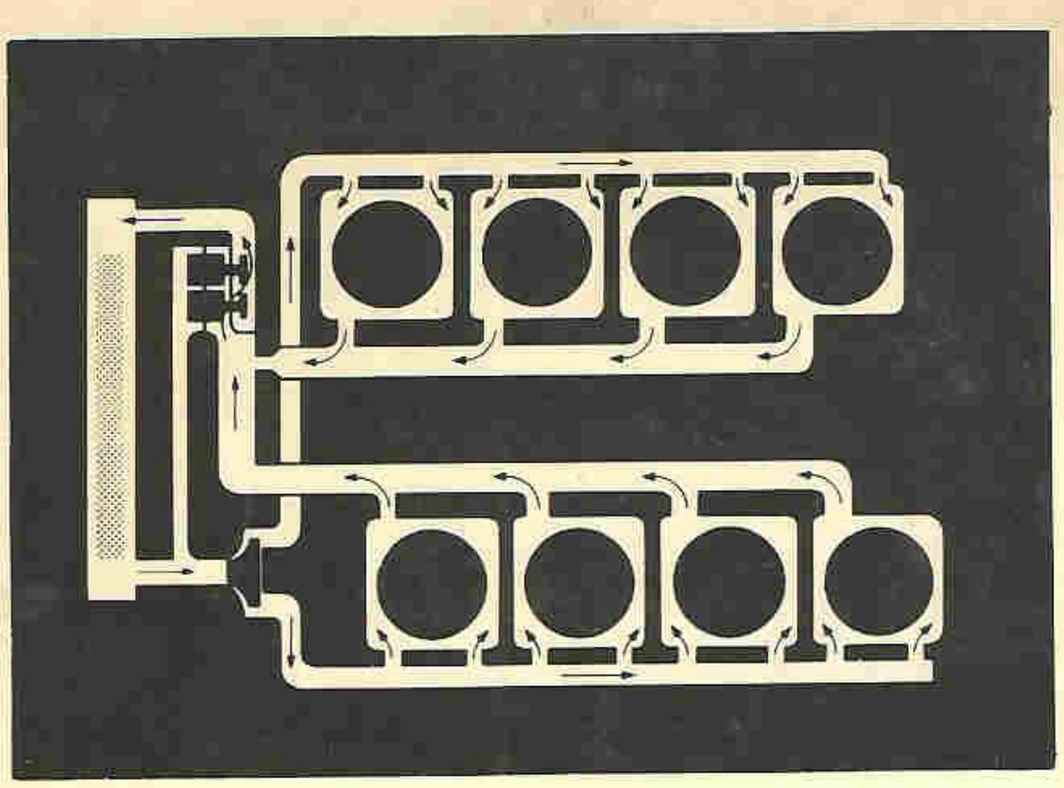
Turbocharged direct injection four-stroke diesel engine with intercooler.

