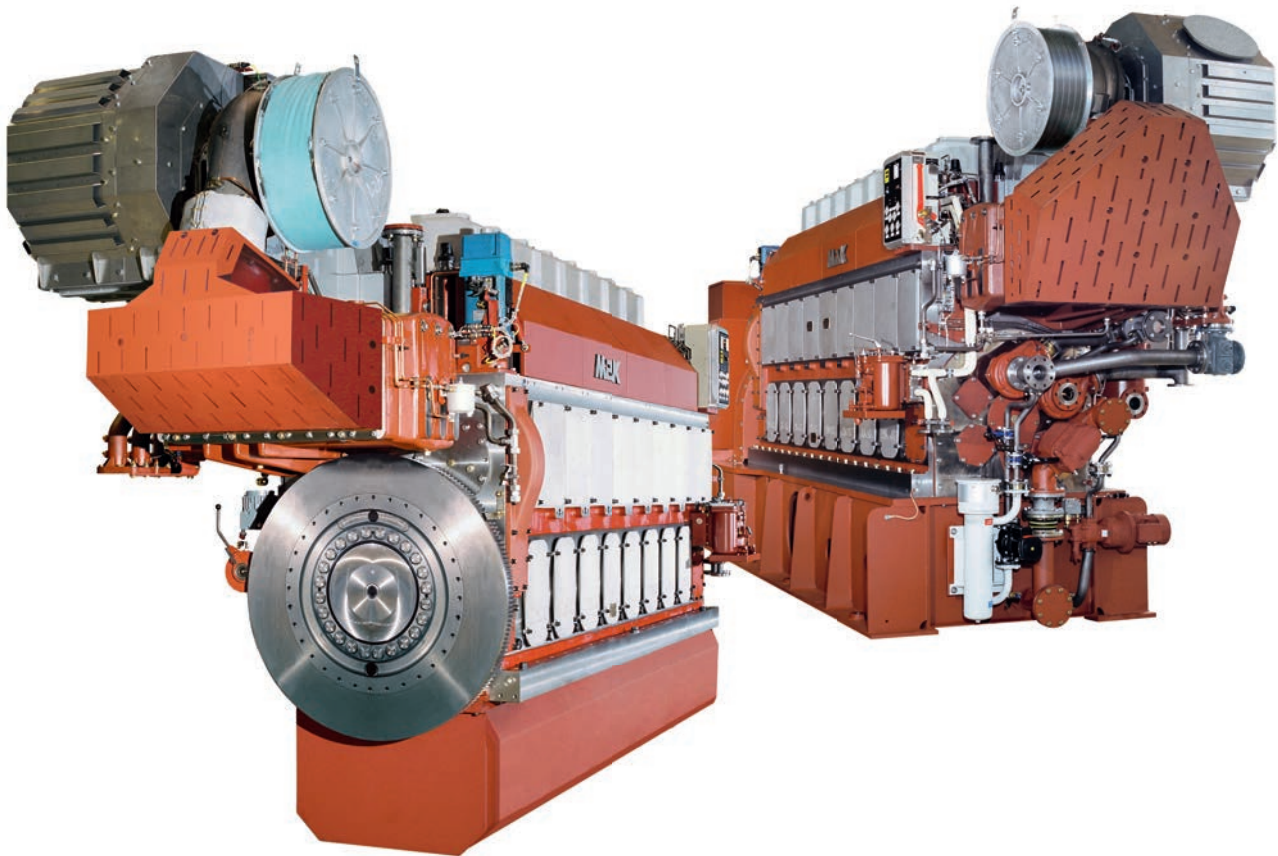


M 25 C

Long-Stroke Diesel Engines
for Maximum Efficiency
and High Reliability

6 • 8 • 9

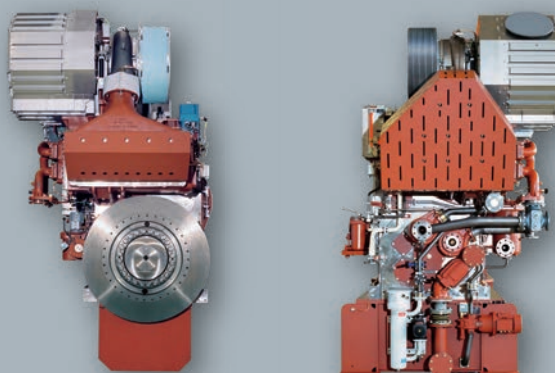


M 25 C – Simply intelligent

M 25 C – Marine Propulsion

M 25 C – On-Board Power

MaK Propulsion Package

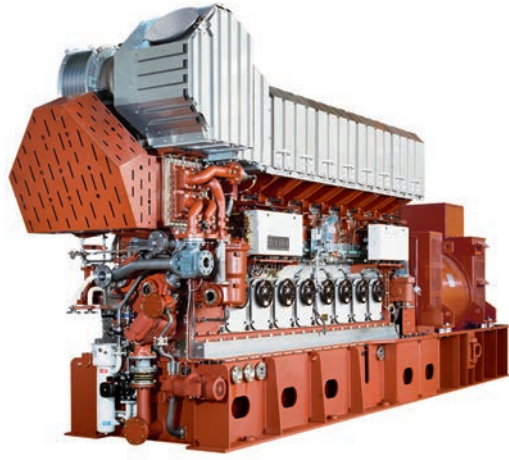


The M 25 C, part of the MaK long-stroke engine generation, is based on the proven design characteristics of the M 20 C, M 32 C and M 43 C engine series. In the development of this new engine generation, the objective was to achieve a high benefit level for the customer. In all design and development considerations, therefore, three criteria had maximum priority – reliability, economy and environmental compatibility.

Other important points of great significance in the engine's design and development work were ease of maintenance, long maintenance intervals, long component life and ease of installation.

