Marine engine programme

MAN Energy Solutions

2021

All data provided in this document is non-binding. This data serves informational purposes only and is especially not guaranteed in any way.

Depending on the subsequent specific individual projects, the relevant data may be subject to changes and will be assessed and determined individually for each project. This will depend on the particular characteristics of each individual project, especially specific site and operational conditions.

If this document is delivered in another language than English and doubts arise concerning the translation, the English text shall prevail.

Contents

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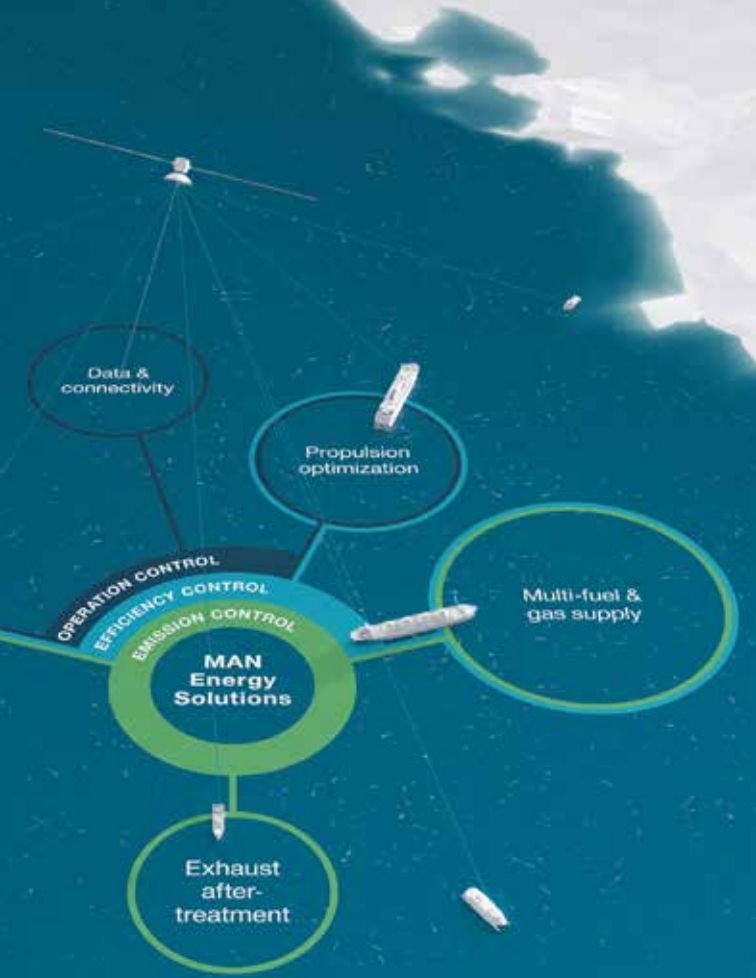


For more information please consult our website.

MAN B&W two-stroke propulsion engines

MAN Energy Solutions Tier II and Tier III engine programme

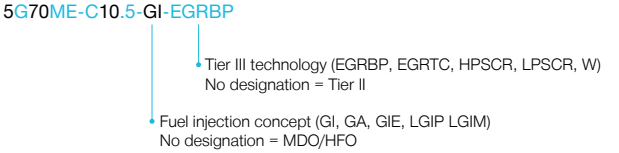
The two-stroke engines in this programme are either:
- Tier II engines complying with IMO Tier II
- Tier III engines complying with Tier II when operated in Tier II mode, and with Tier III when operated in Tier III mode

The latest updates on engine development and options are available at:
www.man-es.com → marine → products → planning-tools-and-downloads → market-update-notes.

The latest updated engine programme is available at:
www.man-es.com → marine → products → planning-tools-and-downloads → marine-engine-programme

Engine type designation

To ensure that the engine designation describes the engine with regard to the fuel injection concept and applied Tier III technologies, the engine type designation also includes these concepts as described below (full designation, see page 19):



Tier III technologies and fuel injection concepts are explained in detail on page 12 (ME-GI, ME-LGI and ME-GA dual fuel engines) and page 14 (Tier III technologies).

ME-C engines
The electronic control of the ME-C engines includes flexible control of the cylinder processes, i.e. fuel injection timing and actuation of exhaust valves, starting valves, and cylinder lubrication.

ME-B engines

ME-B engines use electronically controlled pressure boosters for the fuel injection whereas actuation of the exhaust valves is camshaft operated, but with electronically controlled variable closing timing.

CEAS and turbocharger selection (TCS)

CEAS (computerized engine application system) and TCS applications cover all engine variants including available dual fuel and Tier III technology options. These applications provide basic and essential data for the design and dimensioning of a ship's engine room (CEAS) and for the applicable turbochargers (TCS).

Useful information on latest updates and tools are available at:
www.man-es.com → marine → products → planning-tools-and-downloads
E.g. market update notes: → market-update-notes.

Latest update engine programme: → marine-engine-programme
CEAS and TCS: → ceas-engine-calculations/turbocharger-selection

In CEAS and TCS, all engines in this programme can be selected from the category 'Official Catalogue'.

Earlier versions of this engine programme mention additional engine types. Some of these are still available in CEAS and TCS under the category 'Replaced Catalogue'. New development will only be implemented in these designs to the extent it is considered necessary based on service experience. New efficiency enhancing features will not be available on older engine types.

Engine power

The engine brake power is stated in kW. The power values stated in the tables are available up to tropical conditions at sea level, i.e.:

- turbocharger inlet air temperature 45°C
- turbocharger inlet air pressure 1,000 mbar
- cooling water (sea/fresh) temperature 32/36°C

Specific fuel oil consumption (SFOC)

The figures in the two-stroke chapter represent the values obtained when the engine and turbocharger are matched to the lowest possible SFOC values while fulfilling the IMO NO_x Tier II or Tier III emission limits.

The SFOC figures are given in g/kWh and are based on the use of a fuel oil with a lower calorific value (LCV) equal to 42,700 kJ/kg at ISO conditions:
- turbocharger inlet air temperature 25°C
- turbocharger inlet air pressure 1,000 mbar
- cooling water temperature 25°C

Tolerances

The energy efficiency design index (EEDI) has led to increased focus on part-load SFOC. Therefore, MAN Energy Solutions offers the option to select the SFOC guarantee at a load point in the range from 50% to 100%. It is recommended that the SFOC guarantee point should be limited to the range 50% to 85% for part-load or low-load tuning methods.

When choosing an SFOC guarantee at or below 100%, the tolerances, adjustment and calibration at 100% will affect an engine running at the lower SFOC guarantee load point. This includes tolerances on measuring equipment, engine process control and turbocharger performance.

Consequently, SFOC guarantee tolerances are as follows:
- 5% tolerance for 100-85% engine load
- 6% tolerance for <85-65% engine load
- 7% tolerance for <65-50% engine load

Please note that the SFOC guarantee can only be given in one load point for Tier II engines. For Tier III engines see page 14.

Turbocharging system

Two-stroke engines can be delivered with MAN, ABB or MHI turbochargers as standard.

The SFOC figures given in the two-stroke chapter are based on turbocharging with the best possible turbocharging efficiency generally available, which means 67% for all engines with 45-cm bore and larger, and 64% for engine bores smaller than 45 cm. Both efficiency figures refer to 100% SMCR.

There are exceptions to this rule, S40ME-C9.5 and S35ME-C9.7 are now standard high-efficiency applications offering all Tier II standard tunings and all Tier III options requiring a high-efficiency turbocharger.

Only engine specifications for which an applicable high-efficiency turbocharger is available are subject to firm order.

Fuel consumption and optimisation possibilities for Tier II engines

Various optimisation possibilities for improved part-load and low-load SFOC are available for MAN B&W type engines. High-load optimisation is for best possible SFOC at 100% engine load.

Optimisation of SFOC in the part-load range (50-85%) or low-load range (25-70%) requires selection of the EGB (exhaust gas bypass) tuning method or the HPT (high-pressure tuning) method available for ME-C engines.

EPT (engine process tuning) is available for G95ME-C10.5, G80ME-C10.5 and G60ME-C10.5. EPT uses engine control process parameters to improve part- or low-load SFOC.

This engine programme introduces the G95ME-C10.6 with SEQ (sequential tuning) method. This includes sequential fuel injection and turbocharging application similar to the EGRTC Tier III technology. This will be available in the low-load version.

The tuning methods mentioned are available for all SMCR points, but cannot be combined.

In cases where part-load or low-load EGB tuning is applied, and a higher steam production is needed, the EEC (economiser energy control) solution offers additional automatic control of the EGB.

Forcing an EGB open at loads where the EGB is normally closed results in a higher exhaust gas temperature, but with an SFOC penalty. However, the total fuel consumption (engine and oil-fired boiler) will be improved.

Higher steam production can also be obtained for EPT tuned engines by adding an EGB. The EGB must be closed above 90% engine load, but can be opened below 90% to obtain higher exhaust temperature resulting in increased steam production.

Calculations with EEC are made on request.

ME-GI, ME-LGI and ME-GA dual fuel engines

This engine programme includes a number of engines designed for gas fuel (ME-GI and ME-GA engines) and liquid gas fuel (ME-LGI engines) operation.

ME-GA

The ME-GA engine is the latest addition to our dual fuel portfolio. Methane is admitted during the compression stroke in the Otto cycle process, which allows for a lower supply pressure compared to ME-GI engines. This is especially interesting for vessels with large amounts of boil-off gas and can reduce the investment costs for fuel compressors substantially.

The ME-GA engine is Tier III compliant in dual fuel mode, and if equipped with EGR, it is also Tier III compliant in fuel oil mode.

The first engines introduced are G60 and G70ME-C10.5-GA-EGRBP. Figures for these engines are included in this engine programme (see pages 96-117). ME-GA engines are also available without EGR, but with limitations in performance. Project data can be provided on request.

Fuel	Fuel designation	LCV [kJ/kg]
Methane	GI / GA	50,000
Ethane	GIE	47,500
Methanol	LGIM	19,900
LPG*	LGIP	46,000

*LPG is a mixture of liquid propane and butane.

In this engine programme, GI figures are included for engines where GI is applicable. Examples of figures for GIE, LGIP and LGIM are included for a selection of engines (see page 96).

Pilot oil energy fraction

In dual fuel mode, the pilot oil energy fraction amounts to 1.5% for GI (0.5% for G70ME-C10/9.5-GI), 3.0% for GIE and LGIP, and 5% for LGIM in L_1 rating. For actual pilot oil energy fractions, refer to individual engine pages and CEAS.

Fuel designation	Available pilot oil fraction in %		Compatible pilot fuel oil types
GI	0.5	1.5	MDO & HFO (<0.5% S)
GIE	3.0	-	MDO & HFO (<0.5% S)
LGIP	3.0	-	MDO & HFO (<0.5% S)
LGIM	5.0	-	MDO & HFO (<0.5% S)

G95/90/80/70ME-C10.5-GI have a gas tuning, called “dual fuel gas optimised”, with improved gas consumption in dual fuel mode. All other ME-GI engines have a “dual fuel standard” gas tuning. Both gas tunings apply to both Tier II and all Tier III technologies.

The following fuel consumption figures are shown in the tables for dual fuel engines:
- dual fuel mode with distribution of specific gas consumption (SGC) and specific pilot oil consumption (SPOC)
- fuel oil mode

All types of GI engines can operate with fuel sharing, also referred to as specified dual fuel (SDF) operation, where the ratio between pilot fuel oil and gas fuel can be selected according to preset values.

Guarantee figures for dual fuel engines are given for heat rate, which has the same tolerances as SFOC guarantees, see page 10.

Heat rate is defined as follows (example for methane as dual fuel): Heat rate (kJ/kWh) = SGC (g/kWh) × 50 kJ/g + SPOC (g/kWh) × 42.7 kJ/g.

The CEAS report will specify the distribution between SGC and SPOC as well as the heat rate over the load range.

Please note that dual fuel engines must have cylinder lubrication systems capable of supplying both low-BN lubricating oils and high-BN lubricating oils.

Greenhouse gas emissions

IMO has developed the EEDI (energy efficiency design index) with CO_2 as the only greenhouse gas (GHG) emission accounted for. However, IMO is preparing regulation on other GHGs than CO_2. Especially methane is in focus, as it is a very strong GHG and, accordingly, IMO is preparing to introduce legislation on methane slip with short notice as a first measure. In its effort to facilitate decarbonisation in the shipping industry, MAN Energy Solutions will, for the complete two-stroke engine programme, be able to guarantee a methane slip of 0.2 g/kWh with a tolerance of +/-0.1 g/kWh for ME-GI engines.

Additionally, MAN Energy Solutions provides methane slip figures for part-load engine operation, please refer to CEAS.

Tier III technologies

To ensure compliance with IMO Tier III regulations, a Tier III NO_x reduction technology must be selected. The preferred technology depends on market demands, engine size, other requirements, and operational pattern.

The Emission Project Guide provides more detailed descriptions of these technologies at:
www.man-es.com → marine → products → planning-tools-and-downloads → project-guides → two-stroke

All Tier III engines have at least two operating modes:
– Tier III mode fulfilling the IMO Tier III regulations
– Tier II mode fulfilling the IMO Tier II regulations

Tier III technologies are designed for either low-sulphur fuels (<0.1%) or high-sulphur fuels (>0.5% and <3.5%) in Tier III operation. In Tier II operation, the engine is in all cases capable of using fuels with a high sulphur content. The fuel sulphur content must be selected when the engine is ordered, as it impacts the engine design. Fuel consumption guarantees can be given for engines for both Tier II and Tier III modes.

EGR

Two EGR-matching concepts are available depending on engine bore:

- **EGRTC:** T/C cut-out matching for ME-C engines with bores ≥ 80 cm and more than one turbocharger applied
- **EGRBP:** Bypass matching for ME-C engines with bores ≤ 70 cm and one high efficiency turbocharger applied.

EGR operation is also possible for dual fuel engines, except GIE.

EcoEGR

EcoEGR is an SFOC-optimised version of the EGRBP system available on all ME-C engines with high-efficiency turbochargers. Compared to the standard EGRBP system, the EcoEGR engines operate with 10–15% recirculation in Tier II mode and with slightly increased recirculation in Tier III mode. For EcoEGR engines running on low-sulphur fuels (<0.5 %S), considerable overall savings are obtained. For high-sulphur fuels, the overall benefits must be calculated on a case-to-case basis.

EcoEGR operation is also possible for dual fuel engines, except GIE and engines with gas-optimised tuning.

SCR

Two SCR concepts are available:

- **HPSCR:** High-pressure SCR with reactor installed upstream the turbocharger(s)
- **LPSCR:** Low-pressure SCR with reactor installed downstream the turbocharger(s)

SCR operation applies to ME-C and ME-B engines, including dual fuel engine types. For some large-bore engines (bore ≥ 90 cm) with a high cylinder number, HPSCR is only available on special request. The SCR system must be supplied by an approved supplier.

W (water in methanol)

The 2020 engine programme introduced a new Tier III technology where a considerable amount of water is added to the methanol before injection on the ME-LGI engine with methanol (LGIM). This addition of water makes the engine Tier III compliant. As an example, figures are included for the G50ME-C9.6-LGIM-W engine (see page 114). Project data can be provided on request.

ME-GA

As mentioned on page 12, the ME-GA engine is Tier III compliant in dual fuel mode, and equipped with Tier III technologies, it is also Tier III compliant in fuel oil mode. Project data can be provided on request.

Application of high-sulphur fuels and SO_x scrubbers

All two-stroke engines in the MAN Energy Solutions marine engine programme are compatible with SO_x scrubbers.

A SO_x scrubber installation will increase the backpressure, thereby affecting engine performance. Accordingly, it is required that a SO_x scrubber installation does not increase the backpressure by more than 30 mbar at SMCR.

Fuels

From 1 January 2020, the global sulphur content for marine fuels must not exceed 0.5%. To ensure compliant operation, one of the following methods must be selected:

- Use a compliant fuel:
  - Global: max. 0.5% sulphur
  - ECA: max. 0.1% sulphur
- Use methane, ethane, methanol or LPG together with a compliant pilot fuel.
- Use a high-sulphur fuel in combination with a SO_x scrubber to obtain an exhaust gas SO_x level equivalent to operation on a compliant fuel.

The fuel specification must be selected at engine order as it impacts the engine design.

Fuels with a viscosity below 700 cSt at 50°C can be used.

Waste heat recovery systems

Waste heat recovery systems (WHRS) are available on request for both Tier II and Tier III engines with high-efficiency turbochargers. Contact MAN Energy Solutions for further information.

Power take off systems

Power take off (PTO) systems are available on request for both Tier II and Tier III engines with high-efficiency turbochargers. PTO systems operate in the margin between the light propeller curve and the load limits of the engine. The magnitude of PTO power permitted is as such influenced by the propeller light running margin applied for the specific project. The specific load of the engine permitted for design, including power for propulsion and PTO power, as a function of speed, is governed by the PTO layout limit.

For further information on the PTO layout limit as well as the availability and integration of PTOs, please contact MAN Energy Solutions. For RENK PTO solutions, see page 20.

Lubricating oil consumption

The system oil consumption varies according to engine sizes and, operational and maintenance patterns.

Specific cylinder oil consumption

Alpha ACC (Adaptive Cylinder-oil Control) is the lubricating mode for MAN B&W two-stroke engines that involves lube dosing proportional to the engine load and to the sulphur content in the fuel being burned.

Our general strategy is:
- Use low-BN oil for low-sulphur fuels
- Use high-BN oil for high-sulphur fuels

Dosage:
- Low-sulphur fuels: min. 0.6 g/kWh
- High-sulphur fuels: typically 0.3 g/kWh × %S for a 100 BN oil

Our Service Letters SL2014-587 and SL2014-593 offer further information: www.marine.man-es.com → Two-Stroke → Service Letters

Extent of delivery

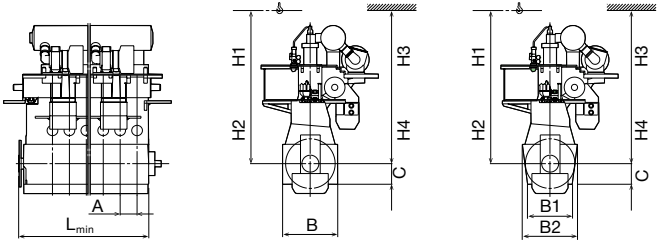
The final and binding extent of delivery of MAN B&W two-stroke engines is to be supplied by our licensee, the engine maker, who should be contacted to determine the execution for the actual project.

To facilitate negotiations between the yard, the engine maker and the customer, a set of guiding 'Extent of Delivery' (EoD) forms are available in which MAN Energy Solutions' recommended basic and optional executions are specified.

The licensees may select a different extent of delivery as their standard.

Engine dimensions

The minimum length L_{min} is stated from the aft end of the crankshaft to the fore end of the engine.



L_{min} Minimum length of engine
A Cylinder distance
B Bedplate width
B1 Bedplate width at foot flange
B2 Bedplate width at top flange
C Crankshaft to underside of foot flange
H1 Normal height lifting procedure
H2 Reduced height lifting procedure
H3 Reduced height lifting procedure with MAN B&W double-jib crane
H4 Normal height lifting procedure with MAN B&W double-jib crane

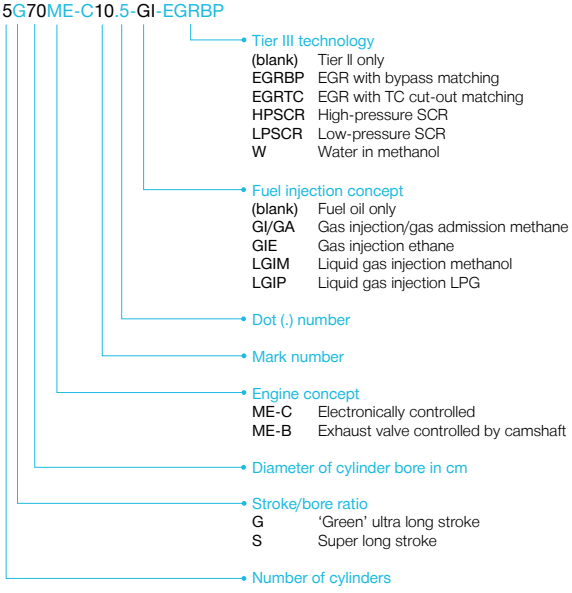
Dry masses

Dry masses are stated in metric tonnes for engines with MAN turbocharger(s) and a standard turning wheel. Figures will vary depending on the design and options chosen, e.g. moment compensators, tuning wheel, etc.

Dry masses for Tier III engines cover components directly integrated on the engine.

Indicated values are for guidance only and are not binding.

Engine type designation



RENK power take-off systems

RENK power take-off (PTO) systems are scalable solutions that can be used with two-stroke engines. They enable fuel savings and CO_2 emission reductions and improve the EEDI index.

The systems can either be operated in parallel, with one or more gensets for peak loads, or as individual sources of power. Furthermore, the maintenance costs of auxiliary generators are reduced thanks to fewer operating hours.

Integrated front-end power system

The integrated front-end power system (IFPS) consists of a front-end mounted PTO system on a two-stroke engine. It features a single-stage gearbox, one or multiple generators with associated frequency converters, and the transformers for the connection to the ship's grid. The gearbox design is flat and the generator length is short, i.e. <1,600 mm, which typically equals two frames on a ship. The system can deliver from 500 to 2,000 kW power.

For a specific ship project, the decision on whether or not an IFPS PTO solution is suitable must be made on the basis of an analysis of the torsional vibrations and the selected propeller, shafting system, and main engine.

MARHY® system

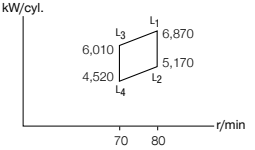
The Maritime Hybrid Drive (MARHY) is a stand-alone PTO/PTI/PTH-system with a power range of 500 to 10,000 kW. It is a hybrid system consisting of well-proven standard components such as a tunnel gear unit, a propeller shaft clutch, and standard electronics components. The MARHY system provides redundancy for single-screw vessels with the power take-home (PTH) solution, ensuring the vessel manoeuvrability if the main engine malfunctions, or can be used for boosting of the engine power utilising the power take-in (PTI) solution. MARHY is a modularised system and it is also available without a propeller shaft clutch.

MAN B&W G95ME-C10.6

Tier II Tier III

Cyl.	L_1 kW
5	34,350
6	41,220
7	48,090
8*	54,960
9*	61,830
10*	68,700
11*	75,570
12*	82,440

Stroke: 3,460 mm/**L_1 MEP: 21.0 bar**



Fuel oil

MAN B&W G95ME-C10.6

L_1 SFOC [g/kWh]			
Opt. load range	**50%**	**75%**	**100%**
Low-load SEQ	151.5	155.5	164.5

MAN B&W G95ME-C10.6-EGRTC

L_1 SFOC [g/kWh]			
	50%	**75%**	**100%**
Tier II mode	151.5	155.5	164.5
Tier III mode	158.5	158.5	162

MAN B&W G95ME-C10.6-HPSCR

L_1 SFOC [g/kWh]			
	50%	**75%**	**100%**
Tier II mode	151.5	155.5	164.5
Tier III mode	155.5	156.5	161.0

MAN B&W G95ME-C10.6-LPSCR

L_1 SFOC [g/kWh]			
	50%	**75%**	**100%**
Tier II mode	151.5	155.5	164.5
Tier III mode	155.5	158.5	162.0

Note: Dual fuel figures similar to G95ME-C10.5

* Available on request for HPSCR.

MAN B&W G95ME-C10.6

Specifications

Dimensions:	A	B	C	H1
mm	1,574	5,380	2,060	16,100

Cyl. distance	5-9 cyl.	10 cyl.	11 cyl.	12 cyl.
mm	1,574	1-6: 1,574	1-6: 1,574	1-6: 1,574
mm		7-10: 1,670	7-11: 1,670	7-12: 1,670

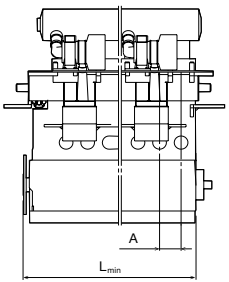
Cylinders:		5	6	7	8	9	10	11	12
L_{min}	mm	11,468	13,042	14,616	16,190	17,804	19,779	21,489	23,159

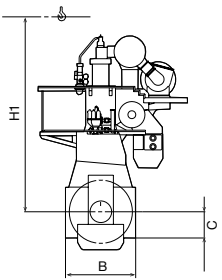
Dry mass

Tier II	t	1,005	1,206	1,407	1,608	1,760	1,912	2,180	2,378

Tier III (added)

EGR	t	11	13	14	15	29	29	31	33
HPSCR	t	10	15	15	15				
LPSCR	t	-	-	-	-	-	-	-	-



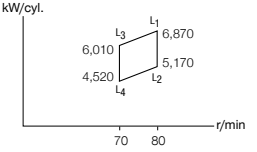


MAN B&W G95ME-C10.5

Tier II

Cyl.	L_1 kW
5	34,350
6	41,220
7	48,090
8	54,960
9	61,830
10	68,700
11	75,570
12	82,440

Stroke: 3,460 mm/**L_1 MEP:** 21.0 bar



Fuel oil

MAN B&W G95ME-C10.5

L_1 SFOC [g/kWh]			
Opt. load range	**50%**	**75%**	**100%**
High-load	158.5	157.5	162.0
Part-load EPT	156.5	156.0	164.5
Low-load EPT	154.5	157.0	164.5

GI (Methane)

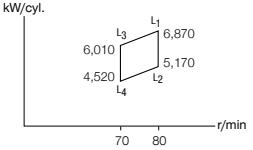
MAN B&W G95ME-C10.5-GI (gas optimised)

L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
Gas tuned	**50%**	**75%**	**100%**
Gas optimised	126.9+3.9/157.5	126.9+2.9/160.5	133.7+2.4/165.0

MAN B&W G95ME-C10.5

Cyl.	L_1 kW
5	34,350
6	41,220
7	48,090
8	54,960
9*	61,830
10*	68,700
11*	75,570
12*	82,440

Stroke: 3,460 mm/**L_1 MEP: 21.0 bar**



Fuel oil

MAN B&W G95ME-C10.5-EGRTC

L_1 SFOC [g/kWh]			
	50%	75%	100%
Tier II mode	154.5	157.0	164.0
Tier III mode	160.6	161.5	166.0

MAN B&W G95ME-C10.5-HPSCR

L_1 SFOC [g/kWh]			
	50%	75%	100%
Tier II mode	154.5	157.0	164.5
Tier III mode	156.0	158.0	165.0

MAN B&W G95ME-C10.5-LPSCR

L_1 SFOC [g/kWh]			
	50%	75%	100%
Tier II mode	154.5	157.0	164.5
Tier III mode	156.5	158.0	165.5

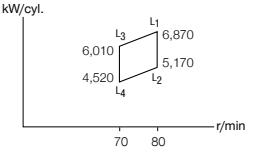
* Available on request for HPSCR.

MAN B&W G95ME-C10.5

Tier III

Cyl.	L_1 kW
5	34,350
6	41,220
7	48,090
8	54,960
9*	61,830
10*	68,700
11*	75,570
12*	82,440

Stroke: 3,460 mm/**L_1 MEP:** 21.0 bar



GI (Methane)

MAN B&W G95ME-C10.5-GI-EGRTC (gas optimised)

L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	125.2+3.9/157.5	126.9+2.9/160.5	133.7+2.4/165.0
Tier III mode	131.2+3.9/158.5	132.0+2.9/158.5	135.4+2.4/162.0

MAN B&W G95ME-C10.5-GI-HPSCR (gas optimised)

L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	126.9+3.9/157.5	126.9+2.9/160.5	134.6+2.4/166.0
Tier III mode	128.6+3.9/155.5	130.3+2.9/156.5	134.6+2.4/161.0

MAN B&W G95ME-C10.5-GI-LPSCR (gas optimised)

L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	126.9+3.9/157.5	126.9+2.9/160.5	134.6+2.4/166.0
Tier III mode	128.6+3.9/155.5	132.0+2.9/158.5	135.4+2.4/162.0

* Available on request for HPSCR.

MAN B&W G95ME-C10.5

Specifications

Dimensions:	A	B	C	H1
mm	1,574	5,380	2,060	16,100

Cyl. distance	5-9 cyl.	10 cyl.	11 cyl.	12 cyl.
mm	1,574	1-6: 1,574	1-6: 1,574	1-6: 1,574
mm		7-10: 1,670	7-11: 1,670	7-12: 1,670

Cylinders:		5	6	7	8	9	10	11	12
L_{min}	mm	11,468	13,042	14,616	16,190	17,804	19,779	21,489	23,159

Dry mass

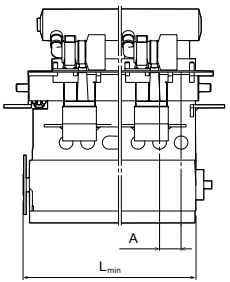
Tier II	t	1,005	1,206	1,407	1,608	1,760	1,912	2,180	2,378

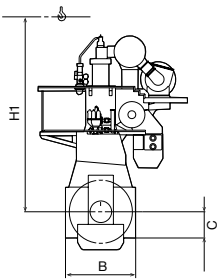
Tier III (added)

EGR	t	11	13	14	15	29	29	31	33
HPSCR	t	-	15	15	15				
LPSCR	t	-	-	-	-	-	-	-	-

Dual fuel (added)

GI	t	7	8	9	10	11	12	13	14



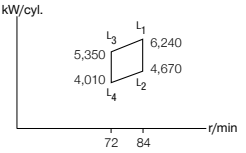


MAN B&W G90ME-C10.5

Tier II

Cyl.	L_1 kW
5	31,200
6	37,440
7	43,680
8	49,920
9	56,160
10	62,400
11	68,640
12	74,880

Stroke: 3,260 mm/**L_1 MEP:** 21.5 bar



Fuel oil

MAN B&W G90ME-C10.5

L_1 SFOC [g/kWh]			
Opt. load range	**50%**	**75%**	**100%**
High-load	161.5	160.5	165.0
Part-load EGB	159.5	159.0	167.5
Low-load EGB	157.5	160.0	167.5

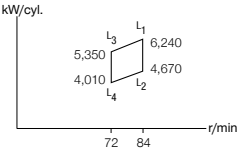
GI (Methane)

MAN B&W G90ME-C10.5-GI (gas optimised)

L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
Gas tuned	**50%**	**75%**	**100%**
Gas optimised	129.4+3.9/160.5	129.4+3.0/163.5	136.2+2.5/168.0

Cyl.	L_1 kW
5	31,200
6	37,440
7	43,680
8	49,920
9	56,160
10*	62,400
11*	68,640
12*	74,880

Stroke: 3,260 mm/**L_1 MEP:** 21.5 bar



Fuel oil

MAN B&W G90ME-C10.5-EGRTC

L_1 SFOC [g/kWh]			
	50%	75%	100%
Tier II mode	157.5	160.0	167.0
Tier III mode	163.5	163.5	169.0

MAN B&W G90ME-C10.5-HPSCR

L_1 SFOC [g/kWh]			
	50%	75%	100%
Tier II mode	157.5	160.0	167.5
Tier III mode	159.0	161.0	168.0

MAN B&W G90ME-C10.5-LPSCR

L_1 SFOC [g/kWh]			
	50%	75%	100%
Tier II mode	157.5	160.0	167.5
Tier III mode	158.5	161.0	168.5

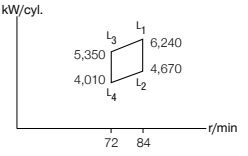
* Available on request for HPSCR.

MAN B&W G90ME-C10.5

Tier III

Cyl.	L_1 kW
5	31,200
6	37,440
7	43,680
8	49,920
9	56,160
10*	62,400
11*	68,640
12*	74,880

Stroke: 3,260 mm/**L_1 MEP:** 21.5 bar



GI (Methane)

MAN B&W G90ME-C10.5-GI-EGRTC (gas optimised)

L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	127.7+3.9/160.5	129.4+3.0/163.5	136.2+2.5/168.0
Tier III mode	133.7+3.9/161.5	134.5+3.0/161.5	137.9+2.5/165.0

MAN B&W G90ME-C10.5-GI-HPSCR (gas optimised)

L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	129.4+3.9/160.5	129.4+3.0/163.5	137.1+2.5/169.0
Tier III mode	131.1+3.9/158.5	132.8+3.0/159.5	137.1+2.5/164.0

MAN B&W G90ME-C10.5-GI-LPSCR (gas optimised)

L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	129.4+3.9/160.5	129.4+3.0/163.5	137.1+2.5/169.0
Tier III mode	131.1+3.9/158.5	134.5+3.0/161.5	137.9+2.5/165.0

* Available on request for HPSCR.

MAN B&W G90ME-C10.5

Specifications

Dimensions:	A	B1	B2	C	H1
mm	1,490	5,110	5,034	1,885	14,425

Cylinders:		5	6	7	8	9	10	11	12
L_{min}	mm	10,740	12,040	12,855	14,345*	15,835*	18,040	19,530	21,020

Dry mass

Tier II	t	791	949	1,107	1,265	1,423	1,581	1,739	1,897

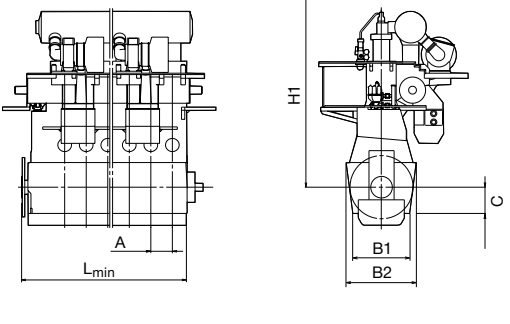
Tier III (added)

EGR	t	17	17	17	18	18	20	20	20
HPSCR	t	-	-	-	-	-			
LPSCR	t	-	-	-	-	-	-	-	-

Dual fuel (added)

GI	t	6	7	8	9	10	11	12	13

* 8-9-cylinder engines can be ordered with either divided or undivided crankshaft. Data is given for undivided crankshaft.

