

# Market Update Note



21 May 2019

## Introduction of S46ME-C

### Replaces S46ME-B

Since the introduction of the S46MC-C in 1996 and of the S46ME-B in 2010, gradually taking over with its electronically controlled fuel injection, more than 900 engines of this type have been ordered.

The S46ME-B engine has a broad applications potential and is still a very popular engine in the 25-50,000-dwt bulker segment as well as for smaller-sized tankers and feeder container vessels.

IMO regulations on NO<sub>x</sub> control and CO<sub>2</sub> reductions by the EEDI are stepwise becoming stricter, while at the same time emission abating equipment is continuously being developed to become more efficient and at lower production costs, however requiring more advanced engine control.

In view of the above, we have decided to upgrade the S46ME-B8.5 to S46ME-C8.6 with full flexibility of the opening and closing time of the exhaust valve. Simultaneously, certain design upgrades of the engine structure, the introduction of the flexrod, and component upgrades around the combustion

chamber have allowed for an increase of the combustion pressures and, thus, improved SFOC (the Mark 8 designation is kept to indicate that MEP is unchanged, and the new dot-6 designation indicates that the SFOC has been improved).

The full flexibility of the exhaust valve timing will enhance the Dynamic Limiter Function (DLF) and enable dual fuel ME-GI/GIE design for the S46 engine type. Table I shows a comparison of the main parameters for S46ME-B8.5 and S46ME-C8.6.

As a result, the following improved performance values become available:

#### Tier II engines

1. SFOC lowered by minimum 3 g/kWh in the whole load range for an engine with high-load optimisation (Fig. 1).
2. Part-load and low-load optimisation is available with EGB and, on request, with HPT tuning. SFOC is reduced by 3-4.4 g/kWh for both optimisation options (Figs. 2 and 3).

	$V_{pist}$ m/s	S mm	B mm	S/B -	MEP <sub>L1</sub> bar	Pscav bara	Pcyl <sub>L1</sub> kW	Speed <sub>L1</sub> rpm	Speed <sub>L3</sub> rpm	SFOC <sub>L1</sub> g/kWh
<b>S46ME-C8.6</b>	8.37	1932	460	4.20	20	4.10	1390	130	105	167
<b>S46ME-B8.5</b>	8.31	1932	460	4.20	20	4.05	1380	129	105	170

Table I



# Market Update Note

## Tier III engines

- EGRBP and EcoEGR are available.
- In Tier II mode, the following reductions in SFOC are obtained compared to an S46ME-B8.5 with HPSCR:
  - 3-4.4 g/kWh with S46ME-C8.6 and HPSCR, see Fig. 4.
  - 5.7-8.6 g/kWh with S46ME-C8.6 and EcoEGR, see Fig. 4.
- In Tier III mode, the following reductions in SFOC are obtained compared to an S46ME-B8.5 with HPSCR:
  - 3-4.4 g/kWh with S46ME-C8.6 and HPSCR, see Fig. 5.
  - 2.6-3 g/kWh with S46ME-C8.6 and EcoEGR above 67% load. At loads below 67%, EcoEGR does not have a lower SFOC compared to an S46ME-B8.5 with HPSCR, see Fig. 5. However, the HPSCR consumes urea, which normally means that the EcoEGR solution offers the lowest operational expenditure.

