

Action code: WHEN CONVENIENT

Engine Perfomance Evaluation

SL2014-590/OBN May 2014

Concerns

Owners and operators of MAN B&W two-stroke marine diesel engines. Type: ME/ME-C/ME-B/MC/MC-C and ME-GI

Summary

This service letter specifies the necessary data that must be submitted to MAN Diesel & Turbo to allow a precise and complete evaluation of the engine perfomance. Engine type specific measuring sheets are enclosed.



Dear Sirs

MAN Diesel & Turbo PrimeServ and warranty departments often have to carry out engine performance evaluations based on readings taken on board by the crew and sent to us. The purpose of such evaluations is to detect the existence or beginning of any faults and, by taking the appropriate countermeasures, to prevent any such incidents from developing into more serious breakdowns.

This service letter is an update of our previous service letter with the reference SL89-250/UM, as new performance sheets and engine types have been introduced since then.

Yours faithfully

Per Rud Vice President PrimeServ Two-stroke

Michael Petersen Senior Manager Technical Service, Academy & **Engine Management**

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Engine performance evaluations can only be as accurate as the data sent to us. However, in some cases the data received has been so incomplete or inadequate that we have been unable to carry out a complete evaluation.

Enclosures 1, 2 and 3 specify the essential data for such evaluations depending on engine type. Enclosure 1 applies to our MC/MC-C engines, Enclosure 2 applies to our ME/ME-C engines and Enclosure 3 to our ME-B type engines.

The enclosures list the essential data required as well as the effect if this data is not included. As can be seen from the enclosures, most of the data is necessary for a complete evaluation, and if any of the data is missing, for example due to a damaged or malfunctioning instrument, the final evaluation will be much less accurate.

For plants not fitted with indicator gear or any electronic measuring equipment, a power meter can be used instead. Data obtained with a power meter will be compared with a power estimate based on turbocharger revolutions, scavenge air pressure and fuel index. For your information, we have also enclosed a copy of the measuring sheets used for our various engine designs.

Enclosure 4 shows the sheet used for MC/MC-C engines, Enclosure 5 the sheet for ME/ME-C engines and Enclosure 6 the relevant sheet for our ME-B engines.

The measuring sheets include a complete set of readings specifying the water and oil pressures and temperatures. These readings are not required for the performance evaluation, but can be useful when evaluating the running condition of the engine.

The optimum would be to receive three sets of measurements at 50%, 75% and at the highest engine load obtainable, preferably close to 100%, as this will result in the most reliable evaluation.

The engine performance evaluation service is provided against payment according to the prevailing service letter in this regard, which for 2014 is SL13-581/MIP.

Please direct any inquiries and questions regarding tables or condition-based overhaul to our Operation Department at leo@mandieselturbo.com or to our Service Department at PrimeServ-cph@mandieselturbo.com.

Enclosures:

- 1. Data required for MC/MC-C and older engines
- 2. Data required ME/ME-C
- 3. Data required for ME-B
- 4. Measuring sheet for MC/MC-C
- 5. Measuring sheet for ME/ME-C
- 6. Measuring sheet for ME-B



