MARINE POWER SOLUTIONS

EDITION 2016 (SEPTEMBER)

CATERPILLAR®

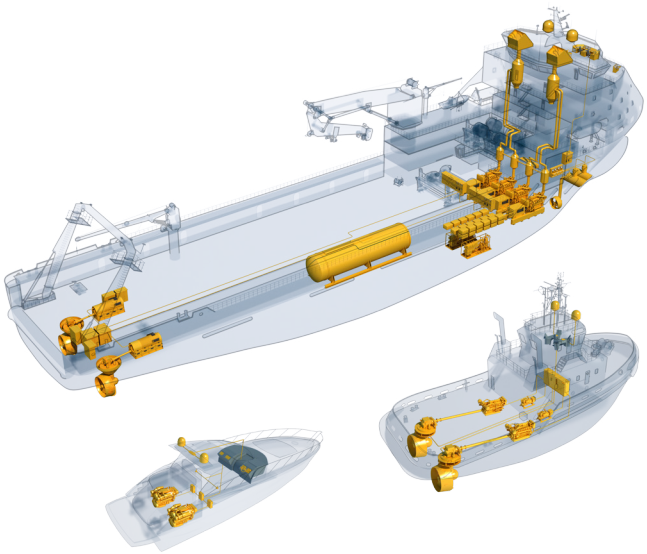
Caterpillar follows a policy of continuous product improvement. For this reason, some material and specifications in the Caterpillar Marine Solutions Guide could change without notice.

For more Information about Caterpillar Marine and current products, as well as legacy products, please visit: **cat.com/marine**

For Cat® Dealers: Please reference TMI Web for the most current information.

Contents

Marine Power Solutions



Not just Components. Complete Solutions.

- High-speed and medium-speed propulsion, auxiliary and generator set solutions
- Optional dual fuel, diesel-electric, and hybrid system configurations
- SCR Systems
- Complete Propulsion Systems - controllable pitch propellers, transverse and azimuth thrusters, and controls
- LNG Propulsion and Fuel Gas Systems - from shore-side bunkering to on-board storage, bunker tanks to LNG fuel gas
- Vessel Monitoring and Analytics
- Comprehensive Global Customer Support and Aftersale Solutions

Caterpillar Marine is headquartered in Hamburg, Germany and part of Caterpillar Inc., headquartered in Peoria, Illinois, United States of America.

Our Values in Action are Integrity, Excellence, Teamwork, Commitment and Sustainability.

6 Sigma methodology is our DNA in customer's satisfaction, product development and cost management. The Caterpillar Production System (CPS) enables product quality, cost saving and employee safety. With the Caterpillar Foundation we reflect our philanthropic efforts & corporate social responsibility.

Caterpillar Marine is working with 60 Cat Dealers and 20 MaK & EMD dealers globally to ensure customers enduring success. Our product offerings includes diesel & dual fuel engines as propulsion and auxiliary engines, as well as complete generator sets. In addition to the power generation we offer after treatment solutions and complete Fuel Gas Handling Systems.

To ensure manoeuvrability, propulsion and control about your vessel we offer Conventional Propeller Systems in a Controllable Pitch layout and Azimuth Propulsion Systems in a Controllable and Fixed Pitch layout as mechanical, electrical or hybrid driven solutions.

Our technical enabled solutions offer complete integrated monitoring, safety and control system through total vessel analytics solutions to increase up time and efficiency even more. This Marine Asset Intelligence (MAI) gives you advanced predictive analytics and expert advisory services across your vessel or across your entire fleet. Automated analytics identify potential issues before failure. Fleet Advisors provide recommendations for maintenance and operations improvements. We analyse and track equipment condition to optimise maintenance and repair scheduling. We optimise energy use by improving maintenance and operations and ensure safety and regulatory compliance.

The entire solution is tailored to your specific needs, depending on which equipment is included, the types of expert services required, releases metrics, reports, and dashboards for optimum utilisation of your fleet.

All this product and innovations will be delivered through our global dealer network, including complete marine integration solutions. In addition we offer world class Marine Financing Solutions by Cat Financial.

Our mission is to offer advanced marine power solution systems. Our vision is to be a full marine system and service provider. This always with the highest up time and the lowest operational cost.

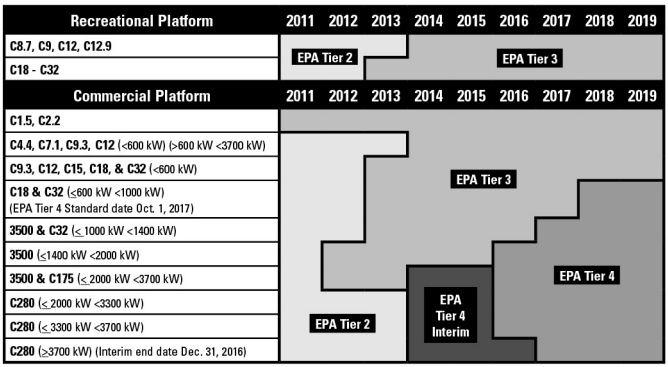
Engines and Generator Sets

Emissions Regulations

Global regulatory agencies, including US Environmental Protection Agency (EPA), EURO Waterways and International Maritime Organization (IMO) have enacted programs to reduce emissions from all diesel vessels.

Caterpillar Marine has a key focus on emissions regulations to ensure that our marine engines meet global requirements. We've long been a leader in solving environmental challenges, allowing customers to focus on business progress.

U.S. EPA Standards



U.S. EPA Regulations

NC Not U.S. EPA Marine Certified for use in the U.S. or Canada.

T3C Meets U.S. EPA Marine Tier 3 Commercial standards.

T3R Meets U.S. EPA Marine Tier 3 Recreational standards.

T3CR Meets U.S. EPA Marine Tier 3 Commercial standards and U.S. EPA Marine Tier 3 Recreational standards.

T4C Meets U.S. EPA Marine Tier 4 Final Commercial standards

Canada Regulations

As of January 1, 2016 Category 2 engines (7 to 30 l/cylinder) on Canadian flagged vessels must meet U.S. EPA requirements or have an equivalent certificate that has been provided by another country. All other marine engines must meet IMO requirements for vessels constructed after December 31, 2010.

IMO/EU Certification

Tier	Date	NOx Limit (g/kWh)		
		n < 130	130 ≤ n < 2000	n ≥ 2000
Tier I	2000	17.0	$45 \cdot n^{-0.2}$	9.8
Tier II	2011	14.4	$44 \cdot n^{-0.23}$	7.7
Tier III	2016*	3.4	$9 \cdot n^{-0.2}$	2.0

IMO Certification

IMO I — Meet IMO emissions standards for the year 2000 as defined by Regulation 13 of Annex VI to the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the protocol of 1997. Applies to specific engines in vessels with a keel lay date from Jan. 1, 2000 until Dec. 31, 2010; other rules may apply.

IMO II — Emissions data measurement is consistent with the procedures described in the NO_X Technical Code 2008. The engine exhaust emissions meet the International Maritime Organization's Regulation 13 of Revised Annex VI to the MARPOL Convention. Applies to engines greater than 130 kW on vessels flagged in countries party to the MARPOL Annex VI Convention and the vessel is constructed after Dec 31, 2010. IMO II typically applies outside of NO_X Emissions Control Areas (NO_X ECA). See IMO.org "status of conventions" for a current list of nations enforcing MARPOL Annex VI. Other rules may apply.

IMO III — Emissions data measurement is consistent with the procedures described in the NO_X Technical Code 2008. The engine exhaust emissions meet the International Maritime Organization's Regulation 13 of Revised Annex VI to the MARPOL Convention. IMO III applies to NO_X Emission Control Areas (NO_X ECA) defined areas. Other rules may apply.

NST — Engines ≤ 130 bkW are not subject to IMO regulations

EU Certification

Commercial Craft Directive 97/68/EC (EU Stage IIIA)

This directive is in effect and applies to all propulsion and auxiliary engines. Caterpillar has certified some engines with a rated power of greater than 560 bkW to this standard. Most of these are to be used for inland waterway vessels. These engines also became effective by reciprocity agreement with CCNR Stage II, on July 1, 2007.

Central Commission for Navigation on the Rhine

Commercial Craft — CCNR Stage II diesel engine emissions limits became effective July 1, 2007; this Directive applies to engines with a rated power at or above 37 kW.

Engine Certification Descriptions

CC2 Meets CCNR Stage II

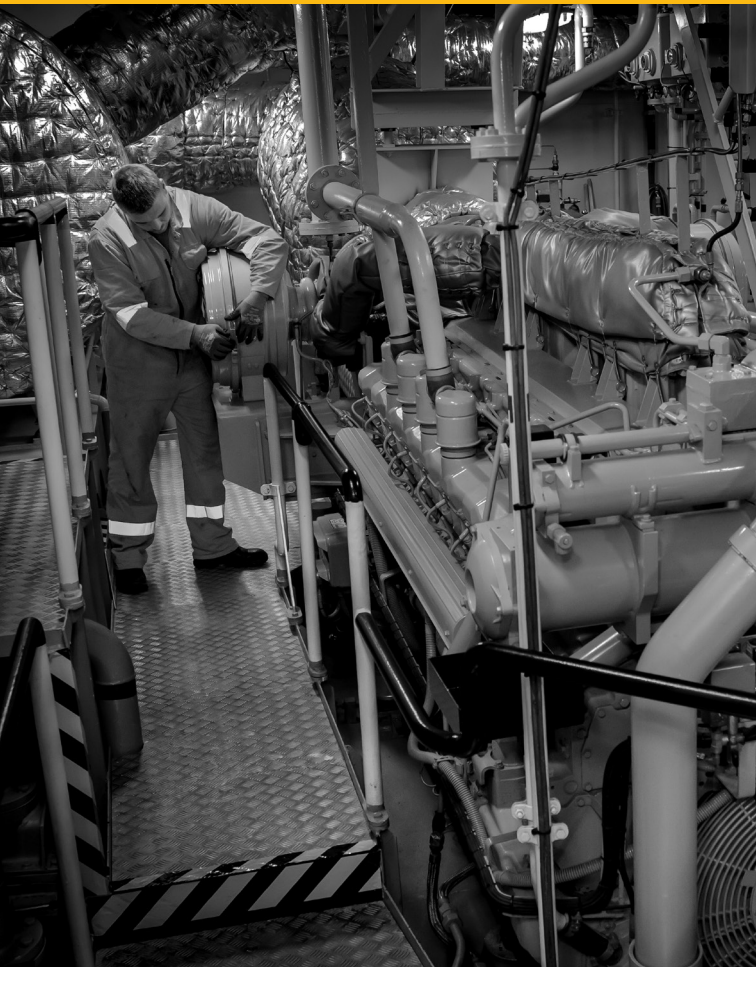
IW Meets EU Stage IIIA or referred to as, Inland Waterway Commercial Craft Directive, meaning the same as Commercial Craft Directive 97/68/EC (EU Stage IIIA). Some engine models and ratings will have (CCNR) or (EU Stage IIIA).

NC Not Certified for specific regulations.

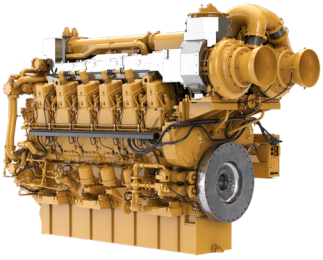
NST Engines ≤ 19 kW are not subject to CCNR legislation.

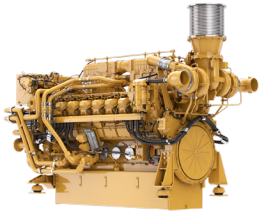
RCD Recreational Craft Directive, meets EU 94/25/EC. This directive is in effect and applies to all recreational engines used in the European Union areas.

Cat High-Speed and Medium-Speed Solutions



Cat Propulsion Engines





Caterpillar Marine offers a complete range of conventional and electronic propulsion solutions spanning across commercial and leisure applications. With power ranging from 298 bkW (400 bhp) to 5645 bkW (7577 bhp), there are Cat high-speed and medium-speed propulsion solutions for you.

Whatever the application, and whatever the solution, our products are renowned for not only reliability, durability and efficiency, but also for design and manufacturing innovation. They deliver the advanced control that vessel operators need to maximize power and efficiency, and the enhanced monitoring that ensures peace of mind. By leveraging our ACERT™ and Cat Common Rail technologies, our electronic engines are designed to meet all the varying global emission standards.

We're built to keep you working – or having fun – on the water.

C7.1

PROPULSION ENGINE

RATINGS AND FUEL CONSUMPTION

	mhp	bhp	bkW	rpm	U.S. g/h	g/bkW-hr	EPA	IMO	EU
E	507	500	373.0	2900	27.3	232	T3R	II	IW
E	456	450	335.7	2900	24.4	228	T3R	II	IW
E	406	400	298.4	2900	21.8	227	T3R	II	IW

DIMENSIONS & WEIGHT

	LE	H	WE
min.	1095mm/43.1in	876mm/34.5in	798mm/31.4in
max.	1095mm/43.1in	876mm/34.5in	798mm/31.4in

SPECIFICATIONS

Aspiration	TA	
Bore x Stroke	105 x 135 mm	4.13 x 5.31 in
Displacement	7.01Liter	428 Cu in
Rotation (from flywheel end)	Counterclockwise	
Engine dry weight (approx)	760kg	1676lb

C8.7

PROPULSION ENGINE

RATINGS AND FUEL CONSUMPTION

	mhp	bhp	bkW	rpm	U.S. g/h	g/bkW-hr	EPA	IMO	EU
E	650	641	478	2300	33.0	217	T3R	II	IW

DIMENSIONS & WEIGHT

	LE	H	WE
min.	47.9 in/1218 mm	38.7 in/984 mm	34.7 in/881 mm
max.	47.9 in/1218 mm	38.7 in/984 mm	34.7 in/881 mm

SPECIFICATIONS

In-line 6, 4-Stroke-Cycle Diesel		
Aspiration	TSA	
Bore x Stroke	4.6 x 5.3 in	117 x 135 mm
Displacement	531 cu in	8.7 liter
Rotation (from flywheel end)	Counterclockwise	
Engine dry weight (approx)	2295 lb	1041 kg

C9.3

PROPULSION ENGINE

RATINGS AND FUEL CONSUMPTION

	mhp	bhp	bkW	rpm	U.S. g/h	g/bkW-hr	EPA	IMO	EU
B	381	375	280	1800	19.3	219.1	T3C	II	IW
C	421	416	310	2100	21.5	220.4	T3C	II	IW
D	483	476	355	2300	24.9	222.3	T3C	II	IW

DIMENSIONS & WEIGHT

	LE	H	WE
min.	57.2 in/1452 mm	43.0 in/1093 mm	38.5 in/978 mm
max.	57.2 in/1452 mm	43.0 in/1093 mm	38.5 in/978 mm

SPECIFICATIONS

In-line 6, 4-Stroke-Cycle Diesel		
Aspiration	TA	
Bore x Stroke	4.53 x 5.87 in	115 x 149 mm
Displacement	568 cu in	9.3 liter
Rotation (from flywheel end)	Counterclockwise	
Engine dry weight (approx)	2083-2474 lb	945-1122 kg

C12

Electronic Control System

PROPULSION ENGINE

RATINGS AND FUEL CONSUMPTION

	mhp	bhp	bkW	rpm	U.S. g/h	g/bkW-hr	EPA	IMO	EU
A	345	340	254	1800	16.6	208.3	NC	II	NC
B	390	385	287	1800	18.6	205.7	NC	II	NC
C	460	454	339	2100	22.0	205.9	NC	II	NC
C	497	490	366	2300	24.0	208.8	NC	I	NC
D	578	570	425	2300	27.9	208.8	NC	I	NC
E	609	600	448	2300	29.3	208.1	NC	I	NC

DIMENSIONS & WEIGHT

	LE	H	WE
min.	62 in/1574 mm	39.5 in/1005 mm	38.1 in/969 mm
max.	62 in/1574 mm	39.5 in/1005 mm	38.1 in/969 mm

SPECIFICATIONS

In-line 6, 4-Stroke-Cycle Diesel		
Aspiration	TA	
Bore x Stroke	5.1 x 5.9 in	130 x 150 mm
Displacement	732 cu in	12 liter
Rotation (from flywheel end)	Counterclockwise	
Engine dry weight (approx)	2588 lb	1174 kg

C12 ACERT
PROPULSION ENGINE

RATINGS AND FUEL CONSUMPTION

	mhp	bhp	bkW	rpm	U.S. g/h	g/bkW-hr	EPA	IMO	EU
E	669	660	492	2300	34.1	220.0	NC	II	NC
E	715	705	526	2300	36.5	220.3	NC	II	NC

DIMENSIONS & WEIGHT

	LE	H	WE
min.	62 in/1574 mm	39.5 in/1005 mm	38.1 in/969 mm
max.	62 in/1574 mm	39.5 in/1005 mm	38.1 in/969 mm

SPECIFICATIONS

In-line 6, 4-Stroke-Cycle Diesel		
Aspiration	TA	
Bore x Stroke	5.1 x 5.9 in	130 x 150 mm
Displacement	732 cu in	12 liter
Rotation (from flywheel end)	Counterclockwise	
Engine dry weight (approx)	2588 lb	1174 kg

C12.9

Electronic Control System

PROPULSION ENGINE

RATINGS AND FUEL CONSUMPTION

	mhp	bhp	bkW	rpm	U.S. g/h	g/bkW-hr	EPA	IMO	EU
E	850	838	625	2300	43.3	220.1	T3R	II	IW
E	1000	985	735	2300	50.7	218.9	T3R	II	IW

DIMENSIONS & WEIGHT

	LE	H	WE
min.	57.6 in/1463 mm	42.7 in/1085 mm	43.7 in/1110 mm
max.	57.6 in/1463 mm	42.7 in/1085 mm	43.7 in/1110 mm

SPECIFICATIONS

In-line 6, 4-Stroke-Cycle Diesel		
Aspiration	TA	
Bore x Stroke	5.31 x 5.9 in	135 x 150 mm
Displacement	787 cu in	12.9 liter
Rotation (from flywheel end)	Counterclockwise	
Engine dry weight (approx)	3479-3523 lb	1578-1598 kg

3406C

PROPULSION ENGINE

Mechanical Control System

RATINGS AND FUEL CONSUMPTION

	mhp	bhp	bkW	rpm	U.S. g/h	g/bkW-hr	EPA	IMO	EU
A	370	365	272	1800	17.8	208.0	NC	NC	NC
B	406	400	298	1800	19.5	208.0	NC	NC	NC

DIMENSIONS & WEIGHT

	LE	H	WE
min.	57.3 in /1454.2 mm	50.3 in/1278.5 mm	36.0 in/913.5 mm
max.	57.3 in /1454.2 mm	50.3 in/1278.5 mm	36.0 in/913.5 mm

SPECIFICATIONS

In-line 6, 4-Stroke-Cycle Diesel		
Aspiration	TA	
Bore x Stroke	5.4 x 6.5 in	137.2 x 165.1 mm
Displacement	891 cu in	14.6 liter
Rotation (from flywheel end)	Counterclockwise	
Engine dry weight (approx)	2921 lb	1325 kg

C18 ACERT
PROPULSION ENGINE

RATINGS AND FUEL CONSUMPTION

IMO Tier II

	mhp	bhp	bkW	rpm	U.S. g/h	g/bkW-hr	EPA	IMO	EU
A	460	454	339	1800	22.6	212.1	NC	II	IW
A	485	479	357	1800	23.7	211.3	NC	II	IW
A	608	600	447	1800	30.0	213.1	NC	II	IW
B	560	533	412	2100	28.7	221.3	NC	II	IW
B	680	670	500	2100	35.2	223.8	NC	II	IW
C	725	715	533	2100	37.6	223.9	NC	II	IW
D	885	873	651	2200	45.0	219.3	NC	II	IW

U.S. EPA Tier 3 and IMO Tier II

	mhp	bhp	bkW	rpm	U.S. g/h	g/bkW-hr	EPA	IMO	EU
A	475	469	350	1800	24.5	222.0	T3C	II	IW
A	608	600	447	1800	30.7	218.5	T3C	II	IW
B[1]	680	670	500	1800-2100	34.7	223.6	T3C	II	IW
C[1]	725	715	533	1800-2100	37.2	221.7	T3C	II	IW
D	814	803	599	2100	41.8	221.6	T3C	II	IW
E	1015	1001	747	2300	53.8	228.9	T3CR	II	IW
E	1150	1136	847	2300	58.6	219.8	T3R	II	IW

[1]Wide Operating Speed Range (WOSR)

Heat Exchanger (32°C Sea Water Temp), Keel Cooled (52°C SCAC Temp)

US EPA commercial ratings 1000 kW and greater will move to EPA T4 starting Jan. 1, 2017, ratings 600 kW and greater will move to EPA T4 Starting Oct.1, 2017

(continued)

C18 ACERT
PROPULSION ENGINE

(continued)

DIMENSIONS & WEIGHT

	LE	H	WE
min.	73.0 in/1854 mm	47.2 in/1198 mm	44.6 in/1134 mm
max.	76.0 in/1931 mm	51.2 in/1300 mm	47.4 in/1204 mm

SPECIFICATIONS

In-line 6, 4-Stroke-Cycle Diesel		
Aspiration	TA, TTA	
Bore x Stroke	5.7 x 7.2 in	145 x 183 mm
Displacement	1106 cu in	18.1 liter
Rotation (from flywheel end)	Counterclockwise	
Engine dry weight (approx)	4000-4299 lb	1814-1950 kg

RATINGS AND FUEL CONSUMPTION

IMO Tier II

	mhp	bhp	bkW	rpm	U.S. g/h	g/bkW-hr	EPA	IMO	EU
A[1]	669	660	492	1600-1800	32.3	208.4	NC	II	IW
A[1]	760	750	559	1600-1800	36.2	205.8	NC	II	IW
A[1]	862	850	634	1600-1800	41.0	205.3	NC	II	IW
A	964	950	709	1600	45.2	202.7	NC	II	IW
A[1]	1014	1000	746	1600-1800	48.1	204.9	NC	II	IW
B[1]	1217	1200	895	1800-2000	59.3	210.5	NC	II	IW
B	1319	1300	970	2100	64.1	211.2	NC	II	IW
C	1319	1300	970	1800	62.5	204.6	NC	II	IW
C[1]	1470	1450	1081	2000-2300	77.2	226.8	NC	II	IW

U.S. EPA Tier 3 and IMO Tier II

	mhp	bhp	bkW	rpm	U.S. g/h	g/bkW-hr	EPA	IMO	EU
A[1]	760	750	559	1600-1800	37.5	213.2	T3C	II	IW
A[1]	862	850	634	1600-1800	42.8	214.2	T3C	II	IW
A[1]	862	850	634	1800-2100	45.4	227.9	T3C	II	IW
A[1]	1014	1000	746	1600-1800	49.8	212.1	T3C	II	IW
B[1]	1217	1200	895	1800-2100	62.6	222.2	T3C	II	IW
C[1]	1319	1300	970	1800-2100	67.9	222.7	T3C	II	IW
C[1]	1470	1450	1081	2100-2300	75.9	223.1	T3C	II	IW

[1]Wide Operating Speed Range (WOSR)

Heat Exchanger (32°C Sea Water Temp), Keel Cooled (52°C SCAC Temp)

US EPA commercial ratings 1000 kW and greater will move to EPA T4 starting Jan. 1, 2017, ratings 600 kW and greater will move to EPA T4 Starting Oct.1, 2017

(continued)

C32 ACERT

PROPULSION ENGINE (Commercial Applications)

(continued)

DIMENSIONS & WEIGHT

	LE	H	WE
min.	83.5 in/2121	60.9 in/1547 mm	60.17 in/1528 mm
max.	89.9 in/2284 mm	62.5 in/1587 mm	60.17 in/1528 mm

SPECIFICATIONS

Vee 12, 4-Stroke-Cycle Diesel		
Aspiration	TTA	
Bore x Stroke	5.71 x 6.38 in	145 x 162 mm
Displacement	1959 cu in	32.1 liter
Rotation (from flywheel end)	Couterclockwise	
Engine dry weight (approx)	6950-7160 lb	3152-3248 kg

C32 ACERT

PROPULSION ENGINE (High Performance Applications)

RATINGS AND FUEL CONSUMPTION

U.S. EPA Tier 3 and IMO Tier II

	mhp	bhp	bkW	rpm	U.S. g/h	g/bkW-hr	EPA	IMO	EU
D	1622	1600	1193	2300	82.1	218.2	T3CR	II	IW
E	1724	1700*	1268	2300	-	-	T3CR	II	IW
E	1825	1800	1342	2300	97.1	229.7	T3CR	II	IW
E	1925	1900	1418	2300	101.4	227.2	T3R	II	IW

**Contact local dealer for availability.*

US EPA commercial ratings 1000 kW and greater will move to EPA T4 starting Jan. 1, 2017, ratings 600 kW and greater will move to EPA T4 Starting Oct.1, 2017

DIMENSIONS & WEIGHT

	LE	H	WE
min.	82.9 in/2106 mm	56.9 in/1445 mm	58.3 in/1482 mm
max.	82.9 in/2106 mm	56.9 in/1445 mm	58.3 in/1482 mm

SPECIFICATIONS

Vee12, 4-Stroke-Cycle Diesel		
Aspiration	TTA	
Bore x Stroke	5.71 x 6.38 in	145 x 162 mm
Displacement	1959 cu in	32.1 liter
Rotation (from flywheel end)	Couterclockwise	
Engine dry weight (approx)	6780 lb	3075 kg

3508C

Electronic Control System

PROPULSION ENGINE

RATINGS AND FUEL CONSUMPTION

	mhp	bhp	bkW	rpm	U.S. g/h	g/bkW-hr	EPA	IMO	EU
A	786	775	578	1200	36.9	206.1	NC	II	IW
A	1015	1000	746	1600	48.9	208.3	NC	II	IW
B	862	850	634	1200	40.4	202.8	NC	II	IW
B	1065	1050	783	1600	51.6	209.4	NC	II	IW
C	913	900	671	1200	42.9	203.4	NC	II	IW
C	1115	1100	820	1600	54.2	210.1	NC	II	IW

DIMENSIONS & WEIGHT

	LE	H	WE
min.	83.4 in/2117 mm	72.0 in/1829 mm	67.0 in/1703 mm
max.	83.4 in/2117 mm	72.0 in/1829 mm	67.0 in/1703 mm

SPECIFICATIONS

Vee 8, 4-Stroke-Cycle Diesel		
Aspiration	TTA	
Bore x Stroke	6.7 x 7.5 in	170 x 190 mm
Displacement	2107 cu in	34.5 liter
Rotation (from flywheel end)	Counterclockwise or clockwise	
Engine dry weight (approx)	10,935 lb	4960 kg

3512C
PROPULSION ENGINE

RATINGS AND FUEL CONSUMPTION

	mhp	bhp	bkW	rpm	U.S. g/h	g/bkW-hr	EPA	IMO	EU
A	1298	1280	955	1600	61.3	204.0	NC	II	IW
A	1318	1300	969	1200	64.3	210.6	NC	II	IW
A	1420	1400	1044	1600	66.6	202.5	NC	II	IW
A	1520	1500	1118	1800	70.3	200.1	NC	II	IW
A[1]	1521	1500	1118	1200	71.5	203.0	NC	II	IW
A[1]	1699	1676	1250	1600	79.7	202.6	NC	II	IW
A[1]	1836	1810	1350	1600	84.7	207.1	NC	II	IW
B	1378	1359	1014	1600	64.8	203.0	NC	II	IW
B	1420	1400	1044	1200	69.1	210.1	NC	II	IW
B	1521	1500	1118	1600	71.1	201.9	NC	II	IW
B	1597	1575	1174	1800	73.8	199.9	NC	II	IW
B[1]	1622	1600	1194	1200	76.2	202.8	NC	II	IW
B[1]	1774	1749	1305	1600	82.5	200.7	NC	II	IW
B[1]	1938	1911	1425	1600	89.0	208.5	NC	II	IW
B[1]	2282	2250	1678	1800	111.0	209.9	NC	II	IW
C	1429	1409	1051	1600	67.0	202.4	NC	II	IW
C	1521	1500	1118	1200	74.1	210.3	NC	II	IW
C	1622	1600	1194	1600	70.4	201.7	NC	II	IW
C	1673	1650	1230	1800	77.2	199.6	NC	II	NC
C[1]	1723	1700	1268	1200	83.4	204.0	NC	II	IW
C[1]	1876	1851	1380	1600	86.4	199.0	NC	II	IW
C[1]	2040	2012	1500	1600	93.7	208.8	NC	II	IW
C[1]	2400	2365	1765	1800	116.5	214.5	NC	II	IW
D[1]	2587	2551	1902	1800	124.4	207.7	NC	II	IW

[1]High displacement engine (HD)

(continued)

3512C
PROPULSION ENGINE

(continued)

DIMENSIONS & WEIGHT

	LE	H	WE
min.	102.0 in/2590 mm	75.0 in/1904 mm	80.2 in/2037 mm
max.	105.1 in/2669 mm	88.3 in/2242 mm	87.9 in/2232 mm

SPECIFICATIONS

Vee 12, 4-Stroke-Cycle Diesel		
Aspiration	TTA	
Bore x Stroke	6.69 x 7.48 in	170 x 190 mm
Bore x Stroke[1]	6.69 x 8.46 in	170 x 215 mm
Displacement	3161 cu in	51.8 liter
Displacement[1]	3574 cu in	58.6 liter
Rotation (from flywheel end)	Counterclockwise or clockwise	
Engine dry weight (approx)	14,400-16,340 lb	6532-7411 kg

3512E

PROPULSION ENGINE

RATINGS AND FUEL CONSUMPTION

U.S. EPA Tier 4 Final and IMO Tier III Ratings

	mhp	bhp	bkW	rpm	U.S. g/h	g/bkW-hr	EPA	IMO	EU
A	1360	1341	1000	1600	TBD	TBD	T4C	III	NC
A	1523	1502	1120	1600	TBD	TBD	T4C	III	NC
A	1523	1502	1120	1800	TBD	TBD	T4C	III	NC
A	1724	1700	1268	1600	TBD	TBD	T4C	III	NC
A	1835	1810	1350	1600	TBD	TBD	T4C	III	NC
A	2028	2000	1491	1600	TBD	TBD	T4C	III	NC
A	2282	2250	1678	1800	TBD	TBD	T4C	III	NC
B	1598	1576	1175	1800	TBD	TBD	T4C	III	NC
B	2142	2112	1575	1600	TBD	TBD	T4C	III	NC
B	2408	2375	1771	1800	TBD	TBD	T4C	III	NC
C	1673	1650	1230	1800	TBD	TBD	T4C	III	NC
C	2244	2213	1650	1600	TBD	TBD	T4C	III	NC
C	2585	2549	1901	1800	TBD	TBD	T4C	III	NC

All high displacement engines (HD).