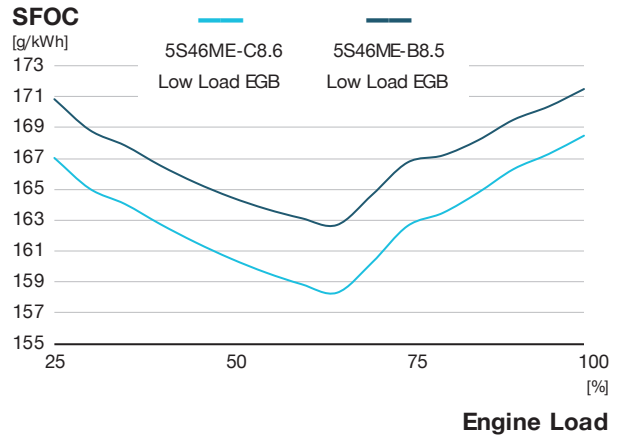


Fig. 3: SFOC low-load optimised Tier II engine

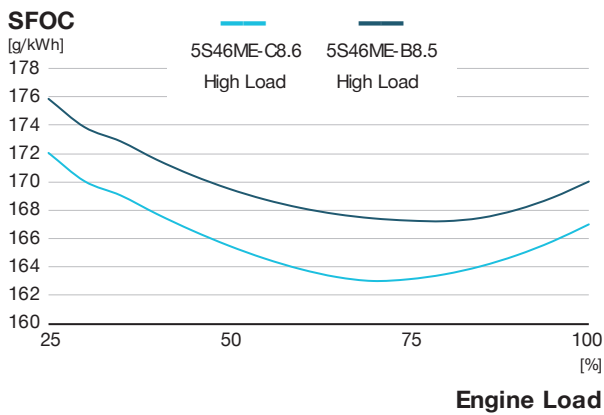


Fig. 1: SFOC high-load optimised Tier II engine

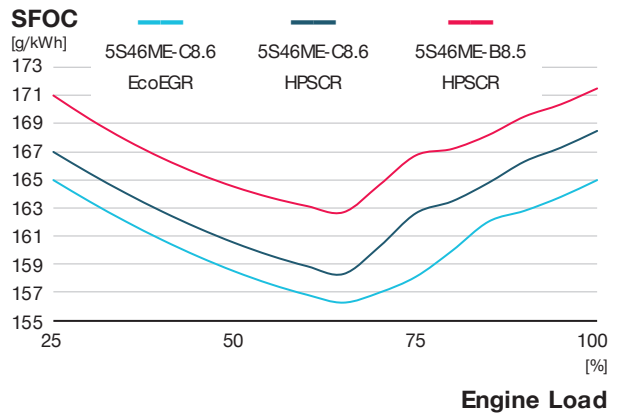


Fig. 4: SFOC Tier III engine in Tier II mode

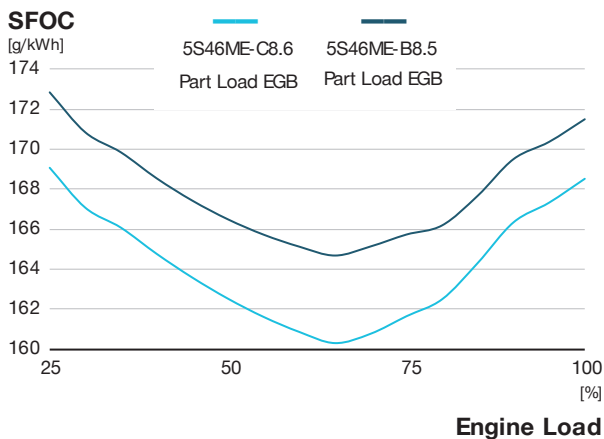


Fig. 2: SFOC part-load optimised Tier II engine

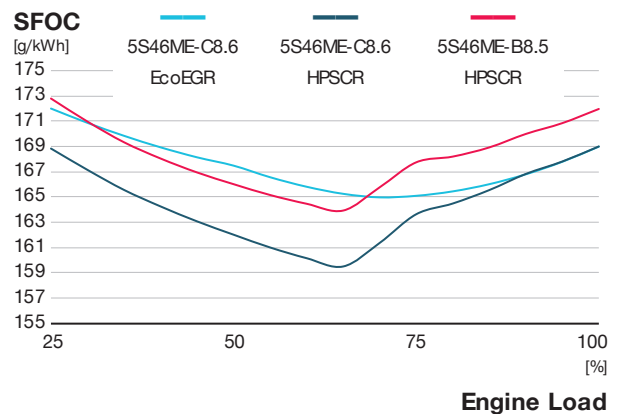


Fig. 5: SFOC Tier III engine in Tier III mode

# Market Update Note



To obtain the ME-C functionality, some ME-B parts are removed and new ME-C parts are added. Table II gives a summary.

The combustion pressure increase will require an upgrade of certain flange thicknesses in the bedplate and frame box. The removal of camshaft housings requires a redesign of the cylinder frame, and a further weight reduction is obtained by an upgrade of the material.

## S46ME-B8.5

### Removed parts

Chain driven camshaft incl. housings and actuator  
HCU incl. fuel booster

ME-B exhaust valve

ME-B HPS (electrically driven)  
Mechanical starting air distributor

ME-B ECS

## S46ME-C8.6

### New or upgraded parts

HCU incl. fuel booster and exhaust actuator

ME-C exhaust valve

ME-C HPS (engine driven)  
Start-up pumps (electrically driven)

ME-C starting air system

ME-C ECS

Flexrod

Upgraded combustion chamber and wide pad crosshead bearing

In order to keep the dimensions of the crank pin and crosshead bearings, the connecting rod will be of the flexrod design and the crosshead bearing will be of the wide-pad design and be made from AISn40 material.

The S46ME-C8.6 will be introduced and implemented in the online engine programme and CEAS by 10 May and, at the same time, the S46ME-B will be removed from the online programme and be moved to replaced engines in CEAS.

For delivery times of the new engine type, please contact the shipyard or the engine builder directly.

Questions regarding this Market Update Note should be directed to our Promotion & Customers Support department, at [lars.bryndum@man-es.com](mailto:lars.bryndum@man-es.com).

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Table II: Design changes S46ME-B to S46ME-C