Action code: WHEN CONVENIENT

Guiding overhaul intervals

Updated tables

Replaces SL2019-681/SRJ

SL2023-744/SRJ
August 2023

Concerns

Owners and operators of MAN B&W two-stroke, low-speed marine engines. Types: ME/ME-C, ME-B, LGIM, LGIP, GI, GIE, and ME-GA

Summary

Guiding overhaul intervals and expected service life of engine components on two-stroke low-speed engines.
This Service Letter replaces SL2019-681/SRJ.

Dear Sir or Madam

Based on the latest service experience and engine development we are pleased to issue a revised version of the guiding overhaul intervals tables. The guiding overhaul intervals apply to electronically controlled ME and dual-fuel type engines.

Longer overhaul intervals can be obtained with a condition-based overhaul strategy. The means to obtain and document this are described in SL07-483/HRR.

In addition, it must be noted that the application of, for example, WHR, EGB, EGR and SCR will affect the heat load on the combustion chamber components. Similarly, a more frequent heavy propeller running caused by the Energy Efficiency Design Index (EEDI) condition and the Adverse Weather Condition (AWC) software can have an influence. The above factors as well as fuel qualities and slow steaming will most probably have an impact on the overhaul intervals of especially, but not exclusively, components affected by the cylinder condition and combustion chamber parts. Application of PMI ACCo will have a positive influence on overhaul intervals.

All stated overhaul intervals are total engine running hours regardless of fuel type (HFO, MGO or gas). However, it must be noted that residual fuels (sulphur) will impact wear rates significantly.

Please direct any inquiries and questions regarding the overhaul tables and condition-based overhaul to the:

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Yours faithfully

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ME-C methane (GA) engines
Guiding overhaul intervals and expected service life

Component	Overhaul interval (hours)	Expected service life (hours)	Remarks
Cylinder liner	Bore size 70 16,000	Bore size 70 60,000	Check the overall cylinder condition at least once a month. Renew cooling jacket O-rings when required (typically every 2nd piston overhaul or 5 years).
Piston rings	Bore size 70 16,000	Bore size 70 16,000	Check the overall cylinder condition at least once every month. Renew at each piston overhaul. Cermet-coated piston rings are to be replaced before wear down.
Piston crown	Bore size 70 16,000	Bore size 70 60,000	Pressure test at every 2nd overhaul. Recondition/rechrome when required (typically every 2nd overhaul). Piston crown can be reconditioned twice by welding-up.
Piston skirt	Bore size 70 16,000	Bore size 70 60,000	Check overall cylinder condition at least once every month. Measure Mo thickness during port inspection. Check instruction book for wear-out criteria. There are two types of piston skirts; Mo coating type and slide ring type.
Cylinder lubricator	Bore size 70 32,000	Bore size 70 96,000	Overhaul at an authorised MAN Energy Solutions workshop. Renew O-rings and non-return valves. Check efficiency, and if below 90%, renew block and plunger. Must be done at a workshop ashore.
Non-return valve in cylinder liner	Bore size 70 16,000	Bore size 70 32,000	Check during piston overhaul. Replace if leaks or excessive liner wear is found.
Stuffing box	Bore size 70 16,000 Check gab of lamellas and sealing rings.	Bore size 70 32,000 Renew lamellas and sealing rings.	Overhaul follows the overhaul of piston rings, but can be extended based on observations. Replace if the gap between the rings is reduced by 50% compared to new rings.

ME-C methane (GA) engines
Guiding overhaul intervals and expected service life

Component	Overhaul interval (hours)	Expected service life (hours)	Remarks
Exhaust valve spindle and bottom piece	Bore size 70 Initial inspections[1] 6,000 & 12,000 Subsequent inspections[2] 24,000	Bore size 70 72,000	[1] Initial inspection Check condition of air spring according to the instruction manual. Inspect seats. Calculate maximum burn-off rate of spindle disc underside to obtain lifetime of spindle. Plan time for subsequent inspection for overhaul and recondition. Inspect minimum two valves. [2] Subsequent inspections Complete overhaul of exhaust valve. To obtain the spindle lifetime given, all spindle types can be reconditioned by welding-up 2 times. For bottom piece seats: only light grinding is usually required at subsequent inspections. Welding-up of DSA spindles is not possible, as no procedure is available yet.
Exhaust actuator Non-return valve	24,000	64,000 12,000	Lifetime can deviate due to cavitation. Lifetime can be extended based on observations. No scoring marks or seizures. Replace the non-return valve every 12,000 hours.
Exhaust valve high-pressure pipe	24,000	64,000	Lifetime can deviate due to cavitation.
Main hydraulic pump	48,000	96,000	Check and replace hydrostatic bearings at overhaul. Check and replace cylinder set and piston if required.
Proportional valve for main hydraulic pump		32,000	Replace
Hydraulic start-up pump Coupling/spider Bearings	 32,000	96,000 6,000 32,000	 Replace spider if found necessary Replace bearings
Pressure relief valve for main hydraulic pumps	48,000	96,000	Replace sealings during overhaul.
ELVA	32,000	64,000	Check and replace if required. Replace pilot valve after 32,000 hours.
ELFI	32,000	64,000	Check and replace if required. Replace pilot valve after 32,000 hours.

ME-C methane (GA) engines
Guiding overhaul intervals and expected service life

Component	Overhaul interval (hours)	Expected service life (hours)	Remarks
Fuel oil valve design with guide rings	4,000 depending on fuel quality	Valve nozzle 8,000 Spindle guide 8,000 Non-return valve 16,000 Spring 16,000 Thrust spindle 16,000 Foot 32,000 Spring pack 16,000 Guide rings 16,000 Back-up ring 16,000 Holder 48,000 Head 48,000	Check components and replace if required. Change O-rings, back-up ring and guide rings.
Fuel oil pressure booster Fuel oil booster throttle valve Suction valve	32,000 based on engine observations Inspection of seat and spring 16,000 8,000	Replace or recondition 64,000 32,000 16,000	Change sealing rings on hydraulic piston and suction valve at overhaul. Replace if index has increased by 10% compared to sea trial observations. Longer lifetime based on observations. Check for wear on seat and conical ring
High-pressure fuel pipe	Visual inspection when dismantled	32,000	Based on observation. Change sealing rings when dismantled.
Micro booster injection valve (MBIV) Fuel valve parts – nozzle – spindle guide – spring – thrust spindle – holder – spring pack – union unit Micro booster parts – suction valve – pilot slide – non-return valve – plunger/barrel/cover – solenoid valve Pre-chamber – nozzle	 8,000 4,000 16,000 16,000 16,000 16,000 4,000 8,000 8,000	 8,000 8,000 16,000 32,000 32,000 16,000 32,000 32,000 32,000 32,000 32,000 16,000 32,000 8,000	Check and replace if required. Clean nozzle holes if required. Replace sealing rings and check for wear on seat and shaft. Check for wear on seat. Replace seals. Replace seals. Based on observation, replace soft iron seal and O-ring.
JWRS pump seals		32,000	Change seals if required.
Cylinder cover	Check holes for fuel valves and starting air valve when valves are dismantled.	96,000	Check for burnt grooves at fuel valve nozzle holes. A combined grinding value of valve housing and valve holes is limited to 2 mm. Measuring tool can be purchased from MAN PrimeServ or each engine builder. Weld-up if required, up to 2-3 times during service life. Replace O-rings.
Starting valve Pilot valve Burst disc	8,000 32,000	96,000 32,000 64,000	 Replace parts if required. Replace if required.