MC/MC-C and older engines

Readings	Unit	The following cannot be evaluated or calculated if measurement is missing
Ambient barometric pressure	mBar or mmHG or HPa	Correction to ISO, TC efficiency
Draft fore	M	Light/heavy propeller, hull fouling
Draft aft	M	Light/heavy propeller, hull fouling
Total running hours	hours	Identification of observation time
p _{max} control Engine speed Engine load	bar r/min bhp or kW	Pmax adjustment Power calculation, light/heavy propeller
p _i	bar	Power calculation, power distribution
p _{max}	bar	Cylinder condition p_{max} - p_{comp} , p_{comp}/p_{scav}
p _{comp}	bar	Cylinder condition p_{max} - p_{comp} , p_{comp}/p_{scav}
Fuel pump index VIT index		Fuel pump condition, power estimation p _{max} adjustment
Exhust valve temperature	°C	Combustion condition
Temperature before TC	℃	TC efficiency, heat load on engine
Temperature after TC	℃	Turbine condition, heat load on engine
Exhaust receiver	bar or mmHG	TC efficiency
TC outlet pressure	mmWaterGauge	TC efficiency, economizer condition
TC revolutions	r/min	TC efficiency, power estimation
$\begin{array}{c} \Delta P \ TC \ filter \\ \Delta P \ air \ cooler \\ p_{scav} \\ t_{scav} \end{array}$	mmWaterGauge mmWaterGauge bar or mmHG °C	TC efficiency, filter condition TC efficiency, air cooler condition TC efficiency, p _{comp} /p _{scav} TC efficiency, correction to ISO, air cooler condition.
TC blower inlet temp.	°C	TC efficiency, correction to ISO
Air cooler water inlet temp.	°C	Air cooler condition
Air cooler water outlet temp.	°C	Air cooler condition



ME engines

Readings	Unit	The following cannot be evaluated or calculated if measurement is missing
Ambient barometric pressure	mBar or mmHG or HPa	Correction to ISO, TC efficiency
Draft fore	М	Light/heavy propeller; hull fouling
Draft aft	Μ	Light/heavy propeller; hull fouling
Total running hours	hours	Identification of observation time
Engine speed	r/min	Power calculation, light/heavy propeller
Engine load	kW	
p _i	bar	Power calculation, power distribution
p _{max}	bar	Cylinder condition p_{max} - p_{comp} , p_{comp}/p_{scav}
p _{comp}	bar	Cylinder condition p_{max} - p_{comp} , p_{comp}/p_{scav}
Fuel index ECU		Power estimation
Exhaust valve temperature	°C	Combustion condition
Temperature before TC	°C	TC efficiency, heat load on engine
Temperature after TC	°C	Turbine condition, heat load on engine
Exhaust receiver	bar or mmHG	TC efficiency
TC outlet pressure	mmWaterGauge	TC efficiency, economizer condition
TC revolutions	r/min	TC efficiency, power estimation
$\Delta P TC$ filter	mmWaterGauge	TC efficiency, filter condition
ΔP air cooler	mmWaterGauge	TC efficiency, air cooler condition
p _{scav}	bar or mmHG	TC efficiency, p_{comp}/p_{scav}
t _{scav}	°C	TC efficiency, correction to ISO, air cooler condition.
TC blower inlet temp.	°C	TC efficiency, correction to ISO
Air cooler water inlet temp.	°C	Air cooler condition
Air cooler water outlet temp.	°C	Air cooler condition
High load offset	%	Fuel equipment condition
Low load offset	%	Fuel equipment condition
Fuel quality adjust. (FQA)	%	ECS against real engine load
p _{max} offset	bar	Fuel equipment condition
p _{comp} /p _{scav} offset	bar	Exhaust system condition
Exh. valve opening timing	°CA	p _{scav} evaluation
MOP estimated load	kW	Verifying engine load
Torque meter load	kW	Verifying engine load



