

Maintenance Schedule

Diesel Engine

EPA

12V/16V/20V4000Gx5S

Application group 3F

MSE50258/00E



Power. Passion. Partnership.

Engine model	kW/cyl.	Application group
12V4000G15S	124 kW/cyl.	3F, Mains backup mode, unlimited, ICXN
12V4000G25S	145 kW/cyl.	3F, Mains backup mode, unlimited, ICXN
16V4000G15S	124 kW/cyl.	3F, Mains backup mode, unlimited, ICXN
16V4000G25S	139 kW/cyl.	3F, Mains backup mode, unlimited, ICXN
20V4000G15S	123 kW/cyl.	3F, Mains backup mode, unlimited, ICXN
20V4000G25S	135 kW/cyl.	3F, Mains backup mode, unlimited, ICXN
20V4000G35S	147 kW/cyl.	3F, Mains backup mode, unlimited, ICXN

Table 1: Applicability

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1 Maintenance Schedule

1.1 Preface

The maintenance schedule is applicable to products certified in accordance with U.S. emissions regulations and operated in the area of applicability of these regulations.

Information about the latest maintenance schedule is available at: <http://www.mtu-online.com>.

The following instructions must be observed for these products:

The maintenance schedule is an integral part of the emissions certification. Nonobservance of the maintenance instructions can result in violation of the statutory emission specifications. Modification or removal of mechanical or electronic components or the installation of additional components as well as the execution of calibration processes that might affect the emission characteristics of the product are prohibited by emission regulations. Emission-relevant components may only be serviced, replaced or repaired if components approved by MTU are used. Emission-relevant components are for instance control units, data records, sensors, injectors, exhaust flaps and all components of exhaust aftertreatment systems.

The maintenance system for MTU products is based on a preventive maintenance concept. Preventive maintenance facilitates advance operational planning and ensures a high level of equipment availability. The maintenance intervals and the scope of required maintenance activities are the result of operational experience and therefore represent recommendations. Severe operating and ambient conditions may require additional maintenance work and/or modification of the maintenance intervals.

Adherence to the specified maintenance intervals is essential to maintain product safety.

Maintenance activities are specified with intervals based on hours in operation and time limits. Whichever value is reached first shall apply.

The individual maintenance intervals are classified in accordance with the qualification levels QL1 to QL4.

QL1: Operational monitoring and maintenance work which does not require disassembly of the product.

QL2: Exchange of components and parts (corrective only, not part of the maintenance schedule).

QL3: Maintenance work which requires partial disassembly of the product.

QL4: Maintenance work which requires complete disassembly of the product.

Additional notes on maintenance and preservation:

For change intervals for fluids and lubricants as well as for preservation specifications, refer to the relevant instructions of the component manufacturers and the MTU Fluids and Lubricants Specifications. The latest version for drive systems is available online at: <http://www.mtu-online.com>, and for power generation systems at: <http://www.mtuonsiteenergy.com>.

Components which are not listed in this maintenance schedule must be serviced in accordance with Manufacturer's Instructions.

1.2 Special conditions

Designation	Value
Load factor	≤ 100%
Operating hours	100 h per year Or for the duration of an emergency
Time between major overhaul	12,000 h
Exhaust gas aftertreatment (EGA)	Is not part of the EPA certification. There are no regulatory requirements regarding the maintenance of EGA components of the engine. However, continuous performance and safe operation of the EGA system can only be ensured if maintenance tasks are carried out according to this document.

Table 2: Special conditions

1.3 Load profile

Load profile		Load factor %	Load indicator %	kW/cyl.	Load profile			
Load %	Time %							
110 ₍₁₀₀₋₁₁₀₎	1	0 to 79	≤ 29	12,000	-	-	-	
100 ₍₉₀₋₁₀₀₎	10							
90 ₍₈₀₋₉₀₎	30							
80 ₍₆₅₋₈₀₎	50							
65 ₍₅₀₋₆₅₎	-							
50 ₍₃₀₋₅₀₎	-							
30 ₍₅₋₃₀₎	-							
Idle ₍₀₋₅₎	9							

Table 3: Load profile

1.4 Noncyclical maintenance tasks

No.	Qualification	Task	Maintenance tasks	Reference task	Offset	Value	Unit	Option
0010	QL1	WM00094	Check valve clearance, adjust if necessary. ATTENTION! First adjustment after 1,000 operating hours on a new engine and after 1,000 operating hours following each cylinder head overhaul		0	1000	HRS	
Reference task: Name of the maintenance task the offset refers to Offset: Interval of a maintenance task which depends on another interval Value: Fixed value for binding execution of a maintenance task								

