

M 25 E

Efficiency and Performance
New Development

6 • 8 • 9 Cylinder



BUILT FOR IT.™

MaK

M 25 E • Concept & Benefits

The new M 25 E has been designed to completely meet the ultimate customer requirements, providing the lowest cost of operation while maintaining the highest uptime in the industry.

Since one engine standard typically does not fit all applications, different M 25 E configurations will be available to support various application-specific requirements.

Based on the proven M 25 C, all versions have been extensively optimized for best fuel consumption and load acceptance, leading reliability and durability, and efficient Selective Catalytic Reduction (SCR) operation. The service and maintenance-friendly design, remote condition monitoring and diagnostic capabilities, as well as our unmatched global product support, respond to the industry's desire to lower operational costs and down times beyond today's standards.

For ultimate efficiency and performance, the M 25 E is available as a part of our integrated propulsion packages with Caterpillar Propulsion Controllable Pitch Propellers (CPP) and Azimuth drives.

Performance

- 5% more power
- Leading load response

Fuel Cost

- Part load optimization

Emissions

- Optimized engine/SCR solution
- Reduced smoke

Future Ready

- Advanced condition monitoring
- Remote diagnostics

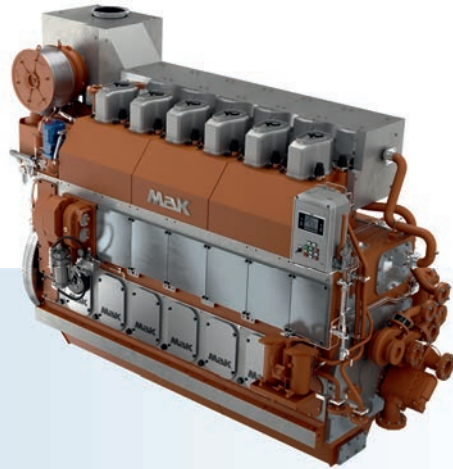
Uptime

- Leading reliability and durability
- Unmatched global product support

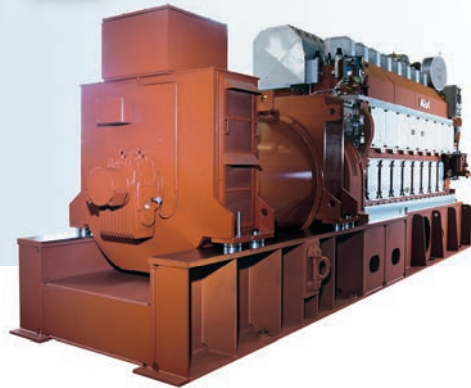
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Comprehensive



EW



Optimization

M 25 E • Applications

Whatever it takes to meet your needs.

We provide customer centric solutions.

A typical offshore supply vessel operator can save up to \$250,000 per year in fuel cost.

The part load efficiency of one M 25 E can save up to 40 tons of fuel per year in a variable speed application (average 60% load). Low load variable speed capability can save 50–60 tons per year versus constant speed applications (average 20–25% load).

Always get home safely, even in the worst conditions.

Unmatched reliability based on the proven MaK M 25 C.

Higher uptime for more revenue.

Extended times between overhauls to reduce lay-days for maintenance.



M 25 E • Applications

More eyes with a sharper view of your operation. Product support on-site and online monitoring.

Engine operation data, available through the Modular Alarm and Control System (MACS), provides the opportunity for real time monitoring and condition based maintenance programs.

- 24/7 global support
- Backed by engineering experts
- Qualified technical advice
- Easiest global interaction
- Cutting edge technology



Unique demands? We'll deliver your best solution.

Combined with propellers designed and optimized for vessels' normal cruise speed, the part load optimized M 25 E is developed for vessels where maximum engine power or propeller thrust is only required for a fraction of the operation time. Operational cost benefits are achieved by operating propellers and engines at best points of efficiency.



M 25 E • Part Load Optimization Technology

With an increased power density, prepared for up-coming environmental regulations, the new M 25 E is designed not only for traditional mechanical and electric propulsion systems, but also to support and complement electric propulsion systems requiring variable engine speed capabilities.

