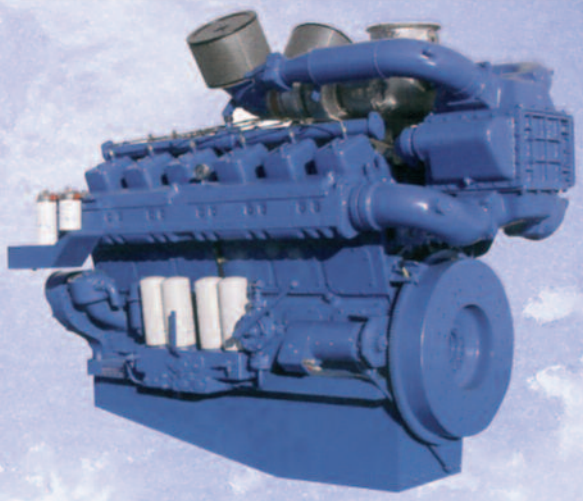
UD25



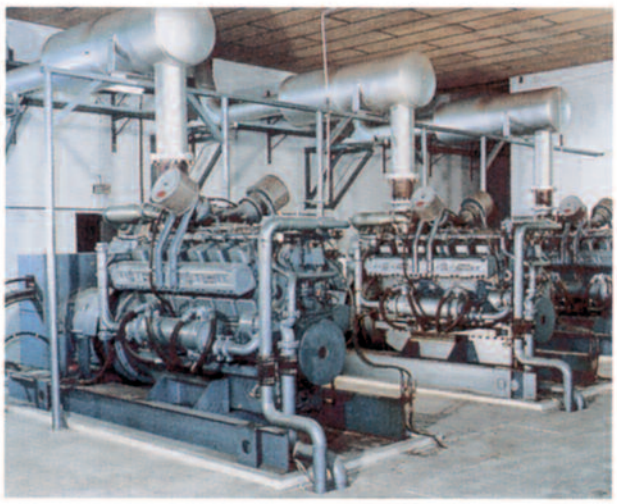
Diesel Engine

WÄRTSILÄ

THE UD 25 D ENGINE

Economical, Robust, Reliable

The ideal power source for applications in the most demanding conditions :



Power station with generating sets with UD 25 V12 S5D engines

GENERATING STATIONS

- Primary or auxiliary power generation
- Standby generators
- Mobile generating sets fitted on a trailer or in a container

MARINE APPLICATIONS

- Propulsion
- On-board generating sets
- Drilling platform equipment
  Generator sets
  Pumping sets
  Fire fighting equipment

The UD 25 D engine is classifiable BV, RINA, GL, LRS, DNV, ABS, URS.

Trawler fitted with UD 25 V12 M3D propulsion engine

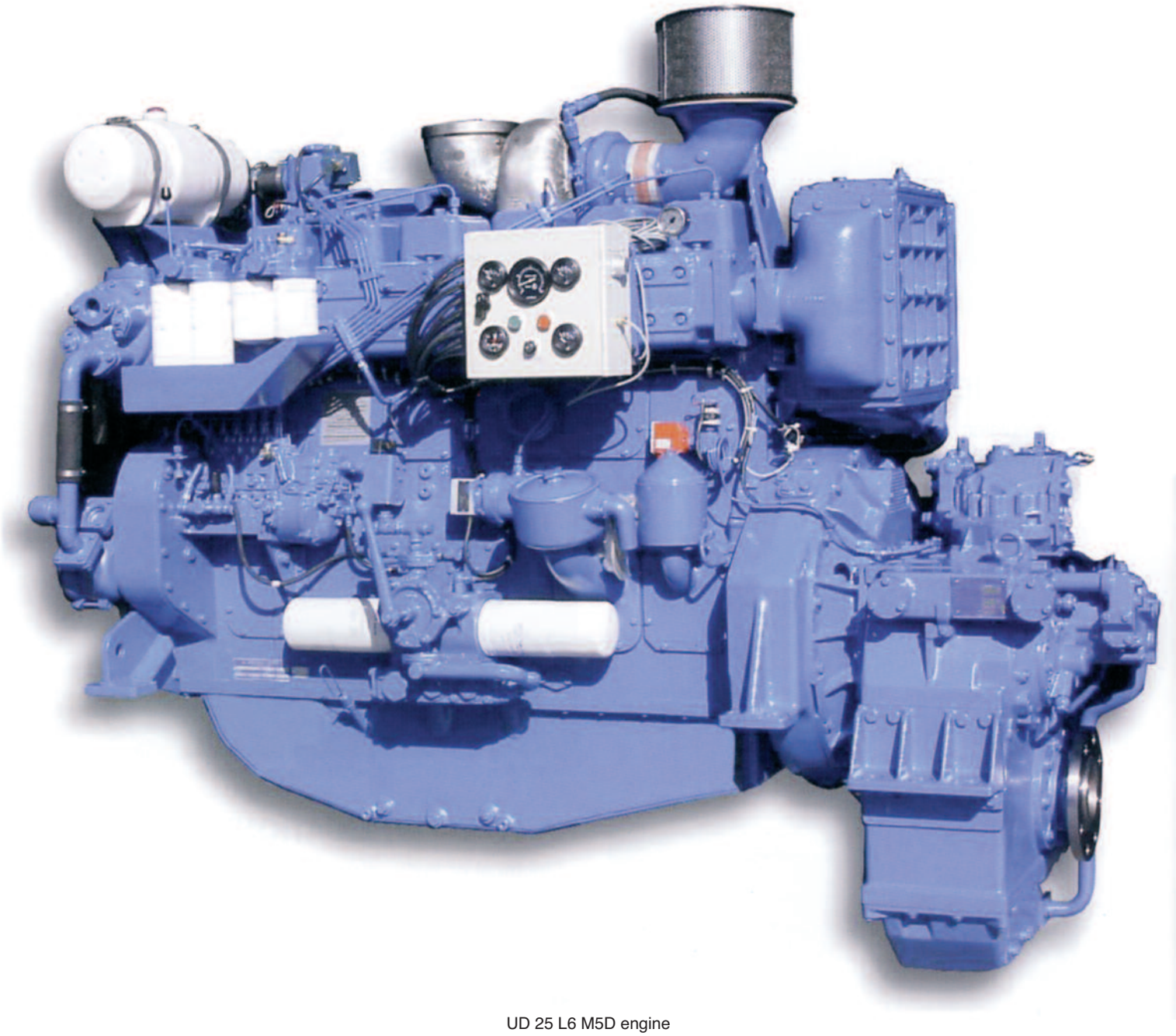
RAILWAY APPLICATIONS

- Electrical or hydro-mechanical traction

Railway-traction with UD 25 V12 R4D diesel electric unit

VARIED INDUSTRIAL APPLICATIONS

- Pumping sets
- Auxiliary power drives



UD 25 L6 M5D engine

UD 25 D
A RELIABLE AND ROBUST HIGH PERFORMANCE INDUSTRIAL ENGINE

The UD 25 D engine has been designed for industrial power generation.
Its sturdiness has been proved in numerous demanding applications and its benefits from the latest technological developments (combustion - high pressure turbo-charging - electronic speed governing).

The UD 25 D diesel engine is produced in 6 cylinders in line and 45° V12 versions.

This engine is operated within the speed range of 1000 to 1650 R.P.M. The power output, according to the extent of supercharging, ranges from 260 kW to 941 kW at 1500 R.P.M.

A gas version of the UD 25 engine is also available.

Since its launch, more than 14000 units of the UD 25 D engine have been produced.