Engines require SCR Aftertreatment.

Contact dealer for availability and technical detail.

3512E

PROPULSION ENGINE

DIMENSIONS & WEIGHT

	LE	H	WE
min.	104.2 in/2624 mm	87.5 in/2222.6 mm	80.2 in/2037 mm
max.	104.2 in/2624 mm	87.5 in/2222.6 mm	80.2 in/2037 mm

SPECIFICATIONS

Vee 12, 4-Stroke-Cycle Diesel		
Aspiration	TTA	
Bore x Stroke	6.69 x 8.46 in	170 x 215 mm
Displacement	3574 cu in	58.6 liter
Rotation (from flywheel end)	Counterclockwise	
Engine dry weight (approx)	16,508 lb	7488 kg

3516C

PROPULSION ENGINE

RATINGS AND FUEL CONSUMPTION

	mhp	bhp	bkW	rpm	U.S. g/h	g/bkW-hr	EPA	IMO	EU
A	1673	1650	1230	1200	78.9	206.2	NC	II	IW
A	2028	2000	1492	1600	96.3	202.8	NC	II	IW
A[1]	2292	2260	1686	1600	107.5	202.4	NC	II	IW
A[1]	2482	2448	1825	1600	113.2	206.9	NC	II	IW
B	1775	1750	1305	1200	84.2	206.2	NC	II	IW
B	2130	2100	1566	1600	100.4	201.8	NC	II	IW
B[1]	2407	2375	1771	1600	112.0	200.8	NC	II	IW
B[1]	2611	2575	1920	1600	118.6	206.7	NC	II	IW
B[1]	3046	3004	2240	1800	148.3	210.3	NC	II	IW
C	1876	1850	1379	1200	90.0	207.0	NC	II	IW
C	2231	2200	1641	1600	104.5	201.9	NC	II	IW
C[1]	2534	2500	1864	1600	117.0	199.3	NC	II	NC
C[1]	2720	2682	2000	1600	123.4	198.5	NC	II	IW
C[1]	3196	3151	2350	1800	148.6	209.2	NC	I	NC
C[1]	3196	3151	2350	1800	154.7	200.9	NC	II	IW
D[1]	2855	2816	2100	1600	114.9	199.0	NC	II	IW
D[1]	3434	3386	2525	1800	165.0	207.6	NC	II	IW

[1]High displacement engine (HD)

(continued)

3516C

PROPULSION ENGINE

(continued)

DIMENSIONS & WEIGHT

	LE	H	WE
min.	143.1 in/3637 mm	77.4 in/1967 mm	80.2 in/2037 mm
max.	148.0 in/3761 mm	84.6 in/2150 mm	84.3 in/2142 mm

SPECIFICATIONS

Vee 16, 4-Stroke-Cycle Diesel		
Aspiration	TTA	
Bore x Stroke	6.69 x 7.48 in	170 x 190 mm
Bore x Stroke[1]	6.69 x 8.46 in	170 x 215 mm
Displacement	4211 cu in	69 liter
Displacement[1]	4765 cu in	78 liter
Rotation (from flywheel end)	Counterclockwise or clockwise	
Engine dry weight (approx)	17,550-19,025 lb	7961-8629 kg

3516E

Electronic Control System

PROPULSION ENGINE

RATINGS AND FUEL CONSUMPTION

U.S. EPA Tier 4 Final and IMO Tier III Ratings

	mhp	bhp	bkW	rpm	U.S. g/h	g/bkW-hr	EPA	IMO	EU
A	2536	2501	1865	1600	TBD	TBD	T4C	III	NC
A	2720	2682	2000	1600	TBD	TBD	T4C	III	NC
A	3046	3004	2240	1800	TBD	TBD	T4C	III	NC
B	2855	2816	2100	1600	TBD	TBD	T4C	III	NC
B	3195	3151	2350	1800	TBD	TBD	T4C	III	NC
C	2991	2950	2200	1600	TBD	TBD	T4C	III	NC
C	3433	3386	2525	1800	TBD	TBD	T4C	III	NC

All ratings are high displacement.

Engines require SCR Aftertreatment.

Contact dealer for availability and technical detail.

DIMENSIONS & WEIGHT

	LE	H	WE
min.	125.7 in/3192 mm	87.6 in/2225 mm	89.9 in/2284 mm
max.	125.7 in/3192 mm	87.6 in/2225 mm	89.9 in/2284 mm

SPECIFICATIONS

Vee 16, 4-Stroke-Cycle Diesel		
Aspiration	TTA	
Bore x Stroke	6.69 x 8.46 in	170 x 215 mm
Displacement	4765 cu in	78 liter
Rotation (from flywheel end)	Counterclockwise	
Engine dry weight (approx)	21,164 lb	9600 kg

C175-16

Electronic Control System

PROPULSION ENGINE

RATINGS AND FUEL CONSUMPTION

IMO Tier II

	mhp	bhp	bkW	rpm	U.S. g/h	g/bkW-hr	EPA	IMO	EU
A	2721	2683	2001	1600	132.7	210.6	NC	II	NC
A	2831	2792	2082	1600	138.3	210.9	NC	II	NC
A	3044	3003	2239	1800	143.9	204.1	NC	II	NC
A	3301	3256	2428	1800	156.2	204.3	NC	II	NC
B	2948	2907	2168	1600	144.4	211.5	NC	II	NC
B	3467	3420	2550	1800	167.9	209.1	NC	II	NC

Cat Emissions Solutions may be able to supply aftertreatment to achieve IMO III compliance. Please contact your local dealer for more information.

DIMENSIONS & WEIGHT

	LE	H	WE
min.	177.8 in/4515 mm	97.6 in/2478 mm	72.6 in/1845 mm
max.	177.8 in/4515 mm	97.6 in/2478 mm	72.6 in/1845 mm

SPECIFICATIONS

Vee 16, 4-Stroke-Cycle Diesel		
Aspiration	TA	
Bore x Stroke	6.88 x 8.66	175 x 220 mm
Displacement	5166.88 cu in	84.67 liter
Rotation (from flywheel end)	Counterclockwise	
Engine dry weight (approx)	28,750 lb	13 041 kg

C280-6

Electronic Control System

PROPULSION ENGINE

RATINGS AND FUEL CONSUMPTION

	mhp	bhp	bkW	rpm	U.S. g/h	g/bkW-hr	EPA	IMO	EU
CS	2352	2320	1730	900	105	194.7	NC	II	NC
CS	2515	2481	1850	1000	112	202.7	NC	II	NC
MC	2583	2548	1900	900	108	194.0	NC	II	NC
MC	2760	2722	2030	1000	116	200.4	NC	II	NC

C280 fuel rate is at full load on the prop curve, BSFC is at full power condition.

C280-6 propulsion ratings listed above are also available in Tier 2 configurations.

Contact local dealer for availability.

DIMENSIONS & WEIGHT

	LE	H	WE
min.	158 in/4013 mm	108 in/2743 mm	71 in/1803 mm
max.	158 in/4013 mm	108 in/2743 mm	71 in/1803 mm

SPECIFICATIONS

In-line 6, 4-Stroke-Cycle Diesel		
Aspiration	TA	
Bore x Stroke	11.0 x 11.8 in	280 x 300 mm
Displacement	6773 cu in	111 liter
Rotation (from flywheel end)	Counterclockwise or clockwise	
Engine dry weight (approx)	34,496 lb	15 680 kg

C280-8

Electronic Control System

PROPULSION ENGINE

RATINGS AND FUEL CONSUMPTION

	mhp	bhp	bkW	rpm	U.S. g/h	g/bkW-hr	EPA	IMO	EU
CS	3127	3084	2300	900	139	187.9	NC	II	NC
CS	3345	3299	2460	1000	139	197,0	T4C	III	NC
MC	3440	3393	2530	900	143	188.4	NC	II	NC
MC	3684	3634	2710	1000	144	197,8	T4C	III	NC

C280 fuel rate is at full load on the prop curve, BSFC is at full power condition.

C280-8 propulsion ratings listed above are also available in Tier 2 configurations.

DIMENSIONS & WEIGHT

	LE	H	WE
min.	195 in/4953 mm	104 in/2642 mm	71 in/1803 mm
max.	195 in/4953 mm	104 in/2642 mm	71 in/1803 mm

SPECIFICATIONS

In-line 8, 4-Stroke-Cycle Diesel		
Aspiration	TA	
Bore x Stroke	11.0 x 11.8 in	280 x 300 mm
Displacement	9031 cu in	148 liter
Rotation (from flywheel end)	Counterclockwise or clockwise	
Engine dry weight (approx)	41,800 lb	19 000 kg

C280-12

Electronic Control System

PROPULSION ENGINE

RATINGS AND FUEL CONSUMPTION

	mhp	bhp	bkW	rpm	U.S. g/h	g/bkW-hr	EPA	IMO	EU
CS	4704	4640	3460	900	208	193.8	NC	II	NC
CS	5031	4962	3700	1000	210	199,2	T4C	III	NC
MC	5167	5096	3800	900	214	194.0	NC	II	NC
MC	5520	5444	4060	1000	217	198,8	T4C	III	NC

C280 fuel rate is at full load on the prop curve, BSFC is at full power condition.

C280-12 propulsion ratings listed above are also available in Tier 2 configurations.

DIMENSIONS & WEIGHT

	LE	H	WE
min.	182 in/4623 mm	134 in/3404 mm	80 in/2032 mm
max.	182 in/4623 mm	134 in/3404 mm	80 in/2032 mm

SPECIFICATIONS

Vee 12, 4-Stroke-Cycle Diesel		
Aspiration	TTA	
Bore x Stroke	11.0 x 11.8 in	280 x 300 mm
Displacement	13,546 cu in	222 liter
Rotation (from flywheel end)	Counterclockwise or clockwise	
Engine dry weight (approx)	57,276 lb	25 980 kg

C280-16

Electronic Control System

PROPULSION ENGINE

RATINGS AND FUEL CONSUMPTION

	mhp	bhp	bkW	rpm	U.S. g/h	g/bkW-hr	EPA	IMO	EU
CS	6255	6169	4600	900	272	187.9	T4C	III	NC
CS	6690	6598	4920	1000	293	197.0	NC	II	NC
MC	6879	6785	5060	900	278	188.4	NC	II	NC
MC	7369	7268	5420	1000	302	197.0	NC	II	NC
FCVR	7682	7577	5650	1000	372	205.3	NC	II	NC

C280 fuel rate is at full load on the prop curve, BSFC is at full power condition.

Arrangements are available with front mounted turbochargers or rear mounted turbochargers.

C280-16 propulsion ratings listed above are also available in Tier 2 configurations

Contact local dealer for availability

DIMENSIONS & WEIGHT

	LE	H	WE
min.	224 in/5690 mm	134 in/3404 mm	80 in/2032 mm
max.	224 in/5690 mm	134 in/3404 mm	80 in/2032 mm

SPECIFICATIONS

Vee 16, 4-Stroke-Cycle Diesel		
Aspiration	TTA	
Bore x Stroke	11.0 x 11.8 in	280 x 300 mm
Displacement	18,062 cu in	296 liter
Rotation (from flywheel end)	Counterclockwise or clockwise	
Engine dry weight (approx)	68,343 lb	31 000 kg

DEP

DIESEL ELECTRIC PROPULSION - 50 HZ

RATINGS AND FUEL CONSUMPTION

	bhp	bkW	rpm	U.S. g/h	g/bkW-hr	EPA	IMO	EU
C4.4 ACERT	94.5	70.5	1500	5.2	236.8	NC	II	CC2
C4.4 ACERT	116.4	86.8	1500	6.2	227.5	NC	II	CC2
C4.4 ACERT	145.6	108.6	1500	7.4	217.9	NC	II	CC2
C7.1 ACERT	134.9	100.6	1500	7.8	263.6	NC	II	CC2
C7.1 ACERT	146.5	109.3	1500	7.9	229.6	NC	II	CC2
C7.1 ACERT	162.6	121.3	1500	9.3	251.3	NC	II	CC2
C7.1 ACERT	172.9	129	1500	9.2	227.5	NC	II	CC2
C7.1 ACERT	209.5	156.3	1500	11.3	239.8	NC	II	CC2
C7.1 ACERT	219.8	164	1500	11.2	216.5	NC	II	CC2
C9.3	292	218	1500	13.9	202.6	NC	II	CC2
C9.3	362	270	1500	17.2	202.6	NC	II	CC2
C18 ACERT	404	301	1500	19.9	210.1	NC	II	CC2
C18 ACERT	514	383	1500	25.2	209.1	NC	II	CC2
C18 ACERT	587	438	1500	28.7	208.2	NC	II	CC2
C18 ACERT	660	492	1500	32.3	208.6	NC	II	CC2
C32 ACERT	791	590	1500	37.9	203.8	NC	II	IW
C32 ACERT	923	688	1500	44.0	203.0	NC	II	IW
C32 ACERT	1172	874	1500	57.0	207.0	NC	II	IW
3512B	1686	1257	1500	77.4	195.7	NC	II	NC
3508C	903	673	1500	44.4	209.4	NC	II	NC
3508C	1100	820	1500	53.2	206.1	NC	II	NC
3512C	1826	1362	1500	84.7	197.5	NC	II	NC
3516C	2303	1717	1500	110.3	203.9	NC	II	NC
3516C	2600	1940	1500	122.6	200.8	NC	II	NC

US EPA commercial ratings 1000 kW and greater will move to EPA T4 starting Jan. 1, 2017, ratings 600 kW and greater will move to EPA T4 Starting Oct.1, 2017

(continued)

DEP

DIESEL ELECTRIC PROPULSION - 50 HZ

(continued)

RATINGS AND FUEL CONSUMPTION

	bhp	bkW	rpm	U.S. g/h	g/bkW-hr	EPA	IMO	EU
C175-16	3243	2418	1500	153.7	201.9	NC	II	NC
C280-6	2481	1850	1000	118.9	204.3	NC	II	NC
C280-6	2722	2030	1000	131.7	206.2	NC	II	NC
C280-8	3299	2460	1000	153.2	197.9	NC	II	NC
C280-8	3634	2710	1000	170.3	199.7	NC	II	NC
C280-12	4962	3700	1000	237.7	204.2	NC	II	NC
C280-12	5445	4060	1000	263.4	206.2	NC	II	NC
C280-16	6598	4920	1000	306.4	197.9	NC	II	NC
C280-16	7268	5420	1000	340.6	194.7	NC	II	NC

US EPA commercial ratings 1000 kW and greater will move to EPA T4 starting Jan. 1, 2017, ratings 600 kW and greater will move to EPA T4 Starting Oct.1, 2017

C280 fuel rate at rated power, BSFC is at full power condition.

DEP

DIESEL ELECTRIC PROPULSION - 60 HZ

RATINGS AND FUEL CONSUMPTION

	bhp	bkW	rpm	U.S. g/h	g/bkW-hr	EPA	IMO	EU
C4.4 ACERT	87.4	65.2	1500	5.0	241.9	NC	II	CC2
C4.4 ACERT	109.2	81.5	1500	5.9	231.3	NC	II	CC2
C4.4 ACERT	145.6	108.6	1500	7.5	220.3	NC	II	CC2
C4.4 ACERT	172.9	129	1500	8.3	204.5	NC	II	CC2
C7.1 ACERT	155.8	116.2	1800	9.1	254.2	NC	II	CC2
C7.1 ACERT	172.9	129	1800	9.5	233.6	NC	II	CC2
C7.1 ACERT	202.7	151.2	1800	11.1	243.5	NC	II	CC2
C7.1 ACERT	219.7	163.9	1800	11.3	219.4	NC	II	CC2
C7.1 ACERT	239.3	178.5	1800	12.7	231.5	NC	II	CC2
C7.1 ACERT	256.4	191.3	1800	13.2	219.5	NC	II	CC2
C7.1 ACERT	293.0	218.6	1800	14.9	216.4	NC	II	CC2
C9.3	369	275	1800	18.6	215.1	T3C	II	CC2
C9.3	436	325	1800	21.8	212.8	T3C	II	CC2
C18 ACERT	624	465	1800	32.8	224.0	T3C	II	NC
C18 ACERT	803	599	1800	25.4	217.0	NC	II	NC
C32 ACERT	916	683	1800	45.3	210.8	NC	II	IW
C32 ACERT	1047	781	1800	57.8	210.4	NC	II	IW
C32 ACERT	1047	781	1800	54.3	220.8	T3C	II	IW
C32 ACERT	1333	994	1800	64.9	207.2	NC	II	IW
C32 ACERT	1333	994	1800	68.0	217.3	T3C	II	IW
3512C	1920	1432	1800	91.9	204.0	NC	II	IW
3512C	2183	1628	1800	110.2	215.1	NC	II	IW
3512C	2400	1790	1800	119.7	212.4	NC	II	IW
3512E	2189	1632	1800	TBD	TBD	T4C	III	NC

US EPA commercial ratings 1000 kW and greater will move to EPA T4 starting Jan. 1, 2017, ratings 600 kW and greater will move to EPA T4 Starting Oct.1, 2017

(continued)

DEP

DIESEL ELECTRIC PROPULSION - 60 HZ

(continued)

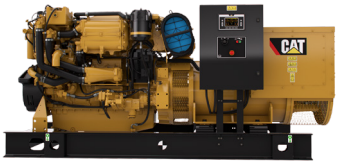
RATINGS AND FUEL CONSUMPTION

	bhp	bkW	rpm	U.S. g/h	g/bkW-hr	EPA	IMO	EU
3512E	2399	1789	1800	TBD	TBD	T4C	III	NC
3516C	2435	1815	1800	129.0	226.0	T3C	II	NC
3516C	2809	2095	1800	132.0	200.2	NC	II	IW
3516C	2984	2225	1800	140.6	200.1	NC	II	IW
3516C	3151	2350	1800	148.9	201.4	NC	II	IW
3516E	2576	1921	1800	TBD	TBD	T4C	III	NC
3516E	2823	2105	1800	TBD	TBD	T4C	III	NC
3516E	3175	2368	1800	TBD	TBD	T4C	III	NC
C280-6	2320	1730	900	107.4	197.3	NC	II	NC
C280-6	2548	1900	900	118.6	198.4	NC	II	NC
C280-8	3084	2300	900	142.7	193.0	T4C	III	NC
C280-8	3393	2530	900	153.8	190.7	T4C	III	NC
C280-12	4640	3460	900	217.4	198.0	T4C	III	NC
C280-12	5096	3800	900	237.0	196.3	T4C	III	NC
C280-16	6169	4600	900	278.5	192.7	T4C	III	NC
C280-16	6786	5060	900	307.0	190.7	T4C	III	NC

US EPA commercial ratings 1000 kW and greater will move to EPA T4 starting Jan. 1, 2017, ratings 600 kW and greater will move to EPA T4 Starting Oct.1, 2017

C280 fuel rate is at rated power, BSFC is at full power condition.

Cat Generator Sets and Auxiliary Engines



With more than 80 years of marine power experience, we offer a wide array of generator sets spanning from 10 eKW (10 kVA) to 5200 eKW (6500 kVA). Cat marine generator sets and auxiliary engines combine proven design and manufacturing methods with the latest technology, such as advanced control for more power and efficiency, and enhanced monitoring that keeps you ahead of any issues that could potentially affect your uptime and productivity.

We're built to provide the power you work with and live by.

C1.5

GENERATOR SET

Mechanical Control System

RATINGS AND FUEL CONSUMPTION

Three Phase ekW@.8pf	Single Phase ekW@1.0pf	kVA	Hz	rpm	U.S. g/h	g/bkW-hr	EPA	IMO	EU
13.0		16.5	60	1800	1.2	268.2	T3C	NST	NST
11.0		13.5	50	1500	1.0	264.1	T3C	NST	NST
	12.0	12.0	60	1800	1.2	290.5	T3C	NST	NST
	10.0	10.0	50	1500	1.0	290.5	T3C	NST	NST

DIMENSIONS & WEIGHT

	LE	H	WE
Open	40.8 in/1038 mm	27.1 in/689 mm	21.1 in/535 mm
Enclosed	43.1 in/1095 mm	27.9 in/711 m	24 in/608 mm

SPECIFICATIONS

In-line 3, 4-Stroke-Cycle Diesel		
Aspiration	NA	
Bore x Stroke	3.31 x 3.5 in	84 x 90 mm
Displacement	91 cu in	1.5 liter
Rotation (from flywheel end)	Counterclockwise	
Generator set weight (approx)	703/908 lb	319/412 kg

C2.2

GENERATOR SET

Mechanical Control System

RATINGS AND FUEL CONSUMPTION

Three Phase ekW@.8pf	Single Phase ekW@1.0pf	kVA	Hz	rpm	U.S. g/h	g/bkW-hr	EPA	IMO	EU
19.5		24.0	60	1800	1.63	242.9	T3C	NST	IW
27.0		34.0	60	1800	2.24	241.0	T3C	NST	IW
16.0		20.0	50	1500	1.37	248.8	T3C	NST	IW
22.5		28.0	50	1500	1.88	242.8	T3C	NST	IW
	19.0	19.0	60	1800	1.63	242.9	T3C	NST	IW
	27.0	27.0	60	1800	2.24	241.0	T3C	NST	IW
	16.0	16.0	50	1500	1.37	248.8	T3C	NST	IW
	22.5	22.5	50	1500	1.88	242.8	T3C	NST	IW

DIMENSIONS & WEIGHT

	LE	H	WE
Open	47.9 in/1219 mm	32.8 in/835 mm	22.3 in/567 mm
Enclosed	50.7 in/1290 mm	31.0 in/775 mm	24.7 in/628 mm

SPECIFICATIONS

In-line 4, 4-Stroke-Cycle Diesel		
Aspiration	NA, T	
Bore x Stroke	3.31 x 3.94 in	84 x 100 mm
Displacement	135 cu in	2.2 liter
Rotation (from flywheel end)	Counterclockwise	
Generator set weight (approx)	857/1027 lb	389/466 kg

RATINGS AND FUEL CONSUMPTION

ekW@.8pf	ekW@1.0pf	kVA	Hz	rpm	U.S. g/h	g/bkW-hr	EPA	IMO	EU
42.0R		53.0	60	1800	3.4	235.2	NC	NST	NC
44.0		55.0	60	1800	3.4	224.5	NC	NST	NC
56.0R		70	60	1800	4.5	233.5	NC	NST	NC
58.5		73.0	60	1800	4.2	208.6	NC	NST	NC
72.0R		90.0	60	1800	5.8	234.0	NC	NST	NC
76.0		95.0	60	1800	5.8	221.7	NC	NST	NC
95.0R		119.0	60	1800	7.3	223.3	NC	NST	NC
99.0		123.0	60	1800	7.3	214.2	NC	NST	NC
36.0R		45.0	50	1500	2.9	234.0	NC	NST	CC2
38.0		47.5	50	1500	2.9	221.7	NC	NST	CC2
49.0R		61.0	50	1500	3.9	231.2	NC	NST	CC2
51.5		64.5	50	1500	3.9	220.0	NC	NST	CC2
65.0R		81.0	50	1500	4.9	219.0	NC	NST	CC2
69.0		86.0	50	1500	4.9	206.3	NC	NST	CC2
82.0R		103.0	50	1500	6.5	230.3	NC	NST	NC
86.0		107.0	50	1500	6.5	219.6	NC	NST	NC

R - Radiator cooled only.