1.5 Maintenance Schedule Matrix 12000 H

0 to 12000 Operating hours

Task	Limit	Operating hours [H]																										
		Daily	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500	7000	7500	8000	8500	9000	9500	10000	10500	11000	11500	12000		
WM00296	1 MON																											
WM00222	1 YR																											
WM00067	2 YR																											
WM00148	3 YR																											
WM00297	9 YR																											
WM00281	12 YR																											
WM00112	-	X																										
WM00285	-	X																										
WM00286	-	X																										
WM00287	-	X																										
WM00288	-	X																										
WM00289	-	X																										
WM00063	2 YR		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
WM00069	1 YR			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
WM00136	1 YR			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
WM00050	1 YR			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
WM00086	2 YR			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
WM00085	2 YR			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
WM00273	2 YR			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
WM00274	2 YR			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
WM00170	2 YR				X			X			X			X			X			X			X			X		
WM00124	3 YR				X			X			X			X			X			X			X			X		
WM00076	3 YR				X			X			X			X			X			X			X			X		
WM00098	18 YR				X			X			X			X			X			X			X			X		
WM00094	18 YR			X	X			X			X			X			X			X			X			X		
WM00106	2 YR							X						X					X							X		
WM00275	6 YR							X						X					X							X		
WM00110	9 YR								X										X									
WM00089	18 YR								X										X									
WM00090	18 YR								X										X									
WM00119	2 YR																										X	
WM00040	18 YR																										X	
WM00276	-			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
WM00277	-			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
WM00300	18 YR				X			X			X			X			X			X			X			X		
WM00279	-							X						X					X							X		
WM00294	18 YR							X						X					X							X		
WM00126	5 YR										X																X	
WM00278	-																										X	
WM00280	-																										X	
WM00005	6 YR																										X	
WM00006	6 YR																										X	

MON = Months
 YR = Years
 H = >> locked

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Task	Limit	Operating hours [H]																									
		Daily	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500	7000	7500	8000	8500	9000	9500	10000	10500	11000	11500	12000	
WM00007	6 YR																										X
WM00008	6 YR																										X
WM00004	18 YR																										X
WM00003	18 YR																										X
WM00097	18 YR																										X
WM00096	18 YR																										X
WM00093	18 YR																										X
WM00091	18 YR																										X
WM00087	18 YR																										X
WM00117	18 YR																										X
WM00072	18 YR																										X
WM00071	18 YR																										X
WM00062	18 YR																										X
WM00060	18 YR																										X
WM00059	18 YR																										X
WM00056	18 YR																										X
WM00054	18 YR																										X
WM00051	18 YR																										X
WM00011	18 YR																										X
WM00002	18 YR																										X
WM00001	18 YR																										X
WM00111	18 YR																										X
WM00108	18 YR																										X
WM00104	18 YR																										X
WM00103	18 YR																										X
WM00139	18 YR																										X
WM00102	18 YR																										X
WM00100	18 YR																										X
WM00099	18 YR																										X
WM00095	18 YR																										X
WM00092	18 YR																										X
WM00088	18 YR																										X
WM00295	18 YR																										X
WM00070	18 YR																										X
WM00061	18 YR																										X
WM00127	18 YR																										X
WM00189	1 YR			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
WM00188	1 YR			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
WM00190	5 YR											X															X
WM00020	18 YR																										X
WM00216	1 MON																										
WM00215	1 MON																										
WM00214	2 YR																										
WM00228	6 MON		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

MON = Months
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1.6 Cyclical maintenance tasks 12000 H