ME-C methane (GA) engines
Guiding overhaul intervals and expected service life

Component	Overhaul interval (hours)	Expected service life (hours)	Remarks
Pneumatic components		32,000	Renew non-metallic parts and O-rings in the various valves every five year (during drydocking). May vary depending on the quality of the air – dry and clean air.
Main starting valve Slow turning valve Non-return valve and actuators		32,000	Overhaul during dry-docking or every five years. Replace parts if required.
Crosshead bearings Main bearings Crank bearings Thrust bearings	Check clearances and crankshaft deflection once a year. Check bearing edges using wire gauges once a year.	64,000 96,000 96,000 96,000	Do not open bearings unless bearing material fragments fall out or other bearing inspection measures indicate so. Check groove in thrust pad and replace based on findings.
Stay bolts	Tighten bolts: First inspection 500 Subsequent inspections 32,000	Engine lifetime	Typically done at 5-year docking.
Holding-down bolts	Tighten bolts: First inspection 500 Second inspection 1,000 Third inspection 1,500 Fourth inspection 4,000 Fifth inspection 8,000 Subsequent inspections 16,000	Engine lifetime	
Turbocharger	According to manufacturer's recommendations.	According to manufacturer's recommendations.	According to manufacturer's recommendations.
Air cooler(s)	Cleaning based on engine observations.	48,000 or according to manufacturer's recommendations	Clean before differential pressure has increased 50% compared to sea trial value.
Flaps and butterfly valves in scavenge air receiver	Check movement at every scavenge port inspection.	48,000	Periods with slow steaming may reduce lifetime.
Various fuel and lubricating oil filters	Cleaning based on engine observations.		According to maker's instructions.
Lubricating oil bottom tank	Cleaning 32,000		Typically done at 5-year docking.
Chains	Retighten chains 3,000-4,000 or every six months	Original length (chain pitch x 10 links). 10 links measurements + 1% of a tensioned chain = scrapping of chain.	New or overhauled chains to be checked/re-tightened after 500 and 1,500 hours.
Gear wheel drive for hydraulic pumps Gear wheel Gear wheel bearings	First inspection 500 Subsequent inspections 6,000	Max. wear on teeth, see engine manual.	Replace if failing
Accumulators on HPS and HCU	N2 pressure 500 Rubber diaphragms 32,000	Engine lifetime	Replace diaphragms after 5 years.
Hydraulic safety block Cartridge valves Solenoid valve	Change O-rings 32,000	96,000 64,000	Check and adjust safety valve if required after 32,000 hrs.

ME-C methane (GA) engines
Guiding overhaul intervals and expected service life

Component	Overhaul interval (hours)	Expected service life (hours)	Remarks
Hydraulic hoses		32,000	Replace after 5 years.
MPC, Triton, MOP	Visual inspection 6,000	64,000	Replace if failing
Angle encoder	Visual inspection 6,000	64,000	Replace if failing
Encoder bearings		32,000	Replace
Angle encoder amplifiers	Visual inspection 6,000	64,000	Replace if failing
Fuel booster sensor	Visual inspection 6,000	64,000	Replace if failing
Exhaust valve sensor	Visual inspection 6,000	64,000	Replace if failing
Marker sensor	Visual inspection 6,000	64,000	Replace if failing
Cables	Visual inspection 6,000	96,000	Replace if failing
FIVA/ELFI safety screen strainer	Visual inspection 6,000	64,000	Replace if failing
Control oil pipe arrangement Non-return valve	32,000 16,000	Engine lifetime Replace or overhaul 32,000	Replace static O-rings at overhaul. Check spring and seat.
Sealing oil unit Solenoid valve	N_2 pressure 500	96,000 64,000	Replace diaphragms after 5 years. Condition-based replacement. Replace
Gas pipe	32,000	64,000	Inspect the supports for the inner pipes. Check for oil in the outer pipe and drain in case of a no-flow alarm in the outer pipe.
Gas regulating unit GRU 4/3-way proportional valve Pressure transducer Blow-off valve Resistance temperature sensor Displacement transmitter	32,000	64,000 32,000	Overhaul inspection of main piston and exchange seals.
Safe gas admission valve Window valve GAV	 16,000 16,000	Engine lifetime 32,000 32,000	Check and replace if required. Visual inspection and pressure test for tightness. Replace seals
Purge block Solenoid valves		 64,000	 Also applicable for GI Mk. 2

ME-C methanol (LGIM) and LPG (LGIP) engines
Guiding overhaul intervals and expected service life

Component	Overhaul interval (hours)	Expected service life (hours)	Remarks
Cylinder liner	Bore sizes 95-80 32,000 70-50 24,000 35 16,000	Bore sizes 95 80,000 80 70,000 70-50 60,000 35 50,000	Check the overall cylinder condition at least once every month. Renew cooling jacket O-when required (typically every 2nd piston overhaul or every 5 years).
Piston rings	Bore sizes 95-80 32,000 70-50 24,000 35 16,000	Bore sizes 95-80 32,000 70-50 24,000 35 16,000	Check the overall cylinder condition at least once a month. Renew at each piston overhaul. Replace cermet-coated piston rings before wear-out.
Piston crown	Bore sizes 95-80 32,000 70-50 24,000 35 16,000	Bore sizes 95 80,000 80 70,000 70-50 60,000 35 50,000	Check the overall cylinder condition at least once every month. Pressure test at every overhaul. Recondition/rechrome as required (typically every 1-2 piston overhaul). Piston crown can be reconditioned twice by welding-up.
Piston skirt	Bore sizes 95-80 32,000 70-50 24,000 35 16,000	All bore sizes 60,000	Check the overall cylinder condition at least once every month. Mo thickness to be measured during port inspection. Check instruction book for wear-out criteria. There are two types of piston skirts; Mo coating type and slide ring type.
Cylinder lubricator	All bore sizes 32,000	All bore sizes 96,000	Overhaul at an authorised MAN Energy Solutions workshop. Renew O-rings and non-return valves. Check efficiency, and if below 90%, renew block and plunger.
Non-return valve in cylinder liner	Bore sizes 95-80 32,000 70-50 24,000 35 16,000	All bore sizes 32,000	Check during piston overhaul. Replace if leaks or excessive liner wear is found.
Stuffing box	Bore sizes 95-80 32,000 70-50 24,000 35 16,000 Check gab of lamellas and sealing rings.	Bore sizes 95-80 48,000 70-50 32,000 35 24,000	Overhaul follows the overhaul of piston rings, but can be extended based on observations. Replace if the gap between the rings is reduced by more than 50% compared to new rings.