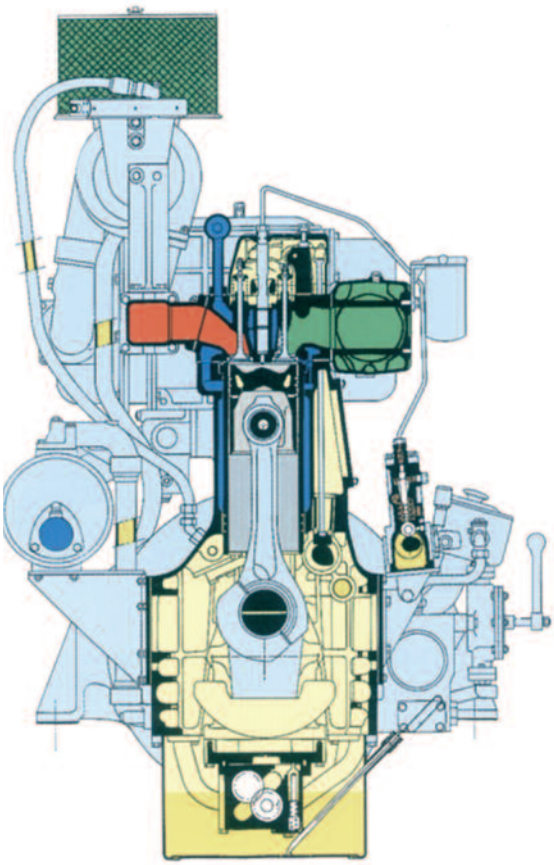
Container mounted 1000 kVA generating set
with UD 25 V12 S5D engine

UD 25 D ENGINE MAIN TECHNICAL CARACTERISTICS

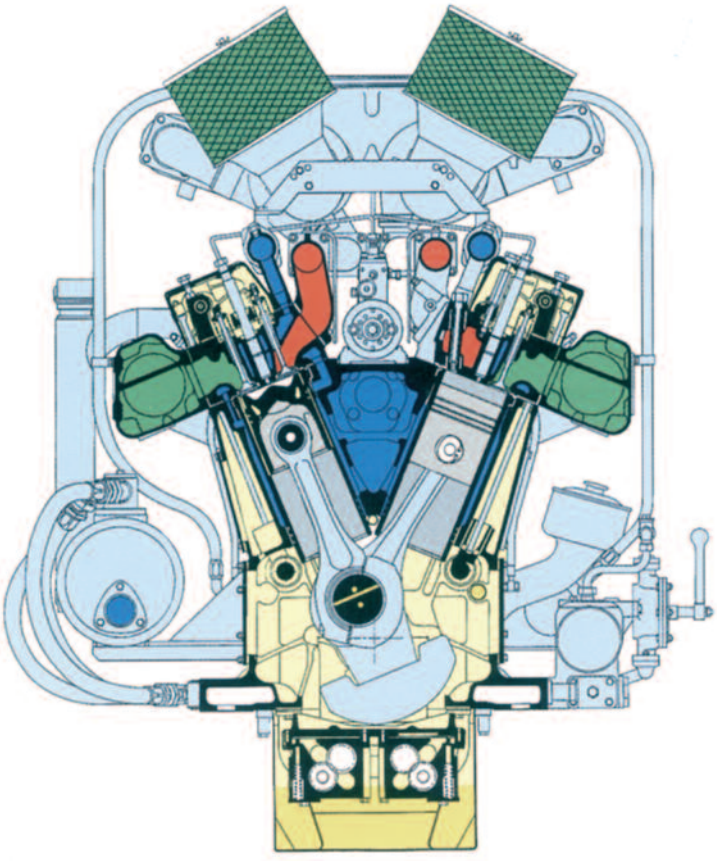
BORE	150 mm	MAX. POWER/CYLINDER	78.5 kW/cylinder
STROKE	180 mm	MEP* Maxi	19.7 bars
SPEED	1000 to 1650 R.P.M.		
MEAN PISTON SPEED	6 - 9.9 m/s		
CYLINDER LAYOUT	6 cylinders in line or 45° V12		
UNIT CYLINDER	3.18 l		

*MEP = Mean Effective Pressure

All characteristics given in this brochure may be revised without prior warning.



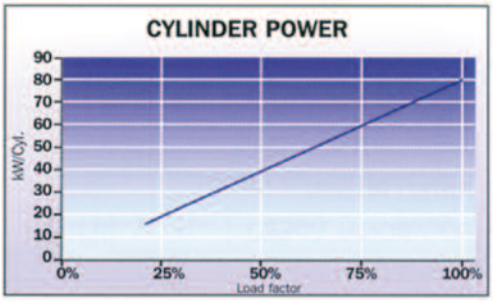
UD 25 L06 D engine

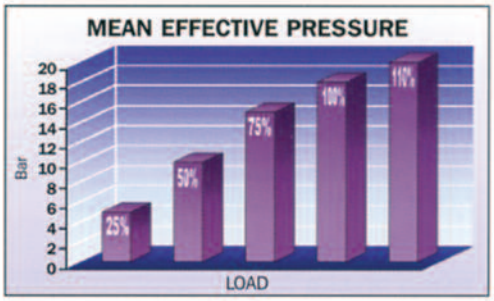


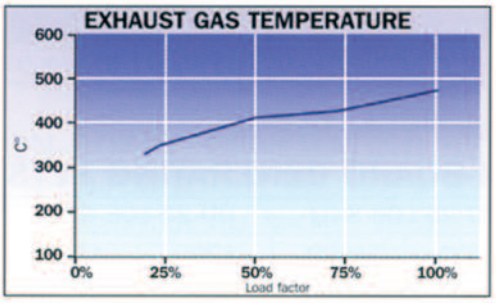
UD 25 V12 D engine

PERFORMANCE

- Excellent power/weight and power/size ratio.
- No power downgrading up to combustive air temperature 45°C for the marine version.
- Quick starting and quick response to loading impact.





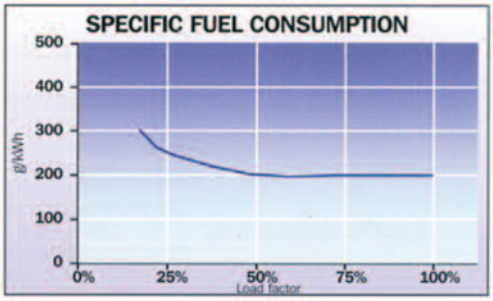


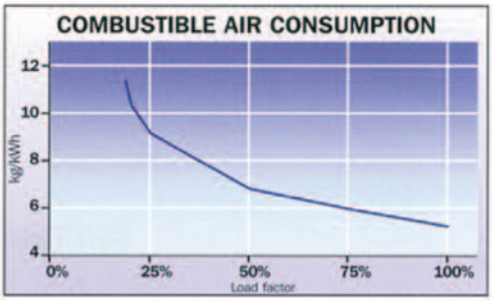
RELIABILITY

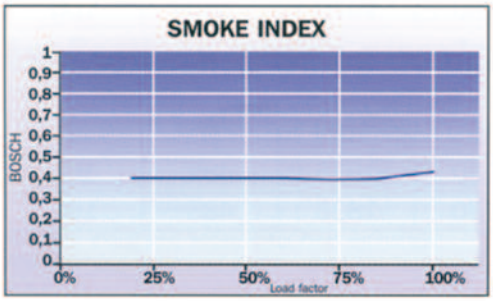
- Excellent reliability borne out by more than 14000 high speed engines already in service with our customers.
- Simple and robust construction.

ECONOMY

- Low fuel consumption.
- Low installation costs as the engine incorporates all its auxiliary equipment.
- Low running costs with long intervals between service operations.







ENVIRONMENTAL PROTECTION

- Very low smoke index.
- Optimal combustion.