Number of cylinders:	8 (90° V-form)
Displacement:	14.2 l
Stroke:	140 mm

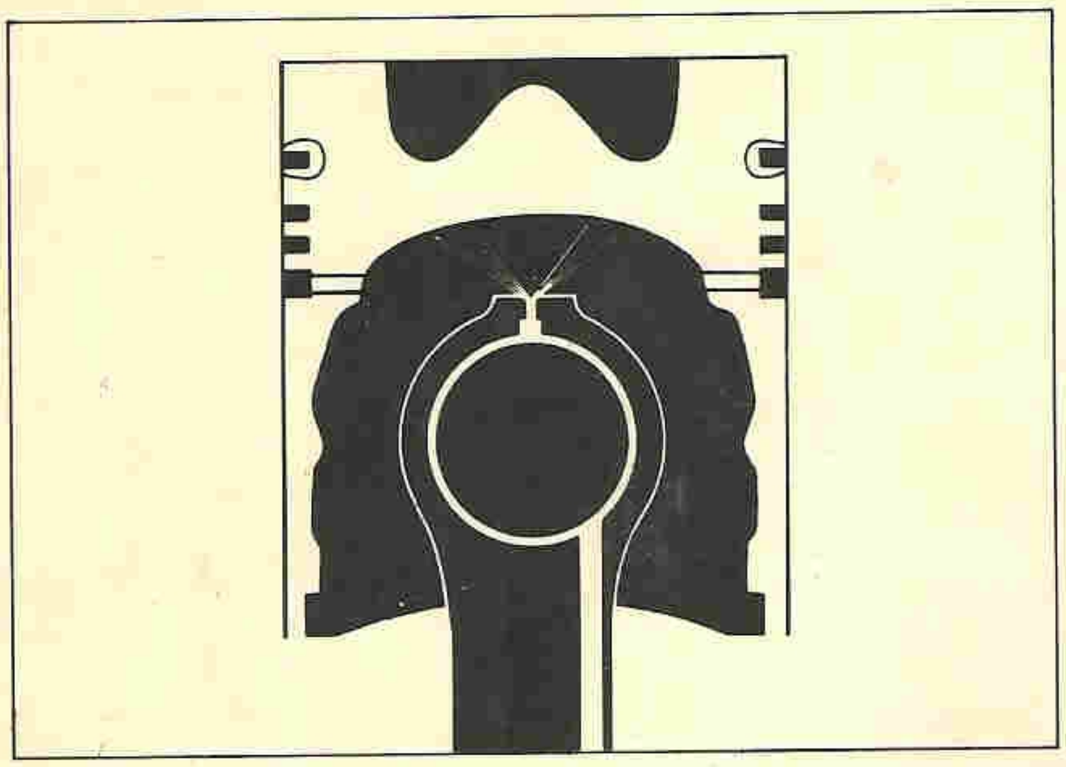
Power output

Heavy continious service:	1 800 r/m	300 HP DIN
Heavy continious service:	1 500 r/m	260 HP DIN
Light service: (pleasure boats):	1 800 r/m	330 HP DIN
Light service: (pleasure boats):	1 500 r/m	290 HP DIN

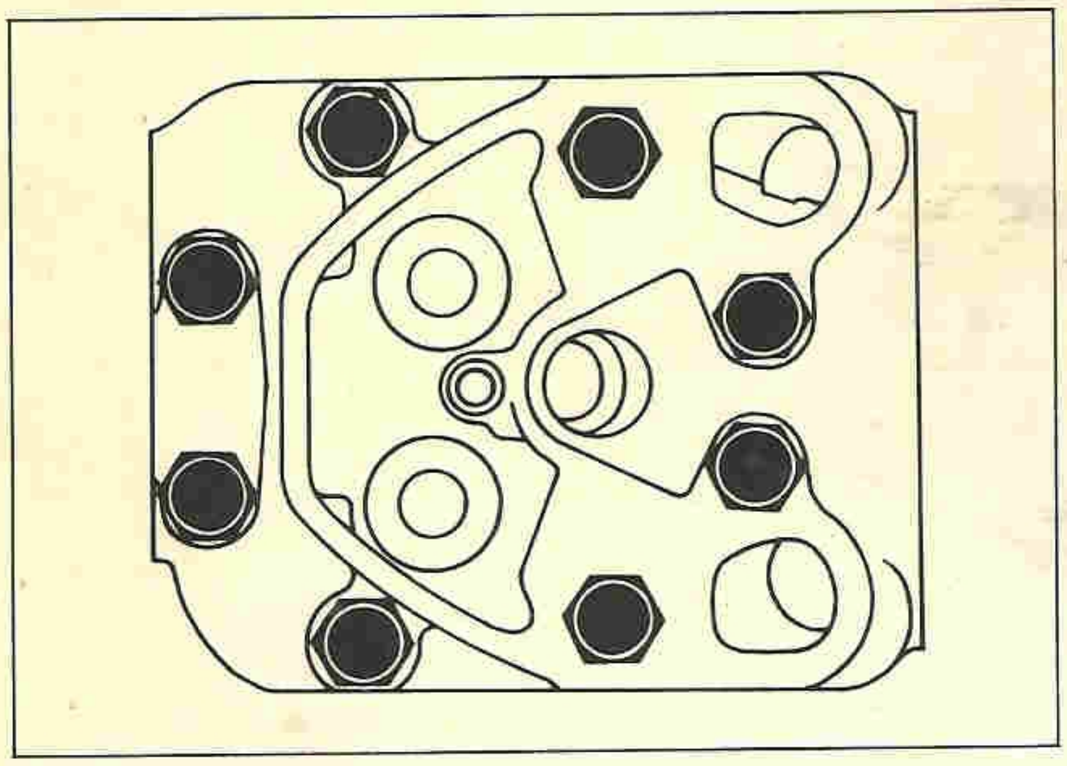
Weight without gear, oil and water: Approximately 1 350 kg.



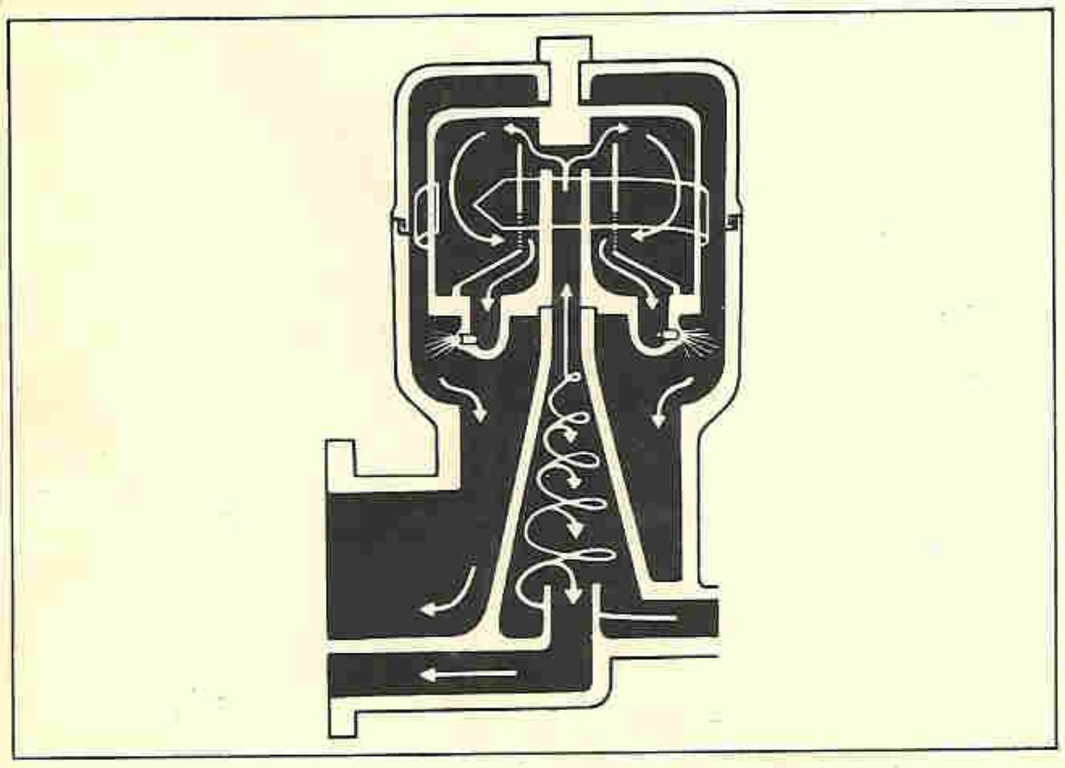
The engine is provided with wet cylinder lines. The cooling system gives perfectly even cooling of all cylinders. Coolant from the fresh water pump is distributed through channels to each row of cylinders. The coolant flows around each liner separately, then to the cylinder head, and from there through calibrated channels back to the thermostats.



