

Maintenance Schedule

Diesel Engine

EPA/CARB

Surface mining application

with MTU Series 4000 C13x/C23x Engines

Application Groups 5A, 5B

MSE50096/00E



Power. Passion. Partnership.

Engine model	kW/cyl.	Application group
12V4000C13	112 kW/cyl.	5A, Continuous operation, unrestricted
12V4000C13L	119 kW/cyl.	5A, Continuous operation, unrestricted
12V4000C13R	99 kW/cyl.	5A, Continuous operation, unrestricted
12V4000C23	140 kW/cyl.	5B, Continuous operation, variable
12V4000C23R	126 kW/cyl.	5B, Continuous operation, variable
16V4000C13	109 kW/cyl.	5A, Continuous operation, unrestricted
16V4000C13L	117 kW/cyl.	5A, Continuous operation, unrestricted
16V4000C13R	93 kW/cyl.	5A, Continuous operation, unrestricted
16V4000C23	140 kW/cyl.	5B, Continuous operation, variable
16V4000C23R	126 kW/cyl.	5B, Continuous operation, variable
20V4000C13L	119 kW/cyl.	5A, Continuous operation, unrestricted
20V4000C23	140 kW/cyl.	5B, Continuous operation, variable
20V4000C23L	150 kW/cyl.	5B, Continuous operation, variable
All 5A ratings can be used for 5B applications.		

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 maintained, exchanged or repaired if the components used for this purpose are approved by MTU or equivalent components. 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.

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 Allocation matrix application group 5A (Excavator)

Load profile		V 4000 Cx3 x						
Load %	Time %	Load factor %	Load indicator %	0 to 112 kW/cyl.	113 to 119 kW/cyl.			
110 ₍₁₀₀₋₁₁₀₎	—	0 to 66	≤ 15	24,000	21,000	—	—	
100 ₍₉₀₋₁₀₀₎	5							
90 ₍₈₀₋₉₀₎	10							
80 ₍₆₅₋₈₀₎	55							
65 ₍₅₀₋₆₅₎	—							
50 ₍₃₀₋₅₀₎	—							
30 ₍₅₋₃₀₎	25							
Idle Speed ₍₀₋₅₎	5							
110 ₍₁₀₀₋₁₁₀₎	—	0 to 66	≤ 36	21,000	21,000	—	—	
100 ₍₉₀₋₁₀₀₎	30							
90 ₍₈₀₋₉₀₎	15							
80 ₍₆₅₋₈₀₎	—							
65 ₍₅₀₋₆₅₎	20							
50 ₍₃₀₋₅₀₎	—							
30 ₍₅₋₃₀₎	30							
Idle Speed ₍₀₋₅₎	5							
110 ₍₁₀₀₋₁₁₀₎	—	67 to 72	≤ 61	21,000	18,000	—	—	
100 ₍₉₀₋₁₀₀₎	55							
90 ₍₈₀₋₉₀₎	15							
80 ₍₆₅₋₈₀₎	—							
65 ₍₅₀₋₆₅₎	—							
50 ₍₃₀₋₅₀₎	—							
30 ₍₅₋₃₀₎	10							
Idle Speed ₍₀₋₅₎	20							
110 ₍₁₀₀₋₁₁₀₎	—	73 to 83	≤ 73	18,000	18,000	—	—	
100 ₍₉₀₋₁₀₀₎	71							
90 ₍₈₀₋₉₀₎	—							
80 ₍₆₅₋₈₀₎	9							
65 ₍₅₀₋₆₅₎	—							
50 ₍₃₀₋₅₀₎	—							
30 ₍₅₋₃₀₎	16							
Idle Speed ₍₀₋₅₎	4							

Table 2: Allocation matrix 5A (Excavator)

TIM-ID: 0000032007 - 007

1.3 Allocation matrix application group 5B (Haul truck, Wheel loader)

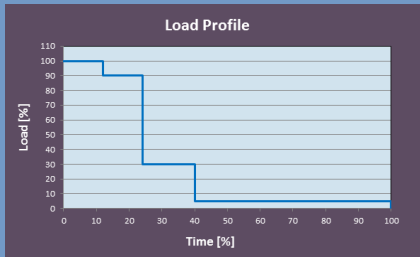
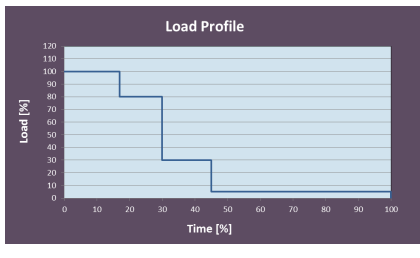
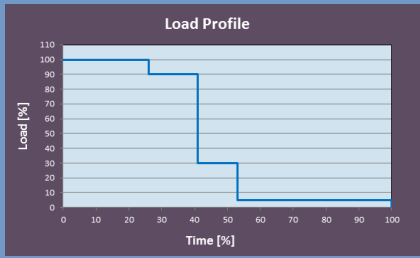
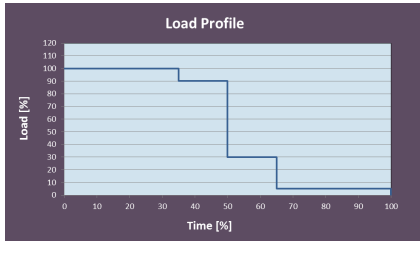
Load profile		Load factor %	Load indicator %	V 4000 Cx3 x				
Load %	Time %			0 to 112 kW/cyl.	113 to 119 kW/cyl.	120 to 140 kW/cyl.	141 to 150 kW/cyl.	
110 (100-110)	—	0 to 31	≤ 17	36,000	30,000	30,000	27,000	<p>Standard Haul truck</p> 
100 (90-100)	12							
90 (80-90)	12							
80 (65-80)	—							
65 (50-65)	—							
50 (30-50)	—							
30 (5-30)	16							
Idle Speed (0-5)	60							
110 (100-110)	—	32 to 35	≤ 19	36,000	30,000	27,000	24,000	<p>Load Profile</p> 
100 (90-100)	17							
90 (80-90)	—							
80 (65-80)	13							
65 (50-65)	—							
50 (30-50)	—							
30 (5-30)	15							
Idle Speed (0-5)	55							
110 (100-110)	—	36 to 45	≤ 32	30,000	27,000	24,000	21,000	<p>Standard Wheel loader</p> 
100 (90-100)	26							
90 (80-90)	15							
80 (65-80)	—							
65 (50-65)	—							
50 (30-50)	—							
30 (5-30)	12							
Idle Speed (0-5)	47							
110 (100-110)	—	46 to 55	≤ 41	27,000	24,000	21,000	18,000	<p>Load Profile</p> 
100 (90-100)	35							
90 (80-90)	15							
80 (65-80)	—							
65 (50-65)	—							
50 (30-50)	—							
30 (5-30)	15							
Idle Speed (0-5)	35							

Table 3: Allocation matrix 5B (Haul truck, Wheel loader)

TIM-ID: 000.0032017 - 006

1.4 Maintenance schedule matrix 36,000 h

0 to 29,000 Operating hours

Task	Limit	Operating hours [h]																																		
		Daily	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000	10,000	11,000	12,000	13,000	14,000	15,000	16,000	17,000	18,000	19,000	20,000	21,000	22,000	23,000	24,000	25,000	26,000	27,000	28,000	29,000					
Engine																																				
W0800	-																																			
W1008	2 a																																			
W0500	-	X																																		
W0501	-	X																																		
W0505	-	X																																		
W0506	-	X																																		
W0507	-	X																																		
W0508	-	X																																		
W1864	6 m	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	X	X	X	X	X	X	X		
W1463	1 a	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	X	X	X	X	X	X	X	X	
W1575	1 a	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	X	X	X	X	X	X	X	X	
W1009	2 a	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	X	X	X	X	X	X	X	X	
W1675	2 a	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	X	X	X	X	X	X	X	X	
W1481	2 a	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	X	X	X	X	X	X	X	X	
W1001	2 a	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	X	X	X	X	X	X	X	X	
W1241	2 a	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	X	X	X	X	X	X	X	X	
W1697	18 a	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	X	X	X	X	X	X	X	X	
W1207	2 a	X	X			X			X			X			X			X			X			X			X			X			X			
W1689	2 a			X			X			X			X			X			X			X			X			X			X			X		
W1698	18 a			X			X			X			X			X			X			X			X			X			X			X		
W1296	3 a						X						X						X								X									
W1055	6 a						X						X						X								X									
W1046	6 a						X						X						X								X									
W1006	9 a												X																					X		
W1011	9 a												X																					X		
W1713	9 a												X																						X	
W1026	9 a												X																						X	
W1812	9 a												X																						X	
W1043	9 a												X													X									X	
W1577	9 a												X													X									X	
W1735	9 a												X																					X		
W1250	6 a																																		X	
W2000	9 a																																		X	
W2001	9 a																																		X	
W2004	9 a																																		X	
W2006	9 a																																		X	
W2007	9 a																																		X	
W2009	9 a																																		X	
W2010	9 a																																		X	
W2062	9 a																																		X	
W2070	9 a																																		X	
W2110	9 a																																		X	