UD 25 D L06 DIESEL ENGINE

GENERATING SET APPLICATIONS

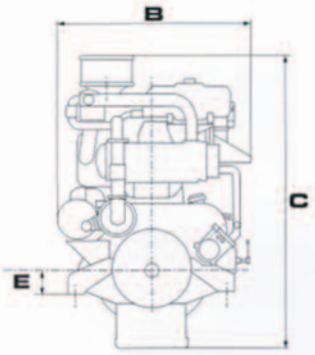
RATED POWER			UD 25 L06 S4D			UD 25 L06 S5D		
ROTATIONAL SPEED		R.P.M.	1000	1200	1500	1000	1200	1500
SERVICE (1)	GE0	kVA	220	310	350	250	360	450
	GE1	kVA		346	391		400	500
	GE2	kVA	260	368	411	295	425	525
	GE3	kVA		433	469		500	600

(1) Output declared at PF 0.8 and alternator efficiency 0.94
GE0 : According to ISO 8528/1 - Continuous service - Power without time and load factor limitation
GE1 : According to ISO 8528/1 - Intermittent service <750h/year - 100% rated power
GE2 : According to ISO 8528/1 - Continuous service - Average load 70% rated power - 100% load <500h/year
GE3 : According to ISO 8528/1 - Emergency service <200h/year - Average load 80% rated power - 100% load <25h/year
Other conditions according to ISO 3046/1

MARINE PROPULSION APPLICATIONS

RATED POWER			UD 25 L06 M3D		UD 25 L06 M4D		UD 25 L06 M5D			
PROPELLER TYPE							CPP		FPP	
ROTATIONAL SPEED		R.P.M.	1500	1650	1500	1650	1500	1650	1500	1650
SERVICE (2)	MA1	kW	294		313	331	373	405	400	440

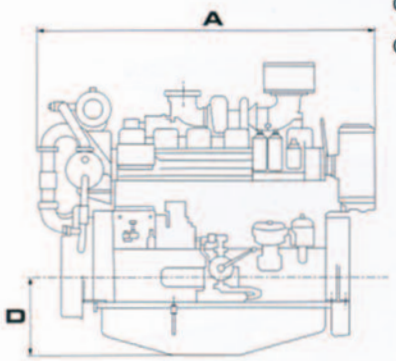
(2) MA1 : Continuous rating - No overloading
Other operating conditions : in accordance with ISO 3046/1 - Applications : fishing vessels and work vessels



ON-BOARD GENERATING SETS

RATED POWER			UD 25 L06 S4D		UD 25 L06 S5D	
POWER/ROTATIONAL SPEED		R.P.M.	1200	1500	1200	1500
SERVICE (3)	GEB0	kVA	310	350	360	450
	GEB1	kVA	346	391	400	500
	GEB2	kVA	368	411	425	525
	GEB3	kVA	433	469	500	600

(3) Output declared at PF 0.8 and alternator efficiency 0.94
GEB0 : According to ISO 8528/1 - Continuous service - Power without time and load factor limitation
GEB1 : According to ISO 8528/1 - Intermittent service <750h/year - 100% rated power
GEB2 : According to ISO 8528/1 - Continuous service - Average load 70% rated power
10% overload <25h/year
GEB3 : According to ISO 8528/1 - Emergency service <200h/year - Average load 80% rated power
100% load <25h/year
Other conditions according to ISO 3046/1



RAILWAY TRACTION APPLICATIONS

RATED POWER		UD 25 L06 R4D	
ROTATIONAL SPEED	R.P.M.	1200	1500
POWER (4)	kW	294	368

(4) Operating conditions in accordance with U.I.C. - 623-1-OR

WEIGHT - CAPACITIES - DIMENSIONS

Energy and railway applications (with oil strengths)

WEIGHT - Kg (with fluids)	CAPACITIES - Litre		DIMENSIONS - mm				
	OIL (max)	WATER	A	B	C	D	E
2600	80	55	2084	1180	1970	580	160

Applications marine propulsion and on-board generator sets

CIRCUIT	WEIGHT - Kg (with fluids)	CAPACITIES - Litre		DIMENSIONS - mm				
		OIL (max)	WATER	A	B	C	D	E
RI	3000	80	80	2072	1180	1835	485	160
RNI	2870	80	55	2084	1180	1835	485	160

RI : With integrated water/water heat exchanger
RNI : Without integrated water/water heat exchanger

UD 25 D V12 DIESEL ENGINE

GENERATING SET APPLICATIONS

RATED POWER			UD 25 V12 S4D			UD 25 V12 S5D		
ROTATIONAL SPEED		R.P.M.	1000	1200	1500	1000	1200	1500
SERVICE (1)	GE0	kVA	440	563	704	500	720	900
	GE1	kVA		626	783		800	1000
	GE2	kVA	520	665	822	590	850	1050
	GE3	kVA		783	939		1000	1200

(1) Output declared at PF 0.8 and alternator efficiency 0.94
GE0 : According to ISO 8528/1 - Continuous service - Power without time and load factor limitation
GE1 : According to ISO 8528/1 - Intermittent service <750h/year - 100% rated power
GE2 : According to ISO 8528/1 - Continuous service - Average load 70% rated power - 100% load <500h/year
GE3 : According to ISO 8528/1 - Emergency service <200h/year - Average load 80% rated power - 100% load <25h/year
Other conditions according to ISO 3046/1

MARINE PROPULSION APPLICATIONS

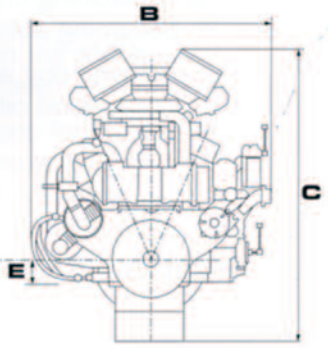
RATED POWER			UD 25 V12 M3D		UD 25 V12 M4D		UD 25 V12 M5D	
ROTATIONAL SPEED		R.P.M.	1500	1650	1500	1650	1500	1650
SERVICE (2)	MA1	kW	589		626	662	745	810

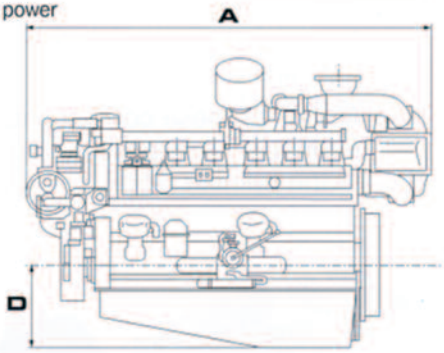
(2) MA1 : Continuous rating - No overloading
Other operating conditions : in accordance with ISO 3046/1 - Applications : fishing vessels and work vessels

ON-BOARD GENERATING SETS

RATED POWER			UD 25 V12 S4D		UD 25 V12 S5D	
POWER/ROTATIONAL SPEED		R.P.M.	1200	1500	1200	1500
SERVICE (3)	GEB0	kVA	510	704	720	900
	GEB1	kVA	571	783	800	1000
	GEB2	kVA	607	822	850	1050
	GEB3	kVA	714	939	1000	1200

(3) Output declared at PF 0.8 and alternator efficiency 0.94
GEB0 : According to ISO 8528/1 - Continuous service - Power without time and load factor limitation
GEB1 : According to ISO 8528/1 - Intermittent service <750h/year - 100% rated power
GEB2 : According to ISO 8528/1 - Continuous service - Average load 70% rated power
10% overload <25h/year
GEB3 : According to ISO 8528/1 - Emergency service <200h/year - Average load 80% rated power
100% load <25h/year
Other conditions according to ISO 3046/1





RAILWAY TRACTION APPLICATIONS

RATED POWER		UD 25 V12 R4D	
ROTATIONAL SPEED	R.P.M.	1200	1500
POWER (4)	kW	589	736

(4) Operating conditions in accordance with U.I.C. - 623-1-0R

WEIGHT - CAPACITIES - DIMENSIONS

Energy and railway applications (with oil strengths)