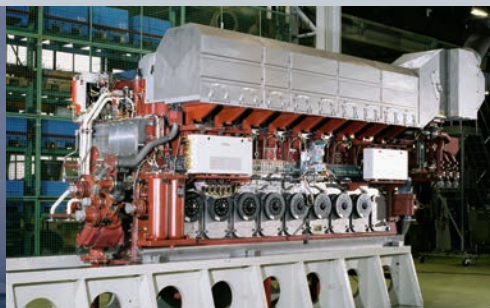


6, 8, 9



The M 25 C series can now be supplied with different cylinder powers: 300 kW or 333 kW per cylinder. So a power range of between 1,800 and 3,000 kW is available. Main features of the series are their high levels of reliability and economy in both MDO and HFO operation. The series is available in 6, 8 and 9-cylinder variants.

With its modern design and high performance, the M 25 C offers its operators a wide range of applications and the certainty that they have bought a reliable and economic engine. Another feature of the series is its low emission levels, which are well within IMO regulatory limits.



Marine Propulsion

M 25 C: The right solution for marine propulsion application

- for fishing vessels
- for tugs and for all the conditions of off-shore use
- for cargo vessels

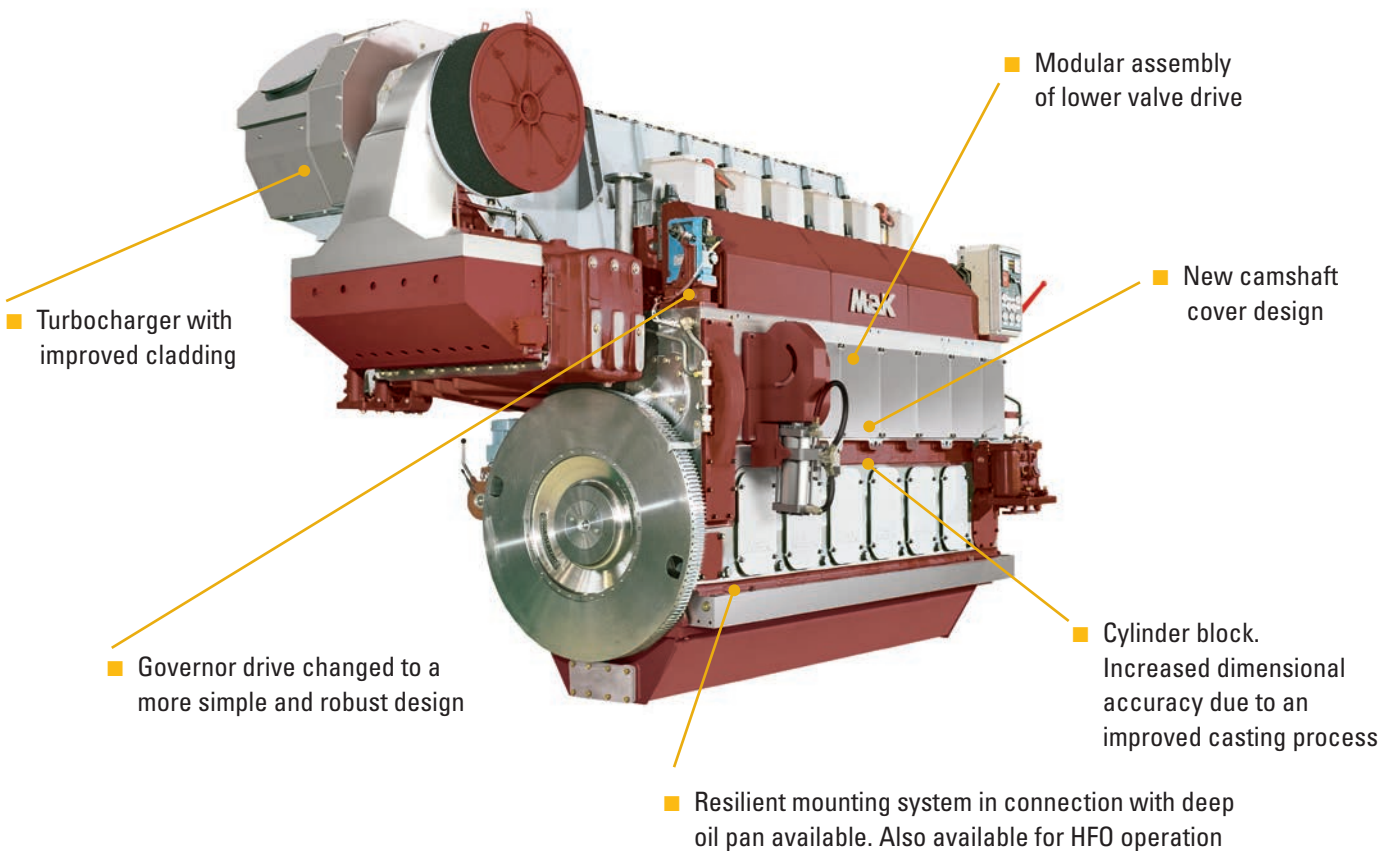
On-Board Power

M 25 C: The reliable generator drive for container reefer and on-board electricity generation

- the dependable solution
- on-board electricity for all types of ships

M 25 C – Design Improvement

- The new M 25 C was changed to meet the same design principles as M 20 C, M 32 C and M 43 C.
- All MaK engine series have the same nomenclature with the design status "C".
- The power output of the M 25 C increased slightly.
- The engine development also considers a possible Caterpillar Common Rail introduction.
- The design changes of the new M 25 C cylinder block result in an improved way of founding with an increased dimensional accuracy.
- The new governor drive is of simple and robust design.
- The design of the lower valve drive was changed to modular pre-assembly.
- New camshaft cover design for improved handling.
- No change of connecting points.