w = weeks
m = months
a = years

TIM-ID: 0000066955 - 001

Task	Limit	Operating hours [h]																																				
		Daily	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000	10,000	11,000	12,000	13,000	14,000	15,000	16,000	17,000	18,000	19,000	20,000	21,000	22,000	23,000	24,000	25,000	26,000	27,000	28,000	29,000							
W1051	9 a																			X																		
W1058	9 a																				X																	
W1038	18 a																				X																	
W1134	9 a																																					
W1478	6 a																				X																	
W1251	6 a																																					
W3000	18 a																																					
W3001	18 a																																					
W3002	18 a																																					
W3003	18 a																																					
W3004	18 a																																					
W3005	18 a																																					
W3018	18 a																																					
W3021	18 a																																					
W3101	18 a																																					
W3102	18 a																																					
W3103	18 a																																					
W3108	18 a																																					
W3144	18 a																																					
W3165	18 a																																					
W3177	18 a																																					
W3182	18 a																																					
W1472	18 a																																					
W1672	18 a																																					
W1124	18 a																																					

w = weeks
m = months
a = years

30,000 to 36,000 Operating hours

Task	Limit	Operating hours [h]																																				
		30,000	31,000	32,000	33,000	34,000	35,000	36,000																														
Engine																																						
W0800	-																																					
W1008	2 a																																					
W0500	-																																					
W0501	-																																					
W0505	-																																					
W0506	-																																					
W0507	-																																					
W0508	-																																					
W1864	6 m	X	X	X	X	X	X	X																														
W1463	1 a	X	X	X	X	X	X	X																														
W1575	1 a	X	X	X	X	X	X	X																														
W1009	2 a	X	X	X	X	X	X	X																														
W1675	2 a	X	X	X	X	X	X	X																														

w = weeks
m = months
a = years

TIM-ID: 000.000.66355 - 001

Task	Limit	Operating hours [h]																											
		30,000	31,000	32,000	33,000	34,000	35,000	36,000																					
W1481	2 a	X	X	X	X	X	X	X																					
W1001	2 a	X	X	X	X	X	X	X																					
W1241	2 a	X	X	X	X	X	X	X																					
W1697	18 a	X	X	X	X	X	X	X																					
W1207	2 a	X			X			X																					
W1689	2 a	X			X			X																					
W1698	18 a	X			X			X																					
W1296	3 a	X						X																					
W1055	6 a	X						X																					
W1046	6 a	X						X																					
W1006	9 a							X																					
W1011	9 a							X																					
W1713	9 a							X																					
W1026	9 a							X																					
W1812	9 a							X																					
W1043	9 a							X																					
W1577	9 a							X																					
W1735	9 a							X																					
W1250	6 a							X																					
W2000	9 a							X																					
W2001	9 a							X																					
W2004	9 a							X																					
W2006	9 a							X																					
W2007	9 a							X																					
W2009	9 a							X																					
W2010	9 a							X																					
W2062	9 a							X																					
W2070	9 a							X																					
W2110	9 a							X																					
W1051	9 a							X																					
W1058	9 a							X																					
W1038	18 a							X																					
W1134	9 a							X																					
W1478	6 a							X																					
W1251	6 a							X																					
W3000	18 a							X																					
W3001	18 a							X																					
W3002	18 a							X																					
W3003	18 a							X																					
W3004	18 a							X																					
W3005	18 a							X																					
W3018	18 a							X																					
W3021	18 a							X																					
W3101	18 a							X																					
W3102	18 a							X																					
W3103	18 a							X																					
W3108	18 a							X																					

w = weeks
m = months
a = years

TIM-ID: 0000066955 - 001

Task	Limit	Operating hours [h]																											
		30,000	31,000	32,000	33,000	34,000	35,000	36,000																					
W3144	18 a							X																					
W3165	18 a							X																					
W3177	18 a							X																					
W3182	18 a							X																					
W1472	18 a							X																					
W1672	18 a							X																					
W1124	18 a							X																					
w = weeks m = months a = years																													

1.5 Maintenance tasks 36,000 h

Qualification level	Interval [h]	Limit	Item	Maintenance tasks	Option	Task
Engine						
QL1	-	-	EPA label	Check if emission label is fitted and legible, and if it contains the correct information.		W0800
QL1	-	2 a	Engine oil filter	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).	X	W1008
QL1	Daily	-	Engine operation	Check engine oil level.		W0500
				Carry out visual inspection of engine for general condition and leaks.		W0501
				Check relief bores of coolant pump(s).		W0505
				Check for abnormal running noises, exhaust gas color and vibration.		W0506
				Drain off water and contamination from fuel prefilter.	X	W0507
				Check differential pressure gauge of fuel prefilter.	X	W0508
QL1	1000	6 m	Automatic engine oil filter	Check and clean oil indicator filter.	X	W1864
QL1	1000	1 a	Engine mounts	Carry out visual inspection of engine mounts for general condition.		W1463
				Carry out visual inspection of Trunion mounts for general condition.		W1575
QL1	1000	2 a	Centrifugal oil filter	Check thickness of oil residue layer. Clean. Fit new sleeve, at the latest, each time the engine oil is changed.	X	W1009
QL1	1000	2 a	Fuel prefilter	Fit new fuel prefilter or new fuel prefilter insert.	X	W1675
QL1	1000	2 a	Intermediate fuel filter	Replace intermediate fuel filter of filter element of intermediate fuel filter.		W1481
QL1	1000	2 a	Fuel filter	Fit new fuel filter or new fuel filter insert.		W1001
QL1	1000	2 a	Belt drive	Inspect condition of drive belts and fit new ones if necessary. Adjust tension.		W1241
QL1	1000	18 a	Flywheel	Check carbon brushes on flywheel, replace as necessary.	X	W1697
QL1	3000	2 a	Valve gear	Check valve clearance, adjust if required. ATTENTION! Initial adjustment after 1,000 operating hours and subsequently 1,000 operating hours after each cylinder-head overhaul..		W1207
QL1	3000	2 a	Cylinder heads	Measure valve stem end to cylinder head top distance.		W1689
QL1	3000	18 a	Flywheel	Replace carbon brushes on flywheel.	X	W1698
QL1	6000	3 a	Coolant expansion tank	Replace valve.	X	W1296
QL1	6000	6 a	Crankcase breathers	Fit new oil separators.	X	W1055
QL1	6000	6 a	Crankcase breathers	Fit new filters or filter inserts.	X	W1046
QL1	12000	9 a	Fuel injectors	Replace fuel injectors.		W1006
QL1	12000	9 a	Combustion chambers	Inspect cylinder chambers using endoscope.		W1011
QL1	12000	9 a	Engine governor	Injector: reset drift compensation parameters (CDC).		W1713
QL1	12000	9 a	Engine mounts	Check buffer clearance of mounts, check proper seating of securing screws.		W1026
				Check for cracks. Measure height of rubber element.		W1812
QL3	9000	9 a	Battery charging alternator	Overhaul battery-charging generator.		W1043
QL3	9000	9 a	Turbochargers	Check turbine housing for cracks (externally by visual inspection and internally by endoscopic examination), replace if necessary..		W1577
QL3	12000	9 a	Auxiliary PTO	Replace PTO.		W1735
QL3	18000	6 a	Rubber sleeves	Replace all rubber sleeves.		W1250
QL3	18000	9 a	Component maintenance	Before starting maintenance work, drain the coolant and flush the cooling systems.		W2000
				Inspect rocker arms and valve bridge for wear. Insert an endoscope through the pushrod bore to visually inspect swing followers and camshaft running surfaces.		W2001
				Fit new high-pressure fuel sensor.		W2004
w = weeks m = months a = years						