The illustration shows how lubricating oil is utilized for cooling the inside of the pistons. Oil passes through the crankshaft and connecting rods up to a jet orifice, and is sprayed over the inside of the pistons.



Sealing is always difficult with engines working at high pressures. The Scania DSI14 has separate cylinder heads for each cylinder. These are retained by 8 massive bolts. A special steel gasket is positioned between the block and cylinder head.



Demirhan Sadıkoğlu
2015

Lubricating oil is cleaned in a double-acting cyclone/centrifugal oil cleaner. The cyclone section separates the used oil which is then passed on to the centrifuge section where suspended matter is removed and deposited on the walls of the cleaner.
Lubrication points in the engine are supplied continously from the cyclone. There is thus no risk of lubricant supply failure owing to a blocked filter.

SCANIA

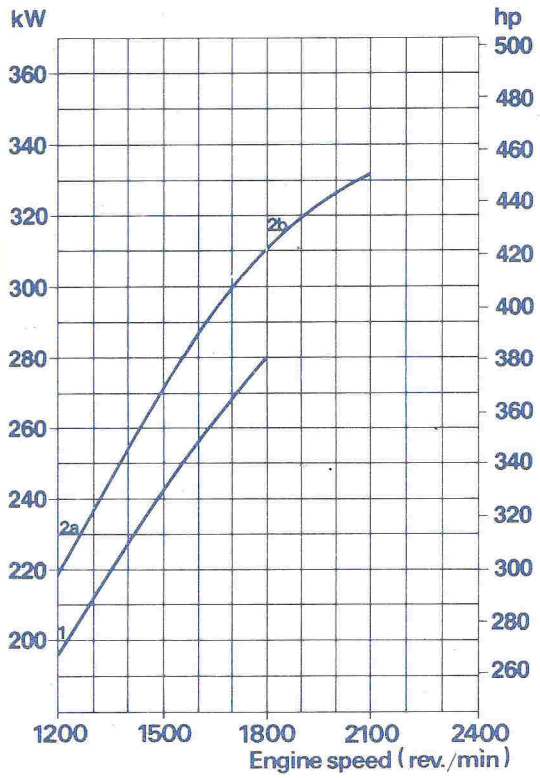
SAAB-SCANIA AUTOMOTIVE GROUP, ENGINE SALES, S 151 87 SÖDERTÄLJE, SWEDEN TELEPHONE 0755-341 40, TELEX 10964