The Highlights

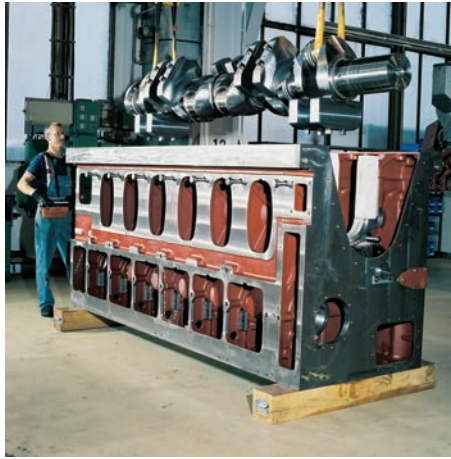
- Maximum operational reliability
- Maximum economy
- Low fuel consumption
- Low lubricating oil consumption
- Long maintenance intervals and component life
- Heavy fuel oil compatibility
- Robust and simple
- Reduction in the number of components
- Very maintenance-friendly
- Environmentally-friendly due to low NO_x and CO₂ emissions
- Ease of installation

M 25 C – Design Features

Intelligent simplicity

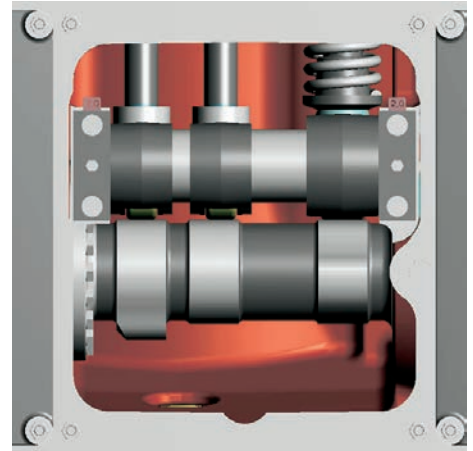
This MaK design principle is most clearly reflected in the reduction in the number of components. About 40% of parts – in particular conduits – have been dispensed with and a high level of functional integration achieved among the remaining components. There are also about 40% fewer interfaces, – with their susceptibility to failure and associated maintenance requirements.

The remaining connections are plug-in connections, again reducing maintenance needs. All of this has resulted in a marked gain in operational reliability and a reduction in operating costs.



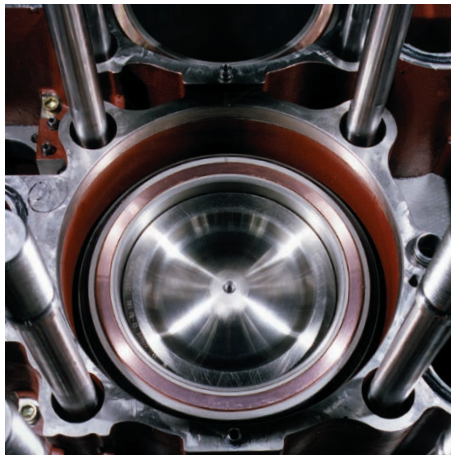
Crankshaft with thrust bearing

- Forged from one piece
- Generously sized trunnions
- Capable of bearing the single-part gearwheel for the control drive
- Linked to the flywheel via an oil-pressure connection
- Generously sized 100% mass counterweights



Cylinder liner with calibration ring

- Robust
- Cooling only above the crankcase
- Cylinder liner protected from wear
- Longer oil change intervals thanks to reduced dirt intake



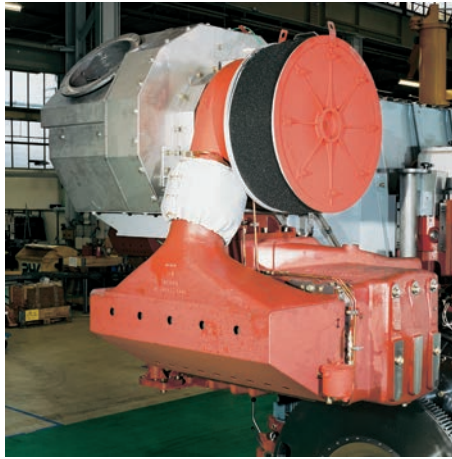
Multifunctional cooling water ring

- Centering action during assembly of cylinder liner and head
- Guides cooling water and charge air
- Concentrated cooling of cylinder liner and head
- Protects cylinder head bolts from corrosion

Camshaft

- Individual cylinder sections
- Integrated non-adjustable cams for injection and valve timing
- Low wear due to cam follower lever arm

M 25 C – Design Features

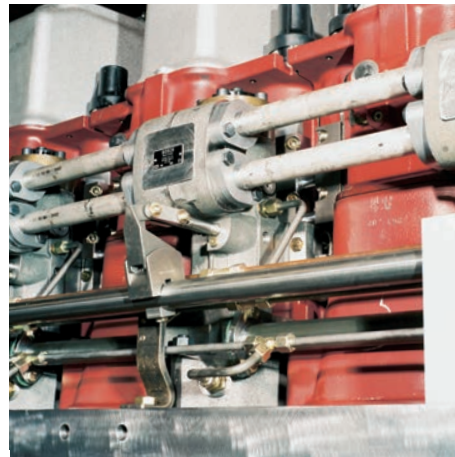


Piston

- Piston with stable combustion chamber
- Hardened first ring groove
- First ring with chromium ceramic-plated running surface
- Piston rings have a long service life and high operational reliability

High-efficiency turbocharger

- Low temperature level of components surrounding the combustion chamber
- Two-stage design
- Corrosion-free turbocharger casing without water cooling



Cylinder head

- Intensive cooling by means of generously dimensioned radial openings
- Longitudinal holes for integrated media guidance
- Robust and form stable thanks to double-bottom construction in nodular cast iron

Injection pumps

- Secure mounting
- Monobloc design with constant-pressure valve
- Integrated low-pressure damping prevents high pressure pulses
- Integrated stop cylinder

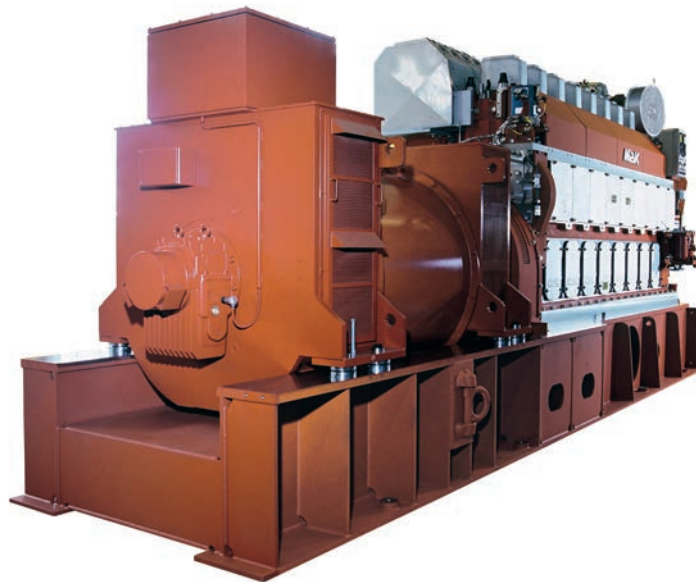
M 25 C – Complete Diesel Generating Sets

Reliable energy supply

The complete diesel generating set is notable for its ease of installation, reliable operation, ease of maintenance and good component accessibility. The basis is formed by the rigid base frame as foundation of the engine and alternator with integrated oil sump, large oil volume and universal equipment for both HFO and MDO operation.