ME-C methanol (LGIM) and LPG (LGIP) engines
Guiding overhaul intervals and expected service life

Component	Overhaul interval (hours)	Expected service life (hours)	Remarks
Exhaust valve spindle and bottom piece	Bore sizes 95-60 Initial inspections[1] 6,000 & 12,000 Subsequent inspections[2] 24,000 50-35 Initial inspections[1] 4,000 & 8,000 Subsequent inspections[2] 16,000 All bore sizes	Bore sizes 95-60 72,000 50-35 48,000	[1] Initial inspection Check condition of air spring according to the instruction manual. Inspect seats. Calculate maximum burn-off rate of spindle disc underside to obtain lifetime of spindle. Plan time for subsequent inspection for overhaul and recondition. Inspect minimum 2 valves. [2] Subsequent inspections Complete overhaul of exhaust valve. To obtain the spindle lifetime given, all spindle types can be reconditioned by welding-up 2 times. For bottom piece seats, only light grinding is usually required at subsequent inspections. Welding-up of DSA spindles is not possible, as no procedure is available yet.
Exhaust actuator Non-return valve	24,000	64,000 12,000	Lifetime can deviate due to cavitation. Lifetime can be extended based on observations. No scoring marks or seizures. Replace the non-return valve every 12,000 hours.
Exhaust valve high-pressure pipe	24,000	64,000	Lifetime can deviate due to cavitation.
Main hydraulic pump	48,000	96,000	Check and replace hydrostatic bearings at overhaul. Check and replace cylinder set and piston if required.
Proportional valve for main hydraulic pump		32,000	Replace
Hydraulic start-up pump Coupling/spider Bearings	 32,000	96,000 6,000	 Replace spider if found necessary Replace bearings
Pressure relief valve for main hydraulic pumps	48,000	96,000	Replace sealings during overhaul.
FIVA	32,000	64,000	Check and replace if required. Replace pilot valve after 32,000 hours.
ELVA	32,000	64,000	Check and replace if required. Replace pilot valve after 32,000 hours.
ELFI	32,000	64,000	Check and replace if required. Replace pilot valve after 32,000 hours.
Standard fuel oil valves without guide rings	4,000 depending on fuel quality	Valve nozzle 8,000 Spindle guide 8,000 Non-return valve 16,000 Spring 16,000 Thrust spindle 16,000 Foot 32,000 Spring pack 16,000 Holder 32,000 Head 32,000	Check components and replace if required. Change O-rings. For fuel oil valves tightened by torque (without spring packs): clean threads on studs and ensure smooth operation of nut – otherwise replace nut and/or fuel oil valve stud.

ME-C methanol (LGIM) and LPG (LGIP) engines
Guiding overhaul intervals and expected service life

Component	Overhaul interval (hours)	Expected service life (hours)	Remarks
Fuel oil valve design with guide rings	4,000 depending on fuel quality	Valve nozzle 8,000 Spindle guide 8,000 Non-return valve 16,000 Spring 16,000 Thrust spindle 16,000 Foot 32,000 Spring pack 16,000 Guide rings 16,000 Back-up ring 16,000 Holder 48,000 Head 48,000	Check components and replace if required. Change O-rings, back-up ring and guide rings.
Fuel oil pressure booster	32,000 based on engine observations	Replace or recondition 64,000	Change sealing rings on hydraulic piston and suction valve at overhaul. Replace if index has increased by 10% compared to sea trial observations.
Fuel oil booster throttle valve	Inspection of seat and spring 16,000	32,000	Longer lifetime based on observations.
Suction valve	8,000	16,000	Check for wear on seat and conical ring
High-pressure fuel pipe	Visual inspection when dismantled.	32,000	Change sealing rings when dismantled. Based on observations.
Fuel booster injection valve (FBIV-P/M)			Check and replace if required.
Fuel valve parts	8,000		
– nozzle	4,000	8,000	Clean nozzle holes if required.
– spindle guide		8,000	Replace sealing rings.
– non-return valve		32,000	Check for wear on seat and shaft.
– spring		16,000	
– thrust spindle		32,000	
– holder		32,000	Check for wear on seat.
– union unit		32,000	
Fuel booster parts	16,000		
– suction valve		32,000	
– top cover		64,000	
– spring pack		16,000	
– return oil orifice		32,000	Check top cover orifice and replace if
– plunger/barrel	16,000	32,000	worn out.
Sleeve	32,000	64,000	
– intermediate piece	32,000	64,000	Replace if required.
– seal	Visual inspection when dismantled	64,000	
– high-pressure hydraulic pipes		64,000	Replace if required.
LDCL pump seals		32,000	Change seals if required.
Cylinder cover	Check the holes for first and second fuel valves and the starting air valve when the valves are dismantled.	96,000	Check for burnt grooves at fuel valve nozzle holes. Max. 2 mm combined grinding value of valve housing and valve holes. Measuring tool can be purchased from MAN PrimeServ or each engine builder. Weld-up if required, up to 2-3 times during service life.
Sleeve and sealing rings		32,000	Replace sealing rings and, if required, replace the sleeve. Replace O-rings.

ME-C methanol (LGIM) and LPG (LGIP) engines
Guiding overhaul intervals and expected service life

Component	Overhaul interval (hours)	Expected service life (hours)	Remarks
Starting valve Pilot valve Burst disc	8,000 32,000	96,000 32,000 64,000	 Replace parts if required. Replace if required.
Pneumatic components		32,000	Renew non-metallic parts and O-rings in the various valves every five year (dry-docking). May vary depending on the ambient air quality - dry and clean air.
Main starting valve Slow turning valve Non-return valve and actuators		32,000	Overhaul during dry-docking or every five years. Replace parts if required.
Crosshead bearings Main bearings Crank bearings Thrust bearings	Check clearances and crankshaft deflection once a year. Check bearing edges by wire gauges once a year.	64,000 96,000 96,000 96,000	Do not open bearings unless bearing material fragments fall out or other bearing inspection measures indicate so. Check groove in thrust pad and replace based on findings.
Stay bolts	Tighten bolts: First inspection 500 Subsequent inspections 32,000	Engine lifetime	 Typically done at 5-year docking.
Holding-down bolts	Tighten bolts: First inspection 500 Second inspection 1,000 Third inspection 1,500 Fourth inspection 4,000 Fifth inspection 8,000 Subsequent inspections 16,000	Engine lifetime	
Turbocharger	According to manufacturer's recommendations.	According to manufacturer's recommendations.	According to manufacturer's recommendations.
Air cooler(s)	Cleaning based on engine observations.	48,000 or according to manufacturer's recommendations	Clean before differential pressure has increased 50% compared to sea trial value.
Flaps and butterfly valves in scavenge air receiver	Check movement at every scavenge port inspection.	48,000	Periods with slow steaming may reduce lifetime.
Various fuel and lubricating oil filters	Cleaning based on engine observations.		According to maker's instructions.
Lubricating oil bottom tank	Cleaning 32,000		Typically done at 5-year docking.
Chains	Retighten chains 3,000-4,000 or every six months	Original length (chain pitch) x 10 links. 10 links measurements + 1% of a tensioned chain = scrapping of chain.	New or overhauled chains to be checked/re-tightened after 500, 1,500 hours.
Gear wheel drive for hydraulic pumps Gear wheel bearings	First inspection 500 Subsequent inspections 6,000	Max. wear on teeth, see engine manual.	 Replace if failing
Accumulators on HPS and HCU	N_2 pressure 500 Rubber diaphragms 32,000	Engine lifetime	Replace diaphragms after 5 years.