The optimized engine performance characteristics and the reduced part load fuel consumption are state of the art for every modern vessel design, addressing operational reliability and lowest operational fuel costs at the same time.

The new Monitoring Alarm and Control System (MACS) from Caterpillar provides additional functionality regarding engine control, diagnostics, and remote monitoring, including the option to extend the features to engine related systems like SCR's (Selective Catalytic Reduction) where customers have elected to reduce NO_x related taxes or harbor fees.

Available as a 6, 8, and 9 cylinder engine platform, three application specific engine configurations have been developed, allowing the selection of engine set up which provides the best fuel efficiency and load acceptance at part load without sacrificing low smoke emissions.

Designed for IMO II emissions regulations in its standard configuration, the M 25 E complies with IMO III regulations when combined with SCR systems.

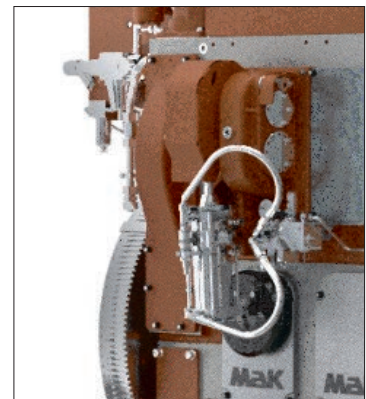
Part Load Optimization for constant speed application

Utilizing the Modular Alarm and Control System (MACS) to control our proven Flexible Camshaft- and Waste Gate Technology, valve timing and boost pressure can be adjusted to reduce fuel consumption over a wider part load range, resulting in improved load response capabilities.

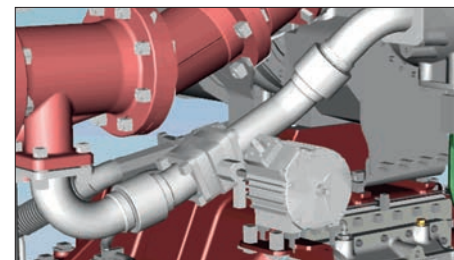
Part Load Optimization for variable speed application

Based on the same engine technology used for constant applications, Caterpillar engineers added a cylinder bypass valve, not only to reduce part load fuel consumption, but also to improve the load response at lower part load and lower engine speed. This is the perfect choice for variable speed-electric propulsion or both controllable and fixed pitch propeller applications.

Flexible Camshaft Technology (FCT)



Waste Gate

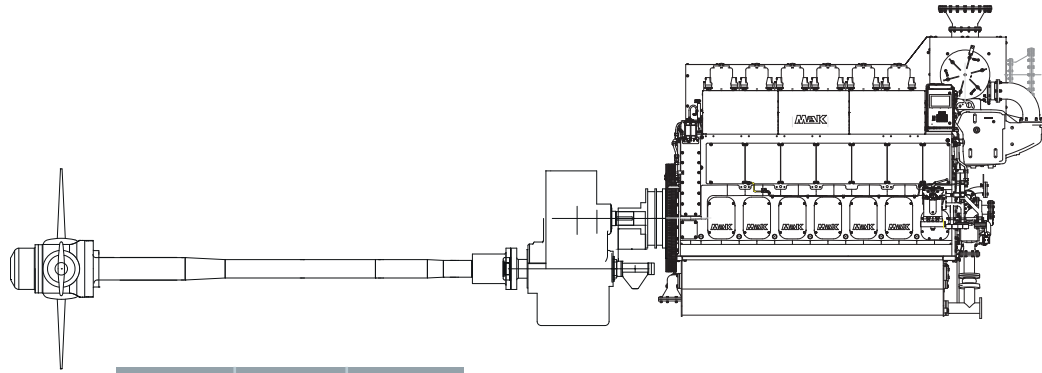


Cylinder Bypass Valve



Part Load Optimization	For Constant Speed	For Variable Speed
Benefits	Reduced sfoc at customized load range	
	Improved load step capability	
	Smoke reduction	
	No influence on power output, lube oil consumption, fuel quality, TBO and life time of all components	
	SCR capability	
	Exhaust gas temperature	
Scope of Supply	Flexible Camshaft Technology	Flexible Camshaft Technology
	Waste Gate	Waste Gate
	New Valve Timing	New Valve Timing
	Adjusted Turbocharger	Adjusted Turbocharger
	MACS	MACS

