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Improved SFOC with S40ME-C9.5 and S35ME-B9.7

Our engine types are continuously challenged by market demands for efficient technologies for emission reduction, dual fuel capabilities and, as always, a better fuel efficiency. We have therefore decided to upgrade the design of the S40ME-B9.5 to S40ME-C9.5, and the S35ME-B9.5 to S35ME-B9.7. The main engine parameters are shown in Fig. 1

Both engine types will have enhanced performance and combustion conditions, and the combustion chamber has been updated accordingly, comprising the following features:

1. New piston geometry with improved cooling
2. Cermet-coated three-piston ring pack for higher efficiency
3. New cylinder cover geometry
4. New slim-type cylinder liner
5. Performance and combustion will require new TC configuration and new fuel nozzles



Fig. 2: New piston design

The new piston design is illustrated in Fig. 2.

	V_{pist} m/s	S mm	B mm	S/B -	MEP_{L1} bar	P_{scav} bara	$P_{cyl_{L1}}$ kW	$Speed_{L1}$ rpm	$Speed_{L3}$ rpm	$SFOC_{L1}$ g/kWh
S35ME-B9.7 (high-eff. T/C)	8.63	1550	350	4.43	21	4.20	870	167	127	170
S35ME-B9.5 (high-eff. T/C)	8.63	1550	350	4.43	21	4.10	870	167	127	174
	V_{pist} m/s	S mm	B mm	S/B -	MEP_{L1} bar	P_{scav} bara	$P_{cyl_{L1}}$ kW	$Speed_{L1}$ rpm	$Speed_{L3}$ rpm	$SFOC_{L1}$ g/kWh
S40ME-C9.5 (high-eff. T/C)	8.61	1770	400	4.43	21	4.10	1135	146	111	172
S40ME-B9.5 (high-eff. T/C)	8.61	1770	400	4.43	21	4.10	1135	146	111	173

Fig. 1: Main engine parameters

S35ME-B9.7

The new S35ME-B9.7 design results in an SFOC reduction of 4 g/kWh. This is achieved by raising the combustion pressures and introducing high-efficiency turbochargers and an improved piston ring pack. The SFOC curves for L1 layout are shown in Fig. 3.

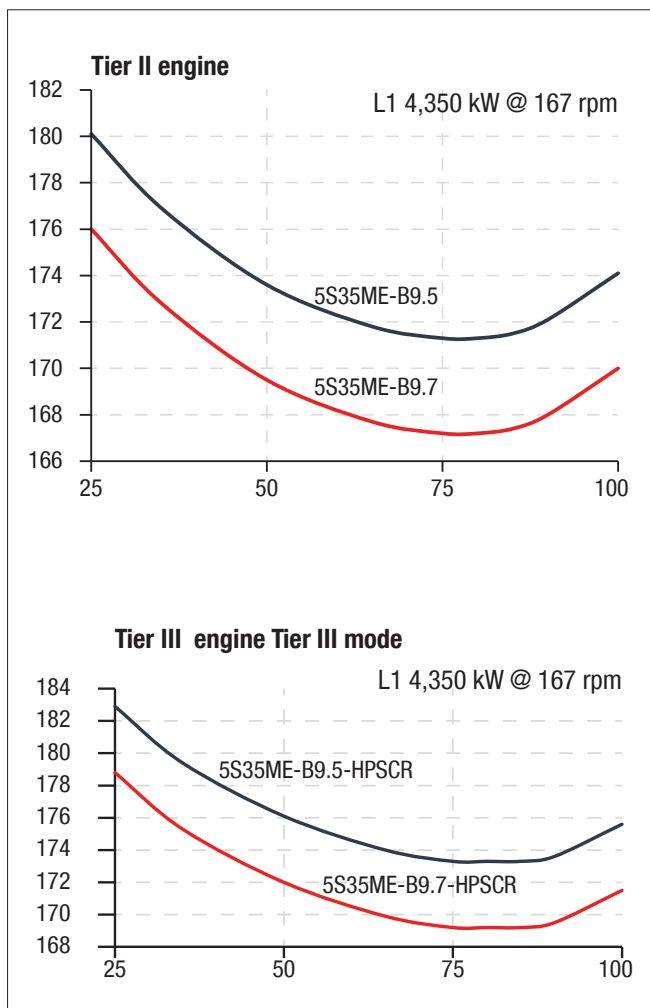


Fig. 3:

S40ME-C9.5

The S40ME-C9.5 will feature a fully hydraulically-actuated exhaust valve as opposed to the S40ME-B9.5 camshaft-operated exhaust valve. This gives full flexibility for the opening and closing timing of the exhaust valve at all engine loads. The necessary design changes are listed in Fig. 4.