Generation of electricity

In addition to its use as a marine propulsion unit, the M 25 C has a wide range of application providing power for the continuous generation of electricity applications where a high level of reliability is always important. The power range of the M 25 C engine series as a generator unit is from 2,140 to 3,560 kVA.



M 25 C – Ready for Installation

Complete

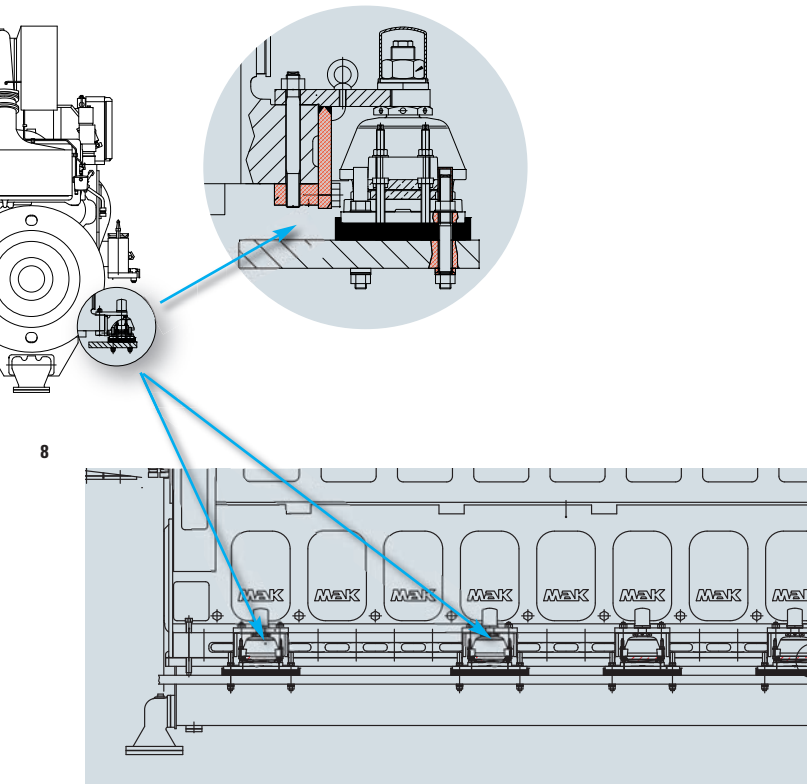
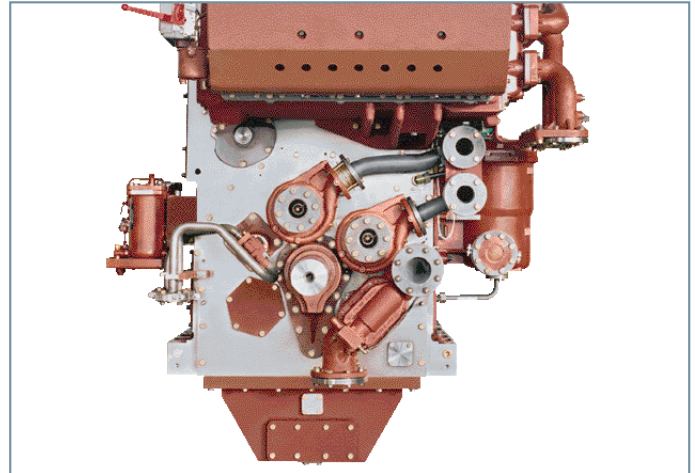
In addition to many outstanding technical features, the long-stroke M 25 C engine is also easy to install and provides good maintenance access to all component parts.

Installation-friendly

Further installation advantages are compact engine construction and the optimal position of interfaces for fuel, lubricating oil and cooling water systems. These are located at the opposite end to the coupling, making connection easier. All engine operating elements and remote switching are integrated into the operating panel, easily accessible to the engine.

Resilient mounting system

The resilient mounting system for vibration and structure-borne noise damping can be assembled safely and simply.



	TBO x 1000 h	Lifetime x 1000 h
Piston crown	30	90
Piston rings	-	30
Cylinder liner	-	60 / 90*
Cylinder head	15	-
Inlet valve	15	30
Exhaust valve	15	30
Nozzle element	-	7,5
Pump element	-	15 / 20*
Main bearing	-	30
Big-end bearing	-	30

*MDO Operation

The above mentioned data are not binding. They only serve as standard values. These standard values can be attained if the MaK operating and maintenance specifications are strictly observed and only MaK spare parts are used. Please consider as well the negative effect of bad fuel qualities.

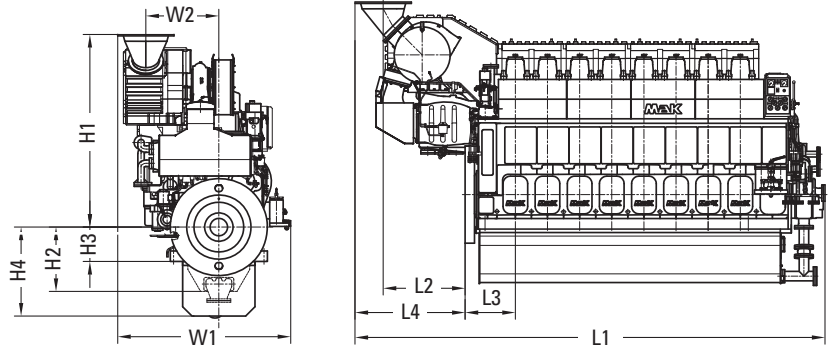
HFO/MDO – Long TBO and lifetime

Long maintenance intervals and the life of components are the basis for low operating costs.