ABS, BV, DnV, GL, LR, RINA, CCS approved generator set packages available for ratings.

(continued)

RATINGS AND FUEL CONSUMPTION

ekW@.8pf	ekW@1.0pf	kVA	Hz	rpm	U.S. g/h	g/bkW-hr	EPA	IMO	EU
42.0R		53.0	60	1800	3.4	235.2	NC	NST	NC
44.0		55.0	60	1800	3.4	224.5	NC	NST	NC
56.0R		70	60	1800	4.5	233.5	NC	NST	NC
58.5		73.0	60	1800	4.2	208.6	NC	NST	NC
72.0R		90.0	60	1800	5.8	234.0	NC	NST	NC
76.0		95.0	60	1800	5.8	221.7	NC	NST	NC
95.0R		119.0	60	1800	7.3	223.3	NC	NST	NC
99.0		123.0	60	1800	7.3	214.2	NC	NST	NC
36.0R		45.0	50	1500	2.9	234.0	NC	NST	CC2
38.0		47.5	50	1500	2.9	221.7	NC	NST	CC2
49.0R		61.0	50	1500	3.9	231.2	NC	NST	CC2
51.5		64.5	50	1500	3.9	220.0	NC	NST	CC2
65.0R		81.0	50	1500	4.9	219.0	NC	NST	CC2
69.0		86.0	50	1500	4.9	206.3	NC	NST	CC2
82.0R		103.0	50	1500	6.5	230.3	NC	NST	NC
86.0		107.0	50	1500	6.5	219.6	NC	NST	NC

R - Radiator cooled only.

ABS, BV, DnV, GL, LR, RINA, CCS approved generator set packages available for ratings.

(continued)

RATINGS AND FUEL CONSUMPTION

U.S. EPA Tier 3 & IMO Tier II

ekW@.8pf	ekW@1.0pf	kVA	Hz	rpm	U.S. g/h	g/bkW-hr	EPA	IMO	EU
51R		64	60	1800	4.9	235.2	T3C	NST	CC2
60		75	60	1800	5.0	241.9	T3C	NST	CC2
66R		83	60	1800	5.8	224.0	T3C	NST	CC2
75		94	60	1800	5.9	231.3	T3C	NST	CC2
90R		113	60	1800	7.3	215.2	T3C	NST	CC2
99		124	60	1800	7.5	220.3	T3C	NST	CC2
105R		131	60	1800	8.5	210.8	T3C	NST	CC2
118		148	60	1800	8.3	204.5	T3C	NST	CC2
58R		73	50	1500	5.1	225.2	T3C	NST	CC2
65		81	50	1500	5.2	236.8	T3C	NST	CC2
73R		91	50	1500	6.1	219.4	T3C	NST	CC2
80		100	50	1500	6.2	227.5	T3C	NST	CC2
88R		110	50	1500	7.0	205.9	T3C	NST	CC2
99		124	50	1500	7.4	217.9	T3C	NST	CC2

Engine type approval available from ABS, BV, DNV, GL, NKK, RINA, CRS.

(continued)

(continued)

DIMENSIONS & WEIGHT

	LE	H	WE
Min.	66.4 in/1687 mm	49 in/1245 mm	38.3 in/974 mm
Max.	80.2 in/2037 mm	78.7 in/1999 mm	38.8 in/986 mm

SPECIFICATIONS

In-line 4, 4-Stroke-Cycle Diesel		
Aspiration	TA	
Bore x Stroke	4.13 x 5.0 in	105 x 127 mm
Displacement	269 cu in	4.4 liter
Rotation (from flywheel end)	Counterclockwise	
Generator set weight (approx)	2736-3389 lb	1241-1537 kg

C7.1

GENERATOR SET

Electronic Control System

RATINGS AND FUEL CONSUMPTION

U.S. EPA Tier 3 & IMO Tier II

ekW@.8pf	ekW@1.0pf	kVA	Hz	rpm	U.S. g/h	g/bkW-hr	EPA	IMO	EU
106R		133	60	1800	9.1	254.2	T3C	NST	CC2
118		148	60	1800	9.5	233.6	T3C	NST	CC2
138R		173	60	1800	11.1	243.5	T3C	II	CC2
150		188	60	1800	11.3	219.4	T3C	II	CC2
163R		204	60	1800	12.7	231.5	T3C	II	CC2
175		219	60	1800	13.2	219.5	T3C	II	CC2
200		250	60	1800	14.9	216.4	T3C	II	CC2
92R		115	50	1500	7.8	263.6	T3C	NST	CC2
100		125	50	1500	7.9	229.6	T3C	NST	CC2
111R		139	50	1500	9.3	251.3	T3C	NST	CC2
118		148	50	1500	9.2	227.5	T3C	NST	CC2
143R		179	50	1500	11.3	239.8	T3C	II	CC2
150		188	50	1500	11.2	216.5	T3C	II	CC2

Engine type approval available from ABS, BV, DNV, GL, LR, NKK, RINA, CRS, CCS.

DIMENSIONS & WEIGHT

	LE	H	WE
Min.	76.3 in/1940 mm	49.7 in/1263 mm	37.6 in/956 mm
Max.	102 in/2582 mm	62.3 in/1583 mm	39.0 in/993 mm

SPECIFICATIONS

In-line 6, 4-Stroke-Cycle Diesel		
Aspiration	TA	
Bore x Stroke	4.13 x 5.3 in	105 x 135 mm
Displacement	433.3 cu in	7.01 liter
Rotation (from flywheel end)	Counterclockwise	
Generator set weight (approx)	3355-4718 lb	1522-2140 kg

C9.3

GENERATOR SET

Electronic Control System

RATINGS AND FUEL CONSUMPTION

ekW@.8pf	ekW@1.0pf	kVA	Hz	rpm	U.S. g/h	g/bkW-hr	EPA	IMO	EU
224R		280	60	1800	18.2	216.4	T3C	II	CC2
250		313	60	1800	18.2	216.4	T3C	II	CC2
274R		343	60	1800	21.5	213.0	T3C	II	CC2
300		375	60	1800	21.5	213.0	T3C	II	CC2
185R		231	50	1500	13.6	203.0	NC	II	CC2
200		250	50	1500	13.6	203.0	NC	II	CC2
235R		294	50	1500	17.0	202.3	NC	II	CC2
250		313	50	1500	17.0	202.3	NC	II	CC2

DIMENSIONS & WEIGHT

	LE	H	WE
Min.	85.8 in/2179 mm	56.5 in/1436 mm	50.4 in/1260 mm
Max.	85.8 in/2179 mm	56.5 in/1436 mm	50.4 in/1260 mm

SPECIFICATIONS

In-line 6, 4-Stroke-Cycle Diesel		
Aspiration	TA	
Bore x Stroke	4.13 x 5.31 in	105 x 135 mm
Displacement	568 cu in	9.3 liter
Rotation (from flywheel end)	Counterclockwise	
Engine dry weight (approx)	5219 lb	2367 kg

RATINGS AND FUEL CONSUMPTION

IMO Tier II

ekW@.8pf	ekW@1.0pf	kVA	Hz	rpm	U.S. g/h	g/bkW-hr	EPA	IMO	EU
280		350	50	1500	19.9	209.5	NC	II	IW
360		450	50	1500	25.2	209.0	NC	II	IW
410		513	50	1500	28.7	208.0	NC	II	IW
465		581	50	1500	32.3	209.0	NC	II	IW
345		431	60	1800	25.4	217.0	NC	II	IW
430		538	60	1800	31.5	215.0	NC	II	IW
260R		325	50	1500	19.2	209.5	NC	II	IW
335R		419	50	1500	25.2	209.0	NC	II	NC
390R		486	50	1500	28.7	208.0	NC	II	NC
445R		556	50	1500	32.3	208.7	NC	II	NC
310R		388	60	1800	25.4	217.0	NC	II	IW
395R		494	60	1800	31.5	215.0	NC	II	NC

U.S. EPA Tier 3 & IMO Tier II

ekW@.8pf	ekW@1.0pf	kVA	Hz	rpm	U.S. g/h	g/bkW-hr	EPA	IMO	EU
430		538	60	1800	32.3	220.0	T3C	II	IW
565		706	60	1800	40.4	214.0	T3C	II	IW
395R		594	60	1800	32.2	220.0	T3C	II	IW
530R		663	60	1800	40.4	214.0	T3C	II	IW

Generator set package includes SRMP generator.

US EPA commercial ratings 1000 kW and greater will move to EPA T4 starting Jan. 1, 2017, rating 600 kW and greater will move to EPA T4 Starting Oct.1, 2017

(continued)

(continued)

DIMENSIONS & WEIGHT

	LE	H	WE
Min.	119.7 in/3040 mm	66.3 in/1684 mm	60.9 in/1547 mm
Max.	119.7 in/3040 mm	66.3 in/1684 mm	60.9 in/1547 mm

SPECIFICATIONS

In-line 6, 4-Stroke-Cycle Diesel		
Aspiration	TA, TTA	
Bore x Stroke	5.7 x 7.2 in	145 x 183 mm
Displacement	1106 cu in	
Rotation (from flywheel end)	Counterclockwise	
Generator set weight (approx)	4406 lb	1999 kg

RATINGS AND FUEL CONSUMPTION

IMO Tier II

ekW@.8pf	ekW@1.0pf	kVA	Hz	rpm	U.S. g/h	g/bkW-hr	EPA	IMO	EU
550		688	50	1500	37.9	203.8	NC	II	IW
830		1038	50	1500	57.0	207.0	NC	II	IW
730		913	60	1800	51.8	210.4	NC	II	IW
940		1175	60	1800	64.9	207.2	NC	II	IW
525R*		656	50	1500	37.9	203.8	NC	II	IW
795R*		994	50	1500	57.0	207.0	NC	II	IW
675R*		1100	60	1800	64.9	207.2	NC	II	IW
880R*		844	60	1800	51.8	210.4	NC	II	IW

U.S. EPA Tier 3 & IMO Tier II

ekW@.8pf	ekW@1.0pf	kVA	Hz	rpm	U.S. g/h	g/bkW-hr	EPA	IMO	EU
730		913	60	1800	54.3	220.8	T3C	II	IW
940		1175	60	1800	68.0	217.3	T3C	II	IW
675R*		844	60	1800	54.3	220.8	T3C	II	IW
880R*		1100	60	1800	68.0	217.3	T3C	II	IW

**Preliminary*

Heat Exchanger (32°C Sea Water Temp), Keel Cooled (52°C SCAC Temp)

US EPA commercial ratings 1000 kW and greater will move to EPA T4 starting Jan. 1, 2017, rating 600 kW and greater will move to EPA T4 Starting Oct.1, 2017

(continued)

(continued)

DIMENSIONS & WEIGHT

	LE	H	WE
Min.	168.2 in/4271 mm	65.6 in/1667 mm	
Max.	175.3 in/4452 mm	65.6 in/1667 mm	

SPECIFICATIONS

Vee 12, 4-Stroke-Cycle Diesel		
Aspiration	TTA	
Bore x Stroke	5.7 x 6.4 in	145 x 162 mm
Displacement	1959 cu in	32.1 liter
Rotation (from flywheel end)	Counterclockwise	
Generator set weight (approx)	15,721 lb	7131 kg

C280-6

Electronic Control System

GENERATOR SET

RATINGS AND FUEL CONSUMPTION

ekW@.8pf	ekW@1.0pf	kVA	Hz	rpm	U.S. g/h	g/bkW-hr	EPA	IMO	EU
1650		2063	60	900	106.4	195.5	NC	II	NC
1820		2275	60	900	116.9	195.5	NC	II	NC
1760		2200	50	1000	116.4	200.0	NC	II	NC
1940		2425	50	1000	127.7	200.0	NC	II	NC

DIMENSIONS & WEIGHT

	LE	LG	H	WE
Min.	145 in/3691 mm	280.3 in/7120 mm	154.9 in/3934 mm	77.2 in/1961 mm
Max.	145 in/3691 mm	280.3 in/7120 mm	154.9 in/3934 mm	77.2 in/1961 mm

SPECIFICATIONS

In-line 6, 4-Stroke-Cycle Diesel		
Aspiration	TA	
Bore x Stroke	11.0 x 11.8 in	280 x 300 mm
Displacement	6773 cu in	111 liter
Rotation (from flywheel end)	Counterclockwise	
Engine dry weight (approx)	34,500 lb	15 680 kg
Generator weight (approx)	18,000 lb	8165 kg

C280-8

GENERATOR SET

Electronic Control System

RATINGS AND FUEL CONSUMPTION

ekW@.8pf	ekW@1.0pf	kVA	Hz	rpm	U.S. g/h	g/bkW-hr	EPA	IMO	EU
2200		2750	60	900	136.5	188.6	T4C	III	NC
2420		3025	60	900	150.1	188.5	T4C	III	NC
2350		2938	50	1000	148.2	191.5	NC	II	NC
2600		3250	50	1000	161.4	189.3	NC	II	NC

C280-8 ratings listed above are also available in Tier 2 configurations.

Contact local dealer for availability.

DIMENSIONS & WEIGHT

	LE	LG	H	WE
Min.	178 in/4511 mm	316.5 in/8040 mm	155.0 in/3937 mm	77.2 in/1961 mm
Max.	178 in/4511 mm	316.5 in/8040 mm	155.0 in/3937 mm	77.2 in/1961 mm

SPECIFICATIONS

In-line 8, 4-Stroke-Cycle Diesel		
Aspiration	TA	
Bore x Stroke	11.0 x 11.8 in	280 x 300 mm
Displacement	9031 cu in	148 liter
Rotation (from flywheel end)	Counterclockwise	
Engine dry weight (approx)	41,800 lb	19 000 kg
Generator weight (approx)	25,000 lb	11 340 kg

C280-12

Electronic Control System

GENERATOR SET

RATINGS AND FUEL CONSUMPTION

ekW@.8pf	ekW@1.0pf	kVA	Hz	rpm	U.S. g/h	g/bkW-hr	EPA	IMO	EU
3300		4125	60	900	212.7	195.4	T4C	III	NC
3640		4550	60	900	233.8	195.5	T4C	III	NC
3520		4400	50	1000	232.7	199.9	NC	II	NC
3880		4850	50	1000	255.5	200.0	NC	II	NC

C280-12 ratings listed above are also available in Tier 2 configurations.

Contact local dealer for availability.

DIMENSIONS & WEIGHT

	LE	LG	H	WE
Min.	161 in/4087 mm	316.5 in/8040 mm	160.8 in/4085 mm	78.7 in/2000 mm
Max.	161 in/4087 mm	316.5 in/8040 mm	160.8 in/4085 mm	78.7 in/2000 mm

SPECIFICATIONS

Vee 12, 4-Stroke-Cycle Diesel		
Aspiration	TA	
Bore x Stroke	11.0 x 11.8 in	280 x 300 mm
Displacement	13,546 cu in	222 liter
Rotation (from flywheel end)	Counterclockwise	
Engine dry weight (approx)	57,276 lb	25 980 kg
Generator weight (approx)	33,000 lb	14 790 kg

C280-16

Electronic Control System

GENERATOR SET

RATINGS AND FUEL CONSUMPTION

ekW@.8pf	ekW@1.0pf	kVA	Hz	rpm	U.S. g/h	g/bkW-hr	EPA	IMO	EU
4400		5500	60	900	272.9	188.5	T4C	III	NC
4840		6050	60	900	300.2	188.6	T4C	III	NC
4700		5875	50	1000	296.4	191.5	NC	II	NC
5200		6500	50	1000	322.8	189.3	NC	II	NC

C280-16 ratings listed above are also available in Tier 2 configurations.

Contact local dealer for availability.

DIMENSIONS & WEIGHT

	LE	LG	H	WE
Min.	197 in/5007 mm	366.7 in/9314 mm	164.1 in/4167 mm	78.3 in/1990 mm
Max.	197 in/5007 mm	366.7 in/9314 mm	164.1 in/4167 mm	78.3 in/1990 mm

SPECIFICATIONS

Vee 12, 4-Stroke-Cycle Diesel		
Aspiration	TA	
Bore x Stroke	11.0 x 11.8 in	280 x 300 mm
Displacement	18,062 cu in	222 liter
Rotation (from flywheel end)	Counterclockwise	
Engine dry weight (approx)	68,343 lb	31 000 kg
Generator weight (approx)	40,000 lb	18 145 kg

C9.3

Electronic Control System

GENERATOR SET ENGINE/AUXILIARY

RATINGS AND FUEL CONSUMPTION

Constant Speed

bhp	bkW	rpm	U.S. g/h	g/bkW-hr	EPA	IMO	EU
292	218	1500	13.9	202.6	NC	II	CC2
362	270	1500	17.2	202.2	NC	II	CC2
369	275	1800	18.6	215.1	T3C	II	CC2
436	325	1800	21.8	212.8	T3C	II	CC2

Variable Speed Auxiliary

bhp	bkW	rpm	U.S. g/h	g/bkW-hr	EPA	IMO	EU
375	280	1800	19.3	219.1	T3C	II	CC2

US EPA commercial ratings 1000 kW and greater will move to EPA T4 starting Jan. 1, 2017, rating 600 kW and greater will move to EPA T4 Starting Oct.1, 2017

DIMENSIONS & WEIGHT

	LE	H	WE
Min.	57.2 in/1452 mm	43.0 in/1093 mm	38.5 in/978 mm
Max.	57.2 in/1452 mm	43.0 in/1093 mm	38.5 in/978 mm

SPECIFICATIONS

In-line 6, 4-Stroke-Cycle Diesel		
Aspiration	TA	
Bore x Stroke	4.53 x 5.87 in	115 x 149 mm
Displacement	568 cu in	9.3 liter
Rotation (from flywheel end)	Counterclockwise	
Engine dry weight (approx)	2083-2474 lb	945-1122 kg

C15

VARIABLE SPEED/AUXILIARY

RATINGS AND FUEL CONSUMPTION

bhp	bkW	rpm	U.S. g/h	g/bkW-hr	EPA	IMO	EU
536	400	1800-2000	27.4	218.8	T3C	II	NC
540	403	1800-2000	27.4	218.8	T3C	II	NC

These engines are certified for auxiliary variable speed applications (C1 cycle).
Some types of applications can include cranes and pumps. Fuel consumption is at 2000 rpm.

DIMENSIONS & WEIGHT

	LE	H	WE
Min.	79.3 in/2013 mm	54.8 in/1391 mm	41.35 in/1050.4 mm
Max.	80.18 in/2036.6 mm	55.65 in/1413.6 mm	43.6 in/1108 mm

SPECIFICATIONS

In-line 6, 4-Stroke-Cycle Diesel		
Aspiration	TA	
Bore x Stroke	5.4 x 6.7 in	137 x 171 mm
Displacement	928 cu in	15.2 liter
Rotation (from flywheel end)	Counterclockwise	
Engine dry weight (approx)	3538-3730 lb	1605-1692 kg

GENERATOR SET ENGINE/AUXILIARY

RATINGS AND FUEL CONSUMPTION

IMO Tier II

bhp	bkW	rpm	U.S. g/h	g/bkW-hr	EPA	IMO	EU
404	301	1500	19.9	210.0	NC	II	IW
514	383	1500	25.2	209.0	NC	II	IW
587	438	1500	28.7	208.0	NC	II	IW
660	492	1500	32.3	209.0	NC	II	IW
499	372	1800	25.4	217.0	NC	II	IW
624	465	1800	31.5	215.0	NC	II	IW

U.S. EPA Tier 3 & IMO Tier II

bhp	bkW	rpm	U.S. g/h	g/bkW-hr	EPA	IMO	EU
624	465	1800	32.2	220.2	T3C	II	NC
803	599	1800	40.2	213.3	T3C	II	NC

US EPA commercial ratings 1000 kW and greater will move to EPA T4 starting Jan. 1, 2017, rating 600 kW and greater will move to EPA T4 Starting Oct.1, 2017

DIMENSIONS & WEIGHT

	LE	H	WE
Min.	73.0 in/1854 mm	51.2 in/1300 mm	44.6 in/1134 mm
Max.	73.0 in/1854 mm	51.2 in/1300 mm	44.6 in/1134 mm

SPECIFICATIONS

In-line 6, 4-Stroke-Cycle Diesel		
Aspiration	TA, TTA	
Bore x Stroke	5.7 x 7.2 in	145 x 183 mm
Displacement	1106 cu in	
Rotation (from flywheel end)	Counterclockwise	
Generator set weight (approx)	1950 lb	4299 kg

C32

GENERATOR SET ENGINE/AUXILIARY

RATINGS AND FUEL CONSUMPTION

IMO Tier II

bhp	bkW	rpm	U.S. g/h	g/bkW-hr	EPA	IMO	EU
791	590	1500	37.9	203.8	NC	II	IW
923	688	1500	44.0	203.0	NC	II	IW
1172	874	1500	57.0	207.0	NC	II	IW
916	683	1800	45.3	210.8	NC	II	IW
1047	781	1800	51.8	210.4	NC	II	IW
1333	994	1800	64.9	207.2	NC	II	IW

U.S. EPA Tier 3 & IMO Tier II

bhp	bkW	rpm	U.S. g/h	g/bkW-hr	EPA	IMO	EU
1047	781	1800	54.3	220.8	T3C	II	IW
1333	994	1800	68.0	217.3	T3C	II	IW

US EPA commercial ratings 1000 kW and greater will move to EPA T4 starting Jan. 1, 2017, rating 600 kW and greater will move to EPA T4 Starting Oct.1, 2017

DIMENSIONS & WEIGHT

	LE	H	WE
Min.	83.5 in/2121 mm	60.9 in/1547 mm	60.2 in/1528 mm
Max.	89.9 in/2284 mm	62.5 in/1587 mm	60.2 in/1528 mm

SPECIFICATIONS

Vee 12, 4-Stroke-Cycle Diesel		
Aspiration	TTA	
Bore x Stroke	5.7 x 6.4 in	145 x 162 mm
Displacement	1959 cu in	32.1 liter
Rotation (from flywheel end)	Counterclockwise	
Engine dry weight (approx)	6950-7160 lb	3152-3248 kg

3500 SERIES

AUXILIARY/ DIESEL ELECTRIC PROPULSION

RATINGS AND FUEL CONSUMPTION

DEP - 50 HZ

	bhp	bkW	rpm	U.S. g/h	g/bkW-hr	EPA	IMO	EU
3512B	1686	1257	1500	77.4	195.7	NC	II	NC
3508C	903	673	1500	44.4	209.4	NC	II	NC
3508C	1100	820	1500	53.2	206.1	NC	II	NC
3512C	1826	1362	1500	84.7	197.5	NC	II	NC
3516C	2303	1717	1500	110.3	203.9	NC	II	NC
3516C	2600	1940	1500	122.6	200.8	NC	II	NC

DEP - 60 HZ

	bhp	bkW	rpm	U.S. g/h	g/bkW-hr	EPA	IMO	EU
3512C	1920	1432	1800	91.9	204.0	NC	II	IW
3512C	2183	1628	1800	110.2	215.1	NC	II	IW
3512C	2400	1790	1800	119.7	212.4	NC	II	IW
3516C	2809	2095	1800	132.0	200.2	NC	II	IW
3516C	2984	2225	1800	140.6	200.1	NC	II	IW
3516C	3151	2350	1800	148.9	201.4	NC	II	IW
3512E	2188	1632	1800			T4C	III	NC
3512E	2400	1789	1800			T4C	III	NC
3516E	2576	1921	1800			T4C	III	NC
3516E	2822	2105	1800			T4C	III	NC
3516E	3176	2368	1800			T4C	III	NC

US EPA commercial ratings 1000 kW and greater will move to EPA T4 starting Jan. 1, 2017, rating 600 kW and greater will move to EPA T4 Starting Oct.1, 2017

(continued)

3500 SERIES

AUXILIARY/ DIESEL ELECTRIC PROPULSION

(continued)

RATINGS AND FUEL CONSUMPTION

Auxiliary - IMO Tier II & III/US EPA T4F

	bhp	bkW	rpm	ekW*	EPA	IMO	EU
3512C	1920	1432	1800	1360	NC	II	NC
3512C[1]	2183	1628	1800	1550	NC	II	NC
3512C[1]	2394	1786	1800	1700	NC	II	NC
3516C[1]	3151	2350	1800	2250	NC	II	NC
3512E	2188	1632	1800	1550	T4C	III	NC
3512E	2400	1789	1800	1700	T4C	III	NC
3516E	2576	1921	1800	1825	T4C	III	NC
3516E	2822	2105	1800	2000	T4C	III	NC
3516E	3176	2368	1800	2250	T4C	III	NC

Ratings are hi displacement (HD)

**ekW is based on a 95% generator efficiency.*

Contact dealer for design-to-order generator set solutions.

Variable Speed DEP

	bhp	bkW	rpm	U.S. g/h	g/bkW-hr	EPA	IMO	EU
3512C		1425	1600			NC	II	NC
3512C		1729	1800			NC	II	NC
3512C		1765	1800			NC	II	NC
3516C		1771	1600			NC	II	NC
3516C		1910	1800			NC	II	NC
3516C		2240	1800			NC	II	NC
3516C	3151	2350	1800			NC	II	NC
3512E	2400	1789	1800			T4C	III	NC
3516E	2576	1921	1800			T4C	III	NC
3516E	3176	2368	1800			T4C	III	NC

US EPA commercial ratings 1000 kW and greater will move to EPA T4 starting Jan. 1, 2017, rating 600 kW and greater will move to EPA T4 Starting Oct.1, 2017

3500E SERIES

AUXILIARY/DIESEL ELECTRIC PROPULSION

DIMENSIONS & WEIGHT

		LE	H	WE
3512E	Min.	127,2 in/3232 mm	86,8 in/2205 mm	85,0 in/2160 mm
	Max.	127,2 in/3232 mm	86,8 in/2205 mm	85,0 in/2160 mm
3516E	Min.	148,5 in/3773 mm	87,6 in/2224 mm	89,9 in/2284 mm
	Max.	148,5 in/3773 mm	87,6 in/2224 mm	89,9 in/2284 mm

SPECIFICATIONS

Vee 12, Vee 16, 4-Stroke-Cycle Diesel			
Aspiration		TA	
Bore x Stroke		6.7 x 8,5 in	170 x 215 mm
Displacement	**3512E**	3576 cu in	58.6 liter
	3516E	4766 cu in	78.1 liter
Engine dry weight (approx)	**3516E**	19,103 lb	8665 kg
	3512E	22,408 lb	10164 kg

C280 SERIES

AUXILIARY

RATINGS AND FUEL CONSUMPTION

	bhp	bkW	rpm	U.S. g/h	g/bkW-hr	EPA	IMO	EU
C280-6	2320	1730	900	107.4	197.3	NC	II	NC
C280-6	2481	1850	1000	118.9	204.4	NC	II	NC
C280-6	2548	1900	900	118.6	198.4	NC	II	NC
C280-6	2722	2030	1000	131.7	206.2	NC	II	NC
C280-8	3084	2300	900	142.7	193.0	T4C	III	NC
C280-8	3299	2460	1000	153.2	197.9	NC	II	NC
C280-8	3393	2530	900	153.8	190.7	T4C	III	NC
C280-8	3634	2710	1000	170.3	199.7	NC	II	NC
C280-12	4640	3460	900	217.4	198.0	T4C	III	NC
C280-12	4962	3700	1000	237.7	204.2	NC	II	NC
C280-12	5096	3800	900	237.0	196.3	T4C	III	NC
C280-12	5444	4060	1000	263.4	206.2	NC	II	NC
C280-16	6169	4600	900	278.5	192.7	T4C	III	NC
C280-16	6598	4920	1000	306.4	197.9	NC	II	NC
C280-16	6785	5060	900	307.0	190.7	T4C	III	NC
C280-16	7268	5420	1000	340.6	199.7	NC	II	NC

C280 fuel rate is at rated power, BSFC is at full power condition.