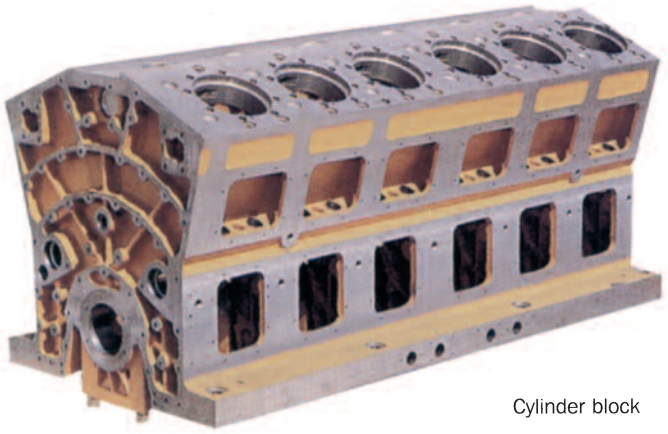
WEIGHT - Kg (with fluids)	CAPACITIES - Litre		DIMENSIONS - mm				
	OIL (max)	WATER	A	B	C	D	E
4956	120	160	2642	1595	1990	580	160

Applications marine propulsion and on-board generator sets

CIRCUIT	WEIGHT - Kg (with fluids)	CAPACITIES - Litre		DIMENSIONS - mm				
		OIL (max)	WATER	A	B	C	D	E
RI	5050	100	175	2706	1566	1910	560	160
RNI	4850	100	160	2674	1566	1910	560	160

RI : With integrated water/water heat exchanger
RNI : Without integrated water/water heat exchanger

SIMPLE AND ROBUST STRUCTURAL COMPONENTS



Cylinder block

CYLINDER BLOCK

Monobloc made from special lamelar graphite cast iron. This block is ribbed to give it very high strength and resistance to dynamic forces during operation (mechanical and thermal).

The lubrication and cooling circuits are integrated in the cylinder block.

CYLINDER LINERS

They are made from special centrifugal cast iron and are removable. At the top they are fitted with an anti-polishing ring to prevent the lapped surface from becoming polished.

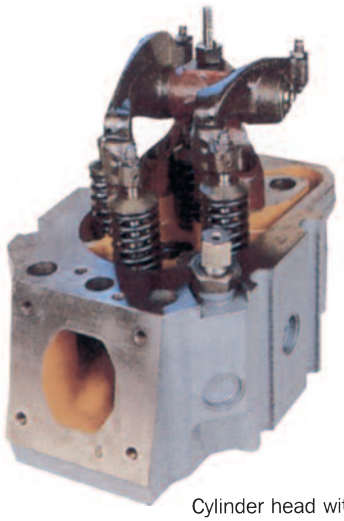
Anti-polishing ring ensures longer cylinder life and guarantees good oil consumption control.

Cylinder liner with anti-polishing ring

TIMING GEARS

A set of helical gears drives the oil pump, the two camshafts, the water pump and the injection pump. The valves are operated by flat tappets, push rods and rockers.

Access to these components for maintenance is facilitated by inspection doors in the upper part of the cylinder block.



Cylinder head with valve gear

CYLINDER HEADS

The cylinder heads are individual and made of cast iron.

Each cylinder head has four valves and four valve seat inserts.

Its rigidity (height = 145 mm) and its attachment to the block by 8 bolts guarantee good gasket sealing.

This design allows for compression pressures as high as 180 bars.

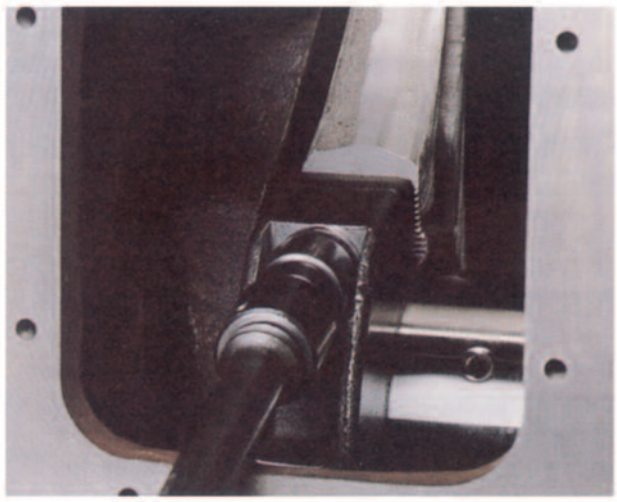
PISTONS

The pistons are made in one piece from aluminium alloy. They have an open combustion chamber and are cooled by oil circulating in a gallery.

The piston ring pack consists of 3 rings.

The upper compression ring is fitted in a cast iron insert.

Piston and rings



Access to the connecting rod via the inspection door

CONNECTING RODS

The connecting rods are made of forged and heat treated alloyed steel.

There is a serration between the rod and the bearing cap on an oblique face.

Access to the connecting rods for maintenance is facilitated by the lower inspection doors in the cylinder block. The piston and connecting rod assembly are removed through the top of cylinder.

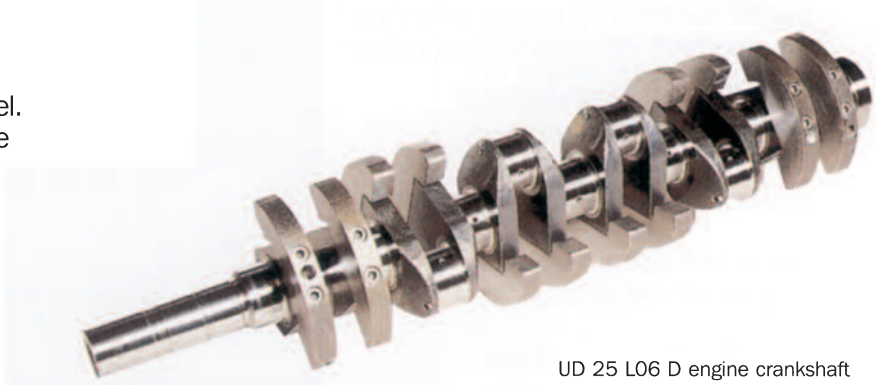
BEARING SHELLS

The connecting rod and main bearing shells are of the “three metal” type.

CRANKSHAFT

The one piece crankshaft is made from forged chrome molybdenum steel. The main bearing-and crankpins are surface hardened.

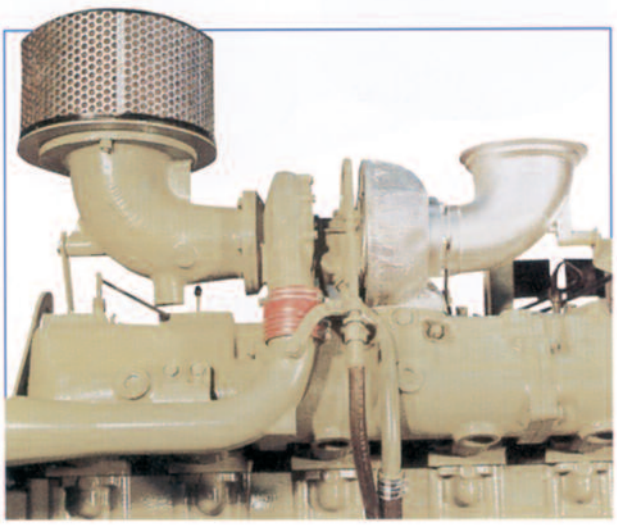
The crankshaft is fitted with 12 counterweights for optimum engine balancing.



UD 25 L06 D engine crankshaft

COMBUSTION CONTROL WITH HIGH PERFORMANCE COMPONENTS

Matching of the supercharging to the injection allows a high level of performance to be obtained while still retaining excellent reliability.



Turbo-charger on the UD 25 L06 S5D engine

TURBO-CHARGING

Supercharging is by one turbo-charger for every six cylinders.

The turbo-charger bearings are lubricated by the engine oil circuit.

Combustion air is filtered through one or two dry filters with large-area elements.