TIM-ID: 0000066556 - 001

Qualification level	Interval [h]	Limit	Item	Maintenance tasks	Option	Task
				Check engine coolant thermostat and fit new thermal actuator.		W2006
				Check charge-air coolant thermostat and fit new thermal actuator.		W2007
				Inspect centrifugal oil filter for wear.	X	W2009
				Overhaul starter.		W2010
				Fit new seals/sealing materials for all disassembled components.		W2062
				Overhaul charge-air coolant pump.		W2070
				Overhaul engine coolant pump.		W2110
QL3	18000	9 a	Fuel delivery pump	Fit new fuel delivery pump.		W1051
QL3	18000	9 a	HP fuel pump	Fit new high-pressure fuel pump.		W1058
QL3	18000	18 a	Turbochargers	Overhaul turbochargers.		W1038
QL3	36000	9 a	Cylinder heads	Overhaul cylinder heads.		W1134
QL4	18000	6 a	Automatic engine oil filter	Remove filter housing and clean. Fit new filter candles.	X	W1478
QL4	36000	6 a	Hose lines	Replace all hose lines.		W1251
QL4	36000	18 a	Extended component maintenance	Completely disassemble the engine. Inspect engine components as per assembly instructions and repair or fit new components as required.		W3000
				Replace all elastomeric parts and seals with new ones.		W3001
				Fit new piston rings.		W3002
				Fit new conrod bearings.		W3003
				Fit new crankshaft bearings.		W3004
				Fit new cylinder liners.		W3005
				Fit new camshaft bearings and camshaft thrust bearings.		W3018
				Fit new pressure relief valve in high-pressure fuel system.		W3021
				Fit new turbine wheels for turbochargers.		W3101
				Overhaul torsionally resilient steel-spring coupling.	X	W3102
				Replace swing followers and swing-follower shafts.		W3103
				Check vibration damper, fit new one if necessary.		W3108
				Insulated flywheel: Check and repair if required.	X	W3144
				Overhaul fan clutch.		W3165
				Check engine oil pump, replace if necessary.		W3177
				Gear train: Check tooth flanks for wear (visual inspection), replace bearing bushings.		W3182
QL4	36000	18 a	Turbochargers	Fit new compressor wheels for turbochargers.		W1472
QL4	36000	18 a	Engine mounts	Fit new rubber elements of engine mounts.		W1672
				Fit new Trunion mount element.		W1124
w = weeks m = months a = years						

1.6 Maintenance schedule matrix 30,000 h

0 to 27,000 Operating hours

Task	Limit	Operating hours [h]																													
		Daily	1,000	2,000	3,000	4,000	5,000	6,000	7,000	7,500	8,000	9,000	10,000	11,000	12,000	13,000	14,000	15,000	16,000	17,000	18,000	19,000	20,000	21,000	22,000	22,500	23,000	24,000	25,000	26,000	27,000
Engine																															
W0800	-																														
W1008	2 a																														
W0500	-	X																													
W0501	-	X																													
W0505	-	X																													
W0506	-	X																													
W0507	-	X																													
W0508	-	X																													
W1864	6 m	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	X	X	X	
W1463	1 a	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	X	X	X	
W1575	1 a	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	X	X	X	
W1009	2 a	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	X	X	X	
W1675	2 a	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	X	X	X	
W1481	2 a	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	X	X	X	
W1001	2 a	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	X	X	X	
W1241	2 a	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	X	X	X	
W1697	18 a	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	X	X	X	
W1207	2 a	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	X	X	X	
W1689	2 a			X		X		X		X		X		X		X		X		X		X		X		X		X		X	
W1698	18 a			X		X		X		X		X		X		X		X		X		X		X		X		X		X	
W1296	3 a					X						X						X							X						
W1055	6 a					X						X						X						X							
W1046	6 a					X						X						X						X							
W1006	9 a										X												X								
W1011	9 a										X												X								
W1713	9 a										X												X								
W1026	9 a										X												X								
W1812	9 a										X												X								
W1043	9 a							X									X									X					
W1577	9 a							X									X									X					
W1735	9 a										X												X								
W1250	6 a																X														
W2000	9 a																X														
W2001	9 a																X														
W2004	9 a																X														
W2006	9 a																X														
W2007	9 a																X														
W2009	9 a																X														
W2010	9 a																X														
W2062	9 a																X														
W2070	9 a																X														
W2110	9 a																X														

w = weeks
m = months
a = years

TIM-ID: 0000066374 - 001

Task	Limit	Operating hours [h]																																				
		Daily	1,000	2,000	3,000	4,000	5,000	6,000	7,000	7,500	8,000	9,000	10,000	11,000	12,000	13,000	14,000	15,000	16,000	17,000	18,000	19,000	20,000	21,000	22,000	22,500	23,000	24,000	25,000	26,000	27,000							
W1051	9 a																	X																				
W1058	9 a																	X																				
W1038	18 a																	X																				
W1134	9 a																																					
W1478	6 a																	X																				
W1251	6 a																																					
W3000	18 a																																					
W3001	18 a																																					
W3002	18 a																																					
W3003	18 a																																					
W3004	18 a																																					
W3005	18 a																																					
W3018	18 a																																					
W3021	18 a																																					
W3101	18 a																																					
W3102	18 a																																					
W3103	18 a																																					
W3108	18 a																																					
W3144	18 a																																					
W3165	18 a																																					
W3177	18 a																																					
W3182	18 a																																					
W1472	18 a																																					
W1672	18 a																																					
W1124	18 a																																					

w = weeks
m = months
a = years

28,000 to 30,000 Operating hours

Task	Limit	Operating hours [h]																																						
		28,000	29,000	30,000																																				
Engine																																								
W0800	-																																							
W1008	2 a																																							
W0500	-																																							
W0501	-																																							
W0505	-																																							
W0506	-																																							
W0507	-																																							
W0508	-																																							
W1864	6 m	X	X	X																																				
W1463	1 a	X	X	X																																				
W1575	1 a	X	X	X																																				
W1009	2 a	X	X	X																																				
W1675	2 a	X	X	X																																				

w = weeks
m = months
a = years

Task	Limit	Operating hours [h]																												
		28,000	29,000	30,000																										
W1481	2 a	X	X	X																										
W1001	2 a	X	X	X																										
W1241	2 a	X	X	X																										
W1697	18 a	X	X	X																										
W1207	2 a			X																										
W1689	2 a			X																										
W1698	18 a			X																										
W1296	3 a			X																										
W1055	6 a			X																										
W1046	6 a			X																										
W1006	9 a			X																										
W1011	9 a			X																										
W1713	9 a			X																										
W1026	9 a			X																										
W1812	9 a			X																										
W1043	9 a			X																										
W1577	9 a			X																										
W1735	9 a			X																										
W1250	6 a			X																										
W2000	9 a			X																										
W2001	9 a			X																										
W2004	9 a			X																										
W2006	9 a			X																										
W2007	9 a			X																										
W2009	9 a			X																										
W2010	9 a			X																										
W2062	9 a			X																										
W2070	9 a			X																										
W2110	9 a			X																										
W1051	9 a			X																										
W1058	9 a			X																										
W1038	18 a			X																										
W1134	9 a			X																										
W1478	6 a			X																										
W1251	6 a			X																										
W3000	18 a			X																										
W3001	18 a			X																										
W3002	18 a			X																										
W3003	18 a			X																										
W3004	18 a			X																										
W3005	18 a			X																										
W3018	18 a			X																										
W3021	18 a			X																										
W3101	18 a			X																										
W3102	18 a			X																										
W3103	18 a			X																										
W3108	18 a			X																										

w = weeks
m = months
a = years

TIM-ID: 0000066374 - 001

Task	Limit	Operating hours [h]																												
		28,000	29,000	30,000																										
W3144	18 a			X																										
W3165	18 a			X																										
W3177	18 a			X																										
W3182	18 a			X																										
W1472	18 a			X																										
W1672	18 a			X																										
W1124	18 a			X																										
w = weeks m = months a = years																														