DIMENSIONS & WEIGHT

		L	LE	H	WE
C280-6	**Min.**	168 in/4276 mm	145 in/3691 mm	108 in/2733 mm	68 in/1722 mm
	Max.	168 in/4276 mm	145 in/3691 mm	108 in/2733 mm	68 in/1722 mm
C280-8	**Min.**	219 in/5561 mm	178 in/4511 mm	104 in/2641 mm	68 in/1722 mm
	Max.	219 in/5561 mm	178 in/4511 mm	104 in/2641 mm	68 in/1722 mm
C280-12	**Min.**	191 in/4861 mm	161 in/4087 mm	140 in/3550 mm	69 in/ 1741 mm
	Max.	191 in/4861 mm	161 in/4087 mm	140 in/3550 mm	69 in/ 1741 mm
C280-16	**Min.**	216 in/5482 mm	197 in/5007 mm	125 in/3171 mm	67 in/1704 mm
	Max.	216 in/5482 mm	197 in/5007 mm	125 in/3171 mm	67 in/1704 mm

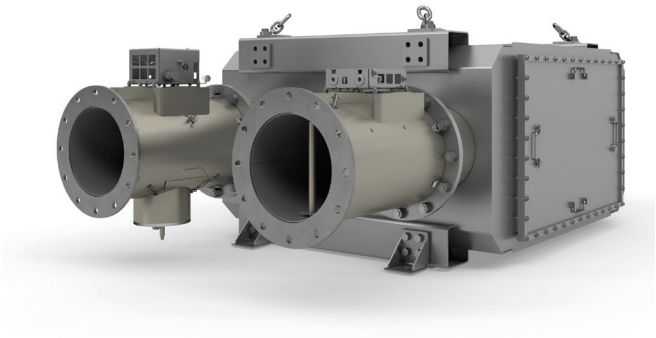
(continued)

(continued)

SPECIFICATIONS

In-line 6, In-line 8, Vee 12, Vee 16, 4-Stroke-Cycle Diesel			
Aspiration		TA	
Bore x Stroke		11.0 x 11.8 in	280 x 300 mm
Displacement	**C280-6**	6773 cu in	111 liter
	C280-8	9031 cu in	148 liter
	C280-12	13,546 cu in	222 liter
	C280-16	18,062 cu in	296 liter
Engine dry weight (approx)	**C280-6**	34,496 lb	15 680 kg
	C280-8	41,800 lb	19 000 kg
	C280-12	57,276 lb	25 980 kg
	C280-16	62,832 lb	28 500 kg

Selective Catalytic Reduction (SCR) System



Cat® Selective Catalytic Reduction (SCR) System

A simple technical solution can help you meet today's stringent Maritime emission standards. The easy-to-install Cat® SCR System is an exhaust gas aftertreatment solution compliant with U.S. EPA Tier 4 and IMO Tier III emission standards.

Tier 4 Final emission standards apply to the following Cat engines: C32 ACERT™ , 3500E, C175, and C280 with ratings equal to and greater than 1400 bkW.

- Proven technology to meet Tier 4 Final emission standards
- Maintains engine efficiency, durability and reliability
- Easy to install with minimum impact to vessel design
- Compact package from one single source
- Available for newbuilds and retrofits

It's your choice – make it count!

Controls

Three60 Precision Control

Three60 Precision Control is an integrated propulsion and maneuvering solution that revolutionizes slow speed control of traditional shaft and propeller drive line vessels.

It simultaneously actuates and controls engines, transmissions, thrusters, and propellers with intuitive easy movements for instantaneous control of vessel direction and speed.

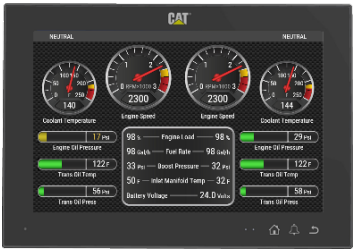
Multi-Station Control System (MSCS)

MSCS provides engine and transmission control for single or dual engine applications with up to eight control stations. Control can be easily transferred from one station to another and the fully redundant backup system ensures propulsion system operation if the primary control system fails. Transmission shift logic prevents stalling the engine during quick shifting maneuvers.

Displays

Cat Marine Display

The CMD provides the operator with easy-to-read, high resolution graphics to monitor all vessel operations. The configurable screen allows for full user customization and visual simplicity.



All electronics are environmentally sealed for increased durability and safety and are built to reliably perform in extreme conditions. The Cat Marine Display is available with a 7" or 13" screen size.

Color Marine Power Display

The CMPD can monitor and display operating parameters for two engines and transmissions including diagnostics, visual alarms, and streaming video from up to four camera inputs. The user can select from seven languages, two gauge types, and daylight or night mode screens.

Control Panels

Cat Control Panels provide complete propulsion engine and generator set control and monitoring from local and remote locations, including engine start/stop capability, alarm and protection, user interface and communication. System modularity allows expansion of remote monitoring, input/output capabilities and programmable relays.

MECP I (C9.3-C32 prop)

The MECP I is an inexpensive, basic control panel that can be mounted directly on the engine. It is not type-approved.

MECP II (C9.3-C32 prop)

The MECP II is type-approved for manned and un-manned engine rooms. It provides local throttle control, a color display and advanced diagnostics and communications.

MECP IIIB (C9.3-3500 prop, C175*, C280*)

The MECP IIIB has all the features of the MECP II and has additional I/O, supports more expansion modules and has extra space for customer options.

* See dealer for availability.

MCS3e (C4.4 – C7.1 ACERT genset)

The MCS3e panel provides generator and engine monitoring to Marine Society specifications, including AC monitoring, load share (optionally enabled), MODbus and CANbus (J1939).
Multi position – left, right, rear, plus tower – remote mountable.
Type-approved for manned and un-manned engine rooms.

EMCP 4.2 (C4.4 – C7.1 ACERT genset)

The EMCP 4.2 panel provides generator and engine monitoring.

Multi position – left, right, rear, plus tower – remote mountable.

It is not type approved.

EMCP 4.2 (C9.3-C32 aux and genset)

The EMCP 4.2 panel provides generator and engine monitoring. It is not type-approved.

MGCP II (C9.3-C32 aux and genset)

The MGCP II is type-approved for manned and un-manned engine rooms. It provides local throttle control, a color display and advanced diagnostics and communications.

MGCP IIIB (C9.3-3500 aux and genset, C175*, C280*)

The MGCP IIIB has all the features of the MGCP II and has additional I/O, supports more expansion modules and has extra space for customer options.

* See dealer for availability.

L2 (3500-C280)

The L2 includes a CMPD as the main operator interface. It also has switches for engine protection override, prelube override, torque limit and manual speed control.

Accessories

RTD Module

The RTD Module monitors 8 RTD temperature sensors. It is generally used on a generator.

Thermocouple Module

The TC Module monitors 20 thermocouple temperature sensors. It is generally used on an engine.

Remote Panel 210E (MECP/MGCP II and III only)

The RP 210E can remotely monitor and start/stop two engines or gensets. Multiple RPs can be installed on a ship.

Remote Panel 410E (MECP/MGCP II and III only)

The RP 410E can remotely monitor and start/stop eight engines or gensets and four IP cameras. Multiple RPs can be installed on a ship.

Remote I/O 410 Module (MECP/MGCP II and III only)

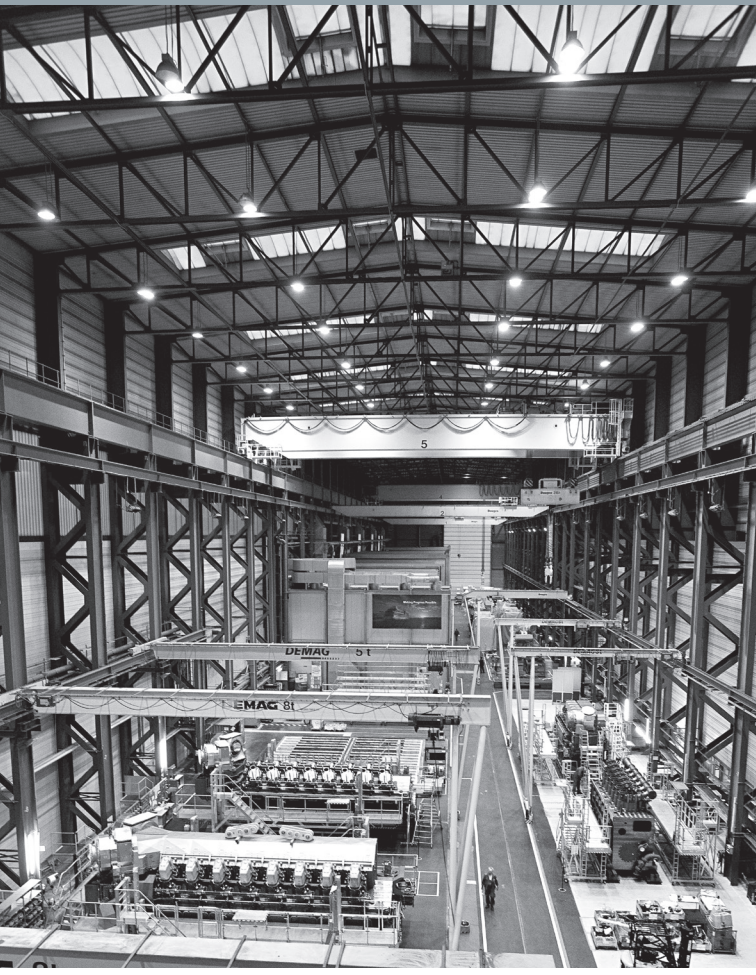
The RIO 410 provides additional switch and sensor inputs for the control panel, as well as relay outputs. Up to four RIOs can be used with the IIIB panels, one with the II panels.

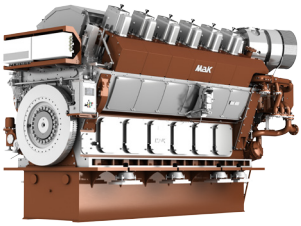
Relay Module (MECP/MGCP II and III only)

The ARM provides 14 programmable relays. It can be connected to the Local Control Panel or to an RP.

Power Analyzer Module (MGCP II and III only)

The PAM provides generator power information, such as phase voltage, current, power factor, Total Harmonic Distortion (THD), etc.


5
DEMAG 5t
DEMAG 8t



MaK Marine Propulsion Engines

Caterpillar Motoren GmbH & Co. KG and the excellent reputation of the MaK brand are based on more than 90 years of experience in the development, manufacture, and service of gas, diesel, and dual fuel engines.

The current MaK product line, comprised of six medium-speed, four-stroke diesel and dual fuel engine models, ranges in power from 1,020 to 16,800 kW. MaK engines feature an extremely high level of reliability, low operating costs, simple installation and maintenance, and meet current engine exhaust emission standards. Please contact your local dealer for specific emissions compliance.

Caterpillar Technology for Emissions Reduction in Medium-Speed Marine Engines

In addition to the right technology to meet emissions standards for IMO Tier II/Tier III and U.S. EPA Tier 3 for category 3 engines, Caterpillar offers options for further performance improvement of medium-speed marine engines:

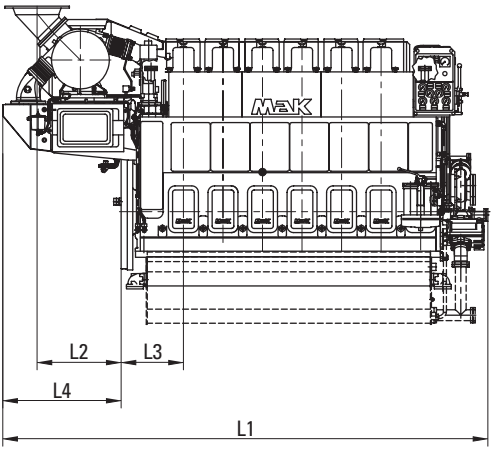
Flexible Camshaft Technology (FCT) achieves synergy between flexible fuel systems and advanced air systems while exploiting current MaK engine design to the fullest. At part load, visible smoke is eliminated and performance and load pick-up are improved. Invisible smoke is a clear advantage for all applications. FCT supports reduced part load fuel consumption and dual fuel engine technology when switching between gas mode and diesel mode. With the exception of the M 20 models, Flexible Camshaft Technology can be retrofitted to any MaK C-engine and E-engine series.

M 20 C

Propulsion Engine

DIMENSIONS (mm) AND WEIGHTS (t)

Type	L1	L2	L3	L4	H1	H2	H3	H4	W1	W2	Weight	
											Wet sump	Dry sump
6 M 20 C	4049	702	520	988	1714	630	330	941	1591	627	11.5	10.9
8 M 20 C	4846	802	520	1125	1856	630	330	941	1727	710	14.5	13.8
9 M 20 C	5176	802	520	1125	1856	630	330	941	1727	710	16.0	15.0

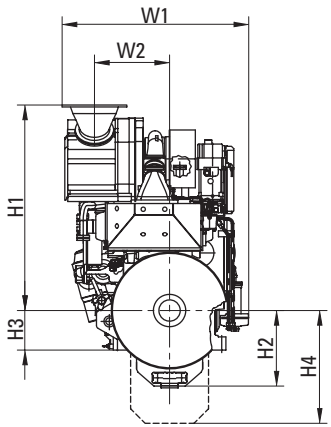


TECHNICAL DATA

Type	Output range		Speed	Mean eff. pressure	Mean piston speed	Spec. fuel consumption	
						100%	85%
	kW	mhp	rpm	bar	m/s	g/kWh	g/kWh
6 M 20 C	1020	1390	900	24.1	9.0	189	188
	1080	1469	900	25.5	9.0	191	189
	1140	1550	1000	24.2	10.0	190	189
	1200	1632	1000	25.5	10.0	192	190
8 M 20 C	1360	1850	900	24.1	9.0	189	188
	1440	1958	900	25.5	9.0	191	189
	1520	2070	1000	24.2	10.0	190	189
	1600	2176	1000	25.5	10.0	192	190
9 M 20 C	1530	2082	900	24.1	9.0	189	188
	1620	2203	900	25.5	9.0	191	189
	1710	2326	1000	24.2	10.0	190	189
	1800	2448	1000	25.5	10.0	192	190

Stroke: 300 mm
Bore: 200 mm

Specific lubricating oil consumption 0.6 g/kWh, ± 0.3 g/kWh
LCV = 42700 kJ/kg, without engine-driven pumps, tolerance 5%



Engine centre distance: 2010 mm

Removal of cylinder liner:
in transverse direction: 1910 mm
in longitudinal direction: 2085 mm

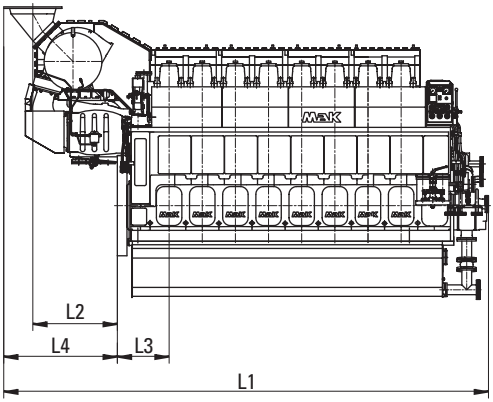
Engine with turbocharger at free end available, ask for dimensions.

M 25 C

Propulsion Engine

DIMENSIONS (mm) AND WEIGHTS (t)

Type	L1	L2	L3	L4	H1	H2	H3	H4	W1	W2	Weight	
											Wet sump	Dry sump
6 M 25 C	5345	1068	672	1390	2526	861	460	1191	2237	977	23.5	21.2
8 M 25 C	6289	1097	672	1474	2578	861	460	1191	2291	977	30.0	28.5
9 M 25 C	6719	1097	672	1474	2578	861	460	1191	2291	977	32.0	30.0

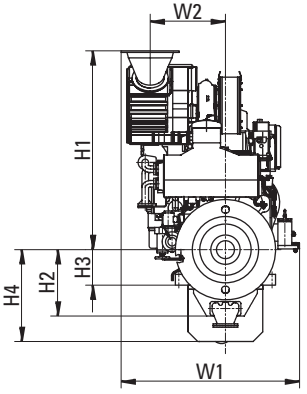


TECHNICAL DATA

Type	Output range		Speed	Mean eff. pressure	Mean piston speed	Spec. fuel consumption	
						100%	85%
	kW	mhp	rpm	bar	m/s	g/kWh	g/kWh
6 M 25 C	1740	2370	720	23.7	9.6	185	184
	1800	2450	750	23.5	10.0	185	184
	2000	2720	720	27.2	9.6	188	185
	2000	2720	750	26.1	10.0	186	184
8 M 25 C	2320	3160	720	23.7	9.6	185	184
	2400	3260	750	23.5	10.0	185	184
	2666	3630	720	27.2	9.6	189	185
	2666	3630	750	26.1	10.0	187	184
9 M 25 C	2610	3550	720	23.7	9.6	185	184
	2700	3670	750	23.5	10.0	185	184
	3000	4080	720	27.2	9.6	189	185
	3000	4080	750	26.1	10.0	187	184

Stroke: 400 mm
Bore: 255 mm

Specific lubricating oil consumption 0.6 g/kWh, ± 0.3 g/kWh
LCV = 42700 kJ/kg, without engine-driven pumps, tolerance 5%



Engine centre distance: 2500 mm

Removal of cylinder liner:
in transverse direction: 2510 mm
in longitudinal direction: 2735 mm

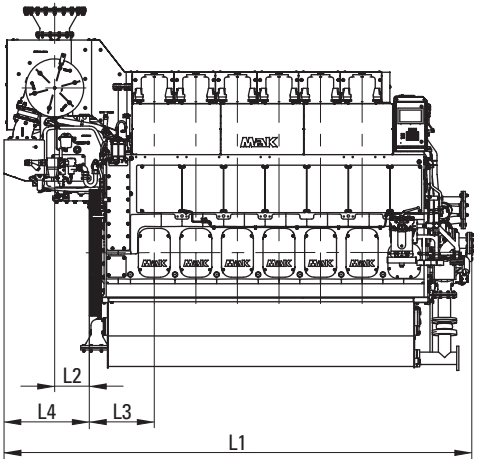
Engine with turbocharger at free end available, ask for dimensions.

M 25 E

Propulsion Engine

DIMENSIONS (mm) AND WEIGHTS (t)

Type	L1	L2	L3	L4	H1	H2	H3	H4	W1	W2	Weight	
											Wet sump	Dry sump
6 M 25 E	4840	358	672	883	2525	861	460	1191	2080	850	23.5	21.2
8 M 25 E	5700	338	672	883	2670	861	460	1191	2230	937	30.0	28.5
9 M 25 E	6130	338	672	883	2670	861	460	1191	2230	937	32.0	30.0

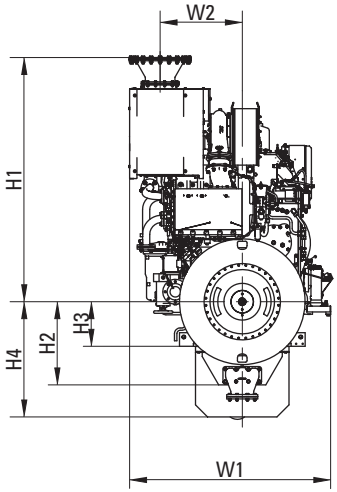


TECHNICAL DATA

Type	Output range		Speed	Mean eff. pressure	Mean piston speed	Spec. fuel consumption	
						100%	85%
	kW	mhp	rpm	bar	m/s	g/kWh	g/kWh
6 M 25 E	2100	2856	720	28.6	9.6	187	183
	2100	2856	750	27.4	10.0	187	183
8 M 25 E	2800	3808	720	28.6	9.6	187	183
	2800	3808	750	27.4	10.0	187	183
9 M 25 E	3150	4284	720	28.6	9.6	187	183
	3150	4284	750	27.4	10.0	187	183

Stroke: 400 mm
Bore: 255 mm

Specific lubricating oil consumption 0.6 g/kWh, ± 0.3 g/kWh
LCV = 42700 kJ/kg, without engine-driven pumps, tolerance 5%
Reduced part load fuel consumption available



Engine centre distance: 2500 mm

Removal of cylinder liner:
in transverse direction: 2510 mm
in longitudinal direction: 2735 mm

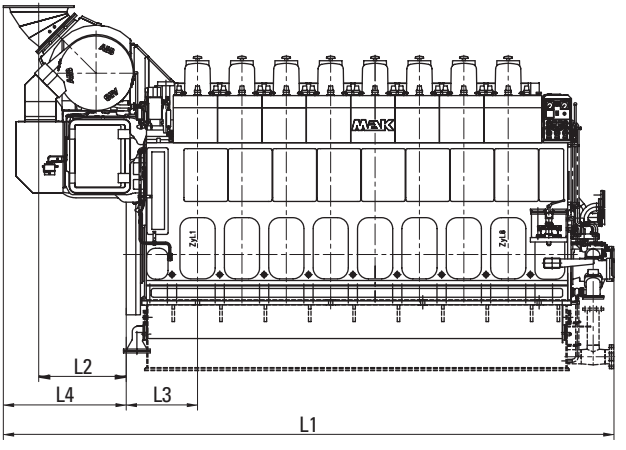
Engine with turbocharger at free end available, ask for dimensions.

Please contact us for lead times.

M 32 C
Propulsion Engine

DIMENSIONS (mm) AND WEIGHTS (t)

Type	L1	L2	L3	L4	H1	H2	H3	H4	W1	W2	W3	Weight	
												Wet sump	Dry sump
6 M 32 C	5936	788	852	1170	2784	1052	550	1392	2368	962	2140	41.6	39.5
8 M 32 C	7293	1044	852	1467	2969	1052	550	1392	2182	262	2140	51.7	49.0
9 M 32 C	7823	1044	852	1467	2969	1052	550	1392	2182	262	2140	55.0	52.0

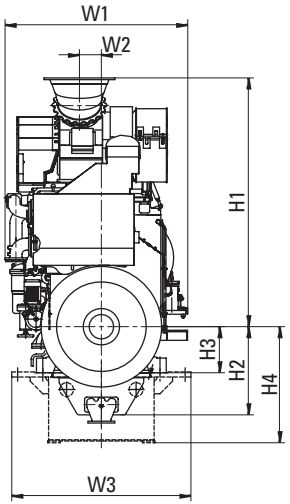


TECHNICAL DATA

Type	Output range		Speed	Mean eff. pressure	Mean piston speed	Spec. fuel consumption	
						100%	85%
	kW	mhp	rpm	bar	m/s	g/kWh	g/kWh
6 M 32 C	2880	3920	600	24.9	9.6	177	176
	3000	4080	600	25.9	9.6	177	176
8 M 32 C	3840	5220	600	24.9	9.6	177	176
	4000	5440	600	25.9	9.6	177	176
9 M 32 C	4320	5880	600	24.9	9.6	177	176
	4500	6120	600	25.9	9.6	177	176

Stroke: 480 mm
Bore: 320 mm

Specific lubricating oil consumption 0.6 g/kWh, ± 0.3 g/kWh
LCV = 42700 kJ/kg, without engine-driven pumps, tolerance 5%



Engine centre distance: 2800 mm*)

Removal of cylinder liner:
in transverse direction: 3040 mm
in longitudinal direction: 3405 mm

Engine with turbocharger at free end available, ask for dimensions.

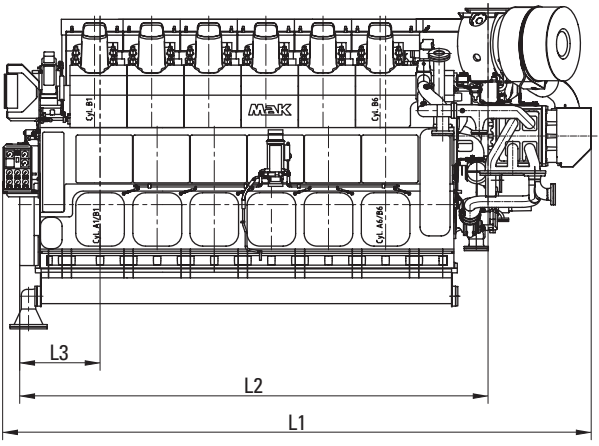
*) If turbocharger is located on opposite coupling side, the water cover of the charge air cooler must be dismantled.

VM 32 C

Propulsion Engine

DIMENSIONS (mm) AND WEIGHTS (t)

Type	L1	L2	L3	H1	H2	H3	W1	W2	Weight
12 M 32 C	6956	5535	949	2319	1205	750	2985	1133	65.0
16 M 32 C	8328	6885	949	2319	1205	750	2985	1133	82.0

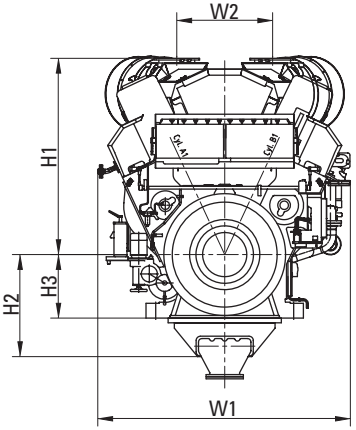


TECHNICAL DATA

Type	Output range		Speed	Mean eff. pressure	Mean piston speed	Spec. fuel consumption	
						100%	85%
	kW	mhp	rpm	bar	m/s	g/kWh	g/kWh
12 M 32 C	6000	8160	720	22.5	11.0	178	177
	6000	8160	750	21.6	11.5	179	179
16 M 32 C	8000	10880	720	22.5	11.0	178	177
	8000	10880	750	21.6	11.5	179	179

Stroke: 460 mm
Bore: 320 mm

Specific lubricating oil consumption 0.6 g/kWh, ± 0.3 g/kWh
LCV = 42700 kJ/kg, without engine-driven pumps, tolerance 5%



Engine centre distance: 3500 mm

Removal of cylinder liner:
in transverse direction: 2836 mm

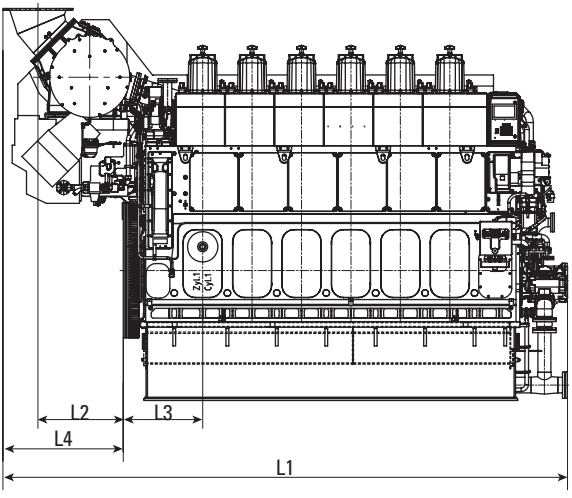
This engine is only available with dry oil sump.