ME-C methanol (LGIM) and LPG (LGIP) engines
Guiding overhaul intervals and expected service life

Component	Overhaul interval (hours)		Expected service life (hours)	Remarks
Hydraulic safety block Cartridge valves Solenoid valve	Change O-rings	32,000	96,000 64,000	Check and adjust safety valve if required after 32,000 hrs.
Hydraulic hoses			32,000	Replace after 5 years.
MPC, Triton, MOP	Visual inspection	6,000	64,000	Replace if failing
Angle encoder	Visual inspection	6,000	64,000	Replace if failing
Encoder bearing			32,000	Replace
Angle encoder amplifiers	Visual inspection	6,000	64,000	Replace if failing
Fuel booster sensor	Visual inspection	6,000	64,000	Replace if failing
Exhaust valve sensor	Visual inspection	6,000	64,000	Replace if failing
Marker sensor	Visual inspection	6,000	64,000	Replace if failing
Cables	Visual inspection	6,000	96,000	Replace if failing
FIVA/ELFI safety screen strainer	Visual inspection	6,000	64,000	Replace if failing
Control oil pipe arrangement		32,000	Engine lifetime	Replace static O-rings at overhaul.
Sealing oil pump N_2 accumulator filter Spider/coupling	N_2 pressure Rubber diaphragms	500 32,000	96,000 6,000	Replace diaphragms after 5 years. Condition-based replacement.
Sealing oil control valve Sealing oil filter			32,000 6,000	
LPS booster pump seals			32,000	Change seals when required.
Blow-off valve		32,000	64,000	
Purge valve		32,000	64,000	
LPG inlet/outlet and bypass valve		32,000	64,000	
Pressure holding valve		32,000	64,000	
ELWI		32,000	64,000	
ELBI				
ELGI		32,000	64,000	
Gas channel pressure sensor			64,000	Replace if failing
Chain pipe		32,000	64,000	Inspect the supports for the inner pipes. Check for oil in the outer pipe and drain in case of a no-flow alarm in the outer pipe.
Gas block Non-return valve Accumulator	 N_2 pressure	 8,000 500	Engine lifetime	Check in situ for gas tightness. Replace diaphragm after 5 years.

ME-C methane (GI) and ethane (GIE) engines
Guiding overhaul intervals and expected service life

Component	Overhaul interval (hours)	Expected service life (hours)	Remarks
Cylinder liner	Bore sizes 95-80 32,000 70-50 24,000 45-35 16,000	Bore sizes 95-90 80,000 80-70 70,000 60-50 60,000 45-35 50,000	Check the overall cylinder condition at least once a month. Renew cooling jacket O-rings when required (typically every 2nd piston overhaul or every 5 years).
Piston rings	Bore sizes 95-80 32,000 70-50 24,000 45-35 16,000	Bore sizes 95-80 32,000 70-50 24,000 45-35 16,000	Check the overall cylinder condition at least once every month. Renew at each piston overhaul. Cermet-coated piston rings are to be replaced before wear down.
Piston crown	Bore sizes 95-80 32,000 70-50 24,000 45-35 16,000	Bore sizes 95-90 80,000 80-65 70,000 60-50 60,000 45-35 50,000	Pressure test every second overhaul. Recondition/rechrome as required (typically every second piston ring overhaul). Reconditioning by welding-up is allowed twice.
Piston skirt	Bore sizes 95-80 32,000 70-50 24,000 45-35 16,000	All bore sizes 60,000	Check the overall cylinder condition at least once every month. Measure Mo thickness during port inspection. Check instruction book for wear-out criteria. There are two types of piston skirts; Mo coating type and slide ring type.
Cylinder lubricator	All bore sizes 32,000	All bore sizes 96,000	Overhaul at an authorised MAN Energy Solutions workshop. Renew O-rings and non-return valves. Check efficiency, and if below 90%, renew block and plunger.
Non-return valve in cylinder liner	Bore sizes 95-80 32,000 70-50 24,000 45-35 16,000	All bore sizes 32,000	Check during piston overhaul. Replace if leaks or excessive liner wear is found.
Stuffing box	Bore sizes 95-80 32,000 70-50 24,000 45-35 16,000 Check gab of lamellas and sealing rings.	Bore sizes 95-80 48,000 70-50 32,000 45-35 24,000 Renew lamellas and sealing rings.	Overhaul follows the overhaul of piston rings, but can be extended based on observations. Replace if the gap between the rings is reduced by more than 50% compared to new rings.

ME-C methane (GI) and ethane (GIE) engines
Guiding overhaul intervals and expected service life

Component	Overhaul interval (hours)	Expected service life (hours)	Remarks
Exhaust valve spindle and bottom piece	Bore sizes 95-60 Initial inspections[1] 6,000 & 12,000 Subsequent inspections[2] 24,000 50-35 Initial inspections[1] 4,000 & 8,000 Subsequent inspections[2] 16,000 All bore sizes	Bore sizes 95-60 72,000 50-35 48,000	[1] Initial inspection Check condition of air spring according to the instruction manual. Inspect seats. Calculate maximum burn-off rate of spindle disc underside to obtain lifetime of spindle. Plan time for subsequent inspection for overhaul and recondition. Inspect minimum two valves. [2] Subsequent inspections Complete overhaul of exhaust valve. To obtain the spindle lifetime given, all spindle types can be reconditioned by welding-up 2 times. For bottom piece seats, only light grinding is usually required at subsequent inspections. Welding-up of DSA spindles is not possible, as no procedure is available yet.
Exhaust actuator Non-return valve	24,000	64,000 12,000	Lifetime can deviate due to cavitation. Lifetime can be extended based on observations. No scoring marks or seizures. Replace the non-return valve every 12,000 hours.
Exhaust valve high-pressure pipe	24,000	64,000	Lifetime can deviate due to cavitation.
Main hydraulic pump	48,000	96,000	Check and replace hydrostatic bearings at overhaul. Check and replace cylinder set and piston if required.
Proportional valve for main hydraulic pump		32,000	Replace
Hydraulic start-up pump Coupling/spider Bearings	 32,000	96,000 6,000 32,000	 Replace spider if found necessary Replace bearings
Pressure relief valve for main hydraulic pumps	48,000	96,000	Replace sealings during overhaul.
FIVA	32,000	64,000	Check and replace if required. Replace pilot valve after 32,000 hours.
ELVA	32,000	64,000	Check and replace if required. Replace pilot valve after 32,000 hours.
ELFI	32,000	64,000	Check and replace if required. Replace pilot valve after 32,000 hours.
PEVA	32,000	64,000	Check and replace if required. Replace pilot valve after 32,000 hours.

ME-C methane (GI) and ethane (GIE) engines
Guiding overhaul intervals and expected service life

Component	Overhaul interval (hours)	Expected service life (hours)		Remarks
Standard fuel oil valves with pilot function	4,000 depending on fuel quality	Valve nozzle Spindle guide Non-return valve Spring Thrust spindle Foot Spring pack Holder Head	8,000 8,000 16,000 16,000 16,000 32,000 16,000 32,000 32,000	Check components and replace if required. Change O-rings. For fuel oil valves tightened by torque (without spring packs): clean threads on studs and ensure smooth operation of nut – otherwise replace nut and/or fuel oil valve stud.
Fuel oil valve design with guide rings	4,000 depending on fuel quality	Valve nozzle Spindle guide Non-return valve Spring Thrust spindle Foot Spring pack Guide rings Back-up ring Holder Head	8,000 8,000 16,000 16,000 16,000 32,000 16,000 16,000 16,000 48,000 48,000	Check components and replace if required. Change O-rings, back-up ring and guide rings.
Fuel oil pressure booster Fuel oil booster throttle valve Suction valve	32,000 based on engine observations Inspection of seat and spring 16,000 8,000	Replace or recondition	64,000 32,000 16,000	Change sealing rings on hydraulic piston and suction valve at overhaul. Replace if index has increased by 10% compared to sea trial observations. Longer lifetime based on observations. Check for wear on seat and conical ring
Fuel oil booster throttle valve	Inspection of seat and spring 16,000		32,000	
Suction valve	8,000		16,000	Check for wear on seat and conical ring.
High-pressure fuel pipe	Visual inspection when dismantled.		32,000	Based on observations. Change sealing rings when dismantled.
Fuel booster injection valve (FBIV) Fuel valve parts – nozzle – spindle guide – non-return valve – spring – thrust spindle – holder – union nut Fuel booster parts – suction valve – top cover – spring pack – return oil orifice – plunger/barrel – sleeve	depending on fuel quality 8,000 4,000		 8,000 8,000 16,000 16,000 32,000 32,000 32,000 32,000 64,000 16,000 32,000 32,000 64,000	Change sealing rings when dismantled. Clean nozzle holes if required. Replace sealing rings and check for wear on seat and shaft. Check for wear on seat.