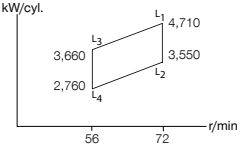


MAN B&W G80ME-C10.6

Tier II Tier III

Cyl.	L_1 kW
6	28,260
7	32,970
8	37,680
9	42,390

Stroke: 3,720 mm/**L_1 MEP:** 21.0 bar



Fuel oil

MAN B&W G80ME-C10.6

L_1 SFOC [g/kWh]			
Opt. load range	**50%**	**75%**	**100%**
High-load	158.5	157.0	161.0
Low-load EGB	154.5	155.0	165.0

MAN B&W G80ME-C10.6-EGRTC

L_1 SFOC [g/kWh]			
	50%	**75%**	**100%**
Tier II mode	154.5	155.0	165.0
Tier III mode	156.5	156.0	162.0

MAN B&W G80ME-C10.6-HPSCR

L_1 SFOC [g/kWh]			
	50%	**75%**	**100%**
Tier II mode	154.5	155.0	165.0
Tier III mode	154.5	155.0	165.5

MAN B&W G80ME-C10.6-LPSCR

L_1 SFOC [g/kWh]			
	50%	**75%**	**100%**
Tier II mode	154.5	155.0	165.0
Tier III mode	157.0	156.5	165.5

MAN B&W G80ME-C10.6

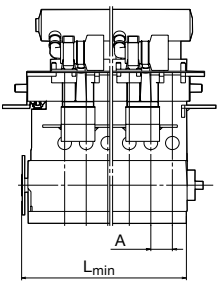
Specifications

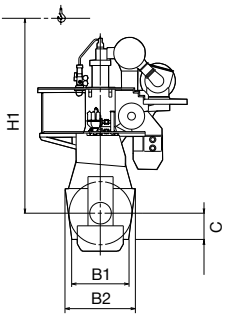
Dimensions:	A	B1	B2	C	H1
mm	1,400	5,018	5,254	1,960	15,725

Cylinders:		6	7	8	9
L_{min}	mm	11,509	12,135	13,535	14,935

Dry mass					
Tier II	t	-	-	-	-

Tier III (added)					
EGR	t	-	-	-	-
HPSCR	t	-	-	-	-
LPSCR	t	-	-	-	-



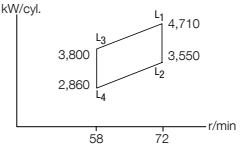


MAN B&W G80ME-C10.5

Tier II

Cyl.	L_1 kW
6	28,260
7	32,970
8	37,680
9	42,390

Stroke: 3,720 mm/**L_1 MEP:** 21.0 bar



Fuel oil

MAN B&W G80ME-C10.5

L_1 SFOC [g/kWh]			
Opt. load range	**50%**	**75%**	**100%**
High-load	160.5	159.5	164.0
Part-load EPT	158.5	158.0	166.5
Low-load EPT	156.5	159.0	166.5

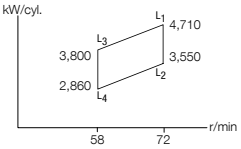
GI (Methane)

MAN B&W G80ME-C10.5-GI (gas optimised)

L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
Gas tuned	**50%**	**75%**	**100%**
Gas optimised	128.6+3.9/159.5	128.5+3.0/162.5	135.4+2.5/167.0

Cyl.	L_1 kW
6	28,260
7	32,970
8	37,680
9	42,390

Stroke: 3,720 mm/**L_1 MEP:** 21.0 bar



Fuel oil

MAN B&W G80ME-C10.5-EGRTC

L_1 SFOC [g/kWh]			
	50%	**75%**	**100%**
Tier II mode	156.5	159.0	166.0
Tier III mode	162.5	162.5	168.0

MAN B&W G80ME-C10.5-HPSCR

L_1 SFOC [g/kWh]			
	50%	**75%**	**100%**
Tier II mode	156.5	159.0	166.5
Tier III mode	158.0	160.0	167.0

MAN B&W G80ME-C10.5-LPSCR

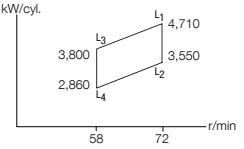
L_1 SFOC [g/kWh]			
	50%	**75%**	**100%**
Tier II mode	156.5	159.0	166.5
Tier III mode	157.5	160.0	167.5

MAN B&W G80ME-C10.5

Tier III

Cyl.	L_1 kW
6	28,260
7	32,970
8	37,680
9	42,390

Stroke: 3,720 mm/L_1 **MEP:** 21.0 bar



GI (Methane)

MAN B&W G80ME-C10.5-GI-EGRTC (gas optimised)

L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	126.9+3.9/159.5	128.5+3.0/162.5	135.4+2.5/167.0
Tier III mode	132.9+3.9/160.5	133.7+3.0/160.5	137.1+2.5/164.0

MAN B&W G80ME-C10.5-GI-HPSCR (gas optimised)

L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	128.6+3.9/159.5	128.5+3.0/162.5	136.2+2.5/168.0
Tier III mode	130.3+3.9/157.5	132.0+3.0/158.5	136.2+2.5/163.0

MAN B&W G80ME-C10.5-GI-LPSCR (gas optimised)

L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	128.6+3.9/159.5	128.5+3.0/162.5	136.2+2.5/168.0
Tier III mode	130.3+3.9/157.5	133.7+3.0/160.5	137.1+2.5/164.0

Specifications

Dimensions:	A	B1	B2	C	H1
mm	1,400	5,018	5,254	1,960	15,725

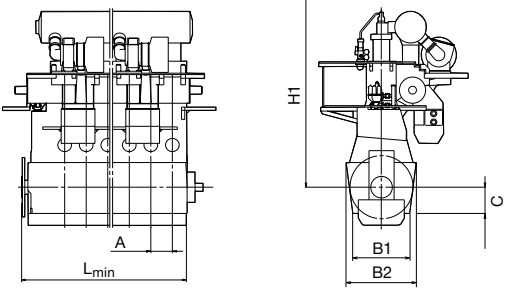
Cylinders:		6	7	8	9
L_{min}	mm	-	-	-	-

Dry mass

Tier II	**t**	864	1,008	1,153	1,297

Tier III (added)					
EGR	**t**	11	12	13	14
HPSCR	**t**	4	5	5	5
LPSCR	**t**	-	-	-	-

Dual fuel (added)					
GI	**t**	6	7	8	9

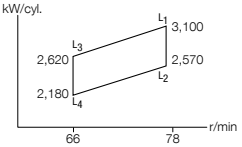


MAN B&W G70ME-C10.5

Tier II

Cyl.	L_1 kW
5	15,500
6	18,600

Stroke: 3,256 mm/**L_1 MEP:** 19.0 bar



Fuel oil

MAN B&W G70ME-C10.5

L_1 SFOC [g/kWh]			
Opt. load range	**50%**	**75%**	**100%**
High-load	160.5	158.5	163.0
Part-load EGB	158.5	157.0	165.5
Low-load EGB	156.5	158.0	165.5

GI (Methane)

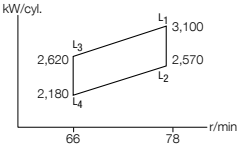
MAN B&W G70ME-C10.5-GI (gas optimised)

L_1 dual fuel mode (SGC+SPOC (0.5%))/fuel oil mode (SFOC) [g/kWh]			
Gas tuned	**50%**	**75%**	**100%**
Gas optimised	130.8+1.3/159.5	129.4+1.0/161.5	135.9+0.8/166.0

Note: Also available for GIE and LGIP, see page 12

Cyl.	L_1 kW
5	15,500
6	18,600

Stroke: 3,256 mm/**L_1 MEP:** 19.0 bar



Fuel oil

MAN B&W G70ME-C10.5-EGRBP

L_1 SFOC [g/kWh]			
	50%	**75%**	**100%**
Tier II mode	156.5	158.0	166.0
Tier III mode	163.5	162.5	168.0

MAN B&W G70ME-C10.5-HPSCR

L_1 SFOC [g/kWh]			
	50%	**75%**	**100%**
Tier II mode	156.5	158.0	165.5
Tier III mode	158.0	159.0	166.0

MAN B&W G70ME-C10.5-LPSCR

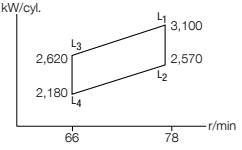
L_1 SFOC [g/kWh]			
	50%	**75%**	**100%**
Tier II mode	156.5	158.0	165.5
Tier III mode	157.5	159.0	166.5

MAN B&W G70ME-C10.5

Tier III

Cyl.	L_1 kW
5	15,500
6	18,600

Stroke: 3,256 mm/**L_1 MEP:** 19.0 bar



GI (Methane)

MAN B&W G70ME-C10.5-GI-EGRBP (gas optimised)

L_1 dual fuel mode (SGC+SPOC (0.5%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	130.8+1.3/159.5	129.4+1.0/161.5	137.6+0.8/168.0
Tier III mode	136.8+1.3/162.5	136.2+1.0/161.5	139.4+0.8/165.0

MAN B&W G70ME-C10.5-GI-HPSCR (gas optimised)

L_1 dual fuel mode (SGC+SPOC (0.5%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	130.8+1.3/159.5	129.4+1.0/161.5	136.8+0.8/167.0
Tier III mode	132.5+1.3/157.5	132.8+1.0/157.5	136.8+0.8/162.0

MAN B&W G70ME-C10.5-GI-LPSCR (gas optimised)

L_1 dual fuel mode (SGC+SPOC (0.5%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	130.8+1.3/159.5	129.4+1.0/161.5	136.8+0.8/167.0
Tier III mode	132.5+1.3/157.5	134.5+1.0/159.5	137.6+0.8/163.0

Note: Also available for GIE and LGIP, except GIE and EGR, see pages 12-14

MAN B&W G70ME-C10.5

Specifications

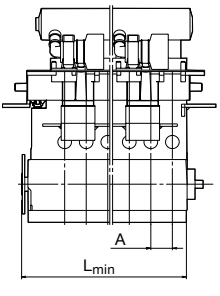
Dimensions:	A	B1	B2	C	H1
mm	1,044	4,470	4,628	1,750	13,625

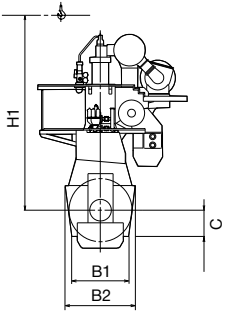
Cylinders:		5	6
L_{min}	mm	7,399	8,443

Dry mass			
Tier II	t	458	549

Tier III (added)			
EGR	t	9	9
HPSCR	t	3	3
LPSCR	t	-	-

Dual fuel (added)			
GI	t	5	6



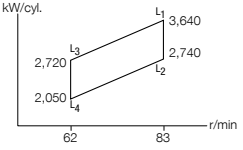


MAN B&W G70ME-C9.5

Tier II

Cyl.	L_1 kW
5	18,200
6	21,840
7	25,480
8	29,120

Stroke: 3,256 mm/**L_1 MEP:** 21.0 bar



Fuel oil

MAN B&W G70ME-C9.5

L_1 SFOC [g/kWh]			
Opt. load range	**50%**	**75%**	**100%**
High-load	165.5	163.0	167.0
Part-load EGB	162.5	161.5	168.5
Low-load EGB	160.5	162.5	168.5

GI (Methane)

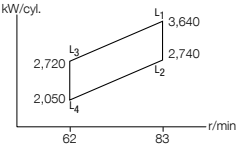
MAN B&W G70ME-C9.5-GI

L_1 dual fuel mode (SGC+SPOC (0.5%))/fuel oil mode (SFOC) [g/kWh]			
Gas tuned	**50%**	**75%**	**100%**
High-load	136.8+1.3/165.5	135.0+1.0/163.0	141.0+0.8/167.0

Note: Also available for GIE and LGIP, see page 12.

Cyl.	L_1 kW
5	18,200
6	21,840
7	25,480
8	29,120

Stroke: 3,256 mm/**L_1 MEP:** 21.0 bar



Fuel oil

MAN B&W G70ME-C9.5-EGRBP

L_1 SFOC [g/kWh]			
	50%	**75%**	**100%**
Tier II mode	160.5	162.5	169.0
Tier III mode	168.5	167.0	172.0

MAN B&W G70ME-C9.5-HPSCR

L_1 SFOC [g/kWh]			
	50%	**75%**	**100%**
Tier II mode	160.5	162.5	168.5
Tier III mode	162.0	163.5	169.0

MAN B&W G70ME-C9.5-LPSCR

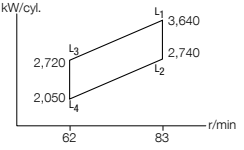
L_1 SFOC [g/kWh]			
	50%	**75%**	**100%**
Tier II mode	160.5	162.5	168.5
Tier III mode	161.5	163.5	169.5

MAN B&W G70ME-C9.5

Tier III

Cyl.	L_1 kW
5	18,200
6	21,840
7	25,480
8	29,120

Stroke: 3,256 mm/L_1 **MEP:** 21.0 bar



GI (Methane)

MAN B&W G70ME-C9.5-GI-EGRBP

L_1 dual fuel mode (SGC+SPOC (0.5%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	135.9+1.3/160.5	138.0+1.0/162.5	143.6+0.8/169.0
Tier III mode	142.8+1.3/168.5	141.8+1.0/167.0	146.2+0.8/172.0

MAN B&W G70ME-C9.5-GI-HPSCR

L_1 dual fuel mode (SGC+SPOC (0.5%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	135.9+1.3/160.5	138.0+1.0/162.5	143.2+0.8/168.5
Tier III mode	137.2+1.3/162.0	138.9+1.0/163.5	143.6+0.8/169.0

MAN B&W G70ME-C9.5-GI-LPSCR

L_1 dual fuel mode (SGC+SPOC (0.5%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	135.9+1.3/160.5	138.0+1.0/162.5	143.2+0.8/168.5
Tier III mode	136.8+1.3/161.5	138.9+1.0/163.5	144.0+0.8/169.5

Note: Also available for GIE and LGIP, except GIE and EGR, see pages 12-14

Specifications

Dimensions:		A	B1	B2	C	H1
Fuel oil	mm	1,260	4,760	4,900	1,750	14,225
GI	mm	1,260	4,760	4,900	1,750	14,225

Cylinders:		5	6	7	8
L_{min}	mm	8,486	9,596	10,856	12,116

Dry mass

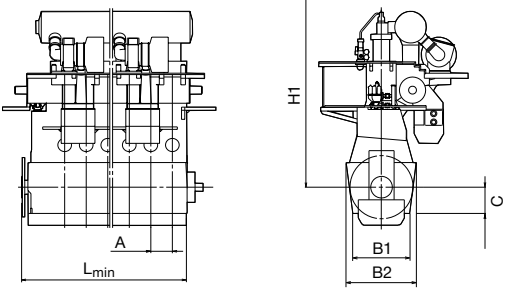
Tier II	t	585	665	750	855

Tier III (added)

EGR	t	14	16	17	18
HPSCR	t	4	5	6	7
LPSCR	t	-	-	-	-

Dual fuel (added)

GI	t	5	6	7	8

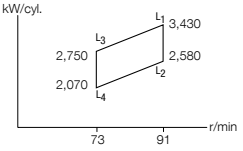


MAN B&W S70ME-C10.5

Tier II

Cyl.	L_1 kW
5	17,150
6	20,580
7	24,010
8	27,440

Stroke: 2,800 mm/L_1 **MEP:** 21.0 bar



Fuel oil

MAN B&W S70ME-C10.5

L_1 SFOC [g/kWh]			
Opt. load range	**50%**	**75%**	**100%**
High-load	164.5	162.0	166.0
Part-load EGB	161.5	160.5	167.5
Low-load EGB	159.5	161.5	167.5

GI (Methane)

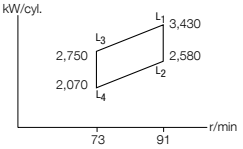
MAN B&W S70ME-C10.5-GI

L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
Gas tuned	**50%**	**75%**	**100%**
High-load	133.7+4.0/164.5	132.4+3.0/162.0	138.8+2.5/166.0

Note: Also available for GIE and LGIP, see page 12

Cyl.	L_1 kW
5	17,150
6	20,580
7	24,010
8	27,440

Stroke: 2,800 mm/**L_1 MEP:** 21.0 bar



Fuel oil

MAN B&W S70ME-C10.5-EGRBP

L_1 SFOC [g/kWh]

	50%	75%	100%
Tier II mode	159.5	161.5	168.0
Tier III mode	167.5	166.0	171.0

MAN B&W S70ME-C10.5-HPSCR

L_1 SFOC [g/kWh]

	50%	75%	100%
Tier II mode	159.5	161.5	167.5
Tier III mode	161.0	162.5	168.0

MAN B&W S70ME-C10.5-LPSCR

L_1 SFOC [g/kWh]

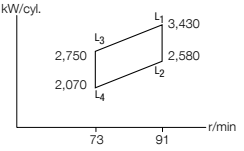
	50%	75%	100%
Tier II mode	159.5	161.5	167.5
Tier III mode	160.5	162.5	168.5

MAN B&W S70ME-C10.5

Tier III

Cyl.	L_1 kW
5	17,150
6	20,580
7	24,010
8	27,440

Stroke: 2,800 mm/**L_1 MEP:** 21.0 bar



GI (Methane)

MAN B&W S70ME-C10.5-GI-EGRBP

L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
	50%	**75%**	**100%**
Tier II mode	132.8+4.0/159.5	135.4+3.0/161.5	141.3+2.5/168.0
Tier III mode	139.7+4.0/167.5	139.3+3.0/166.0	143.9+2.5/171.0

MAN B&W S70ME-C10.5-GI-HPSCR

L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
	50%	**75%**	**100%**
Tier II mode	132.8+4.0/159.5	135.4+3.0/161.5	140.9+2.5/167.5
Tier III mode	134.1+4.0/161.0	136.3+3.0/162.5	141.3+2.5/168.0

MAN B&W S70ME-C10.5-GI-LPSCR

L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	132.8+4.0/159.5	135.4+3.0/161.5	140.9+2.5/167.5
Tier III mode	133.7+4.0/160.5	136.3+3.0/162.5	141.8+2.5/168.5

Note: Also available for GIE and LGIP, except GIE and EGR, see pages 12-14

MAN B&W S70ME-C10.5

Specifications

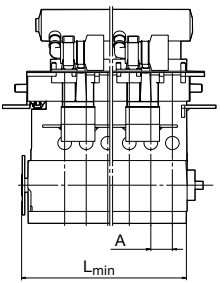
Dimensions:		A	B1	B2	C	H1
mm		1,098	4,012	4,150	1,520	12,675

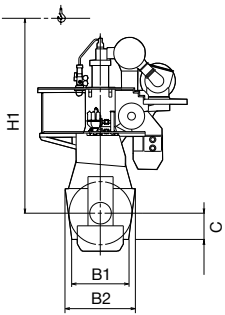
Cylinders:		5	6	7	8
L_{min}	mm	7,581	8,679	9,777	10,875

Dry mass					
Tier II	t	465	503	541	579

Tier III (added)					
EGR	t	9	9	12	12
HPSCR	t	-	-	-	-
LPSCR	t	-	-	-	-

Dual fuel (added)					
GI	t	5	6	7	8



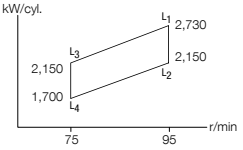


MAN B&W S65ME-C8.6

Tier II

Cyl.	L_1 kW
5	13,650
6	16,380
7	19,110
8	21,840

Stroke: 2,730 mm/L_1 **MEP:** 19.0 bar



Fuel oil

MAN B&W S65ME-C8.6

L_1 SFOC [g/kWh]			
Opt. load range	**50%**	**75%**	**100%**
High-load	164.5	161.5	165.5
Part-load EGB	161.5	160.0	167.0
Low-load EGB	159.5	161.0	167.0

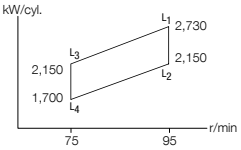
GI (Methane)

MAN B&W S65ME-C8.6-GI

L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
Gas tuned	**50%**	**75%**	**100%**
High-load	133.6+3.9/164.5	132.0+3.0/161.5	138.4+2.5/165.5

Cyl.	L_1 kW
5	13,650
6	16,380
7	19,110
8	21,840

Stroke: 2,730 mm/**L_1 MEP:** 19.0 bar



Fuel oil

MAN B&W S65ME-C8.6-EGRBP

L_1 SFOC [g/kWh]			
	50%	**75%**	**100%**
Tier II mode	159.5	161.0	167.5
Tier III mode	167.5	165.5	170.5

MAN B&W S65ME-C8.6-HPSCR

L_1 SFOC [g/kWh]			
	50%	**75%**	**100%**
Tier II mode	159.5	161.0	167.0
Tier III mode	161.0	162.0	167.5

MAN B&W S65ME-C8.6-LPSCR

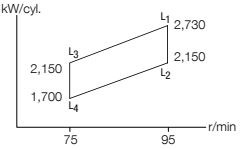
L_1 SFOC [g/kWh]			
	50%	**75%**	**100%**
Tier II mode	159.5	161.0	167.0
Tier III mode	160.5	162.0	168.0

MAN B&W S65ME-C8.6

Tier III

Cyl.	L_1 kW
5	13,650
6	16,380
7	19,110
8	21,840

Stroke: 2,730 mm/**L_1 MEP:** 19.0 bar



GI (Methane)

MAN B&W S65ME-C8.6-GI-EGRBP

L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	132.8+3.9/159.5	135.0+3.0/161.0	140.9+2.5/167.5
Tier III mode	139.6+3.9/167.5	138.9+3.0/165.5	143.5+2.5/170.5

MAN B&W S65ME-C8.6-GI-HPSCR

L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	132.8+3.9/159.5	135.0+3.0/161.0	140.5+2.5/167.0
Tier III mode	134.0+3.9/161.0	135.9+3.0/162.0	140.9+2.5/167.5

MAN B&W S65ME-C8.6-GI-LPSCR

L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	132.8+3.9/159.5	135.0+3.0/161.0	140.5+2.5/167.0
Tier III mode	133.6+3.9/160.5	135.9+3.0/162.0	141.4+2.5/168.0

MAN B&W S65ME-C8.6

Specifications

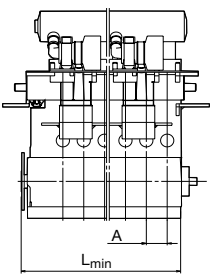
Dimensions:	A	B1	B2	C	H1	H2	H3
mm	1,084	4,124	4,170	1,410	11,950	11,225	11,025

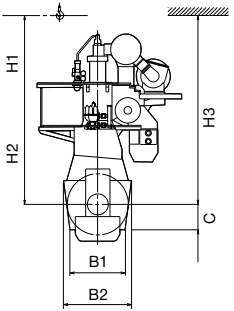
Cylinders:		5	6	7	8
L_{min}	mm	7,148	8,232	9,316	10,400

Dry mass					
Tier II	t	366	439	513	586

Tier III (added)					
EGR	t	14	15	16	17
HPSCR	t	4	5	6	6
LPSCR	t	-	-	-	-

Dual fuel (added)					
GI	t	5	5	6	7



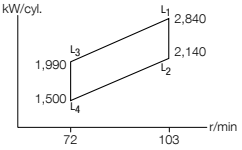


MAN B&W G60ME-C10.5

Tier II

Cyl.	L_1 kW
5	14,200
6	17,040
7	19,880
8	22,720

Stroke: 2,790 mm/**L_1 MEP:** 21.0 bar



Fuel oil

MAN B&W G60ME-C10.5

L_1 SFOC [g/kWh]			
Opt. load range	50%	75%	100%
High-load	161.5	160.5	165.0
Part-load EPT	159.5	159.0	167.5
Low-load EPT	157.5	160.0	167.5

GI (Methane)

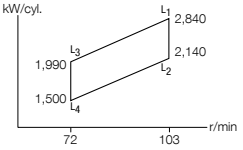
MAN B&W G60ME-C10.5-GI

L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
Gas tuned	50%	75%	100%
High-load	131.1+3.9/161.5	131.2+3.0/160.5	137.9+2.5/165.0

Note: Also available for GIE and LGIP, see page 12

Cyl.	L_1 kW
5	14,200
6	17,040
7	19,880
8	22,720

Stroke: 2,790 mm/**L_1 MEP:** 21.0 bar



Fuel oil

MAN B&W G60ME-C10.5-EGRBP

L_1 SFOC [g/kWh]			
	50%	75%	100%
Tier II mode	157.5	160.0	168.0
Tier III mode	164.5	164.5	170.0

MAN B&W G60ME-C10.5-HPSCR

L_1 SFOC [g/kWh]			
	50%	75%	100%
Tier II mode	157.5	160.0	167.5
Tier III mode	159.0	161.0	168.0

MAN B&W G60ME-C10.5-LPSCR

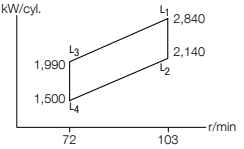
L_1 SFOC [g/kWh]			
	50%	75%	100%
Tier II mode	157.5	160.0	167.5
Tier III mode	158.5	161.0	168.5

MAN B&W G60ME-C10.5

Tier III

Cyl.	L_1 kW
5	14,200
6	17,040
7	19,880
8	22,720

Stroke: 2,790 mm/**L_1 MEP:** 21.0 bar



GI (Methane)

MAN B&W G60ME-C10.5-GI-EGRBP

L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	131.1+3.9/157.5	134.2+3.0/160.0	141.4+2.5/168.0
Tier III mode	137.1+3.9/164.5	138.0+3.0/164.5	143.1+2.5/170.0

MAN B&W G60ME-C10.5-GI-HPSCR

L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	131.1+3.9/157.5	134.2+3.0/160.0	140.9+2.5/167.5
Tier III mode	132.4+3.9/159.0	135.0+3.0/161.0	141.4+2.5/168.0

MAN B&W G60ME-C10.5-GI-LPSCR

L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	131.1+3.9/157.5	134.2+3.0/160.0	140.9+2.5/167.5
Tier III mode	132.0+3.9/158.5	135.0+3.0/161.0	141.8+2.5/168.5

Note: Also available for GIE and LGIP, except GIE and EGR, see pages 12-14

MAN B&W G60ME-C10.5

Specifications

Dimensions:		A	B1	B2	C	H1	H2	H3
mm		1,080	4,090	4,220	1,500	12,175	11,400	11,075

Cylinders:		5	6	7	8
L_{min}	mm	7,390	8,470	9,550	10,630

Dry mass

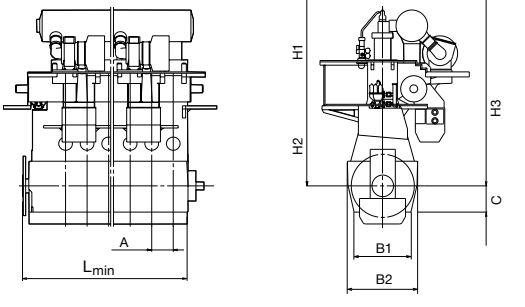
Tier II	t	352	423	493	564

Tier III (added)

EGR	t	24	24	28	28
HPSCR	t	8	17	21	21
LPSCR	t	-	-	-	-

Dual fuel (added)

GI	t	5	5	6	7

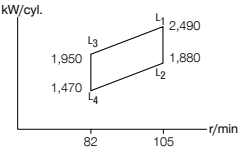


MAN B&W S60ME-C10.6

Tier II Tier III

Cyl.	L_1 kW
5	12,450
6	14,940
7	17,430
8	19,920

Stroke: 2,400 mm/L_1 **MEP:** 21.0 bar



Fuel oil

MAN B&W S60ME-C10.6

L_1 SFOC [g/kWh]			
Opt. load range	**50%**	**75%**	**100%**
High-load	157.5	156.0	160.0
Low-load EGB	153.5	154.0	164.0

MAN B&W S60ME-C10.6-EGRBP

L_1 SFOC [g/kWh]			
	50%	**75%**	**100%**
Tier II mode	153.5	154.0	165.0
Tier III mode	156.5	156.0	165.0

MAN B&W S60ME-C10.6-HPSCR

L_1 SFOC [g/kWh]			
	50%	**75%**	**100%**
Tier II mode	153.5	154.0	164.0
Tier III mode	153.5	154.0	164.5

MAN B&W S60ME-C10.6-LPSCR

L_1 SFOC [g/kWh]			
	50%	**75%**	**100%**
Tier II mode	153.5	154.0	164.0
Tier III mode	156.0	155.5	164.5

Specifications

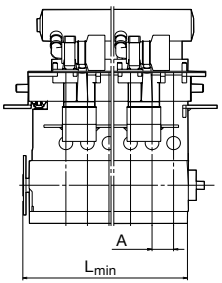
Dimensions:	A	B1	B2	C	H1	H2	H3
mm	940	3,420	3,550	1,300	10,500	9,725	10,125

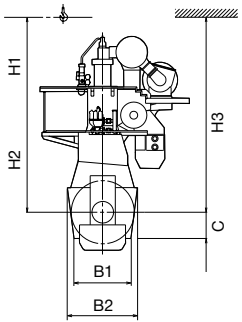
Cylinders:	5	6	7	8
L_{min} mm	6,502	7,442	8,382	9,322

Dry mass

Tier II t	-	-	-	-

Tier III (added)				
EGR t	-	-	-	-
HPSCR t	-	-	-	-
LPSCR t	-	-	-	-



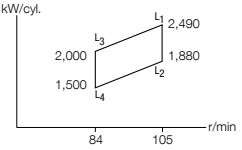


MAN B&W S60ME-C10.5

Tier II

Cyl.	L_1 kW
5	12,450
6	14,940
7	17,430
8	19,920

Stroke: 2,400 mm/L_1 **MEP:** 21.0 bar



Fuel oil

MAN B&W S60ME-C10.5

L_1 SFOC [g/kWh]			
Opt. load range	**50%**	**75%**	**100%**
High-load	164.5	162.0	166.0
Part-load EGB	161.5	160.5	167.5
Low-load EGB	159.5	161.5	167.5

GI (Methane)

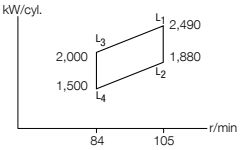
MAN B&W S60ME-C10.5-GI

L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
Gas tuned	**50%**	**75%**	**100%**
High-load	133.7+4.0/164.5	132.4+3.0/162.0	138.8+2.5/166.0

Note: Also available for GIE and LGIP, see page 12

Cyl.	L_1 kW
5	12,450
6	14,940
7	17,430
8	19,920

Stroke: 2,400 mm/**L_1 MEP:** 21.0 bar



Fuel oil

MAN B&W S60ME-C10.5-EGRBP

L_1 SFOC [g/kWh]			
	50%	**75%**	**100%**
Tier II mode	159.5	161.5	168.0
Tier III mode	167.5	166.0	171.0

MAN B&W S60ME-C10.5-HPSCR

L_1 SFOC [g/kWh]			
	50%	**75%**	**100%**
Tier II mode	159.5	161.5	167.5
Tier III mode	161.0	162.5	168.0

MAN B&W S60ME-C10.5-LPSCR

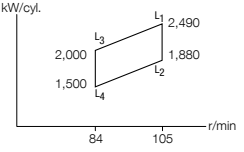
L_1 SFOC [g/kWh]			
	50%	**75%**	**100%**
Tier II mode	159.5	161.5	167.5
Tier III mode	160.5	162.5	168.5

MAN B&W S60ME-C10.5

Tier III

Cyl.	L_1 kW
5	12,450
6	14,940
7	17,430
8	19,920

Stroke: 2,400 mm/L_1 **MEP:** 21.0 bar



GI (Methane)

MAN B&W S60ME-C10.5-GI-EGRBP

L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	132.8+4.0/159.5	135.4+3.0/161.5	141.3+2.5/168.0
Tier III mode	139.7+4.0/167.5	139.3+3.0/166.0	143.9+2.5/171.0

MAN B&W S60ME-C10.5-GI-HPSCR

L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
	50%	**75%**	**100%**
Tier II mode	132.8+4.0/159.5	135.4+3.0/161.5	140.9+2.5/167.5
Tier III mode	134.1+4.0/161.0	136.3+3.0/162.5	141.3+2.5/168.0

MAN B&W S60ME-C10.5-GI-LPSCR

L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
	50%	**75%**	**100%**
Tier II mode	132.8+4.0/159.5	135.4+3.0/161.5	140.9+2.5/167.5
Tier III mode	133.7+4.0/160.5	136.3+3.0/162.5	141.8+2.5/168.5

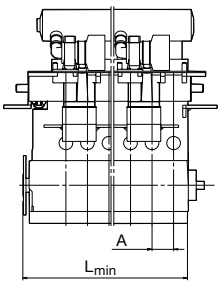
Note: Also available for GIE and LGIP, except GIE and EGR, see pages 12-14

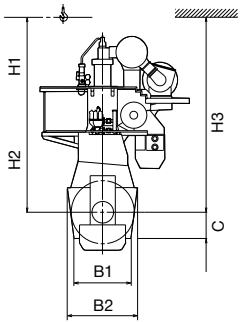
Specifications

Dimensions:	A	B1	B2	C	H1	H2	H3
mm	940	3,420	3,550	1,300	10,500	9,725	10,125

Cylinders:		5	6	7	8
L_{min}	mm	6,502	7,442	8,382	9,322

Dry mass					
Tier II	t	303	326	349	372
Tier III (added)					
EGR	t	12	12	21	12
HPSCR	t	6	6	6	6
LPSCR	t	-	-	-	-
Dual fuel (added)					
GI	t	5	5	6	7



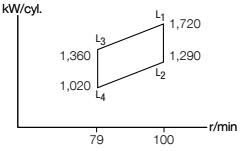


MAN B&W G50ME-C9.6

Tier II

Cyl.	L_1 kW
5	8,600
6	10,320
7	12,040
8	13,760
9	15,480

Stroke: 2,500 mm/**L_1 MEP:** 21.0 bar



Fuel oil

MAN B&W G50ME-C9.6

L_1 SFOC [g/kWh]			
Opt. load range	**50%**	**75%**	**100%**
High-load	163.5	162.5	167.0
Part-load EGB	161.5	161.0	169.5
Low-load EGB	159.5	162.0	169.5