M 25 C – Technical Data

PROPULSION

Type	Output range		Speed rpm	Mean eff. pressure bar	Mean piston Speed m/s	Spec. fuel consumption	
	kW	mhp				100% g/kWh	85% g/kWh
6 M 25 C	1,740	2,370	720	23.6	9.6	185	184
	1,800	2,450	750	23.5	10.0	185	184
	2,000	2,720	720	27.2	9.6	188	185
	2,000	2,720	750	26.1	10.0	186	184
	2,100	2,856	720	28.5	9.6	187	186
	2,100	2,856	750	27.4	10.0	187	186
8 M 25 C	2,320	3,160	720	23.6	9.6	185	184
	2,400	3,260	750	23.5	10.0	185	184
	2,666	3,630	720	27.2	9.6	189	185
	2,666	3,630	750	26.1	10.0	187	184
	2,800	3,808	720	28.5	9.6	189	187
	2,800	3,808	750	27.4	10.0	189	187
9 M 25 C	2,610	3,550	720	23.6	9.6	185	184
	2,700	3,670	750	23.5	10.0	185	184
	3,000	4,080	720	27.2	9.6	189	185
	3,000	4,080	750	26.1	10.0	187	184
	3,150	4,284	720	28.5	9.6	189	187
	3,150	4,284	750	27.4	10.0	189	187



Stroke 400 mm, Bore 255mm
 Specific lubricating oil consumption 0.6 g/kWh, ± 0.3 g/kWh
 LCV= 42,700 kJ/kg, without engine-driven pumps, tolerance 5%

Propulsion engine (Dimensions in mm)												
Engine	L1	L2	L3	L4	H1	H2	H3	H4	W1	W2	Weight	
											wet sump	dry sump
6 M 25 C	5,345	1,068	672	1,390	2,526	861	460	1,191	2,261	977	23.5	21.2
8 M 25 C	6,289	1,097	672	1,474	2,578	861	460	1,191	2,316	977	30.0	28.5
9 M 25 C	6,719	1,097	672	1,474	2,578	861	460	1,191	2,316	977	32.0	30.0

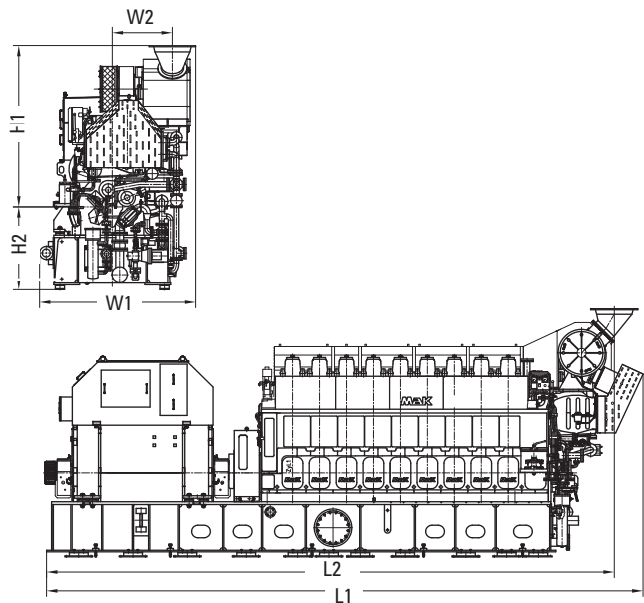
GENERATING SETS

Type	Engine rating kW	Generator rating 50 Hz kWe	Speed 1,000 rpm	Frequency Hz	Speed rpm	Mean eff. pressure bar	Mean piston Speed m/s	Spec. fuel consumption	
								100% g/kWh	85% g/kWh
6 M 25 C	1,740	1,669	2,088	60	720	23.6	9.6	185	184
	1,800	1,726	2,160	50	750	23.5	10.0	185	184
	2,000	1,918	2,400	60	720	27.2	9.6	188	185
	2,000	1,918	2,400	50	750	26.1	10.0	186	184
	2,100	2,014	2,520	60	720	28.5	9.6	187	186
	2,100	2,014	2,520	50	750	27.4	10.0	187	186
8 M 25 C	2,320	2,225	2,784	60	720	23.6	9.6	185	184
	2,400	2,302	2,880	50	750	23.5	10.0	185	184
	2,666	2,557	3,199	60	720	27.2	9.6	189	185
	2,666	2,557	3,199	50	750	26.1	10.0	187	184
	2,800	2,685	3,360	60	720	28.5	9.6	189	187
	2,800	2,685	3,360	50	750	27.4	10.0	189	187
9 M 25 C	2,610	2,503	3,132	60	720	23.6	9.6	185	184
	2,700	2,589	3,240	50	750	23.5	10.0	185	184
	3,000	2,877	3,600	60	720	27.2	9.6	189	185
	3,000	2,877	3,600	50	750	26.1	10.0	187	184
	3,150	3,021	3,780	60	720	28.5	9.6	189	187
	3,150	3,021	3,780	50	750	27.4	10.0	189	187

Specific lubricating oil consumption 0.6 g/kWh, ± 0.3 g/kWh
 LCV= 42,700 kJ/kg, without engine-driven pumps, tolerance 5%
 Generator efficiency: 0.96, cosφ: 0.8

Generating set (Dimensions in mm)							
Engine	L1*	L2	H1	H2	W1	W2	Weight (t)
6 M 25 C	8070	7638	2571	1340	2479	977	43.0
8 M 25 C	9130	8727	2623	1340	2534	977	53.0
9 M 25 C	9516	9057	2623	1340	2534	977	56.0

*Dependent on generator make/type.



M 25 C – MaK Propulsion Package

Complete propulsion systems

The supply of complete propulsion systems is a market requirement which is becoming more and more important. We have wide experience gathered in the design and installation of many successful propulsion plants and from our close cooperation with competent partners.