Trycks.nr. E 1159.3.72/5000

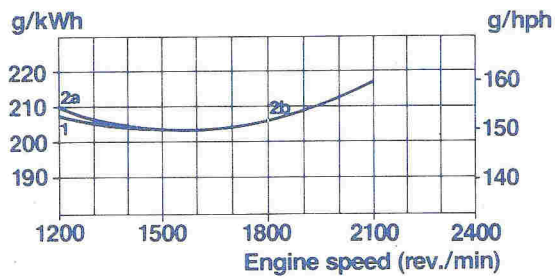
332(450) MARINE ENGINE

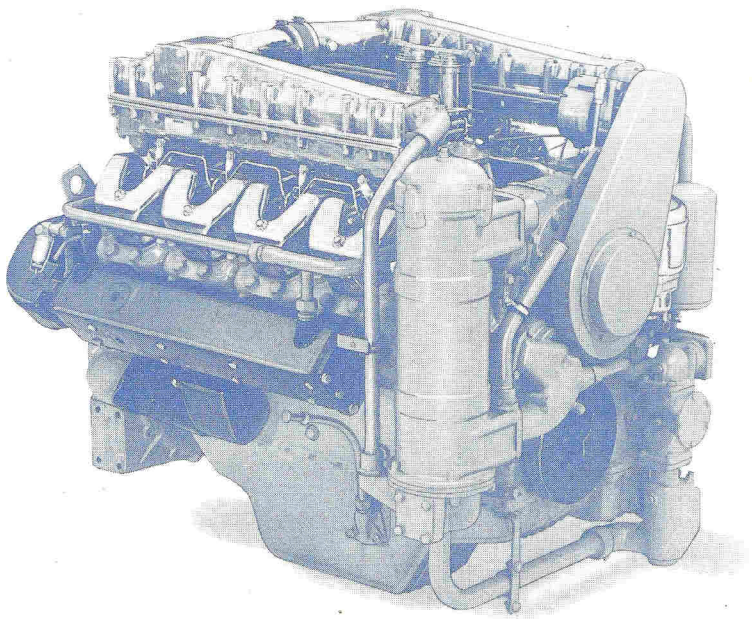
SCANIA DSI14

Power



Specific fuel consumption





Basic data

DSI 14 engine is a turbocharged and charge-air cooled, V-8, water-cooled, 4-stroke, direct injected diesel engine.

Number of cylinders		8 in 90°V
Displacement	dm^3	14.19
Bore	mm	127
Stroke	mm	140
Number of main bearings		5
Compression ratio		15.5:1
Direction of rotation, viewed from flywheel end:		counter clockwise
Moment of inertia, with industrial flywheel	kgm^2	3.03
Cyclic irregularity at full load, curve 1		1:250
Speed variation when taking off, or applying 100% load:		
All speed engine.	%	6-12
Lube oil capacity, standard sump.	dm^3	25
Time between lube oil changes, standard sump	h	200
Specific lube oil consumption at 100% load, curve 1, approx g/kWh (g/hph)		0.7 (0.5)
Cooling water temperature:		
Normal	°C	75-80
Max permitted, without pressure cap,	°C	90
Max permitted, with pressure cap,	°C	95
Weight (excl.oil and water)	kg	1325

Firing order 1-5-4-2-6-3-7-8

1	2	3	4
5	6	7	8

Test conditions

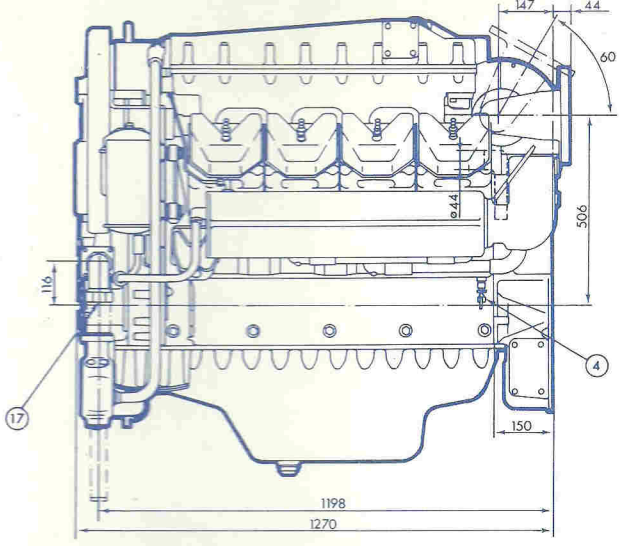
Ambient temperature	+ 27°C
Barometric pressure	100 kPa (750 mm Hg)
Humidity	60%
Power test codes, main:	ISO 3046
supplementary:	ISO 2534
	DIN 6270
	SAE J 1349
	B.S. 5514

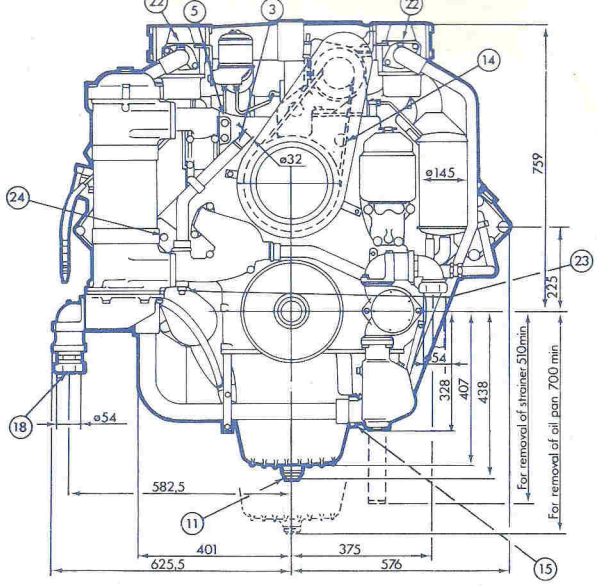
Power rating codes

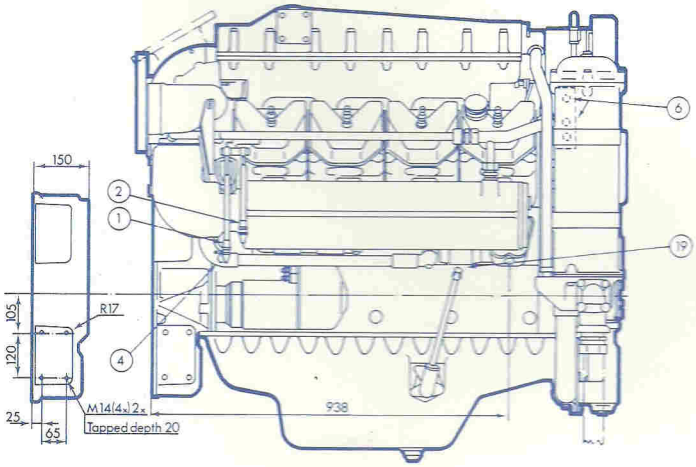
Curve 1 Continuous uninterrupted
Curve 2a Medium duty commercial
Curve 2b Light duty commercial