1.7 Maintenance tasks 30,000 h

Qualification level	Interval [h]	Limit	Item	Maintenance tasks	Option	Task
Engine						
QL1	-	-	EPA label	Check if emission label is fitted and legible, and if it contains the correct information.		W0800
QL1	-	2 a	Engine oil filter	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).	X	W1008
QL1	Daily	-	Engine operation	Check engine oil level.		W0500
				Carry out visual inspection of engine for general condition and leaks.		W0501
				Check relief bores of coolant pump(s).		W0505
				Check for abnormal running noises, exhaust gas color and vibration.		W0506
				Drain off water and contamination from fuel prefilter.	X	W0507
				Check differential pressure gauge of fuel prefilter.	X	W0508
QL1	1000	6 m	Automatic engine oil filter	Check and clean oil indicator filter.	X	W1864
QL1	1000	1 a	Engine mounts	Carry out visual inspection of engine mounts for general condition.		W1463
				Carry out visual inspection of Trunnion mounts for general condition.		W1575
QL1	1000	2 a	Centrifugal oil filter	Check thickness of oil residue layer. Clean. Fit new sleeve, at the latest, each time the engine oil is changed.	X	W1009
QL1	1000	2 a	Fuel prefilter	Fit new fuel prefilter or new fuel prefilter insert.	X	W1675
QL1	1000	2 a	Intermediate fuel filter	Replace intermediate fuel filter or filter element of intermediate fuel filter.		W1481
QL1	1000	2 a	Fuel filter	Fit new fuel filter or new fuel filter insert.		W1001
QL1	1000	2 a	Belt drive	Inspect condition of drive belts and fit new ones if necessary. Adjust tension.		W1241
QL1	1000	18 a	Flywheel	Check carbon brushes on flywheel, replace as necessary.	X	W1697
QL1	3000	2 a	Valve gear	Check valve clearance, adjust if required. ATTENTION! Initial adjustment after 1,000 operating hours and subsequently 1,000 operating hours after each cylinder-head overhaul..		W1207
QL1	3000	2 a	Cylinder heads	Measure valve stem end to cylinder head top distance.		W1689
QL1	3000	18 a	Flywheel	Replace carbon brushes on flywheel.	X	W1698
QL1	6000	3 a	Coolant expansion tank	Replace valve.	X	W1296
QL1	6000	6 a	Crankcase breathers	Fit new oil separators.	X	W1055
QL1	6000	6 a	Crankcase breathers	Fit new filters or filter inserts.	X	W1046
QL1	10000	9 a	Fuel injectors	Replace fuel injectors.		W1006
QL1	10000	9 a	Combustion chambers	Inspect cylinder chambers using endoscope.		W1011
QL1	10000	9 a	Engine governor	Injector: reset drift compensation parameters (CDC).		W1713
QL1	10000	9 a	Engine mounts	Check buffer clearance of mounts, check proper seating of securing screws.		W1026
				Check for cracks. Measure height of rubber element.		W1812
QL3	7500	9 a	Battery charging alternator	Overhaul battery-charging generator.		W1043
QL3	7500	9 a	Turbochargers	Check turbine housing for cracks (externally by visual inspection and internally by endoscopic examination), replace if necessary..		W1577
QL3	10000	9 a	Auxiliary PTO	Replace PTO.		W1735
QL3	15000	6 a	Rubber sleeves	Replace all rubber sleeves.		W1250
QL3	15000	9 a	Component maintenance	Before starting maintenance work, drain the coolant and flush the cooling systems.		W2000
				Inspect rocker arms and valve bridge for wear. Insert an endoscope through the pushrod bore to visually inspect swing followers and camshaft running surfaces.		W2001
				Fit new high-pressure fuel sensor.		W2004
w = weeks m = months a = years						

TIM-ID: 0000066375 - 001

Qualification level	Interval [h]	Limit	Item	Maintenance tasks	Option	Task
				Check engine coolant thermostat and fit new thermal actuator.		W2006
				Check charge-air coolant thermostat and fit new thermal actuator.		W2007
				Inspect centrifugal oil filter for wear.	X	W2009
				Overhaul starter.		W2010
				Fit new seals/sealing materials for all disassembled components.		W2062
				Overhaul charge-air coolant pump.		W2070
				Overhaul engine coolant pump.		W2110
QL3	15000	9 a	Fuel delivery pump	Fit new fuel delivery pump.		W1051
QL3	15000	9 a	HP fuel pump	Fit new high-pressure fuel pump.		W1058
QL3	15000	18 a	Turbochargers	Overhaul turbochargers.		W1038
QL3	30000	9 a	Cylinder heads	Overhaul cylinder heads.		W1134
QL4	15000	6 a	Automatic engine oil filter	Remove filter housing and clean. Fit new filter candles.	X	W1478
QL4	30000	6 a	Hose lines	Replace all hose lines.		W1251
QL4	30000	18 a	Extended component maintenance	Completely disassemble the engine. Inspect engine components as per assembly instructions and repair or fit new components as required.		W3000
				Replace all elastomeric parts and seals with new ones.		W3001
				Fit new piston rings.		W3002
				Fit new conrod bearings.		W3003
				Fit new crankshaft bearings.		W3004
				Fit new cylinder liners.		W3005
				Fit new camshaft bearings and camshaft thrust bearings.		W3018
				Fit new pressure relief valve in high-pressure fuel system.		W3021
				Fit new turbine wheels for turbochargers.		W3101
				Overhaul torsionally resilient steel-spring coupling.	X	W3102
				Replace swing followers and swing-follower shafts.		W3103
				Check vibration damper, fit new one if necessary.		W3108
				Insulated flywheel: Check and repair if required.	X	W3144
				Overhaul fan clutch.		W3165
				Check engine oil pump, replace if necessary.		W3177
				Gear train: Check tooth flanks for wear (visual inspection), replace bearing bushings.		W3182
QL4	30000	18 a	Turbochargers	Fit new compressor wheels for turbochargers.		W1472
QL4	30000	18 a	Engine mounts	Fit new rubber elements of engine mounts.		W1672
				Fit new Trunion mount element.		W1124
w = weeks m = months a = years						

1.8 Maintenance schedule matrix 27,000 h

0 to 22,000 Operating hours

Task	Limit	Operating hours [h]																												
		Daily	1,000	2,000	3,000	4,000	5,000	5,400	6,000	6,750	7,000	8,000	9,000	10,000	10,800	11,000	12,000	13,000	13,500	14,000	15,000	16,000	16,200	17,000	18,000	19,000	20,000	20,250	21,000	21,600
Engine																														
W0800	-																													
W1008	2 a																													
W0500	-	X																												
W0501	-	X																												
W0505	-	X																												
W0506	-	X																												
W0507	-	X																												
W0508	-	X																												
W1864	6 m	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	X	X	X
W1463	1 a	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	X	X	X
W1575	1 a	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	X	X	X
W1009	2 a	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	X	X	X
W1675	2 a	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	X	X	X
W1481	2 a	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	X	X	X
W1001	2 a	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	X	X	X
W1241	2 a	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	X	X	X
W1697	18 a	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	X	X	X
W1207	2 a	X	X				X				X				X			X			X			X				X		
W1689	2 a			X			X			X				X			X			X			X				X			
W1698	18 a			X			X			X				X			X			X			X				X			
W1296	3 a						X						X							X									X	
W1055	6 a							X									X											X		
W1046	6 a							X								X											X			
W1006	9 a									X													X							
W1011	9 a									X													X							
W1713	9 a									X													X							
W1026	9 a									X													X							
W1812	9 a									X													X							
W1577	9 a						X									X										X				
W1043	9 a									X													X							
W1735	9 a									X													X							
W1250	6 a															X														
W2000	9 a															X														
W2001	9 a															X														
W2004	9 a															X														
W2006	9 a															X														
W2007	9 a															X														
W2009	9 a															X														
W2010	9 a															X														
W2062	9 a															X														
W2070	9 a															X														
W2110	9 a															X														

w = weeks
m = months
a = years

TIM-ID: 0000066376 - 001

Task	Limit	Operating hours [h]																																	
		Daily	1,000	2,000	3,000	4,000	5,000	5,400	6,000	6,750	7,000	8,000	9,000	10,000	10,800	11,000	12,000	13,000	13,500	14,000	15,000	16,000	16,200	17,000	18,000	19,000	20,000	20,250	21,000	21,600	22,000				
W1051	9 a																		X																
W1058	9 a																		X																
W1038	18 a																		X																
W1134	9 a																																		
W1478	6 a																		X																
W1251	6 a																																		
W3000	18 a																																		
W3001	18 a																																		
W3002	18 a																																		
W3003	18 a																																		
W3004	18 a																																		
W3005	18 a																																		
W3018	18 a																																		
W3021	18 a																																		
W3101	18 a																																		
W3102	18 a																																		
W3103	18 a																																		
W3108	18 a																																		
W3144	18 a																																		
W3165	18 a																																		
W3177	18 a																																		
W3182	18 a																																		
W1472	18 a																																		
W1672	18 a																																		
W1124	18 a																																		

w = weeks
m = months
a = years

23,000 to 27,000 Operating hours

Task	Limit	Operating hours [h]																																		
		23,000	24,000	25,000	26,000	27,000																														
Engine																																				
W0800	-																																			
W1008	2 a																																			
W0500	-																																			
W0501	-																																			
W0505	-																																			
W0506	-																																			
W0507	-																																			
W0508	-																																			
W1864	6 m	X	X	X	X	X																														
W1463	1 a	X	X	X	X	X																														
W1575	1 a	X	X	X	X	X																														
W1009	2 a	X	X	X	X	X																														
W1675	2 a	X	X	X	X	X																														