We offer

- System responsibility and supply from a single source
- Accurately matched interfaces
- Coordinated delivery data control

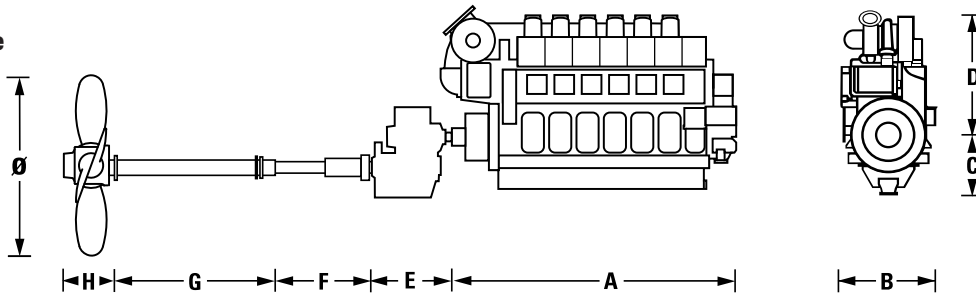
A complete propulsion system usually consists of:

- MaK main propulsion engine with flexible coupling
- Reduction gearbox with or without installed clutch and gearbox PTO* with shaft generator
- Propeller and shaft installation
- Matched remote control and monitoring equipment

*Power Take Off



Examples of complete propulsion systems



Type	Engine		Gear				Shaft		Propeller			
	Rating kW	Speed rpm	A	B	C	D	E	F	G	H	Ø	Speed rpm
6 M 25 C	2,000	750	5,345	2,260	861/1,191	2,906	1,904	2,000	3,000	617	3,000	220
8 M 25 C	2,640	750	6,289	2,315	861/1,191	3,052	1,837	2,000	3,000	617	3,300	205
9 M 25 C	3,000	750	6,719	2,315	861/1,191	3,052	1,795	2,000	3,000	630	3,450	200

Subject to be change



M 25 C – Clean Solution

The long-stroke concept for ecological operation

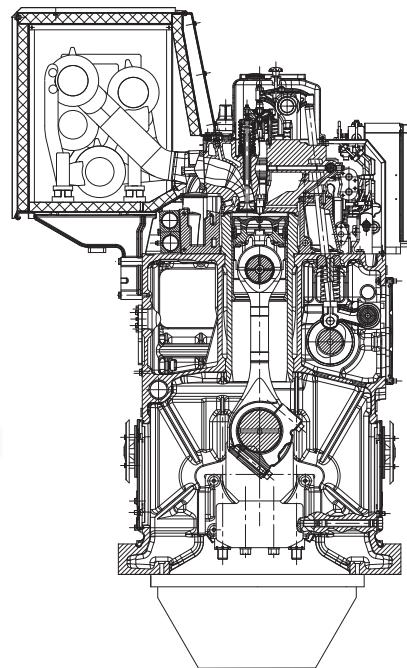
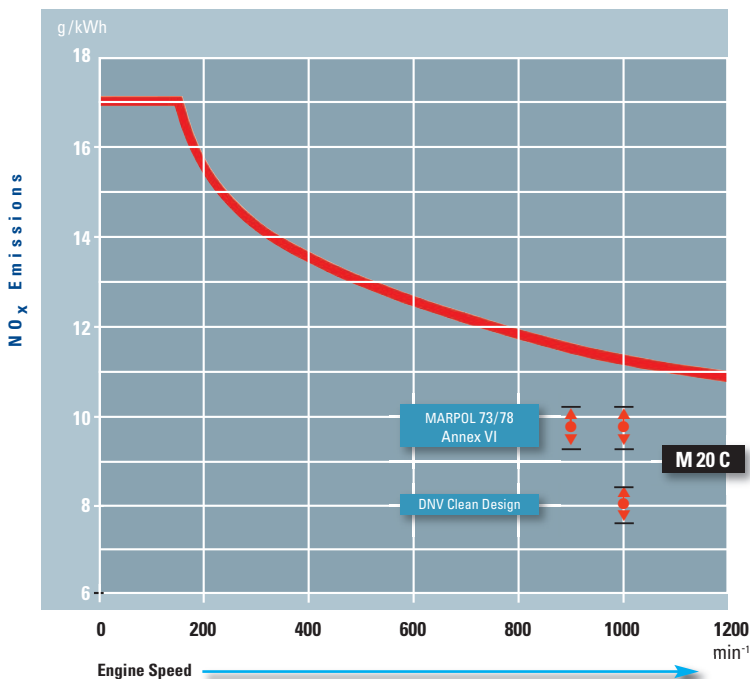
Environmental protection is also becoming increasingly important for seagoing shipping. Caterpillar Motoren recognized this trend in good time and, with the design and development of the modern long-stroke engine concept, created the conditions for engine operation at reduced emission levels. The NO_x emissions of the M 20 C engine lies well below the International Maritime Organisation's limiting curve.

The long-stroke concept for engine operation at reduced emission levels

The following features characterise the concept which ensures, in addition to smooth running, maximum operational reliability and also permits operation on heavy fuel oil up to 700 cSt/50°C.

- Long piston stroke
- Large stroke/bore ratio
- Intensive injection
- Shaped injection curve
- Optimised control times
- High ignition pressure

For MDO operation the engine is also available with less NO_x emission: Det Norske Veritas DNV "Clean Design" and Federal Ministry of Environment "Blue Angel".



Cat Financial – World-Class Financing Solutions

You specify Cat or MaK power solutions, because you believe in the power of Caterpillar engines to keep you and your vessel safely on course. Cat Financial has the same commitment to your success – whether you need construction, term or repower financing.

We know how to support customers in one country, construction in a second country and registration in a third. We understand the marine industry – we’ve been lending to marine customers for nearly 30 years. And, as it has been since 1986, our service commitment is powered by Caterpillar and Cat and MaK dealers everywhere.

Global Coverage

Whether you’re a German operator building at a Chinese shipyard or a U.S. citizen building a yacht in Italy, Cat Financial can help. Our customers do business around the world, and we support them wherever they go.