ME-B engines

Readings	Unit	Following cannot be evaluated or calculated if measurement is missing
Ambient barometric pressure	mBar or mmHG or HPa	Correction to ISO, TC efficiency
Draft fore	М	Light/heavy propeller, hull fouling
Draft aft	Μ	Light/heavy propeller, hull fouling
Total running hours	hours	Identification of observation time
Engine speed	r/min	Power calculation, light/heavy propeller
Engine load	kW	
p _i	bar	Power calculation, power distribution
p _{max}	bar	Cylinder condition p_{max} - p_{comp} , p_{comp}/p_{scav}
p _{comp}	bar	Cylinder condition p_{max} - p_{comp} , p_{comp}/p_{scav}
Fuel index ECU		power estimation
Exhaust valve temperature	°C	Combustion condition
Temperature before TC	°C	TC efficiency, heat load on engine
Temperature after TC	°C	Turbine condition, heat load on engine
Exhaust receiver	bar or mmHG	TC efficiency
TC outlet pressure	mmWaterGauge	TC efficiency, economizer condition
TC revolutions	r/min	TC efficiency, power estimation
$\Delta P TC$ filter	mmWater Gauge	TC efficiency, filter condition
ΔP air cooler	mmWaterGauge	TC efficiency, air cooler condition
p _{scav}	bar or mmHG	TC efficiency, p_{comp}/p_{scav}
t _{scav}	°C	TC efficiency, correction to ISO, air cooler condition.
TC blower inlet temp.	°C	TC efficiency, correction to ISO
Air cooler water inlet temp.	°C	Air cooler condition
Air cooler water out let temp.	°C	Air cooler condition
High load offset	%	Fuel equipment condition
Low load offset	%	Fuel equipment condition
Fuel quality adjust. (FQA)	%	ECS load against real engine load
p _{max} offset	bar	Fuel equipment evaluation
MOP estimated load	kW	Verifying engine load.
Torque meter load	kW	Verifying engine load

Encl. 4 of 6 to SL2014-590

SER	VICE	Engine	Type:			Name of vessel:																	
DA	TA	Engine	Builder:	1			Engine	Engine No.: Yard:											MARI				
Layout	kW:			Layout	RPM:			Sign.:	1			1				1				Test No.:			
	Turboch	narger(s)	No. of	TC:				5	Serial N	0.	No. of	Cyl.:			Bore, r	m:		Stroke, m:				
Make:				Type:					1			Cylinde	er Cons	tant (kV	V,bar):			ı. Press., bar:					
Max. RF	PM:			emp., °			2						Lubri	cation (Dil Syste	em (Ticl	<u>k box)</u>		F	- 1 6			
Compr.	Slip Fac	tor:		Compr	. Diam.	, m:			3			-		Interna	11		MES	ai from System			Gravity	ai from / Tank	
TC spec	cification								4								IVI. E. C	ystem			Clavity	Turik	
Obser	vatior	I NO:													1								
Fuel Oil	Viscosit	y:				at:				°C		0.15				Bra	and			Туре			
Bunker	Station:						.1 . 1	1.4				Cylind	der Oil										
Oil Bran	ia:	ka/m3	at.		۰C	Heat v Sulphi	<u>alue, K.</u>	J/Kg:				Circuia	ating Oil										
Density		kg/m ,	а.		0	Supri	ui, 70.	Amhien	t			Turc							Sn	eed	V	ІТ	
Test	Date	Test	Hour		Load			Pressur	e		Engine	•	Tot	al Runr	ning	Gov	/ernor ir	ndex	Set	ting	Cor	ntrol	
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Pmax, b	bar																						
Ref. Pm	nax, bar																			1			
Pcomp,	bar																						
Fuel Pu	mp Inde	x																					
VIT inde	ex																						
Exhaus	t Gas Te	mp., °C																					
Cooling	Water C	Dutlet Te	mp., °C																				
Piston C	Dutlet Lu	b. Temp	., °C																				
Coc	oling Wa	ter Temp	perature,	°C Exhaust Gas Ter				s Temp., °C			Pressu	ire	Tu	rbo	A	ux.		Sca	venge /	Air Pres	sure		
Air C	ooler	M	ain Engir	ne		Tu	rbine		Receiver		Turb	Turb. Outl.		Charger		wer	▲p	Filter	≰p C	Cooler	Rec	eiver	
Inlet	Outlet	Inlet	Turb.	Outlet	In	let	Outlet		bar		mm	nWC	RI	РМ	On	/Off	mm	nWc	mmWc		b	ar	
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Remarks:

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SER	/ICE	Engine	Туре:				Name	Name of vessel:																	
DATA	(ME) Engine Builder:						Engine	No.:			Yard:									(mari)					
Layout k	W:			Layout	RPM:			Engine	Mode:			-		Sign.:		-			Test No.:						
-	Furbocł	harger(s)	No. of	TC:				5	Serial No	0.	No. of	Cyl.:			Bore, r	n:		Stroke, m:						
Make:				Type:					1			Cylinde	er Cons	tant (kV	V,bar):			Mean I	Friction.	Press.	, bar:				
Max. RF	'M:			Max. T	emp., °	°C:			2						Lubri	Lubrication Oil System (Tick box									
Compr.	Slip Fac	tor:		Compr	. Diam.	., m:			3					Interna	l		Extern	al from			Externa	al from			
TC specification:									4								IVI. E. C	system			Gravity	гапк			
Observation No:															1				1						
Fuel Oil	Viscosit	y:				at:				°C						Bra	and			Ту	ре				
Bunker	Station:					1						Cylind	ler Oil												
Oil Bran	d:					Heat v	alue, k.	J/kg:				Circula	ting Oil												
Density		kg/m³,	at:		°C	Sulphu	ır, %:					Turb	o Oil												
Test	Date	Test	Hour	Lo	ad	Am	bient	Eng	gine	Fuel F(Index	Spe Set	ed ting	Draft F	ore, m	Log I	Knots	Winc	l, m/s	Direc	tion, °				
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Pcomp/	Pscav O	ffset																							
Exh. Va	ve Oper	n Timing	, °CA																						
(Correct	ion valu	e)																							
Exhaust	Gas Te	mp., °C																							
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Piston C	outlet Lu	b. Temp	., °C				_		Exhaust Drass				T	-	۸.										
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SER	VICE	Engine	Туре:				Name	of vess	el:		-										\frown			
DATA	(ME-B) Engine Builder: Engine I								jine No.: Yard:											(mar)				
Layout k	ut kW: Layout RPM:								Engine Mode: Sign.:										Test No.:					
	Turboch	arger(s)	No. of	TC:				5	Serial N	0.	No. of	Cyl.:			Bore, r	n:			Stroke,	m:			
Make:				Type:					1			Cylinde	er Cons	tant (kV	V,bar):			Mean F	Friction.	Press.,	bar:			
Max. RPM: Max. Temp., °C:									2															
Compr. Slip Factor: Compr. Diam., m: TC specification:									3															
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Fuel Oil Viscosity:										°C						Br	and			Т	me			
i uei oli visuosity. at: Bunker Station:										0		Cyline	ler Oil			BR				Гуре				
Oil Bran	d.					Heat v	alue ki	/ka:				Circula	ting Oil											
Density	u.	ka/m³	at:		°C	Sulphi	ur % [.]	/kg.				Turb	o Oil											
					-	Am	hient			Fuel	Index	Spe	ed.	Draft F	ore m	Log	Knote	Winc	l m/s	Direc	tion °			
Test	Date	Test	Hour	Lo	ad	Pres	sure	Eng	gine	EC	CU	Set	ting	Dianti	016, 111	LUG	111013	VVIIIC	1, 1173	Direc		ĺ		
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				~//.\\/h		~///////			Hou			%		bar		bar		Pcomp/Ps		cav				
ĸ	/V	ĸ	VV		g/kvvn		g/kWh						,-				-							
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	ality Adi		A) %																					
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	ad Offset	· %																						
Exhaust	Gas Te	mn °C																						
Cool W	ater Out	let Temr	ე°C																					
Piston C	Dutlet Lu	b. Temp	°C																					
Coc	oling Wa	ter Temr	perature	°C	Fxh	aust Ga	as Temp., °C		F	xhaust	Pressu	re Tu		rbo	T/C N	Nozzle		Sca	venge A	Air Pres	sure			
Air C	ooler	M	ain Engi	ne			Turbine		Receiver		Turb	. Outl.	utl. Char		irger Ri		۵	Filter	▲p C	Cooler	Rec	eiver		
Inlet	Outlet	Inlet	Turb.	Outlet	tlet Inlet		Ou	ıtlet	bar		mm	nWC	RI	PM	Actu	ual, %		nWc	mm	mmWc		ar		
1	1		1	I		1	1					1		1		1		1		1				
		Seaw.							Variable XBP												Pscav			
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