w = weeks
m = months
a = years

TIM-ID: 000.000.66376 - 001

Task	Limit	Operating hours [h]																											
		23,000	24,000	25,000	26,000	27,000																							
W1481	2 a	X	X	X	X	X																							
W1001	2 a	X	X	X	X	X																							
W1241	2 a	X	X	X	X	X																							
W1697	18 a	X	X	X	X	X																							
W1207	2 a		X																										
W1689	2 a		X																										
W1698	18 a		X																										
W1296	3 a																												
W1055	6 a																												
W1046	6 a																												
W1006	9 a																												
W1011	9 a																												
W1713	9 a																												
W1026	9 a																												
W1812	9 a																												
W1577	9 a																												
W1043	9 a																												
W1735	9 a																												
W1250	6 a																												
W2000	9 a																												
W2001	9 a																												
W2004	9 a																												
W2006	9 a																												
W2007	9 a																												
W2009	9 a																												
W2010	9 a																												
W2062	9 a																												
W2070	9 a																												
W2110	9 a																												
W1051	9 a																												
W1058	9 a																												
W1038	18 a																												
W1134	9 a																												
W1478	6 a																												
W1251	6 a																												
W3000	18 a																												
W3001	18 a																												
W3002	18 a																												
W3003	18 a																												
W3004	18 a																												
W3005	18 a																												
W3018	18 a																												
W3021	18 a																												
W3101	18 a																												
W3102	18 a																												
W3103	18 a																												
W3108	18 a																												

w = weeks
m = months
a = years

TIM-ID: 0000066376 - 001

Task	Limit	Operating hours [h]																											
		23,000	24,000	25,000	26,000	27,000																							
W3144	18 a					X																							
W3165	18 a					X																							
W3177	18 a					X																							
W3182	18 a					X																							
W1472	18 a					X																							
W1672	18 a					X																							
W1124	18 a					X																							
w = weeks m = months a = years																													

1.9 Maintenance tasks 27,000 h

Qualification level	Interval [h]	Limit	Item	Maintenance tasks	Option	Task
Engine						
QL1	-	-	EPA label	Check if emission label is fitted and legible, and if it contains the correct information.		W0800
QL1	-	2 a	Engine oil filter	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).	X	W1008
QL1	Daily	-	Engine operation	Check engine oil level.		W0500
				Carry out visual inspection of engine for general condition and leaks.		W0501
				Check relief bores of coolant pump(s).		W0505
				Check for abnormal running noises, exhaust gas color and vibration.		W0506
				Drain off water and contamination from fuel prefilter.	X	W0507
				Check differential pressure gauge of fuel prefilter.	X	W0508
QL1	1000	6 m	Automatic engine oil filter	Check and clean oil indicator filter.	X	W1864
QL1	1000	1 a	Engine mounts	Carry out visual inspection of engine mounts for general condition.		W1463
				Carry out visual inspection of Trunion mounts for general condition.		W1575
QL1	1000	2 a	Centrifugal oil filter	Check thickness of oil residue layer. Clean. Fit new sleeve, at the latest, each time the engine oil is changed.	X	W1009
QL1	1000	2 a	Fuel prefilter	Fit new fuel prefilter or new fuel prefilter insert.	X	W1675
QL1	1000	2 a	Intermediate fuel filter	Replace intermediate fuel filter or filter element of intermediate fuel filter.		W1481
QL1	1000	2 a	Fuel filter	Fit new fuel filter or new fuel filter insert.		W1001
QL1	1000	2 a	Belt drive	Inspect condition of drive belts and fit new ones if necessary. Adjust tension.		W1241
QL1	1000	18 a	Flywheel	Check carbon brushes on flywheel, replace as necessary.	X	W1697
QL1	3000	2 a	Valve gear	Check valve clearance, adjust if required. ATTENTION! Initial adjustment after 1,000 operating hours and subsequently 1,000 operating hours after each cylinder-head overhaul..		W1207
QL1	3000	2 a	Cylinder heads	Measure valve stem end to cylinder head top distance.		W1689
QL1	3000	18 a	Flywheel	Replace carbon brushes on flywheel.	X	W1698
QL1	5400	3 a	Coolant expansion tank	Replace valve.	X	W1296
QL1	6750	6 a	Crankcase breathers	Fit new oil separators.	X	W1055
QL1	6750	6 a	Crankcase breathers	Fit new filters or filter inserts.	X	W1046
QL1	9000	9 a	Fuel injectors	Replace fuel injectors.		W1006
QL1	9000	9 a	Combustion chambers	Inspect cylinder chambers using endoscope.		W1011
QL1	9000	9 a	Engine governor	Injector: reset drift compensation parameters (CDC).		W1713
QL1	9000	9 a	Engine mounts	Check buffer clearance of mounts, check proper seating of securing screws.		W1026
				Check for cracks. Measure height of rubber element.		W1812
QL3	6750	9 a	Turbochargers	Check turbine housing for cracks (externally by visual inspection and internally by endoscopic examination), replace if necessary..		W1577
QL3	9000	9 a	Battery charging alternator	Overhaul battery-charging generator.		W1043
QL3	9000	9 a	Auxiliary PTO	Replace PTO.		W1735
QL3	13500	6 a	Rubber sleeves	Replace all rubber sleeves.		W1250
QL3	13500	9 a	Component maintenance	Before starting maintenance work, drain the coolant and flush the cooling systems.		W2000
				Inspect rocker arms and valve bridge for wear. Insert an endoscope through the pushrod bore to visually inspect swing followers and camshaft running surfaces.		W2001
				Fit new high-pressure fuel sensor.		W2004
w = weeks m = months a = years						

TIM-ID: 0000066377 - 001

Qualification level	Interval [h]	Limit	Item	Maintenance tasks	Option	Task
				Check engine coolant thermostat and fit new thermal actuator.		W2006
				Check charge-air coolant thermostat and fit new thermal actuator.		W2007
				Inspect centrifugal oil filter for wear.	X	W2009
				Overhaul starter.		W2010
				Fit new seals/sealing materials for all disassembled components.		W2062
				Overhaul charge-air coolant pump.		W2070
				Overhaul engine coolant pump.		W2110
QL3	13500	9 a	Fuel delivery pump	Fit new fuel delivery pump.		W1051
QL3	13500	9 a	HP fuel pump	Fit new high-pressure fuel pump.		W1058
QL3	13500	18 a	Turbochargers	Overhaul turbochargers.		W1038
QL3	27000	9 a	Cylinder heads	Overhaul cylinder heads.		W1134
QL4	13500	6 a	Automatic engine oil filter	Remove filter housing and clean. Fit new filter candles.	X	W1478
QL4	27000	6 a	Hose lines	Replace all hose lines.		W1251
QL4	27000	18 a	Extended component maintenance	Completely disassemble the engine. Inspect engine components as per assembly instructions and repair or fit new components as required.		W3000
				Replace all elastomeric parts and seals with new ones.		W3001
				Fit new piston rings.		W3002
				Fit new conrod bearings.		W3003
				Fit new crankshaft bearings.		W3004
				Fit new cylinder liners.		W3005
				Fit new camshaft bearings and camshaft thrust bearings.		W3018
				Fit new pressure relief valve in high-pressure fuel system.		W3021
				Fit new turbine wheels for turbochargers.		W3101
				Overhaul torsionally resilient steel-spring coupling.	X	W3102
				Replace swing followers and swing-follower shafts.		W3103
				Check vibration damper, fit new one if necessary.		W3108
				Insulated flywheel: Check and repair if required.	X	W3144
				Overhaul fan clutch.		W3165
				Check engine oil pump, replace if necessary.		W3177
				Gear train: Check tooth flanks for wear (visual inspection), replace bearing bushings.		W3182
QL4	27000	18 a	Turbochargers	Fit new compressor wheels for turbochargers.		W1472
QL4	27000	18 a	Engine mounts	Fit new rubber elements of engine mounts.		W1672
				Fit new Trunnion mount element.		W1124
w = weeks m = months a = years						