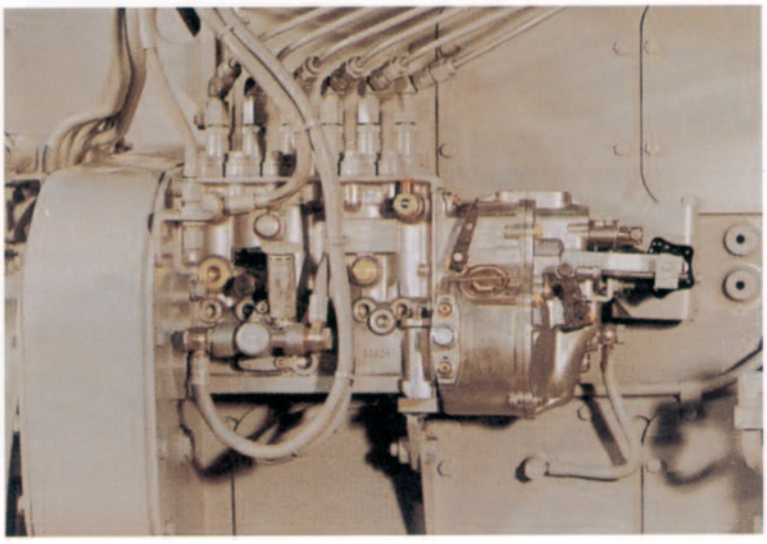
AIR COOLING

The supercharger air is cooled by a water from the engine cooling system. The device is generously dimensioned
to reduce the engine's sensitivity to inlet air temperatures.

INJECTION PUMP

This is a monobloc type installed in the "V" for the V12 engine, or on the side for the 6 cylinders in line engine.

The preset injection pump is interchangeable.



Injection pump on the UD 25 L06 D engine

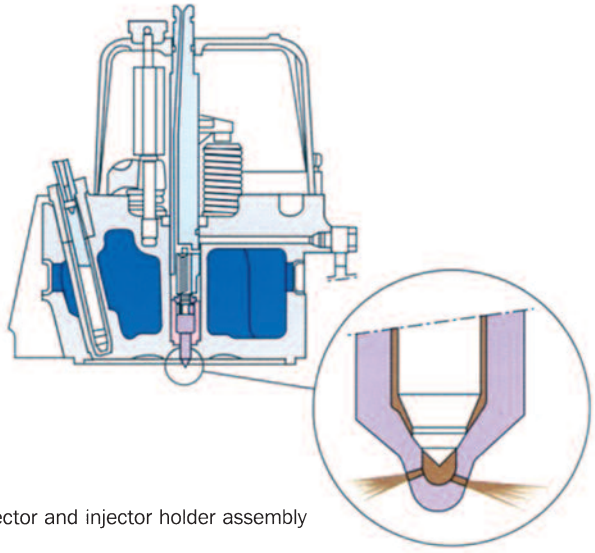
DIRECT INJECTION

- Fine optimization of the parameters affecting the combustion is essential to ensure :

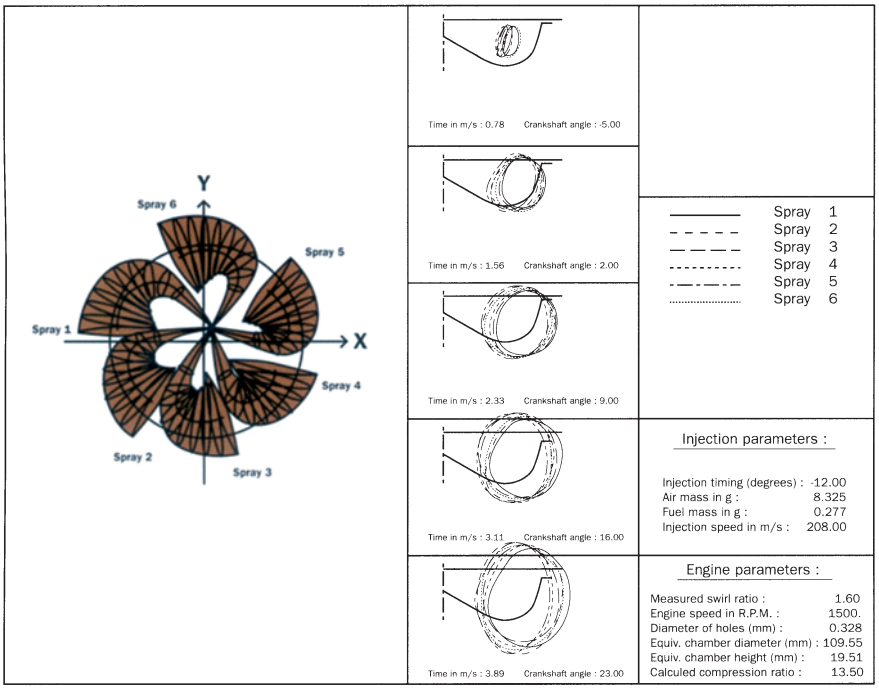
• minimum fuel consumption and a reduction in engine emissions

• reduced mechanical stresses due to pressure in the cylinders.

- As diesel combustion is a complex operation with many variables, we have developed computer programmes simulating optimum combustion.



Injector and injector holder assembly



Simulation of spray penetration during injection

FUEL SUPPLY CIRCUIT

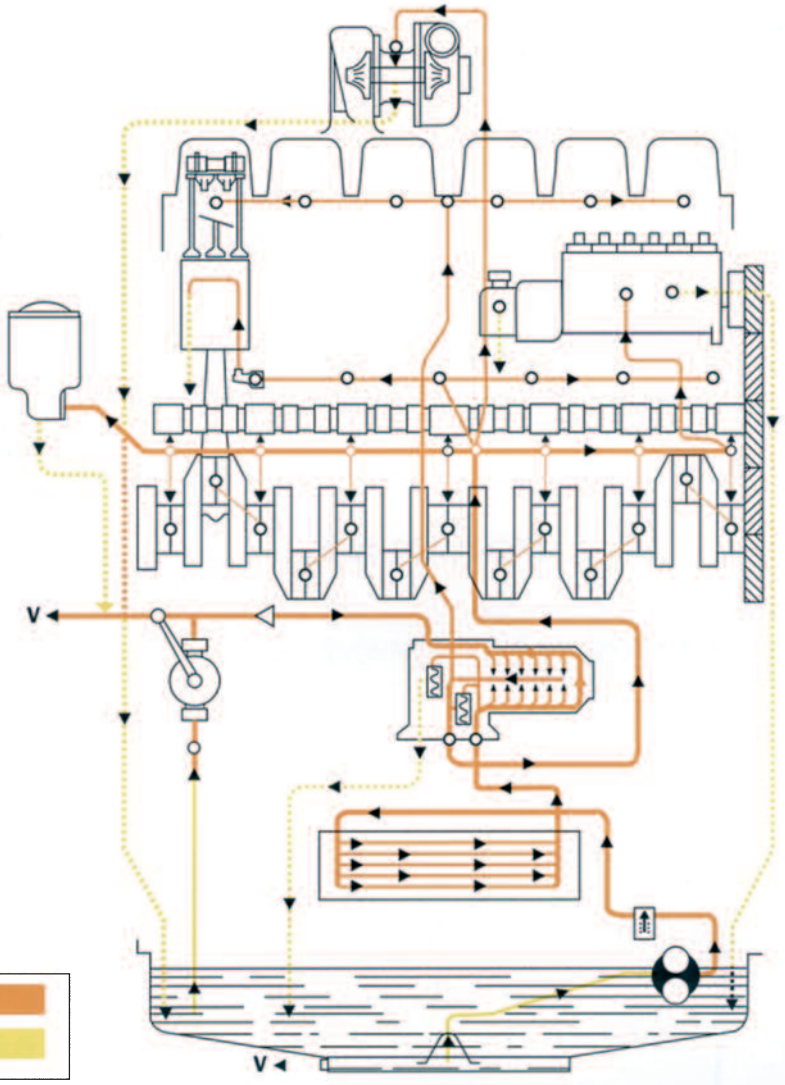
The complete fuel supply circuit is fitted on the engine. As basic equipment the following items are included :

- the manual priming pump

- the gear driven fuel pump coupled to the timing gear

- pre-filters and fuel filters with quick-change screw-in cartridges.