GI (Methane)

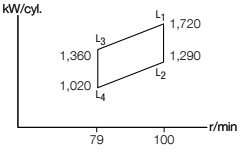
MAN B&W G50ME-C9.6-GI

L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
Gas tuned	50%	75%	100%
High-load	132.8+4.0/163.5	132.9+3.0/162.5	139.6+2.5/167.0

Note: Also available for GIE, LGIM and LGIP, see page 12

Cyl.	L_1 kW
5	8,600
6	10,320
7	12,040
8	13,760
9	15,480

Stroke: 2,500 mm/**L_1 MEP:** 21.0 bar



Fuel oil

MAN B&W G50ME-C9.6-EGRBP

L_1 SFOC [g/kWh]			
	50%	**75%**	**100%**
Tier II mode	159.5	162.0	170.0
Tier III mode	166.5	166.5	172.0

MAN B&W G50ME-C9.6-HPSCR

L_1 SFOC [g/kWh]			
	50%	**75%**	**100%**
Tier II mode	159.5	162.0	169.5
Tier III mode	161.0	163.0	170.0

MAN B&W G50ME-C9.6-LPSCR

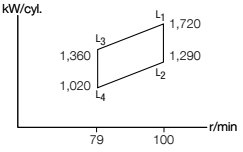
L_1 SFOC [g/kWh]			
	50%	**75%**	**100%**
Tier II mode	159.5	162.0	169.5
Tier III mode	160.5	163.0	170.5

MAN B&W G50ME-C9.6

Tier III

Cyl.	L_1 kW
5	8,600
6	10,320
7	12,040
8	13,760
9	15,480

Stroke: 2,500 mm/**L_1 MEP:** 21.0 bar



GI (Methane)

MAN B&W G50ME-C9.6-GI-EGRBP

L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	132.8+4.0/159.5	135.8+3.0/162.0	143.0+2.5/170.0
Tier III mode	138.8+4.0/166.5	139.7+3.0/166.5	144.7+2.5/172.0

MAN B&W G50ME-C9.6-GI-HPSCR

L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	132.8+4.0/159.5	135.8+3.0/162.0	142.6+2.5/169.5
Tier III mode	134.1+4.0/161.0	136.7+3.0/163.0	143.0+2.5/170.0

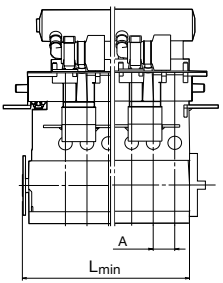
MAN B&W G50ME-C9.6-GI-LPSCR

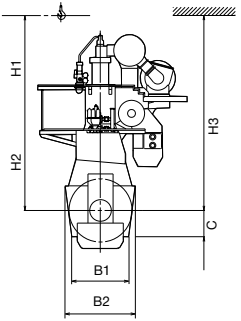
L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	132.8+4.0/159.5	135.8+3.0/162.0	142.6+2.5/169.5
Tier III mode	133.7+4.0/160.5	136.7+3.0/163.0	143.5+2.5/170.5

Note: Also available for GIE, LGIM and LGIP, except GIE and EGR, see pages 12-14

Specifications

Dimensions:		A	B1	B2	C	H1	H2	H3
mm		872	3,776	3,652	1,205	10,775	10,075	9,775
Cylinders:		**5**	**6**	**7**	**8**	**9**		
L_{min}	mm	5,748	6,620	7,492	8,364	9,236		
Dry mass								
Tier II	**t**	211	246	276	311	346		
Tier III (added)								
EGR	**t**	12	12	13	13	13		
HPSCR	**t**	4	4	5	6	6		
LPSCR	**t**	-	-	-	-	-		
Dual fuel (added)								
GI	**t**	4	4	5	5	6		



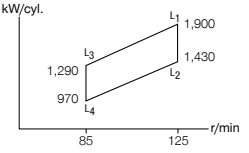


MAN B&W S50ME-C10.6

Tier II Tier III

Cyl.	L_1 kW
5	9,500
6	11,400
7	13,300
8	15,200
9	17,100

Stroke: 2,214 mm/L_1 **MEP:** 21.0 bar



Fuel oil

MAN B&W S50ME-C10.6

L_1 SFOC [g/kWh]			
Opt. load range	**50%**	**75%**	**100%**
High-load	158.5	157.0	161.0
Low-load EGB	154.5	155.0	165.0

MAN B&W S50ME-C10.6-EGRBP

L_1 SFOC [g/kWh]			
	50%	**75%**	**100%**
Tier II mode	154.5	155.0	166.0
Tier III mode	157.5	157.0	166.0

MAN B&W S50ME-C10.6-HPSCR

L_1 SFOC [g/kWh]			
	50%	**75%**	**100%**
Tier II mode	154.5	155.0	165.0
Tier III mode	154.5	155.0	165.5

MAN B&W S50ME-C10.6-LPSCR

L_1 SFOC [g/kWh]			
	50%	**75%**	**100%**
Tier II mode	154.5	155.0	165.0
Tier III mode	157	156.5	165.5

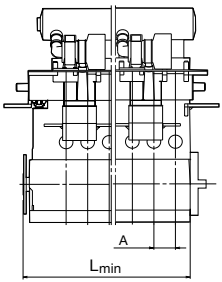
Specifications

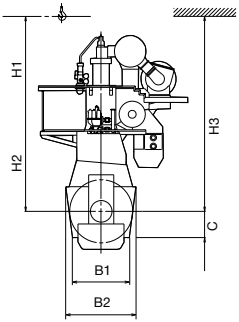
Dimensions:	A	B1	B2	C	H1	H2	H3
mm	875	3,350	3,290	1,190	9,875	9,125	8,850

Cylinders:	5	6	7	8	9
L_{min} mm	5,747	6,622	7,497	8,372	9,247

Dry mass

Tier II	t	195	226	262	293	324
Tier III (added)						
EGR	t	-	-	-	-	-
HPSCR	t	-	-	-	-	-
LPSCR	t	-	-	-	-	-



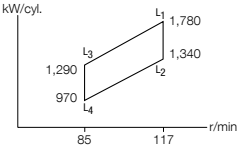


MAN B&W S50ME-C9.7

Tier II

Cyl.	L_1 kW
5	8,900
6	10,680
7	12,460
8	14,240
9	16,020

Stroke: 2,214 mm/**L_1 MEP:** 21.0 bar



Fuel oil

MAN B&W S50ME-C9.7

L_1 SFOC [g/kWh]			
Opt. load range	**50%**	**75%**	**100%**
High-load	161.5	160.5	165.0
Part-load EGB	159.5	159.0	167.5
Low-load EGB	157.5	160.0	167.5

GI (Methane)

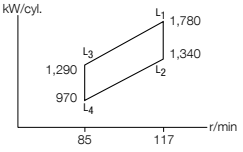
MAN B&W S50ME-C9.7-GI

L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
Gas tuned	**50%**	**75%**	**100%**
High-load	131.1+3.9/161.5	131.2+3.0/160.5	137.9+2.5/165.0

Note: Also available for GIE, LGIM and LGIP, see page 12

Cyl.	L_1 kW
5	8,900
6	10,680
7	12,460
8	14,240
9	16,020

Stroke: 2,214 mm/**L1 MEP:** 21.0 bar



Fuel oil

MAN B&W S50ME-C9.7-EGRBP

L_1 SFOC [g/kWh]			
	50%	75%	100%
Tier II mode	157.5	160.0	168.0
Tier III mode	164.5	164.5	170.0

MAN B&W S50ME-C9.7-HPSCR

L_1 SFOC [g/kWh]			
	50%	75%	100%
Tier II mode	157.5	160.0	167.5
Tier III mode	159.0	161.0	168.0

MAN B&W S50ME-C9.7-LPSCR

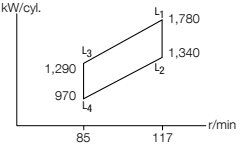
L_1 SFOC [g/kWh]			
	50%	75%	100%
Tier II mode	157.5	160.0	167.5
Tier III mode	158.5	161.0	168.5

MAN B&W S50ME-C9.7

Tier III

Cyl.	L_1 kW
5	8,900
6	10,680
7	12,460
8	14,240
9	16,020

Stroke: 2,214 mm/**L_1 MEP:** 21.0 bar



GI (Methane)

MAN B&W S50ME-C9.7-GI-EGRBP

L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	131.1+3.9/157.5	134.2+3.0/160.0	141.4+2.5/168.0
Tier III mode	137.1+3.9/164.5	138.0+3.0/164.5	143.1+2.5/170.0

MAN B&W S50ME-C9.7-GI-HPSCR

L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	131.1+3.9/157.5	134.2+3.0/160.0	140.9+2.5/167.5
Tier III mode	132.4+3.9/159.0	135.0+3.0/161.0	141.4+2.5/168.0

MAN B&W S50ME-C9.7-GI-LPSCR

L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	131.1+3.9/157.5	134.2+3.0/160.0	140.9+2.5/167.5
Tier III mode	132.0+3.9/158.5	135.0+3.0/161.0	141.8+2.5/168.5

Note: Also available for GIE, LGIM and LGIP, except GIE and EGR, see pages 12-14

MAN B&W S50ME-C9.7

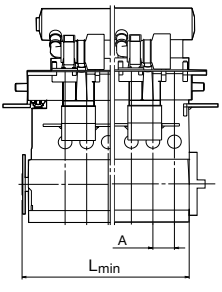
Specifications

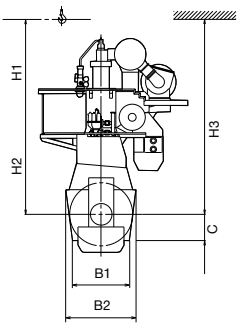
Dimensions:		A	B1	B2	C	H1	H2	H3
mm		875	3,350	3,290	1,190	9,875	9,125	8,850

Cylinders:		5	6	7	8	9
L_{min}	mm	5,747	6,622	7,497	8,372	9,247

Dry mass

Tier II	**t**	193	223	259	289	320
Tier III (added)						
EGR	**t**	12	12	13	13	13
HPSCR	**t**	4	4	5	6	7
LPSCR	**t**	-	-	-	-	-
Dual fuel (added)						
GI	**t**	4	4	5	5	6



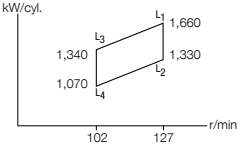


MAN B&W S50ME-C8.5

Tier II

Cyl.	L_1 kW
5	8,300
6	9,960
7	11,620
8	13,280
9	14,940

Stroke: 2,000 mm/**L_1 MEP:** 20.0 bar



Fuel oil

MAN B&W S50ME-C8.5

L_1 SFOC [g/kWh]			
Opt. load range	**50%**	**75%**	**100%**
High-load	168.5	166.0	170.0
Part-load EGB	165.5	164.5	171.5
Low-load EGB	163.5	165.5	171.5

GI (Methane)

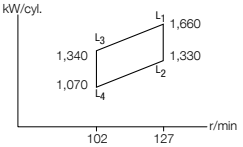
MAN B&W S50ME-C8.5-GI

L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
Gas tuned	**50%**	**75%**	**100%**
High-load	137.0+4.1/168.5	135.8+3.1/166.0	142.1+2.6/170.0

Note: Also available for GIE and LGIP, see page 12

Cyl.	L_1 kW
5	8,300
6	9,960
7	11,620
8	13,280
9	14,940

Stroke: 2,000 mm/**L1 MEP:** 20.0 bar



Fuel oil

MAN B&W S50ME-C8.5-EGRBP

L_1 SFOC [g/kWh]			
	50%	75%	100%
Tier II mode	163.5	165.5	172.0
Tier III mode	171.5	170.0	175.0

MAN B&W S50ME-C8.5-HPSCR

L_1 SFOC [g/kWh]			
	50%	75%	100%
Tier II mode	163.5	165.5	171.5
Tier III mode	165.0	166.5	172.0

MAN B&W S50ME-C8.5-LPSCR

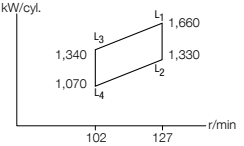
L_1 SFOC [g/kWh]			
	50%	75%	100%
Tier II mode	163.5	165.5	171.5
Tier III mode	164.5	166.5	172.5

MAN B&W S50ME-C8.5

Tier III

Cyl.	L_1 kW
5	8,300
6	9,960
7	11,620
8	13,280
9	14,940

Stroke: 2,000 mm/**L_1 MEP:** 20.0 bar



GI (Methane)

MAN B&W S50ME-C8.5-GI-EGRBP

L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	136.2+4.1/163.5	138.8+3.1/165.5	144.7+2.6/172.0
Tier III mode	143.0+4.1/171.5	142.6+3.1/170.0	147.3+2.6/175.0

MAN B&W S50ME-C8.5-GI-HPSCR

L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	136.2+4.1/163.5	138.8+3.1/165.5	144.3+2.6/171.5
Tier III mode	137.5+4.1/165.0	139.6+3.1/166.5	144.7+2.6/172.0

MAN B&W S50ME-C8.5-GI-LPSCR

L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	136.2+4.1/163.5	138.8+3.1/165.5	144.3+2.6/171.5
Tier III mode	137.0+4.1/164.5	139.6+3.1/166.5	145.1+2.6/172.5

Note: Also available for GIE and LGIP, except GIE and EGR, see pages 12-14

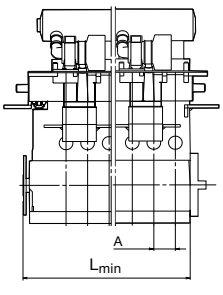
MAN B&W S50ME-C8.5

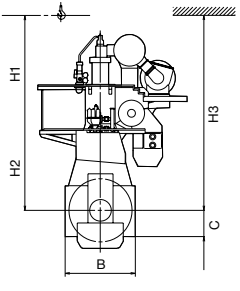
Specifications

Dimensions:		A	B	C	H1	H2	H3
mm		850	3,150	1,085	9,050	8,500	8,250

Cylinders:		5	6	7	8	9
L_{min}	mm	5,542	6,392	7,242	8,092	8,942

Dry mass						
Tier II	t	180	210	240	270	295
Tier III (added)						
EGR	t	12	12	13	13	13
HPSCR	t	3	4	5	5	6
LPSCR	t	-	-	-	-	-
Dual fuel (added)						
GI	t	4	4	5	5	6



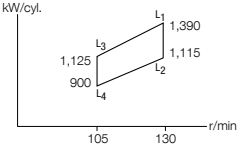


MAN B&W S46ME-C8.6

Tier II

Cyl.	L_1 kW
5	6,950
6	8,340
7	9,730
8	11,120

Stroke: 1,932 mm/**L_1 MEP:** 20.0 bar



Fuel oil

MAN B&W S46ME-C8.6

L_1 SFOC [g/kWh]			
Opt. load range	**50%**	**75%**	**100%**
High-load	165.5	163.0	167.0
Part-load EGB	162.5	161.5	168.5
Low-load EGB	160.5	162.5	168.5

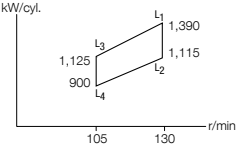
GI (Methane)

MAN B&W S46ME-C8.6-GI

L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
Gas tuned	**50%**	**75%**	**100%**
High-load	134.5+4.0/165.5	133.3+3.0/163.1	139.6+2.5/167.0

Cyl.	L_1 kW
5	6,950
6	8,340
7	9,730
8	11,120

Stroke: 1,932 mm/L_1 **MEP:** 20.0 bar



Fuel oil

MAN B&W S46ME-C8.6-EGRBP

L_1 SFOC [g/kWh]			
	50%	75%	100%
Tier II mode	160.5	162.5	169.0
Tier III mode	168.5	167.0	172.0

MAN B&W S46ME-C8.6-HPSCR

L_1 SFOC [g/kWh]			
	50%	75%	100%
Tier II mode	160.5	162.5	168.5
Tier III mode	162.0	163.5	169.0

MAN B&W S46ME-C8.6-LPSCR

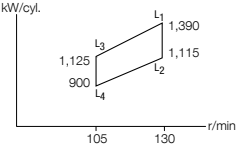
L_1 SFOC [g/kWh]			
	50%	75%	100%
Tier II mode	160.5	162.5	168.5
Tier III mode	161.5	163.5	169.5

MAN B&W S46ME-C8.6

Tier II Tier III

Cyl.	L_1 kW
5	6,950
6	8,340
7	9,730
8	11,120

Stroke: 1,932 mm/**L_1 MEP:** 20.0 bar



GI (Methane)

MAN B&W S46ME-C8.6-GI-EGRBP

L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	133.7+4.0/160.5	136.3+3.0/162.5	142.2+2.5/169.0
Tier III mode	140.5+4.0/168.5	140.1+3.0/167.0	144.7+2.5/172.0

MAN B&W S46ME-C8.6-GI-HPSCR

L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	133.7+4.0/160.5	136.3+3.0/162.5	141.8+2.5/168.5
Tier III mode	134.9+4.0/162.0	137.1+3.0/163.5	142.2+2.5/169.0

MAN B&W S46ME-C8.6-GI-LPSCR

L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	133.7+4.0/160.5	136.3+3.0/162.5	141.8+2.5/168.5
Tier III mode	134.5+4.0/161.5	137.1+3.0/163.5	142.6+2.5/169.5

MAN B&W S46ME-C8.6

Specifications

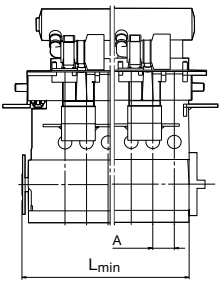
Dimensions:		A	B	C	H1	H2	H3
mm		782	2,924	986	8,725	8,175	7,925

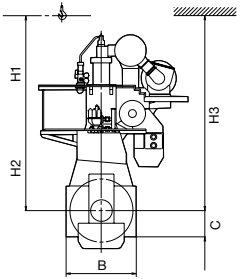
Cylinders:		5	6	7	8
L_{min}	mm	5,100	5,882	6,664	7,446

Dry mass					
Tier II	t	150	168	191	211

Tier III (added)					
EGR	t	12	12	12	12
HPSCR	t	3	3	4	5
LPSCR	t	-	-	-	-

Dual fuel (added)					
GI	t	-	-	-	-



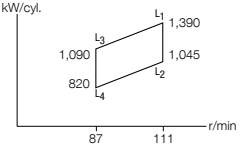


MAN B&W G45ME-C9.7

Tier II Tier III

Cyl.	L_1 kW
5	6,950
6	8,340
7	9,730
8	11,120

Stroke: 2,250 mm/L_1 **MEP:** 21.0 bar



Fuel oil – Tier II

MAN B&W G45ME-C9.7

L_1 SFOC [g/kWh]			
Opt. load range	**50%**	**75%**	**100%**
High-load	162.5	161.5	166.0
Part-load EGB	160.5	160.0	168.5
Low-load EGB	158.5	161.0	168.5

Fuel oil – Tier III

MAN B&W G45ME-C9.7-EGRBP

L_1 SFOC [g/kWh]			
	50%	**75%**	**100%**
Tier II mode	158.5	161.0	169.0
Tier III mode	165.5	165.5	171.0

MAN B&W G45ME-C9.7-HPSCR

L_1 SFOC [g/kWh]			
	50%	**75%**	**100%**
Tier II mode	158.5	161.0	168.5
Tier III mode	160.0	162.0	169.0

MAN B&W G45ME-C9.7-LPSCR

L_1 SFOC [g/kWh]			
	50%	**75%**	**100%**
Tier II mode	158.5	161.0	168.5
Tier III mode	159.5	162.0	169.5

MAN B&W G45ME-C9.7

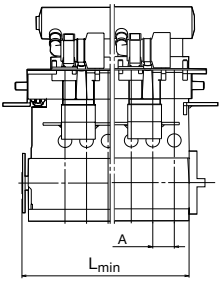
Specifications

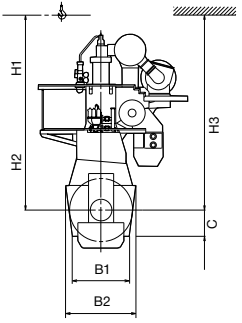
Dimensions:		A	B1	B2	C	H1	H2	H3
mm		784	3,350	3,260	1,169	9,725	9,525	9,250

Cylinders:		5	6	7	8
L_{min}	mm	5,200	5,984	6,768	7,552

Dry mass

Tier II	t	165	186	209	238
Tier III (added)					
EGR	t	12	12	12	12
HPSCR	t	3	3	4	5
LPSCR	t	-	-	-	-



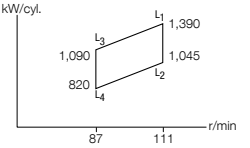


MAN B&W G45ME-C9.5-GI

Tier II Tier III

Cyl.	L_1 kW
5	6,950
6	8,340
7	9,730
8	11,120

Stroke: 2,250 mm/L_1 **MEP:** 21.0 bar



GI (Methane) – Tier II

MAN B&W G45ME-C9.5-GI

L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
Gas tuned	**50%**	**75%**	**100%**
High-load	137.0+4.1/168.5	135.8+3.1/166.0	142.1+2.6/170.0

GI (Methane) – Tier III

MAN B&W G45ME-C9.5-GI-EGRBP

L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
	50%	**75%**	**100%**
Tier II mode	136.2+4.1/163.5	138.8+3.1/165.5	144.7+2.6/172.0
Tier III mode	143.0+4.1/171.5	142.6+3.1/170.0	147.3+2.6/175.0

MAN B&W G45ME-C9.5-GI-HPSCR

L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
	50%	**75%**	**100%**
Tier II mode	136.2+4.1/163.5	138.8+3.1/165.5	144.3+2.6/171.5
Tier III mode	137.5+4.1/165.0	139.6+3.1/166.5	144.7+2.6/172.0

MAN B&W G45ME-C9.5-GI-LPSCR

L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
	50%	**75%**	**100%**
Tier II mode	136.2+4.1/163.5	138.8+3.1/165.5	144.3+2.6/171.5
Tier III mode	137.0+4.1/164.5	139.6+3.1/166.5	145.1+2.6/172.5

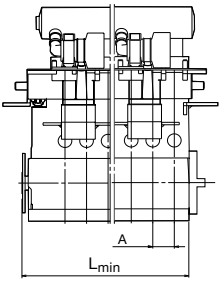
MAN B&W G45ME-C9.5-GI

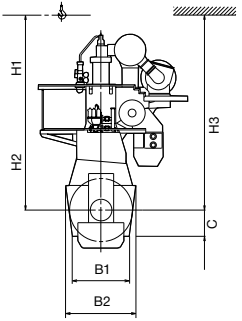
Specifications

Dimensions:	A	B1	B2	C	H1	H2	H3
mm	784	3,350	3,260	1,169	9,725	9,525	9,250

Cylinders:		5	6	7	8
L_{min}	mm	5,200	5,984	6,768	7,552

Dry mass					
Tier II	t	163	183	206	234
Tier III (added)					
EGR	t	12	12	12	12
HPSCR	t	3	3	4	5
LPSCR	t	-	-	-	-
Dual fuel (added)					
GI	t	4	4	5	5



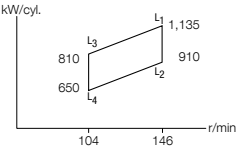


MAN B&W S40ME-C9.5

Tier II

Cyl.	L_1 kW
5	5,675
6	6,810
7	7,945
8	9,080
9	10,215

Stroke: 1,770 mm/**L_1 MEP:** 21.0 bar



Fuel oil

MAN B&W S40ME-C9.5

L_1 SFOC [g/kWh]			
Opt. load range	**50%**	**75%**	**100%**
High-load	172.5	170.0	174.0
Part-load EGB	169.5	168.5	175.5
Low-load EGB	167.5	169.5	175.5

GI (Methane)

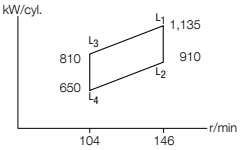
MAN B&W S40ME-C9.5-GI

L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
Gas tuned	**50%**	**75%**	**100%**
High-load	140.4+4.1/172.5	139.2+3.2/170.0	145.5+2.6/174.0

Note: All fuel consumption figures are based on engine driven HPS.

Cyl.	L_1 kW
5	5,675
6	6,810
7	7,945
8	9,080
9	10,215

Stroke: 1,770 mm/**L_1 MEP:** 21.0 bar



Fuel oil

MAN B&W S40ME-C9.5-EGRBP

L_1 SFOC [g/kWh]			
	50%	75%	100%
Tier II mode	167.5	169.5	176.0
Tier III mode	175.5	174.0	179.0

MAN B&W S40ME-C9.5-HPSCR

L_1 SFOC [g/kWh]			
	50%	75%	100%
Tier II mode	167.5	169.5	175.5
Tier III mode	169.0	170.5	176.0

MAN B&W S40ME-C9.5-LPSCR

L_1 SFOC [g/kWh]			
	50%	75%	100%
Tier II mode	167.5	169.5	175.5
Tier III mode	168.5	170.5	176.5

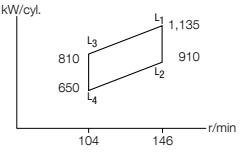
Note: All fuel consumption figures are based on engine driven HPS.

MAN B&W S40ME-C9.5

Tier III

Cyl.	L_1 kW
5	5,675
6	6,810
7	7,945
8	9,080
9	10,215

Stroke: 1,770 mm/**L_1 MEP:** 21.0 bar



GI (Methane)

MAN B&W S40ME-C9.5-GI-EGRBP

L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	139.5+4.1/167.5	142.2+3.2/169.5	148.1+2.6/176.0
Tier III mode	146.3+4.1/175.5	146.0+3.2/174.0	150.6+2.6/179.0

MAN B&W S40ME-C9.5-GI-HPSCR

L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	139.5+4.1/167.5	142.2+3.2/169.5	147.6+2.6/175.5
Tier III mode	140.8+4.1/169.0	143.0+3.2/170.5	148.1+2.6/176.0

MAN B&W S40ME-C9.5-GI-LPSCR

L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	139.5+4.1/167.5	142.2+3.2/169.5	147.6+2.6/175.5
Tier III mode	140.4+4.1/168.5	143.0+3.2/170.5	148.5+2.6/176.5

Note: All fuel consumption figures are based on engine driven HPS.

Specifications

Dimensions:		A	B1	B2	C	H1	H2	H3
mm		700	2,650	2,610	950	7,800	7,475	7,200

Cylinders:		5	6	7	8	9
L_{min}	mm	4,642	5,342	6,042	6,742	7,442

Dry mass

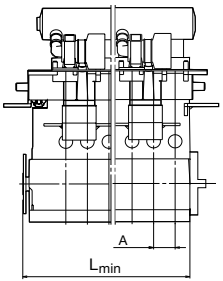
Tier II	t	107	126	142	157	189

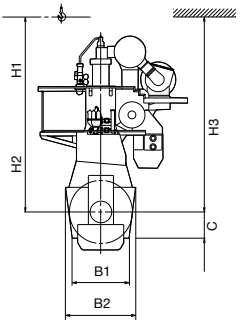
Tier III (added)

EGR	t	10	10	10	10	10
HPSCR	t	2	3	3	4	4
LPSCR	t	-	-	-	-	-

Dual fuel (added)

GI	t	3	3	4	4	5



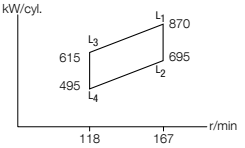


MAN B&W S35ME-C9.7

Tier II

Cyl.	L_1 kW
5	4,350
6	5,220
7	6,090
8	6,960

Stroke: 1,550 mm/**L_1 MEP:** 21.0 bar



Fuel oil

MAN B&W S35ME-C9.7

L_1 SFOC [g/kWh]			
Opt. load range	**50%**	**75%**	**100%**
High-load	169.5	167.0	171.0
Part-load EGB	166.5	165.5	172.5
Low-load EGB	164.5	166.5	172.5

GI (Methane)

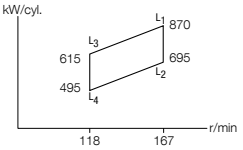
MAN B&W S35ME-C9.7-GI

L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
	50%	**75%**	**100%**
Tier II mode	137.9+4.1/169.5	136.7+3.1/167.0	143.0+2.4/171.0

Note: Also available for LGIP, see page 12
Note: All fuel consumption figures are based on engine driven HPS.

Cyl.	L_1 kW
5	4,350
6	5,220
7	6,090
8	6,960

Stroke: 1,550 mm/**L_1 MEP:** 21.0 bar



Fuel oil

MAN B&W S35ME-C9.7-EGRBP

L_1 SFOC [g/kWh]			
	50%	**75%**	**100%**
Tier II mode	164.5	166.5	173.0
Tier III mode	172.5	171.0	176.0

MAN B&W S35ME-C9.7-HPSCR

L_1 SFOC [g/kWh]			
	50%	**75%**	**100%**
Tier II mode	164.5	166.5	172.5
Tier III mode	166.0	167.5	173.0

MAN B&W S35ME-C9.7-LPSCR

L_1 SFOC [g/kWh]			
	50%	**75%**	**100%**
Tier II mode	164.5	166.5	172.5
Tier III mode	165.5	167.5	173.5

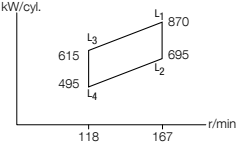
Note: All fuel consumption figures are based on engine driven HPS.

MAN B&W S35ME-C9.7

Tier III

Cyl.	L_1 kW
5	4,350
6	5,220
7	6,090
8	6,960

Stroke: 1,550 mm/**L_1 MEP:** 21.0 bar



GI (Methane)

MAN B&W S35ME-C9.7-GI-EGRBP

L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	137.0+4.1/164.5	139.6+3.1/166.5	145.6+2.6/173.0
Tier III mode	143.8+4.1/172.5	143.5+3.1/171.0	148.1+2.6/176.0

MAN B&W S35ME-C9.7-GI-HPSCR

L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	137.0+4.1/164.5	139.6+3.1/166.5	145.1+2.6/172.5
Tier III mode	138.3+4.1/166.0	140.5+3.1/167.5	145.6+2.6/173.0

MAN B&W S35ME-C9.7-GI-LPSCR

L_1 dual fuel mode (SGC+SPOC (1.5%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	137.0+4.1/164.5	139.6+3.1/166.5	145.1+2.6/172.5
Tier III mode	137.9+4.1/165.5	140.5+3.1/167.5	146.0+2.6/173.5

Note: Also available for LGIP, see page 12
Note: All fuel consumption figures are based on engine driven HPS.

MAN B&W S35ME-C9.7

Specifications

Dimensions:		A	B1	B2	C	H1	H2	H3
mm		612	2,300	2,288	830	7,025	6,675	6,275

Cylinders:		5	6	7	8
L_{min}	mm	4,080	4,692	5,304	5,916

Dry mass

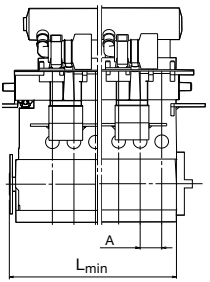
Tier II	**t**	77	87	98	108

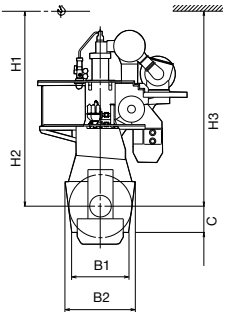
Tier III (added)

EGR	**t**	8	8	8	8
HPSCR	**t**	2	2	3	3
LPSCR	**t**	-	-	-	-

Dual fuel (added)

GI	**t**	3	3	4	4
LGIP	**t**	5	5	6	6



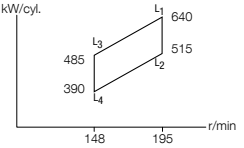


MAN B&W S30ME-B9.5

Tier II | Tier III

Cyl.	L_1 kW
5	3,200
6	3,840
7	4,480
8	5,120

Stroke: 1,328 mm/**L_1 MEP:** 21.0 bar



Tier II Fuel oil

MAN B&W S30ME-B9.5

L_1 SFOC [g/kWh]			
Opt. load range	50%	75%	100%
High-load	175.5	173.0	176.0

Tier III fuel oil

MAN B&W S30ME-B9.5-HPSCR

L_1 SFOC [g/kWh]			
	50%	**75%**	**100%**
Tier II mode	175.5	173.0	176.0
Tier III mode	177.0	174.0	176.5

MAN B&W S30ME-B9.5-LPSCR

L_1 SFOC [g/kWh]			
	50%	**75%**	**100%**
Tier II mode	175.5	173.0	176.0
Tier III mode	176.0	173.5	176.5

Note: If EGR is the preferred Tier III technology, MAN Energy Solutions must be contacted.

MAN B&W S30ME-B9.5

Specifications

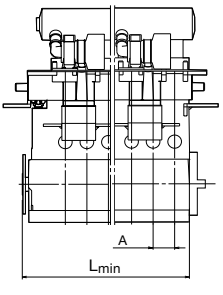
Dimensions:	A	B1	B2	C	H1	H2	H3
mm	538	1,980	2,020	712	6,025	5,950	5,625

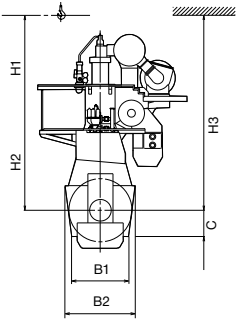
Cylinders:	5	6	7	8
L_{min} mm	3,700	4,238	4,776	5,314

Dry mass

Tier II t	61	69	77	86

Tier III (added)				
HPSCR t	1	2	2	2
LPSCR t	-	-	-	-





MAN B&W two-stroke propulsion engines

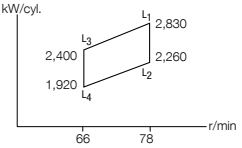
Alternative fuels
Tier II and Tier III

MAN B&W G70ME-C10.5-GA

Tier II Tier III

Cyl.	L_1 kW
5	14,150
6	16,980

Stroke: 3,256 mm/**L_1 MEP:** 17.4 bar



GA (Methane)

MAN B&W G70ME-C10.5-GA-EGRBP

L_1 dual fuel mode equivalent SFOC (heat-rate)/fuel oil mode SFOC [g/kWh]

	50%	75%	100%
Tier III mode	162.0 (6,918)/171.9	161.0 (6,876)/171.0	166.0 (7,088)/179.0
Tier II mode	162.0 (6,918)/170.1	161.0 (6,876)/169.2	166.0 (7,088)/177.1

Note. Also available without EGR, but with adjusted engine data.