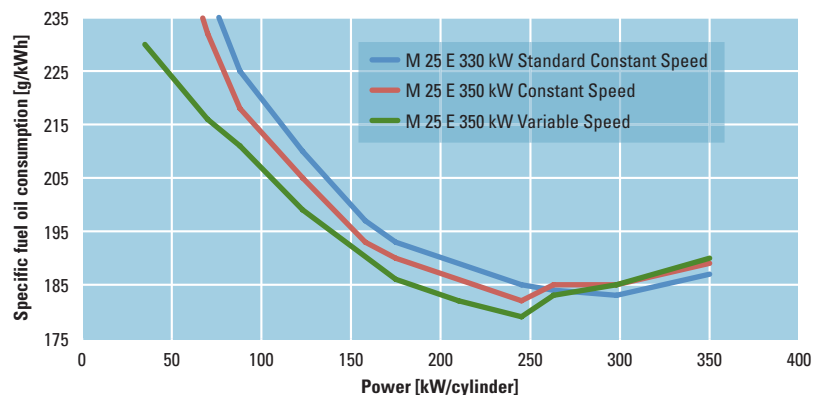
M 25 E → Controllable Pitch Propeller Application



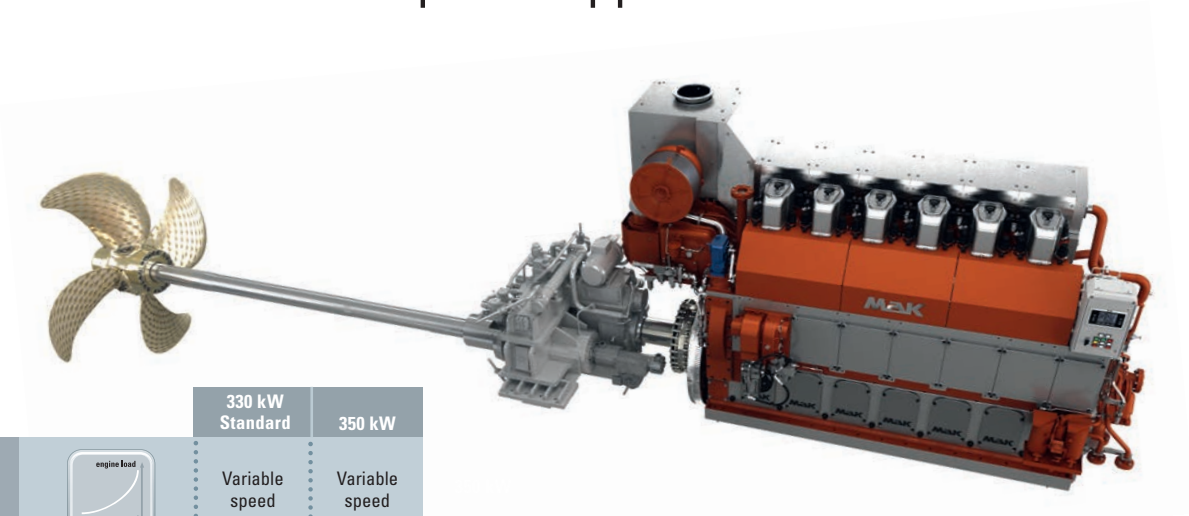
		330 kW Standard	350 kW	350 kW
Engine Speed		Constant speed	Constant speed	Variable speed
Brake Specific Fuel Consumption BSFC			Up to 8 g/kWh lower BSFC	Up to 24 g/kWh lower BSFC
Load Range		Full load optimized	Part load optimized	Part load optimized
Load Steps			3 load step capability	Optimized transient behaviour
Smoke Behavior			Reduced smoke	Reduced smoke
SCR Capability		Optimized exhaust gas conditions	Optimized exhaust gas conditions	Optimized exhaust gas conditions
System Monitoring		Future readiness	Future readiness	Future readiness

Propulsion engine models are available for constant and variable speed applications, providing opportunity for significant cost savings and environmental benefits to ship owners who typically operate their vessel at lower loads.