Qualification	Interval [H]	Limit	Item	Maintenance tasks	Option	Task
Engine						
QL1	-	1 MON	ENGINE IN GENERAL	Test run at not below 1/3 load and at least until steady-state temperature is reached (monthly)		WM00296
QL1	-	1 YR	202, 367	Preheater, check function and inspect for leaks	X	WM00222
QL1	-	2 YR	OIL FILTRATION/COOLING	Fit new engine oil filters each time the engine oil is changed or, at the latest, on expiry of the time limit (given in years)		WM00067
QL1	-	3 YR	202, 367	Preheater, replace thermostat (electrical)	X	WM00148
QL1	-	9 YR	FUEL INJECTOR	Replace rings		WM00297
QL1	-	12 YR	EXHAUST AFTERTREATMENT SYSTEM	Replace reducing-agent hoses	X	WM00281
QL1	24	-	LABELS AND AUXILIARY MATERIALS	Check emission label		WM00112
QL1	24	-	ENGINE IN GENERAL	Check engine oil level		WM00285
QL1	24	-	ENGINE IN GENERAL	Carry out visual inspection of engine for general condition and leaks		WM00286
QL1	24	-	ENGINE IN GENERAL	Inspect service indicator of air filter	X	WM00287
QL1	24	-	ENGINE IN GENERAL	Check relief bore of coolant pump		WM00288
QL1	24	-	ENGINE IN GENERAL	Check for abnormal running noises, exhaust gas color and vibration		WM00289
QL1	500	2 YR	OIL FILTRATION/COOLING	Automatic centrifugal oil filter: Check layer thickness of oil residues, clean and replace paper element, together with each engine oil change, at the latest	X	WM00063
QL1	1000	1 YR	LUBE OIL PUMP AND DRIVE	Visually inspect pump	X	WM00069
QL1	1000	1 YR	ENGINE MOUNTING	Check screws for strong fit	X	WM00136
QL1	1000	1 YR	ENGINE MOUNTING	Check general condition of resilient mounts (visual inspection)	X	WM00050
QL1	1000	2 YR	FUEL FILTER	Replace easy-change fuel filter		WM00086
QL1	1000	2 YR	FUEL FILTER	Replace additional fuel filter	X	WM00085
QL1	1000	2 YR	EXHAUST AFTERTREATMENT SYSTEM	Dosing system - Replace filter element	X	WM00273
QL1	1000	2 YR	151, 152	Pre-feed module - Replace filter element	X	WM00274
QL1	2000	2 YR	GENERATOR	Inspect condition of belt and fit new ones if necessary. Adjust tension	X	WM00170
QL1	2000	3 YR	COOLANT EXPANSION TANK	Replace valve cover	X	WM00124
QL1	2000	3 YR	121, 369	Replace air filter	X	WM00076
QL1	2000	18 YR	CYLINDER HEAD	Measure valve protrusion		WM00098
QL1	2000	18 YR	VALVE DRIVE	Check valve clearance, adjust if necessary. ATTENTION! First adjustment after 1,000 operating hours on a new engine and after 1,000 operating hours following each cylinder head overhaul		WM00094
QL1	4000	2 YR	CRANKCASE BREATHER	Replace oil separator (impactor)	X	WM00106
QL1	4000	6 YR	CONTROL/REGULATION/SENSOR TECHNOLOGY FOR EXHAUST AFTERTREATM	Replace NOx sensor	X	WM00275
QL1	4500	9 YR	CRANKCASE	Perform endoscopic inspection of cylinder liners		WM00110
QL1	4500	18 YR	FUEL INJECTOR	Reset drift compensation parameters (CDC)		WM00089
QL1	4500	18 YR	FUEL INJECTOR	Replace injection valve/injector		WM00090
QL1	12000	2 YR	CRANKCASE BREATHER	Replace filter or filter element	X	WM00119
QL1	12000	18 YR	202, 367	Overhaul preheater	X	WM00040
QL3	1000	-	EXHAUST AFTERTREATMENT SYSTEM	Replace diesel particulate filter	X	WM00276
QL3	1000	-	EXHAUST AFTERTREATMENT SYSTEM	Replace diesel oxidation catalyst	X	WM00277

