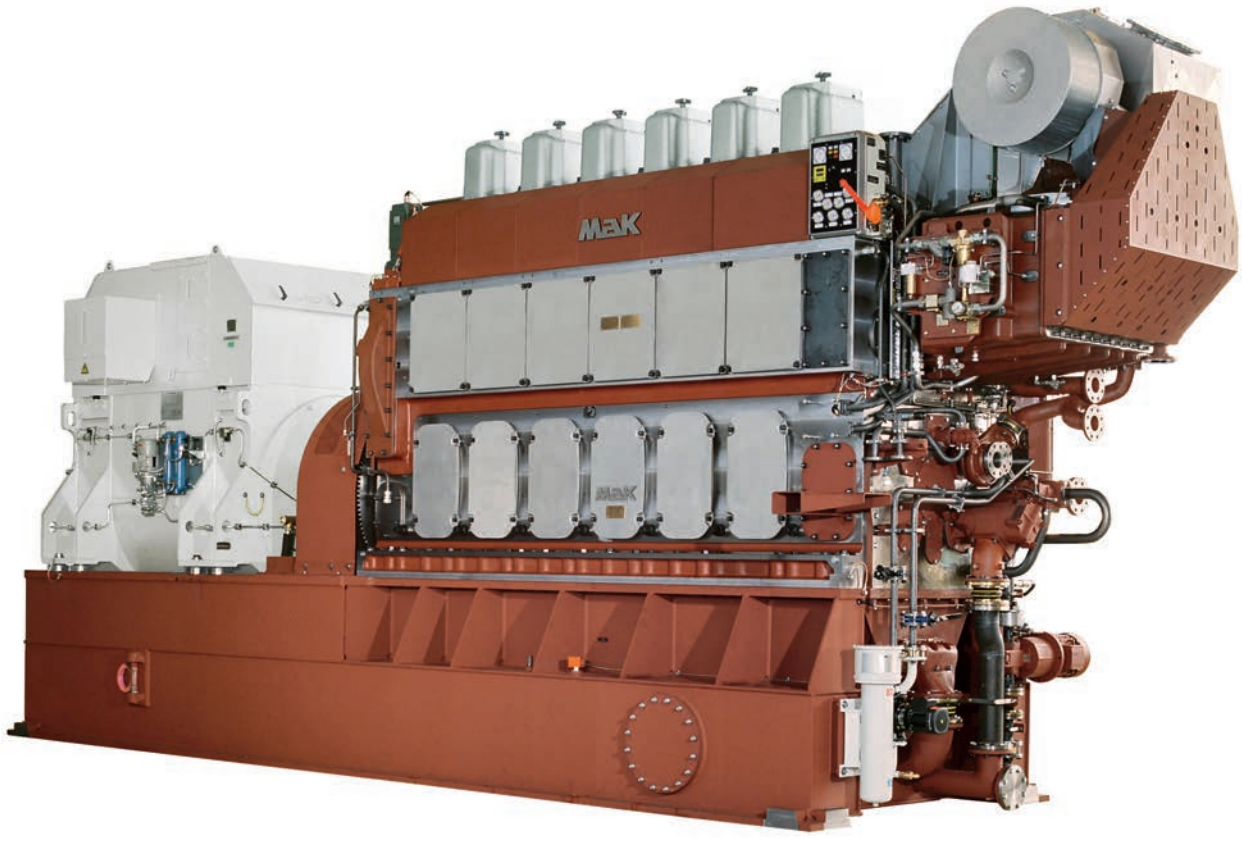
M 32 E

New engine development
based on the successful
M32 C design

6 • 8 • 9 Cylinder



BUILT FOR IT.™

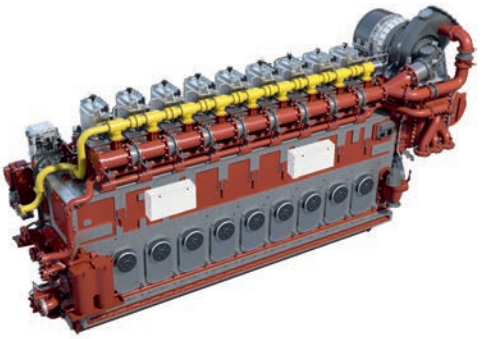
MaK

Range Strategy and Concept • M 32 E

Caterpillar Motoren designed the M 32 E based on the reliable M 32 C engine series. The M 32 E will share the same footprint as the sucessful M 32 C. The M 32 E is the first MaK 5 MW engine in the 320 mm bore segment.