Engine with turbocharger at driving end available, ask for dimensions.

M 32 E
Propulsion Engine

DIMENSIONS (mm) AND WEIGHTS (t)

Type	L1	L2	L3	L4	H1	H2	H3	H4	W1	W2	W3	Weight	
												Wet sump	Dry sump
6 M 32 E	6055	915	852	1290	2810	1052	550	1392	2195	126	2140	40.7	37.5
8 M 32 E	7320	1021	852	1495	3014	1052	550	1392	2195	191	2140	50.4	46.4
9 M 32 E	7850	1021	852	1495	3014	1052	550	1392	2195	191	2140	53.9	49.4

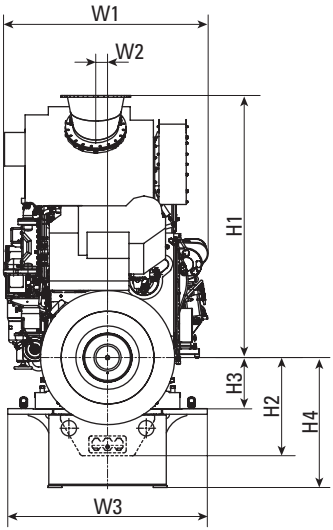


TECHNICAL DATA

Type	Output range		Speed	Mean eff. pressure	Mean piston speed	Spec. fuel consumption	
						100%	85%
	kW	mhp	rpm	bar	m/s	g/kWh	g/kWh
6 M 32 E	3300	4488	720	24.8	11.0	179	178
	3300	4488	750	23.8	11.5	179	178
8 M 32 E	4400	5984	720	24.8	11.0	179	178
	4400	5984	750	23.8	11.5	179	178
9 M 32 E	4950	6732	720	24.8	11.0	179	178
	4950	6732	750	23.8	11.5	179	178

Stroke: 460 mm
Bore: 320 mm

Specific lubricating oil consumption 0.6 g/kWh, ± 0.3 g/kWh
LCV = 42700 kJ/kg, without engine-driven pumps, tolerance 5%
Reduced part load fuel consumption available



Engine centre distance: 2800 mm

Removal of cylinder liner:
in transverse direction: 3040 mm
in longitudinal direction: 3400 mm

Engine with turbocharger at free end available, ask for dimensions.

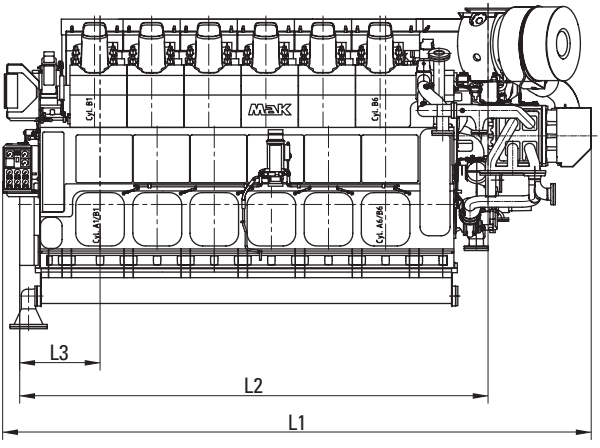
Please contact us for lead times.

VM 32 E

Propulsion Engine

DIMENSIONS (mm) AND WEIGHTS (t)

Type	L1	L2	L3	H1	H2	H3	W1	W2	Weight
12 M 32 E	6956	5535	949	2319	1205	750	2985	1133	65.0
16 M 32 E	8328	6885	949	2319	1205	750	2985	1133	82.0

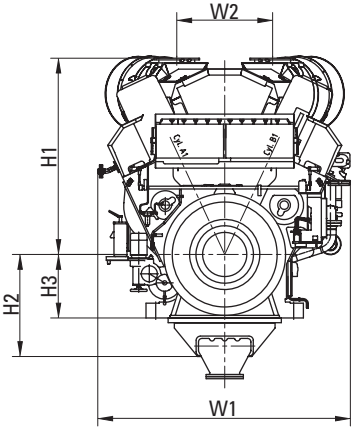


TECHNICAL DATA

Type	Output range		Speed	Mean eff. pressure	Mean piston speed	Spec. fuel consumption	
						100%	85%
	kW	mhp	rpm	bar	m/s	g/kWh	g/kWh
12 M 32 E	6360	8650	720	23.9	11.0	178	177
	6360	8650	750	22.9	11.5	179	179
	6720*)	9139	720	25.2	11.0	178	177
	6720*)	9139	750	24.2	11.5	179	179
16 M 32 E	8480	11533	720	23.8	11.0	178	177
	8480	11533	750	22.9	11.5	179	179
	8960*)	12186	720	25.2	11.0	181	177
	8960*)	12186	750	24.2	11.5	182	179

*) MDO only
Stroke: 460 mm
Bore: 320 mm

Specific lubricating oil consumption 0.6 g/kWh, ± 0.3 g/kWh
LCV = 42700 kJ/kg, without engine-driven pumps, tolerance 5%
Reduced part load fuel consumption available



Engine centre distance: 3500 mm

Removal of cylinder liner:
in transverse direction: 2836 mm

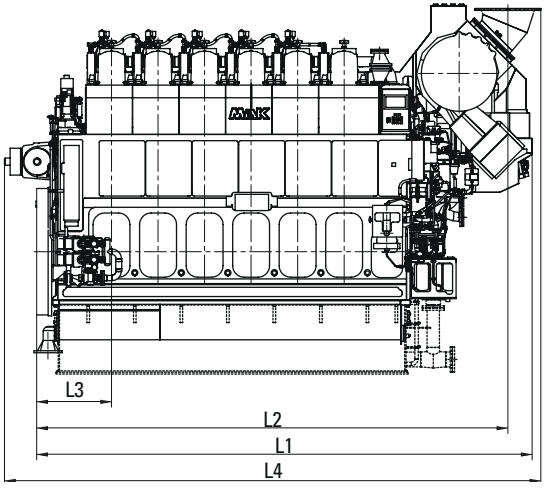
Engine with turbocharger at driving end available, ask for dimensions.

M 34 DF

Propulsion Engine

DIMENSIONS (mm) AND WEIGHTS (t)

Type	L1	L2	L3	L4	H1	H2	H3	H4	H5	W1	W2	W3	Weight
6 M 34 DF	5645	5366	852	6109	2767	1052	550	2817	1392	2291	126	2140	39.5
8 M 34 DF	6704	6533	852	7325	2970	1052	550	2995	1392	2291	191	2140	49.0
9 M 34 DF	7234	7063	852	7855	2970	1052	550	2995	1392	2291	191	2140	52.0

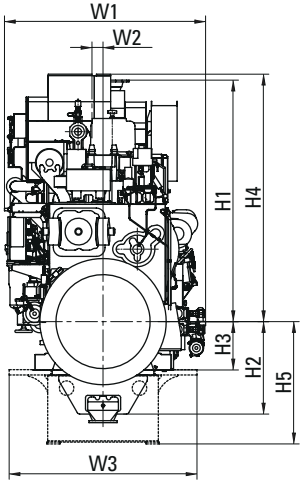


TECHNICAL DATA

Type	Output range		Speed	Mean eff. pressure	Mean piston speed	Spec fuel consumption 100% 85%	Total spec. energy consumption 100% 85%
	kW	mhp	rpm	bar	m/s	g/kWh	kJ/kWh
6 M 34 DF	3060	4162	720	20.3	11.0	188/187	7520/7680
	3180	4325	750	20.2	11.5	188/187	7520/7680
8 M 34 DF	4080	5549	720	20.3	11.0	188/187	7520/7680
	4240	5766	750	20.2	11.5	188/187	7520/7680
9 M 34 DF	4590	6242	720	20.3	11.0	188/187	7520/7680
	4770	6487	750	20.2	11.5	188/187	7520/7680

Stroke: 460 mm
Bore: 340 mm

Without engine driven pumps. Tolerance 5 % for liquid fuel.
Maximum continuous rating according to ISO 3046/1.



Engine centre distance: 2800 mm

Removal of cylinder liner:
in transverse direction: 3040 mm
in longitudinal direction: 3400 mm

Engine with turbocharger at free end available, ask for dimensions.

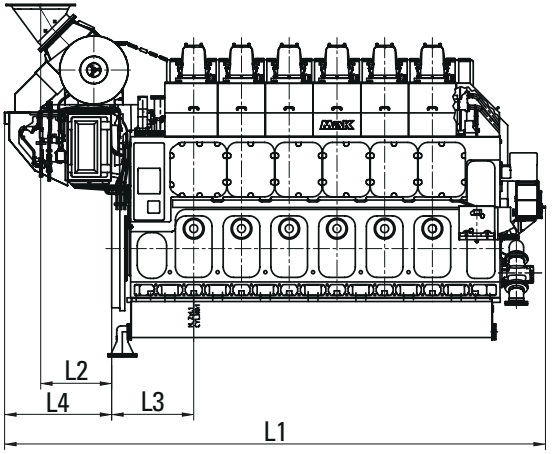
Please contact us for lead times.

M 43 C

Propulsion Engine

DIMENSIONS (mm) AND WEIGHTS (t)

Type	L1	L2	L3	L4	H1	H2	H3	W1	W2	Weight
6 M 43 C	8271	1086	1255	1638	3734	1396	750	2878	215	91.0
7 M 43 C	9068	1119	1255	1704	4105	1396	750	2878	232	107.0
8 M 43 C	9798	1119	1255	1704	4105	1396	750	2878	232	117.0
9 M 43 C	10528	1119	1255	1704	4105	1396	750	2878	232	127.0

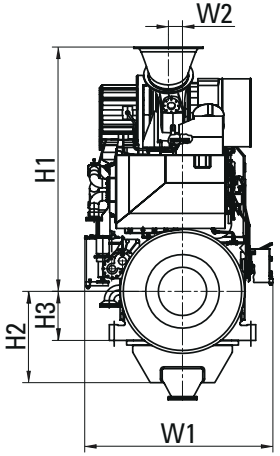


TECHNICAL DATA

Type	Output range		Speed	Mean eff. pressure	Mean piston speed	Spec. fuel consumption	
						100%	85%
	kW	mhp	rpm	bar	m/s	g/kWh	g/kWh
6 M 43 C	6000	8160	500	27.1	10.2	176	175
	6000	8160	514	26.4	10.5	176	175
	6300	8568	500	28.4	10.2	178	176
	6300	8568	514	27.7	10.5	178	176
7 M 43 C	7000	9520	500	27.1	10.2	176	176
	7000	9520	514	26.4	10.5	176	175
	7350	9996	500	28.4	10.2	178	176
	7350	9996	514	27.7	10.5	178	176
8 M 43 C	8000	10880	500	27.1	10.2	176	175
	8000	10880	514	26.4	10.5	176	175
	8400	11424	500	28.4	10.2	178	176
	8400	11424	514	27.7	10.5	178	176
9 M 43 C	9000	12240	500	27.1	10.2	176	175
	9000	12240	514	26.4	10.5	176	175
	9450	12852	500	28.4	10.2	178	176
	9450	12852	514	27.7	10.5	178	176

Stroke: 610 mm
Bore: 430 mm

Specific lubricating oil consumption 0.6 g/kWh, ± 0.3 g/kWh
LCV = 42700 kJ/kg, without engine-driven pumps, tolerance 5%



Engine centre distance: 3400 mm

Removal of cylinder liner:
in transverse direction: 4165 mm
in longitudinal direction: 4610 mm

This engine is only available with dry oil sump.

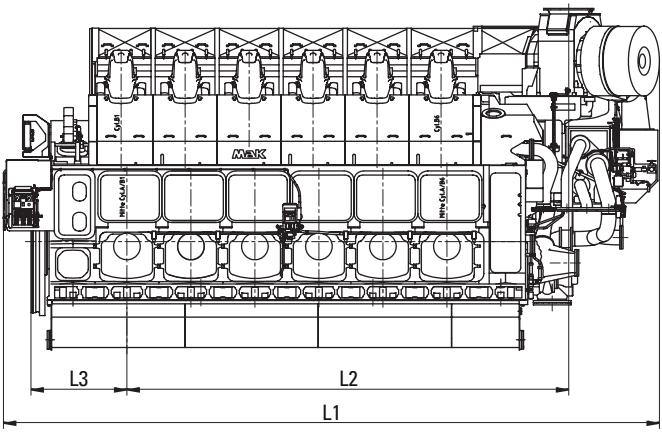
Engine with turbocharger at free end available, ask for dimensions.

VM 43 C

Propulsion Engine

DIMENSIONS (mm) AND WEIGHTS (t)

Type	L1	L2	L3	H1	H2	H3	W1	W2	Weight
12 M 43 C	9842	6628	1440	3497	1625	875	3890	1685	160.0
16 M 43 C	11943	8533	1440	3473	1625	875	4027	1670	220.0

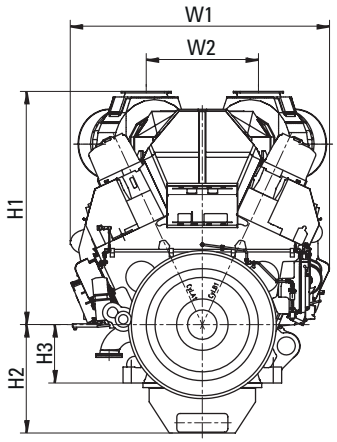


TECHNICAL DATA

Type	Output range		Speed	Mean eff. pressure	Mean piston speed	Spec. fuel consumption 100%	Spec. fuel consumption 85%
	kW	mhp	rpm	bar	m/s	g/kWh	g/kWh
12 M 43 C	12000	16320	500	27.1	10.2	176	175
	12000	16320	514	26.4	10.5	176	175
	12600	17136	500	28.4	10.2	177	176
	12600	17136	514	27.7	10.5	177	176
16 M 43 C	16000	21760	500	27.1	10.2	176	175
	16000	21760	514	26.4	10.5	176	175
	16800	22848	500	28.4	10.2	177	176
	16800	22848	514	27.7	10.5	177	176

Stroke: 610 mm
Bore: 430 mm

Specific lubricating oil consumption 0.6 g/kWh, ± 0.3 g/kWh
LCV = 42700 kJ/kg, without engine-driven pumps, tolerance 5%



Engine centre distance: 4500 mm

Removal of cylinder liner:
in transverse direction: 3700 mm

This engine is only available with dry oil sump.

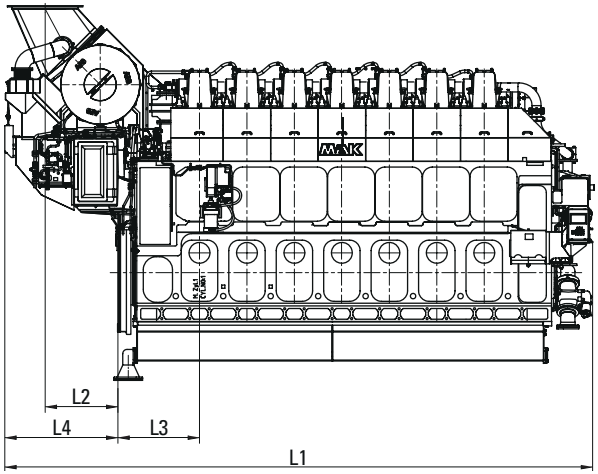
Engine with turbocharger at flywheel end available, ask for dimensions.

M 46 DF

Propulsion Engine

DIMENSIONS (mm) AND WEIGHTS (t)

Type	L1	L2	L3	L4	H1	H2	H3	W1	W2	Weight
6 M 46 DF	8330	1086	1255	1723	3734	1396	750	2961	215	96.0
7 M 46 DF	9068	1119	1255	1740	4105	1396	750	2961	232	109.0
8 M 46 DF	9798	1119	1255	1740	4105	1396	750	2961	232	119.0
9 M 46 DF	10768	1119	1255	1740	4105	1396	750	2961	232	131.0



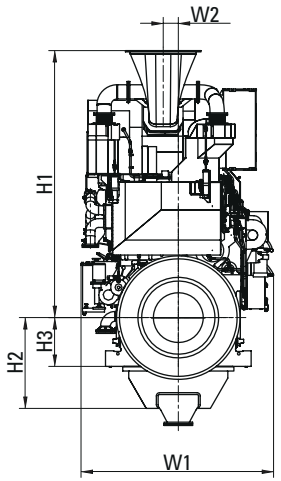
TECHNICAL DATA

Type	Output range		Speed	Mean eff. pressure	Mean piston speed	Spec fuel consumption	Total spec. energy consumption
						100% 85%	100% 85%
	kW	mhp	rpm	bar	m/s	g/kWh	g/kWh
6 M 46 DF	5400	7344	500/514	21.3/20.7	10.2/10.5	186/185	7441/7524
	5790	7874	500	22.8	10.2	185/183	7350/7460
	5790	7874	514	22.2	10.5	186/184	7350/7460
7 M 46 DF	6300	8568	500/514	21.3/20.7	10.2/10.5	186/185	7441/7524
	6755*)	9187	500	22.8	10.2	185/183	7350/7460
	6755*)	9187	514	22.2	10.5	186/184	7350/7460
8 M 46 DF	7200	9792	500/514	21.3/20.7	10.2/10.5	186/185	7441/7524
	7720	10499	500	22.8	10.2	185/183	7350/7460
	7720	10499	514	22.2	10.5	186/184	7350/7460
9 M 46 DF	8100	11016	500/514	21.3/20.7	10.2/10.5	186/185	7441/7524
	8685*)	11812	500	22.8	10.2	185/183	7350/7460
	8685*)	11812	514	22.2	10.5	186/184	7350/7460

*) MDO only

Stroke: 610 mm
Bore: 460 mm

Specific lubricating oil consumption 0.6 g/kWh, ± 0.3 g/kWh
LCV = 42700 kJ/kg, without engine-driven pumps, tolerance 5% for liquid fuel
LCV = 31.5 MJ/Nm³ for gas fuel
Note: 5% tolerance +1% per pump



Engine centre distance: 3400 mm

Removal of cylinder liner:
in transverse direction: 4165 mm
in longitudinal direction: 4610 mm

This engine is only available with dry oil sump.

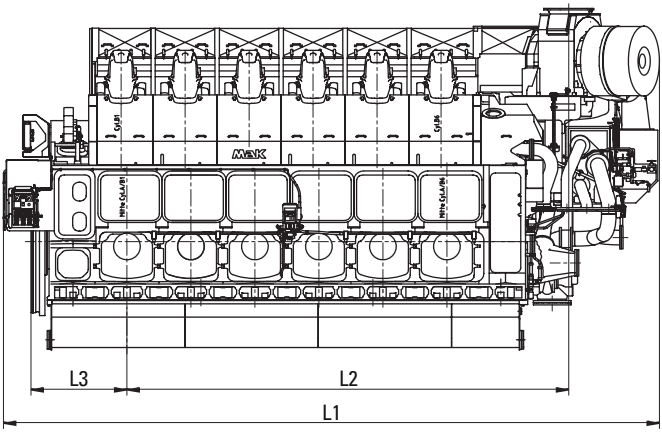
Engine with turbocharger at free end available, ask for dimensions.

VM 46 DF

Propulsion Engine

DIMENSIONS (mm) AND WEIGHTS (t)

Type	L1	L2	L3	H1	H2	H3	W1	W2	Weight
12 M 46 DF	9847	6628	1440	3497	1625	875	3890	1685	160.0
16 M 46 DF	11943	8533	1440	3473	1625	875	4027	1670	220.0

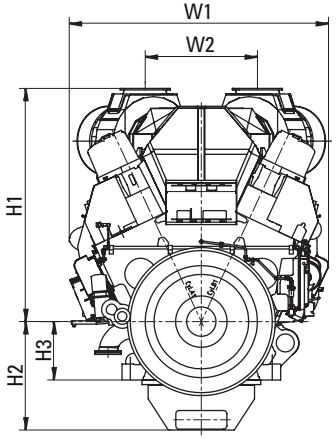


TECHNICAL DATA

Type	Output range		Speed	Mean eff. pressure	Mean piston speed	Spec fuel consumption 100% 85%	Total spec. energy consumption 100% 85%
	kW	mhp	rpm	bar	m/s	g/kWh	kJ/kWh
12 M 46 DF	10800	14688	500	21.3	10.2	184/184	7272/7417
	10800	14688	514	20.7	10.5	184/184	7272/7417
	11580	15749	500	22.8	10.2	184/182	7350/7370
	11580	15749	514	22.2	10.5	185/183	7350/7370
16 M 46 DF	14400	19584	500	21.3	10.2	184/184	7272/7417
	14400	19584	514	20.7	10.5	184/184	7272/7417
	15440	20998	500	22.8	10.2	184/182	7350/7370
	15440	20998	514	22.2	10.5	185/183	7350/7370

Stroke: 610 mm
Bore: 460 mm

Specific lubricating oil consumption 0.6 g/kWh, ± 0.3 g/kWh
LCV = 42700 kJ/kg, without engine-driven pumps, tolerance 5% for liquid fuel
LCV = 31.5 MJ/Nm³ for gas fuel
Note: 5% tolerance +1% per pump



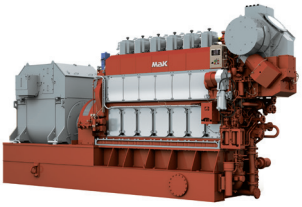
Engine centre distance: 4500 mm

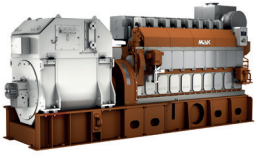
Removal of cylinder liner:
in transverse direction: 3700 mm

This engine is only available with dry oil sump.

Engine with turbocharger at free end available, ask for dimensions.

Please contact us for lead times.





MaK Marine Generator Sets

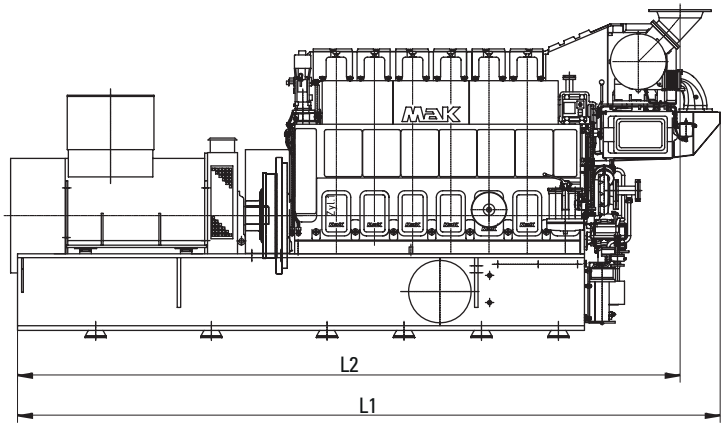
Today's shipping industry relies on dependable on-board electrical power generation. MaK auxiliary diesel engines ensure the availability of electrical power, wherever and whenever needed. For navigational equipment, monitoring installations, refrigerated containers, lighting, pumps, heating, or ventilation, MaK auxiliary engines are the right choice. As with MaK propulsion engines, these auxiliary engines can be operated with economical Heavy Fuel Oil (HFO), and meet NOx limits according to IMO Code Revised MARPOL, Annex VI, NOx Technical Code 2008, (IMO Tier II).

M 20 C
Generator Set

DIMENSIONS (mm) AND WEIGHTS (t)

Type	L1*)	L2*)	H1	H2	W1	W2	Weight*)
6 M 20 C	6073	5727	1779	1054	1680	627	18.8
8 M 20 C	6798	6475	1956	1054	1816	710	23.1
9 M 20 C	7125	6802	1956	1054	1816	710	30.0

*) Dependent on generator make/type

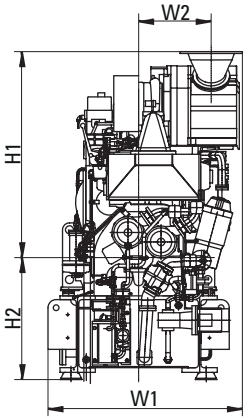


TECHNICAL DATA

Type	Engine rating	Output range		Frequency	Speed	Mean eff. pressure	Mean piston speed	Spec fuel consumption	
								100%	85%
	kW	kWe	kVA	Hz	rpm	bar	m/s	g/kWh	g/kWh
6 M 20 C	1020	979	1224	60	900	24.1	9.0	189	188
	1080	1036	1296	60	900	25.5	9.0	191	189
	1140	1094	1368	50	1000	24.2	10.0	190	189
	1200	1151	1440	50	1000	25.5	10.0	192	190
8 M 20 C	1360	1306	1632	60	900	24.1	9.0	189	188
	1440	1381	1728	60	900	25.5	9.0	191	189
	1520	1459	1824	50	1000	24.2	10.0	190	189
	1600	1534	1920	50	1000	25.5	10.0	192	190
9 M 20 C	1530	1468	1836	60	900	24.1	9.0	189	188
	1620	1553	1944	60	900	25.5	9.0	191	189
	1710	1641	2052	50	1000	24.2	10.0	190	189
	1800	1726	2160	50	1000	25.5	10.0	192	190

Stroke: 300 mm
Bore: 200 mm

Specific lubricating oil consumption 0.6 g/kWh, ± 0.3 g/kWh
LCV = 42700 kJ/kg, without engine-driven pumps, tolerance 5%
Generator efficiency: 0.96, cos φ : 0.8



Genset centre distance: min. 2010 mm

Removal of cylinder liner:
in transverse direction: 2964 mm
in longitudinal direction: 3139 mm

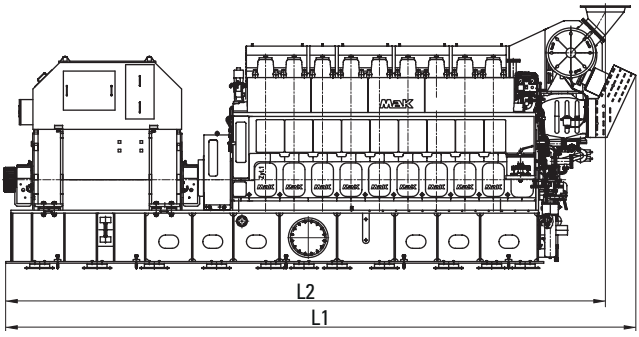
Engine with turbocharger at driving end available, ask for dimensions.