PERFECTLY INTEGRATED ENGINE CIRCUITS PROVIDE FOR INSTALLATION ECONOMIES



UD 25 L06 D engine lubrication circuit

OIL (high pressure)

OIL (low pressure)

LUBRICATION

Engine lubrication is ensured by integrated linked gear pumps.
Engine inlet oil pressure is regulated by a wide section discharge valve.

Full flow oil cooling is achieved by a heat exchanger fitted to the engine.

OIL FILTRATION

The high capacity oil filters are of the quick-change screw-in replaceable cartridge type.

The fineness of the filtering guarantees high quality lubrication.

Depending on application a centrifugal cleaning strainer is fitted on a by-pass circuit. This equipment reduces filter clogging offering greater oil cartridge life.

Centrifugal oil filters

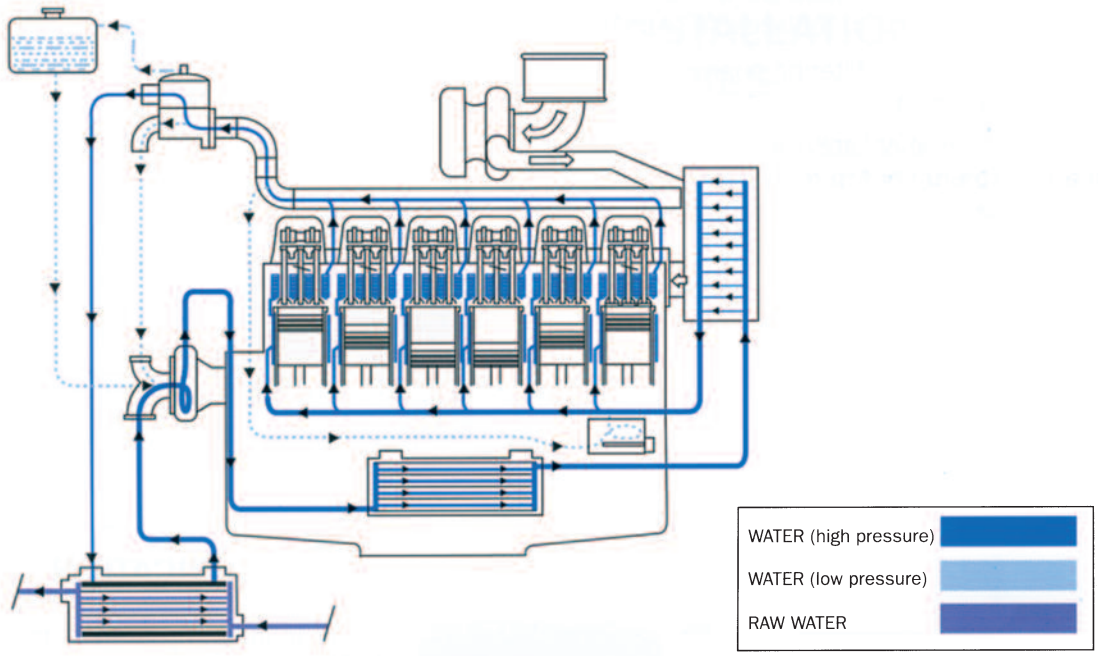
Lubricating and draining pump

PRE-LUBRICATION

A manual pump fixed to the bottom side of the oil filter provides pre-lubrication before engine starting.
The same pump allows engine draining.

A SIMPLE, FULLY EQUIPPED COOLING SYSTEM

All the components of the water cooling system are fully integrated with the engine. This system also cools the turbocharger air and the engine lubricating oil circuits.



UD 25 L06 D cooling circuit

This design allows the cooling air to act progressively on the supercharger air :

- by raising its temperature during low load operations
- and by cooling it during high load operations.

Cooling circuit water pump

The water pump is directly driven from an engine power take-off point.

- External installation of the engine cooling system can be composed, according to the application of:
  - air cooling fan
  - a water/water heat exchanger of the lost water type or a heat pump
- The built-in cooling system includes :
  - a fresh water/raw water heat exchanger
  - an engine driven raw water pump.

A FULLY EQUIPPED ENGINE COUPLED WITH A LARGE RANGE OF OPTIONS

ELECTRIC STARTER IN THE BASIC VERSION

This simple and robust starting system allows the engine to be started in all conditions.

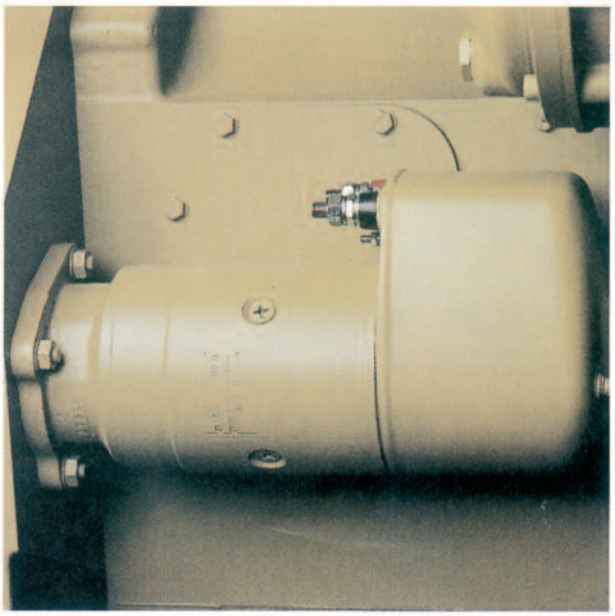
As an option, a special relay controls the engaging sequence and ensures the reliability of the automatic starting.

CROWN WHEEL PNEUMATIC STARTING (option)

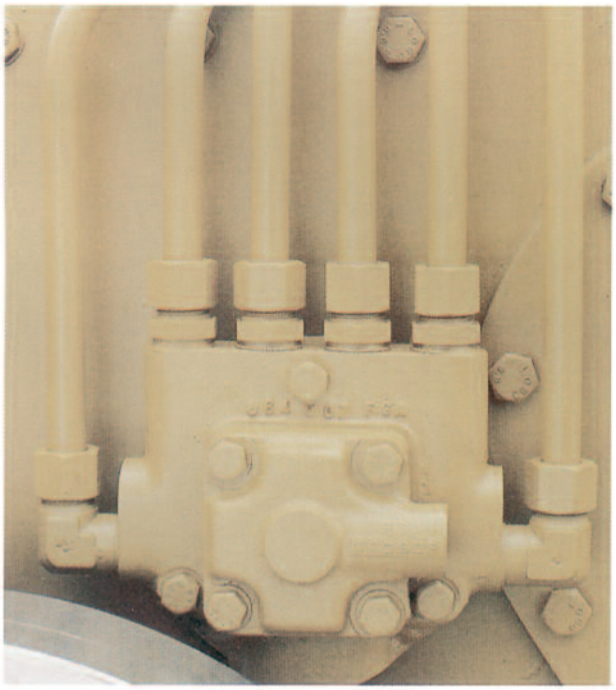
Two types of pneumatic starters exist, using one of the following pressure ranges :
20 to 40 bars or 7 to 10 bars.

This type of starting is economical and all the accessories can be supplied.

The engine can be fitted with dual starting (electric and pneumatic).



Electric starting assembly



Pneumatic starting by air injection system

PNEUMATIC STARTING BY AIR INJECTION INTO THE CYLINDER (option)

This pneumatic starting system operates in the pressure range of 20 to 40 bars.

The air filter and the starting electro-valve are fitted on the engine.

POWER TRANSMISSION

The following power take offs exist :

- At the flywheel end by :
  - an SAE interface
  - a pin coupling interface providing drive security.
- At the vibration damper end by :
  - the possibility of SAE 2 flanging for the UD 25 L06 D
  - a special output sleeve on the UD 25 V12 D
- Different power take off option auxiliary equipment.