ME-C methane (GI) and ethane (GIE) engines
Guiding overhaul intervals and expected service life

Component	Overhaul interval (hours)	Expected service life (hours)	Remarks
Pilot injection valve (PIV)	4,000 depending on fuel quality	Valve nozzle 8,000 Spindle guide 8,000 Non-return valve 16,000 Spring 16,000 Thrust spindle 16,000 Spring pack 16,000 Guide ring 16,000 Holder 32,000 Head 32,000 Housing 32,000 Nozzle union nut 32,000 Union nut/sleeve 32,000	Check components and replace if required. Change O-rings, sealing rings, and guide rings when overhauling.
Gas injection valve (GIV) Valve nozzle Spring pack	16,000 4,000	32,000 8,000 16,000	Check and replace if required. Visual inspection and pressure test for tightness. Clean nozzle holes if required.
PVU and HPS (for PVU) Spider coupling for hydraulic pumps Cold ends Hot ends Moog valves AEV valves Herose valves LP safety valve HP safety valve Hydraulic hoses Blowdown valves Hydraulic pump/cont valve Accumulators/ diaphragms GWS	 6,000 32,000 32,000 32,000 16,000 16,000 32,000 48,000 500	 6,000 18,000 64,000 32,000 5 years 64,000 96,000 12,000	 To be renewed. Repair kit. Depends on gas quality and cleanliness. Repair kit. Depends on hydraulic oil quality and cleanness. To be renewed as required. Depends on hydraulic oil quality and cleanness. Repair kit Repair kit Class requirement. Opening test. Class requirement. Opening test. Class requirement. Renewal. Repair kit Overhaul/recondition According to manufacturer According to manufacturer
LDCL pump seals		32,000	Change seals if required.
Cylinder cover	Check first and second fuel valves as well as staring air valve holes when valves are dismantled.	96,000	Check for burnt grooves at fuel oil valve nozzle holes. Max. 2 mm grinding in valve holes. Measuring tool can be purchased from MAN PrimeServ or each engine builder. Weld-up if required, up to 2-3 times during service life. Replace O-rings.
Sleeve and sealing rings		32,000	Replace sealing rings and, if required, replace the sleeve.
Starting valve Pilot valve Burst disc	8,000 32,000	96,000 32,000 64,000	 Replace parts if required. Replace if required.

ME-C methane (GI) and ethane (GIE) engines
Guiding overhaul intervals and expected service life

Component	Overhaul interval (hours)	Expected service life (hours)	Remarks
Pneumatic components		32,000	Renew non-metallic parts and O-rings in the various valves every five years (during drydocking). May vary depending on the air quality – dry and clean air.
Main starting valve Slow turning valve Non-return valve and actuators		32,000	Overhaul during drydocking or every five years. Replace parts if required.
Crosshead bearings Main bearings Crank bearings Thrust bearings	Check clearances and crankshaft deflection once a year. Check bearing edges by wire gauges once a year.	64,000 96,000 96,000 96,000	Do not open bearings unless bearing material fragments fall out or other bearing inspection measures indicate so. Check groove in thrust pad and replace based on findings.
Stay bolts	Tighten bolts: First inspection 500 Subsequent inspections 32,000	Engine lifetime	Typically done at 5-year docking.
Holding-down bolts	Tighten bolts: First inspection 500 Second inspection 1,000 Third inspection 1,500 Fourth inspection 4,000 Fifth inspection 8,000 Subsequent inspections 16,000	Engine lifetime	
Turbocharger	According to manufacturer's recommendations.	According to manufacturer's recommendations.	According to manufacturer's recommendations.
Air cooler(s)	Cleaning based on engine observations.	48,000 or according to manufacturer's recommendations	Clean before differential pressure has increased by 50% compared to sea trial value.
Flaps and butterfly valves in scavenge air receiver	Check movement at every scavenge port inspection.	48,000	Periods with slow steaming may reduce lifetime.
Various fuel and lubricating oil filters	Cleaning based on engine observations.		According to maker's instructions.
Lubricating oil bottom tank	Cleaning 32,000		Typically done during 5-year docking.
Chains	Retighten chains 3,000-4,000 or every six months	Original length (chain pitch x 10 links). 10-links measurements + 1% of a tensioned chain = scrapping of chain.	New or overhauled chains to be checked/re-tightened after 500 and 1,500 hours.
Gear wheel drive for hydraulic pumps Gear wheel bearings	First inspection 500 Subsequent inspections 6,000	Max. wear on teeth, see engine manual.	Replace if failing
Accumulators on HPS and HCU	N_2 pressure 500 Rubber diaphragms 32,000	Engine lifetime	Replace diaphragms after 5 years.
Hydraulic safety block Cartridge valves Solenoid valve	Change O-rings 32,000	96,000 64,000	Check and adjust safety valve if required after 32,000 hrs.
Hydraulic hoses		32,000	Replace after 5 years.

ME-C methane (GI) and ethane (GIE) engines
Guiding overhaul intervals and expected service life

Component	Overhaul interval (hours)		Expected service life (hours)		Remarks
MPC, Triton, MOP	Visual inspection	6,000	64,000		Replace if failing
Angle encoder	Visual inspection	6,000	64,000		Replace if failing
Encoder bearing			32,000		Replace
Angle encoder amplifiers	Visual inspection	6,000	64,000		Replace if failing
Fuel booster sensor	Visual inspection	6,000	64,000		Replace if failing
Exhaust valve sensor	Visual inspection	6,000	64,000		Replace if failing
Marker sensor	Visual inspection	6,000	64,000		Replace if failing
Cables	Visual inspection	6,000	96,000		Replace if failing
FIVA/ELFI safety screen strainer	Visual inspection	6,000	64,000		Replace if failing
Control oil pipe arrangement Non-return valve		32,000 16,000	Engine lifetime Replace or overhaul	32,000	Replace static O-rings at overhaul. Check spring and seat.
Window valve High-pressure gas seal Soft iron ring		16,000 8,000	32,000 16,000		Pressure and function test. Replace when required or at overhaul. Replace soft iron ring when dismantled.
Sealing oil pump N_2 accumulator filter Spider/coupling Proportional valve	N_2 pressure Rubber diaphragms	500 32,000 32,000	96,000 6,000 32,000		Replace diaphragms after 5 years. Condition-based replacement. Replace
LPS booster pump seals			32,000		Change seals when required.
Blow-off valve		32,000	64,000		
Purge valve		32,000	64,000		
Resume valve		32,000	64,000		
ELWI		32,000	64,000		
ELGI		32,000	64,000		
GCRV		32,000	64,000		
WV forced closed		16,000	32,000		
Gas channel pressure sensor			64,000		Replace if failing.
Chain pipe		32,000	64,000		Inspect the supports for the inner pipes. Check for oil in the outer pipe and drain in case of a no-flow alarm in the outer pipe.
Gas block Non-return valve Accumulator	 N_2 pressure	 500	Engine lifetime 32,000		Check in situ for gas tightness. Replace diaphragm after 5 years.
Solenoid valve			64,000		