MAN B&W G70ME-C10.5-GA

Specifications

Dimensions:	A	B1	B2	C	H1
mm	1,044	4,470	4,628	1,750	13,625

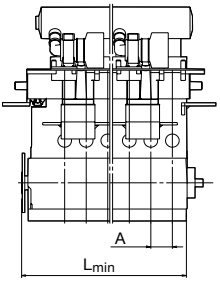
Cylinders:		5	6
L_{min}	mm	7,549	8,443

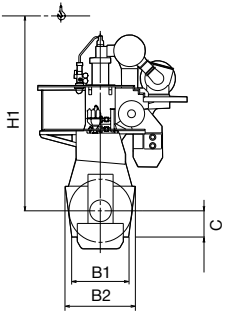
Dry mass

Tier II	t	458	549

Dual fuel (added)

GA	t	5	5



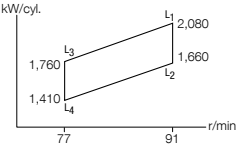


MAN B&W G60ME-C10.5-GA

Tier II Tier III

Cyl.	L_1 kW
5	10,400
6	12,480
7	14,560
8	16,640

Stroke: 2,790 mm/**L_1 MEP:** 17.4 bar



GA (Methane)

MAN B&W G60ME-C10.5-GA-EGRBP

L_1 dual fuel mode equivalent SFOC (heat-rate)/fuel oil mode SFOC [g/kWh]

	50%	75%	100%
Tier III mode	162.0 (6,917)/172.1	161.0 (6,877)/171.2	166.0 (7,088)/179.1
Tier II mode	162.0 (6,917)/170.3	161.0 (6,877)/169.4	166.0 (7,088)/177.3

Note: Also available without EGR, but with adjusted engine data.

Specifications

Dimensions:	A	B1	B2	C	H1	H2	H3
mm	1,080	4,090	4,220	1,500	12,175	11,400	11,075

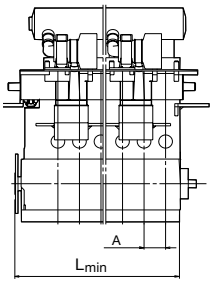
Cylinders:	5	6	7	8
L_{min} mm	7,378	8,458	9,538	10,618

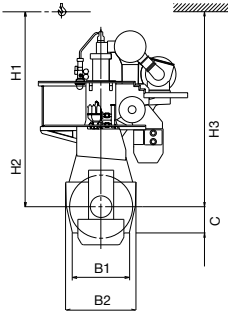
Dry mass

Tier II t	352	423	493	564

Dual fuel (added)

GA t	5	5	6	7



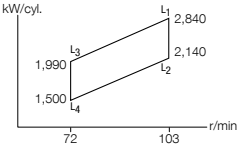


MAN B&W G60ME-C10.5

Tier II

Cyl.	L_1 kW
5	14,200
6	17,040
7	19,880
8	22,720

Stroke: 2,790 mm/L_1 **MEP:** 21.0 bar



GIE (Ethane)

MAN B&W G60ME-C10.5-GIE

L_1 dual fuel mode (SGC+SPOC (3.0%))/fuel oil mode (SFOC) [g/kWh]			
Gas tuned	**50%**	**75%**	**100%**
High-load	140.8+7.9/164.5	143.5+6.0/160.0	148.4+5.0/165.0

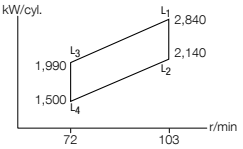
LGIP (LPG)

MAN B&W G60ME-C10.5-LGIP

L_1 dual fuel mode (SGC+SPOC (3.0%))/fuel oil mode (SFOC) [g/kWh]			
Gas tuned	**50%**	**75%**	**100%**
High-load	145.4+7.9/161.5	148.2+6.0/160.5	153.2+5.0/165.0

Cyl.	L_1 kW
5	14,200
6	17,040
7	19,880
8	22,720

Stroke: 2,790 mm/**L_1 MEP:** 21.0 bar



GIE (Ethane)

MAN B&W G60ME-C10.5-GIE-HPSCR

L_1 dual fuel mode (SGC+SPOC (3.0%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	137.2+7.9/157.5	143.0+6.0/160.0	150.6+5.0/167.5
Tier III mode	138.6+7.9/159.0	143.9+6.0/161.0	151.1+5.0/168.0

MAN B&W G60ME-C10.5-GIE-LPSCR

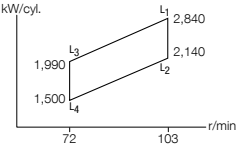
L_1 dual fuel mode (SGC+SPOC (3.0%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	137.2+7.9/157.5	143.0+6.0/160.0	150.6+5.0/167.5
Tier III mode	138.1+7.9/158.5	143.9+6.0/161.0	151.5+5.0/168.5

MAN B&W G60ME-C10.5

Tier III

Cyl.	L_1 kW
5	14,200
6	17,040
7	19,880
8	22,720

Stroke: 2,790 mm/L_1 **MEP:** 21.0 bar



LGIP (LPG)

MAN B&W G60ME-C10.5-LGIP-EGRBP

L_1 dual fuel mode (SGC+SPOC (3.0%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	138.9+7.9/157.5	143.0+6.0/160.0	151.4+5.0/168.0
Tier III mode	145.4+7.9/164.5	147.2+6.0/164.5	153.2+5.0/170.0

MAN B&W G60ME-C10.5-LGIP-HPSCR

L_1 dual fuel mode (SGC+SPOC (3.0%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	138.9+7.9/157.5	143.0+6.0/160.0	150.9+5.0/167.5
Tier III mode	140.3+7.9/159.0	144.0+6.0/161.0	151.4+5.0/168.0

MAN B&W G60ME-C10.5-LGIP-LPSCR

L_1 dual fuel mode (SGC+SPOC (3.0%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	138.9+7.9/157.5	143.0+6.0/160.0	150.9+5.0/167.5
Tier III mode	139.8+7.9/158.5	144.0+6.0/161.0	151.8+5.0/168.5

MAN B&W G60ME-C10.5

Specifications

Dimensions:	A	B1	B2	C	H1	H2	H3
mm	1,080	4,090	4,220	1,500	12,175	11,400	11,075

Cylinders:	5	6	7	8
L_{min} mm	7,390	8,470	9,550	10,630

Dry mass

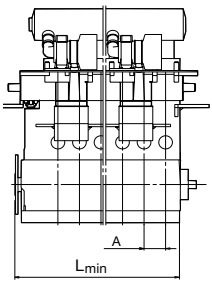
Tier II t	352	423	493	564

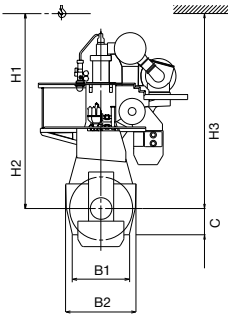
Tier III (added)

EGR t	24	24	28	28
HPSCR t	8	17	21	21
LPSCR t	-	-	-	-

Dual fuel (added)

GI t	5	5	6	7
LGIP t	5	5	6	7



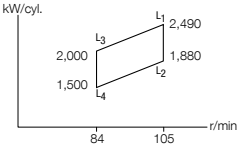


MAN B&W S60ME-C10.5

Tier II

Cyl.	L_1 kW
5	12,450
6	14,940
7	17,430
8	19,920

Stroke: 2,400 mm/**L_1 MEP:** 21.0 bar



GIE (Ethane)

MAN B&W S60ME-C10.5-GIE

L_1 dual fuel mode (SGC+SPOC (3.0%))/fuel oil mode (SFOC) [g/kWh]			
Gas tuned	**50%**	**75%**	**100%**
High-load	143.5+7.9/164.5	144.8+6.0/162.0	149.2+5.0/166.0

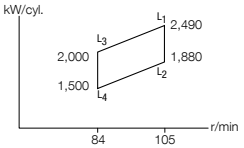
LGIP (LPG)

MAN B&W S60ME-C10.5-LGIP

L_1 dual fuel mode (SGC+SPOC (3.0%))/fuel oil mode (SFOC) [g/kWh]			
Gas tuned	**50%**	**75%**	**100%**
High-load	145.4+7.9/164.5	144.9+6.0/162.0	149.5+5.0/166.0

Cyl.	L_1 kW
5	12,450
6	14,940
7	17,430
8	19,920

Stroke: 2,400 mm/**L_1 MEP:** 21.0 bar



GIE (Ethane)

MAN B&W S60ME-C10.5-GIE-HPSCR

L_1 dual fuel mode (SGC+SPOC (3.0%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	139.0+7.9/159.5	144.3+6.0/161.5	150.6+5.0/167.5
Tier III mode	140.3+7.9/161.0	145.2+6.0/162.5	151.0+5.0/168.0

MAN B&W S60ME-C10.5-GIE-LPSCR

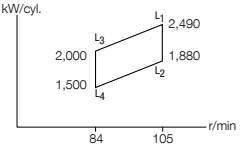
L_1 dual fuel mode (SGC+SPOC (3.0%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	139.0+7.9/159.5	144.3+6.0/161.5	150.6+5.0/167.5
Tier III mode	139.9+7.9/160.5	145.2+6.0/162.5	151.5+5.0/168.5

MAN B&W S60ME-C10.5

Tier III

Cyl.	L_1 kW
5	12,450
6	14,940
7	17,430
8	19,920

Stroke: 2,400 mm/**L_1 MEP:** 21.0 bar



LGIP (LPG)

MAN B&W S60ME-C10.5-LGIP-EGRBP

L_1 dual fuel mode (SGC+SPOC (3.0%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	140.7+7.9/159.5	144.4+6.0/161.5	151.3+5.0/168.0
Tier III mode	148.1+7.9/167.5	148.6+6.0/166.0	154.1+5.0/171.0

MAN B&W S60ME-C10.5-LGIP-HPSCR

L_1 dual fuel mode (SGC+SPOC (3.0%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	140.7+7.9/159.5	144.4+6.0/161.5	150.9+5.0/167.5
Tier III mode	142.1+7.9/161.0	145.3+6.0/162.5	151.3+5.0/168.0

MAN B&W S60ME-C9.10-LGIP-LPSCR

L_1 dual fuel mode (SGC+SPOC (3.0%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	140.7+7.9/159.5	144.4+6.0/161.5	150.9+5.0/167.5
Tier III mode	141.6+7.9/160.5	145.3+6.0/162.5	151.8+5.0/168.5

Specifications

Dimensions:	A	B1	B2	C	H1	H2	H3
mm	940	3,440	3,520	1,300	10,500	9,725	10,125

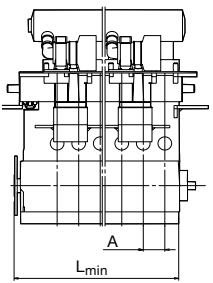
Cylinders:	5	6	7	8
L_{min} mm	6,440	7,380	8,320	9,260

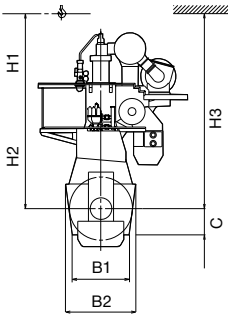
Dry mass

Tier II t	293	332	369	425

Tier III (added)				
EGR t	12	12	21	12
HPSCR t	6	6	6	6
LPSCR t	-	-	-	-

Dual fuel (added)				
GI t	5	5	6	7
LGIP t	5	5	6	7



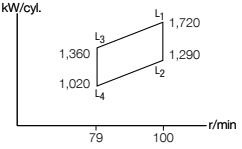


MAN B&W G50ME-C9.6

Tier II

Cyl.	L_1 kW
5	8,600
6	10,320
7	12,040
8	13,760
9	15,480

Stroke: 2,500 mm/L_1 **MEP:** 21.0 bar



GIE (Ethane)

MAN B&W G50ME-C9.6-GIE

L_1 dual fuel mode (SGC+SPOC (3.0%))/fuel oil mode (SFOC) [g/kWh]			
Gas tuned	**50%**	**75%**	**100%**
High-load	142.6+7.9/163.5	145.2+6.0/162.5	150.1+5.0/167.0

LGIM (Methanol)

MAN B&W G50ME-C9.6-LGIM

L_1 dual fuel mode (SGC+SPOC (5.0%))/fuel oil mode (SFOC) [g/kWh]			
Gas tuned	**50%**	**75%**	**100%**
High-load	322.4+13.3/163.5	327.2+10.1/162.5	340.4+8.4/167.0

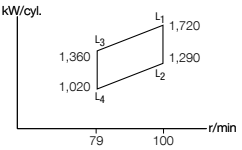
LGIP (LPG)

MAN B&W G50ME-C9.6-LGIP

L_1 dual fuel mode (SGC+SPOC (3.0%))/fuel oil mode (SFOC) [g/kWh]			
Gas tuned	**50%**	**75%**	**100%**
High-load	144.4+7.9/163.5	145.3+6.0/162.5	150.4+5.0/167.0

Cyl.	L_1 kW
5	8,600
6	10,320
7	12,040
8	13,760
9	15,480

Stroke: 2,500 mm/**L_1 MEP:** 21.0 bar



GIE (Ethane)

MAN B&W G50ME-C9.6-GIE-HPSCR

L_1 dual fuel mode (SGC+SPOC (3.0%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	139.0+7.9/159.5	144.8+6.0/162.0	152.4+5.0/169.5
Tier III mode	140.3+7.9/161.0	145.7+6.0/163.0	152.8+5.0/170.0

MAN B&W G50ME-C9.6-GIE-LPSCR

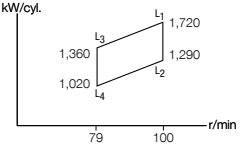
L_1 dual fuel mode (SGC+SPOC (3.0%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	139.0+7.9/159.5	144.8+6.0/162.0	152.4+5.0/169.5
Tier III mode	139.9+7.9/160.5	145.7+6.0/163.0	153.3+5.0/170.5

MAN B&W G50ME-C9.6

Tier III

Cyl.	L_1 kW
5	8,600
6	10,320
7	12,040
8	13,760
9	15,480

Stroke: 2,500 mm/L_1 **MEP:** 21.0 bar



LGIP (LPG)

MAN B&W G50ME-C9.6-LGIP

L_1 dual fuel mode (SGC+SPOC (3.0%))/fuel oil mode (SFOC) [g/kWh]			
Gas tuned	**50%**	**75%**	**100%**
High-load	-	-	-
Tier III mode	140.3+7.9/161.0	145.7+6.0/163.0	152.8+5.0/170.0

MAN B&W G50ME-C9.6-LGIP-EGRBP

L_1 dual fuel mode (SGC+SPOC (3.0%))/fuel oil mode (SFOC) [g/kWh]			
	50%	**75%**	**100%**
Tier II mode	140.7+7.9/159.5	144.9+6.0/162.0	153.2+5.0/170.0
Tier III mode	147.2+7.9/166.5	149.1+6.0/166.5	155.0+5.0/172.0

MAN B&W G50ME-C9.6-LGIP-HPSCR

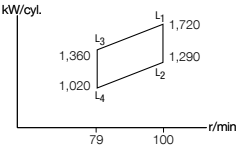
L_1 dual fuel mode (SGC+SPOC (3.0%))/fuel oil mode (SFOC) [g/kWh]			
	50%	**75%**	**100%**
Tier II mode	140.7+7.9/159.5	144.9+6.0/162.0	152.7+5.0/169.5
Tier III mode	142.1+7.9/161.0	145.8+6.0/163.0	153.2+5.0/170.0

MAN B&W G50ME-C9.6-LGIP-LPSCR

L_1 dual fuel mode (SGC+SPOC (3.0%))/fuel oil mode (SFOC) [g/kWh]			
	50%	**75%**	**100%**
Tier II mode	140.7+7.9/159.5	144.9+6.0/162.0	152.7+5.0/169.5
Tier III mode	141.6+7.9/160.5	145.8+6.0/163.0	153.6+5.0/170.5

Cyl.	L_1 kW
5	8,600
6	10,320
7	12,040
8	13,760
9	15,480

Stroke: 2,500 mm/**L_1 MEP:** 21.0 bar



LGIM (Methanol)

MAN B&W G50ME-C9.6-LGIM-EGRBP

L_1 dual fuel mode (SGC+SPOC (5.0%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	313.8+13.3/159.5	326.1+10.1/162.0	346.9+8.4/170.0
Tier III mode	328.8+13.3/166.5	335.8+10.1/166.6	351.1+8.4/172.0

MAN B&W G50ME-C9.6-LGIM-HPSCR

L_1 dual fuel mode (SGC+SPOC (5.0%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	313.8+13.3/159.5	326.1+10.1/162.0	345.8+8.4/169.5
Tier III mode	317.0+13.3/161.0	328.3+10.1/163.0	346.9+8.4/170.0

MAN B&W G50ME-C9.6-LGIM-LPSCR

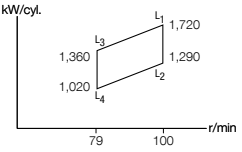
L_1 dual fuel mode (SGC+SPOC (5.0%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	313.8+13.3/159.5	326.1+10.1/162.0	345.8+8.4/169.5
Tier III mode	316.0+13.3/160.5	328.3+10.1/163.0	347.9+8.4/170.5

MAN B&W G50ME-C9.6

Tier III

Cyl.	L_1 kW
5	8,600
6	10,320
7	12,040
8	13,760
9	15,480

Stroke: 2,500 mm/L_1 **MEP:** 21.0 bar



LGIM-W (Water in methanol)

MAN B&W G50ME-C9.6-LGIM-W

L_1 dual fuel mode (SGC+SPOC (5.0%))/fuel oil mode (SFOC) [g/kWh]			
	50%	75%	100%
Tier II mode	322.4+13.3/163.5	327.2+10.1/162.5	340.4+8.4/167.0
Tier III mode	329.3+13.3/-	334.3+10.1/-	347.6+8.4/-

Note: Tier III operation in fuel oil mode available on request.

Specifications

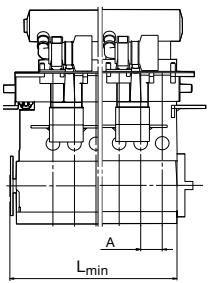
Dimensions:		A	B1	B2	C	H1	H2	H3
mm		872	3,776	3,652	1,205	10,775	10,075	9,775

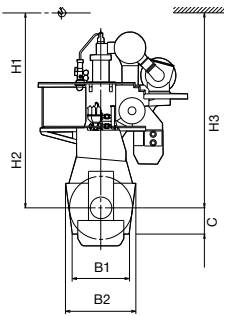
Cylinders:		5	6	7	8	9
L_{min}	mm	5,748	6,620	7,492	8,364	9,236

Dry mass

Tier II	t	211	246	276	311	346
Tier III (added)						
EGR	t	12	12	13	13	13
HPSCR	t	4	4	5	6	6
LPSCR	t	-	-	-	-	-
Dual fuel (added)						
GIE	t	5	5	6	6	7
LGIM	t	7	7	8	9	10
LGIM-W*	t	7	7	8	9	10
LGIP	t	6	6	7	8	9

* Tier III compliance



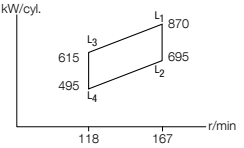


MAN B&W S35ME-C9.7

Tier II Tier III

Cyl.	L_1 kW
5	4,350
6	5,220
7	6,090
8	6,960

Stroke: 1,550 mm/L_1 **MEP:** 21.0 bar



Tier II LGIP (LPG)

MAN B&W S35ME-C9.7-LGIP

L_1 dual fuel mode (SGC+SPOC (3.0%))/fuel oil mode (SFOC) [g/kWh]			
Gas tuned	**50%**	**75%**	**100%**
High-load	149.8+8.1/169.5	149.4+6.2/167.0	154.0+5.1/171.0

Tier III LGIP (LPG)

MAN B&W S35ME-C9.7-LGIP-EGRBP

L_1 dual fuel mode (SGC+SPOC (3.0%))/fuel oil mode (SFOC) [g/kWh]			
	50%	**75%**	**100%**
Tier II mode	145.1+8.1/164.5	148.9+6.2/166.5	155.8+5.1/173.0
Tier III mode	152.6+8.1/172.5	153.1+6.2/171.0	158.6+5.1/176.0

MAN B&W S35ME-C9.7-LGIP-HPSCR

L_1 dual fuel mode (SGC+SPOC (3.0%))/fuel oil mode (SFOC) [g/kWh]			
	50%	**75%**	**100%**
Tier II mode	145.1+8.1/164.5	148.9+6.2/166.5	155.4+5.1/172.5
Tier III mode	146.5+8.1/166.0	149.8+6.2/167.5	155.8+5.1/173.0

MAN B&W S35ME-C9.7-LGIP-LPSCR

L_1 dual fuel mode (SGC+SPOC (3.0%))/fuel oil mode (SFOC) [g/kWh]			
	50%	**75%**	**100%**
Tier II mode	145.1+8.1/164.5	148.9+6.2/166.5	155.4+5.1/172.5
Tier III mode	146.1+8.1/165.5	149.8+6.2/167.5	156.3+5.1/173.5

Note: All fuel consumption figures are based on engine driven HPS.

MAN B&W S35ME-C9.7

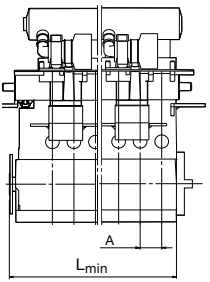
Specifications

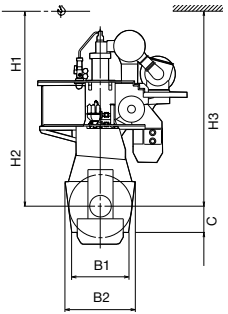
Dimensions:		A	B1	B2	C	H1	H2	H3
mm		612	2,300	2,288	830	7,025	6,675	6,275

Cylinders:		5	6	7	8
L_{min}	mm	4,430	4,990	5,602	6,275

Dry mass

Tier II	**t**	77	87	98	108
Tier III (added)					
EGR	**t**	8	8	8	8
HPSCR	**t**	2	2	3	3
LPSCR	**t**	-	-	-	-
Dual fuel (added)					
GIE	**t**	-	-	-	-
LGIP	**t**	5	5	6	6
LGIM	**t**	5	5	6	6





MAN B&W two-stroke propulsion systems

MAN Alpha

Propeller Programme – FPP and CPP

The MAN Alpha FPP portfolio covers:

- power range of 4-40 MW per shaft
- blade configurations for 3, 4, 5 and 6-bladed propellers
- propellers with integrated shaft line and stern tube solutions
- wide range of stern tube lube and sealing systems
  – oil, water, biodegradable oils.

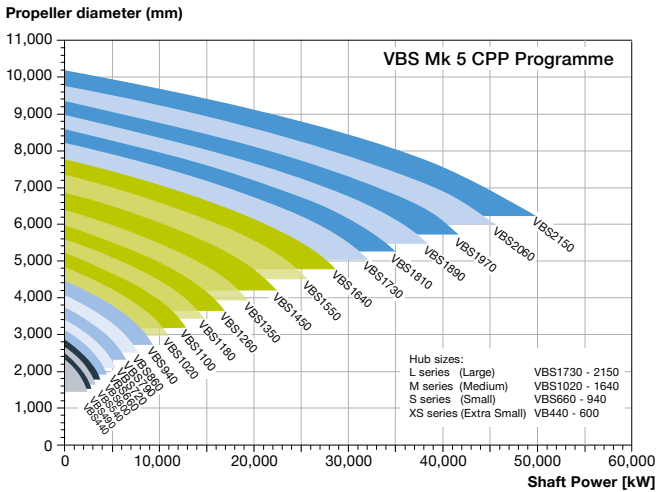
The MAN Alpha FPPs are characterised by the following benefits:

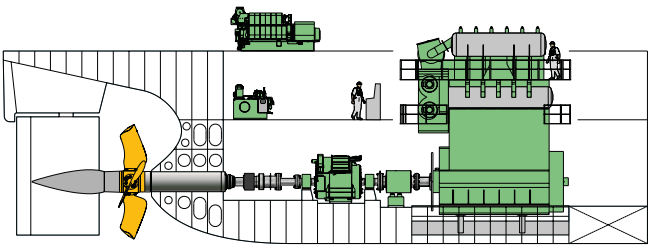
- High-efficient, hydrodynamically optimised blade profiles
  – Kappel designs available
- High reliability: robust approach with ample mechanical design margins
- High-efficient aft-ship integration with rudder, rudder bulb, ducts, etc.
- Layouts for complete two-stroke propulsion systems, e.g. with PTO solutions
- Plant calculations with upfront consideration to torsional vibration calculation (TVC), alignment and control systems.

MAN Alpha controllable pitch propeller

- Standard Mk 5 versions are 4-bladed – 3 and 5-bladed propellers are available upon request
- The figures stated after the VBS indicate the propeller hub diameter
- Standard blade/hub materials are Ni-Al-bronze; stainless steel is optional
- Propellers are available up to the highest ice classes; however the standard programme is based on ‘no ice’.

Standard programme



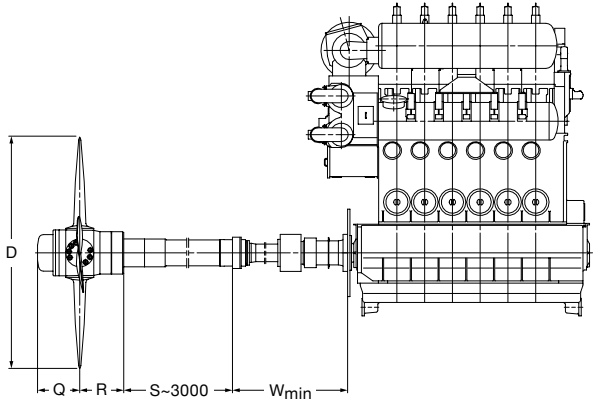


Two-stroke propulsion system installation – complete powertrain with propeller and aft ship equipment.

MAN B&W standard package examples

Cyl.	kW	Prop. speed r/min	D [1] mm	Hub VBS mm	Q mm	R mm	Wmin mm	Prop. mass t [2]
G70ME-C9.5/-GI								
5	18,200	83	8,100	1,890	1,436	1,496	3,700	90.0
6	21,840	83	8,450	2,060	1,565	1,593	3,700	93.5
7	25,480	83	8,750	2,150	1,634	1,645	3,700	102.0
8	29,120	83						[3]

[1] For optimal Kappel blades, the propeller diameter is reduced by an average of 3-10% compared to the listed standard diameters
[2] The masses are stated for 4,000 mm stern tube and 8,000 mm propeller shaft
[3] Available on request



MAN B&W standard package examples

Cyl.	kW	Prop. speed r/min	D [1] mm	Hub VBS mm	Q mm	R mm	Wmin mm	Prop. mass t [2]
G50ME-C9.6/-GI								
5	8,600	100	6,150	1,450	1,102	1,174	3,100	42.7
6	10,320	100	6,450	1,550	1,178	1,231	3,100	45.1
7	12,040	100	6,650	1,550	1,178	1,231	3,100	48.1
8	13,760	100	6,850	1,640	1,246	1,287	2,900	50.9
9	15,480	100	7,050	1,730	1,315	1,339	3,100	58.1
S50ME-C9.7/-GI								
5	8,900	117	5,650	1,350	1,037	1,096		
6	10,680	117	5,850	1,450	1,114	1,148		
7	12,460	117	6,050	1,450	1,114	1,148		
8	14,240	117	6,200	1,550	1,175	1,256		
9	16,020	117	6,350	1,640	1,260	1,288		
S50ME-C8.5/-GI [3]								
5	8,300	127	5,400	1,350	1,030	1,082	2,690	31.7
6	9,960	127	5,600	1,350	1,100	1,145	2,690	35.4
7	11,620	127	5,800	1,450	1,175	1,233	2,690	39.9
8	13,280	127	5,950	1,450	1,175	1,248	2,690	42.0

[1] For optimal Kappel blades, the propeller diameter is reduced by an average of 3-10% compared to the listed standard diameters

[2] The masses are stated for 4,000 mm stern tube and 8,000 mm propeller shaft

[3] Data for 9 cylinder is available on request

MAN B&W standard package examples

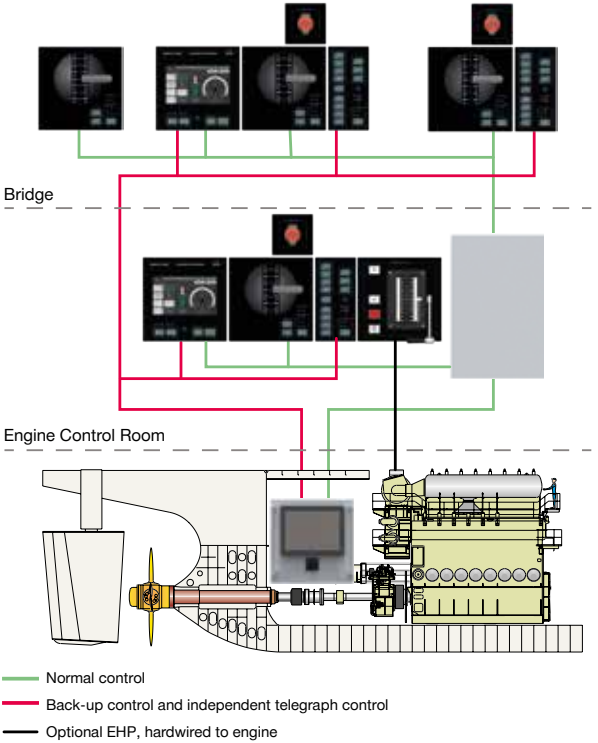
Cyl.	kW	Prop. speed r/min	D [1] mm	Hub VBS mm	Q mm	R mm	Wmin mm	Prop. mass t [2]
G45ME-C9.7								
5	6,950	111	5,650	1,350	1,026	1,109	2,700	28.8
6	8,340	111	5,900	1,350	1,026	1,109	2,700	30.6
7	9,730	111	6,100	1,450	1,102	1,197	2,700	35.1
8	11,120	111	6,250	1,550	1,178	1,236	2,700	37.6
S40ME-C9.5/-GI								
5	5,675	146	4,650	1,100	885	972	2,500	22.1
6	6,810	146	4,800	1,180	957	1,025	2,500	24.6
7	7,945	146	4,950	1,180	957	1,025	2,500	26.0
8	9,080	146	5,050	1,260	975	1,081	2,500	29.8
9	10,215	146	5,550	1,350	1,026	1,140	2,700	34.4
S35ME-C9.7/-GI								
5	4,350	167	4,050	940	821	920	2,500	16.3
6	5,220	167	4,200	1,020	821	920	2,500	16.9
7	6,090	167	4,350	1,100	885	946	2,500	19.4
8	6,960	167	4,450	1,100	885	946	2,500	20.4
S30ME-B9.5/-GI								
5	3,200	195	3,500	860	653	750	2,350	10.5
6	3,840	195	3,600	860	653	750	2,350	11.0
7	4,480	195	3,700	940	714	886	2,350	12.3
8	5,120	195	3,800	940	714	886	2,350	13.0

[1] For optimal Kappel blades, the propeller diameter is reduced by an average of 3-10% compared to the listed standard diameters

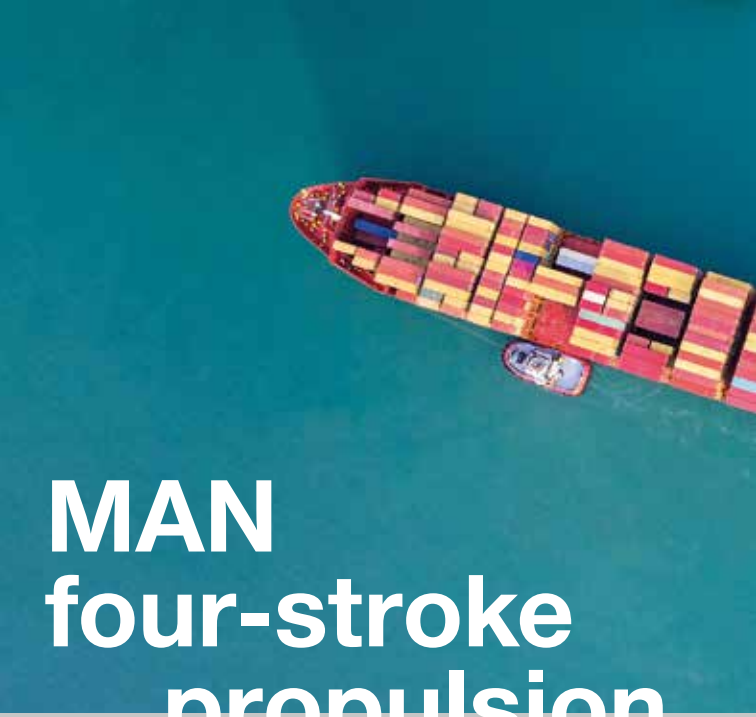
[2] The masses are stated for 3,000 mm stern tube and 8,000 mm propeller shaft

Alphatronic 3000 Propulsion control system

A high number of various FPP and CPP propulsion package applications are controlled by the Alphatronic 3000 system – customised for combinations of MAN low and medium speed engines in a wide range of diesel-mechanical, hybrid or diesel-electric propulsion setups.