PRE-HEATING (option)

Two heating elements are fitted in the water circuit to pre-heat the engine.

SPEED GOVERNING SYSTEM

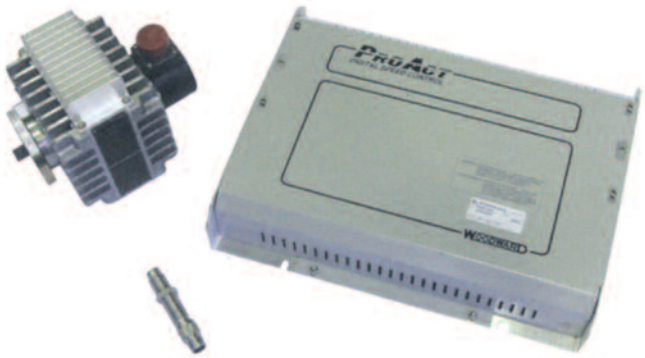
SPEED GOVERNING

■ **For generating sets :**
The speed governor is of the electronic type with an electric isochronic actuator.

The speed governing capabilities can be extended, enabling the engine to be driven by any electrical management system (synchronisation - load transfer - load sharing, etc.).

As an option, the engine can be fitted with a hydraulic governor with adjustable operating ranges and ancillary motor.

■ **For Marine propulsion :**
- "All speed" regulation provided by one of the following materials :
  - a mechanical governor
  - a hydraulic governor
  - an electronic controller.



Electronic speed governing equipment

INSTRUMENTATION

The basic UD 25 D engine control panel includes the following equipment :

- engine oil pressure gauge
- water temperature gauge
- oil temperature gauge or reversing box oil pressure for marine engine
- tachometer (optional).

Control panel

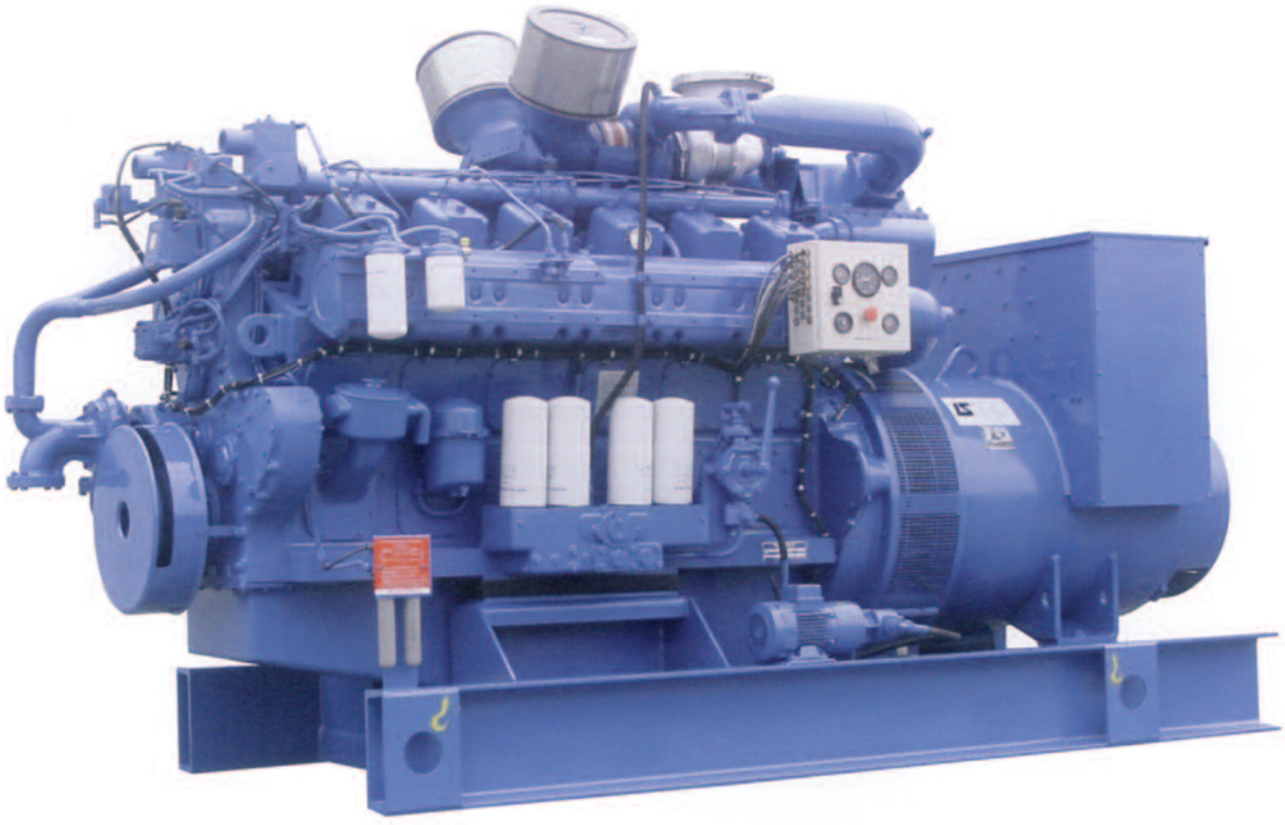
SAFETY EQUIPMENT

The engine is protected by an alarm for high water temperature and low oil pressure.

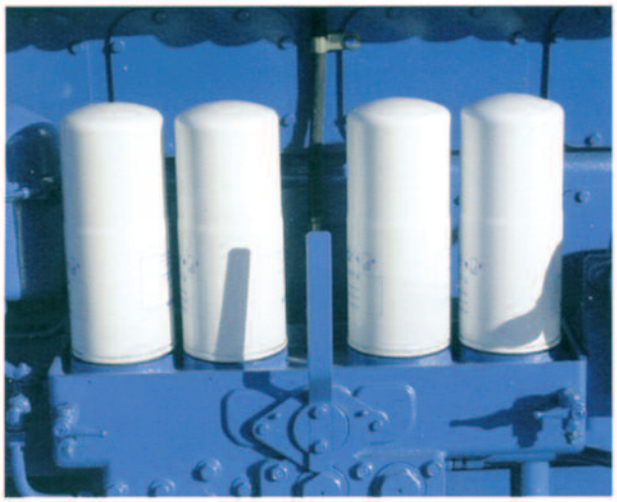
■ **Overspeed control :**
Linked to electric engine speed governing system, a device for stopping the engine by gas injection into the fuel circuit protects and stops the engine in the event of overspeed.

This device is also offered as an option with other types of speed governing system.

Overspeed safety device



UD 25 V12 S5D engine



Oil filter cartridge replacing

EASY MAINTENANCE LOW OPERATING COSTS

The design and the equipment of the UD 25 engine enable various types of maintenance work to be carried out with the minimum of down-time.

Equipment selection linked to sturdiness gives the benefit of extended operating periods between maintenance work.

FILTERS

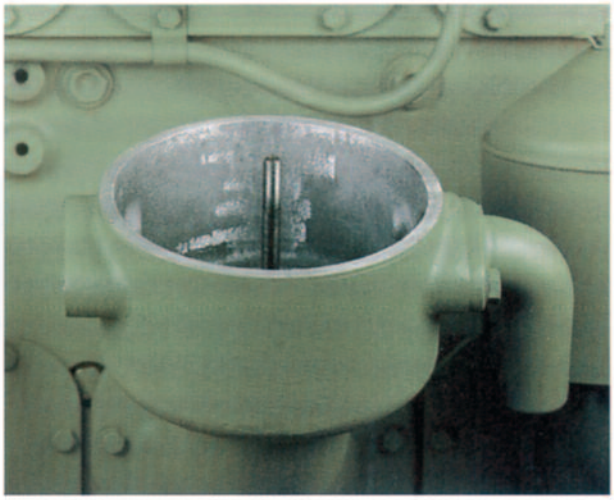
All filters used are of the replaceable screwed cartridge type.