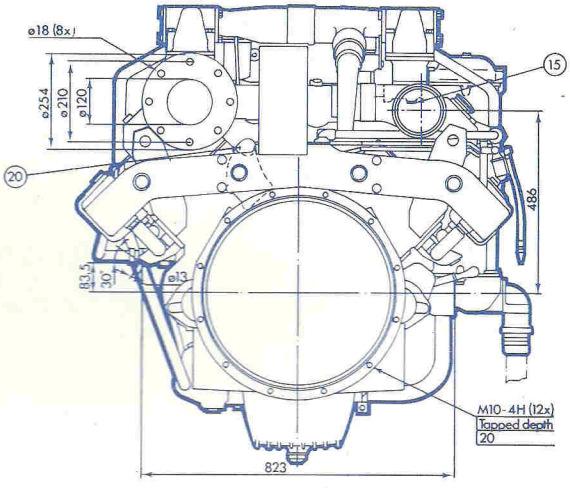
Diesel fuel according to	SIS 155432, or DIN 51601, ASTM-D975-No.2
Density of fuel	0,83 kg/dm^3
Calorific value of fuel	42700 kJ/kg (10200 kcal/kg)
Temperature of fuel	35°C

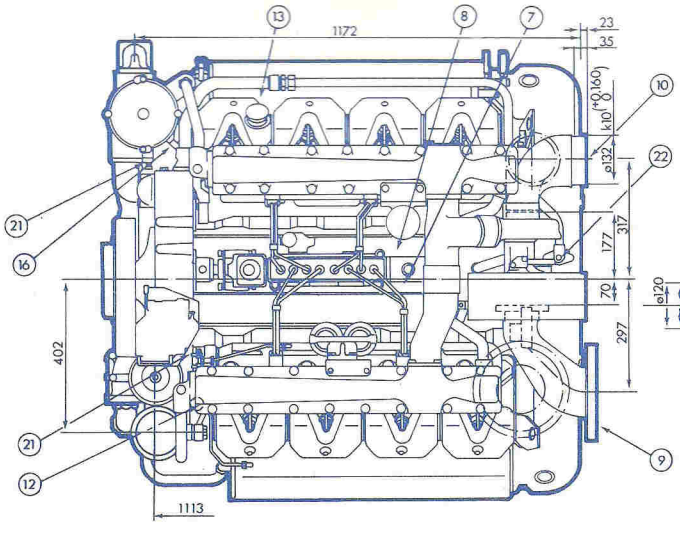
A new engine gives up to 3% lower power

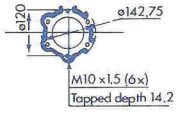


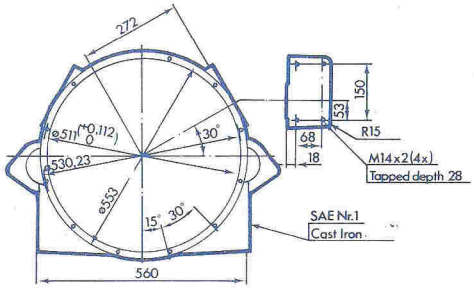












1. Fuel inlet (Pipe 10×1 alt 15×1.5)
2. Fuel return (Pipe 10×1)
3. Connection for expansion tank (Tube Ø 32)
4. Draintaps for fresh water
5. Connection for cooling water thermometer ½ – 14 NPTF(2×)
6. Connection for cooling water thermometer M 14×1.5(3×)
7. Speed control lever (with RSV governor)
8. Stop lever (with RSV governor)
9. Flange exhaust outlet
10. Air inlet for separate air cleaner
11. Drainplug for oil
12. Oil pressure switch
13. Cap for oil filling
14. Connection for tachometer acc. to DIN75532 form E2
15. Drainplug for seawater
16. Draintaps for fresh water
17. Sea water inlet
18. Sea water outlet
19. Oil dipstick
20. Breather housing
21. Venting, to expansion tank (Tube 6×1)
22. Plug for venting
23. Plug for fresh water draining or connection for water return from radiator heating (M14×1.5) (NPSF ¾"– 14)
24. Connection for radiator heating (¾"– 14 NPSF)

Scale 1:20

GENERAL DESCRIPTION

Cylinder block

The cylinders are placed 4 by 4 in 90° V-form. The cylinder block is integral with the upper half of the crankcase and is made in one piece of alloy cast iron. The main bearing caps are made of nodular cast-iron. Each main bearing cap is fixed on the block with 2 vertical and 2 horizontal bolts. The exchangeable wet-type cylinder liners (in direct contact with the coolant) are centrifugally cast of special cast-iron, and are flanged at the top for fitting into the cylinder block. Sealing between the coolant jacket and the crankcase is provided by rings of oil- and heat-resistant rubber.

