

G95ME-C10.5

Following a period of low contracting, the market is expected to pick up in coming years, and after 2020, once the situation with low-sulphur fuels is more clear regarding types, availability and price, the ordering of ships is expected to increase significantly.

In 2017, we introduced the G95ME-C9.6 with improved fuel efficiency. Now, we have decided to follow up with a full “Mark 10 make-over” of the G95ME-C9.5. This is done in expectation of increased ordering based on the high focus on stricter emission rules, and the demand for fuel flexibility and improved fuel efficiency. The design targets are the following:

1. Improved performance with 3 g/kWh lower SFOC over the whole load range compared to the Mk 9.5
2. Low load and part load tuned engines will be optimised with high-pressure tuning (HPT) instead of exhaust gas bypass (EGB) tuning
3. Same power and layout area as for the G95ME-C9.5, see Fig. 1
4. Optimum Tier III designs
5. ME-GI ready design with minimum retrofit costs.

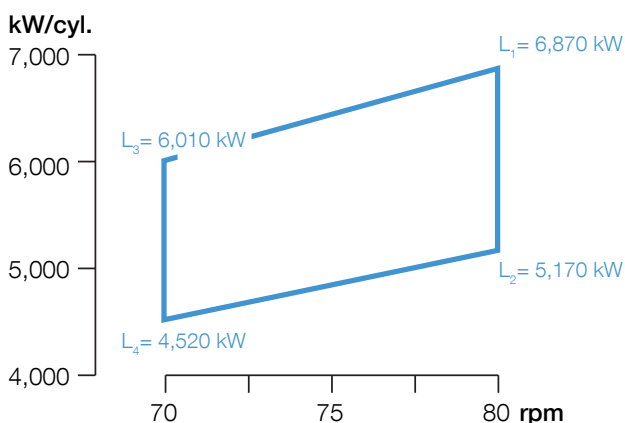


Fig. 1: Layout diagram - G90ME-C9.5/10.5

We have introduced the Mark 10 design on the G90, G70, S70, and S60ME-C10.5 type engines. The first Mark 10 engine tested is a 6G90ME-C10.5-GI EGRTC that will be type approval tested in May at Doosan.

In general, Mk 10 engines feature a thorough optimisation of all main structural engine components, taking advantage of the latest simulation and design methodologies.

In particular, an improved bearing performance has paved the way for a more compact design. This bearing performance improvement has been achieved by utilising advanced in-house EHD (elastohydrodynamics) and FEM (finite element method) studies. In this way, a better structural adaptability can be achieved between the two counterparts of the bearing assemblies.

The minute flexing during operation of the main bearing girder is adapting well to the main bearing pin of the crankshaft, and the new flex-rod connecting rod design improves the adaptability between the crankpin and the connecting rod while carrying the combustion load. In a similar way, we have developed a new cylinder frame design using topology optimisation in combination with state-of-the-art casting simulations, so as to achieve improved load carrying capacity and assure top quality in the casting.

Such an overall optimisation of the structure and moving parts has resulted in an increased power-weight ratio of the Mark 10 engine design.

Furthermore, the new TCEV (top-controlled exhaust valve) and FBIV (fuel booster injection valve) designs for fuel injection and exhaust valve actuation will be introduced on the G95ME-C Mark 10, similar to the G90ME-C10.5.

Market Update Note



In its standard fuel oil burning design, the 95ME-C is ready for retrofit to ME-GI and gas operation with minimum modifications.

Thanks to its robust Diesel combustion cycle, the ME-GI engine will have basically the same high fuel efficiency as the ME engine. Furthermore, the optimum gas combustion provided by the Diesel cycle ensures a negligible slip of unburned methane. Methane slip is an emission type that is in high focus due to its strong greenhouse effect.

If Tier III compliance is required, the engines can be fitted with either SCR or EGR solutions to lower NO_x emissions. Later this year, we will introduce the so-called EcoEGR, which improves the SFOC by 1.5 to 6 g/kWh when the ship operates in Tier II mode.

G95ME-C10.5 can be ordered with immediate effect. Please contact the engine builders for details of delivery schedule.

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Attachment:
Performance Layout and Tuning Methods for G95ME-C10.5

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To-whom-it-may-concern

Performance Layout and Tuning Methods for G95ME-C10.5

With reference to our Market Update Note of 25 May 2018, ref. MUN2018-04-25, this letter provides a further clarification and update on the tuning methods for the G95ME-C10.5 engine. Low-load and part-load tuned engines will be optimised with engine process tuning (EPT), as described in this letter.

The G95ME-C10.5 type engine was introduced to meet the demand for efficient propulsion. Compared to previous G95ME-C engine designs, a 2-3 g/kWh reduction of the fuel consumption has been obtained by increasing the scavenge air and cylinder cycle pressures.

The G95ME-C10.5 has been introduced with 5 to 12 cylinders and is rated as given in the table below.

		L1	L2	L3	L4
Power/cylinder	kW/cyl.	6,870	5,170	6,010	4,520
Engine speed	r/min	80	80	70	70

The G95ME-C10.5 is available with the following fuel injection concepts: MDO/HFO, GI and GIE.

Tier II tuning methods

The low-load (LL) and part-load (PL) tuning methods have been updated to become a combination of higher scavenge air pressure and modified engine control parameters in the low-load and part-load range. These methods will be denoted LL-EPT (engine process tuning) and PL-EPT and they replace the previous tuning methods LL/PL-EGB (exhaust gas bypass) and LL/PL-HPT (high-pressure tuning).

The LL-EPT and PL-EPT tuning methods offer the same SFOC benefits as known from the LL/PL-EGB and LL/PL-HPT tuning methods. However, the exhaust flow and temperature are changed.



Tier III technologies

EGR

EGR is available for G95ME-C10.5 as an EGRTC cut-out system with the known engine modes for Tier III, Tier II and Tier II with TC cut-out. All of the modes inherit the improved fuel consumption of 2-3 g/kWh from the increased cylinder cycle pressures.

LPSCR and HPSCR

The Tier II and Tier III modes for HPSCR (high-pressure selective catalytic reduction) are updated to be based on the LL-EPT tuning and will have a performance that is similar to this mode.

The Tier II mode for LPSCR (low-pressure selective catalytic reduction) is also based on the LL-EPT tuning. In Tier III mode, the required temperature level of the exhaust gas is achieved by a combination of EGB and modified engine parameters.

All operation modes for LPSCR and HPSCR inherit the improved fuel consumption of 2-3 g/kWh from the increased cylinder cycle pressures.

Performance data

All performance data for the G95ME-C10.5 with different fuel types, tuning methods and Tier III technologies can be calculated in the CEAS programme on marine.mandieselturbo.com/two-stroke/ceas.

Questions regarding G95ME-C10.5 performance can be sent to our performance and emission department at ld@mandieselturbo.com

Best regards
MAN Diesel & Turbo