Fuel filters are of the type which can be changed while running, are also available.

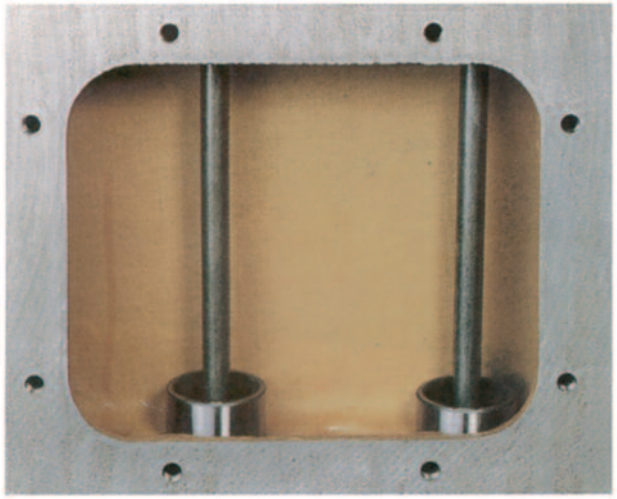
OIL FILLING-DRAINING

Oil filling is carried out through an easily accessible large dimension filler hole.

Oil draining can be carried out using the manual pump.



Oil filler pipe



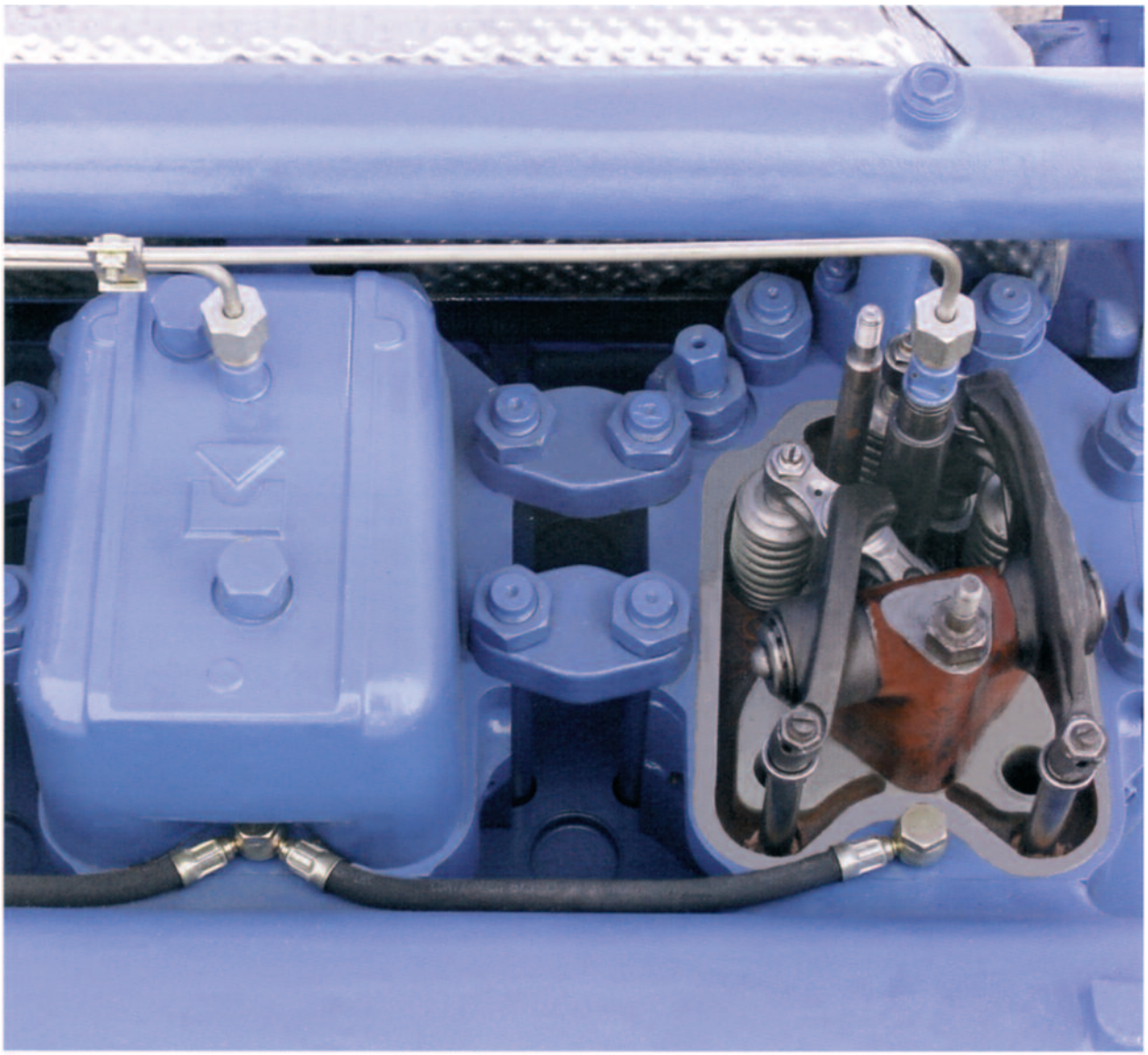
Access to the valve tappets by an inspection door

ENGINE INSPECTION

Numerous inspection doors incorporated in the cylinder block ensure easy inspection and intervention.

ROCKER GEAR - INJECTION

Access to the rocker gear parts is made easy by the presence of large removable covers.



Access to rocker gear parts - injection, for inspection

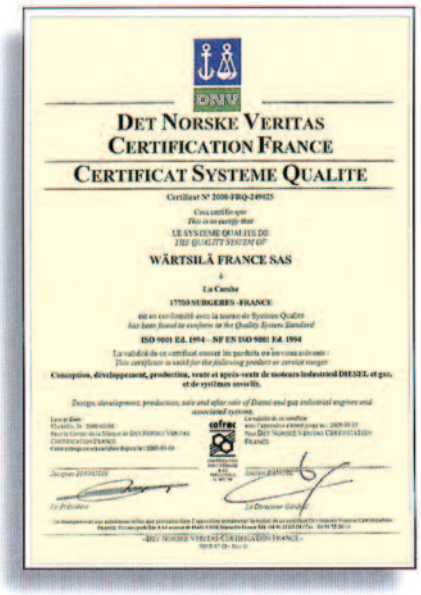
EIAPP CERTIFICATE

IMO MARPOL 73/78 Protocol 97 annex VI :
Regulations for the prevention of air pollution from ships. The standard engine complies with the maximum permissible NOx emission according to annex VI. The annex VI will concern ships built on or after 01.01.2000 (date of keel-laying).

WÄRTSILÄ France
CUSTOMER QUALITY

POYAUD engine is a Wärtsilä France manufacture. WÄRTSILÄ France operates a total quality policy to respond to its customers' demands :

- reliability
- performance
- cost
- delivery


DET NORSKE VERITAS
CERTIFICATION FRANCE
CERTIFICAT SYSTEME QUALITE
WÄRTSILÄ FRANCE SAS
ISO 9001 Ed. 1994 - NF EN ISO 9001 Ed. 1994

WÄRTSILÄ France is dedicated to the following principles :

- total company quality commitment
- all technological development subject of endurance testings and validation before approval
- all Wärtsilä France suppliers must meet up to the quality criteria imposed on them.

WÄRTSILÄ France has selected the ISO 9001 standard as the basic quality standard for its organization.

Other standards are applied in the event of a contractual requirement imposed by major customers.

UD 25 engine complies with most classification societies.

Worldwide network

Argentina
Australia
Bengladesh
Brazil
Canada
Chile
China
Colombia
Cyprus
Denmark
Dominican rep.
Egypt
Faroe Islands
Finland
France
French Polynesia
Gabon
Germany
Greece
Greenland
Guam / Saipan
Guatemala
Haïti
Hong Kong
Iceland
India
Indonesia
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Japan
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Pakistan
Peru
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