S40ME-B.5

Components removed:

Chain drive and chain drive casing
Exhaust actuator, roller guide,
camshaft and camshaft housing,
pneumatic and ME-B ECS

S40ME-C9.5

Components added:

ME HCU with ELFI/ELVA
Larger electrically driven HPS
ME-LOP
ECS ME-C style

Fig. 4:

The fully-flexible exhaust valve timing combined with a high-efficiency application of the TC enables the following benefits:

1. Considerable SFOC saving by means of part- and low-load optimisation of Tier II engines using the standard EGB and HPT tuning methods. For Tier III engines in Tier II mode, a similar SFOC reduction becomes available by the use of EGB.
2. Enhanced DLF (dynamic limiter function) performance.
3. In general, Tier III engines with EGRBP will benefit from the ME-C exhaust valve closing function to ensure the optimal combination of NO_x compliance in both Tier II and Tier III operation, while at the same time securing an acceptable heat load condition, suitable excess air ratios and smoke condition, and a satisfactory SFOC.

Market Update Note



The SFOC improvements achieved from the S40ME-B9.5 to the upgraded S40ME-C9.5 are illustrated in Fig. 5 for a Tier II engine with high-load optimisation (HLO) and for low-load optimisation (LLO), and in Fig. 6 for Tier III engines in Tier II and Tier III modes with, respectively, HPSCR and EGRBP.

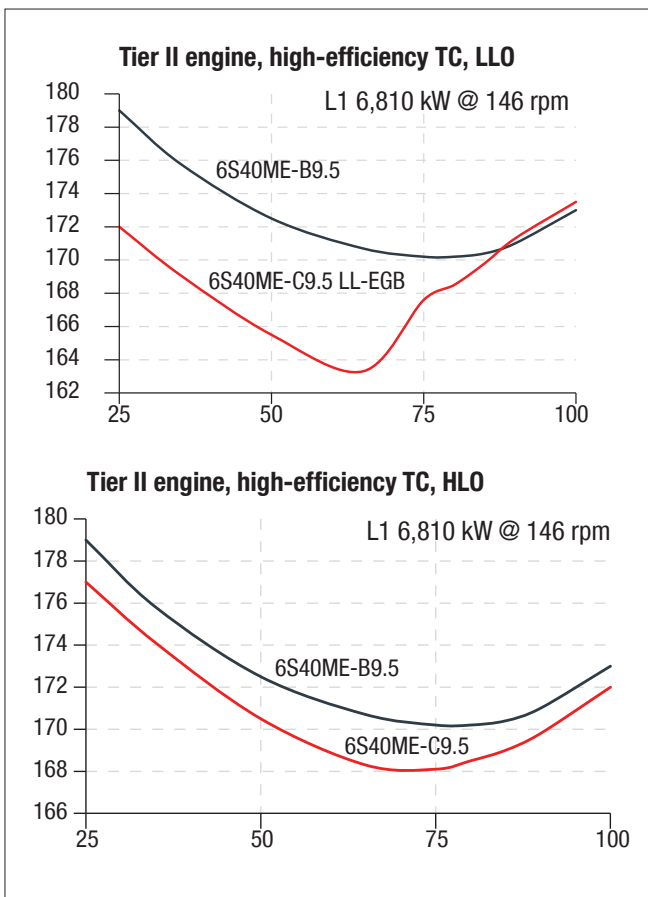


Fig. 5:

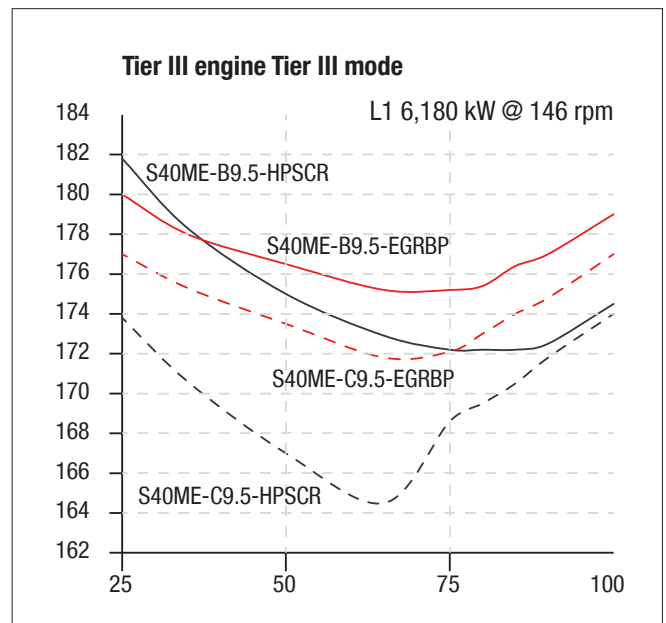


Fig. 6:

The two engine types are available in our CEAS programme as ME and ME-GI, and they will be included in the next printed Marine Engine Programme, which will be issued in August 2018.

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