ME/ME-C engines (diesel and HFO)
Guiding overhaul intervals and expected service life

Component	Overhaul interval (hours)	Expected service life (hours)	Remarks
Cylinder liner	Bore sizes 98-80 24,000 70-50 16,000 46-35 12,000	Bore sizes 98-90 80,000 80-65 70,000 60-50 60,000 46-35 50,000	Check the overall cylinder condition at least once every month. Cooling jacket O-ring to be renewed as required (typical every 2nd piston overhaul or every 5 years).
Piston rings	Bore sizes 98-80 24,000 70-50 16,000 46-35 12,000	Bore sizes 98-80 24,000 70-50 16,000 46-35 12,000	Check the overall cylinder condition at least once every month. Renew at each piston overhaul. Cermet-coated piston rings are to be replaced before wear down.
Piston crown	Bore sizes 98-80 24,000 70-50 16,000 46-35 12,000	Bore sizes 98-90 80,000 80-65 70,000 60-50 60,000 46-35 50,000	Pressure test at every 2nd overhaul. Recondition/rechrome as required (typically every 1-2 piston overhaul). Piston crown can be reconditioned twice by welding-up.
Piston skirt	Bore sizes 98-80 24,000 70-50 16,000 46-35 12,000	All bore sizes 60,000	Check the overall cylinder condition at least once every month. Measure the Mo thickness during port inspection. Check instruction book for wear-out criteria. There are two types of piston skirts; Mo coating type and slide ring type.
Cylinder lubricator	All bore sizes 32,000	All bore sizes 96,000	Overhaul at an authorised MAN Energy Solutions workshop. Renew O-rings and non-return valves. Check efficiency, and if below 90%, renew block and plunger.
Non-return valve in cylinder liner	Bore sizes 98-80 24,000 70-50 16,000 46-35 12,000	All bore sizes 32,000	Check during piston overhaul. Replace if leaks or excessive liner wear is found.
Stuffing box	Bore sizes 98-80 24,000 70-50 16,000 46-35 12,000 Check gab of lamellas and sealing rings.	Bore sizes 98-80 48,000 70-50 32,000 46-35 24,000 Renew lamellas and sealing rings.	Overhaul follows the overhaul of piston rings, but can be extended based on observations. Replace the rings if the gap between the rings is reduced by 50% compared to new rings.

ME/ME-C engines (diesel and HFO)
Guiding overhaul intervals and expected service life

Component	Overhaul interval (hours)	Expected service life (hours)	Remarks
Exhaust valve spindle and bottom piece	Bore sizes 98-60 Initial inspections[1] 6,000 & 12,000 Subsequent inspections[2] 24,000 Bore sizes 50-35 Initial inspections[1] 4,000 & 8,000 Subsequent inspections[2] 16,000 All bore sizes	Bore sizes 95-60 72,000 50-35 48,000	[1] Initial inspection Check condition of air spring according to the instruction manual. Inspect seats. Calculate maximum burn-off rate of spindle disc underside to obtain lifetime of spindle. Plan time for subsequent inspection for overhaul and recondition. Inspect minimum two valves. [2] Subsequent inspections Complete overhaul of exhaust valve. To obtain the spindle lifetime given, all spindle types can be reconditioned by welding-up 2 times. For bottom piece seats: only light grinding is usually required at subsequent inspections. Welding-up of DSA spindles is not possible, as no procedure is available yet.
Exhaust actuator Non-return valve	24,000	64,000 12,000	Lifetime can deviate due to cavitation. Lifetime can be extended based on observations. No scoring marks or seizures. Replace the non-return valve every 12,000 hours.
Exhaust valve high-pressure pipe	24,000	64,000	Lifetime can deviate due to cavitation.
Main hydraulic pump	48,000	96,000	Check and replace hydrostatic bearings at overhaul. Check and replace cylinder set and piston if required.
Proportional valve for main hydraulic pump		32,000	Replace
Hydraulic start-up pump Coupling/spider Bearings	 32,000	96,000 6,000 32,000	 Replace spider if found necessary Replace bearings
Pressure relief valve for main hydraulic pumps	48,000	96,000	Replace sealings at overhaul.
FIVA	32,000	64,000	Check and replace if required. Replace pilot valve after 32,000 hours.
ELVA	32,000	64,000	Check and replace if required. Replace pilot valve after 32,000 hours.
ELFI	32,000	64,000	Check and replace if required. Replace pilot valve after 32,000 hours.
PEVA	32,000	64,000	Check and replace if required. Replace pilot valve after 32,000 hours.
ELSQ	32,000	32,000	Replace

ME/ME-C engines (diesel and HFO)
Guiding overhaul intervals and expected service life

Component	Overhaul interval (hours)	Expected service life (hours)		Remarks
WIVA	32,000		64,000	Check and replace if required. Replace pilot valve after 32,000 hours.
Standard fuel oil valves without guide rings	4,000 depending on fuel quality	Valve nozzle Spindle guide Non-return valve Spring Thrust spindle Foot Spring pack Holder Head	8,000 8,000 16,000 16,000 32,000 16,000 32,000 32,000	Check components and replace if required. Change O-rings. For fuel oil valves tightened by torque (without spring packs): clean threads on studs and ensure smooth operation of nut – otherwise replace nut and/or fuel oil valve stud.
Fuel oil valve design with guide rings	4,000 depending on fuel quality	Valve nozzle Spindle guide Non-return valve Spring Thrust spindle Foot Spring pack Guide rings Back-up ring Holder Head	8,000 8,000 16,000 16,000 16,000 32,000 16,000 16,000 16,000 48,000 48,000	Check components and replace if required. Change O-rings, back-up ring and guide rings.
Fuel oil pressure booster Fuel oil booster throttle valve Suction valve	32,000 based on engine observations Inspection of seat and spring 16,000 8,000	Replace or recondition	64,000 32,000 16,000	Change sealing rings on hydraulic piston and suction valve at overhaul. Replace if index has increased by 10% compared to sea trial observations. Longer lifetime based on observations. Check for wear on seat and conical ring
High-pressure fuel pipe	Visual inspection when dismantled.		32,000	Based on observations. Change sealing rings when dismantled.
Fuel booster injection valve (FBIV/S) Fuel valve parts – nozzle – spindle guide – non-return valve – spring – thrust spindle – holder – union unit Fuel booster parts – suction valve – top cover – return oil orifice – plunger/barrel Sleeve – intermediate piece – seals – high-pressure hydraulic pipes	 8,000 4,000 16,000 16,000 32,000 32,000 Visual inspection when dismantled		 8,000 16,000 16,000 16,000 32,000 32,000 32,000 32,000 64,000 32,000 32,000 64,000 64,000 64,000 64,000	Check and replace if required. Clean nozzle holes if required. Replace sealing rings Check for wear on seat and shaft. Check for wear on seat. Check top cover orifice and replace if worn out. Replace if required Replace if required
LDCL pump seals			32,000	Change seals if required.