Cylinder heads

The cylinder heads are made of alloy cast-iron. One cylinder head for each cylinder. Valves and injectors are mounted in the cylinder head. Each cylinder head is fastened with 8 bolts. The gas sealing between block and cylinder head is executed by a steel plate gasket. The sealing around cooling water and lube oil canals, between block and cylinder head is carried out with heavy duty rubber rings. Each head is easily removable. All valve seat inserts are made of a special alloy. The inlet port in the cylinder head is specially shaped to give the incoming air a swirl which improves engine function. This results in optimal combustion of the injected fuel, which to a large extent contributes to the low fuel consumption.

Valves and valve mechanism

Both inlet and exhaust valves are made of heat-resistant steel and are stellite-faced. The inlet valves are mechanically rotated by means of a spring loaded device. The valve stems are chromium-plated and have exchangeable steel caps, against which the hardened thrust surfaces of the rocker arms act. Double springs on every valve. The valve clearance is adjusted with a hardened ball stud on the rocker arm. The pushrods, which rise against the rocker arm, are of steel tubing and are carried in cup type valve lifters of chill-hardened cast iron. The valve mechanism is protected by a light-alloy cover.

Camshaft

The camshaft is drop-forged of alloy steel with cams and journals hardened, ground and polished. It runs in bushings in the cylinder block. The axial thrust is taken up by a flange at the front bearing. The camshaft is driven from the crankshaft through silent-running helical gears.

Pistons

The pistons are made of a light alloy. The shape of the piston crown ensures optimum combustion. For the top compression ring there is a cast-iron insert to reduce the wear of the ring groove to a minimum. Compression rings and oil control ring of alloy cast-iron. Top compression ring of keystone type. The gudgeon pins are made of case-hardened chrome steel.
Piston cooled from inside by lubricating oil, sprayed from a nozzle in the crank case.

Connecting rods

The connecting rods are I-section dropforgings of alloy steel. The small end of the connecting rod is wedge shaped so that combustion pressure is taken up by a much larger area than otherwise, both in piston and connecting rod.
There is a bronze bushing for the gudgeon pin. The gudgeon pin is lubricated by lubricating oil, sprayed from a nozzle in the crankcase. Exchangeable big end bearings of the same type as the main bearings.

Crankshaft

The crankshaft is made of drop-forged alloy steel. It is substantially dimensioned and is dynamically balanced and Magnaflux tested like many other forged engine parts. It is mounted in sturdy main bearings with exchangeable bearing shells consisting of a steel plate with lead-bronze lining covered with lead-indium.
The bearing surfaces of the crankshaft are extra deep induction hardened, ground and polished. The hardening allows, if required, regrinding to 6 undersizes for which standard bearings can be obtained. The axial forces are taken up by thrust washers at the rear main bearing.
The crankshaft has a patented viscous-type vibration damper at the frontend.

Oil sump

The oil sump is cast in aluminium alloy and provided with a magnetic drain plug. The standard oil sump has the oil drain plug in the bottom of the sump. Handpump for oil draining is delivered loose with the engine.

Lubricating system

From a gear pump located in the front of the sump the oil is forced to the main bearings, big-end bearings, camshaft bushings, the bearings of the timing gears and the piston cooling nozzles. The pump capacity at 2,100 engine rev/min is 123 dm^3/min. By a special device at the first camshaft bearing the oil is fed intermittently to the rocker mechanism from which it runs off to lubricate the valve lifters.
The oil pressure is regulated by a pressure relief valve. Maximum oil pressure is set to 4.5–6 bar.
The lubricating system has a oil cooler of the heat exchanging type, connected to the engine cooling system.

Oil cleaner

The lubricating oil is cleaned prior to the oil pump by a strainer in the oil sump and after the oil pump by a patented cleaning arrangement consisting of a cyclone and a centrifugal type cleaner. An extra spin on type oil filter is cleaning the oil, lubricating the floating type bushing of the turbocharger.

Crankcase ventilation

The interior of the crankcase is ventilated by a breather pipe on the block, provided with an oil trap and a protection filter.

Fuel system

The fuel is drawn from the fuel tank through a prefilter by a feed pump. It is then forced through two parallelly connected fine filters to the injection pump. The injection pump forces the fuel through pressure pipes to the injectors. The pump is driven from the crankshaft through helical gears and an adjustable coupling. It is provided with a centrifugal governor which regulates the fuel charge according to the load of the engine.
The camshaft of the injection pump has a special design which prevents reverse running. The injectors have multi-

orifice nozzles and are furnished with edge-type filters. The opening pressure is set to 230 bar. Leak-off oil from the injectors is carried back to the tank. The cold-starting device facilitates starting at low temperatures. It gives additional fuel for starting and is then automatically cut out. The injection pump is lubricated from the engine lubricating system. The prefilter is a fine-mesh gauze filter. The fine filters have cartridges of specially impregnated paper.