Simple system architecture for a straightforward two-stroke CPP propulsion plant



MAN four-stroke propulsion engines

MAN four-stroke propulsion engines – all emission requirements

Besides focus on power density and fuel economy, MAN Energy Solutions is committed to a steady reduction of the environmental impact of our engines.

IMO Tier II

Applying well-proven methods to achieve a cleaner and more efficient combustion process, MAN Energy Solutions has significantly decreased NO_X emissions. Our four-stroke propulsion engines are IMO Tier II compliant with internal engine measures alone.

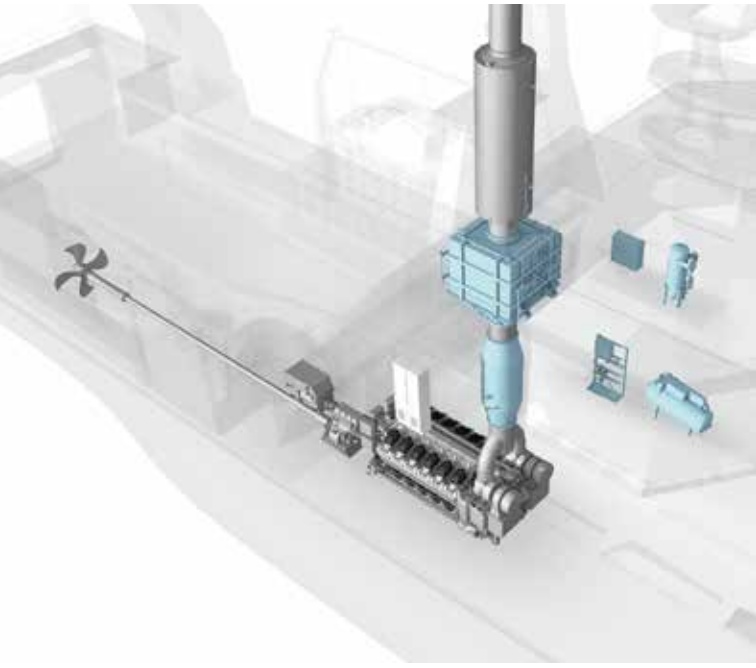
IMO Tier III

For operation in emission control areas (ECA), MAN Energy Solutions has developed a comprehensive range of selective catalytic reduction (SCR) systems that tremendously reduce NO_X levels surpassing IMO Tier III requirements.

MAN Energy Solutions is the first manufacturer to successfully produce and offer IMO Tier III compliant four-stroke marine engines based on a fully modular SCR kit covering our entire four-stroke engine portfolio. In 2014 MAN Energy Solutions was awarded the first IMO Tier III EIAPP certificate together with the classification society DNV-GL.

MAN Energy Solutions' standard SCR system is available in fourteen different sizes covering our entire portfolio of four-stroke engines. Customised SCR systems are offered on demand.

MAN has developed a complete range of SCR systems that work perfectly with our engines for maximum system efficiency. The intelligent exhaust gas temperature control allows significant savings in fuel consumptions as compared to third-party supplier systems. MAN SCR systems work with MGO, MDO and HFO with up to 3.5% sulphur.



MAN SCR system

Our modular system comes in 14 different sizes to match all power demands. Some notable benefits of standardisation are significant cost reduction and simplification of installation.

The modular SCR component kit

Urea consumption

The urea consumption depends on engine type, selected performance characteristics (engine map), in case of an engine with ECOMAP capability, operating profile, fuel type, ambient conditions, type of reduction agent, etc.

For more detailed information on the expected level of urea consumption, please contact MAN Energy Solutions with your project specific request.

Conventional injection engines

Our well-established engine types are used in a vast array of applications all over the world. Based on long-term experience of historical proportions, our engines are in continuous development to increase power, reduce emissions, increase reliability, reduce fuel oil consumption, and increase longevity. Our engines are the prime movers of choice in the maritime sector.

Common rail (CR) engines

The flexibility of our CR technology enables a substantial improvement of the combustion process that improves the fuel economy and reduces emission levels. It is particularly advantageous in the low-load and mid-load ranges where our unique ECOMAP system (optional) applies different engine maps to reduce fuel consumption while observing IMO emission limits. Another feature is our patented Boost Injection. Our engine control system senses a load increase at a very early stage and tremendously improves the load response with the activation of boost injection by the common rail control. In addition, exhaust gas opacity is markedly reduced, far below the visibility limit. Our CR engines run efficiently on liquid fuels complying with ISO 8217 DMA, DMZ, and DMB, and on residual fuels (HFO) up to 700 cSt (in compliance with ISO-F-RMK 700).

Diesel oil (D) engines

The V28/33D STC features very favourable ratios of power-to-weight and power-to-installation space. The combination of low fuel consumption, low emissions and reduced life cycle costs makes this engine the ideal solution for propulsion in high speed ferries, naval and offshore patrol vessels. The V28/33D STC engine operates on distillates according to ISO 8217 DMA or equivalent fuel types.

With the MAN 175D, MAN Energy Solutions is presenting a new power pack setting future standards in the high-speed diesel engine market. The MAN 175D, developed especially for use in the shipping industry, is part of a product initiative aimed at providing MAN customers with a product portfolio that covers every power requirement, from high-speed diesel engines to low-speed diesel engines.

Sequential turbocharging (STC)

The MAN Energy Solutions sequential turbocharging system operates with two high-efficiency turbochargers. Depending on the amount of charge air required, the second turbocharger is switched on or off. In this way, the engine is operated at its optimum operating point over the whole applicable load range.

The result is an extended operating envelope at low engine speeds, which gives a power reserve for ship acceleration, ship turning, sprints or towing. Furthermore, the STC system is characterised by a low thermal signature, decreased smoke emission, low vibrations and continuous low-load operation with reduced fuel consumption, which makes it the ideal solution for propulsion in naval applications and offshore patrol vessels.

Dual fuel (DF) engines

Dual fuel engines from MAN Energy Solutions run efficiently on liquid fuels or natural gas with very low emissions that are compliant with IMO limits. On gaseous fuel, the engines comply with IMO Tier III without the need for additional exhaust gas aftertreatment, and on liquid fuel they either fulfill IMO Tier II, or IMO Tier III together with an SCR system. The possibility to switch over seamlessly from gas to diesel operation and vice versa provides full flexibility in multiple applications.

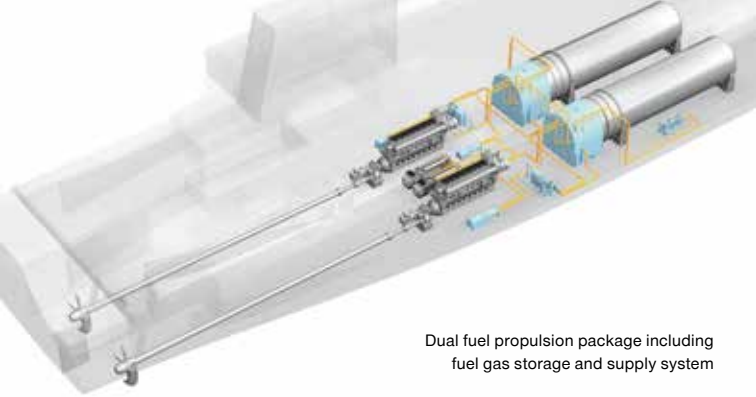
All dual fuel engines can run on natural gas with a methane number higher than 80 without adjustments. For lower methane numbers, MAN Energy Solutions can deliver well-adapted solutions. The optimised combustion chamber ensures very low fuel consumption in both operational modes.

MAN Cryo fuel gas supply systems

MAN Cryo fuel gas systems are the world's leading solution for safely storing energy on board gas fuelled ships and reliably providing it to the engines.

After pioneering in the market for LNG-fuelled ships in 1999, MAN Cryo fuel gas systems have since then been installed on a major part of today's gas fuelled ship fleet, either standardised or tailor-made. The references range from passenger ferries to offshore platform supply vessels, tug boats, bunker barges and even ice breakers.

Low pressure LNG fuel gas system



Dual fuel propulsion package including fuel gas storage and supply system

In order to deliver cost-optimised systems with shortest delivery times, MAN Energy Solutions offers a broad range of standard cryo packages in all required sizes. Beyond this standard scope and for larger tank sizes, customised solutions are engineered in the most efficient way in order to meet all our customers' demands.

MAN Cryo LNG standard packages (example sizes)

Geometrical volume m^3	Net filling volume (95%) m^3	Outer diameter m	Tank length (without TCS)
76	73	3.6	10.9
100	95	3.6	13.9
124	118	3.6	16.9
142	135	4.2	14.0
175	167	4.2	17.0
209	199	4.2	20.0
249	237	5.3	16.4
300	285	5.3	19.4
352	335	5.3	22.4
385	366	6.0	19.8
450	428	6.0	22.5
516	491	6.0	25.8
600	570	6.9	23.2

Engine power

Engine brake power is stated in kW.

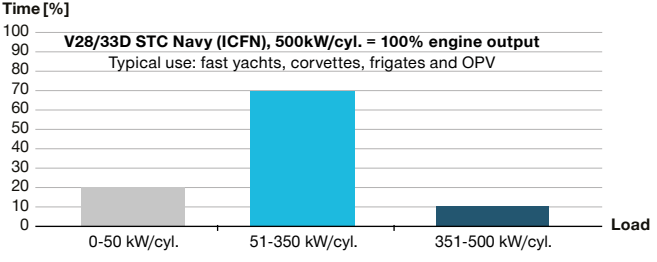
Ratings are given according to ISO 3046-1.

According to ISO 15550, the power figures in the tables are valid within a range of ±3% up to tropical conditions at sea level, i.e.:
- compressor inlet temperature 45 °C
- compressor inlet pressure 1,000 mbar
- sea water temperature 32 °C

For all commercial medium speed propulsion engines the power is defined according ICN[1] definition (ISO 3046-1:2002: ISO standard power).

For all navy medium speed propulsion applications the engine rated power is stated as ICFN (ISO standard Continuous Fuel stop Net power), derived from standard ISO 3046-1:2002. It means the engine is capable to deliver power continuously during a period of time corresponding to the application. The engine is operated at stated speed and reference ambient conditions as stated above, while the fuel amount is limited and the fuel stop power cannot be exceeded. The engine rated power is delivered between the maintenance intervals as defined. The ICFN[1] engine power rating description corresponds to 100% engine power output and cannot be exceeded.

Exemplary load profile type:



[1] **I** = Power ISO 3046. **C** = continuous power output. **F** = fuel stop power. **N** = net

Specific fuel oil consumption (SFOC) and heat rate

The stated consumption figures refer to the following reference conditions according to ISO 3046-1:

- ambient air pressure: 1,000 mbar
- ambient air temperature: 25 °C (77 °F)
- charge air temperature: according to engine type, corresponding to 25 °C cooling water temperature before CAC

The figures are given with a tolerance of +5% and without engine driven pumps. Attached pumps and engines running in suction dredger operation will require additional fuel.

In accordance with the NO_x Technical Code 2008 of the International Maritime Organization, DM-grade fuel oil is used as reference fuel oil for engine tests and, thus, also forms the basis for the SFOC figures stated for engines in liquid fuel operation.

Unless otherwise specifically stated, SFOC figures are based on a lower calorific value of the fuel oil of 42,700 kJ/kg and, in addition for engines with common rail injection (CR-engines), on DMA-grade fuel oil (ISO 8217). For engines with conventional fuel injection, SFOC figures are based on DMB-grade fuel oil (ISO 8217). For further details, please refer to our engine specific project guides available from MAN Energy Solutions.

Specific lube oil consumption (SLOC)

The specific lube oil consumption is specified at MCR (maximum continuous rating) with a tolerance of 20%.

Blocking of output

Blocking of output is made for engines driving a propeller at 100% of the rated output. For engines powering an alternator, blocking of output is made at 110%. However, operation above 100% load is only recommended for a short period of time for recovery and prevention of a frequency drop.

Weights and dimensions

For marine main engines, the weights stated refer to engines without a flywheel.

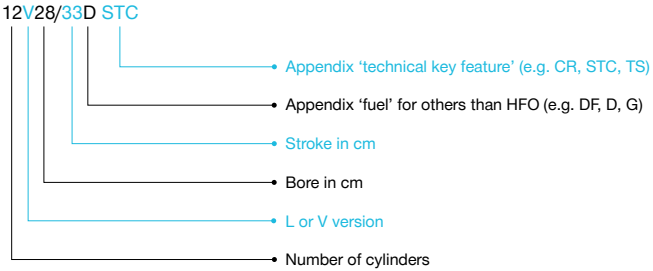
All weights given are without lube oil and cooling water.

For auxiliary engines (GenSets), weights refer to the unit (including alternator). The weight of the GenSet may vary depending on the alternator make.

The length of the GenSet unit depends on the alternator make. For a twin engine installation, the centreline distance is stated for each engine type.

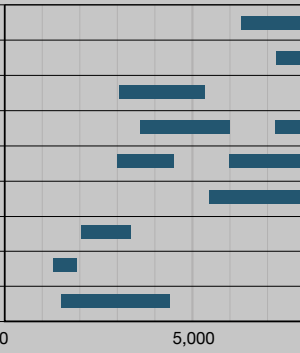
The centreline distance for twin engine installation is given as a minimum value. Specific requirements to the passageway (e.g. of classification societies or flag state authority), seating type or a gallery can lead to higher values.

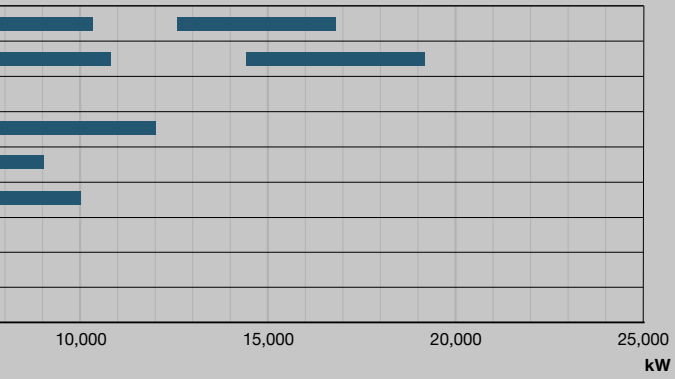
Engine type designation



MAN four-stroke propulsion engines programme

r/min	Engine type
500-514	L51/60DF V51/60DF
500-514	L48/60CR V48/60CR
720-750	L35/44DF
720-750	L32/44CR V32/44CR
720-750	L32/40 V32/40
1,000-1,032	V28/33D STC
800	L27/38 L27/38 (MDO/MGO)
1,000	L21/31
1,600-2,000	175D




10,000
15,000
20,000
25,000
kW

MAN V51/60DF

Tier II | Tier III

High efficiency variant

Tier III in gas mode

Bore: 510 mm, **Stroke:** 600 mm

Speed	**r/min**	514	500
mep	**bar**	20.0	20.6
		kW	**kW**
12V51/60DF		12,600	12,600
14V51/60DF		14,700	14,700
16V51/60DF		16,800	16,800

LHV of fuel gas ≥ 28,000 kJ/Nm^3
(Nm^3 corresponds to one cubic meter of gas at 0 °C and 1.013 bar)

Specific fuel oil consumption (SFOC) and Heat rate at ISO conditions

MCR	**100%**	**85%**
Specific fuel oil consumption[1]	178.5 g/kWh (43 °C)[4]	176.0 g/kWh (43 °C)[4]
Heat rate[2]	7,150 kJ/kWh (43 °C)[4]	7,150 kJ/kWh (45 °C)[4]

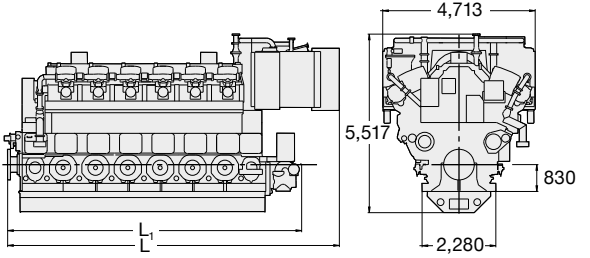
Specific lube oil consumption[3]: 0.38 g/kWh for nominal output 1,050 kW/cyl.

[1] Liquid fuel operation
[2] Gas operation (including pilot fuel, cetan no ≥ 50), gas fuel: methane no. ≥ 80
[3] Related to 100% actual engine load
[4] Engine type specific reference charge air temperature before cylinder

Dimensions

Cyl. No.		**12**	**14**	**16**
L	**mm**	10,254	11,254	12,254
L$_1$	**mm**	9,088	10,088	11,088
Dry mass	**t**	187	213	240

Minimum centreline distance for twin engine installation: 4,800 mm



MAN L51/60DF

High efficiency variant

Bore: 510 mm, **Stroke:** 600 mm

Speed	**r/min**	514	500
mep	**bar**	20.0	20.6
		kW	**kW**
6L51/60DF		6,300	6,300
7L51/60DF		7,350	7,350
8L51/60DF		8,400	8,400
9L51/60DF		9,450	9,450

LHV of fuel gas ≥ 28,000 kJ/Nm^3
(Nm^3 corresponds to one cubic meter of gas at 0 °C and 1.013 bar)

Specific fuel oil consumption (SFOC) and Heat rate at ISO conditions

MCR	**100%**	**85%**
Specific fuel oil consumption[1]	178.5 g/kWh (43°C)[4]	176.0 g/kWh (43°C)[4]
Heat rate[2]	7,150 kJ/kWh (43°C)[4]	7,150 kJ/kWh (45°C)[4]

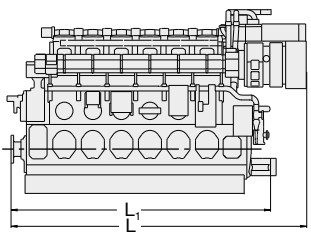
Specific lube oil consumption[3]: 0.38 g/kWh for nominal output 1,050 kW/cyl.

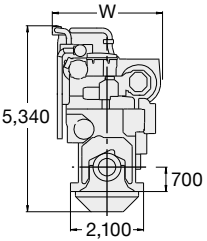
[1] Liquid fuel operation
[2] Gas operation (including pilot fuel), gas fuel: methane no. ≥ 80
[3] Related to 100% actual engine load
[4] Engine type specific reference charge air temperature before cylinder

Dimensions

Cyl. No.		**6**	**7**	**8**	**9**
L	**mm**	8,494	9,314	10,134	11,160
L_1	**mm**	7,455	8,275	9,095	9,915
W	**mm**	3,165	3,165	3,165	3,283
Dry mass	**t**	106	119	135	148

Minimum centreline distance for twin engine installation: 3,200 mm





MAN V51/60DF

Tier II Tier III

High power variant

Tier III in gas mode

Bore: 510 mm, **Stroke:** 600 mm

Speed	**r/min**	514	500
mep	**bar**	21.9	22.5
		kW	**kW**
12V51/60DF		13,800	13,800
14V51/60DF		16,100	16,100

LHV of fuel gas ≥ 28,000 kJ/Nm^3
(Nm^3 corresponds to one cubic meter of gas at 0 °C and 1.013 bar)

Specific fuel oil consumption (SFOC) and Heat rate at ISO conditions

MCR	**100%**	**85%**
Specific fuel oil consumption[1)]	186.5 g/kWh (43 °C)[4)]	182.5 g/kWh (43 °C)[4)]
Heat rate[2)]	7,400 kJ/kWh (50 °C)[4)]	7,400 kJ/kWh (50 °C)[4)]

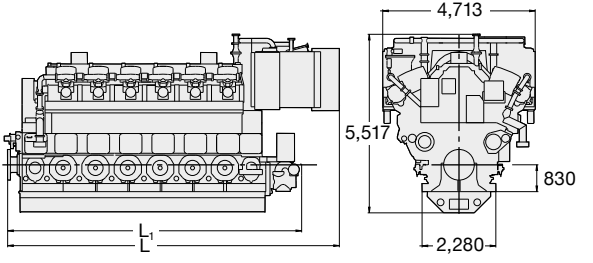
Specific lube oil consumption[3)]: 0.35 g/kWh for nominal output 1,150 kW/cyl.

[1)] Liquid fuel operation
[2)] Gas operation (including pilot fuel, cetan no ≥ 50), gas fuel: methane no. ≥ 80
[3)] Related to 100% actual engine load
[4)] Engine type specific reference charge air temperature before cylinder

Dimensions

Cyl. No.		**12**	**14**	**16**
L	**mm**	10,254	11,254	12,254
L_1	**mm**	9,088	10,088	11,088
Dry mass	**t**	187	213	240

Minimum centreline distance for twin engine installation: 4,800 mm



MAN L51/60DF

High power variant

Bore: 510 mm, **Stroke:** 600 mm

Speed	**r/min**	514	500
mep	**bar**	21.9	22.5
		kW	**kW**
6L51/60DF		6,900	6,900
7L51/60DF		8,050	8,050
8L51/60DF		9,200	9,200
9L51/60DF		10,350	10,350

LHV of fuel gas ≥ 28,000 kJ/Nm^3
(Nm^3 corresponds to one cubic meter of gas at 0 °C and 1.013 bar)

Specific fuel oil consumption (SFOC) and Heat rate at ISO conditions

MCR	**100%**	**85%**
Specific fuel oil consumption[1]	186.5 g/kWh (43 °C)[4]	182.5 g/kWh (43 °C)[4]
Heat rate[2] **(6L51/60DF)**	7,440 kJ/kWh (50 °C)[4]	7,420 kJ/kWh (50 °C)[4]
Heat rate[2] **(7L-9L51/60DF)**	7,420 kJ/kWh (50 °C)[4]	7,420 kJ/kWh (50 °C)[4]

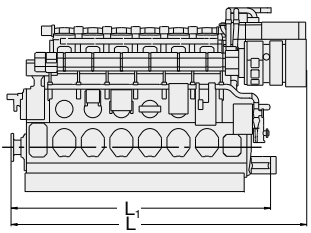
Specific lube oil consumption[3]: 0.35 g/kWh for nominal output 1,150 kW/cyl.

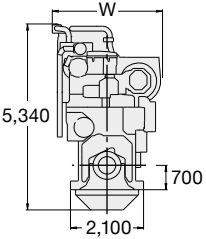
[1] Liquid fuel operation
[2] Gas operation (including pilot fuel, cetan no ≥ 50), gas fuel: methane no. ≥ 80
[3] Related to 100% actual engine load
[4] Engine type specific reference charge air temperature before cylinder

Dimensions

Cyl. No.		**6**	**7**	**8**	**9**
L	**mm**	8,494	9,314	10,134	11,160
L_1	**mm**	7,455	8,275	9,095	9,915
W	**mm**	3,165	3,165	3,165	3,283
Dry mass	**t**	106	119	135	148

Minimum centreline distance for twin engine installation: 3,200 mm





MAN V48/60CR

Tier II | Tier III

Tier III with SCR

Bore: 480 mm, **Stroke:** 600 mm

Speed	**r/min**	514	500
mep	**bar**	25.8	26.5
		kW	**kW**
12V48/60CR		14,400	14,400
14V48/60CR		16,800	16,800
16V48/60CR		19,200	19,200

Specific fuel oil consumption (SFOC) at ISO conditions

MCR	**100%**	**85%**
V48/60CR	182 g/kWh	173.5 g/kWh

Specific lube oil consumption[1]: 0.5 g/kWh for nominal output 1,200 kW/cyl.

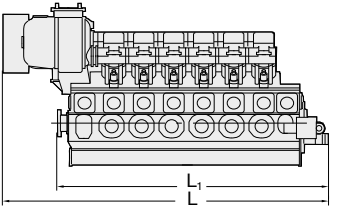
Engine type specific reference charge air temperature before cylinder 37 °C

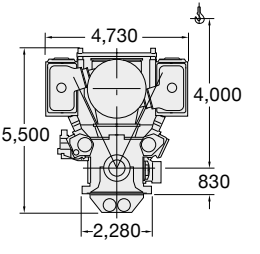
[1] Related to 100% actual engine load

Dimensions

Cyl. No.		**12**	**14**	**16**
L	**mm**	10,790	11,790	13,140
L_1	**mm**	9,088	10,088	11,088
Dry mass	**t**	189	213	240

Minimum centreline distance for twin engine installation: 4,800 mm





MAN L48/60CR

Bore: 480 mm, **Stroke:** 600 mm

Speed	**r/min**	514	500
mep	**bar**	25.8	26.5
		kW	**kW**
6L48/60CR		7,200	7,200
7L48/60CR		8,400	8,400
8L48/60CR		9,600	9,600
9L48/60CR		10,800	10,800

Specific fuel oil consumption (SFOC) at ISO conditions

MCR	**100%**	**85%**
L48/60CR	184.0 g/kWh	175.5 g/kWh

Specific lube oil consumption[1]: 0.5 g/kWh for nominal output 1,200 kW/cyl.

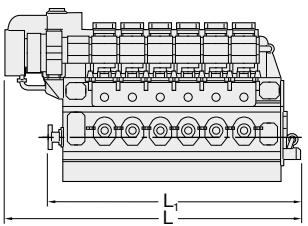
Engine type specific reference charge air temperature before cylinder 37 °C

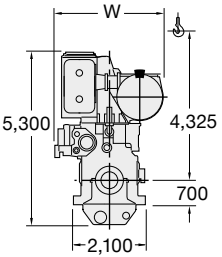
[1] Related to 100% actual engine load

Dimensions

Cyl. No.		**6**	**7**	**8**	**9**
L	**mm**	8,760	9,580	10,540	11,360
L_1	**mm**	7,455	8,275	9,095	9,915
W	**mm**	3,165	3,165	3,280	3,280
Dry mass	**t**	106	119	135	148

Minimum centreline distance for twin engine installation: 3,200 mm





Tier III in gas mode

Bore: 350 mm, **Stroke:** 440 mm

Speed	**r/min**	750	720
mep	**bar**	20.0	20.1
		kW	**kW**
6L35/44DF		3,180	3,060
7L35/44DF		3,710	3,570
8L35/44DF		4,240	4,080
9L35/44DF		4,770	4,590
10L35/44DF		5,300	5,100

LHV of fuel gas ≥ 28,000 kJ/Nm^3
(Nm^3 corresponds to one cubic meter of gas at 0 °C and 1.013 bar)

Specific fuel oil consumption (SFOC) and Heat rate at ISO conditions

MCR		**100%**	**85%**
Specific fuel oil consumption[1]	6L	179.5 g/kWh	175.5 g/kWh
	7L-10L	178.5 g/kWh	175.5 g/kWh
Heat rate[2]		7,410 kJ/kWh	7,440 kJ/kWh

Specific lube oil consumption[3]: 0.5 g/kWh for nominal output 530 kW/cyl. or 0.52 g/kWh for nominal output 510 kW/cyl.

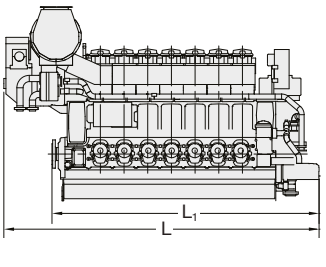
Engine type specific reference charge air temperature before cylinder 40 °C

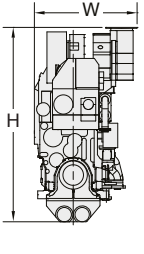
[1] Liquid fuel operation
[2] Gas operation (including pilot fuel, cetan no ≥ 50), gas fuel: methane no. ≥ 80
[3] Related to 100% actual engine load

Dimensions

Cyl. No.		**6**	**7**	**8**	**9**	**10**
L	**mm**	6,485	7,015	7,545	8,075	8,605
L_1	**mm**	5,265	5,877	6,407	6,937	7,556
W	**mm**	2,539	2,678	2,678	2,678	2,678
H	**mm**	4,163	4,369	4,369	4,369	4,369
Dry mass[4]	**t**	43.1	48.2	53.3	57.6	62.3

Minimum centreline distance for twin engine installation: 2,500 mm
[4] Including built-on lube oil automatic filter, fuel oil filter and electronic equipment
Speed 720 r/min for generator drive only





MAN V32/44CR

Tier II Tier III

Tier III with SCR

Bore: 320 mm, **Stroke:** 440 mm

Speed	**r/min**	750	720
mep	**bar**	27.1	28.3
		kW	**kW**
12V32/44CR		7,200	7,200
14V32/44CR[1]		8,120	8,120
16V32/44CR		9,600	9,600
18V32/44CR[2]		10,800	10,800
20V32/44CR		12,000	12,000

Specific fuel oil consumption (SFOC) at ISO conditions

MCR	**100%**	**85%**
V32/44CR	176.0 g/kWh	172.0 g/kWh
14V32/44CR	176.5 g/kWh	173.0 g/kWh
V32/44CR FPP	176.5 g/kWh	172.5 g/kWh
14V32/44CR FPP	177.5 g/kWh	174.0 g/kWh

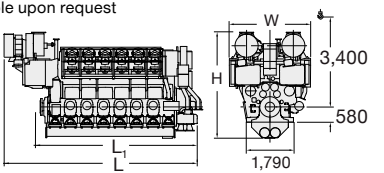
Specific lube oil consumption[3]: 0.5 g/kWh for nominal output 600 kW/cyl., 0.52 g/kWh for nominal output 580 kW/cyl., 0.55 g/kWh for nominal output 550 kW/cyl.

Engine type specific reference charge air temperature before cylinder 40 °C

Dimensions

Cyl. No.		**12**	**14**	**16**	**18**	**20**
L	**mm**	7,195	7,970	8,600	9,230	9,860
L_1	**mm**	5,795	6,425	7,055	7,685	8,315
W	**mm**	3,100	3,100	3,100	3,100	3,100
H	**mm**	4,039	4,262	4,262	4,262	4,262
Dry mass[4]	**t**	70	79	87	96	104

Minimum centreline distance for twin engine installation: 4,000 mm
Speed 720 r/min for generator drive/constant speed operation only
[1] 580 kW/cyl.
[2] 18V32/44CR available rigidly mounted only
[3] Related to 100% actual engine load
[4] Including built-on lube oil automatic filter, fuel oil filter and electronic equipment
Fixed pitch propeller: 550 kW/cyl., 750 r/min
Wet oil sump available upon request



Bore: 320 mm, **Stroke:** 440 mm

Speed	r/min	750	720
mep	bar	27.1	28.3
		kW	kW
6L32/44CR		3,600	3,600
7L32/44CR[1)]		4,060	4,060
8L32/44CR		4,800	4,800
9L32/44CR		5,400	5,400
10L32/44CR		6,000	6,000

Specific fuel oil consumption (SFOC) at ISO conditions

MCR	100%	85%
L32/44CR	176.0 g/kWh	172.0 g/kWh
7L32/44CR	176.5 g/kWh	173.0 g/kWh
L32/44CR FPP	176.5 g/kWh	172.5 g/kWh
7L32/44CR FPP	177.5 g/kWh	174.0 g/kWh

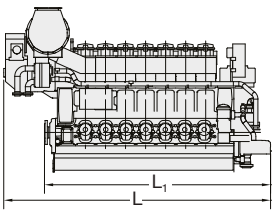
Specific lube oil consumption[2)]: 0.5 g/kWh for nominal output 600 kW/cyl., 0.52 g/kWh for nominal output 580 kW/cyl., 0.55 g/kWh for nominal output 550 kW/cyl.

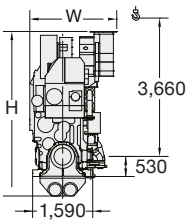
Engine type specific reference charge air temperature before cylinder 40 °C

Dimensions

Cyl. No.		6	7	8	9	10
L	mm	6,312	6,924	7,454	7,984	8,603
L_1	mm	5,265	5,877	6,407	6,937	7,556
W	mm	2,174	2,359	2,359	2,359	2,359
H	mm	4,163	4,369	4,369	4,369	4,369
Dry mass[3)]	t	39.5	44.5	49.5	53.5	58.0

Minimum centreline distance for twin engine installation: 2,500 mm
Speed 720 r/min for generator drive/constant speed operation only
[1)] 580 kW/cyl.
[2)] Related to 100% actual engine load
[3)] Including built-on lube oil automatic filter, fuel oil filter and electronic equipment
Fixed pitch propeller: 550 kW/cyl., 750 r/min
Wet oil sump available upon request





MAN V32/40

Tier II Tier III

Tier III with SCR

Bore: 320 mm, **Stroke:** 400 mm

Speed	**r/min**	750	720
mep	**bar**	24.9	25.9
		kW	**kW**
12V32/40		6,000	6,000
14V32/40		7,000	7,000
16V32/40		8,000	8,000
18V32/40		9,000	9,000

Specific fuel oil consumption (SFOC) at ISO conditions

MCR	100%	85%
V32/40	184 g/kWh	182 g/kWh
V32/40 FPP	187 g/kWh	183 g/kWh

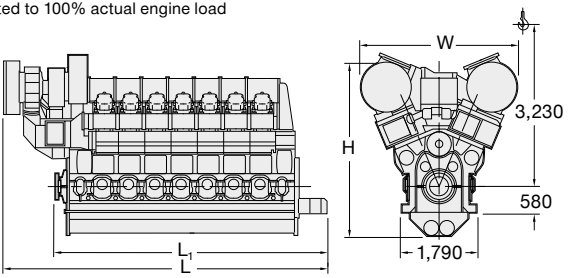
Specific lube oil consumption[1]: 0.5 g/kWh for nominal output 500 kW/cyl., 0.56 g/kWh for nominal output 450 kW/cyl.