1.10 Maintenance schedule matrix 24,000 h

0 to 24,000 Operating hours

Task	Limit	Operating hours [h]																									
		Daily	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000	10,000	11,000	12,000	13,000	14,000	15,000	16,000	17,000	18,000	19,000	20,000	21,000	22,000	23,000	24,000	
Engine																											
W0800	-																										
W1008	2 a																										
W0500	-	X																									
W0501	-	X																									
W0505	-	X																									
W0506	-	X																									
W0507	-	X																									
W0508	-	X																									
W1864	6 m	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
W1463	1 a	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
W1575	1 a	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
W1009	2 a	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
W1675	2 a	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
W1481	2 a	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
W1001	2 a	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
W1241	2 a	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
W1697	18 a	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
W1207	2 a	X	X			X			X			X			X			X			X			X			X
W1689	2 a			X			X			X			X			X			X			X			X		X
W1698	18 a			X			X			X			X			X			X			X			X		X
W1296	3 a						X						X					X							X		
W1055	6 a						X						X					X							X		
W1046	6 a						X						X					X							X		
W1006	9 a								X								X								X		
W1011	9 a								X								X								X		
W1713	9 a								X								X								X		
W1026	9 a								X								X								X		
W1812	9 a								X								X								X		
W1577	9 a						X						X				X								X		
W1043	9 a								X								X								X		
W1735	9 a								X								X								X		
W1250	6 a												X												X		
W2000	9 a												X												X		
W2001	9 a												X												X		
W2004	9 a												X												X		
W2006	9 a												X												X		
W2007	9 a												X												X		
W2009	9 a												X												X		
W2010	9 a												X												X		
W2062	9 a												X												X		
W2070	9 a												X												X		
W2110	9 a												X												X		

w = weeks
m = months
a = years

TIM-ID: 000.0066378 - 001

Task	Limit	Operating hours [h]																									
		Daily	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000	10,000	11,000	12,000	13,000	14,000	15,000	16,000	17,000	18,000	19,000	20,000	21,000	22,000	23,000	24,000	
W1051	9 a													X													X
W1058	9 a													X													X
W1038	18 a													X													X
W1134	9 a																										X
W1478	6 a													X													X
W1251	6 a																										X
W3000	18 a																										X
W3001	18 a																										X
W3002	18 a																										X
W3003	18 a																										X
W3004	18 a																										X
W3005	18 a																										X
W3018	18 a																										X
W3021	18 a																										X
W3101	18 a																										X
W3102	18 a																										X
W3103	18 a																										X
W3108	18 a																										X
W3144	18 a																										X
W3165	18 a																										X
W3177	18 a																										X
W3182	18 a																										X
W1472	18 a																										X
W1672	18 a																										X
W1124	18 a																										X

w = weeks
m = months
a = years

1.11 Maintenance tasks 24,000 h

Qualification level	Interval [h]	Limit	Item	Maintenance tasks	Option	Task
Engine						
QL1	-	-	EPA label	Check if emission label is fitted and legible, and if it contains the correct information.		W0800
QL1	-	2 a	Engine oil filter	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).	X	W1008
QL1	Daily	-	Engine operation	Check engine oil level.		W0500
				Carry out visual inspection of engine for general condition and leaks.		W0501
				Check relief bores of coolant pump(s).		W0505
				Check for abnormal running noises, exhaust gas color and vibration.		W0506
				Drain off water and contamination from fuel prefilter.	X	W0507
				Check differential pressure gauge of fuel prefilter.	X	W0508
QL1	1000	6 m	Automatic engine oil filter	Check and clean oil indicator filter.	X	W1864
QL1	1000	1 a	Engine mounts	Carry out visual inspection of engine mounts for general condition.		W1463
				Carry out visual inspection of Trunion mounts for general condition.		W1575
QL1	1000	2 a	Centrifugal oil filter	Check thickness of oil residue layer. Clean. Fit new sleeve, at the latest, each time the engine oil is changed.	X	W1009
QL1	1000	2 a	Fuel prefilter	Fit new fuel prefilter or new fuel prefilter insert.	X	W1675
QL1	1000	2 a	Intermediate fuel filter	Replace intermediate fuel filter or filter element of intermediate fuel filter.		W1481
QL1	1000	2 a	Fuel filter	Fit new fuel filter or new fuel filter insert.		W1001
QL1	1000	2 a	Belt drive	Inspect condition of drive belts and fit new ones if necessary. Adjust tension.		W1241
QL1	1000	18 a	Flywheel	Check carbon brushes on flywheel, replace as necessary.	X	W1697
QL1	3000	2 a	Valve gear	Check valve clearance, adjust if required. ATTENTION! Initial adjustment after 1,000 operating hours and subsequently 1,000 operating hours after each cylinder-head overhaul..		W1207
QL1	3000	2 a	Cylinder heads	Measure valve stem end to cylinder head top distance.		W1689
QL1	3000	18 a	Flywheel	Replace carbon brushes on flywheel.	X	W1698
QL1	6000	3 a	Coolant expansion tank	Replace valve.	X	W1296
QL1	6000	6 a	Crankcase breathers	Fit new oil separators.	X	W1055
QL1	6000	6 a	Crankcase breathers	Fit new filters or filter inserts.	X	W1046
QL1	8000	9 a	Fuel injectors	Replace fuel injectors.		W1006
QL1	8000	9 a	Combustion chambers	Inspect cylinder chambers using endoscope.		W1011
QL1	8000	9 a	Engine governor	Injector: reset drift compensation parameters (CDC).		W1713
QL1	8000	9 a	Engine mounts	Check buffer clearance of mounts, check proper seating of securing screws.		W1026
				Check for cracks. Measure height of rubber element.		W1812
QL3	6000	9 a	Turbochargers	Check turbine housing for cracks (externally by visual inspection and internally by endoscopic examination), replace if necessary..		W1577
QL3	8000	9 a	Battery charging alternator	Overhaul battery-charging generator.		W1043
QL3	8000	9 a	Auxiliary PTO	Replace PTO.		W1735
QL3	12000	6 a	Rubber sleeves	Replace all rubber sleeves.		W1250
QL3	12000	9 a	Component maintenance	Before starting maintenance work, drain the coolant and flush the cooling systems.		W2000
				Inspect rocker arms and valve bridge for wear. Insert an endoscope through the pushrod bore to visually inspect swing followers and camshaft running surfaces.		W2001
				Fit new high-pressure fuel sensor.		W2004
w = weeks m = months a = years						

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Qualification level	Interval [h]	Limit	Item	Maintenance tasks	Option	Task
				Check engine coolant thermostat and fit new thermal actuator.		W2006
				Check charge-air coolant thermostat and fit new thermal actuator.		W2007
				Inspect centrifugal oil filter for wear.	X	W2009
				Overhaul starter.		W2010
				Fit new seals/sealing materials for all disassembled components.		W2062
				Overhaul charge-air coolant pump.		W2070
				Overhaul engine coolant pump.		W2110
QL3	12000	9 a	Fuel delivery pump	Fit new fuel delivery pump.		W1051
QL3	12000	9 a	HP fuel pump	Fit new high-pressure fuel pump.		W1058
QL3	12000	18 a	Turbochargers	Overhaul turbochargers.		W1038
QL3	24000	9 a	Cylinder heads	Overhaul cylinder heads.		W1134
QL4	12000	6 a	Automatic engine oil filter	Remove filter housing and clean. Fit new filter candles.	X	W1478
QL4	24000	6 a	Hose lines	Replace all hose lines.		W1251
QL4	24000	18 a	Extended component maintenance	Completely disassemble the engine. Inspect engine components as per assembly instructions and repair or fit new components as required.		W3000
				Replace all elastomeric parts and seals with new ones.		W3001
				Fit new piston rings.		W3002
				Fit new conrod bearings.		W3003
				Fit new crankshaft bearings.		W3004
				Fit new cylinder liners.		W3005
				Fit new camshaft bearings and camshaft thrust bearings.		W3018
				Fit new pressure relief valve in high-pressure fuel system.		W3021
				Fit new turbine wheels for turbochargers.		W3101
				Overhaul torsionally resilient steel-spring coupling.	X	W3102
				Replace swing followers and swing-follower shafts.		W3103
				Check vibration damper, fit new one if necessary.		W3108
				Insulated flywheel: Check and repair if required.	X	W3144
				Overhaul fan clutch.		W3165
				Check engine oil pump, replace if necessary.		W3177
				Gear train: Check tooth flanks for wear (visual inspection), replace bearing bushings.		W3182
QL4	24000	18 a	Turbochargers	Fit new compressor wheels for turbochargers.		W1472
QL4	24000	18 a	Engine mounts	Fit new rubber elements of engine mounts.		W1672
				Fit new Trunion mount element.		W1124
w = weeks m = months a = years						