M 32 C

- Robust engine control terminal
- Emission reduction technology
- Flexible Camshaft Technology (FCT), optional
- 500 kW/cyl. @ 600 rpm
- HFO capability
- IMO II compliant



M 34 DF

- Dual Fuel Engine for operation on liquid and gaseous fuels
- Outstanding efficiency and loading capacity, as well as operational simplicity supported by a fully automated engine control
- MDO ignition fuel capable
- Operation on natural gas with low methane number at reduced load
- 500 kW/cyl. @ 720/750 rpm
- HFO capability
- IMO III compliant in gas mode
- IMO II compliant in liquid mode

M 32 E

The new M 32 E extends the M 32 C Power-Range to 5 MW

- Power increase to 550 kW/cyl.
- Generator friendly speed 720/750 rpm
- Part load optimization kit available for DE/CPP and generator set application
- Available in fourth quarter 2014
- New high efficiency turbo charger generation
- Smaller charge air cooler optimized for better serviceability
- More compact engine design
- Reduced weight
- FPP application capability available mid 2015

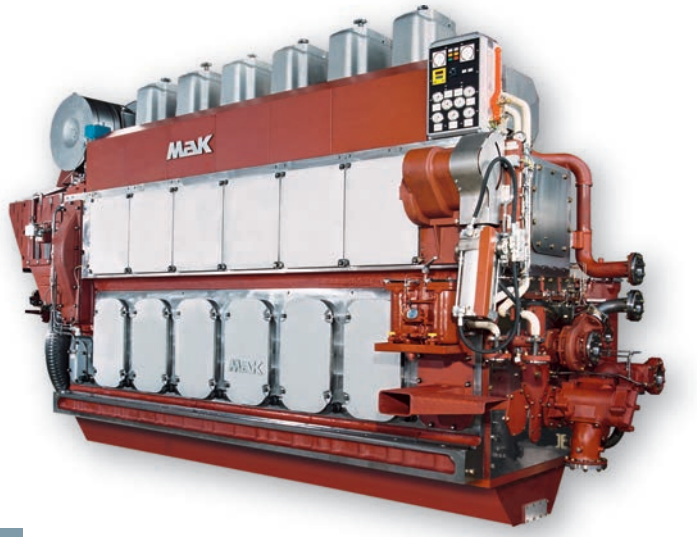
Benefits • M 32 E

M 32 E is designed for the offshore market focused on diesel electric and genset application. The 720/750 rpm concept will reduce generator costs. Charge air cooler housing and charge air cooler allow easier disassembly and cleaning. The new design still supports operation at any ambient condition without load reduction.

We offer two part load optimization kits for DE/CPP and generator set application for customers operating the engines mainly below 47 % (generator set) or 72 % (DE/CPP) load.

Application and installation

- Reduced generator costs because of speed increase to 720/750 rpm
- Retrofittable to Dual Fuel technology M 34 DF
- On engine IMO II solution without Selective Catalytic Reduction (SCR)
- Low smoke option
- Flexible Camshaft Technology (FCT) option
- Heavy Fuel Oil and Marine Diesel Oil capability
- Low sulphur fuel capability



Same maintenance intervalls as M 32 C:
M 32 E economical from installation to operation.

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

* with optional steel version ** 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.

Part Load Optimization • M 32 E

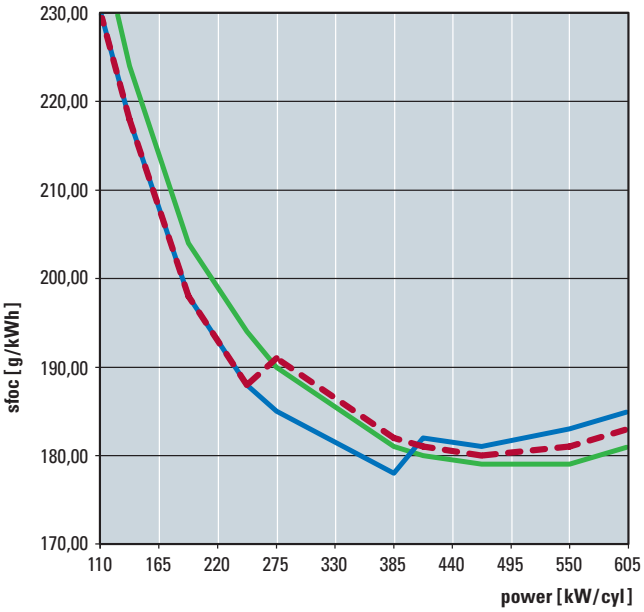
Specific fuel oil consumption M 32 E IMO II