MON = Months
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Qualification	Interval [H]	Limit	Item	Maintenance tasks	Option	Task
QL3	2000	18 YR	AIR SUPPLY TO CYLINDERS	Check articulated rod for wear		WM00300
QL3	4000	-	EXHAUST AFTERTREATMENT SYSTEM	Replace SCR module	X	WM00279
QL3	4000	18 YR	AIR SUPPLY TO CYLINDERS	Check throttle for axial clearance		WM00294
QL3	6000	5 YR	ENGINE MOUNTING	Measure height of rubber element	X	WM00126
QL3	12000	-	EXHAUST AFTERTREATMENT SYSTEM	Replace diesel particulate filter module	X	WM00278
QL3	12000	-	151, 152	Replace pre-feed module	X	WM00280
QL3	12000	6 YR	ENGINE IN GENERAL	Replace rubber bellows		WM00005
QL3	12000	6 YR	ENGINE IN GENERAL	Replace hose line		WM00006
QL3	12000	6 YR	ENGINE IN GENERAL	Replace hose		WM00007
QL3	12000	6 YR	ENGINE IN GENERAL	Replace rubber sleeve		WM00008
QL3	12000	18 YR	ENGINE IN GENERAL	Before starting maintenance work, carry out measurement run, record engine parameters, drain coolant and flush cooling circuits		WM00004
QL3	12000	18 YR	ENGINE IN GENERAL	Replace sealing material on all disassembled components		WM00003
QL3	12000	18 YR	CYLINDER HEAD	Overhaul cylinder head		WM00097
QL3	12000	18 YR	CAMSHAFT	Inspect camshaft running surface through pushrod bore using endoscope		WM00096
QL3	12000	18 YR	VALVE DRIVE	Check rocker arms and valve bridge for wear Inspect swing follower through pushrod bore using endoscope		WM00093
QL3	12000	18 YR	INJECTION PUMP / HP PUMP	Replace HP pump		WM00091
QL3	12000	18 YR	FUEL PIPEWORK BEFORE DELIVERY PUMP	Replace pump		WM00087
QL3	12000	18 YR	EXHAUST TURBOCHARGER, GENERAL OR H.P. TURBOCHARGER	Replace exhaust turbocharger		WM00117
QL3	12000	18 YR	EXHAUST DUCTING AFTER ENGINE (TO END OF EXH. AFTERTREATMENT)	Replace exhaust pipe bellows		WM00072
QL3	12000	18 YR	172, 173	Overhaul starter		WM00071
QL3	12000	18 YR	OIL FILTRATION/COOLING	Check centrifugal oil filter for wear	X	WM00062
QL3	12000	18 YR	COOLANT CIRCUIT, GENERAL, HT CIRCUIT	Overhaul pump		WM00060
QL3	12000	18 YR	LOW-TEMPERATURE CIRCUIT	Overhaul coolant pump		WM00059
QL3	12000	18 YR	COOLANT PIPEWORK WITH THERMOSTAT	Check HT thermostat housing and replace thermal actuator		WM00056
QL3	12000	18 YR	COOLANT PIPEWORK WITH THERMOSTAT	Check LT thermostat housing and replace thermal actuator		WM00054
QL3	12000	18 YR	GENERATOR	Overhaul battery-charging generator	X	WM00051
QL3	12000	18 YR	WIRING, GENERAL, FOR ENGINE/GEARBOX/PLANT	Replace HP fuel sensor		WM00011
QL4	12000	18 YR	ENGINE IN GENERAL	Disassemble engine completely. Inspect engine components acc. to assembly instructions; repair or replace as necessary		WM00002
QL4	12000	18 YR	ENGINE IN GENERAL	Replace elastomeric parts and seals		WM00001
QL4	12000	18 YR	CRANKCASE	Replace camshaft bearings		WM00111
QL4	12000	18 YR	CRANKCASE	Replace cylinder liners		WM00108
QL4	12000	18 YR	GEARCASE, AUX PTO END	Gear train: Check tooth flanks for wear (visual inspection), replace bushing		WM00104
QL4	12000	18 YR	CRANKSHAFT WITH BEARINGS	Replace crankshaft bearings		WM00103
QL4	12000	18 YR	CRANKSHAFT, PTO ON DRIVING END	Check flywheel (insulated), overhaul if necessary	X	WM00139
QL4	12000	18 YR	CRANKSHAFT, PTO ON AUX PTO END	Check vibration damper, replace if necessary		WM00102

MON = Months
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Qualification	Interval [H]	Limit	Item	Maintenance tasks	Option	Task
QL4	12000	18 YR	PISTON	Replace rings		WM00100
QL4	12000	18 YR	CONNECTING ROD	Replace conrod bearings		WM00099
QL4	12000	18 YR	CAMSHAFT	Replace thrust bearing flange		WM00095
QL4	12000	18 YR	VALVE DRIVE	Replace swing follower and swing follower shaft		WM00092
QL4	12000	18 YR	INJECTION LINE / HP FUEL LINE	Replace pressure relief valve		WM00088
QL4	12000	18 YR	AIR SUPPLY TO CYLINDERS	Replace throttle		WM00295
QL4	12000	18 YR	LUBE OIL PUMP AND DRIVE	Check pump, replace if necessary		WM00070
QL4	12000	18 YR	OIL LEVEL REGULATING PUMP	Replace gear pump	X	WM00061
QL4	12000	18 YR	ENGINE MOUNTING	Replace rubber elements of engine mounts	X	WM00127
Generator						
QL1	1000	1 YR	ENGINE MOUNTING	Check general condition of rubber elements of generator mounts (visual inspection)	X	WM00189
QL1	1000	1 YR	ENGINE MOUNTING	Check securing screws of generator mounts for firm seating	X	WM00188
QL3	6000	5 YR	ENGINE MOUNTING	Measure height of rubber element of generator mounts	X	WM00190
QL4	12000	18 YR	ENGINE MOUNTING	Replace rubber elements of generator mounts	X	WM00020
Fuel prefilter						
QL1	-	1 MON	FUEL SUPPLY SYSTEM (FOR PERIPHERAL APPLICATIONS)	Check reading of vacuum pressure gauge	X	WM00216
QL1	-	1 MON	FUEL SUPPLY SYSTEM (FOR PERIPHERAL APPLICATIONS)	Drain off water and contamination from fuel prefilter	X	WM00215
QL1	-	2 YR	FUEL SUPPLY SYSTEM (FOR PERIPHERAL APPLICATIONS)	Replace filter element	X	WM00214
Fuel cooler						
QL1	500	6 MON	FUEL PIPEWORK FROM DELIVERY PUMP TO FILTER	Check cooler / radiator elements externally for contamination and leaks	X	WM00228
MON = Months YR = Years H = >> locked						