Cooling system

The engine including exhaust manifold is fresh water cooled. The fresh water i cooled by a heat-exhanger mounted directly on the front of the engine.
The coolant is pumped from the radiator by a powerful pump lengthwise in a distribution canal in each cylinder row. Through these passages the coolant is led to and round the cylinder liners after which the coolant passes up to the cylinder heads. The coolant passages in the cylinder heads are so directed that the injectors and exhaust valves receive maximum cooling. From the cylinder heads the coolant is led through two canals (one for each cylinder row) provided with calibrated holes for exact cooling efficiency by direct cooling of each cylinder head. Then back to the heat-exhanger via two vax-thermostats. The thermostats do not open until the coolant has reached normal working temperature. At low temperature the coolant is led through a return passage in the transmission case straingt to the suction side of the coolant pump. Thus the coolant circulates only in the engine to reach working temperature quickly. The coolant pump is of centrifugal type. It is mounted on the front end of the cylinder block and is directdriven by the engine timing gears. The pump has a self-adjusting carbon seal. The pump shaft is of stainless steel and runs in sealed ball-bearings. The sea water pump is driven directly from the engine and gears.

Charge-air cooler

The charge-air cooler is located inside the inlet manifold. Sea water cools the intake air. This means that more air can be forced into the cylinders as cold air needs less space than warm.

Exhaust manifold

Standard watercooled exhaust manifold is shown in the main drawing.

Turbocharger

The turbocharger consists of a single stage radial turbine and a single stage centrifugal compressor. The turbine utilizes the energy of the exhaust gases and supplies the engine with extra air for optimum combustion and higher output. Turbine and compressor wheels are individually balanced and are fitted on one shaft, which runs in a floating type bearing. The turbine blades are made of special heat-resistant material. The turbocharger is cooled and lubricated from the engine lubricating system. The turbocharger is provided with an insulation cover.

Flywheel housing and flywheel

Standard flywheel housing is made of nodular iron and has a SAE 1 connection flange. The flywheel housing have the possibility to mount double starter motors.
Standard flywheel is for reverse gear or industrial clutch.

Electrical system

The electrical system has a nominal voltage of 24 V. 2-pole 35 A 28 V alternator with relay and sending unit for tachometer. 2-pole starter motor rated 6.5 kW (9 hp).

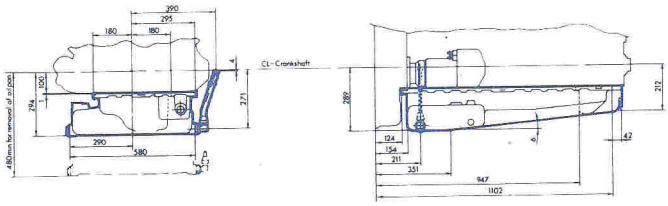
OPTIONAL EQUIPMENT

Crankshaft

For high output power take off from the crankshaft front end, a special crankshaft with polygon joint can be supplied.

Oil sump

This lower oil sump have the oil draining plug on the right hand side and the dip-stick on the left hand side.



Flywheels

Flywheels are available for different types of industrial clutches, converters, reverse gears, flange mounted generators and for flexible couplings.

EXTRA EQUIPMENT

Engine mountings

Stiff and fixed suspensions are available in combinations with several different reverse gears.

Power take-offs

Several direct driven optionals can be connected to the crank shaft and the timing gear train. Air compressor, side or front mounted power take-offs, hydraulic pump etc.

Clutches, reverse gears and couplings

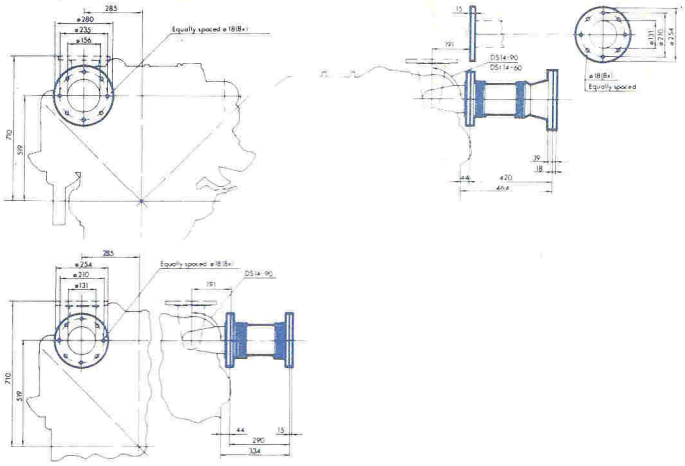
One 14" triple plate, industrial clutch is available.
Different types of reverse gears and flexible couplings can be supplied.
Single or double flexible couplings, flywheel mounted or shaft mounted.

Silencer

Silencers can be delivered in different executions.

Exhaust fittings

Following flexible exhaust connections can be delivered optionally.



Air cleaner

Two dry types are available: One with metal net and one with paper insert.

Instrumentation

Panel 285102, for propulsion engines with 2-pole electrical system.
Includes: Electrical tachometer with
revolution counter,
engine oil pressure and
water temperature gauges,
warning lamps for charging voltage,
water temperature and oil pressure,
starter push-botton, stopping push-botton,
ON/OFF-switch,
rheostat for instrument lighting and jointing cable 5 meters.
Manual stop in event of fault

To the instrument panel 285102 is a connection box on the engine, with relays for starting, stopping and alarm. In the connection box is a terminal board to which the lines from all the measuring and monitoring points are run.
The couplings consist of divisible, multi-pole pin connectors with a splashproof locking arrangement.
All connection cables are ready-made upon delivery.