- M 32 E with 550 kW/cyl. @ 720/750 rpm and 460 mm stroke
- ISO 3046/1 and LCV 42,7 MJ/kg
- 5% tolerance, + 1% per engine driven pump
- Values for information only (preliminary)

M 32 E standard

Part load optimization with FCT* for cylce E2 (CPP and DE)

Part load optimization with FCT* for cycle D2 (Aux – Gensets)



- Part load optimization concept realized by our proven Flexible Camshaft Technology (FCT) with optimized control strategy. FCT switch point adjusted to emission test cycle.
- IMO approval (ISO 8178) for auxiliary generator sets performed to test cycle D2. FCT switch point at 47% power.
- IMO approval (ISO 8178) for CPP- or diesel-electric drives performed to test cycle E2. FCT switch point at 72 % power.

	Test cycle E2				Test cycle D2				
Speed	100%	100%	100%	100%	100%	100%	100%	100%	100%
Power	100%	75%	50%	25%	100%	75%	50%	25%	10%
Emission weighting factor	0.2	0.5	0.15	0.15	0.05	0.25	0.3	0.3	0.1

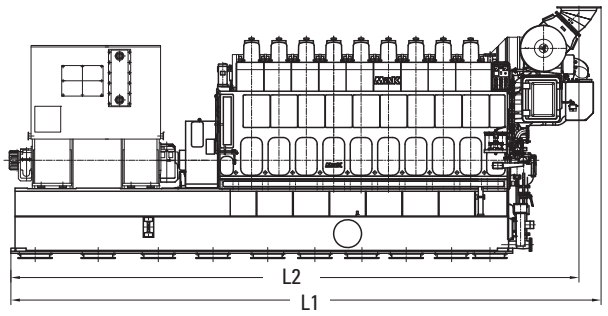
			M 32 E Standard	**M 32 E** Part Load Optimization Genset (D2)	**M 32 E** Part Load Optimization CPP & DE (E2)
Maximum continous rating acc. ISO 3046/1		kW/cyl.	550	550	550
Speed		rpm	720/750	720/750	720/750
Brake mean effective pressure (BMEP)		bar	23.7/22.7	23.7/22.7	23.7/22.7
Specific fuel oil consumption*					
n = const	75 %	g/kWh	180	181	182
	50 %	g/kWh	190	191	185
	40 %	g/kWh	198	192	192
	25 %	g/kWh	224	218	218

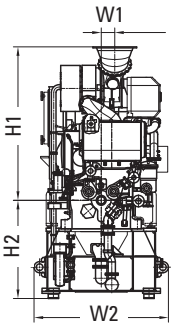
* Available for 6, 8 and 9 cylinder without derating

M 32 E • Technical Data

		6 M 32 E	8 M 32 E	9 M 32 E
Maximum continous rating acc. ISO 3046/1	kW	3,300	4,400	4,950
Speed	rpm	720/750	720/750	720/750
Minimum speed	rpm	360	360	360
Bore	mm	320	320	320
Stroke	mm	460	460	460
Brake mean effective pressure (BMEP)	bar	23.7/22.7	23.7/22.7	23.7/22.7
Charge air pressure	bar	4.1	4.1	4.1
Firing pressure	bar	225	225	225
Combustion air demand (ta = 20 °C)	m^3/h	17,875	23,850	26,820
Specific fuel oil consumption*				
n = const 100 %	g/kWh	179	179	179
85 %	g/kWh	179	179	179
75 %	g/kWh	180	180	180
50 %	g/kWh	190	190	190
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





Generating set (Dimensions in mm)							
Engine	L1*	L2	H1	H2	W1	W2	Weight (t)
6 M 32 E	9302	8869	2901	1900	962	2639	73.0
8 M 32 E	10866	10461	2969	1900	962	2600	92.0
9 M 32 E	11419	10991	2969	1900	962	2600	98.0

* Dependent on generator make/type.

M 32 E – Key Features and Key Values

- M 32 E is based on the very successful M 32 C engine. Nearly 1.500 engines have been delivered between launching 1995 and today
- IMO II/EPA compliant
- Heavy Fuel Oil capability
- Same footprint as M 32 C
- Durability and simplicity as M 32 C
- Class leading maintenance intervals
- Competitive fuel consumption
- Part load optimization version available

Excellent support

- Global application and installation support for engine and periphery
- Operator and technician training
- Strong, global dealer service network

All mentioned data is preliminary!

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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LEDM0043-00

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