ME/ME-C engines (diesel and HFO)
Guiding overhaul intervals and expected service life

Component	Overhaul interval (hours)	Expected service life (hours)	Remarks
Cylinder cover	Check the holes for first and second fuel valves and the starting air valve when the valves are dismantled.	96,000	Check for burnt grooves at fuel oil valve nozzle holes. Max. 2 mm grinding in valve holes. Measuring tool can be purchased from MAN PrimeServ or each engine builder. Weld-up if required, up to 2-3 times during service life. Replace O-rings.
Starting valve Pilot valve Burst disc	8,000 32,000	96,000 32,000 64,000	 Replace parts if required. Replace if required.
Pneumatic components		32,000	Renew non-metallic parts and O-rings in the various valves every five years (during drydocking). May vary depending on air quality – dry and clean air.
Main starting valve Slow turning valve Non-return valve and actuators		32,000	Overhaul during drydocking or every five years. Replace parts if required.
Crosshead bearings Main bearings Crank bearings Thrust bearings	Check clearances and crankshaft deflection once a year. Check bearing edges by wire gauges once a year.	64,000 96,000 96,000 96,000	Do not open bearings unless bearing material fragments fall out or other bearing inspection measures indicate so. Check groove in thrust pad and replace based on findings (see engine manual).
Stay bolts	Tighten bolts: First inspection 500 Subsequent inspections 32,000	Engine lifetime	 Typically done at 5-year docking.
Holding-down bolts	Tighten bolts: First inspection 500 Second inspection 1,000 Third inspection 1,500 Fourth inspection 4,000 Fifth inspection 8,000 Subsequent inspections 16,000	Engine lifetime	
Turbocharger	According to manufacturer's recommendations.	According to manufacturer's recommendations.	According to manufacturer's recommendations.
Air cooler(s)	Cleaning based on engine observations.	48,000 or according to manufacturer's recommendations	Clean before differential pressure has increased 50% compared to sea trial value.
Flaps and butterfly valves in scavenge air receiver	Check movement at every scavenge port inspection.	48,000	Periods with slow steaming may reduce lifetime.
Various fuel and lubricating oil filters	Cleaning based on engine observations.		According to maker's instructions.
Lubricating oil bottom tank	Cleaning 32,000		Typically done at 5-year docking.

ME/ME-C engines (diesel and HFO)
Guiding overhaul intervals and expected service life

Component	Overhaul interval (hours)	Expected service life (hours)	Remarks
Chains	Retighten chains 3,000-4,000 or every six months	Original length (chain pitch x10 links). 10-links measurements + 1% of a tensioned chain = scrapping of chain.	New or overhauled chains to be checked/re-tightened after 500 and 1,500 hours.
Gear wheel drive for hydraulic pumps Gear wheel Gear wheel bearings	First inspection 500 Subsequent inspections 6,000	Max. wear on teeth, see engine manual.	 Replace if failing
Accumulators on HPS and HCU	N_2 pressure 500 Rubber diaphragms 32,000	Engine lifetime	Replace diaphragms after 5 years.
Hydraulic safety block Cartridge valves Solenoid valve	Change O-rings 32,000	 96,000 64,000	Check and adjust safety valve if required after 32,000 hrs.
Hydraulic hoses		32,000	Replace after 5 years.
MPC, Triton, MOP	Visual inspection 6,000	64,000	Replace if failing
CCU and ACU amplifiers	Visual inspection 6,000	64,000	Replace if failing
LVDT and LDI hydraulic pump amplifiers	Visual inspection 6,000	64,000	Replace if failing
Angle encoder	Visual inspection 6,000	64,000	Replace if failing
Encoder bearing		32,000	Replace
Angle encoder amplifiers	Visual inspection	64,000	Replace if failing
Fuel booster sensor	Visual inspection 6,000	64,000	Replace if failing
Exhaust valve sensor	Visual inspection 6,000	64,000	Replace if failing
Marker sensor	Visual inspection 6,000	64,000	Replace if failing
Cables	Visual inspection 6,000	96,000	Replace if failing
FIVA/ELFI safety screen strainer	Visual inspection 6,000	64,000	Replace if failing

ME-B engines (diesel and HFO)
Guiding overhaul intervals and expected service life

Component	Overhaul interval (hours)	Expected service life (hours)	Remarks
Cylinder liner	Bore sizes 60-50 16,000 46-30 12,000	Bore sizes 60-50 60,000 46-30 50,000	Check the overall cylinder condition at least once every month. Renew cooling jacket O-when required (typically every 2nd piston overhaul or every 5 years).
Piston rings	Bore sizes 60-50 16,000 46-30 12,000	Bore sizes 60-50 16,000 46-30 12,000	Check the overall cylinder condition at least once every month. Renew rings at each piston overhaul. Replace cermet-coated piston rings before wear-out.
Piston crown	Bore sizes 60-50 16,000 46-30 12,000	Bore sizes 60-50 60,000 46-30 50,000	Check the overall cylinder Condition at least once every month. Pressure test at every overhaul. Recondition/rechrome as required (typically every 1-2 piston overhaul). Piston crown can be reconditioned twice by welding-up.
Piston skirt	Bore sizes 60-50 16,000 46-30 12,000	Bore sizes 60-50 60,000 46-30 50,000	Check the overall cylinder condition at least once every month. Measure the Mo thickness during port inspection. Check instruction book for wear-out criteria. There are two types of piston skirts; Mo coating type and slide ring type.
Cylinder lubricator	All bore sizes 32,000	All bore sizes 96,000	Overhaul at an authorised MAN Energy Solutions workshop. Renew O-rings and non-return valves. Check efficiency, and if below 90%, renew block and plunger.
Non-return valve in cylinder liner	Bore sizes 60-50 16,000 46-30 12,000	All bore sizes 32,000	Check during piston overhaul. Replace if leaks or excessive liner wear is found.
Stuffing box	Bore sizes 60-50 16,000 46-30 12,000 Check gap of lamellas and sealing rings.	Bore sizes 60-50 32,000 46-30 24,000 Renew lamellas and sealing rings.	Overhaul follows the overhaul of piston rings, but can be extended based on observations. Replace if the gap between the rings is reduced by more than 50% compared to new rings.

ME-B engines (diesel and HFO)
Guiding overhaul intervals and expected service life

Component	Overhaul interval (hours)	Expected service life (hours)	Remarks
Exhaust valve spindle and bottom piece	Bore sizes 60-35 Initial inspections[1] 6,000 & 12,000 50-35 Subsequent inspections[2] 16,000 60 Subsequent inspections[2] 24,000 All bore sizes	Bore sizes 60 72,000 50-35 48,000	[1] First inspection Check condition of air spring according to the instruction manual. Inspect seats. Calculate maximum burn-off rate of spindle disc underside to obtain lifetime of spindle. Plan time for subsequent inspection for overhaul and recondition. Inspect minimum two valves. [2] Subsequent inspections Complete overhaul of exhaust valve. To obtain the spindle lifetime given, all spindle types can be reconditioned by welding-up 2 times. For bottom piece seats: only light grinding is usually required at subsequent inspections. Welding-up of DSA spindles is not possible, as no procedure is available yet.
Exhaust actuator	32,000	96,000	Lifetime can be extended based on observations. No scoring marks or seizures.
ELFI valve	32,000	64,000	Check and replace if required. Replace pilot valve after 32,000 hours.
Exhaust valve high-pressure pipe	32,000	96,000	
Proportional valve for hydraulic pump		32,000	Replace
Hydraulic pump Coupling/spider		96,000 6,000	 Replace spider if found necessary
Pressure relief valve for main hydraulic pumps	48,000	96,000	Replace sealings at overhaul.
Standard fuel oil valves without guide rings	4,000 depending on fuel quality	Valve nozzle 8,000 Spindle guide 8,000 Non-return valve 16,000 Spring 16,000 Thrust spindle 16,000 Foot 32,000 Spring pack 16,000 Holder 32,000 Head 32,000	Check components and replace if required. Change O-rings. For fuel oil valves tightened by torque (without spring packs): clean threads on studs and ensure smooth operation of nut – otherwise replace nut and/or fuel oil valve stud.