Utilizing a combination of proven technologies (Waste Gate, Flexible Camshaft Technology, Cylinder Bypass Valve), Caterpillar engineers designed a variety of ratings allowing naval architects to match engine efficiency characteristics with an optimized vessel and propulsion system design.



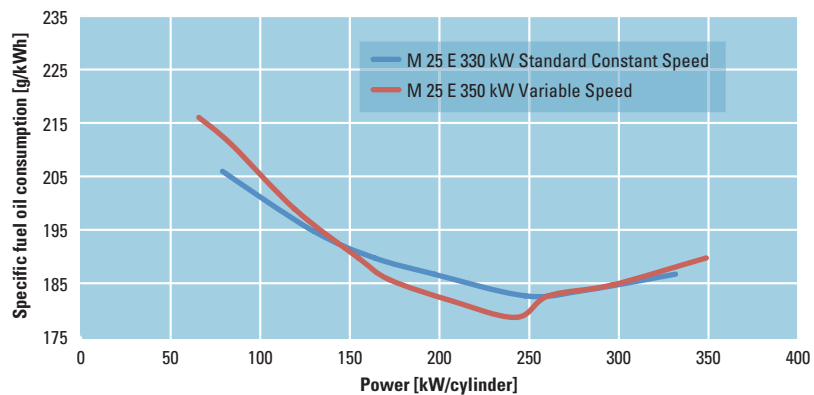
M 25 E → Fixed Pitch Propeller Application



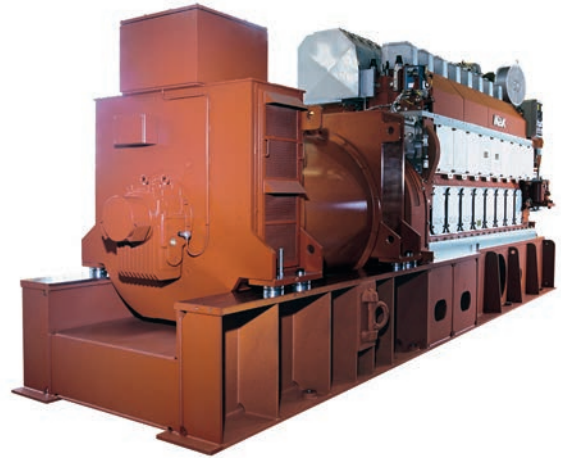
		330 kW Standard	350 kW
Engine Speed		Variable speed	Variable speed
Brake Specific Fuel Consumption BSFC			4 g/kWh lower BSFC
Load Range		Full load optimized	Part load optimized
Smoke Behavior			Reduced smoke
SCR Capability		Optimized exhaust gas conditions	Optimized exhaust gas conditions
System Monitoring		Future readiness	Future readiness

Developed for vessels where maximum vessel speed or propeller thrust is only required for a small fraction of the operation time.

By combining a set of proven technologies (Waste Gate, Flexible Camshaft Technology, Cylinder Bypass Valve), Caterpillar engineers designed a rating which especially fits with modern vessel designs where hull and propeller have been optimized for lowest operational costs at cruising speed.