1.12 Maintenance schedule matrix 21,000 h

0 to 21,000 Operating hours

Task	Limit	Operating hours [h]																									
		Daily	1,000	2,000	3,000	4,000	5,000	5,250	6,000	7,000	8,000	9,000	10,000	10,500	11,000	12,000	13,000	14,000	15,000	15,750	16,000	17,000	18,000	19,000	20,000	21,000	
Engine																											
W0800	-																										
W1008	2 a																										
W0500	-	X																									
W0501	-	X																									
W0505	-	X																									
W0506	-	X																									
W0507	-	X																									
W0508	-	X																									
W1864	6 m	X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X	X	X	X
W1463	1 a	X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X	X	X	X
W1575	1 a	X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X	X	X	X
W1009	2 a	X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X	X	X	X
W1675	2 a	X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X	X	X	X
W1481	2 a	X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X	X	X	X
W1001	2 a	X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X	X	X	X
W1241	2 a	X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X	X	X	X
W1697	18 a	X	X	X	X	X		X	X	X	X	X		X	X	X	X	X		X	X	X	X	X	X	X	X
W1207	2 a	X		X				X		X				X		X					X		X				X
W1689	2 a			X				X		X				X		X					X		X				X
W1698	18 a			X				X		X				X		X					X		X				X
W1296	3 a						X						X						X								X
W1055	6 a						X						X						X								X
W1046	6 a						X						X						X								X
W1006	9 a							X									X										X
W1011	9 a							X									X										X
W1713	9 a							X									X										X
W1026	9 a							X									X										X
W1812	9 a												X														X
W1577	9 a						X						X						X								X
W1043	9 a							X									X										X
W1250	6 a												X														X
W2000	9 a												X														X
W2001	9 a												X														X
W2004	9 a												X														X
W2006	9 a												X														X
W2007	9 a												X														X
W2009	9 a												X														X
W2010	9 a												X														X
W2062	9 a												X														X
W2070	9 a												X														X
W2110	9 a												X														X
W1735	9 a												X														X

w = weeks
m = months
a = years

TIM-ID: 000.006.980 - 001

Task	Limit	Operating hours [h]																													
		Daily	1,000	2,000	3,000	4,000	5,000	5,250	6,000	7,000	8,000	9,000	10,000	10,500	11,000	12,000	13,000	14,000	15,000	15,750	16,000	17,000	18,000	19,000	20,000	21,000					
W1051	9 a													X													X				
W1058	9 a													X														X			
W1038	18 a													X														X			
W1134	9 a																											X			
W1478	6 a																											X			
W1251	6 a																											X			
W3000	18 a																											X			
W3001	18 a																											X			
W3002	18 a																											X			
W3003	18 a																											X			
W3004	18 a																											X			
W3005	18 a																											X			
W3018	18 a																											X			
W3021	18 a																											X			
W3101	18 a																											X			
W3102	18 a																											X			
W3103	18 a																											X			
W3108	18 a																											X			
W3144	18 a																											X			
W3165	18 a																											X			
W3177	18 a																											X			
W3182	18 a																											X			
W1472	18 a																											X			
W1672	18 a																											X			
W1124	18 a																											X			

w = weeks
m = months
a = years

1.13 Maintenance tasks 21,000 h

Qualification level	Interval [h]	Limit	Item	Maintenance tasks	Option	Task
Engine						
QL1	-	-	EPA label	Check if emission label is fitted and legible, and if it contains the correct information.		W0800
QL1	-	2 a	Engine oil filter	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).	X	W1008
QL1	Daily	-	Engine operation	Check engine oil level.		W0500
				Carry out visual inspection of engine for general condition and leaks.		W0501
				Check relief bores of coolant pump(s).		W0505
				Check for abnormal running noises, exhaust gas color and vibration.		W0506
				Drain off water and contamination from fuel prefilter.	X	W0507
				Check differential pressure gauge of fuel prefilter.	X	W0508
QL1	1000	6 m	Automatic engine oil filter	Check and clean oil indicator filter.	X	W1864
QL1	1000	1 a	Engine mounts	Carry out visual inspection of engine mounts for general condition.		W1463
				Carry out visual inspection of Trunion mounts for general condition.		W1575
QL1	1000	2 a	Centrifugal oil filter	Check thickness of oil residue layer. Clean. Fit new sleeve, at the latest, each time the engine oil is changed.	X	W1009
QL1	1000	2 a	Fuel prefilter	Fit new fuel prefilter or new fuel prefilter insert.	X	W1675
QL1	1000	2 a	Intermediate fuel filter	Replace intermediate fuel filter or filter element of intermediate fuel filter.		W1481
QL1	1000	2 a	Fuel filter	Fit new fuel filter or new fuel filter insert.		W1001
QL1	1000	2 a	Belt drive	Inspect condition of drive belts and fit new ones if necessary. Adjust tension.		W1241
QL1	1000	18 a	Flywheel	Check carbon brushes on flywheel, replace as necessary.	X	W1697
QL1	3000	2 a	Valve gear	Check valve clearance, adjust if required. ATTENTION! Initial adjustment after 1,000 operating hours and subsequently 1,000 operating hours after each cylinder-head overhaul..		W1207
QL1	3000	2 a	Cylinder heads	Measure valve stem end to cylinder head top distance.		W1689
QL1	3000	18 a	Flywheel	Replace carbon brushes on flywheel.	X	W1698
QL1	5250	3 a	Coolant expansion tank	Replace valve.	X	W1296
QL1	5250	6 a	Crankcase breathers	Fit new oil separators.	X	W1055
QL1	5250	6 a	Crankcase breathers	Fit new filters or filter inserts.	X	W1046
QL1	7000	9 a	Fuel injectors	Replace fuel injectors.		W1006
QL1	7000	9 a	Combustion chambers	Inspect cylinder chambers using endoscope.		W1011
QL1	7000	9 a	Engine governor	Injector: reset drift compensation parameters (CDC).		W1713
QL1	7000	9 a	Engine mounts	Check buffer clearance of mounts, check proper seating of securing screws.		W1026
QL1	10500	9 a	Engine mounts	Check for cracks. Measure height of rubber element.		W1812
QL3	5250	9 a	Turbochargers	Check turbine housing for cracks (externally by visual inspection and internally by endoscopic examination), replace if necessary..		W1577
QL3	7000	9 a	Battery charging alternator	Overhaul battery-charging generator.		W1043
QL3	10500	6 a	Rubber sleeves	Replace all rubber sleeves.		W1250
QL3	10500	9 a	Component maintenance	Before starting maintenance work, drain the coolant and flush the cooling systems.		W2000
				Inspect rocker arms and valve bridge for wear. Insert an endoscope through the pushrod bore to visually inspect swing followers and camshaft running surfaces.		W2001
				Fit new high-pressure fuel sensor.		W2004
				Check engine coolant thermostat and fit new thermal actuator.		W2006

w = weeks
m = months
a = years

Qualification level	Interval [h]	Limit	Item	Maintenance tasks	Option	Task
				Check charge-air coolant thermostat and fit new thermal actuator.		W2007
				Inspect centrifugal oil filter for wear.	X	W2009
				Overhaul starter.		W2010
				Fit new seals/sealing materials for all disassembled components.		W2062
				Overhaul charge-air coolant pump.		W2070
				Overhaul engine coolant pump.		W2110
QL3	10500	9 a	Auxiliary PTO	Replace PTO.		W1735
QL3	10500	9 a	Fuel delivery pump	Fit new fuel delivery pump.		W1051
QL3	10500	9 a	HP fuel pump	Fit new high-pressure fuel pump.		W1058
QL3	10500	18 a	Turbochargers	Overhaul turbochargers.		W1038
QL3	21000	9 a	Cylinder heads	Overhaul cylinder heads.		W1134
QL4	21000	6 a	Automatic engine oil filter	Remove filter housing and clean. Fit new filter candles.	X	W1478
QL4	21000	6 a	Hose lines	Replace all hose lines.		W1251
QL4	21000	18 a	Extended component maintenance	Completely disassemble the engine. Inspect engine components as per assembly instructions and repair or fit new components as required.		W3000
				Replace all elastomeric parts and seals with new ones.		W3001
				Fit new piston rings.		W3002
				Fit new conrod bearings.		W3003
				Fit new crankshaft bearings.		W3004
				Fit new cylinder liners.		W3005
				Fit new camshaft bearings and camshaft thrust bearings.		W3018
				Fit new pressure relief valve in high-pressure fuel system.		W3021
				Fit new turbine wheels for turbochargers.		W3101
				Overhaul torsionally resilient steel-spring coupling.	X	W3102
				Replace swing followers and swing-follower shafts.		W3103
				Check vibration damper, fit new one if necessary.		W3108
				Insulated flywheel: Check and repair if required.	X	W3144
				Overhaul fan clutch.		W3165
				Check engine oil pump, replace if necessary.		W3177
				Gear train: Check tooth flanks for wear (visual inspection), replace bearing bushings.		W3182
QL4	21000	18 a	Turbochargers	Fit new compressor wheels for turbochargers.		W1472
QL4	21000	18 a	Engine mounts	Fit new rubber elements of engine mounts.		W1672
				Fit new Trunion mount element.		W1124
w = weeks m = months a = years						