Panel 335850 for engine with 1-pole electrical system
Includes: Electrical tachometer with hourmeter, engine oil pressure and water temerature gauges, rheostat for instrument lighting, key switch, interlock push-button, stopping push-button with warning lamp for battery charging, buzzer, alarm lamp and automatic stop at high coolant temperature and/or low oil pressure (the automatic stop can be disconnected), jointing cable 6 meters.

The complete instrumentation consists of instrument panel, jointing cable, cable bundle and a junction box with relays for starting/stopping and a automatic fuse.

SERVICE INSTRUMENT PANEL

Panel 218719,
Instrument panel without instruments. Can be equipped with three ∅ 60 mm instruments as required.

Additional equipment and classification

Different devices for accurate speed adjustment, engine heater, emergency starting equipment, protection covers for V-belts and pump couplings, tool kit, spare parts set etc, can be supplied.
The engine can be delivered with certificate from most classification societies.

Technical data, all speed engine.

		Curve No.	Engine speed, rev./min. 1200	1500	1800	2100
Gross power:						
1 h/2 h and max. 1,000 h/year	kW (hp)	2 b	–	–	310 (421)	332 (450)
8 h/24 h	kW (hp)	2 a	219 (298)	269 (366)	310 (421)	–
24 h/24 h	kW (hp)	1	197 (268)	241 (328)	279 (379)	–
Specific fuel consumption:						
4/4 load	g/kWh (g/hph)	2 a–2 b	210 (154)	204 (150)	206 (152)	217 (160)
3/4 load	g/kWh (g/hph)	2 a–2 b	206 (152)	204 (150)	206 (152)	218 (160)
1/2 load	g/kWh (g/hph)	2 a–2 b	212 (156)	211 (155)	216 (159)	232 (171)
4/4 load	g/kWh (g/hph)	1	210 (154)	204 (150)	206 (152)	–
3/4 load	g/kWh (g/hph)	1	205 (151)	205 (151)	207 (152)	–
1/2 load	g/kWh (g/hph)	1	213 (157)	213 (157)	215 (158)	–
Specific heat rejection:						
to cooling water	kJ/kWh	2 a–2 b	3030	2865	2825	2935
to exhaust gas	kJ/kWh	2 a–2 b	2260	2265	2470	2670
to surrounding air	kJ/kWh	2 a–2 b	225	125	150	280
Air consumption	m^3/min	2 a–2 b	13	18	23	26
Exhaust flow	m^3/min	2 a–2 b	34	45	57	66
Exhaust temperature	°C	2 a–2 b	470	440	435	445
Permitted exhaust back pressure	mm w.c.		500	500	500	500
Permitted pressure drop in air intake line	mm w.c.		500	500	500	500

Single speed engine for Generating sets etc.

		Engine speed, rev./min.**) 1500	1800
Gross power, at rating for:			
Stand by duty	kW (hp)	275 (374)	315 (428)
Stand by duty 10% overload ***)	kW (hp)	302 (411)	347 (472)
Prime duty	kW (hp)	245 (333)	282 (383)
Prime duty 10% overload	kW (hp)	269 (366)	310 (421)
Idle speed max.	rev./min.	1575	1890
Specific fuel consumption:			
4/4 load Stand-by duty	g/kWh (g/hph)	205 (151)	206 (152)
3/4 load Stand-by duty	g/kWh (g/hph)	205 (151)	206 (152)
1/2 load Stand-by duty	g/kWh (g/hph)	210 (154)	214 (157)
4/4 load Prime duty	g/kWh (g/hph)	204 (150)	206 (152)
3/4 load Prime duty	g/kWh (g/hph)	205 (151)	207 (152)
1/2 load Prime duty	g/kWh (g/hph)	214 (157)	215 (158)
Specific heat rejection. Stand-by duty:			
to cooling water	kJ/kWh	2900	2830
to exhaust gas	kJ/kWh	2275	2480
to surrounding air	kJ/kWh	115	140
Air consumption	m^3/min	18	23
Exhaust flow	m^3/min	46	58
Exhaust temperature	°C	445	440
Specific heat rejection. Prime duty:			
to cooling water	kJ/kWh	2760	2805
to exhaust gas	kJ/kWh	2220	2410
to surrounding air	kJ/kWh	220	175
Air consumption	m^3/min	17	21
Exhaust flow	m^3/min	41	51
Exhaust temperature	°C	420	420

) Speed variation according to ISO 3046/IV, class A1. *) For transient loads only.

Power conditions.
Prime duty: Intended for prime power, back up or peak shaving units.
Stand-by duty: Intended for emergency or stand-by units with a maximum total operating time of 300 h/year.

This specification may be revised without notice.

SCANIA
INDUSTRIAL & MARINE ENGINES, S-151 87 SÖDERTÄLJE, SWEDEN

E1424 – 8305 Tofters tryckeri ab, Österväla 1983