Engine type specific reference charge air temperature before cylinder 43 °C

Dimensions

Cyl. No.		12	14	16	18
L	**mm**	6,915	7,545	8,365	8,995
L_1	**mm**	5,890	6,520	7,150	7,780
W	**mm**	3,140	3,140	3,730	3,730
H	**mm**	4,100	4,100	4,420	4,420
Dry mass	**t**	61	68	77	85

Minimum centreline distance for twin engine installation: 4,000 mm
Speed 720 r/min for generator drive/constant speed operation only
Fixed pitch propeller: 450 kW/cyl., 750 r/min
V32/40 as marine main engine to be applied for multi-engine plants only
[1] Related to 100% actual engine load



Tier III with SCR

Bore: 320 mm, **Stroke:** 400 mm

Speed	**r/min**	750	720
mep	**bar**	24.9	25.9
		kW	**kW**
6L32/40		3,000	3,000
7L32/40		3,500	3,500
8L32/40		4,000	4,000
9L32/40		4,500	4,500

Specific fuel oil consumption (SFOC) at ISO conditions

MCR	100%	85%
L32/40	186 g/kWh	183 g/kWh
L32/40 FPP	189 g/kWh	184 g/kWh

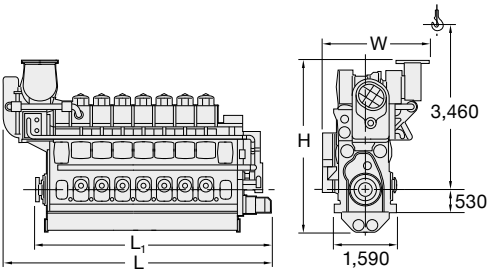
Specific lube oil consumption[1]: 0.5 g/kWh for nominal output 500 kW/cyl., 0.56 g/kWh for nominal output 450 kW/cyl.

Engine type specific reference charge air temperature before cylinder 43 °C

Dimensions

Cyl. No.		6	7	8	9
L	**mm**	5,940	6,470	7,000	7,530
L_1	**mm**	5,140	5,670	6,195	6,725
W	**mm**	2,630	2,630	2,715	2,715
H	**mm**	4,010	4,010	4,490	4,490
Dry mass	**t**	38	42	47	51

Minimum centreline distance for twin engine installation: 2,500 mm. Please contact MAN Energy Solutions for the precise information about the centreline distance for two engines with the same cylinder number standing near each other.
Speed 720 r/min for generator drive/constant speed operation only.
Fixed pitch propeller: 450 kW/cyl., 750 r/min
[1] Related to 100% actual engine load



MAN V28/33D STC

Tier II Tier III

Tier III with SCR

Bore: 280 mm, **Stroke:** 330 mm

		Standard engine	Load profile 'Navy'
Speed	**r/min**	1,000	1,032
mep	**bar**	26.9	28.6
12V28/33D STC		5,460	6,000
16V28/33D STC		7,280	8,000
20V28/33D STC		9,100	10,000

Specific fuel oil consumption (SFOC) at ISO conditions

Output		100%	85%	100%	85%
12V28/33D STC	**g/kWh**	189.0	186.0	194.0	188.5
16V28/33D STC	**g/kWh**	188.0	183.5	192.0	186.5
20V28/33D STC	**g/kWh**	188.0	183.5	192.0	186.5

Specific lube oil consumption[1]: 0.4 g/kWh for nominal output 455 kW/cyl., 0,36 g/kWh for nominal output 500 kW/cyl.

Engine type specific reference charge air temperature before cylinder 40 °C

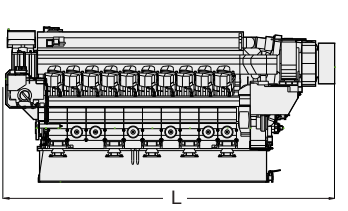
Figures on theoretical propeller curve for distillates according to ISO 8217 DMA, with all attached pumps

Dimensions

Cyl. No.		12	16	20
L	**mm**	6,207	7,127	8,047
H[2]	**mm**	3,417	3,417	3,417
H[3]	**mm**	3,682	3,682	3,682
Dry mass[4]	**t**	36.1	43.6	51.3

[1] Related to 100% actual engine load
[2] With low oilsump
[3] With deep oilsump
[4] Tolerance: 5%

Weight and performance parameters refer to engine with flywheel, TC silencer, attached pumps, oil filters and lube oil cooler.
V28/33D STC as marine main engine to be applied for multi-engine plants only in class-approved vessels.



Tier III with SCR

Bore: 270 mm, **Stroke:** 380 mm

Speed	**r/min**	800	800 (MDO[1]/MGO)
mep	**bar**	23.5	25.2
		kW	**kW**
6L27/38		2,040	2,190
7L27/38		2,380	2,555
8L27/38		2,720	2,920
9L27/38		3,060	3,285

Specific fuel oil consumption (SFOC) at ISO conditions

MCR	**100%**		**85%**	
	340 kW	365 kW	340 kW	365 kW
L27/38 CPP	188 g/kWh	191 g/kWh	185 g/kWh	186 g/kWh
L27/38 FPP	187 g/kWh	191 g/kWh	181 g/kWh	185 g/kWh

Specific lube oil consumption 0.8 g/kWh

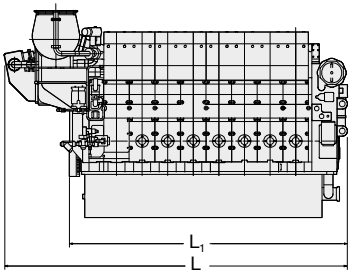
Engine type specific reference charge air temperature before cylinder 40 °C

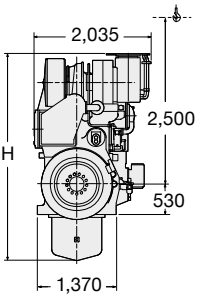
Dimensions

Cyl. No.		**6**	**7**	**8**	**9**
L	**mm**	5,070	5,515	5,960	6,405
L_1	**mm**	3,962	4,407	4,852	5,263
H	**mm**	3,555	3,687	3,687	3,687
Dry mass	**t**	29.0	32.5	36.0	39.5

Minimum centreline distance for twin engine installation: 2,500 mm

[1] MDO viscosity must not exceed 6 mm^2/s = cSt at 40 °C.





MAN L21/31

Tier II Tier III

Tier III with SCR

Bore: 210 mm, **Stroke:** 310 mm

Speed	**r/min**	1,000
mep	**bar**	24.0
		kW
6L21/31		1,290
7L21/31		1,505
8L21/31		1,720
9L21/31		1,935

Specific fuel oil consumption (SFOC) at ISO conditions

MCR	**100%**	**85%**
L21/31 CPP	192 g/kWh	190 g/kWh
L21/31 FPP	192 g/kWh	190 g/kWh

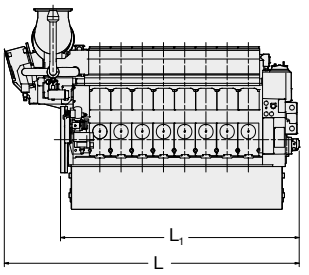
Specific lube oil consumption 0.4-0.8 g/kWh

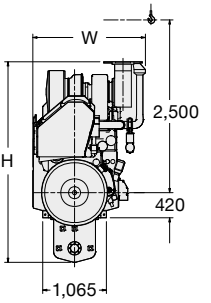
Engine type specific reference charge air temperature before cylinder 40 °C

Dimensions

Cyl. No.		**6**	**7**	**8**	**9**
L	**mm**	4,544	4,899	5,254	5,609
L_1	**mm**	3,424	3,779	4,134	4,489
H	**mm**	3,113	3,267	3,267	3,267
W	**mm**	1,695	1,695	1,820	1,820
Dry mass	**t**	16.0	17.5	19.0	20.5

Minimum centreline distance for twin engine installation: 2,400 mm





MAN 175D

12V

Bore: 175 mm, **Stroke:** 215 mm

Engine model	Rating def.	kW	rpm	SFOC at 100% MCR Tier II/Tier III g/kWh	Avg. Load %
12V175D-MH	Heavy Duty	1,499	1,600	188.0/189.0	100
12V175D-MH	Heavy Duty	1,499	1,800	194.5/195.5	100
12V175D-MH	Heavy Duty	1,740	1,800	192.5/193.5	85
12V175D-MM	Medium Duty	1,860	1,800	191.0/192.0	80
12V175D-MM	Medium Duty	2,040	1,800	190.5/191.5	70
12V175D-MM	Medium Duty	2,220	1,800	191.5/193.0	40
12V175D-MM	Medium Duty	2,220	1,900	195.0/196.0	65
12V175D-ML	Light Duty	2,400	2,000	197.5/198.0	60
12V175D-ML	Light Duty	2,580	2,000	* / -	60

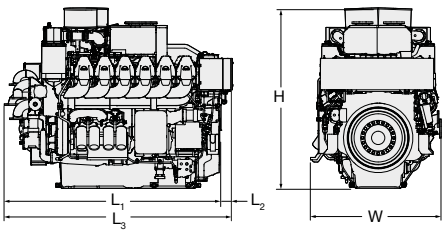
* Please contact MAN Energy Solutions

For multi-engine arrangement only. Specific fuel oil consumption according to ISO 3046-1:2002 based on a lower calorific value of 42,700 kJ/kg with attached lube oil, HT and LT cooling water pumps fulfilling IMO Tier II/Tier III emission limits with 5% tolerance.

Dimensions

Cyl. No.		12
L_1	mm	2,734
L_2	mm	167
L_3	mm	2,901
H	mm	2,295
W	mm	1,661
Dry mass	t	8.70

Configuration shown: MAN 12V175D-MM without seawater cooler



MAN 175D

16V

Tier II Tier III

Tier III with SCR

Bore: 175 mm, **Stroke:** 215 mm

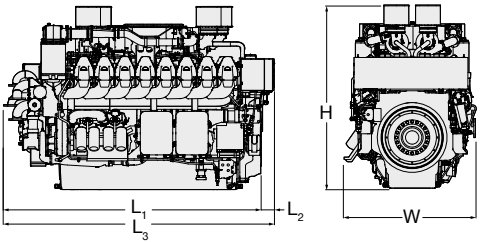
Engine model	Rating def.	kW	rpm	SFOC at 100% MCR Tier II/Tier III g/kWh	Avg. Load %
16V175D-MH	Heavy Duty	2,000	1,600	191.0/192.0	100
16V175D-MH	Heavy Duty	2,000	1,800	197.5/198.5	100
16V175D-MH	Heavy Duty	2,320	1,800	195.5/196.5	85
16V175D-MM	Medium Duty	2,480	1,800	194.0/195.0	80
16V175D-MM	Medium Duty	2,720	1,800	193.5/194.5	70
16V175D-MM	Medium Duty	2,960	1,800	194.5/196.0	40
16V175D-MM	Medium Duty	2,960	1,900	198.0/199.0	65
16V175D-ML	Light Duty	3,200	2,000	200.5/201.0	60

For multi-engine arrangement only. Specific fuel oil consumption according to ISO 3046-1:2002 based on a lower calorific value of 42,700 kJ/kg with attached lube oil, HT and LT cooling water pumps fulfilling IMO Tier II/Tier III emission limits with 5% tolerance.

Dimensions

Cyl. No.		16
L_1	mm	3,254
L_2	mm	167
L_3	mm	3,421
H	mm	2,316
W	mm	1,661
Dry mass	t	10.80

Configuration shown: MAN 16V175D-MM without seawater cooler



MAN 175D

20V

Bore: 175 mm, **Stroke:** 215 mm

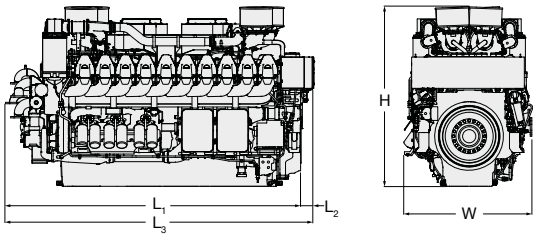
Engine model	Rating def.	kW	rpm	SFOC at 100% MCR Tier II/Tier III g/kWh	Avg. Load %
20V175D-MH	Heavy Duty	2,500	1,600	189.5/190.5	100
20V175D-MH	Heavy Duty	2,500	1,800	196.0/197.0	100
20V175D-MH	Heavy Duty	2,900	1,800	194.0/195.0	85
20V175D-MM	Medium Duty	3,100	1,800	192.5/193.5	80
20V175D-MM	Medium Duty	3,400	1,800	192.0/193.0	70
20V175D-MM	Medium Duty	3,700	1,800	193.0/194.5	40
20V175D-MM	Medium Duty	3,700	1,900	196.5/197.5	65
20V175D-ML	Light Duty	4,000	2,000	199.0/199.5	60
20V175D-ML	Light Duty	4,400	2,000	199.0/ -	60

For multi-engine arrangement only. Specific fuel oil consumption according to ISO 3046-1:2002 based on a lower calorific value of 42,700 kJ/kg with attached lube oil, HT and LT cooling water pumps fulfilling IMO Tier II/Tier III emission limits with 5% tolerance.

Dimensions (preliminary)

Cyl. No.		20
L_1	mm	3,774
L_2	mm	167
L_3	mm	3,941
H	mm	2,297
W	mm	1,647
Dry mass	t	13.00

Configuration shown: MAN 20V175D-MM without seawater cooler



MAN four-stroke marine GenSets

MAN four-stroke marine GenSets – all emission requirements

Besides focus on power density and fuel economy, MAN Energy Solutions is committed to a steady reduction of the environmental impact of our engines.

IMO Tier II

MAN Energy Solutions has decreased NO_x emissions significantly by applying well-proven methods that ensure a cleaner and more efficient combustion process. Our four-stroke propulsion engines are IMO Tier II compliant by internal engine measures alone.

IMO Tier III

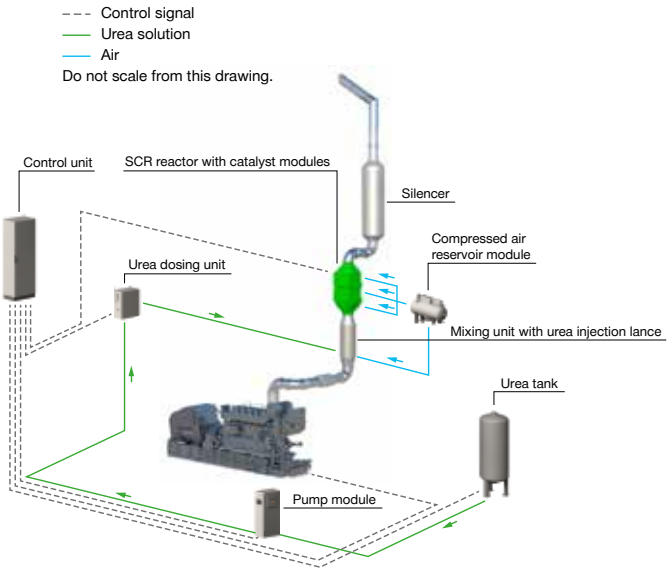
For operation in emission control areas (ECA), MAN Energy Solutions has developed a comprehensive range of selective catalytic reduction (SCR) systems that provides a tremendous reduction in NO_x levels surpassing IMO Tier III requirements.

MAN Energy Solutions is the first manufacturer to successfully produce and offer IMO Tier III compliant four-stroke marine engines based on a fully modular SCR kit covering our entire four-stroke engine portfolio.

In 2014 MAN Energy Solutions was awarded the first IMO Tier III EIAPP certificate together with the classification society DNV-GL.

MAN Energy Solutions' standard SCR system is available in fourteen different sizes covering our entire portfolio of four-stroke engines. Customised SCR systems are offered on demand.

MAN has developed a complete range of SCR systems that work perfectly with our engines for maximum system efficiency. The intelligent exhaust gas temperature control enables significant savings in fuel consumption as compared to third party supplier systems. MAN SCR systems work with MGO, MDO and HFO with up to 3.5% sulphur.



MAN GenSet plant with complete SCR system

100% MCR PTO-solutions for L21/31 Mk 2 and L27/38 GenSets

Optimised for both new and existing ship designs.

PTO on alternator – external pump

Pump on alternator – common base frame

PTO on front end – external pump (new feature)

Pump on front end – common base frame (new feature)

Fuel oil saving for small bore GenSet (part load optimised)

GenSets can be delivered with improved fuel oil consumption at low load and part load. The penalty will be higher SFOC at high load. The part-load optimised engine complies with the IMO Tier II limit.

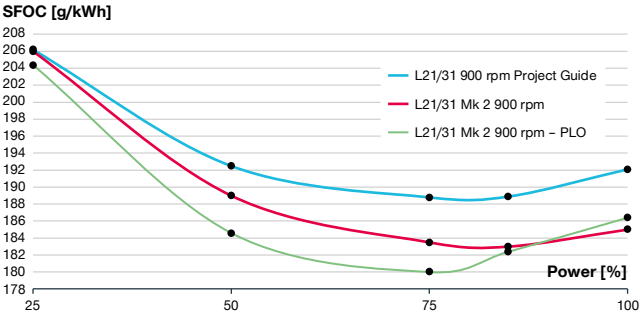
The new tuning method, referred to as part-load optimisation, optimises the engine performance at approx. 60-65% MCR, as this is often the load range in which the GenSet is operating, but it can also be customised to other specific operating conditions.

With the new development of L21/31 Mk 2 together with part-load optimisation techniques, fuel oil savings of up to nearly 12 g/kWh have been obtained, depending on the engine type/model and load point.

Traditionally, GenSets are optimised at 80-85% MCR due to limitations in turbocharger matching, but this is also the load point where power management will engage additional GenSets when more power is needed.

With part-load optimisation, there is a fuel oil penalty when the load exceeds approx. 80% MCR, but this has no practical consequence as the GenSet rarely exceeds 85% MCR.

This is illustrated in the figure below. For further information, please contact MAN Energy Solutions.



Based on Project Guide figures for IMO Tier II engines – 60Hz: ISO reference condition, HFO/MDO, Without pumps, tolerance +5% (not included) August 2020.

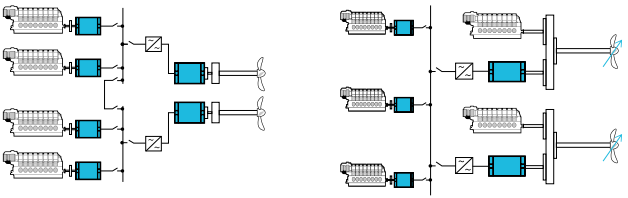
Electric and hybrid propulsion trains (HyProp ECO)

MAN Energy Solutions offers a full range of electric and hybrid power and propulsion plants. Our solutions are designed and optimised to meet the highest efficiencies of an integrated system covering the complete operational profile of the vessel. Our propulsion systems provide a well-balanced and tailor-made solution with emphasis on increased fuel efficiency, flexibility and performance.

Our comprehensive propulsion packages include the complete array of required components from GenSets to propulsors, including switchboards, variable speed drives, propulsion motors and controls. They ensure the optimal technical and economical solution while minimising the operational costs.

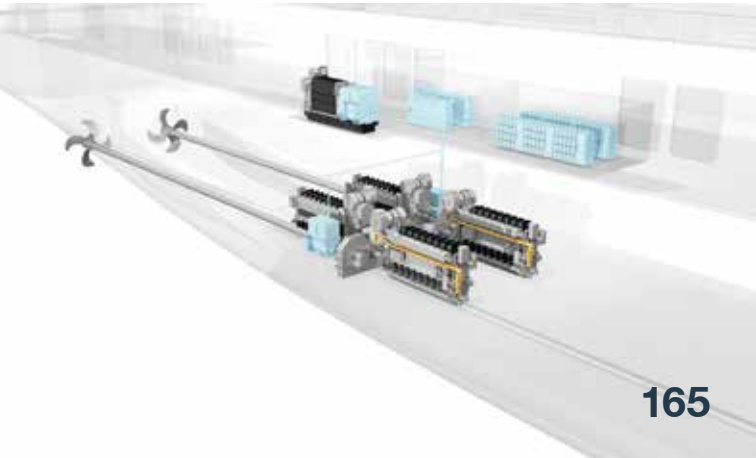
The HyProp ECO introduces a system to control the power delivered by or to the shaft machine. It overcomes the constraint on constant speed propulsion machinery by utilising variable speed drives at the shaft generator/motor.

Our innovative HyProp battery system also integrates batteries which enable an optimised loading of our engines, and provide an electric spinning reserve, dynamic support of the propellers as well as peak shaving.



High-efficient and customised power trains for electric and hybrid propulsion applications

HyProp ECO
Hybrid
propulsion
system

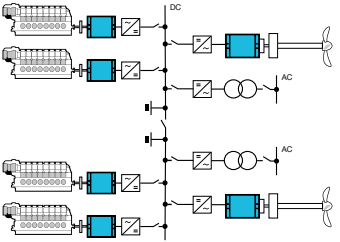


Energy saving electric propulsion (EPROX-DC)

Recent developments in electric propulsion have resulted in electric systems where engines can operate at variable speed. The “classic” constant speed operation of GenSets is no longer a constraint. Utilising an enlarged engine operation map with a speed range of 60% to 100% paves the way to a high potential in fuel oil savings. Each speed set point of the engines can be adjusted independently in order to achieve a minimum fuel oil consumption according to the system load. The electric system using DC distribution enables a decoupled operation of the engines, propulsion drives, and other consumers.

Another major advantage is the possible integration of energy storage systems, like batteries. They can reduce the transient loads on the engines and improve the dynamic response of the propulsion system. Fast load application is removed from the engines and load peaks are shaved. Also, emission free propulsion can be realized when running on the batteries. In addition, the energy storage system allows a constant and high loading of the engines, provides spinning reserve and will have a positive effect on engine maintenance.

MAN Energy Solutions offers this advanced package solution in close cooperation with our partner Aspin Kemp & Associates.



EPROX-DC energy-saving electric propulsion plant

EPROX-DC propulsion solution

EPROX-DC propulsion solution on anchor handling tug supply vessel

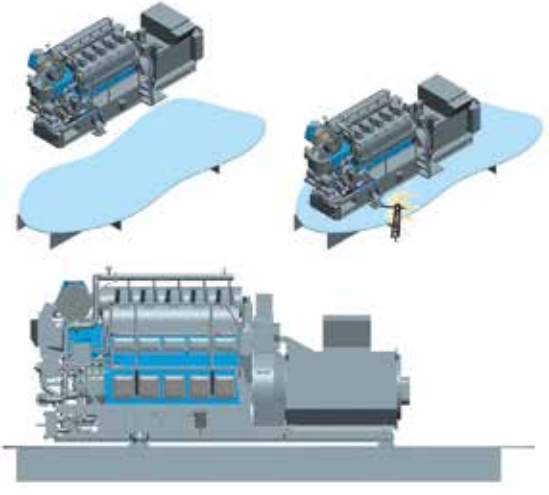
MAN L23/30H monocoque GenSet – continued development

The monocoque GenSet includes several updates of the tried and tested L23/30H engine, which are focused on weight reduction, vibration optimisation and simplified installation.

The most significant update is that the alternator is now a load-bearing component, with a 'top brace' connection to the engine. This enables up to 63% weight reduction of the base frame, which again results in weight reduction of up to 13% of the GenSet and a lower vibration level.

The three and four point 'deck-level' supports significantly simplify the GenSet installation process. This design is installed on a flat deck, which is a major reduction of the vessels foundation structure. Furthermore, applying only three conicals makes the GenSets self-leveling.

The monocoque GenSet application is available for all variants of the L23/30H engine.



Monocoque GenSet

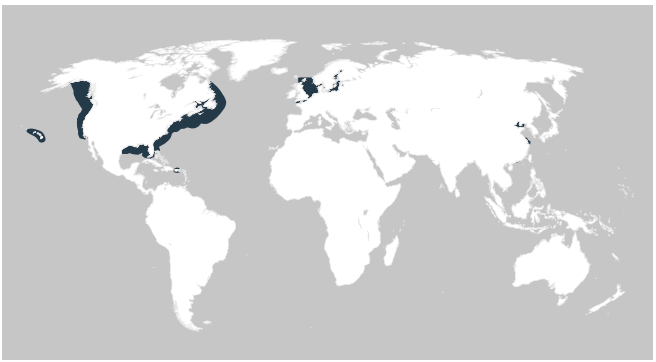
Marine fuels after 2020 (in accordance with ISO 8217)

From 1 January 2020, the global 0.5% limit for sulphur content in marine fuels enters into force. To ensure compliant operation, one of following methods must be used:

- HFO GenSet running on a compliant low-sulphur fuel oil (LSFO) in accordance with ISO 8217.
- Global: max 0.5% sulphur (VLSFO).
- ECA: max 0.1% sulphur (ULSFO).
- HFO GenSet running on a high-sulphur fuel oil (HSFO) in accordance with ISO 8217 and with a SO_X scrubber for exhaust gas cleaning.
- DF GenSet running on LNG with a compliant pilot distillate fuel.

MAN GenSets have for decades been running on low-sulphur and low-viscosity fuels on small power plants on Greenland. The many years of experience have been transferred to the standard marine GenSet. To be prepared for operation on compliant fuels after 2020, the HFO GenSets will be updated with optimised fuel pumps and inlet/exhaust valve materials for low-viscosity fuels.

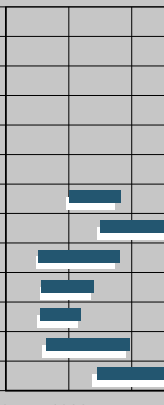
It is important to note that paraffinic and aromatic fuels are incompatible and should not be mixed in the same fuel tank. Notice the issued Service Letters, PrimeServ Customer Information and follow MAN guidelines.



ECAs – 0.10% S (effective 2015) Global sulfur cap – 0.50% S (effective 2020)

MAN four-stroke marine GenSets programme

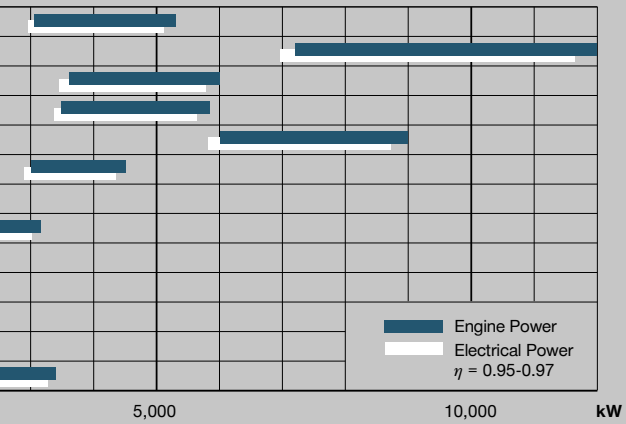
r/min	Engine type
720-750	L35/44DF
720-750	V32/44CR
720-750	L32/44CR
720-750	L32/44
720-750	V32/40
720-750	L32/40
720-750	L28/32DF
720-750	L27/38 L27/38 (MDO/MGO)
720-900	L23/30H Mk 3
720-900	L23/30H Mk 2
720-900	L23/30DF
900-1,000	L21/31 Mk 2
1,080-1,800	175D



GenSets

GenSets can be applied as auxiliary GenSets, GenSets for electric propulsion or for offshore applications.

Project specific demands can be clarified at an early project stage.



Tier III GenSets

Four-stroke GenSets are Tier III compatible when a downstream SCR is added to clean the exhaust gas on a Tier II engine. The additional SCR will only have an impact on SFOC if the backpressure is increased.

MAN L35/44DF

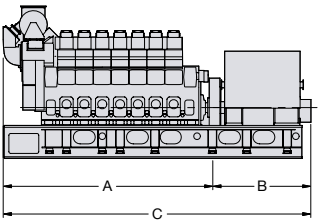
Bore: 350 mm, **Stroke:** 440 mm

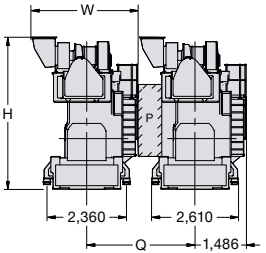
Speed	**r/min**	750		720	
Frequency	**Hz**	50		60	
		Eng. kW	**Gen. kW**[1]	**Eng. kW**	**Gen. kW**[1]
6L35/44DF		3,180	3,069	3,060	2,953
7L35/44DF		3,710	3,580	3,570	3,445
8L35/44DF		4,240	4,092	4,080	3,937
9L35/44DF		4,770	4,603	4,590	4,429
10L35/44DF		5,300	5,115	5,100	4,922

Dimensions[2]

Cyl. no.		**6**	**7**	**8**	**9**	**10**
A	**mm**	6,270	6,900	7,480	8,110	8,690
B[3]	**mm**	3,900	4,100	4,400	4,600	4,800
C[3]	**mm**	10,170	11,000	11,880	12,710	13,490
W	**mm**	2,958	3,108	3,108	3,108	3,108
H	**mm**	4,631	4,867	4,867	4,867	4,867
Dry mass[3]	**t**	85	94	103	110	118

1) Based on nominal generator efficiencies of 96.5%
2) Dimensions are not finally fixed
3) Depending on alternator applied





P Free passage between the engines, width 600 mm and height 2,000 mm
Q Minimum distance between centre of engines: ~3,400 mm (with gallery)

MAN V32/44CR

Tier II | Tier III

Tier III with SCR

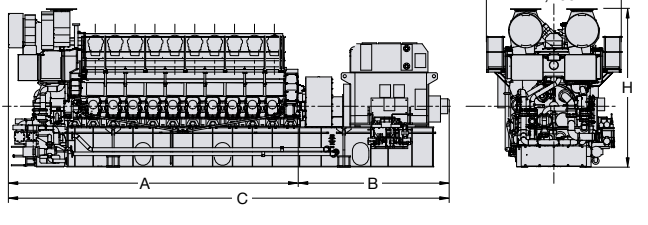
Bore: 320 mm, **Stroke:** 440 mm

Speed	**r/min**	750		720	
Frequency	**Hz**	50		60	
		Eng. kW	**Gen. kW[1)]**	**Eng. kW**	**Gen. kW[1)]**
12V32/44CR		7,200	6,984	7,200	6,984
14V32/44CR[2)]		8,120	7,876	8,120	7,876
16V32/44CR		9,600	9,312	9,600	9,312
18V32/44CR[3)]		10,800	10,476	10,800	10,476
20V32/44CR		12,000	11,640	12,000	11,640

Dimensions

Cyl. no.		**12**	**14**	**16**	**18**	**20**
A	**mm**	5,382	6,012	6,642	7,272	7,902
B	**mm**	4,201	4,201	4,201	4,201	4,201
C	**mm**	11,338	11,968	12,598	13,228	13,858
H	**mm**	5,014	5,014	5,014	5,014	5,014
Dry mass	**t**	117	131	144	159	172

[1)] Based on nominal generator efficiencies of 97%
[2)] 580 kW/cyl.
[3)] 18V32/44CR available rigidly mounted only
Frame Auxiliary Box (FAB) available upon request



Tier III with SCR

Bore: 320 mm, Stroke: 440 mm

Speed r/min	750		720	
Frequency Hz	50		60	
	Eng. kW	Gen. kW[1)]	Eng. kW	Gen. kW[1)]
6L32/44CR	3,600	3,474	3,600	3,474
7L32/44CR[2)]	4,060	3,918	4,060	3.918
8L32/44CR	4,800	4,632	4,800	4,632
9L32/44CR	5,400	5,211	5,400	5,211
10L32/44CR	6,000	5,790	6,000	5,790

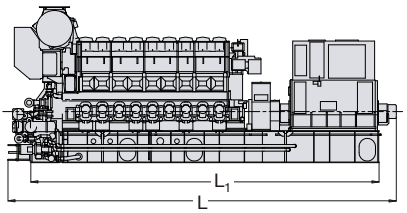
Dimensions

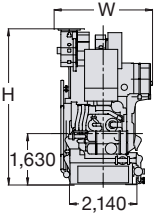
Cyl. no.		6	7	8	9	10
L	mm	10,738	11,268	11,798	12,328	12,858
L_1	mm	10,150	10,693	11,236	11,779	12,309
W	mm	2,490	2,490	2,573	2,573	2,573
H	mm	4,768	4,768	4,955	4,955	4,955
Dry mass	t	71	78	84	91	97

1) Based on nominal generator efficiencies of 96.5%

2) 580 kW/cyl.

Frame Auxiliary Box (FAB) available upon request





Free passage between the engines, width 600 mm and height 2,000 mm
Minimum distance between centre of engines: ~2,835 mm (without gallery) ~3,220 mm (with gallery)

Tier III with SCR

Exclusively for auxiliary GenSet operation. High power density and space saving GenSet with conventional injection and optimised SFOC for part-load operation.