Our service commitment extends to all marine sectors. From production and custom yachts to workboats and ocean-going vessels – we have you covered.

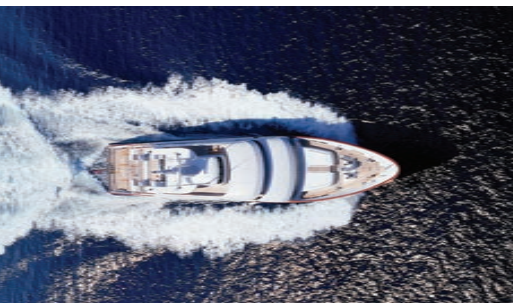
Local Presence

Need a local expert? We know local markets and how to navigate the legal and regulatory environments.

Cat Financial has offices in the Americas, Europe and Asia, and financing representatives all over the world. Put our knowledge to work to power the deal.

Get your project moving anywhere in the world with Cat Financial – backed by the power of Caterpillar and our unmatched dealer network.

Visit us online at MARINE.CAT.COM/finance



Integrated Solutions – Product Support Portfolio

The central graphic is a grid of product support services. It features a light blue background with a grid of white boxes. Each box contains an image and a text label. The images include: a person in a red shirt working on a boat; a person in a red shirt working on an engine; a person in a red shirt working on a boat; a person in a red shirt working on an engine; a person in a red shirt working on a boat; a person in a red shirt working on an engine; a person in a red shirt working on a boat; a person in a red shirt working on an engine; a person in a red shirt working on a boat; a person in a red shirt working on an engine. The text labels are: Commissioning, Training, Brochures, Maintenance, Overhauls/Repairs, Customer Support Agreements (CSAs), Engine Upgrades, Genuine Spare Parts, Remanufactured Parts, and Monitoring and Diagnostic Software.

	Commissioning		Customer Support Agreements (CSAs)
	Training		Engine Upgrades
	Brochures		Genuine Spare Parts
	Maintenance		Remanufactured Parts
	Overhauls/Repairs		Monitoring and Diagnostic Software

Providing integrated solutions for your power system means much more than just supplying your engines. Beyond complete auxiliary and propulsion power systems, we offer a broad portfolio of customer support solutions and financing options. Our global dealer network takes care of you wherever you are – worldwide. Localized dealers offer on-site technical expertise through marine specialists and an extensive inventory of all the spare parts you might need.

To find your nearest dealer, simply go to:
MARINE.CAT.COM

Perfect Solutions for Main Propulsion and On-Board Power Supply

The Program: Quality is our Motto. For more than 90 years we have developed, built, supplied and serviced diesel engines – worldwide. Today Caterpillar Marine with its brands Cat and MaK offer high-speed and medium-speed engines with power ratings from 93 kW to 14,400 kW. Many different engine families are available to meet your specific application needs.

Cat and MaK diesel engines are distinguished by high reliability, extremely low operational costs, simple installation and maintenance and compliance with IMO environmental regulations.

The application of engines in main and auxiliary marine power systems varies greatly and extends from high-speed boats and yachts, through tugs, trawlers and offshore vessels to freighters, ferries and cruise liners.

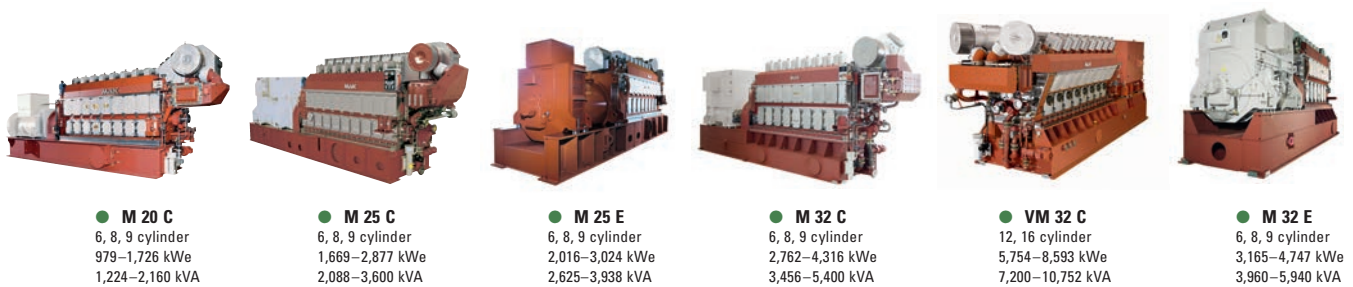
Sales and Service Organization

Caterpillar has combined the sales and service activities and responsibility of their Cat and MaK brand marine engine business into Caterpillar Marine Power Systems with headquarters in Hamburg/Germany.

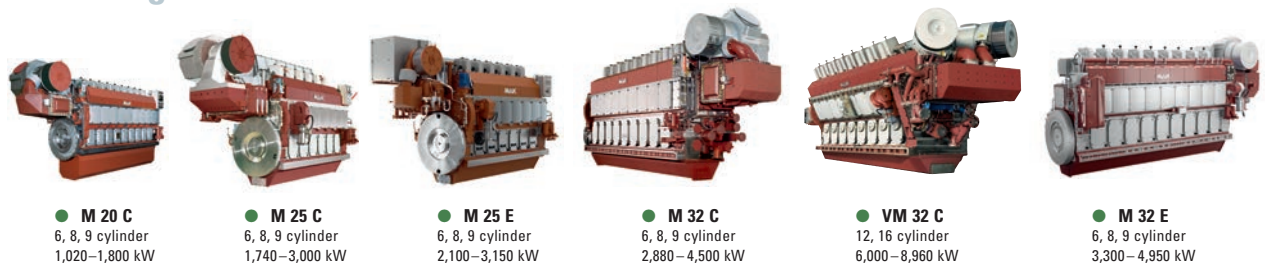
In setting-up this worldwide structure, we have concentrated on integrating the Cat and MaK brand groups into a single, united marine team, which utilises the particular expertise of each group.