M 25 C
Generator Set

DIMENSIONS (mm) AND WEIGHTS (t)

Type	L1*)	L2*)	H1	H2	W1	W2	Weight*)
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

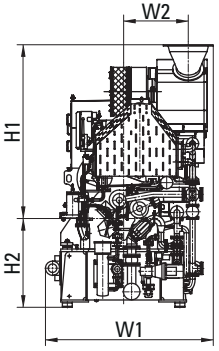


TECHNICAL DATA

Type	Engine rating	Output range		Frequency	Speed	Mean eff. pressure	Mean piston speed	Spec fuel consumption	
								100%	85%
	kW	kWe	kVA	Hz	rpm	bar	m/s	g/kWh	g/kWh
6 M 25 C	1740	1669	2088	60	720	23.6	9.6	185	184
	1800	1726	2160	50	750	23.5	10.0	185	184
	2000	1918	2400	60	720	27.2	9.6	188	185
	2000	1918	2400	50	750	26.1	10.0	186	184
8 M 25 C	2320	2225	2784	60	720	23.6	9.6	185	184
	2400	2302	2880	50	750	23.5	10.0	185	184
	2666	2557	3199	60	720	27.2	9.6	189	185
	2666	2557	3199	50	750	26.1	10.0	187	184
9 M 25 C	2610	2503	3132	60	720	23.6	9.6	185	184
	2700	2589	3240	50	750	23.5	10.0	185	184
	3000	2877	3600	60	720	27.2	9.6	189	185
	3000	2877	3600	50	750	26.1	10.0	187	184

Stroke: 400 mm
Bore: 255 mm

Specific lubricating oil consumption 0.6 g/kWh, ± 0.3 g/kWh
LCV = 42700 kJ/kg, without engine-driven pumps, tolerance 5%
Generator efficiency: 0.96, cos φ : 0.8



Genset centre distance: min. 2700 mm

Removal of cylinder liner:
in transverse direction: 3850 mm
in longitudinal direction: 4075 mm

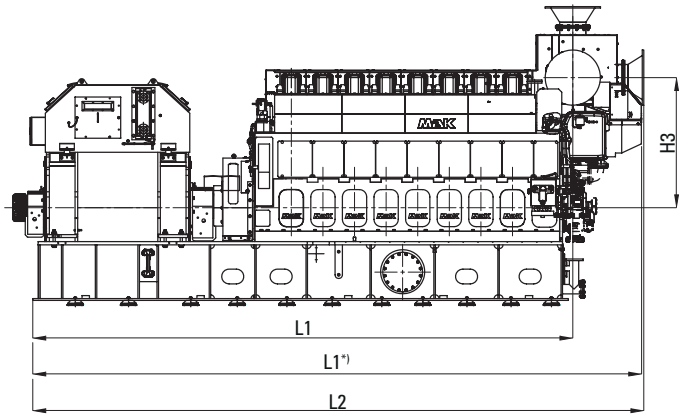
Engine with turbocharger at driving end available, ask for dimensions.

M 25 E
Generator Set

DIMENSIONS (mm) AND WEIGHTS (t)

Type	L1	L2	H1	H2	W1	W2	L1*)	H3	Dry weight **)
	Turbocharger nozzle position 0°						Turbocharger nozzle position 90°		
6 M 25 E	6776	7717	2537	1329	2357	850	7579	1734	43.0
8 M 25 E	7347	8283	2737	1329	2357	937	8313	1770	53.0
9 M 25 E	7777	8713	2737	1329	2357	937	8743	1770	56.0

**) Dependent on generator make/type

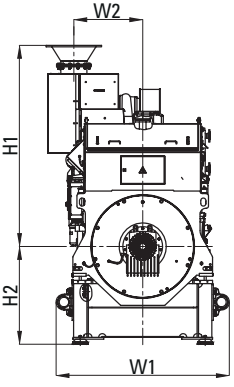


TECHNICAL DATA

Type	Engine rating	Output range		Frequency	Speed	Mean eff. pressure	Mean piston speed	Spec fuel consumption	
								100%	85%
	kW	kWe	kVA	Hz	rpm	bar	m/s	g/kWh	g/kWh
6 M 25 E	2100	2016	2625	60	720	28.56	9.6	187	183
	2100	2016	2625	50	750	27.4	10.0	187	183
8 M 25 E	2800	2688	3500	60	720	28.56	9.6	187	183
	2800	2688	3500	50	750	27.4	10.0	187	183
9 M 25 E	3150	3024	3938	60	720	28.56	9.6	187	183
	3150	3024	3938	50	750	27.4	10.0	187	183

Stroke: 400 mm
Bore: 255 mm

Specific lubricating oil consumption 0.6 g/kWh, ± 0.3 g/kWh
LCV = 42700 kJ/kg, without engine-driven pumps, tolerance 5%
Generator efficiency: 0.96, cos φ : 0.8
Reduced part load fuel consumption available



Genset centre distance: min. 2700 mm

Removal of cylinder liner:
in transverse direction: 3850 mm
in longitudinal direction: 4075 mm

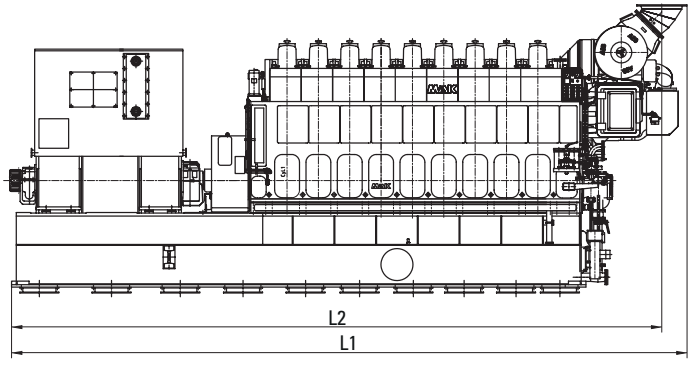
Engine with turbocharger at driving end available, ask for dimensions.

M 32 C
Generator Set

DIMENSIONS (mm) AND WEIGHTS (t)

Type	L1*)	L2*)	H1	H2	W1	W2	Weight*)
6 M 32 C	9302	8869	2901	1900	2639	962	73.0
8 M 32 C	10866	10461	2969	1900	2600	262	92.0
9 M 32 C	11419	10991	2969	1900	2600	262	98.0

*) Dependent on generator make/type

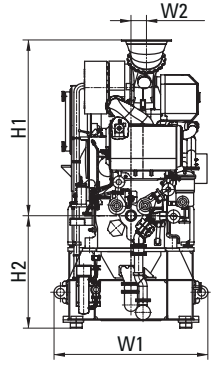


TECHNICAL DATA

Type	Engine rating	Output range		Frequency	Speed	Mean eff. pressure	Mean piston speed	Spec fuel consumption	
								100%	85%
	kW	kWe	kVA	Hz	rpm	bar	m/s	g/kWh	g/kWh
6 M 32 C	2880	2762	3456	50/60	600	24.9	9.6	177	176
	3000	2877	3600	50/60	600	25.9	9.6	177	176
8 M 32 C	3840	3682	4608	50/60	600	24.9	9.6	177	176
	4000	3836	4800	50/60	600	25.9	9.6	177	176
9 M 32 C	4320	4143	5184	50/60	600	24.9	9.6	177	176
	4500	4316	5400	50/60	600	25.9	9.6	177	176

Stroke: 480 mm
Bore: 320 mm

Specific lubricating oil consumption 0.6 g/kWh, ± 0.3 g/kWh
LCV = 42700 kJ/kg, without engine-driven pumps, tolerance 5%
Generator efficiency: 0.96, cos φ : 0.8



Genset centre distance: min. 3000 mm

Removal of cylinder liner:
in transverse direction: 4940 mm
in longitudinal direction: 5305 mm

Engine with turbocharger at driving end available, ask for dimensions.

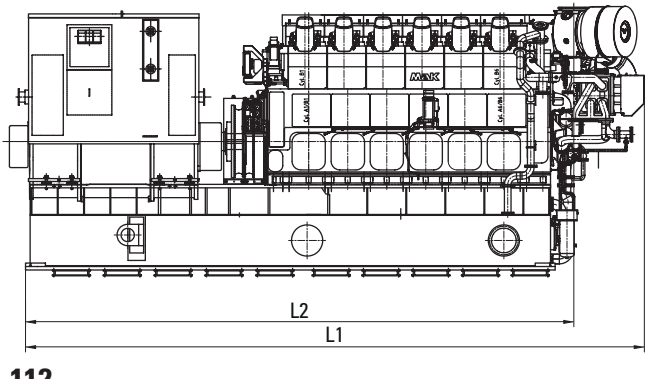
VM 32 C

Generator Set

DIMENSIONS (mm) AND WEIGHTS (t)

Type	L1*)	L2*)	H1	H2	W1	W2	Weight*)
12 M 32 C	10703	9484	2319	2320	3526	1133	120.0
16 M 32 C	12149	10930	2319	2320	3526	1133	140.0

*) Dependent on generator make/type

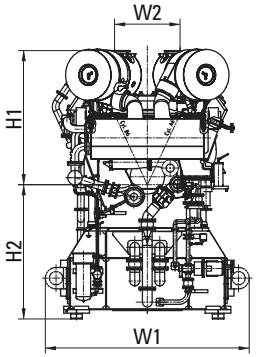


TECHNICAL DATA

Type	Engine rating	Output range		Frequency	Speed	Mean eff. pressure	Mean piston speed	Spec fuel consumption	
								100%	85%
	kW	kWe	kVA	Hz	rpm	bar	m/s	g/kWh	g/kWh
12 M 32 C	6000	5754	7200	60	720	22.5	11.0	178	177
	6000	5754	7200	50	750	21.6	11.5	179	179
16 M 32 C	8000	7672	9600	60	720	22.5	11.0	178	177
	8000	7672	9600	50	750	21.6	11.5	179	179

Stroke: 460 mm
Bore: 320 mm

Specific lubricating oil consumption 0.6 g/kWh, ± 0.3 g/kWh
LCV = 42700 kJ/kg, without engine-driven pumps, tolerance 5%
Generator efficiency: 0.96, cos φ : 0.8



Genset centre distance: min. 3500 mm

Removal of cylinder liner:
in transverse direction: 5156 mm

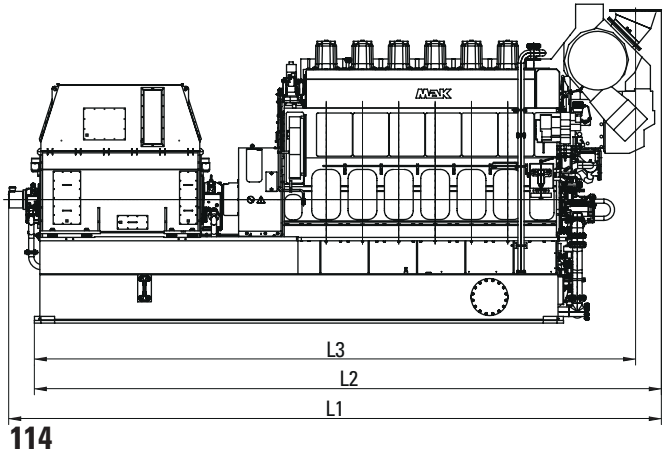
Engine with turbocharger at driving end available, ask for dimensions.

M 32 E
Generator Set

DIMENSIONS (mm) AND WEIGHTS (t)

Type	L1*)	L2*)	L3	H1	H2	W1	W2	Weight*)
6 M 32 E	9566	9094	8672	2767	1800	2600	126	73.0
8 M 32 E	10626	10154	9732	2970	1800	2600	190	92.0
9 M 32 E	11156	10684	10262	2970	1800	2600	190	98.0

*) Dependent on generator make/type

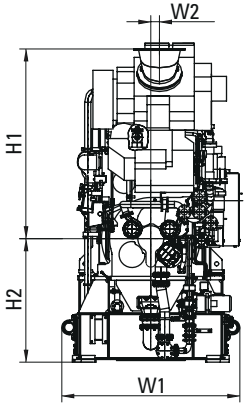


TECHNICAL DATA

Type	Engine rating	Output range		Frequency	Speed	Mean eff. pressure	Mean piston speed	Spec fuel consumption	
								100%	85%
	kW	kWe	kVA	Hz	rpm	bar	m/s	g/kWh	g/kWh
6 M 32 E	3300	3165	3960	60	720	23.7	11.0	179	178
	3300	3165	3960	50	750	22.7	11.5	179	178
8 M 32 E	4400	4220	5280	60	720	23.7	11.0	179	178
	4400	4220	5280	50	750	22.7	11.5	179	178
9 M 32 E	4950	4747	5940	60	720	23.7	11.0	179	178
	4950	4747	5940	50	750	22.7	11.5	179	178

Stroke: 460 mm
Bore: 320 mm

Specific lubricating oil consumption 0.6 g/kWh, ± 0.3 g/kWh
LCV = 42700 kJ/kg, without engine-driven pumps, tolerance 5%
Generator efficiency: 0.96, cos φ : 0.8
Reduced part load fuel consumption available



Genset centre distance: min. 3000 mm

Removal of cylinder liner:
in transverse direction: 4940 mm
in longitudinal direction: 5305 mm

Engine with turbocharger at driving end available, ask for dimensions.

Please contact us for lead times.

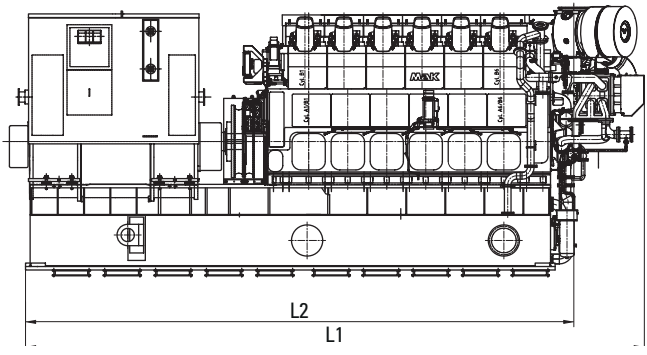
VM 32 E

Generator Set

DIMENSIONS (mm) AND WEIGHTS (t)

Type	L1*)	L2*)	H1	H2	W1	W2	Weight*)
12 M 32 E	10703	9484	2319	2320	3526	1133	120.0
16 M 32 E	12149	10930	2319	2320	3526	1133	140.0

*) Dependent on generator make/type

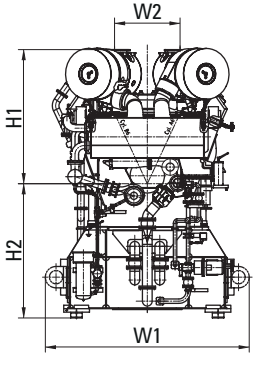


TECHNICAL DATA

Type	Engine rating	Output range		Frequency	Speed	Mean eff. pressure	Mean piston speed	Spec fuel consumption 100%	Spec fuel consumption 85%
	kW	kWe	kVA	Hz	rpm	bar	m/s	g/kWh	g/kWh
12 M 32 E	6360	6099	7632	60	720	23.8	11.0	178	177
	6360	6099	7632	50	750	22.9	11.5	179	179
	6720*)	6444	8064	60	720	25.2	11.0	178	177
	6720*)	6444	8064	50	750	24.2	11.5	179	179
16 M 32 E	8480	8132	10176	60	720	23.8	11.0	178	177
	8480	8132	10176	50	750	22.9	11.5	179	179
	8960*)	8593	10752	60	720	25.2	11.0	181	177
	8960*)	8593	10752	50	750	24.2	11.5	182	179

*) MDO only
Stroke: 460 mm
Bore: 320 mm

Specific lubricating oil consumption 0.6 g/kWh, ± 0.3 g/kWh
LCV = 42700 kJ/kg, without engine-driven pumps, tolerance 5%
Generator efficiency: 0.96, cos φ : 0.8
Reduced part load fuel consumption available



Genset centre distance: min. 3500mm

Removal of cylinder liner:
in transverse direction: 5156 mm

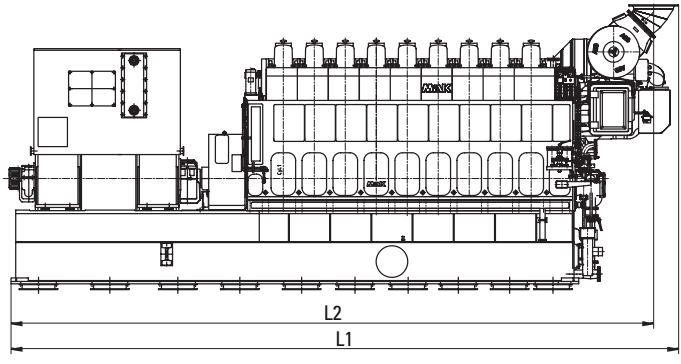
Engine with turbocharger at driving end available, ask for dimensions.

M 34 DF
Generator Set

DIMENSIONS (mm) AND WEIGHTS (t)

Type	L1*)	L2*)	L3	H1	H2	W1	W2	Weight*)
6 M 34 DF	9566	9094	8672	2767	1800	2600	126	73.0
8 M 34 DF	10626	10154	9732	2970	1800	2600	191	92.0
9 M 34 DF	11156	10684	10262	2970	1800	2600	191	98.0

*) Dependent on generator make/type

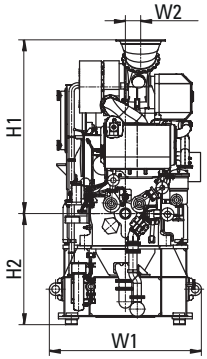


TECHNICAL DATA

Type	Engine rating	Output range		Frequency	Speed	Mean eff. pressure	Mean piston speed	Spec fuel consumption	Total spec. energy consumption
								100% 85%	100% 85%
	kW	kWe	kVA	Hz	rpm	bar	m/s	g/kWh	kJ/kWh
6 M 34 DF	3060	2934	3672	60	720	20.3	11.0	188/187	7520/7680
	3180	3050	3816	50	750	20.2	11.5	188/187	7520/7680
8 M 34 DF	4080	3913	4896	60	720	20.3	11.0	188/187	7520/7680
	4240	4066	5088	50	750	20.2	11.5	188/187	7520/7680
9 M 34 DF	4590	4401	5508	60	720	20.3	11.0	188/187	7520/7680
	4770	4574	5724	50	750	20.2	11.5	188/187	7520/7680

Stroke: 460 mm
Bore: 340 mm

Specific lubricating oil consumption 0.6 g/kWh, ± 0.3 g/kWh
LCV = 42700 kJ/kg, without engine-driven pumps, tolerance 5%
Generator efficiency: 0.96, cos φ : 0.8



Genset centre distance: min. 3000mm

Removal of cylinder liner:
in transverse direction: 4940 mm
in longitudinal direction: 5305 mm

Engine with turbocharger at driving end available, ask for dimensions.

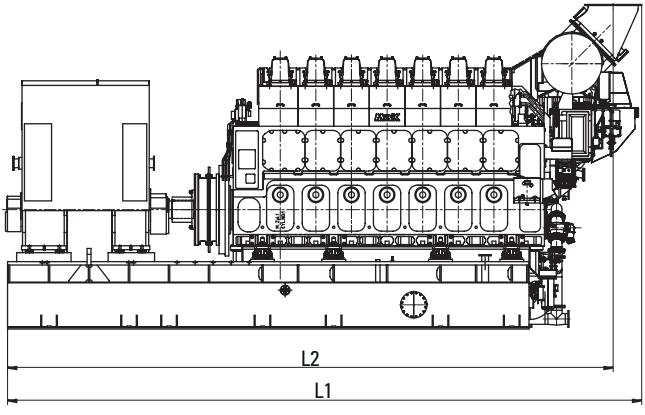
Please contact us for lead times.

M 43 C
Generator Set

DIMENSIONS (mm) AND WEIGHTS (t)

Type	L1*)	L2*)	H1	H2	W1	W2	Weight*)
6 M 43 C	12202	11651	3834	2444	3400	215	178.0
7 M 43 C	12999	12414	4205	2444	3400	232	195.0
8 M 43 C	13729	13144	4205	2444	3400	232	210.0
9 M 43 C	14459	13874	4205	2444	3400	232	240.0

*) Dependent on generator make/type

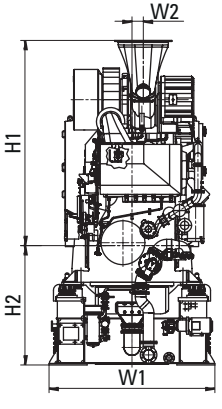


TECHNICAL DATA

Type	Engine rating	Output range		Frequency	Speed	Mean eff. pressure	Mean piston speed	Spec fuel consumption	
								100%	85%
	kW	kWe	kVA	Hz	rpm	bar	m/s	g/kWh	g/kWh
6 M 43 C	6000	5754	7200	50/60	500/514	27.1/26.4	10.2/10.5	176	175
	6300	6042	7560	50/60	500/514	28.4/27.7	10.2/10.5	178	176
7 M 43 C	7000	6713	8400	50/60	500/514	27.1/26.4	10.2/10.5	176	175
	7350	7049	8820	50/60	500/514	28.4/27.7	10.2/10.5	178	176
8 M 43 C	8000	7672	9600	50/60	500/514	27.1/26.4	10.2/10.5	176	175
	8400	8056	10080	50/60	500/514	28.4/27.7	10.2/10.5	178	176
9 M 43 C	9000	8631	10800	50/60	500/514	27.1/26.4	10.2/10.5	176	175
	9450	9063	11340	50/60	500/514	28.4/27.7	10.2/10.5	178	176

Stroke: 610 mm
Bore: 430 mm

Specific lubricating oil consumption 0.6 g/kWh, ± 0.3 g/kWh
LCV = 42700 kJ/kg, without engine-driven pumps, tolerance 5%
Generator efficiency: 0.96, cos φ : 0.8



Genset centre distance: min. 3700mm

Removal of cylinder liner:
in transverse direction: 6609 mm

VM 43 C

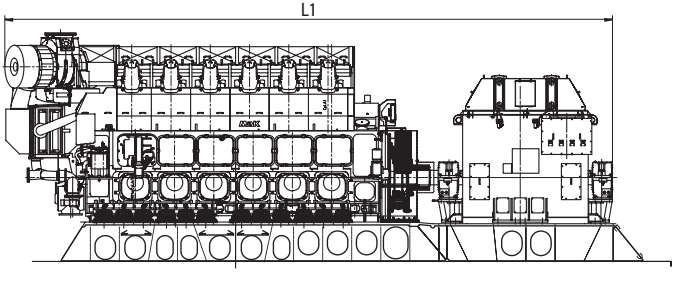
Generator Set

DIMENSIONS (mm) AND WEIGHTS (t)

Type	L1*)	H1	H2	W1	W2	Weight**)
12 M 43 C	14855	3497	1088	3890	1684	160.0
16 M 43 C	16940	3473	1088	4027	1670	220.0

*) Dependent on generator make/type

**) Engine weight only

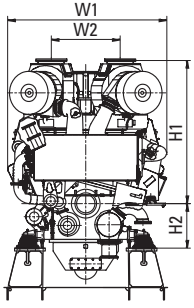


TECHNICAL DATA

Type	Engine rating	Output range		Frequency	Speed	Mean eff. pressure	Mean piston speed	Spec fuel consumption	
								100%	85%
	kW	kWe	kVA	Hz	rpm	bar	m/s	g/kWh	g/kWh
12 M 43 C	12000	11508	14400	50/60	500/514	27.1/26.4	10.2/10.5	176	175
	12600	12083	15120	50/60	500/514	28.4/27.7	10.2/10.5	178	176
16 M 43 C	16000	15344	19200	50/60	500/514	27.1/26.4	10.2/10.5	176	175
	16800	16111	20160	50/60	500/514	28.4/27.7	10.2/10.5	178	176

Stroke: 610 mm
Bore: 430 mm

Specific lubricating oil consumption 0.6 g/kWh, ± 0.3 g/kWh
LCV = 42700 kJ/kg, without engine-driven pumps, tolerance 5%
Generator efficiency: 0.96, cos φ : 0.8



Foundation Shipyard (example)

Genset centre distance: min. 4500mm

Removal of cylinder liner: 6720 mm

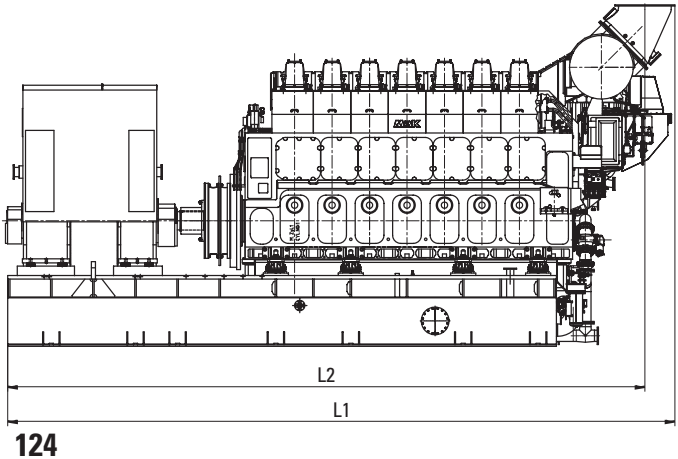
M 46 DF

Generator Set

DIMENSIONS (mm) AND WEIGHTS (t)

Type	L1*)	L2*)	H1	H2	W1	W2	Weight*)
6 M 46 DF	12202	11651	3834	2444	3400	215	178.0
7 M 46 DF	12999	12414	4205	2444	3400	232	195.0
8 M 46 DF	13729	13144	4205	2444	3400	232	210.0
9 M 46 DF	14459	13874	4205	2444	3400	232	240.0

*) Dependent on generator make/type

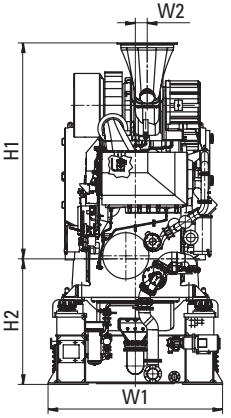


TECHNICAL DATA

Type	Engine rating	Output range		Frequency	Speed	Mean eff. pressure	Mean piston speed	Spec fuel consumption 100% 85%	Total spec. energy consumption 100% 85%
	kW	kWe	kVA	Hz	rpm	bar	m/s	g/kWh	kJ/kWh
	5400	5179	6480	50/60	500/514	21.3/20.7	10.2/10.5	186/185	7441/7524
6 M 46 DF	5790*)	5553	6948	50	500	22.8	10.2	185/183	7350/7460
	5790*)	5553	6948	60	514	22.2	10.5	186/184	7350/7460
	6300	6042	7560	50/60	500/514	21.3/20.7	10.2/10.5	186/185	7441/7524
7 M 46 DF	6755*)	6478	8106	50	500	22.8	10.2	185/183	7350/7460
	6755*)	6478	8106	50	514	22.2	10.5	186/184	7350/7460
	7200	6905	8640	50/60	500/514	21.3/20.7	10.2/10.5	186/185	7441/7524
8 M 46 DF	7720*)	7403	9264	50	500	22.8	10.2	185/183	7350/7460
	7720*)	7403	9264	60	514	22.2	10.5	186/184	7350/7460
	8100	7768	9720	50/60	500/514	21.3/20.7	10.2/10.5	186/185	7441/7524
9 M 46 DF	8685*)	8329	10422	50	500	22.8	10.2	185/183	7350/7460
	8685*)	8329	10422	60	514	22.2	10.5	186/184	7350/7460

*) MDO only
Stroke: 610 mm
Bore: 460 mm

Specific lubricating oil consumption 0.6 g/kWh, ± 0.3 g/kWh
LCV = 42700 kJ/kg, without engine-driven pumps, tolerance 5%
for liquid fuel; LCV = 31.5 MJ/Nm³ for gas fuel
Generator efficiency: 0.96, cos φ : 0.8
Note: 5% tolerance + 1% per pump



Genset centre distance: min. 3700mm

Removal of cylinder liner
in transverse direction: 6609 mm

Nozzle position: ask for availability.