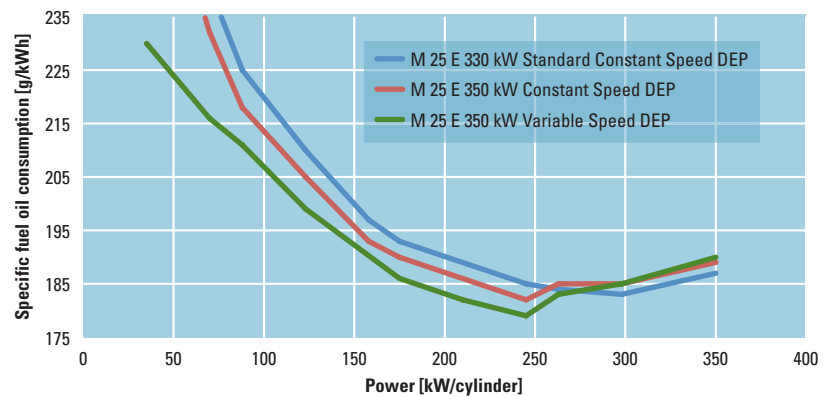


M 25 E → Generator Application



		330 kW Standard	350 kW	350 kW
Engine Speed		Constant speed	Constant speed	Variable speed
Brake Specific Fuel Consumption BSFC			8 g/kWh lower BSFC	24 g/kWh lower BSFC
Load Range		Full load optimized	Part load optimized	Part load optimized
Load Steps			3 load step capability	Optimized transient behaviour
Smoke Behavior			Reduced smoke	Reduced smoke
SCR Capability		Optimized exhaust gas conditions	Optimized exhaust gas conditions	Optimized exhaust gas conditions
System Monitoring		Future readiness	Future readiness	Future readiness

Designed for a higher power output the M 25 E is the right choice for customers. Not only seeking power density paired with increased load response capabilities, but also for customers who have elected to lower operational fuel costs utilizing selected load profiles in combination with the most efficient engine speed.

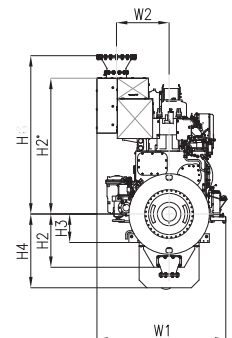
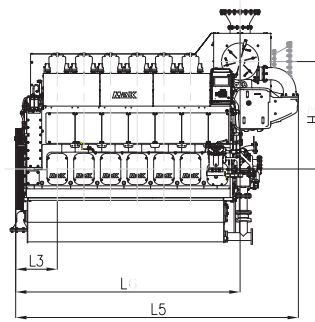
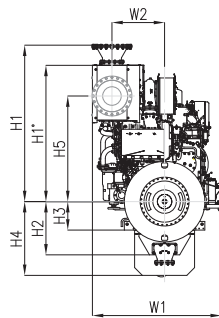
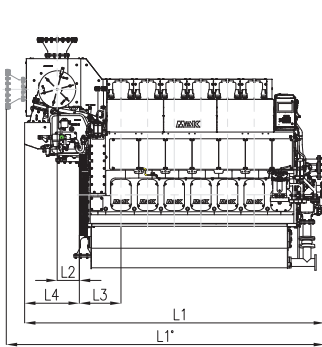


M 25 E • Technical Data

Propulsion

		6 M 25 E	8 M25 E	9 M 25 E
Maximum continous rating acc. ISO 3046/1	kW	2,100	2,800	3,150
Speed	rpm	720/750	720/750	720/750
Minimum speed	rpm	240/250	240/250	240/250
Bore	mm	255	255	255
Stroke	mm	400	400	400
Brake mean effective pressure (BMEP)	bar	28.6/27.4	28.6/27.4	28.6/27.4
Charge air pressure	bar	3.35	3.35	3.35
Firing pressure	bar	220	220	220
Combustion air demand (ta = 20 °C)	m³/h	11,850/11,965	15,040/15,200	17,715/17,880
Specific fuel oil consumption*				
n = const				
100 %	Basic engine configuration	g/kWh	187	187
85 %		g/kWh	185	185
75 %		g/kWh	184	184
50 %		g/kWh	193	193
Lube oil consumption	g/kWh	0.6 ± 0.3	0.6 ± 0.3	0.6 ± 0.3
NO_x emission	g/kWh	9.6	9.6	9.6

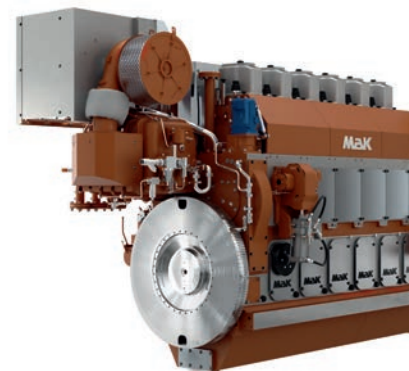
* Reference conditions: LCV = 42.700 kJ/kg, without engine driven pumps, tolerance 5% plus 1% per engine driven pump • Ambient temperature 25 °C