Commercial marine engine business is split into three geographic regions,

- Europe, Africa, Middle East
- Americas ■ Asia-Pacific,



Propulsion Engines



Production Facilities

which manage all sales and product support activities. They have direct responsibility for achieving the ambitious growth targets set for the Cat and MaK brands and for providing our customers and dealers with complete marine solutions.

Caterpillar's global dealer network provides a key competitive edge – customers deal with people they know and trust.

Cat dealers strive to form a strong working relationship with their customers, offering comprehensive and competent advice from project support to repair work.

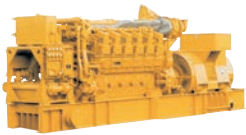
Some of the most advanced manufacturing concepts are used at Caterpillar locations throughout the world to produce engines in which reliability, economy and performance are second-to-none.

From the production of core components, the assembly of engines to the delivery of complete propulsion packages, quality is always the top priority.

Comprehensive, recognized analysis systems, test procedures and measuring

methods ensure that quality requirements are met throughout all the individual manufacturing phases. All of our production facilities are certified under 1:2000 ISO 9001 EN, the international benchmark that is helping to set new quality standards worldwide.

In addition to product quality, our customers expect comprehensive service which includes the supply of spare parts throughout the life of the engine.



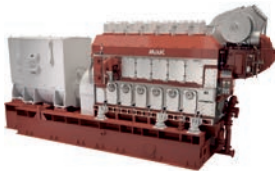
● **C280**
6, 8, 12, 16 cylinder
1,650–5,200 kW
2,063–6,500 kVA

Onboard Power Supply

- High-Speed Engines
- Medium-Speed Engines



● **M 34 DF**
6, 8, 9 cylinder
2,877–4,316 kW
3,600–5,400 kVA



● **M 43 C**
6, 7, 8, 9 cylinder
5,179–9,063 kW
6,480–11,340 kVA



● **VM 43 C**
12, 16 cylinder
10,357–16,111 kW
12,960–20,160 kVA



● **M 46 DF**
6, 7, 8, 9 cylinder
5,179–7,768 kW
6,480–9,720 kVA



● **VM 46 DF**
12, 16, cylinder
10,357–13,810 kW
12,960–17,280 kVA



● **C32 ACERT**
12 cylinder
492–1,417 kW



● **3500**
8, 12, 16 cylinder
526–2,525 kW



● **C175**
16 cylinder
2,001–2,550 kW

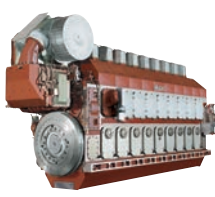


● **C280**
6, 8, 12, 16 cylinder
1,730–5,650 kW

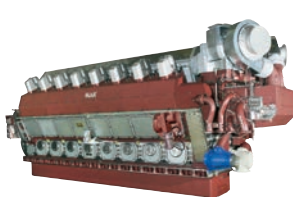
- High-Speed Engines
- Medium-Speed Engines



● **M 34 DF**
6, 8, 9 cylinder
3,000–4,500 kW



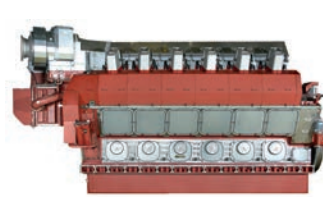
● **M 43 C**
6, 7, 8, 9 cylinder
5,400–9,450 kW



● **VM 43 C**
12, 16 cylinder
10,800–16,800 kW



● **M 46 DF**
6, 7, 8, 9 cylinder
5,400–8,100 kW



● **VM 46 DF**
12, 16 cylinder
10,800–14,400 kW

The Power You Need.

The Cat® and MaK™ brands of Caterpillar Marine offer premier high- and medium-speed propulsion, auxiliary, and generator set solutions, as well as optional dual fuel, diesel-electric, and hybrid system configurations. With the launch of Caterpillar Propulsion our comprehensive and evolving product line gives customers one source for the most extensive engine power range available, complete propulsion systems, controllable pitch propellers, transverse and azimuth thrusters, and controls. Cat and MaK products and technologies are proven reliable and are built to last in all marine applications, demonstrating superior productivity and the lowest lifecycle cost.

The Cat Global Dealer Network, more than 2,200 global service locations strong, ensures that you'll have local expertise, highly-trained technicians, rapid parts delivery, and the proper equipment and services to keep you working – anytime, anywhere.

Construction, term, or repower financing through Cat Financial helps you make Cat and MaK power a reality. With our knowledge of customer needs, local markets, and legal and regulatory requirements, we've been providing tailored financing solutions and exceeding expectations since our start in 1986.

For more information and to find your local dealer, please visit our website: **MARINE.CAT.COM**

Visit Cat Financial at: **CatPowerFinance.com**

BUILT FOR IT.™

Caterpillar Marine

Europe, Africa, Middle East

Caterpillar Marine
A Division of
Caterpillar Motoren GmbH & Co.KG

Neumühlen 9
22763 Hamburg
Germany

Phone: +49 40 2380 3000
Telefax: +49 40 2380 3535

Americas

MaK Americas Inc.

3450 Executive Way
Miramar Park of Commerce
Miramar, FL. 33025/USA

Phone: +1 954 885 3200
Telefax: +1 954 885 3131

Asia Pacific

Caterpillar Marine Trading
(Shanghai) Co., Ltd.

25/F, Caterpillar Marine Center
1319, Yan'an West Road
200050 Shanghai/P. R. China

Phone: +86 21 6226 2200
Telefax: +86 21 6226 4500

Caterpillar Marine Asia
Pacific Pte Ltd

No. 5 Tukang
Innovation Grove
Singapore 618304
Republic of Singapore

Phone: +65 68287 600
Telefax: +65 68287 625

Subject to change without notice.
Leaflet No. 230 -09.14 - e · L+S · VM3
LEDM0041-00

© 2014 CAT, CATERPILLAR, their respective logos, MaK, "Caterpillar Yellow" and the "Power Edge" trade dress, as well as corporate and product identity used herein, are trademarks of Caterpillar and may not be used without permission.



Caterpillar Marine is committed to sustainability. This document is printed on PEFC certified paper