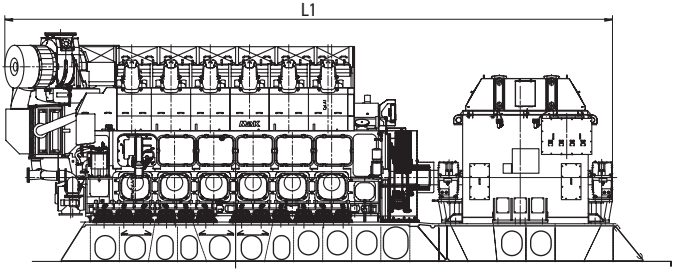
VM 46 DF

Generator Set

DIMENSIONS (mm) AND WEIGHTS (t)

Type	L1*)	H1	H2	W1	W2	Weight**)
12 M 46 DF	14855	3497	1088	3890	1684	160.0
16 M 46 DF	16940	3473	1088	4027	1670	220.0

*) Dependent on generator make/type
**) Engine weight only

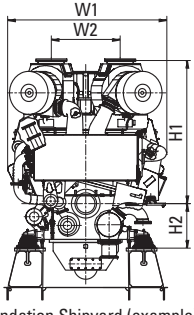


TECHNICAL DATA

Type	Engine rating	Output range		Frequency	Speed	Mean eff. pressure	Mean piston speed	Spec fuel consumption 100%85%	Total spec. energy consumption 100% 85%
	kW	kWe	kVA	Hz	rpm	bar	m/s	g/kWh	kJ/kWh
	10880	10357	12960	50/60	500/514	21.3/20.7	10.2/10.5	184/184	7272/7417
12 M 46 DF	11580*)	11105	13896	50	500	22.8	10.2	184/182	7350/7370
	11580*)	11105	13896	60	514	22.2	10.5	185/183	7350/7370
	14400	13810	17280	50/60	500/514	21.3/20.7	10.2/10.5	184/184	7272/7417
16 M 46 DF	15440*)	14807	18528	50	500	22.8	10.2	184/182	7350/7370
	15440*)	14807	18528	60	514	22.2	10.5	185/183	7350/7370

*) MDO only
Stroke: 610 mm
Bore: 460 mm

Specific lubricating oil consumption 0.6 g/kWh, ± 0.3 g/kWh
LCV = 42700 kJ/kg, without engine-driven pumps, tolerance 5% for liquid fuel; LCV = 31.5 MJ/Nm³ for gas fuel
Generator efficiency: 0.96, cos φ : 0.8
Note: 5% tolerance + 1% per pump



Foundation Shipyard (example)

Genset centre distance: min. 4500 mm

Removal of cylinder liner:
in transverse direction: 6720 mm

Please contact us for lead times.

Selective Catalytic Reduction (SCR) System

Already today governments benefit shipowners who invest in NO_x emissions reducing technologies. The Cat SCR System solution was designed by Caterpillar especially for MaK medium-speed engines to meet future IMO III emissions requirements. Installation and operation of the Cat SCR System is a sustainable solution to reduce NO_x emissions without sacrificing the typical MaK marine engine efficiency, durability and reliability that our customers are used to.

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 downtime beyond today's standards.

Cat SCR System key features and values:

- Complete marine certification society solution
- NO_X reduction solution consisting of SCR chamber, mixing tube, urea injection system and dosing cabinet
- Urea transfer pump skid optional available
- One-stop IMO Tier III solution
- IMO Tier III parent engine certification (scheme A), no certification in the vessel necessary
- Common control and monitoring of engine and SCR system for reliable and safe operation which enables market leading user friendliness
- United development of SCR system and engine calibration for optimized performance
- Application and installation support for every market segment and ship type
- Excellent serviceability due to strong Caterpillar dealer network
- Corresponding Maintenance Schedules of SCR system and engine for optimized operational availability

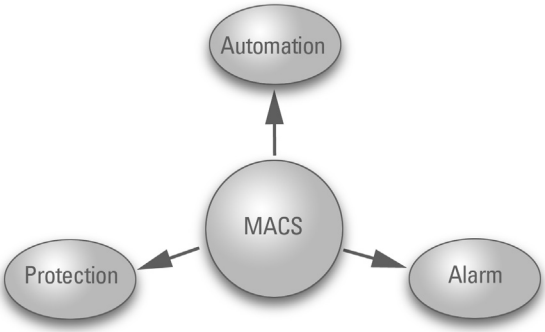
New Technology Platform for Onboard and Remote Engine Analysis and Condition Monitoring

Caterpillar is now offering a comprehensive technology solution to provide onboard and remote condition monitoring and analytics for MaK engines, as well as other critical systems on the vessel. Caterpillar Marine Asset Intelligence (MAI) gives onboard and shore users a better understanding of equipment health and performance and enables Caterpillar experts to provide advisory services. For detailed information, please contact Caterpillar MAI at +1 757 965 5963.

Modular Alarm and Control System (MACS)
MACS is Marine Classification Society (MCS) approved and available for MaK M 25 E, M 32 E, M 34 DF, M 46 DF and VM 46 DF.

The MACS consists of several base functions that are required for each engine type, such as start-stop control or protection system. In addition, modular-built function blocks are added as optional scope of supply or for the dual fuel engine, such as FCT, slow turn, GVU control, and leakage monitoring.

The system design remains identical, independent from the engine type equipped with the new MACS.



MACS Functions

MACS consists of the following software functions:

- Automation
  - Start/stop function
  - Diesel/gas mode control (only dual fuel engines)
  - Engine diesel automation
  - Engine gas automation (only dual fuel engines)
- Monitoring and alarm system
  - Includes Modbus TCP or Modbus RTU interface to the ship
- Protection system

MACS Components

Diesel Control Unit (DCU)

The engine's alarm system and the local display are consolidated in the DCU, located in the local control panel. The 5.7" display can display multiple instrument views as well as an alarm and event list. The user can switch on the fly between languages and units.

Various modules communicate directly with the DCU. By this it receives status and measurement values from all I/O modules, the engine control system (ECM) and the protection system (SDU). Furthermore the DCU provides all measurement values, status values and alarms on Modus RTU or Modbus TCP for the vessel's system and via Modbus TCP for the Cat remote monitoring system.

The alarm system determines critical engine conditions, activates alarms and, if necessary, shuts down the engine. The DCU has the ability of actuating the secondary safety stop valve and the gas shutoff signal. That means the DCU is able to stop the engine almost as reliably as the protection system (SDU). All alarms are stored in an alarm history and are shown in a manner requested by the marine class societies (MCS). The complete alarm management is handled by the DCU. All information is visualized via the screen in the LCP and additional remote panels (RP).

Shutdown Unit (SDU)

The SDU is the independent engine protection system and shuts down the engine in case of a major fault that may damage the engine. The SDU has its own sensors for all implemented shutdown functions and is connected to a separate safety stop valve. The local and remote manual emergency stops are connected hardwired to the SDU. All switch inputs causing an engine shutdown are monitored for wire break. All automatic shutdowns except the overspeed event can be overridden. Each shutdown event is displayed additionally via LEDs at the SDU itself as well as on the display in the local control panel or at the remote panel. Of course, each alarm is also transmitted to the ship's alarm system. In case of an SDU device fault the engine will continue to run and a device fault alarm will be raised at the alarm system.

PLC System

The PLC system contains the monitoring and automation system. It involves the start and stop functionality as well as the engine diesel and engine gas automation.

It consists of two parts whereas one part (TB part) is mounted in the terminal box on the engine and the other part (EC part) is located in the engine cabinet next to the engine. The TB part is the main controller collecting engine sensor signals and actuating valves on the engine. The EC part is mainly used as an additional I/O module and ties up all signals coming from and going to an external system as the ship's alarm system.

The PLC communicates via partly redundant busses with the ECM, temperature input modules (TC, RTD), the in-cylinder pressure module (ICPM; only on dual fuel engines), and the engine alarm system. Internally generated alarm signals are transmitted via bus to the DCU.

If the PLC system fails, the engine can still be started by means of the mechanical emergency start function. The engine must then be operated attended. External and internal starting interlocks are not processed in that emergency case.

Temperature Modules

Several temperature modules of the RTD type and TC type are necessary to connect all temperature sensors. This includes all temperatures except for conrod bearings. The modules transmit the measured values via bus to the engine alarm, engine automation, and engine control system. All devices are capable of transmitting diagnostic messages in case of faulty sensors.

(The following components are not part of the MACS , but belongs to engines with MACS.)

Engine Control System (ECM)

The engine control system consists of one or more ECMs. This system is controlling the fuel systems, air fuel ratio, engine speed, and FCT. For load sharing, droop mode is implemented. Isochronous load sharing is implemented in the ECM or an external control module. The ECM has its own set of sensors for all control relevant functions and can operate independently from start/stop system (PLCs), alarm system (DCU), or protection system (SDU). Measurement values for performance purposes are received via bus.

Oil Mist Detector (OMD)

The OMD monitors the oil mist concentration in the crankcase. It provides hardwired outputs for pre-alarm, shutdown, and device fault that are connected to the PLC system or protection system (SDU). A remote indication is possible via a separate serial interface or the engine alarm system provides data via Modbus (dependent on OMD type). The oil mist monitoring is obligatory for all engine types, except for M 20 and M 25 C engine series.

Conrod Temperature Module (CTM)

The big end bearing temperature device reads the temperature for all conrod bearings and transmits the measurement values and diagnostics to the alarm system (DCU). In addition it provides hardwired outputs for pre-alarm and shutdown. For most engines big end bearing monitoring is optional.

In-Cylinder Pressure Module (ICPM)

On dual fuel engines each cylinder is equipped with a cylinder pressure sensor. Those sensors are connected directly to the ICPM. The ICPM computes combustion characteristics for each cylinder including knock intensity per cylinder. The results are transmitted once per combustion cycle via CAN interface to the engine control system and MACS.

Gas Valve Unit (GVU)

The GVU is completely monitored and controlled by the Cat system. Monitoring and automation functions are included in the MACS system; fuel gas pressure is controlled directly by the engine control system.

Remote Panel (RP)

Remote panels can be used to provide visualization of engine status and measurement values remote from the engine where needed, such as the engine control room or bridge. A remote panel uses the same configuration as each DCU and a healthy DCU is necessary to display engines data. Several remote panels can be installed on a vessel and one remote panel can show data of eight engines. The 8.4" touch-screen display can be set for automatic or night mode and can show one, two, or four engines at a time.

Remote Monitoring

Remote indications and optional displays receiving measurement values from all engines provided by Modbus TCP.

Large Engine Safety System (LESS)

For engines without MACS, LESS is a compact engine control, monitoring, and protection system. Included functions are control of the engine (start, stop), monitoring of the actual status of sensors, and the protection system (i.e., emergency stops, interlocks).

Engine control boxes include:

- Protection System
- rpm switch control
- LED panel
- Graphic display
- Engine monitoring
- Modbus output to alarm system (Modbus RTU protocol RS 485/422)
- Exhaust gas mean value system (option)

System designed for:

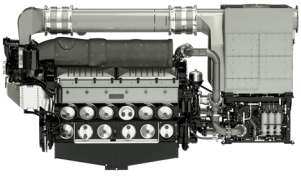
- Automatic shutdown
- Manual stop inputs
- Configurable inputs (shutdown, reduction, start interlock)
- Override
- Remote reset
- All inputs are wire break and short circuit monitored
- Free adjustable speed contact
- Fuel setting signals
- Overload contact
- rpm signal

Advantages:

- Complete equipped/tested engine
- Less installation space, no separate components, installation-friendly engine
- Less wiring
- Less commissioning time
- Data transfer via Modbus RTU protocol to alarm system

LESS is available for MaK M 20 C, M 25 C, M 32 C, VM 32 C, M 43 C and VM 43 C.

EMD Medium-Speed and Dual Fuel Solutions



EMD E 23 (710 Series) Marine Propulsion and Generator Set Engines

Electro-Motive Diesel (EMD) has been in the marine propulsion business since 1935. EMD brings a two-cycle medium-speed engine to the Caterpillar Marine family, with over 78,000 engines in operation around the world.

Built on the successful 710 Series, the current EMD product line consists of a medium-speed two-cycle diesel and dual fuel engine models ranging in power from 1,490 to 4,100 kW. The EMD E 23 offers the following features:

- Predictive maintenance – actual inspection of power assemblies
- Simplicity by design – no special tooling required to maintain
- Industry best transient response – idle to full rated power in approximately 10 seconds in fixed pitch propeller applications
- Low life cycle cost

EMD Technology
Electronic Unit injection (EUI) is a simple, cost-effective fuel management system. Metering and timing of the fuel are controlled by an Electronic Control Module (ECM) based on the inputs received from the engine control system. EUI is a proven technology that is simple to maintain and has been in service for over 25 years.

Charge Air System – The E 23 turbocharger system is an industry-leading charge and scavenging air management system. Powered by a hybrid gear train/exhaust gas drive system, it provides high pressure charge air at all operating points, allowing for quick transient response.

Accessory Rack – The E 23 has an optional integrated accessory rack that includes lube oil filtration, lube oil cooling, fuel filters, cooling system expansion tank, and a fuel priming pump.

For custom vessel installations these components are available as a ship loose option.

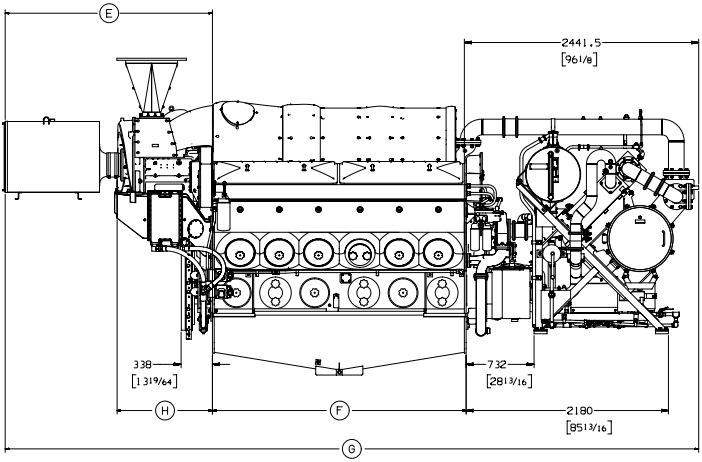
E 23

DIMENSIONS (m) AND WEIGHTS (kg)

Type	A	B	C	D	E	F	G	H	Engine Weight	Acc. Rack Weight
8 E 23	3.246	2.573	0.479	2.790	2.134	1.864	6.202	0.929	13,018	1,723
12 E 23	3.410	2.764	0.632	2.948	2.240	2.734	7.178	1.050	17,690	1,723
16 E 23	3.410	2.764	0.632	2.948	2.240	3.715	8.171	1.050	20,865	1,723
20 E 23	3.642	2.966	0.835	3.150	2.240	4.559	9.015	1.050	23,949	1,769

DIMENSIONS (in) AND WEIGHTS (lb)

Type	A	B	C	D	E	F	G	H	Engine Weight	Acc. Rack Weight
8 E 23	127.8	101.3	18.9	109.9	84.0	73.4	244.2	36.66	28,700	3,799
12 E 23	134.3	108.8	24.9	116.1	88.2	107.6	282.6	41.3	39,000	3,799
16 E 23	134.3	108.8	24.9	116.1	88.2	146.3	321.7	41.3	45,999	3,799
20 E 23	143.4	116.8	32.9	124.0	88.2	179.5	354.9	41.3	52,799	3,900



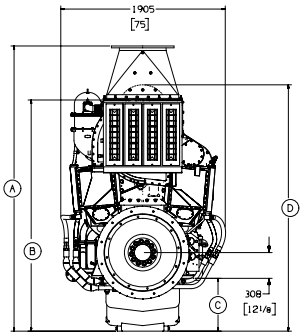
(shown with accessory rack)

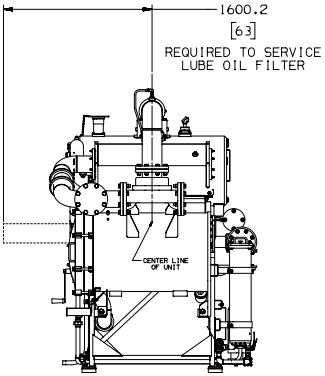
TECHNICAL DATA

Model	Cylinders	Rating	bkW	bhp	rpm	g/bkW-hr	U.S. g/h	EPA	IMO
8 E 23	8	CS	1491	2000	900	201	93	T3	II
12 E 23	12	CS	2237	3000	900	198	138	T3	II
16 E 23	16	CS	2983	4000	900	196	182	T3	II
20 E 23	20	CS	3729	5000	900	209	236	T3	II
8 E 23	8	MC	1641	2200	900	200	103	T3	II
12 E 23	12	MC	2461	3300	900	197	152	T3	II
16 E 23	16	MC	3281	4400	900	195	201	T3	II
20 E 23	20	MC	4101	5500	900	210	261	T3	II

Note: EMD E 23 engines were formerly EMD 710 Series.

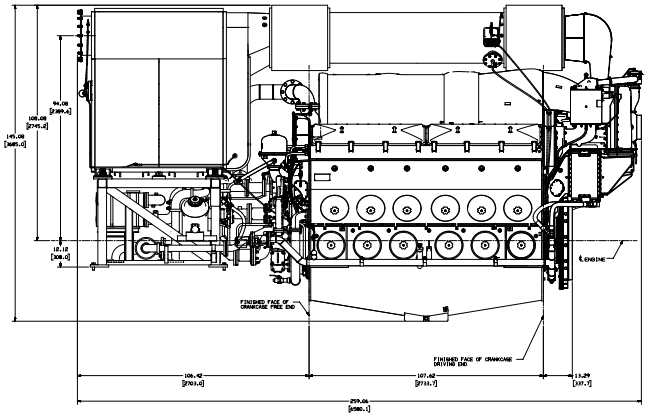
750 rpm (50 Hz) and dual fuel options are available. Contact local dealer for detail.





(shown with accessory rack)

E 23 B



12 cylinder E 23 B Consult your dealer for details on other model availability.

TECHNICAL DATA

Model	Cylinders	Rating	bkW	bhp	rpm	EPA	IMO	EU
8 E 23 B*	8	CS	1491	2000	900	T4F	II	NC
12 E 23 B	12	CS	2237	3000	900	T4F	II	NC
16 E 23 B*	16	CS	2983	4000	900	T4F	II	NC
20 E 23 B*	20	CS	3729	5000	900	T4F	II	NC
8 E 23 B*	8	MC	1641	2200	900	T4F	II	NC
12 E 23 B	12	MC	2461	3300	900	T4F	II	NC
16 E 23 B*	16	MC	3281	4400	900	T4F	II	NC
20 E 23 B*	20	MC	4101	5500	900	T4F	II	NC

Note: *Contact your local dealer for details.

E 23 B Enhancements:

- US EPA Tier 4 Final / IMO III
- EMD/Cat SCR System
- Closed Crankcase
- High pressure lube oil system
- Mechanical oil filtration with centrifuge
- Next generation Accessory rack

EMD SCR System • Emissions and Legislation

The upcoming global and local regulations covering exhaust gas emissions for medium-speed marine diesel engines will become more stringent. While fulfilling IMO Tier II exhaust gas emissions is possible with internal engine solutions, IMO Tier III compliance will be achieved with exhaust gas after treatment solutions.

Regional initiatives from environmentally friendly governments are already in effect with incentives benefitting ship owners who invest in NOx emissions reduction technology.

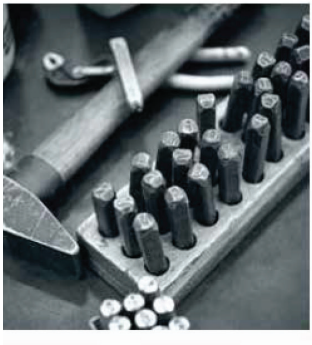
EMD chose to take part in this environmentally friendly strategy. Thus, EMD and Caterpillar designed the EMD SCR System for our two-cycle medium-speed engines.

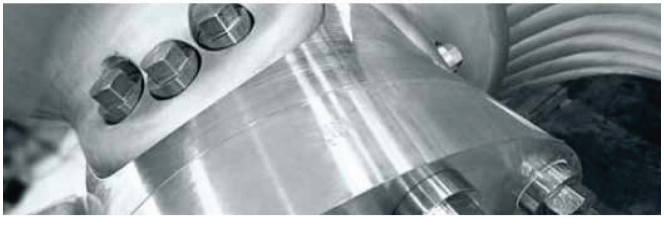
Propulsion Systems

Performance You Can Rely On

Caterpillar Propulsion supplies complete, world-leading propulsion systems. Custom-designed and optimized for uptime and cost effective operations, our top-of-the-line controllable pitch propellers, thrusters, gearboxes, control systems, and hubs are all manufactured at our state-of-the-art production facilities in Sweden and Singapore.

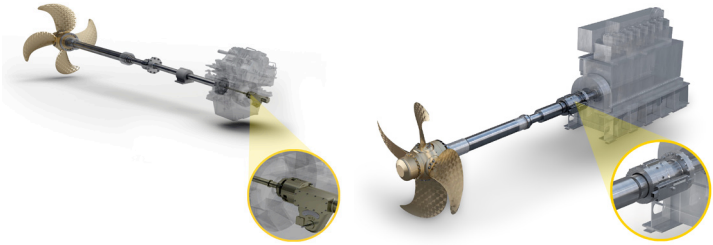
Our expertise in hydrodynamics give you the dependable, heavy-duty performance you expect.





Main Propellers

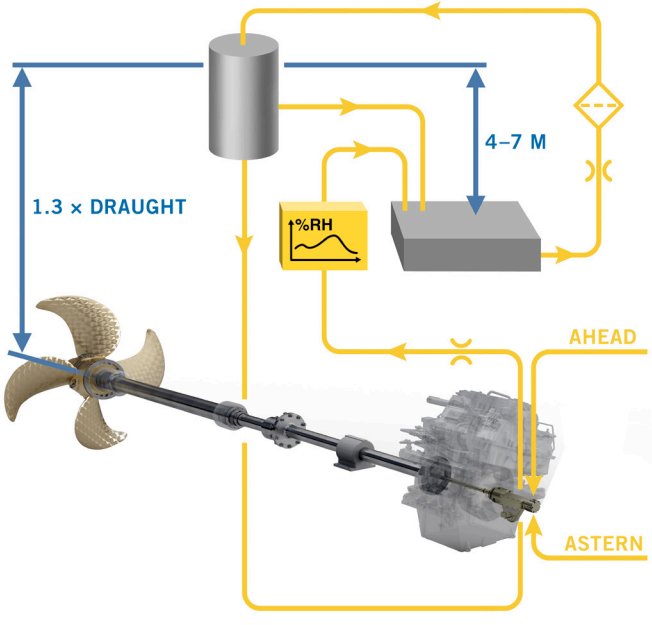
The Cat Propulsion controllable pitch propellers (MPP) are designed for heavy-duty applications with a hydraulic servo cylinder in the hub that sets the desired pitch of the propeller blades.



Our patented *feathering solution* improves the operating flexibility and efficiency of vessels with twin propeller installations. When feathered, the blades are set parallel to the flow in a position that minimizes drag. With one engine and propeller shaft off-line, the small reduction in vessel power is outweighed by a substantial increase in propulsion efficiency and fuel savings.

Ahead Feathered Astern

The propeller hub is lubricated by a unique oil circulating system with *integrated moisture monitoring.*



The CP hub with the oil distribution box at the forward end of the gear box (HDX), intended for propeller installations where a hollow bored gearbox shaft is applicable.

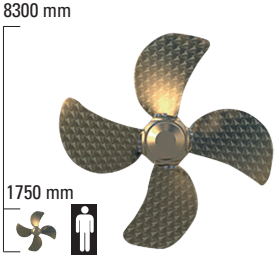
The CP hub with an oil distribution box on an intermediate shaft (BCX), intended for direct drive or systems with long intermediate shaft lines.

With a Cat Controllable Pitch Propeller system, it's all about your uptime. Outstanding reliability and monitoring ensure your safe operation.

MPP REFERENCE CHART

VESSEL SEGMENT	ENGINE KW	PROPELLER HUB
DREDGE	1350-4000	620-1140
CARGO	750-15200	550-2000
FERRY	750-4000	490-950
FISHING	550-4000	550-1040
OFFSHORE	700-9700	490-1500
TUG/SALV	1340-9850	620-1320

MPP	
HUB	**RANGE kW**
490	550-1050
550	550-2550
620	950-2550
690	950-3000
760	1150-4000
850	1150-5500
950	1600-7000
1040	2200-9000
1140	2400-10000
1230	3300-11000
1320	3300-12000
1410	7500-15000
1500	7500-18000
2000	15000-20000



There are no guarantees in life—especially out on the open seas. But your Cat Controllable Pitch Propeller systems will give you peace of mind. As well as maximum reliability and continuous propeller hub condition monitoring, with minimum downtime, maintenance and space requirements.

CP HUB FEATURES	ADVANTAGES
Stiffness of the hub body.	Maximum reliability.
Largest possible bearing surface for the propeller blades.	Minimum downtime.
Optimal propeller blade sealing system.	Minimum maintenance.
Continuous circulation and moisture content monitoring of the hub lubrication oil.	Hub oil condition monitoring.
	Logging of the moisture content, which makes it possible to foresee the need for, and plan, the overhaul of the hub.
	Order-unique blade design guarantees highest possible efficiency with low levels of noise and vibration.

The Azimuth thruster (MTA):

The Azimuth thruster (MTA) is designed to provide unparalleled flexibility and is custom-built for long-term performance. This system is steerable and has a custom-made controllable or fixed-pitch propeller.

Z-drive

Hydraulic steering

Electric steering

L-drive

Electric steering

The thruster unit is available in an L-drive configuration with electric steering or a Z-drive configuration with hydraulic or electric steering.

MTA – Marine Thruster Azimuth L-Drive Series

MODEL	MAX Propeller Diameter Ducted (mm)	MAX Continuous Input Power (KW)	Input Shaft Speed (RPM)	Max Thrust (TON)
MTA1	1400	605	1200-1800	11
MTA2	1600	770	1000-1800	14
MTA3	1800	1000	900-1200	17
MTA4	2000	1320	750-1000	22
MTA5	2400	1710	600-900	30

Given values are maximum. Propeller diameter can be reduced.