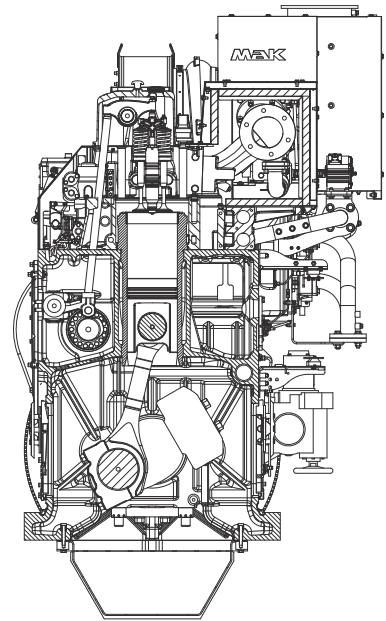


Turbocharger at driving end

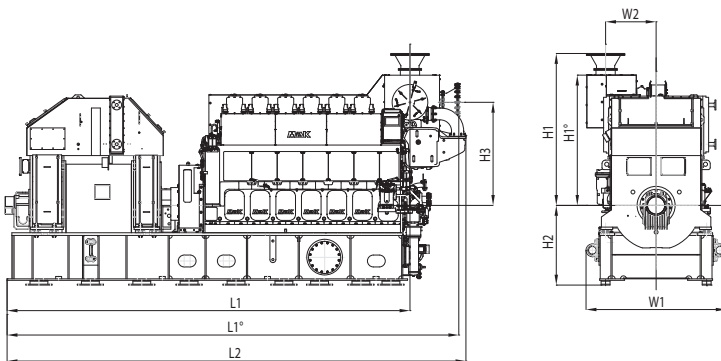
Turbocharger at free end

Engine	Turbocharger at driving end [Dimensions (mm)]										Turbocharger at free end			Weight [t]		Turbocharger at free end				
	Turbocharger nozzle position 0°										Turbocharger nozzle position 90°					Turbocharger nozzle position 0°			Turbocharger nozzle position 90°	
	L1	L2	L3	L4	H1	H2	H3	H4	W1	W2	L1°	H1°	H5	wet sump	dry sump	L5	L6	H6	H2°	H7
6 M 25 E	4,840	358	672	883	2,525	861	460	1,191	2,080	850	5,136	2,200	1,704	23.5	21.2	4,563	3,622	2,555	2,230	1,734
8 M 25 E	5,700	338	672	883	2,670	861	460	1,191	2,230	937	6,085	2,322	1,704	30.0	28.5	5,423	4,502	2,700	2,352	1,770
9 M 25 E	6,130	338	672	883	2,670	861	460	1,191	2,230	937	6,515	2,322	1,704	30.0	30.0	5,853	4,932	2,700	2,352	1,770

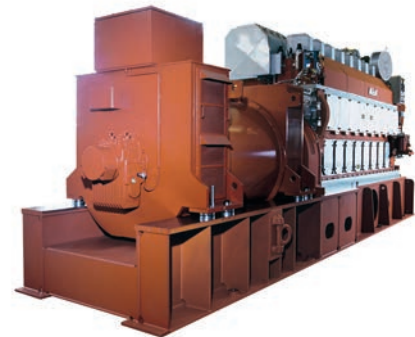




Generator Set



Generator Set										
Type	Turbocharger nozzle position 0°						Turbocharger nozzle position 90°			Weight [t]
	L1	L2	H1	H2	W1	W2	H1°	L1°	H3	
6 M 25 E	6,776	7,717	2,555	1,340	2,357	850	2,230	7,597	1,734	43.0
8 M 25 E	7,636	8,577	2,700	1,340	2,357	937	2,352	8,887	1,770	53.0
9 M 25 E	8,066	9,007	2,700	1,340	2,357	937	2,352	9,317	1,770	56.0



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.

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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

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