1.14 Maintenance schedule matrix 18,000 h

0 to 18,000 Operating hours

Task	Limit	Operating hours [h]																				
		Daily	1,000	2,000	3,000	4,000	4,500	5,000	6,000	7,000	8,000	9,000	10,000	11,000	12,000	13,000	13,500	14,000	15,000	16,000	17,000	18,000
Engine																						
W0800	-																					
W1008	2 a																					
W0500	-	X																				
W0501	-	X																				
W0505	-	X																				
W0506	-	X																				
W0507	-	X																				
W0508	-	X																				
W1864	6 m	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
W1463	1 a	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
W1575	1 a	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
W1009	2 a	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
W1675	2 a	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
W1481	2 a	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
W1001	2 a	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
W1241	2 a	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
W1697	18 a	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
W1207	2 a	X		X			X		X		X		X		X		X		X		X	
W1689	2 a			X			X		X		X		X		X		X		X		X	
W1698	18 a			X			X		X		X		X		X		X		X		X	
W1046	6 a					X				X					X					X		
W1296	3 a						X							X						X		
W1055	6 a						X							X						X		
W1006	9 a						X							X						X		
W1011	9 a						X							X						X		
W1713	9 a						X							X						X		
W1026	9 a						X							X						X		
W1812	9 a									X										X		
W1577	9 a						X							X						X		
W1043	9 a						X							X						X		
W1250	6 a									X										X		
W2000	9 a									X										X		
W2001	9 a									X										X		
W2004	9 a									X										X		
W2006	9 a									X										X		
W2007	9 a									X										X		
W2009	9 a									X										X		
W2010	9 a									X										X		
W2062	9 a									X										X		
W2070	9 a									X										X		
W2110	9 a									X										X		
W1735	9 a									X										X		

w = weeks
m = months
a = years

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Task	Limit	Operating hours [h]																																												
		Daily	1,000	2,000	3,000	4,000	4,500	5,000	6,000	7,000	8,000	9,000	10,000	11,000	12,000	13,000	13,500	14,000	15,000	16,000	17,000	18,000																								
W1051	9 a										X											X																								
W1058	9 a										X												X																							
W1038	18 a										X												X																							
W1134	9 a																						X																							
W1478	6 a																						X																							
W1251	6 a																						X																							
W3000	18 a																						X																							
W3001	18 a																						X																							
W3002	18 a																						X																							
W3003	18 a																						X																							
W3004	18 a																						X																							
W3005	18 a																						X																							
W3018	18 a																						X																							
W3021	18 a																						X																							
W3101	18 a																						X																							
W3102	18 a																						X																							
W3103	18 a																						X																							
W3108	18 a																						X																							
W3144	18 a																						X																							
W3165	18 a																						X																							
W3177	18 a																						X																							
W3182	18 a																						X																							
W1472	18 a																						X																							
W1672	18 a																						X																							
W1124	18 a																						X																							

w = weeks
m = months
a = years

1.15 Maintenance tasks 18,000 h

Qualification level	Interval [h]	Limit	Item	Maintenance tasks	Option	Task
Engine						
QL1	-	-	EPA label	Check if emission label is fitted and legible, and if it contains the correct information.		W0800
QL1	-	2 a	Engine oil filter	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).	X	W1008
QL1	Daily	-	Engine operation	Check engine oil level.		W0500
				Carry out visual inspection of engine for general condition and leaks.		W0501
				Check relief bores of coolant pump(s).		W0505
				Check for abnormal running noises, exhaust gas color and vibration.		W0506
				Drain off water and contamination from fuel prefilter.	X	W0507
				Check differential pressure gauge of fuel prefilter.	X	W0508
QL1	1000	6 m	Automatic engine oil filter	Check and clean oil indicator filter.	X	W1864
QL1	1000	1 a	Engine mounts	Carry out visual inspection of engine mounts for general condition.		W1463
				Carry out visual inspection of Trunion mounts for general condition.		W1575
QL1	1000	2 a	Centrifugal oil filter	Check thickness of oil residue layer. Clean. Fit new sleeve, at the latest, each time the engine oil is changed.	X	W1009
QL1	1000	2 a	Fuel prefilter	Fit new fuel prefilter or new fuel prefilter insert.	X	W1675
QL1	1000	2 a	Intermediate fuel filter	Replace intermediate fuel filter or filter element of intermediate fuel filter.		W1481
QL1	1000	2 a	Fuel filter	Fit new fuel filter or new fuel filter insert.		W1001
QL1	1000	2 a	Belt drive	Inspect condition of drive belts and fit new ones if necessary. Adjust tension.		W1241
QL1	1000	18 a	Flywheel	Check carbon brushes on flywheel, replace as necessary.	X	W1697
QL1	3000	2 a	Valve gear	Check valve clearance, adjust if required. ATTENTION! Initial adjustment after 1,000 operating hours and subsequently 1,000 operating hours after each cylinder-head overhaul..		W1207
QL1	3000	2 a	Cylinder heads	Measure valve stem end to cylinder head top distance.		W1689
QL1	3000	18 a	Flywheel	Replace carbon brushes on flywheel.	X	W1698
QL1	4500	6 a	Crankcase breathers	Fit new filters or filter inserts.	X	W1046
QL1	6000	3 a	Coolant expansion tank	Replace valve.	X	W1296
QL1	6000	6 a	Crankcase breathers	Fit new oil separators.	X	W1055
QL1	6000	9 a	Fuel injectors	Replace fuel injectors.		W1006
QL1	6000	9 a	Combustion chambers	Inspect cylinder chambers using endoscope.		W1011
QL1	6000	9 a	Engine governor	Injector: reset drift compensation parameters (CDC).		W1713
QL1	6000	9 a	Engine mounts	Check buffer clearance of mounts, check proper seating of securing screws.		W1026
QL1	9000	9 a	Engine mounts	Check for cracks. Measure height of rubber element.		W1812
QL3	6000	9 a	Turbochargers	Check turbine housing for cracks (externally by visual inspection and internally by endoscopic examination), replace if necessary..		W1577
QL3	6000	9 a	Battery charging alternator	Overhaul battery-charging generator.		W1043
QL3	9000	6 a	Rubber sleeves	Replace all rubber sleeves.		W1250
QL3	9000	9 a	Component maintenance	Before starting maintenance work, drain the coolant and flush the cooling systems.		W2000
				Inspect rocker arms and valve bridge for wear. Insert an endoscope through the pushrod bore to visually inspect swing followers and camshaft running surfaces.		W2001
				Fit new high-pressure fuel sensor.		W2004
				Check engine coolant thermostat and fit new thermal actuator.		W2006

w = weeks
m = months
a = years

Qualification level	Interval [h]	Limit	Item	Maintenance tasks	Option	Task
				Check charge-air coolant thermostat and fit new thermal actuator.		W2007
				Inspect centrifugal oil filter for wear.	X	W2009
				Overhaul starter.		W2010
				Fit new seals/sealing materials for all disassembled components.		W2062
				Overhaul charge-air coolant pump.		W2070
				Overhaul engine coolant pump.		W2110
QL3	9000	9 a	Auxiliary PTO	Replace PTO.		W1735
QL3	9000	9 a	Fuel delivery pump	Fit new fuel delivery pump.		W1051
QL3	9000	9 a	HP fuel pump	Fit new high-pressure fuel pump.		W1058
QL3	9000	18 a	Turbochargers	Overhaul turbochargers.		W1038
QL3	18000	9 a	Cylinder heads	Overhaul cylinder heads.		W1134
QL4	18000	6 a	Automatic engine oil filter	Remove filter housing and clean. Fit new filter candles.	X	W1478
QL4	18000	6 a	Hose lines	Replace all hose lines.		W1251
QL4	18000	18 a	Extended component maintenance	Completely disassemble the engine. Inspect engine components as per assembly instructions and repair or fit new components as required.		W3000
				Replace all elastomeric parts and seals with new ones.		W3001
				Fit new piston rings.		W3002
				Fit new conrod bearings.		W3003
				Fit new crankshaft bearings.		W3004
				Fit new cylinder liners.		W3005
				Fit new camshaft bearings and camshaft thrust bearings.		W3018
				Fit new pressure relief valve in high-pressure fuel system.		W3021
				Fit new turbine wheels for turbochargers.		W3101
				Overhaul torsionally resilient steel-spring coupling.	X	W3102
				Replace swing followers and swing-follower shafts.		W3103
				Check vibration damper, fit new one if necessary.		W3108
				Insulated flywheel: Check and repair if required.	X	W3144
				Overhaul fan clutch.		W3165
				Check engine oil pump, replace if necessary.		W3177
				Gear train: Check tooth flanks for wear (visual inspection), replace bearing bushings.		W3182
QL4	18000	18 a	Turbochargers	Fit new compressor wheels for turbochargers.		W1472
QL4	18000	18 a	Engine mounts	Fit new rubber elements of engine mounts.		W1672
				Fit new Trunion mount element.		W1124
w = weeks m = months a = years						