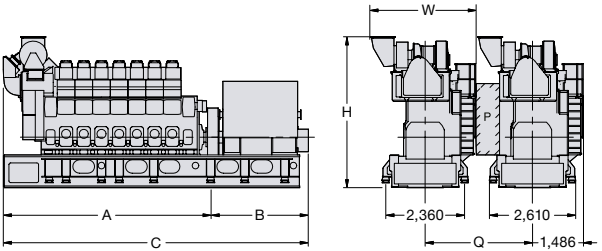
Bore: 320 mm, **Stroke:** 440 mm

Speed	**r/min**	750		720	
Frequency	**Hz**	50		60	
		Eng. kW	**Gen. kW**[1)]	**Eng. kW**	**Gen. kW**[1)]
6L32/44		3,498	3,375	3,498	3,375
8L32/44		4,664	4,500	4,664	4,500
9L32/44		5,247	5,063	5,247	5,063
10L32/44		5,830	5,625	5,830	5,625

Dimensions

Cyl. no.		**6**	**8**	**9**	**10**
A	**mm**	6,470	7,531	8,061	8,590
B	**mm**	3,990	4,229	4,529	4,530
C	**mm**	10,460	11,760	12,590	13,120
W	**mm**	2,845	3,054	3,105	3,105
H	**mm**	4,701	4,887	4,887	4,887
Dry mass	**t**	82	98	107	113

[1)] Based on nominal generator efficiencies of 96.5%



P Free passage between the engines, width 600 mm and height 2,000 mm
Q Minimum distance between centre of engines: ~2,835 mm (with gallery)

MAN V32/40

Tier II Tier III

Tier III with SCR

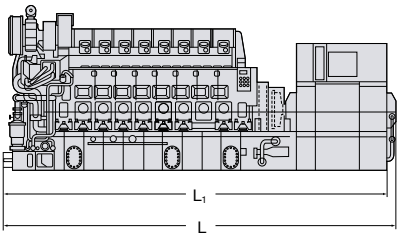
Bore: 320 mm, **Stroke:** 400 mm

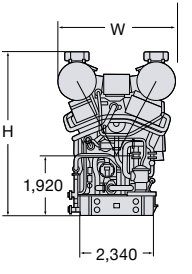
Speed	**r/min**	750		720	
Frequency	**Hz**	50		60	
		Eng. kW	**Gen. kW**[1)]	**Eng. kW**	**Gen. kW**[1)]
12V32/40		6,000	5,820	6,000	5,820
14V32/40		7,000	6,790	7,000	6,790
16V32/40		8,000	7,760	8,000	7,760
18V32/40		9,000	8,730	9,000	8,730

Dimensions

Cyl. no.		**12**	**14**	**16**	**18**
L	**mm**	11,045	11,710	12,555	13,185
L_1	**mm**	10,450	11,115	11,950	12,580
W	**mm**	3,365	3,365	3,730	3,730
H	**mm**	4,850	4,850	5,245	5,245
Dry mass	**t**	101	113	126	138

[1)] Based on nominal generator efficiencies of 97%





Tier III with SCR

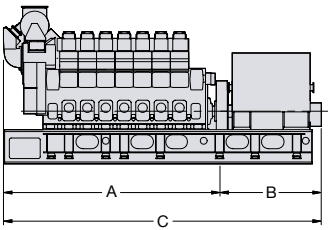
Bore: 320 mm, **Stroke:** 400 mm

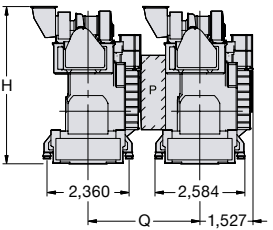
Speed	r/min	750		720	
Frequency	Hz	50		60	
		Eng. kW	Gen. kW[1)]	Eng. kW	Gen. kW[1)]
6L32/40		3,000	2,895	3,000	2,895
7L32/40		3,500	3,378	3,500	3,378
8L32/40		4,000	3,860	4,000	3,860
9L32/40		4,500	4,343	4,500	4,343

Dimensions

Cyl. no.		6	7	8	9
A	mm	6,340	6,870	7,400	7,930
B	mm	3,415	3,415	3,635	3,635
C	mm	9,755	10,285	11,035	11,565
H	mm	4,622	4,622	4,840	4,840
Dry mass	t	75.0	79.0	87.0	91.0

[1)] Based on nominal generator efficiencies of 96.5%





P Free passage between the engines, width 600 mm and height 2,000 mm
Q Minimum distance between centre of engines: ~2,835 mm (without gallery) ~3,220 mm (with gallery)

MAN L28/32DF

Tier II Tier III

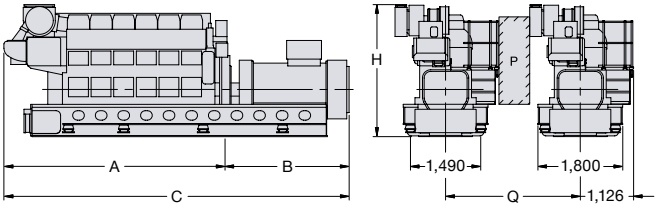
Bore: 280 mm, **Stroke:** 320 mm

Speed	**r/min**	750		720	
Frequency	**Hz**	50		60	
		Eng. kW	**Gen. kW**[1)]	**Eng. kW**	**Gen. kW**[1)]
5L28/32DF		1,050	1,000	1,050	1,000
6L28/32DF		1,260	1,200	1,260	1,200
7L28/32DF		1,470	1,400	1,470	1,400
8L28/32DF		1,680	1,600	1,680	1,600
9L28/32DF		1,890	1,800	1,890	1,800

Dimensions

Cyl. no.		**5**	**6**	**7**	**8**	**9**
A	**mm**	4,321	4,801	5,281	5,761	6,241
B	**mm**	2,400	2,510	2,680	2,770	2,690
C	**mm**	6,721	7,311	7,961	8,531	8,931
H	**mm**	2,835	3,009	3,009	3,009	3,009
Dry mass	**t**	32.6	36.3	39.4	40.7	47.1

[1)] Based on nominal generator efficiencies of 95%
Gas methane number ≥ 80



P Free passage between the engines, width 600 mm and height 2,000 mm
Q Minimum distance between centre of engines: ~2,655 mm (without gallery)
~2,850 mm (with gallery)

MAN L27/38

Bore: 270 mm, **Stroke:** 380 mm

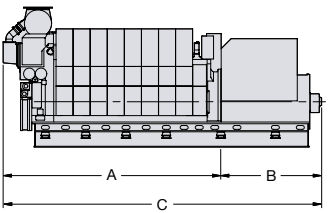
Speed	**r/min**	750/720		750/720 (MDO[1]/MGO)	
Frequency	**Hz**	50/60		50/60	
		Eng. kW	**Gen. kW[2]**	**Eng. kW**	**Gen. kW[2]**
5L27/38		1,600/1,500	1,535/ 1,440	-	-
6L27/38		1,980	1,900	2,100	2,015
7L27/38		2,310	2,220	2,450	2,355
8L27/38		2,640	2,535	2,800	2,690
9L27/38		2,970	2,850	3,150	3,025

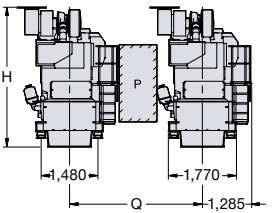
Dimensions

Cyl. no.		**5**	**6**	**7**	**8**	**9**
A	**mm**	4,346	4,791	5,236	5,681	6,126
B	**mm**	2,486	2,766	2,766	2,986	2,986
C	**mm**	6,832	7,557	8,002	8,667	9,112
H	**mm**	3,712	3,712	3,899	3,899	3,899
Dry mass	**t**	40.0	44.5	50.4	58.2	64.7

[1] MDO viscosity must not exceed 6 mm^2/s = cSt @ 40 °C

[2] Based on nominal generator efficiencies of 96%





P Free passage between the engines, width 600 mm and height 2,000 mm

Q Minimum distance between centre of engines: ~2,900 mm (without gallery) ~3,100 mm (with gallery).

MAN L23/30H Mk 3

Tier II Tier III

Tier III with SCR

Bore: 225 mm, **Stroke:** 300 mm

Speed	r/min	750		720		900	
Frequency	Hz	50		60		60	
		Eng. kW	Gen. kW[1)]	Eng. kW	Gen. kW[1)]	Eng. kW	Gen. kW[1)]
5L23/30H Mk 3 ECR		-	-	500	475	-	-
5L23/30H Mk 3		885	840	850	810	-	-
6L23/30H Mk 3		1,062	1,010	1,020	970	1,200	1,140
7L23/30H Mk 3		1,239	1,180	1,190	1,130	1,400	1,330
8L23/30H Mk 3		1,416	1,345	1,360	1,290	1,600	1,520
9L23/30H Mk 3		1,593	1,515	1,530	1,455	1,800	1,710

Dimensions (5-7 cylinder)

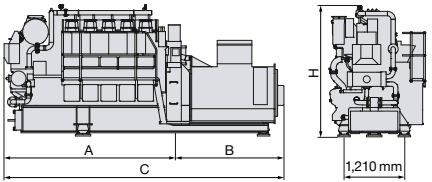
Cyl. no.		5	5	6	6	7	7
	r/min	720 ECR	720/750	720/750	900	720/750	900
A	mm	3,379	3,379	3,749	3,749	4,119	4,276
B	mm	2,202	2,202	2,252	2,252	2,302	2,302
C	mm	5,581	5,581	6,001	6,001	6,421	6,578
H	mm	2,621	2,621	2,621	2,621	2,621	2,621
Dry mass	t	16.8	16.8	18.4	18.6	20.7	20.7

Dimensions (8-9 cylinder)

Cyl. no.		8	8	9	9
	r/min	720/750	900	720/750	900
A	mm	4,489	4,896	4,859	5,266
B	mm	2,352	2,352	2,402	2,402
C	mm	6,841	7,248	7,261	7,668
H	mm	2,621	2,621	2,621	2,621
Dry mass	t	22.5	22.6	24.5	24.5

[1)] Based on nominal generator efficiencies of 95%

Note: Part load optimised – available



Free passage between the engines, width 600 mm and height 2,000 mm

Minimum distance between centre of engines: ~2,250 mm (without gallery) ~2,600 mm (with gallery)

Tier II Tier III

Tier III with SCR

MAN L23/30H Mk 2

Bore: 225 mm, **Stroke:** 300 mm

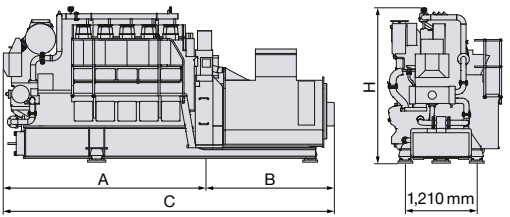
Speed	**r/min**		750		720		900
Frequency	**Hz**		50		60		60
		Eng. kW	**Gen. kW**[1)]	**Eng. kW**	**Gen. kW**[1)]	**Eng. kW**	**Gen. kW**[1)]
5L23/30H Mk 2 ECR		580	550	580	550	-	-
5L23/30H Mk 2		675/740	640/705	650/710	620/675	-	-
6L23/30H Mk 2		888	845	852	810	1,050	1,000
7L23/30H Mk 2		1,036	985	994	945	1,225	1,165
8L23/30H Mk 2		1,184	1,125	1,136	1,080	1,400	1,330

Dimensions

Cyl. no.		5	6	6	7	7	8	8
	r/min	720/750	720/750	900	720/750	900	720/750	900
A	**mm**	3,379	3,749	3,749	4,119	4,276	4,489	4,896
B	**mm**	2,202	2,252	2,252	2,302	2,302	2,352	2,352
C	**mm**	5,581	6,001	6,001	6,421	6,578	6,841	7,248
H	**mm**	2,621	2,621	2,621	2,621	2,621	2,621	2,621
Dry mass	**t**	16.8	18.4	18.6	20.7	20.7	22.5	22.6

[1)] Based on nominal generator efficiencies of 95%

Note: Part load optimised – available



Free passage between the engines, width 600 mm and height 2,000 mm

Minimum distance between centre of engines: ~2,250 mm (without gallery) ~2,600 mm (with gallery)

MAN L23/30DF

Tier II | Tier III

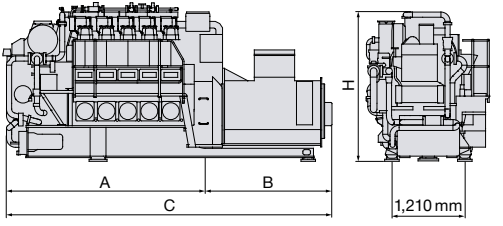
Bore: 225 mm, **Stroke:** 300 mm

Speed	**r/min**		750		720		900
Frequency	**Hz**		50		60		60
		Eng. kW	**Gen. kW**[1)]	**Eng. kW**	**Gen. kW**[1)]	**Eng. kW**	**Gen. kW**[1)]
5L23/30DF		625	590	625	590	-	-
6L23/30DF		750	710	750	710	900	855
7L23/30DF		875	830	875	830	1,050	995
8L23/30DF		1,000	950	1,000	950	1,200	1,140
9L23/30DF		-	-	-	-	-	-

Dimensions

Cyl. no.		**5**	**6**	**6**	**7**	**7**	**8**	**8**
	r/min	720/750	720/750	900	720/750	900	720/750	900
A	**mm**	3,469	3,839	3,839	4,209	4,276	4,579	4,896
B	**mm**	2,202	2,252	2,252	2,302	2,302	2,352	2,352
C	**mm**	5,671	6,091	6,091	6,511	6,578	6,931	7,241
H	**mm**	2,749	2,749	2,749	2,749	2,749	2,749	2,749
Dry mass	**t**	17.3	19.0	19.2	21.4	21.4	23.3	23.4

[1)] Based on nominal generator efficiencies of 95%.
Gas methane number ≥ 80.



Free passage between the engines, width 600 mm and height 2,000 mm
Minimum distance between centre of engines: ~2,250 mm (without gallery) ~2,600 mm (with gallery)

MAN L21/31 Mk 2

Tier III with SCR

Bore: 210 mm, **Stroke:** 310 mm

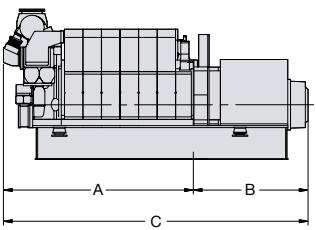
Speed	**r/min**	1,000		900	
Frequency	**Hz**	50		60	
		Eng. kW	**Gen. kW**[1)]	**Eng. kW**	**Gen. kW**[1)]
5L21/31 Mk 2		1,000	950	1,000	950
6L21/31 Mk 2		1,320	1,255	1,320	1,255
7L21/31 Mk 2		1,540	1,465	1,540	1,465
8L21/31 Mk 2		1,760	1,675	1,760	1,675
9L21/31 Mk 2		1,980	1,880	1,980	1,880

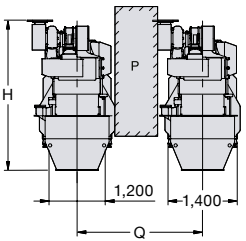
Dimensions

Cyl. no.		**5**	**6**	**7**	**8**	**9**
A	**mm**	3,485	3,840	4,258	5,161	5,516
B	**mm**	1,870	2,000	1,970	2,110	2,135
C	**mm**	5,355	5,840	6,228	7,208	7,651
H	**mm**	3,183	3,183	3,289	3,289	3,289
Dry mass	**t**	22.3	25.8	29.3	32.8	36.3

[1)] Based on nominal generator efficiencies of 95%

Note: Part load optimised – available





P Free passage between the engines, width 600 mm and height 2,000 mm

Q Minimum distance between centre of engines: ~2,500 mm (without gallery) ~2,700 mm (with gallery).

MAN 175D

12V

Tier II Tier III

Tier III with SCR

Bore: 175 mm, **Stroke:** 215 mm, **Cylinder:** 12

Engine model	Rating def.	kWm	kWe[1)]	rpm (frequency)	SFOC at 100% MCR Tier II/Tier III g/kWh
12V175D-MEM	Electric propulsion	1,440	1,382	1,500 (50 Hz)	184/185
	medium duty	1,800	1,728	1,800 (60 Hz)	190/191
12V175D-MEL	Electric propulsion	1,620	1,555	1,500 (50 Hz)	183/184
	light duty	1,920	1,843	1,800 (60 Hz)	189/190
12V175D-MEV	Electric propulsion	1,860	1,786	1,080-1,800 (36-60 Hz)	191/192
	variable speed	2,040	1,958	1,080-1,800 (36-60 Hz)	190/191
12V175D-MA	Auxiliary power	1,620	1,555	1,500 (50 Hz)	183/184
		1,920	1,843	1,800 (60 Hz)	189/190

[1)] 3-phase, 0.8 p.f., assumes alternator efficiency of 96.0%.
Specific fuel oil consumption related to mechanical output acc. to ISO 3046-1:2002 based on a lower calorific value of fuel 42,700 kJ/kg with attached lube oil, HT and LT-cooling water pumps limitations with 5% tolerance.

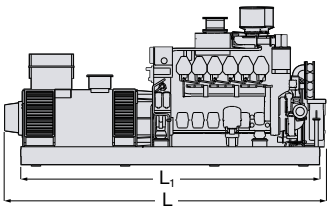
Rating definitions:

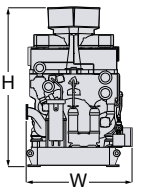
Marine electric propulsion medium duty	Average load: up to 75%
Marine electric propulsion light duty	Average load: up to 50%
Marine electric propulsion, variable speed	Average load: up to 75%/50%
Marine auxiliary	Average load: up to 50%

Dimensions

L	**mm**	5,385
L_1	**mm**	5,000
H	**mm**	2,670
W	**mm**	1,770
Dry weight	**t**	15.80

Weight and dimensions are preliminary. Please request installation drawing for planning purposes.





Bore: 175 mm, **Stroke:** 215 mm, **Cylinder:** 16

Engine model	Rating def.	kWm	kWe[1)]	rpm (frequency)	SFOC at 100% MCR Tier II/Tier III g/kWh
16V175D-MEM	Electric propulsion	1,920	1,843	1,500 (50 Hz)	187/188
	medium duty	2,400	2,304	1,800 (60 Hz)	193/194
16V175D-MEL	Electric propulsion	2,160	2,074	1,500 (50 Hz)	186/187
	light duty	2,560	2,458	1,800 (60 Hz)	192/193
16V175D-MEV	Electric propulsion	2,480	2,381	1,080-1,800 (36-60 Hz)	194/195
	variable speed	2,720	2,611	1,080-1,800 (36-60 Hz)	193/194
16V175D-MA	Auxiliary power	2,400	2,304	1,800 (60 Hz)	193/194

[1)] 3-phase, 0.8 p.f., assumes alternator efficiency of 96.0%.
Specific fuel oil consumption related to mechanical output acc. to ISO 3046-1:2002 based on a lower calorific value of fuel 42,700 kJ/kg with attached lube oil, HT and LT-cooling water pumps limitations with 5 % tolerance.

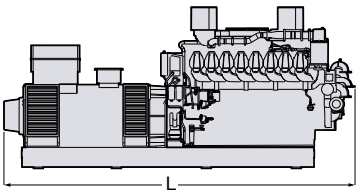
Rating definitions

Marine electric propulsion medium duty	Average load: up to 75%
Marine electric propulsion light duty	Average load: up to 50%
Marine electric propulsion, variable speed	Average load: up to 75%/50%

Dimensions

L	**mm**	6,000
H	**mm**	2,850
W	**mm**	1,800
Dry weight	**t**	23

Weight and dimensions are preliminary. Please request installation drawing for planning purposes.



MAN 175D

20V

Tier II Tier III

Tier III with SCR

Bore: 175 mm, **Stroke:** 215 mm, **Cylinder:** 20

Engine model	Rating def.	kWm	kWe[1)]	rpm (frequency)	SFOC at 100% MCR Tier II/Tier III g/kWh
20V175D-MEM	Electric propulsion medium duty	2,400	2,304	1,500 (50 Hz)	185.5/186.5
		3,000	2,880	1,800 (60 Hz)	191.5/192.5
20V175D-MEL	Electric propulsion light duty	2,700	2,592	1,500 (50 Hz)	184.5/185.5
		3,200	3,072	1,800 (60 Hz)	190.5/191.5
20V175D-MEV	Electric propulsion variable speed	3,100	2,976	1,080-1,800 (36-60 Hz)	192.5/193.5
		3,400	3,264	1,080-1,800 (36-60 Hz)	191.5/192.5

[1)] 3-phase, 0.8 p.f., assumes alternator efficiency of 96.0%.

Specific fuel oil consumption related to mechanical output acc. to ISO 3046-1:2002 based on a lower calorific value of fuel 42,700 kJ/kg with attached lube oil, HT and LT-cooling water pumps limitations with 5 % tolerance.

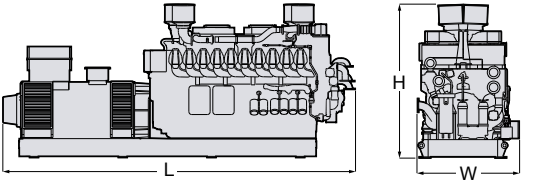
Rating definitions

Marine electric propulsion medium duty	Average load: up to 75%
Marine electric propulsion light duty	Average load: up to 50%
Marine electric propulsion, variable speed	Average load: up to 75%/50%

Dimensions

L	**mm**	6,500
H	**mm**	2,900
W	**mm**	1,800
Dry weight	**t**	27

Weight and dimensions are preliminary. Please request installation drawing for planning purposes.



S.E.M.T. Pielstick four-stroke propulsion engines

S.E.M.T. Pielstick PA6 B STC

Tier II Tier III

Tier III with SCR

Bore: 280 mm, **Stroke:** 330 mm

		Standard engine	Load profile 'Navy'
Speed	**r/min**	1,050	1,084
mep	**bar**	22.8	24.3
Rated power output		**kW**[1)]	**- ICFN kW**
12PA6 B STC		4,860	5,346
16PA6 B STC		6,480	7,128
20PA6 B STC		8,100	8,910

Specific fuel oil consumption (SFOC) to ISO conditions

Engine rating	ICFN stop power	MCR 100%	MCR 85%
Load profile 'Navy'	212 g/kWh	205 g/kWh	193 g/kWh

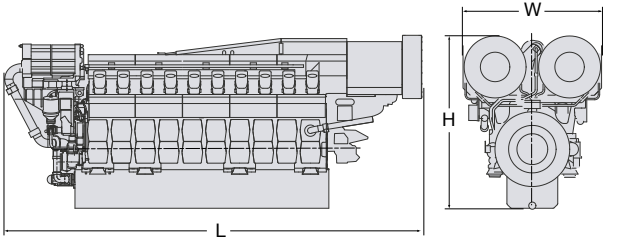
Specific lube oil consumption[1)]: 0.7 g/kWh.
Figures on theoretical propeller curve for distillates according to ISO 8217 DMA, with all attached pumps.

Dimensions

Cyl. No.		12	16	20
L	**mm**	5,830	6,780	7,960
W	**mm**	2,340	2,340	2,640
H	**mm**	3,124	3,124	3,166
Dry mass	**t**	31	37	43

Engine fuel: distillate according to ISO 8217 DMA and DMZ. Capabilities with JP-5 and bio-fuel.
Shock qualification.

[1)] Related to 100% actual engine load.



S.E.M.T. Pielstick PA6 B

Tier III with SCR

GenSet for electric propulsion.

Bore 280 mm, **Stroke** 330 mm

Speed	**r/min**	**1,000**		**900**	
Frequency	**Hz**	50		60	
		Eng. kW	**Gen. kW[1)]**	**Eng. kW**	**Gen. kW[1)]**
12PA6 B		4,440	4,307	4,200	4,074
16PA6 B		5,920	5,742	5,600	5,432
18PA6 B		6,660	6,460	6,300	6,111
20PA6 B		7,400	7,178	7,000	6,790

Specific fuel oil consumption (SFOC) to ISO conditions

Engine rating	**MCR 110%**	**MCR 100%**	**MCR 85%**
Frequency 50 Hz	204 g/kWh	200 g/kWh	198 g/kWh
Frequency 60 Hz	204 g/kWh	199 g/kWh	197 g/kWh

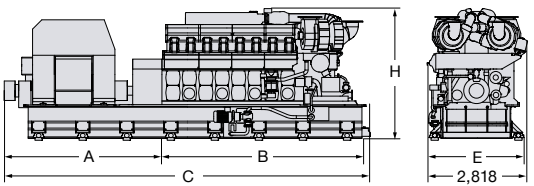
Figures on theoretical propeller curve for distillates according to ISO 8217 DMA, with all attached pumps.

Dimensions[2)]

Cyl. No.		**12**	**16**	**18**	**20**
A	**mm**	4,370	4,727	4,732	4,770
B	**mm**	4,600	5,637	6,097	6,557
C	**mm**	9,287	10,583	11,048	11,547
H	**mm**	3,695	3,695	3,695	3,695
E	**mm**	2,670	2,670	2,670	2,670
Dry mass[3)]	**t**	60	72	80	85

1) Nominal generator efficiencies: 97%.
2) Dimensions are based on operation under inclination up to 25 degrees in any direction.
3) Incl. 5% tolerance, weight may vary due to different configurations.

Engine fuel: distillate according to ISO 8217 DMA and DMZ. Capabilities with JP-5 and bio-fuel.
Engine rating: engine suitable for 110% overload during 1 hour every 6 operating hours.
Shock qualification.



S.E.M.T. Pielstick PC2.6 B

Tier II Tier III

Tier III with SCR

Bore: 400 mm, **Stroke:** 500 mm

Speed	**r/min**	600
mep	**bar**	23.9
Rated power output		**kW**
12PC2.6 B		9,000
14PC2.6 B		10,500
16PC2.6 B		12,000

Specific Fuel Oil Consumption (SFOC) to ISO conditions

Engine rating	**MCR 100%**	**MCR 85%**
PC2-6 B	185 g/kWh	179 g/kWh

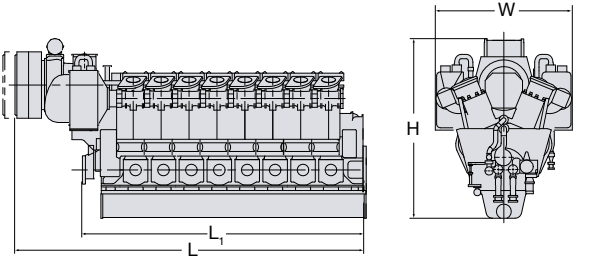
Specific lube oil consumption[1]: 1.0 g/kWh
Figures on theoretical propeller curve for distillates according to ISO 8217 DMA.

Dimensions

Cyl. No.		**12**	**14**	**16**
L	**mm**	9,100	9,840	10,580
L_1	**mm**	5,960	6,700	7,440
W	**mm**	3,780	3,780	3,780
H	**mm**	4,800	4,800	4,800
Dry mass	**t**	94	104	114

Engine rating: engine suitable for 110% overload during 1 hour every 6 operating hours.
Engine fuel: distillate according to ISO 8217 DMA and DMZ. Capabilities with JP-5 and heavy fuel.
Shock qualification.

[1] Related to 100% actual engine load.



MAN Four-stroke propulsion systems


4
2
5M
8
6
4
2
4M
8
6
4
2
3M

MAN Alpha

Propeller programme – FPP and CPP

The MAN Alpha FPP portfolio covers:

- power range of 4-40 MW per shaft
- blade configurations for 3, 4, 5 and 6-bladed propellers
- propellers with integrated shaft line and stern tube solutions
- a wide range of stern tube lube and sealing systems
  - oil, water, biodegradable oils

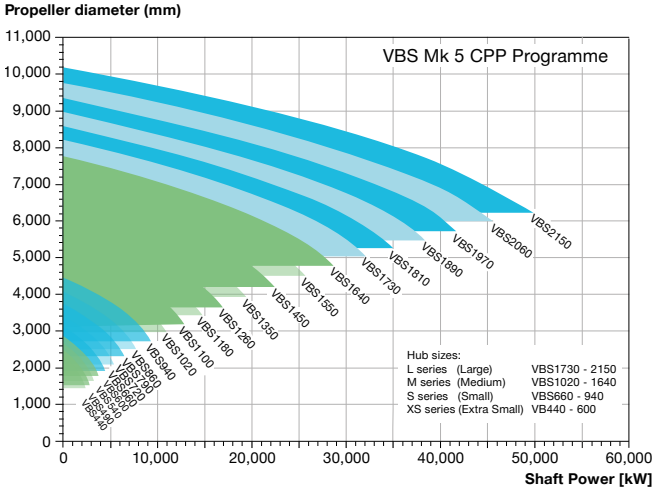
The MAN Alpha FPPs are characterised by the following benefits:

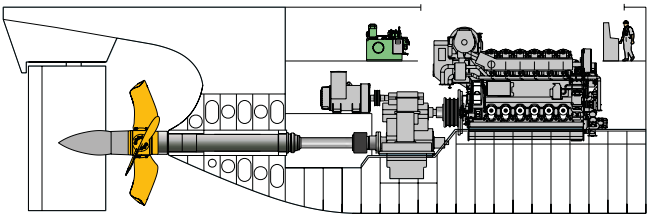
- High-efficient hydrodynamically optimised blade profiles
  - Kappel designs available
- High reliability: robust approach with ample mechanical design margins
- High-efficient aft ship integration with rudder, rudder bulb, ducts, etc.
- Layouts for complete propulsion systems
- Plant calculations with upfront consideration to torsional vibration calculation (TVC), alignment and control systems

MAN Alpha controllable pitch propeller

- As standard Mk 5 versions are 4-bladed – optionally 3- and 5-bladed propellers are available on request
- The figures stated after VBS indicate the propeller hub diameter
- Standard blade/hub materials are Ni-Al-bronze, stainless steel is optional
- The propellers are available up to the highest ice classes. However the standard programme, is based on 'no ice'

Standard programme





Four-stroke propulsion system installation – complete powertrain with propeller and aft ship equipment.

MAN standard package examples

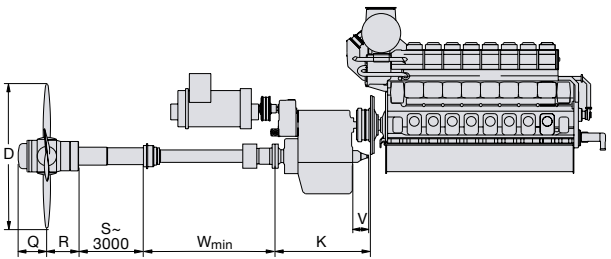
Cyl.	kW	Prop. speed r/min	D mm	Hub VBS mm	Q mm	R mm	Wmin mm	K mm	V mm	Prop. mass t[1]
L51/60DF										
6	6,900	162	4,400	1,100	851	920				
6	6,900	133	5,000	1,180	914	989				
6	6,900	103	5,850	1,350	1,037	1,096				
7	8,050	160	4,550	1,180	914	989				
7	8,050	133	5,150	1,260	975	1,036				
7	8,050	104	6,000	1,450	1,114	1,148				
8	9,200	157	4,700	1,180	914	989				
8	9,200	132	5,300	1,350	1,037	1,096				
8	9,200	103	6,200	1,450	1,114	1,148				
9	10,350	155	4,850	1,260	975	1,036				
9	10,350	131	5,450	1,350	1,037	1,096				
9	10,350	102	6,400	1,550	1,175	1,213				
V48/60CR										
12	14,400	160	4,950	1,350	1,037	1,096	1,800	2,620		26.7
12	14,400	130	5,600	1,450	1,114	1,163	1,850	2,770		33.2
12	14,400	100	6,600	1,640	1,260	1,256	1,900	3,140		42.2
14	16,800	160	5,100	1,450	1,114	1,163	1,850	2,775		31.7
14	16,800	130	5,850	1,550	1,187	1,208	1,900	2,905		38.1
14	16,800	100	6,850	1,730	1,330	1,307	1,950	3,355		48.5
16	19,200	160	5,260	1,450	1,114	1,163	1,850	2,805		32.9
16	19,200	130	6,050	1,640	1,260	1,256	1,950	3,155		43.9
16	19,200	100	7,100	1,730	1,330	1,367	2,000	3,455		56.3

[1] S_{min} and propeller mass are based on 6,000 mm propeller shaft and 3,000 mm stern tube

MAN standard package examples

Cyl.	kW	Prop. speed r/min	D mm	Hub VBS mm	Q mm	R mm	Wmin mm	K mm	V mm	Prop. mass t[1]
L48/60CR										
6	7,200	172	4,250	1,100	851	970	1,700			19.1
6	7,200	143	4,800	1,180	914	989	1,700			23.0
6	7,200	112	5,600	1,350	1,037	1,096	1,700			29.9
7	8,400	169	4,400	1,100	851	995	1,700			21.4
7	8,400	141	5,000	1,260	975	1,036	1,700			26.4
7	8,400	110	5,850	1,350	1,037	1,096	1,750			32.3
8	9,600	166	4,550	1,180	914	989	1,700			24.2
8	9,600	139	5,150	1,260	975	1,036	1,700			28.2
8	9,600	110	6,000	1,450	1,114	1,148	1,800			37.9
9	10,800	163	4,700	1,260	975	1,036	1,700			27.2
9	10,800	137	5,300	1,350	1,037	1,096	1,800			33.2
9	10,800	108	6,200	1,450	1,114	1,163	1,800			40.2

[1] S_{min} and propeller mass are based on 6,000 mm propeller shaft and 3,000 mm stern tube



MAN standard package examples

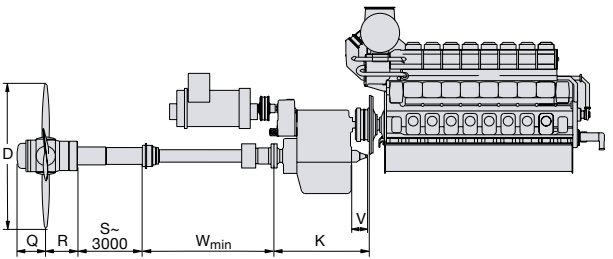
Cyl.	kW	Prop. speed r/min	D mm	Hub VBS mm	Q mm	R mm	Wmin mm	K mm	V mm	Prop. mass t[1)]
L35/44DF										
6	3,180	208	3,300	790	600	692	1,400			6.4
6	3,180	167	3,800	940	714	886	1,530			8.7
6	3,180	130	4,400	1,020	775	896	1,530			10.9
7	3,710	198	3,500	860	653	750	1,530			7.9
7	3,710	161	4,000	940	714	886	1,530			9.5
7	3,710	128	4,600	1,100	836	1,001	1,560			12.7
8	4,240	197	3,600	860	653	750	1,530			8.4
8	4,240	165	4,050	940	714	886	1,530			10.0
8	4,240	127	4,750	1,100	836	1,001	1,560			13.6
9	4,770	202	3,600	940	714	886	1,530			9.3
9	4,770	167	4,100	1,020	775	896	1,560			11.9
9	4,770	130	4,800	1,100	836	1,001	1,630			14.7
10	5,300	199	3,700	940	714	886	1,560			10.2
10	5,300	166	4,200	1,020	775	896	1,560			12.5
10	5,300	126	5,000	1,180	897	1,004	1,630			16.8

[1)] S_{min} and propeller mass are based on 6,000 mm propeller shaft and 3,000 mm stern tube