ME-B engines (diesel and HFO)
Guiding overhaul intervals and expected service life

Component	Overhaul interval (hours)	Expected service life (hours)	Remarks
Fuel oil valve design with guide rings	4,000 depending on fuel quality	Valve nozzle 8,000 Spindle guide 16,000 Non-return valve 16,000 Spring 16,000 Thrust spindle 16,000 Foot 32,000 Spring pack 16,000 Guide rings 16,000 Back-up ring 16,000 Holder 48,000 Head 48,000	Check components and replace if required. Change O-rings, back-up ring and guide rings.
Fuel oil pressure booster Fuel oil booster throttle valve Suction valve	32,000 based on engine observations Inspection of seat and spring 16,000 8,000	Replace or recondition 64,000 32,000 16,000	Change sealing rings on hydraulic piston and suction valve at overhaul. Replace if index has increased by 10% compared to sea trial observations. Longer lifetime based on observations. Check for wear on seat and conical ring
High-pressure fuel pipe	Visual inspection when dismantled.	32,000	Based on observations. Change sealing rings when dismantled.
LDCL pump seals		32,000	Change seals if required.
Cylinder cover	Check holes for fuel valves and starting air valve when valves are dismantled.	96,000	Check for burnt grooves at fuel oil valve nozzle holes. Max. 2 mm grinding in valve holes. Measuring tool can be purchased from MAN PrimeServ or each engine builder. Weld-up if required, up to 2-3 times during service life. Replace O-rings.
Starting valve Pilot valve Burst disc	8,000 32,000	96,000 32,000 64,000	 Replace if required. Replace if required.
Pneumatic components		32,000	Renew non-metallic parts and O-rings in the various valves every five years (during drydocking). Can vary depending on air quality – dry and clean air.
Main starting valve Slow turning valve Non-return valve and actuators		32,000	Overhaul during drydocking or every five years. Replace parts if required.
Crosshead bearings Main bearings Crank bearings Thrust bearings	Check clearances and crankshaft deflection once a year. Check bearing edges using wire gauges once a year.	64,000 96,000 96,000 96,000	Do not open bearings unless bearing material fragments fall out or other bearing inspection measures indicate so. Check groove in thrust pad and replace based on findings (see engine manual).
Stay bolts	Tighten bolts: First inspection 500 Subsequent inspections 32,000	Engine lifetime	 Typically done during 5-year docking.

ME-B engines (diesel and HFO)
Guiding overhaul intervals and expected service life

Component	Overhaul interval (hours)	Expected service life (hours)	Remarks
Holding-down bolts	Tighten bolts: First inspection 500 Second inspection 1,000 Third inspection 1,500 Fourth inspection 4,000 Fifth inspection 8,000 Subsequent inspections 16,000	Engine lifetime	
Turbocharger	According to manufacturer's recommendations.	According to manufacturer's recommendations.	According to manufacturer's recommendations.
Air cooler(s)	Cleaning based on engine observations.	48,000 or according to manufacturer's recommendations	Clean before differential pressure has increased 50% compared to sea trial value.
Flaps and butterfly valves in scavenge air receiver	Check movement at every scavenge port inspection.	48,000	Periods with slow steaming may reduce lifetime.
Various fuel and lubricating oil filters	Cleaning based on engine observations.		According to maker's instructions
Lubricating oil bottom tank	Cleaning 32,000		Typically done at 5-year docking.
Chains	Retighten chains 3,000-4,000 or every six months	Original length (chain pitch x 10 links). 10-links measurements + 1% of a tensioned chain = scrapping of chain.	New or overhauled chains to be checked/re-tightened after 500 and 1,500 hours.
Gear wheel drive for hydraulic pumps Gear wheel Gear wheel bearings	First inspection 500 Subsequent inspections 6,000	Max. wear on teeth, see engine manual.	 Replace if failing
Accumulators on HPS and HCU	N_2 pressure 500 Rubber diaphragms 32,000	Engine lifetime	Replace diaphragms after 5 years.
Hydraulic safety block Cartridge valves Solenoid valve	Change O-rings 32,000	 96,000 64,000	Check and adjust safety valve if required after 32,000 hrs.
Hydraulic hoses		32,000	Replace after 5 years.
MPC, Triton, MOP	Visual inspection 6,000	64,000	Replace if failing
Angle encoder	Visual inspection 6,000	64,000	Replace if failing
Encoder bearing		32,000	Replace
Angle encoder amplifiers	Visual inspection 6,000	64,000	Replace if failing
Marker sensor	Visual inspection 6,000	64,000	Replace if failing
Cables	Visual inspection 6,000	96,000	Replace if failing
FIVA/ELFI safety screen strainer	Visual inspection 6,000	64,000	Replace if failing

Values below for EGR, HPSCR, and LPSCR are valid for all engine types

Component	Overhaul interval (hours)	Expected service life (hours)	Remarks
OSU 02 (NO_x) sensor		2,000	NOx sensors are wear parts and must be changed regularly.
SUC 02 sensor	2-point calibration every 2 weeks	32,000	Refer to maker's guidance.
EGR blower	32,000	64,000 or according to manufacturer's recommendations	Refer to maker's guidance.
EGR gas valves	32,000	64,000 or according to manufacturer's recommendations	Refer to maker's guidance.
EGR cooler	Cleaning based on engine observations.	48,000 or according to manufacturer's recommendations	Clean before differential pressure has increased 50% compared to sea trial value.
EGR WMC	Replace gaskets at drydock 32,000	48,000 or according to manufacturer's recommendations	Refer to maker's guidance.
pH sensors	2-point calibration every month	12,000 or according to manufacturer's recommendations	Refer to maker's guidance.
EGR water valves (with PW filter)	Inspect after 32,000	64,000 or according to manufacturer's recommendations	Coax valves should be dismantled for inspection.
EGR water valves (without PW filter)	Inspect after 6,000	64,000 or according to manufacturer's recommendations	Coax valves should be dismantled for inspection.
PW filters	Inspect after dP PW filter alarm	Replace if failing	Refer to maker's guidance.
NaOH dosing pump	4,000 or according to manufacturer's recommendations	According to manufacturer's recommendations	Refer to maker's guidance.
EGR WHS pumps	5,000 or according to manufacturer's recommendations		Refer to maker's guidance.
WTS	According to manufacturer's recommendations	64,000 or according to manufacturer's recommendations	Refer to maker's guidance.
NO_x sensor		2,000 ME hours	NOx sensors are wear parts and must be changed regularly.
Ambient sensor	Check condition every year	32,000 ME hours	
Differential transmitters	Clean based on observations	Engine lifetime	Cleaning of transmitters and piping.
SCR valves and pneumatic system	Check condition every year*	Engine lifetime	See maker's guide
Reactor elements	Check condition every year*	12,000 Tier III hours	See maker's guide
Dosing system	Check condition every year*	Engine lifetime	See maker's guide
Soot blowing system	Check condition every year*	Engine lifetime	See maker's guide
Decomposition unit (LPSCR)	Check condition every year*	Engine lifetime	See maker's guide

*Stated service interval for guidance only. Actual interval depending on equipment supplier.