All values are indicative. For real data, refer to the sales configurator.
Thrust is stated per thruster. No thrust deduction is considered.

MTA – Marine Thruster Azimuth Z-Drive Series

MODEL	MAX Propeller Diameter Ducted (mm)	MAX Continuous Input Power (KW)	Input Shaft Speed (RPM)	Max Thrust (TON)
MTA3	1800	1000	900-2000	17
MTA4	2000	1320	900-2000	22
MTA5	2400	1710	700-2000	30
MTA6	2700	2200	700-1800	38
MTA7	3000	2827	600-1800	49
MTA8	3400	3740	600-1800	63

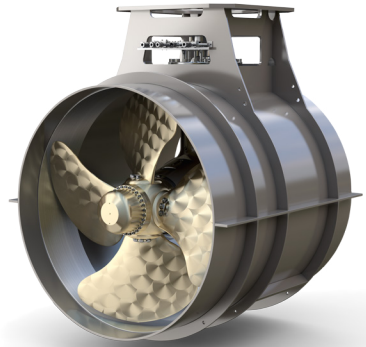
Given values are maximum. Propeller diameter can be reduced.

All values are indicative. For real data, refer to the sales configurator.
Thrust is stated per thruster. No thrust deduction is considered.

AZIMUTH THRUSTER FEATURE	ADVANTAGES
Modular design – most components are used in other Cat models. This means that you get a proven and reliable design.	A high level of redundancy and condition monitoring will ensure long and reliable operation of the propulsion equipment.
Custom-designed blades guarantee the highest possible efficiency with low levels of noise and vibration to suit each individual application. The propeller diameter can be from 1.1 to 3.4 metres.	Good serviceability owing to intelligent design.
Conservatively designed heavy-duty gears & bearings with extra heavy-duty material give robust margins that meet all major classification standards.	Environment friendly by means of improved efficiency.
Can be driven by an electric motor or a diesel engine from 3400 KW to 3740 kW..	Modular design – proven technical solutions from our Tunnel Thrusters are applied to the Azimuth Thruster as well. This paves the way for smooth operation of the ship.
A highly reliable control system with more redundancy than most of our competitors. In principle, all functions are doubled. It has a modern graphical user interface that facilitates the operation of the ship.	
Built to the demands of the major classification standards.	
Smart features simplifies installation and give minimized maintenance and a high level of serviceability.	
MTA with EAL oil as lubricant as an option.	
Continuous circulation and moisture content monitoring of thruster oil.	

The transverse thruster (MTT):

The transverse thruster (MTT) is available with a controllable pitch propeller or a fixed-pitch propeller for maximum uptime.

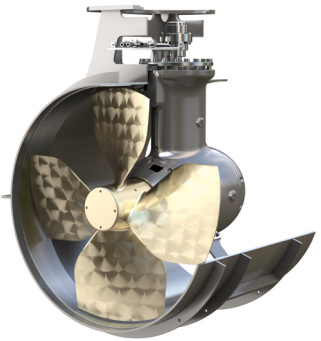


The controllable pitch propeller is normally used for constant shaft speeds and the fixed pitch propeller is used for variable and reversing shaft speeds. The MTT is available in two configurations, a heavy-duty MTT suitable for DP-applications and an auxiliary MTT suitable for harbor maneuvering.

	MTT 111	MTT 113	MTT 114	MTT 216	MTT 318	MTT 419	MTT 522	MTT 625	MTT 728	MTT 832
Power (KW)	380	500	672	840	960	1320	1800	2100	2500	3600
Diameter (mm)	1100	1300	1450	1650	1850	1950	2250	2550	2850	3200
Thrust (ton)	5	7	9	11	14	17	23	28	34	47

Given values are maximum. For fixed-pitch propeller, maximum power will be lower.

All values are indicative. For real data, refer to the sales configurator. Thrust is stated per thruster.

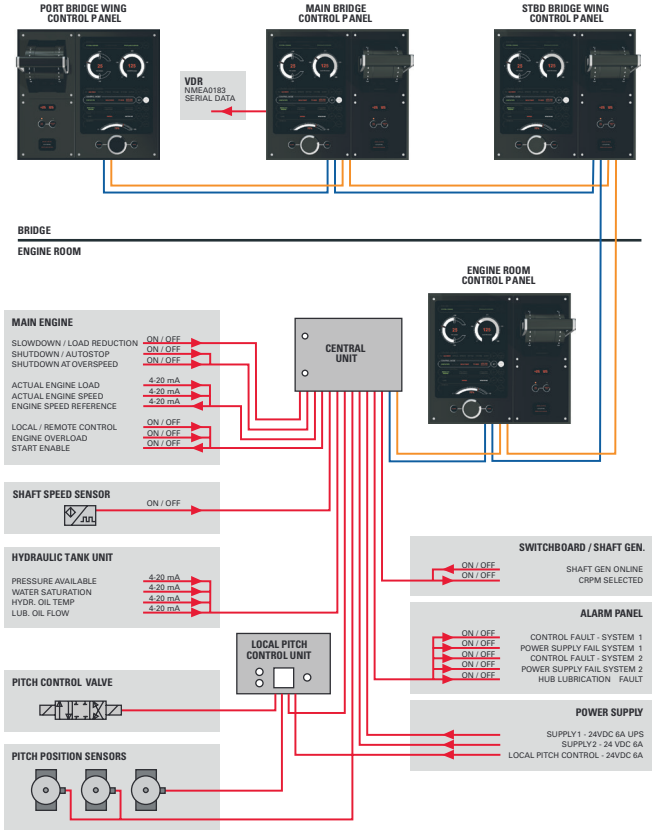
TRANSVERSE THRUSTER FEATURES	ADVANTAGES
Modular design with modern transmission layout.	Maximum reliability.
Custom-designed blades for fixed-pitched propeller to suit each individual application.	Minimum downtime.
Heavy-duty gears and bearings designed for continuous DP operation.	Good serviceability.
The complete thruster can be mounted & dismounted in the tunnel (swing-in/swing out design).	Modular design with bolted mounting.
Can be driven by electric motor or diesel engine.	
Highly reliable electronic remote control system with interface to joystick and DP systems.	
Continuous circulation and moisture content monitoring of thruster oil.	
Built to the demands of the major classification standards.	
MTT with EAL oil as lubricant as an option.	

Remote Control System

The MPC 800 Remote Control System enables the crew to control and oversee the controllable pitch propellers and thrusters for all types of vessels. Using the latest microprocessor technology, all information is clearly displayed on all control stations. The control panels have daylight readable graphical displays, which can be easily configured to control or interface with a wide range of supplementary systems, including clutches, PTH systems, shaft brakes, joysticks, DP systems, VDR and conning systems. A number of service modes can also be configured, including different combinator curves and constant speed modes.

ADVANTAGES
Real field bus technology means reduced wiring.
The electronic and bus system is duplicated for maximum redundancy.
Daylight readable graphical displays on all panels.
Easy to use jog wheel for user input.
Settings and service data easily accessed at all panels. Faults diagnosis and self-monitoring in plain text. Load control and different service modes provided as standard. Type approved equipment in full compliance with classification demands.

Typical system layout



Continuing Customer Support

Your business demands more than just quality products. That's why the global Cat dealer network is with you for the long haul. Our market-leading experience and customer service includes everything you need to get exactly what you want from your vessel.

We study your particular case and we can offer you a "tailor made" propulsion package. Everything You Need!

- Gearbox
- Electrical motors and drivers
- Frequency converters
- Hydraulic motors
- Shaft alternator

[…]

With a world-leading reputation for service and reliability, your Cat dealer will provide:

- Detailed product specifications
- Expert system sizing services and dealer consultation
- Flexible configurations
- Clear communication throughout the entire process
- Support through the lifetime of the vessel

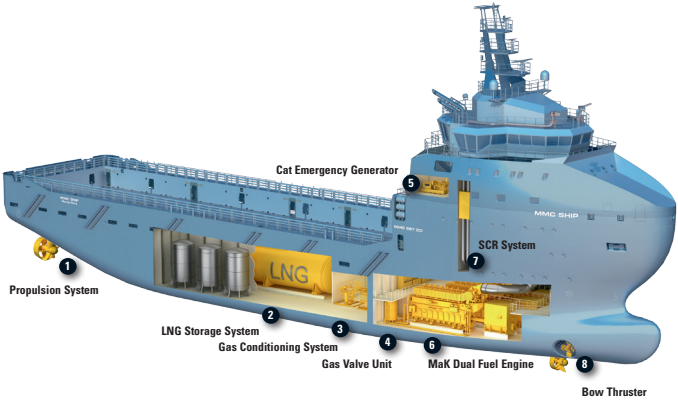
System Solutions

LNG Propulsion and Fuel Gas Systems

We've Chartered the Course for a Cleaner Now.

Current environmental restrictions are forcing the marine industry to explore more environmentally friendly energy conversion systems. Cruise lines and commercial operators see LNG as the smart new option, complying with all existing and upcoming regulations on emission of SO_X, NO_X, particulate matter and CO_2.

Meanwhile, suppliers have been providing sound logistic chains to ensure the availability of LNG worldwide, and ship designs are supporting this alternative. An industry leader in the development of dual-fuel technology, Caterpillar now coops with renowned LNG and cryogenic specialists and has already developed a clear lead in the production of purpose-designed LNG propulsion and fuel gas systems for a generation of new vessels.



Complete Solutions from a Single Source.

We specialize in all aspects of LNG fuel and propulsion. Our global dealer network and industry leading after sales service enable us to offer complete, single source solutions – from shore-side bunkering to on-board storage; from bunker tanks to LNG fuel gas and automation systems; and, ultimately, from main engines and propellers to SCR aftertreatment.

Whether you are planning an upgrade or a newbuild, we have your solution.

Cat® Connect

Vessel Monitoring and Analytics
Turn onboard data into actionable information. Take the guesswork out of equipment management. Maximize efficiency, increase productivity, and decrease operating costs by providing information to the right people, at the right time, to improve your bottom line.

Increase uptime and reduce operating costs
- Know the location, health and efficiency of your vessels
- Detect problems before they happen using data and inspections
- Receive expert recommendations
- Reduce costs through preventive maintenance, fleet optimizations, and equipment lifecycle management

Enhance awareness to keep people and equipment safe
- Precisely track equipment locations and avoidance zones
- Reduce the risk of injuries
- Apply remote controls in harsh or challenging environments
- Promote a positive safety culture

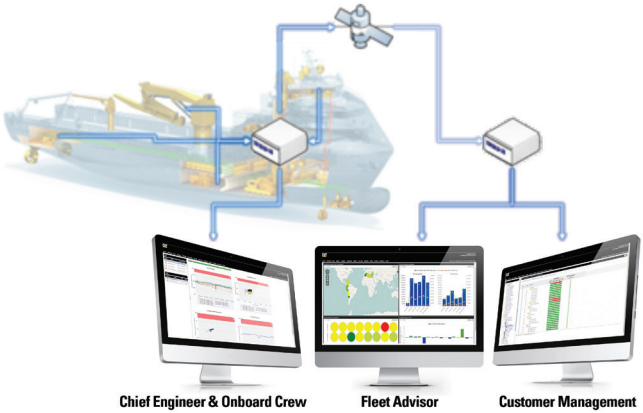
Monitor productivity and manage vessel efficiency
- Receive accurate information on daily operations
- Boost production with increased efficiency
- Use production data to enhance performance
- Identify ownership options for various user needs

Reduce environmental impact and simplify compliance
- Make compliance reporting easier with better emissions monitoring
- Reduce emissions by burning less fuel; fuel selections.
- Optimize owning and operating costs
- Lower cost of regulatory reporting

Cat Asset Intelligence

Increase uptime and efficiency
Asset Intelligence gives you advanced predictive analytics and expert advisory services across your vessel – or across your entire fleet. The entire solution is tailored to your specific needs: which equipment is included, types of expert services, metrics, reports, and dashboards.

- Automated analytics identify potential issues before failure
- Fleet Advisors provide recommendations for maintenance and operations improvements
- Analyze and track equipment condition to optimize maintenance and repair scheduling
- Optimize energy use by improving maintenance and operations
- Ensure safety and regulatory compliance



For more information on these solutions and services, visit www.cat.com/assetintel or email us at ConnectMAI@cat.com

Product Link™

Remotely monitor and manage your assets in the field
Product Link enables users to determine the location, operation and condition of all Cat Products. Product Link benefits include:

- Utilization and productivity information
- Real-time alerts, engine hours, equipment location, fuel information
- Advanced data collection and summarization capabilities
- Totals, trends and histograms
- Low communication costs

gplink

gplink is a satellite/cellular-based tracking, monitoring, and notification system that protects Cat powered vessels by monitoring engine operating parameters, engine diagnostic codes, and on-board critical systems such as bilge levels, fire alarms, low batteries, and power interruption.

gplink provides immediate notification via e-mail, SMS and/or phone of any critical alarm or event. Trained Caterpillar technical experts can remotely access fault codes, and operating conditions, review a vessel's alarm status, troubleshoot engine conditions, and could defer a visit to the vessel. The vessel owner can also view the status of the engines remotely on a phone, tablet, or computer.

Customer Support Solutions

Worldwide Dealer Network

The global dealer network of Caterpillar – the strongest in the world – ensures customer access to a whole support team, from people at the local branch to those at the corporate level. Service locations offer dealer personnel who know and understand their local market, their customers, and their customers' businesses.

Cat dealer field service capability is second to none. With the fastest response time available, and qualified, experienced field service technicians with the expertise and equipment to quickly diagnose and fix problems, customer uptime is maximized. Our technicians know Cat and MaK products and solutions, and deliver the same world-class support to customers – wherever and whenever they need it.

Need to find your local dealer? Please visit:
http://www.cat.com/en_US/support/dealer-locator.html

Caterpillar offers a variety of customer support solutions to protect your investment in Cat equipment, minimize owning/operating costs, and maximize uptime.

The primary options are Customer Service Agreements and Extended Service Coverage.

Customer Service Agreement

Customer Service Agreement
One of the best investments you can make for your new or used Cat or MaK marine engines is a Customer Service Agreement (CSA), a highly cost-effective way of reducing expense, disruption, and loss of revenue caused by engine downtime.

Because each of our customers is unique, we offer three flexible CSA options — Inspection, Preventive Maintenance, and Total Maintenance & Repair — that can be customized to your needs. CSAs ensure that maintenance and repairs are completed by highly skilled technicians, allowing you more time to tend to your business. Caterpillar tests have proven that, with CSAs, engine-operating time is significantly increased — your engines run longer, productivity rises, and potential revenue increases.

Extended Service Coverage

From design and engineering to performance and support, Cat is the most reliable name in power. Extended Service Coverage (ESC) from Caterpillar increases this reliability as far out as you want to go — with complete confidence. We offer total coverage for new, used, and overhauled engines, and, because it is transferable, ESC may increase the resale value of your Cat powered vessel.

ESC protects against unexpected repair bills and rising parts/labor costs by providing 100 percent parts and labor reimbursement for covered components (less any applicable deductible), and our global service network ensures prompt, quality repairs by trained technicians. The broad range of coverage options — which can be customized to suit your individual needs — combined with simple pricing, provides confidence and peace of mind towards your engine's performance, today and tomorrow.

There are multiple options for both ESC coverage and CSAs.
For more information, contact your local dealer or visit us at **cat.com/marine**

Financing

Caterpillar Marine's power solutions provide the ruggedness and reliability to keep you and your vessel safely on course, and Cat Financial has the same commitment to your success. Whether you need construction, term, or repower financing, we have flexible terms and schedules that help you manage your cash, making Cat and MaK ownership easy and affordable, so you can get to work as soon as possible.

Our expertise extends to all marine sectors — from production and custom yachts to workboats and tankers, we have you covered. While we provide one customer experience worldwide, you'll benefit from our deep knowledge of the local markets. And, as it has been since 1986, our service commitment is powered by Caterpillar and Cat dealers everywhere, and our success is powered by strong customer relationships.

Get your project moving anywhere in the world with Cat Financial. Visit Cat Financial online at Cat Financial.com or contact your local dealer.

CAT® Financial

Glossary

Caterpillar Marine

HEADQUARTERS
Caterpillar Marine
Neumühlen 9
22763 Hamburg/Germany

EUROPE, AFRICA, MIDDLE EAST
Caterpillar Marine
Neumühlen 9
22763 Hamburg/Germany

Caterpillar Marine
Falckensteiner Str. 2,
24159 Kiel/Germany

Caterpillar Marine
22 Cobham Road
Wimborne
Dorset
BH21 7 PW
United Kingdom

AMERICAS
Caterpillar Marine
3450 Executive Way
Miramar Park of Commerce
Miramar, FL 33025/USA

Marine Center of Excellence
560 Rehoboth Road
Griffin, GA 30224/USA

Caterpillar Marine
3701 South Street
Lafayette, IN 47905/USA

Caterpillar Marine
100 NE Adams St.
AC6131
Peoria, IL 61629/USA

Caterpillar Marine
2270 7th Street
2nd Floor Unit 2A
Mandeville, LA 70471/USA

EMD Power Products
9301 West 55th Street
LaGrange, IL 60525

ASIA-PACIFIC
Caterpillar Marine Trading (Shanghai) Co., Ltd.
25/F, Caterpillar Marine Center
1319, Yan'an West Road
200050 Shanghai/P.R. China

Caterpillar Marine Asia Pacific Pte Ltd
No. 5 Tukang Innovation Grove
Singapore 618304
Republic of Singapore

Caterpillar Propulsion

NAMIBIA
Caterpillar Propulsion Africa
Product Support
Service
2nd Street East & John Newman
Walvis Bay, Namibia, Africa

BRAZIL
Caterpillar Propulsion Brazil
Sales, Service
Rua do Mercado, 17 - Sbj 201 - Centro
20010-120
Rio de Janeiro, RJ, Brazil

CHINA
Caterpillar Propulsion Guangzhou
Sales, Service
RM 4306, Building B, China Shine Plaza
No. 9 Lin He Xi Road, Tian He District
510610 Guangzhou, China

Caterpillar Propulsion (Shanghai)
Product Support, Sales
6F, Lei Shing International Plaza, No. 1319
West Yan'an Road
200050 Shanghai, China

ITALY
Caterpillar Propulsion Italy S.R.L
Sales
Torre WTC – 19 Piano, Via de Marini 1
16149 Genova, Italy

KOREA
Caterpillar Propulsion Korea
Sales
2505 Centrum APEC-ro, LeadersMark 17
Haeundae-gu, Busan, Korea

SINGAPORE
Caterpillar Propulsion Singapore
Sales, Service
85 Tuas South Avenue 1
637419 Singapore, Singapore

Caterpillar Propulsion Production Singapore
Production & Purchasing
85 Tuas South Avenue 1
637419 Singapore, Singapore

SPAIN
Caterpillar Propulsion Spain
Sales
Avda de Zumalakarregui 1, Entr A
20008 San Sebastian, Spain

SWEDEN
Caterpillar Propulsion Sweden
Press & Media, Product Support,
Sales, Service
Tärnvägen 15
475 40 Gothenburg, Sweden

Caterpillar Propulsion Production Sweden
Production & Purchasing
Langesand 1, Box 1005
475 22 Gothenburg, Sweden

TURKEY
Caterpillar Propulsion Turkey
Sales, Service
Fatih Sultan Mehmet Cad. Yayabey
Sokak No. 12 Kat 2
34810 Kavacik-Istanbul, Turkey

UNITED ARAB EMIRATES
Caterpillar Propulsion Middle East
Sales, Service
Dubai Airport Free Zone. East wing 6E-A.
P.O. Box 54517
Dubai 118
United Arab Emirates

UNITED STATES
Caterpillar Propulsion U.S.
Sales
2270 7th Street
Mandeville, Louisiana 70471
United States

Cat Marine Rating Definition Propulsion Engines

Rating definitions provide guidelines to help determine the appropriate rating for specific applications based on vessel operation. Cat marine propulsion engine rating applications for C9 through C175-16 are based on load factor, time at full throttle, and operational hours per year.

Contact your local Cat dealer for assistance in determining the appropriate rating for your specific application.

A Rating (Unrestricted Continuous)

Typical applications: For vessels operating at rated load and rated speed up to 100% of the time without interruption or load cycling (80% to 100% load factor). Typical operation ranges from 5000 to 8000 hours per year.

For C280-6, C280-8, C280-12, and C280-16 Engines Only:

- **Continuous Service (CS) Rating** is suitable for continuous duty applications, including dredges, for operation without interruption or load cycling.

B Rating (Heavy Duty)

Typical applications: For vessels operating at rated load and rated speed up to 80% of the time with some load cycling (40% to 80% load factor). Typical operation ranges from 3000 to 5000 hours per year.

C Rating (Maximum Continuous)

Typical applications: For vessels operating at rated load and rated speed up to 50% of the time with cyclical load and speed (20% to 80% load factor). Typical operation ranges from 2000 to 4000 hours per year.

For C280-6, C280-8, C280-12, C280-16, and E 23 Engines Only:

- **Maximum Continuous (MC) Rating** is generally used for vessel applications involving varying loads. The engine power actually produced is limited by application guidelines, leaving a power reserve for unusual operating conditions. Operating time at loads above the Continuous Service Rating for a given rpm is limited to one hour in 12 or 8.3% of total operating hours.
- **FCVR – Fast Commercial Vessel Rating:** 85% of operating hours at rated speed, 15% of hours at less than 50% rated power. TBO approximately 20,000-25,000 hours. The propulsion system design should consider heavy ship condition, sea state, hull fouling and propulsion system power losses for proper match between engine and prop/jet.

D Rating (Intermittent Duty)

Typical applications: For vessels operating at rated load and rated speed up to 16% of the time (up to 50% load factor). Typical operation ranges from 1000 to 3000 hours per year.

E Rating (High Performance)

Typical applications: For vessels operating at rated load and rated speed up to 8% of the time (up to 30% load factor). Typical operation ranges from 250 to 1000 hours per year.

DEP Ratings (Diesel Electric Propulsion, Electric Drive)

Typical applications: For all vessels operating with generator sets that provide power to the propulsion systems. All ratings are Prime Ratings according to ISO 8528-1 for unlimited usage per year at a load factor of $\leq$ 70%. 10% overload capability is required for a maximum of 1 hour out of every 12 and a maximum of 25 hours total per year. **Typical applications could include but are not limited to supply vessels, cruise vessels, research vessels, or any other ship using diesel electric drive systems.**

Rating Conditions for C175 and Smaller Engines

Ratings are based on SAE J1228 standard conditions of 29.61 in Hg (100 kPa) and 77°F (25°C). These ratings also apply at ISO3046-1:2002E, ISO8665, DIN6271-3, and BS5514 conditions of 29.61 in Hg (100 kPa), 81°F (27°C), and 60% relative humidity.

Caterpillar maintains ISO9001:2000 certified quality management systems for engine test facilities to assure accurate calibration of test equipment. Electronically controlled engines are set at the factory at the advertised power corrected to standard ambient conditions. The published fuel consumption rates are in accordance with ISO3046-1:2002E.

Fuel consumption is based on SAEJ1995 with +/- 3% tolerance at rated power for fuel having an LHV of 18,390 Btu/lb (42 780 kJ/kg) when used at 84.2°F (29°C) and weighing 7.001 lbs/U.S. gal (838.9 g/liter). Additional ratings may be available for specific customer requirements. Consult your Cat representative for details.

Rating Conditions for C280 Engines

Ratings are based on SAE J1349 standard conditions of 29.61 in Hg (100 kPa) and 77°F (25°C). These ratings also apply at ISO3046-1:2002E, ISO8665, DIN6271-3, and BS5514 standard reference conditions. Ratings also meet classification society maximum temperature requirements of 113°F (45°C) temperature to turbo and 90°F (32°C) seawater temperature without derate.

Fuel consumption is based on ISO3046/1 with +5% tolerance at rated power for fuel having an LHV of 18,390 Btu/lb (42 780 kJ/kg) and weighing 7.001 lbs/U.S. gal (838.9 g/liter). Includes engine mounted fresh water and lube oil pumps. BSFC without pumps, 2% less.

Additional ratings may be available for specific customer requirements. Consult your Cat representative for details.

Performance Data

Performance along a typical fixed pitch propeller curve with a 3.0 exponent.

Power rated in accordance with NMMA procedure as crankshaft power. For units equipped with Caterpillar supplied marine gears, reduce crankshaft power by 3% for propeller shaft power.

Cat Marine Rating Definition Generator Sets and Auxiliary Engines

Caterpillar has offered packaged power systems for over 70 years. We assure power and performance ratings, as advertised, through extensive factory testing.

Cat Generator Sets typically exceed NEMA and IEEE standards for load acceptance. All rotor designs have been type tested at 150% overspeed for two hours at 338°F (170°C) ambient temperature.

Rating Definition

All Caterpillar Marine Auxiliary engines and generator sets are rated for prime power for continuous electric service according to ISO 8528-1.

Hours per Year	Unlimited
Load Factor	≤ 70%
Overload Capacity	+ 10% maximum of 1 hour in 12 maximum of 25 hours per year

Rating Conditions

Ratings are based on SAE J3046 and J1349 standard conditions of 29.61 in. Hg (100 kPa) and 77°F (25°C). These ratings also apply at ISO8665, ISO3046-1:2002E, DIN6271-3, and BS5514 standard conditions of 29.61 in. Hg (100 kPa), 81°F (27°C), and 60% relative humidity.

Fuel rates are based on fuel oil of 35° API [60°F (16°C)] gravity having an LHV of 18,390 Btu/lb (42 780 kJ/kg) when used at 85°F (29°C) and weighing 7.001 lbs/U.S. gal. (838.9 g/liter).

Marine Auxiliary Engines are mainly used as generator set engines; however, they can be used for electrically driven pumps, winches, conveyors, thrusters, when it is specified. Engines can be radiator cooled or heat exchanger/keel cooled.

Abbreviations

bhp Brake Horsepower
bkW Brake Kilowatts
DIN German Standards Organization
DF Dual Fuel
ekW Electrical Kilowatts
EPA Environmental Protection Agency
EU European Union
EUI Electronic Unit Injection
g/bkW-hr Grams per Brake Kilowatt Hour
H Height of Engine
HE Heat Exchanger Cooled
IMO International Maritime Organization
ISO International Standards Organization
kVA Kilovolt-Ampere
L Overall Engine Length
LE Length of Engine from Front of Engine to Rear Face of Flywheel Housing
LG Length of Engine with Gear/Generator
MCS Marine Control System
mhp Metric Horsepower
NA Naturally Aspirated
R Radiator Cooled
SAE Society of Automotive Engineers
SCAC Separate Circuit Aftercooled
T Turbocharged
TA Turbocharged Aftercooled
TSA Turbocharged, Supercharged, Aftercooled
TTA Twin Turbo Aftercooled
U.S. g/h U.S. Gallons per Hour
W Overall Width
WE Width of Engine

Note: For Engine Emissions Information abbreviations see pages 9-11.

For more information
please visit:
cat.com/marine

E-mail: **cat_power@cat.com**

LEDM3457-21 (9-16) Printed on recycled paper.

CATERPILLAR®