MAN standard package examples

Cyl.	kW	Prop. speed r/min	D mm	Hub VBS mm	Q mm	R mm	Wmin mm	K mm	V mm	Prop. mass t[1]
V32/44CR										
12	7,200	207	3,800	1,020	795	879	1,650			14.4
12	7,200	167	4,400	1,100	851	920	1,700			17.4
12	7,200	128	5,250	1,260	975	1,036	1,700			22.9
14	8,120	202	3,950	1,020	795	879	1,650			15.2
14	8,120	164	4,550	1,180	914	989	1,700			19.7
14	8,120	127	5,400	1,260	975	1,036	1,700			24.4
16	9,600	205	4,050	1,100	851	945	1,700			18.1
16	9,600	165	4,650	1,180	914	989	1,700			21.8
16	9,600	127	5,550	1,350	1,037	1,096	1,750			28.2
18	10,800	205	4,150	1,180	914	989	1,700			20.2
18	10,800	164	4,750	1,260	975	1,036	1,700			24.2
18	10,800	126	5,700	1,450	1,114	1,148	1,800			32.7
20	12,000	204	4,250	1,180	914	989	1,700			21.2
20	12,000	163	4,850	1,260	975	1,036	1,750			25.8
20	12,000	124	5,850	1,450	1,114	1,163	1,800			34.7

[1] S_{min} and propeller mass are based on 6,000 mm propeller shaft and 3,000 mm stern tube



MAN standard package examples

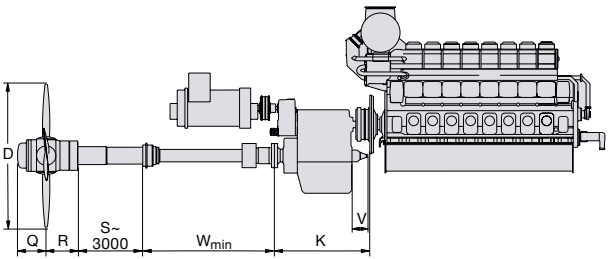
Cyl.	kW	Prop. speed r/min	D mm	Hub VBS mm	Q mm	R mm	Wmin mm	K mm	V mm	Prop. mass t[1)]
L32/44CR										
6	3,600	206	3,350	860	653	750	1,400			8.9
6	3,600	170	3,800	940	714	886	1,520			10.4
6	3,600	130	4,450	1,020	775	896	1,520			12.4
7	4,060	202	3,500	860	653	750	1,520			9.7
7	4,060	168	3,950	940	714	886	1,520			11.2
7	4,060	131	4,600	1,100	836	1,001	1,550			14.3
8	4,800	199	3,600	940	714	886	1,520			10.9
8	4,800	167	4,050	1,020	775	896	1,520			12.5
8	4,800	129	4,750	1,100	836	1,001	1,630			16.2
9	5,400	200	3,650	940	714	886	1,520			11.3
9	5,400	166	4,150	1,020	775	896	1,550			13.6
9	5,400	128	4,900	1,180	897	1,004	1,630			17.9
10	6,000	201	3,700	940	714	886	1,550			12.3
10	6,000	164	4,250	1,020	775	896	1,630			15.1
10	6,000	128	5,000	1,180	897	1,004	1,650			18.9
V32/40										
12	6,000	187	3,950	1,020	775	896	1,560			15.2
12	6,000	159	4,400	1,100	836	970	1,630			18.3
12	6,000	128	5,050	1,180	914	989	1,700			22.6
14	7,000	183	4,100	1,020	775	901	1,630			17.1
14	7,000	158	4,550	1,100	836	970	1,650			19.8
14	7,000	127	5,250	1,260	975	1,036	1,700			26.1
16	8,000	183	4,200	1,100	836	970	1,650			19.3
16	8,000	155	4,700	1,180	914	989	1,700			23.6
16	8,000	126	5,400	1,260	975	1,036	1,700			27.8
18	9,000	181	4,300	1,100	836	995	1,700			21.0
18	9,000	153	4,850	1,260	975	1,036	1,700			26.2
18	9,000	123	5,600	1,350	1,037	1,096	1,740			31.6

[1)] S_{min} and propeller mass are based on 6,000 mm propeller shaft and 3,000 mm stern tube

MAN standard package examples

Cyl.	kW	Prop. speed r/min	D mm	Hub VBS mm	Q mm	R mm	Wmin mm	K mm	V mm	Prop. mass t[1]
L32/40										
6	3,000	205	3,300	790	639	692	1,400			8.8
6	3,000	171	3,700	860	653	745	1,400			9.9
6	3,000	137	4,200	940	714	886	1,520			12.0
7	3,500	199	3,450	860	653	745	1,400			9.8
7	3,500	168	3,850	940	714	886	1,520			11.8
7	3,500	134	4,400	1,020	775	896	1,520			13.9
8	4,000	198	3,550	860	653	745	1,400			10.3
8	4,000	165	4,000	940	714	906	1,520			12.5
8	4,000	133	4,550	1,100	836	1,001	1,560			16.3
9	4,500	195	3,650	940	714	906	1,520			12.2
9	4,500	164	4,100	1,020	775	896	1,520			14.1
9	4,500	134	4,650	1,100	836	1,006	1,560			17.1
V28/33D STC										
12	6,000	187	3,700	940	735	828	1,600			10.9
12	6,000	155	4,000	1,020	795	879	1,650			13.1
12	6,000	140	4,300	1,100	851	920	1,650			14.5
16	8,000	211	3,700	1,020	795	879	1,650			13.1
16	8,000	184	4,000	1,100	851	920	1,650			14.7
16	8,000	159	4,300	1,100	851	945	1,700			16.2
20	10,000	228	3,700	1,100	851	920	1,650			14.6
20	10,000	199	4,000	1,100	851	945	1,700			16.3
20	10,000	176	4,300	1,180	914	989	1,700			18.3

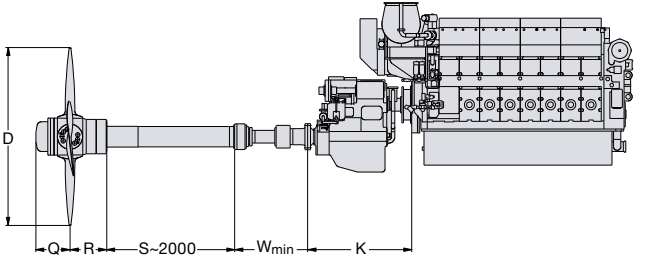
[1] S_{min} and propeller mass are based on 6,000 mm propeller shaft and 3,000 mm stern tube



MAN standard package examples

Cyl.	kW	Prop. speed r/min	D mm	Hub VBS mm	Q mm	R mm	Wmin mm	K mm	V mm	Prop. mass t[1)]
L27/38										
6	2,040	258	2,650	660	501	631	1,320			4.9
6	2,040	218	2,950	720	547	650	1,350			5.7
6	2,040	191	3,200	790	639	692	1,350			6.6
6	2,040	163	3,500	790	639	692	1,350			7.0
6	2,040	152	3,650	860	653	745	1,350			7.8
7	2,380	247	2,800	720	547	513	1,350			5.7
7	2,380	211	3,100	720	547	513	1,350			6.1
7	2,380	186	3,350	790	639	692	1,350			7.0
7	2,380	161	3,650	860	653	745	1,400			8.1
7	2,380	150	3,800	860	653	745	1,400			8.4
8	2,720	242	2,900	720	547	513	1,350			6.1
8	2,720	209	3,200	790	639	692	1,350			6.9
8	2,720	186	3,450	790	639	692	1,400			7.5
8	2,720	173	3,600	860	653	745	1,400			8.3
8	2,720	147	3,950	940	714	886	1,400			9.7
9	3,060	243	2,950	720	547	513	1,350			6.3
9	3,060	206	3,300	790	639	692	1,400			7.5
9	3,060	184	3,550	860	653	745	1,400			8.5
9	3,060	172	3,700	860	653	745	1,400			8.7
9	3,060	147	4,050	940	714	886	1,530			10.5

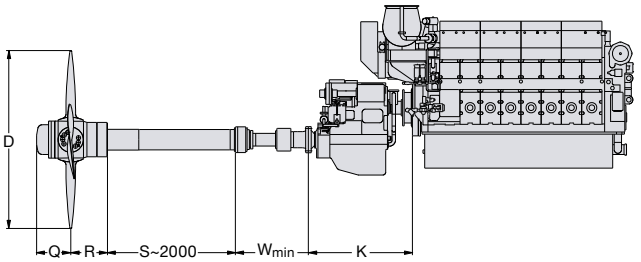
[1)] S_{min} and propeller mass are based on 4,000 mm propeller shaft and 2,000 mm stern tube for 21/31, 27/38 and 6,000 mm propeller shaft and 3,000 mm stem tube for the other types



MAN standard package examples

Cyl.	kW	Prop. speed r/min	D mm	Hub VBS mm	Q mm	R mm	Wmin mm	K mm	V mm	Prop. mass t[1]
L21/31										
6	1,290	274	2,350	600	456	566	1,320			3.8
6	1,290	232	2,600	600	456	566	1,320			4.1
6	1,290	205	2,800	660	501	631	1,320			4.4
6	1,290	181	3,000	660	501	631	1,320			4.7
7	1,505	260	2,500	600	456	566	1,320			4.1
7	1,505	223	2,750	660	501	631	1,320			4.6
7	1,505	198	2,950	660	501	631	1,320			4.8
7	1,505	176	3,150	720	547	650	1,320			5.4
8	1,720	261	2,550	600	456	581	1,320			4.4
8	1,720	219	2,850	660	501	631	1,320			4.8
8	1,720	196	3,050	720	547	650	1,320			5.1
8	1,720	176	3,250	720	547	650	1,350			5.6
9	1,935	262	2,600	660	501	631	1,320			4.7
9	1,935	221	2,900	720	547	650	1,320			5.4
9	1,935	199	3,100	720	547	650	1,350			5.9
9	1,935	188	3,200	720	547	650	1,350			6.0

[1] S_{min} and propeller mass are based on 4,000 mm propeller shaft and 2,000 mm stern tube for 21/31, 27/38 and 6,000 mm propeller shaft and 3,000 mm stem tube for the other types



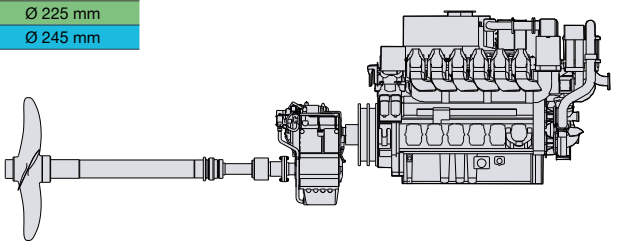
MAN Alpha FPP and CPP solutions for MAN 175D

Engine	Output		Ship speeds [knots]							
Type	Power	RPM	30		25		20		15	
	[kW]	[r/min]	Recommended propeller diameters [mm]							
12V175D	1,499	1,600	1,450	1,550	1,650	1,800	1,900	2,050	2,200	2,300
12V175D	1,499	1,800	1,400	1,500	1,650	1,750	1,800	1,850	1,950	2,100
12V175D	1,740	1,800	1,400	1,500	1,600	1,700	1,800	1,950	2,050	2,200
12V175D	1,860	1,800	1,400	1,550	1,650	1,750	1,850	1,950	2,050	2,200
12V175D	2,040	1,800	1,450	1,550	1,700	1,800	1,850	1,975	2,100	2,225
12V175D	2,220	1,900	1,450	1,550	1,700	1,850	2,000	2,150	2,250	2,300
12V175D	2,220	1,800	1,450	1,600	1,750	1,850	1,900	2,000	2,150	2,250
12V175D	2,400	2,000	1,400	1,525	1,650	1,775	1,900	1,950	2,000	2,100
16V175D	2,000	1,600	1,525	1,700	1,775	1,850	2,000	2,150	2,275	2,400
16V175D	2,000	1,800	1,425	1,550	1,700	1,775	1,850	1,975	2,100	2,200
16V175D	2,320	1,800	1,500	1,600	1,750	1,875	1,925	2,025	2,150	2,275
16V175D	2,480	1,800	1,500	1,650	1,775	1,900	1,975	2,050	2,150	2,300
16V175D	2,720	1,800	1,525	1,675	1,800	1,950	2,050	2,100	2,200	2,350
16V175D	2,960	1,900	1,525	1,650	1,775	1,900	2,050	2,150	2,200	2,300
16V175D	2,960	1,800	1,550	1,700	1,850	1,975	2,100	2,175	2,200	2,350
16V175D	3,200	2,000	1,500	1,625	1,750	1,875	2,000	2,125	2,225	2,275
Reduction gear ratio			3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5

Propellers for the MAN 175D engines are optimised for a diesel-mechanical twin screw vessel operating at 85% engine rating. For engine versions and rating conditions, see the MAN four-stroke propulsion engines chapter. The standard propeller programme is dimensioned according to Lloyd's Register No Ice.

Standard shaft diameter:

Ø 175 mm
Ø 205 mm
Ø 225 mm
Ø 245 mm



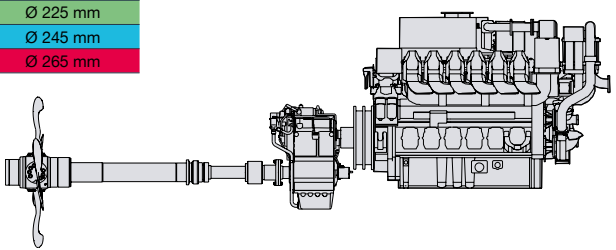
MAN Alpha FPP and CPP solutions for MAN 175D

Engine	Output		Ship speeds [knots]							
Type	Power	RPM	30		25		20		15	
	[kW]	[r/min]	Recommended propeller diameters [mm]							
20V175D	2,500	1,600	1,600	1,750	1,900	1,975	2,075	2,200	2,350	2,500
20V175D	2,500	1,800	1,500	1,650	1,775	1,900	1,975	2,050	2,150	2,300
20V175D	2,900	1,800	1,550	1,700	1,850	1,950	2,100	2,150	2,200	2,350
20V175D	3,100	1,800	1,600	1,700	1,850	2,000	2,125	2,200	2,250	2,400
20V175D	3,400	1,800	1,625	1,750	1,900	2,025	2,150	2,275	2,325	2,400
20V175D	3,700	1,900	1,600	1,750	1,850	2,000	2,150	2,250	2,350	2,425
20V175D	3,700	1,800	1,650	1,775	1,925	2,050	2,200	2,325	2,400	2,450
20V175D	4,000	2,000	1,600	1,700	1,850	1,975	2,100	2,200	2,350	2,450
20V175D	4,400	2,000	1,650	1,800	1,900	2,000	2,200	2,250	2,400	2,500
2x12V175D	4,440	1,900	1,700	1,800	1,950	2,050	2,200	2,350	2,450	2,575
2X16V175D	4,960	1,800	1,800	1,900	2,050	2,200	2,300	2,500	2,600	
2X16V175D	5,440	1,800	1,850	1,950	2,100	2,250	2,375			
2X16V175D	5,920	1,900	1,850	1,950	2,075	2,200				
2X20V175D	6,800	1,800	1,950	2,100	2,200					
2X20V175D	7,400	1,900	1,950	2,075	2,200					
2X20V175D	8,000	2,000	1,900	2,075						
Reduction gear ratio			3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5

Propellers for the MAN 175D engines are optimised for a diesel-mechanical twin screw vessel operating at 85% engine rating. For engine versions and rating conditions, see the MAN four-stroke propulsion engines chapter. The standard propeller programme is dimensioned according to Lloyd's Register No Ice.

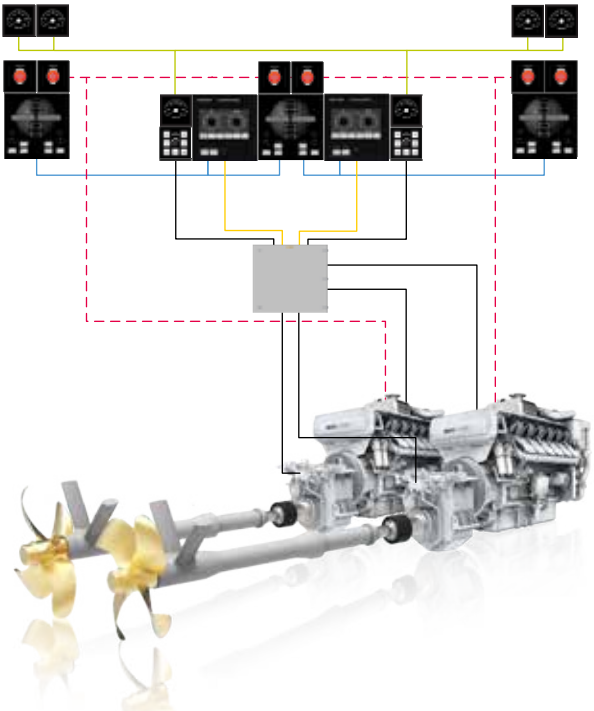
Standard shaft diameter:

- Ø 175 mm
- Ø 205 mm
- Ø 225 mm
- Ø 245 mm
- Ø 265 mm



Alphatronic 3000 propulsion control system

A high number of various FPP and CPP propulsion package applications are controlled by the Alphatronic 3000 system – customised for combinations of MAN medium and high speed engines in a wide range of diesel-mechanical, hybrid or electric propulsion setups.



Simple system architecture for a straightforward twin MAN 175D FPP plant

Alphatronic 3000 at your finger tips: Safe and accurate propulsion control all the way – from the navigator's finger tips to the propeller tips. Any manoeuvring order given is translated into electrical speed setting-, pitch- or clutch signals, governing the hydraulic servo circuits of the gearbox and propeller system. Swift and reliable vessel manoeuvres are ensured due to quick and stable system response.

MAN turbochargers and exhaust gas systems

MAN turbochargers and exhaust gas systems

MAN Energy Solutions has a long and successful track record in the development of exhaust gas turbochargers for low, medium and high-speed diesel and gas engines. Drawing on its unrivalled expertise in the design and manufacture of this crucial engine component, MAN Energy Solutions can offer you world-leading technology that helps you maximise the efficiency of your operations.

MAN turbochargers are designed to deliver peak performance throughout their working lives – in some of the harshest conditions encountered anywhere in the world. This is achieved by combining three elements: simplicity, flexibility and reliability. For example, we develop and build our turbochargers to make installation, operation, servicing and maintenance as easy and efficient as possible. This reduces your initial capital investment and results in lower lifecycle costs.

Applications

- Marine propulsion
- Marine GenSets
- Power generation
- Construction
- Mining
- Off-road vehicles
- Locomotives
- Industrial
- Offshore
- Mechanical drives

Technical data

Turbine type	Axial flow turbine
Max. permissible temperature	520 °C
Pressure ratio	up to 4.7
Optimised for IMO Tier III	

Supercharged engine output

Type	kW	Mass kg
TCT40	9,460	2,500
TCT50	12,000	3,455
TCT60	15,120	4,735
TCT70	19,040	6,480
TCT80	24,030	8,890

Specific air consumption (le) 7.5 kg/kWh

MAN TCA Series

Technical data

Turbine type	Axial flow turbine
Max. permissible temperature	500 °C two-stroke / 650 °C four-stroke
Pressure ratio	up to 5.5
Suitable for HFO, MDO, gas	

Turbocharger programme

	Max. supercharged engine output kW		Max. permissible	
Type	**Two-stroke**	**Four-stroke**	**Speed**	**Mass**
	le* = 7.5 kg/kWh	le* = 6.5 kg/kWh	rpm	kg
TCA33	-	5,400	27,800	1,370
TCA44	7,400	7,900	22,500	1,950
TCA55	10,200	10,400	20,000	3,200
TCA66	14,600	14,800	16,900	5,300
TCA77	20,700	21,000	14,200	8,330
TCA88	32,400	30,000	12,000	14,000

* Specific air consumption

Technical data

Turbine type	Radial flow turbine
Max. permissible temperature	650 °C
Pressure ratio	up to 5.4
Suitable for HFO, MDO, gas	

Turbocharger programme

Type	Max. supercharged engine output kW Four-stroke	Max. permissible Speed	Mass
	le* = 6.5 kg/kWh	rpm	kg
TCR10	600	85,000	50
TCR12	880	70,900	100
TCR14	1,300	58,700	110
TCR16	1,850	48,800	180
TCR18	2,750	40,300	300
TCR20	4,000	33,400	500
TCR22	6,850	25,600	1,050

* Specific air consumption

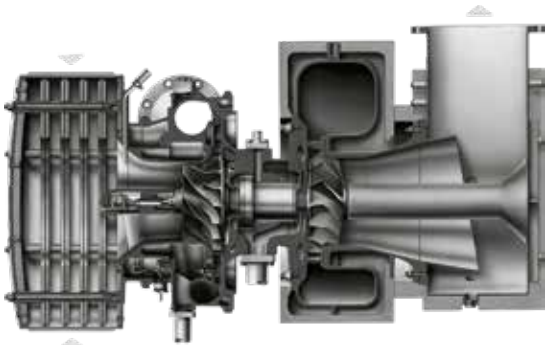
Technical data

Turbine type	Radial flow turbine
Max. permissible temperature	650 °C (opt. 720 °C)
Pressure ratio	up to 4.5
Suitable for HFO, MDO, gas	

Turbocharger programme

	Max. supercharged engine output	Max. permissible speed	Mass
Type	**kW**	**rpm**	**kg**
NR12/S	670	75,000	155
NR14/S	950	64,000	190
NR17/S	1,350	52,600	260
NR20/S	1,870	44,700	350
NR24/S	2,690	37,300	505
NR29/S	3,820	31,300	780
NR34/S	5,400	26,300	1,450

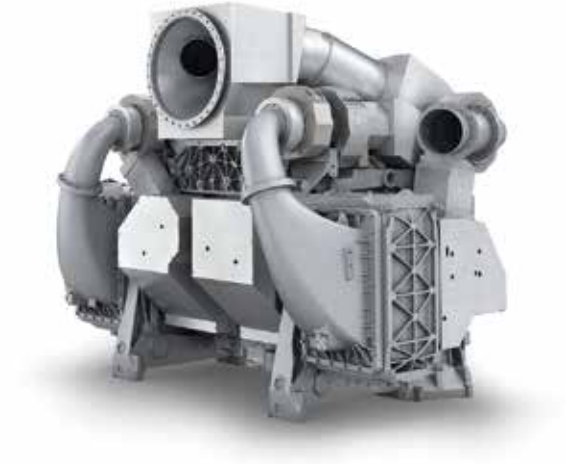
Specific air consumption Ie = 7 kg/kWh



MAN ECOCHARGE
Market leader in two-stage turbocharging

MAN ECOCHARGE two-stage turbocharging is suitable for high and medium-speed engines of all fuel types and for application in all engine power ranges. Extremely high efficiencies and pressure ratios enable increased power density and improved key engine parameters. For example, it is possible to use a smaller engine for the same required power output or to achieve lower NO_X emissions and lower specific fuel oil consumptions (SFOC).

As a compact two-stage unit, the MAN ECOCHARGE delivers outstanding turbocharging efficiency. A variety of product types and sizes are available, ensuring the perfect turbocharger-to-engine-fit. MAN ECOCHARGE always consists of a clever combination of high and low-pressure turbochargers. While MAN TCX has been specifically designed for high-pressure applications, MAN TCA and MAN TCR as well as our new MAN TCT generation series round up the package as low-pressure turbochargers.



Technical data

Turbine type	Mixed flow turbine
Max. permissible temperature	650 °C
Pressure ratio (two stages)	up to 10.5
Suitable for HFO, MDO, gas	

TCX turbocharger programme

Type	Max. engine output* kW	Max. permissible speed rpm	Mass kg
TCX17	8,500	40,980	470
TCX19	11,900	34,550	870
TCX21	16,900	29,000	1,564
TCX23	23,900	24,390	2,394

* le = 6 kg/kWh; pHPCin = 3 bar; THPCin = 45 °C

MAN ETB

MAN's EGR Blower series – Electrical Turbo Blower (ETB)

Specifically designed for EGR systems the MAN ETB plays an important role in enabling these systems to reach IMO Tier III emission limitation. The EGR blower is a core component of MAN Energy Solutions' high-pressure EGR system that raises the exhaust-gas pressure in order to overcome the pressure difference between exhaust gas and scavenging receiver. In addition the recirculated exhaust gas amount is controlled during the EGR operation by varying the blower speed.

The desired EGR operating conditions are achieved by using a high-speed electric motor, directly coupled to the compressor wheel and speed controlled by a frequency converter. The scope of supply consists of the ETB and one cabinet with frequency converter and sine wave filter.

The MAN ETB features a high-efficient blower wheel, optimized for the low-pressure ratios necessary for the high pressure EGR system of a two-stroke diesel engine with materials designed to withstand corrosive agents caused by Sulphur content fuels. As such MAN's ETB is suitable for high-pressure EGR engines of all fuel types and in all application ranges.

Technical data

Type	Max. blower speed	Mass of blower
	rpm	kg
ETB40 [1]	9,200	1,860
ETB30 [2]	14,000	1,200

[1] Available
[2] Coming up soon

With ETB30 and ETB40 the MAN two-stroke engine portfolio can be covered with just two frame sizes.

The maximum engine power output with one ETB depends on the EGR volume flow and the pressure difference between exhaust gas and scavenging receiver. Therefore an EGR blower selection tool will be introduced and the output will be available in CEAS soon.

For more information and blower assignment, please contact turbochargers@man-es.com.

ETB – explicitly designed for EcoEGR

MAN's ETB is explicitly designed for EcoEGR applications where the blower will run continuously in both Tier III and Tier II Eco mode. This results in a compact and cost optimized design with highest availability.

In Tier II Eco mode the EGR volume flow is approx. 50% of the required volume flow in Tier III mode. To cover the operating points of both running modes MAN's ETB features an extremely wide compressor map.

The ETB achieves benchmark efficiencies and therefore the operational costs are minimized.

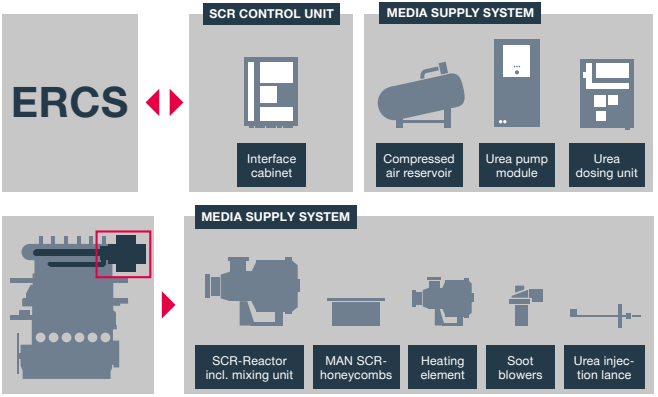
For more information about EcoEGR see the section EcoEGR in the MAN B&W two-stroke propulsion engines chapter.

MAN SCR-HP

Dimensions

Cluster	Reactor diameter	Reactor length < 0.1% sulphur	Reactor length < 3.5% sulphur
	mm	mm	mm
1	2,000	4,800	5,800
2	2,400	5,000	6,000
3	2,900	5,500	6,500
4	3,400	5,900	6,900
5	3,900	6,300	7,300
6	4,500	6,900	7,900

Illustration contains optional features



MAN SCR-HP

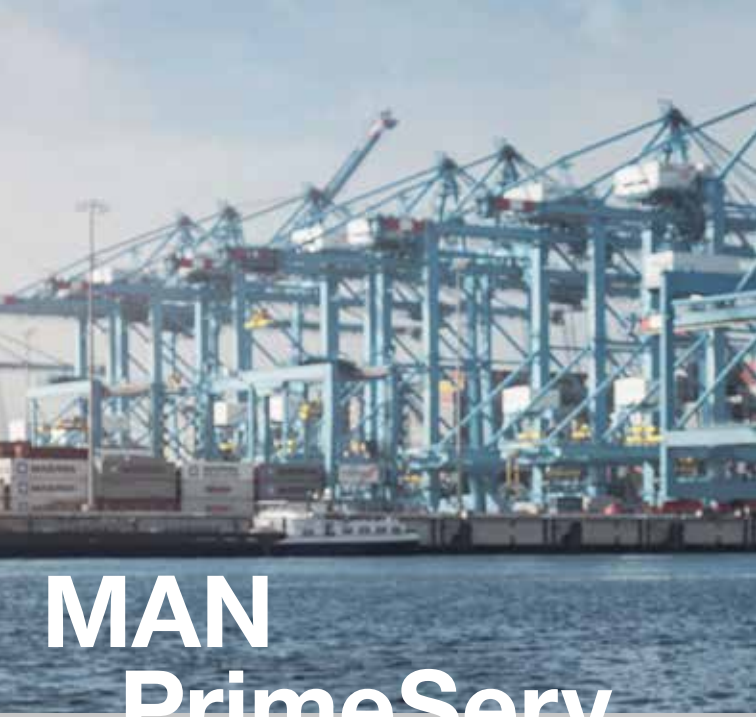
The MAN SCR-HP is a small and compact NO_X emission reduction system. The most compact design in the market allows for easy integration, and the few frame sizes will cover the entire two-stroke portfolio up to 25 MW per SCR reactor.

The integrated mixing unit reduces the overall length and volume. The specific honeycombs ensure a compact design.

The MAN SCR-HP can be mounted in all positions and is capable of running on all fuels.

Auxiliary components like the urea injection lance, urea dosing unit and urea pump module are from MAN's well-proven SCR-LP system.

SCR-HP system



MAN PrimeServ

The service brand of MAN Energy Solutions

- Increase uptime with high-quality OEM spare parts
- Manage maintenance costs with tailor-made service agreements
- High-quality maintenance, repair and reconditioning for all major brands
- Global service network for 24/7 reliable support, technical expertise and onsite recovery
- Digital service solutions for enhanced monitoring and analytics
- Professional training with MAN PrimeServ academies and flexible e-Learning
- Optimize efficiency and sustainability with advanced retrofit and upgrade solutions

MAN Fluid Monitor

Step into a new dimension of operation & maintenance with condition monitoring

It all starts with a tiny anomaly. Something is off by just a little bit in a machine – not noticeable, even to an experienced operator.
But it's not going to go away on its own. Sooner or later, it will have consequences: performance degradation, safety hazards or even failure and downtime.

What if you could receive an alarm or a recommendation to stop your engine in real time? And then do something about it in time? To prevent serious damage?

How do you usually detect a bearing seizure? Cylinder scuffing? Slight wear of components? Water presence? Fuel pollution? Soot pollution?

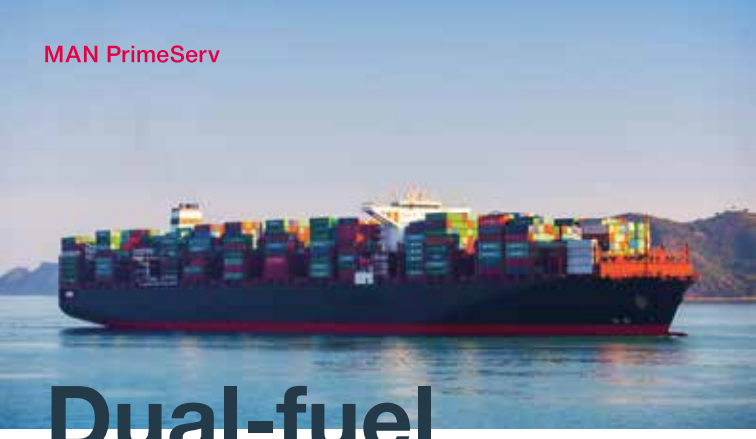
How do you detect tiny anomalies between planned maintenances? Now you can. Now there's MAN Fluid Monitor for lube oil.

PrimeServ Omnicare

Your one-stop service solution

For over a century, MAN PrimeServ has provided the best technical and mechanical support for all MAN engines and equipment. Now, PrimeServ Omnicare offers you the same level of care for all your equipment, no matter the brand. This one-stop service solution covers the maintenance, repair and reconditioning of engines and machinery for most major brands.

PrimeServ Omnicare gives you access to one of the largest global service networks, represented in more than 100 service centers worldwide. Our skilled field service personnel will be available to you 24/7, dedicated to keep your fleet working efficiently.



Dual-fuel conversion

One of our biggest retrofit solutions is to convert an existing diesel engine to a dual-fuel gas engine. This enables you to switch between diesel and gas as necessary, to both reduce operational costs and take advantage of optimal fuel prices as they arise.

Using alternative fuels, such as LNG, ethane, LPG, or methanol, greatly reduces SO_x, NO_x, CO_2, and particulate matter, enabling you to comply with global environmental regulations, secure worldwide port access, and meet your own sustainability targets.

Our dual-fuel retrofit solutions range from a straightforward conversion of the main engine to turnkey solutions that include gas systems. To ensure the process is executed seamlessly from start to finish, MAN PrimeServ covers everything from research and site survey to engineering and project management, and finally to hardware commissioning.

Our dual-fuel retrofit solutions are not limited to the main engine, and customized projects can be provided as a turnkey solution, or including gas systems in partnership with MAN Cryo.

MAN PrimeServ Academies

Professional certification

MAN PrimeServ Academies offer courses covering the entire portfolio of MAN Energy Solutions products, both two- and four-stroke, power generation, and turbochargers. In the academies, participants are guided through theoretical lectures, and hands-on exercises covering the operation, maintenance, and troubleshooting, of the MAN Energy Solutions product portfolio. We strive to create a “real life” atmosphere such that participants can relate learning objectives to their daily working environment. That includes working on original engines, fully functioning diesel GenSets, and simulators.

PrimeServ Assist

Secured availability – optimized efficiency

Ensuring engine reliability is essential for today's business competitiveness. Preventing un-planned downtime and detecting anomalies before a breakdown is the key to a reliable operation. Have MAN experts review your engine data to optimize engine efficiency. Our proactive service solution, PrimeServ Assist is always available.

Using secure connectivity technology, our MAN experts continuously monitor and analyze near real-time data, diagnosing anomalies and notifying on-site engineers with valuable operational and maintenance advice supported by the MAN CEON platform.

Based on your data, PrimeServ Assist secures engine availability and keeps your engine operating at peak efficiency through ad-hoc notifications and instant technical support from our MAN experts. In addition, we provide your data visualized in graphic data charts to review your engine's performance and data history.

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List of licensees

Symbols used:

T: MAN Energy Solutions two-stroke licence
F: MAN Energy Solutions four-stroke licence
P: MAN Energy Solutions four-stroke SEMT Pielstick licence
TC: MAN Energy Solutions turbocharger licence
FP: MAN Energy Solutions fixed pitch propeller license

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