

38 SPECIFICATIONS¹ AND MAINTENANCE STANDARDS

38.1 Engine Main Parts

Unit: mm (in.)

Description	Specification or Standard	Repair Limit	Service Limit
Cylinder compression pressure	2.7 MPa (28 kgf/cm ²) [398 psi] (at 280 RPM)	2.5 MPa (25 kgf/cm ²) [356 psi]	2.2 MPa (22 kgf/cm ²) [313 psi]
Difference between cylinders (maximum)	0.25 MPa (2.5 kgf/cm ²) [35.6 psi]		
Fuel injection order	L2: 1-2, L3: 1-3-2		
Cylinder head			
Bottom surface distortion (Flatness)	Within 0.05 [0.0020]	0.1 [0.0039]	
Valve guide Inside diameter (IN and EX)	6.6 [0.2598]		
Valve seat angle (IN and EX)	45°		
Valve seat width (IN and EX)	1.3 to 1.8 [0.0512 to 0.0709]	2.5 [0.0984]	
Valve seat sinkage			-1 [-0.0394]
Valve clearance (IN and EX)	0.25 [0.0098] (Cold)		
Valve			
Valve head diameter (IN)	26.7 [1.0512]		
(EX)	24.7 [0.9724]		
Overall length	94 [3.7008]		
Stem Outside diameter	6.6 [0.2598]		
Stem to Guide clearance (IN)			0.10 [0.0039]
(EX)			0.15 [0.0059]
Valve face angle	45°		
Valve head thickness (Margin width)	1.0 [0.0394]		0.5 [0.0197]
Valve head sinkage (from cylinder head bottom face)	0.5 [0.0197]		
Valve spring			
Free length, p/n MM432-668 (white color on the 2 upper side coils)	40.5 [1.5945]	39.3 [1.5472]	
Free length, p/n 30L04-04500 (yellow color on the 2 upper side coils)	40.0 [1.5748]		
Set force/Set length, p/n MM432-668 (white color on the 2 upper side coils)	58 N (5.94 kgf) [13.1 lbf]/35.5 mm [1.3976 in.] 146 N (14.84 kgf) [32.7 lbf]/28 mm [1.1024 in.]		-15%
Set force/Set length, p/n 30L04-04500 (yellow color on the 2 upper side coils)	68 N (6.89 kgf) [15.2 lbf]/35.5 mm [1.3976 in.] 180 N (18.36 kgf) [40.5 lbf]/28 mm [1.1024 in.]		-15%
Perpendicularity	2°		3°
Rocker arm			
Rocker arm Inside diameter	12 [0.4724]		
Rocker arm to Shaft clearance			-0.2 [-0.0079]
Crankcase			
Camshaft hole diameter			
Front	42 [1.6535] Ball bearing hole		
No. 2	34 [1.3386]		
No.3	33 (L3) [1.2992]		
Rear	33 [1.2992]		

1. All specifications are subject to change without any prior notice.

Unit: mm (in.)

Description	Specification or Standard	Repair Limit	Service Limit
Cylinder bore			
L2A, L3A	65 [2.5591]	+0.2 [0.0079]	+0.70 [0.0276]
L2C, L3C	70 [2.7559]	+0.2 [0.0079]	+0.70 [0.0276]
L2E, L3E	76 [2.9921]	+0.2 [0.0079]	+0.70 [0.0276]
Oversize finish tolerance	0 to 0.03 [0 to 0.0012] for each oversize		
Cylindricity	0.01 [0.0004] or less		
Gasket fitting surface distortion	0.05 [0.0020] or less	0.1 [0.0039]	
Piston			
Type	Solid type		
Material	Aluminum alloy		
Outside diameter (Skirt end)			
L2A, L3A	65 [2.5591]		
L2C, L3C	70 [2.7559]		
L2E, L3E	76 [2.9921]		
Clearance to cylinder			0.2 [0.0079]
Oversize	0.25 [0.0098], 0.50 [0.0197]		
Protrusion from crankcase top surface	0.9 [0.0354]		
Piston pin			
Type	Semi-floating type		
Outside diameter	Outside diameter		
Piston pin to piston clearance			0.08 [0.0031]
Piston pin to connecting rod clearance	Press-fit load: 1000±500 kg [2204.6±1102.3 lb]		(Within standard range)
Piston ring			
Number of rings			
Compression	2{ No.1: Chrome plated, semi-keystone type No.2: Tapered		
Oil	1 (Chrome plated ring with coil expander)		
Ring width			
Compression (No.2)	2 [0.0787]		
Oil	3 [0.1181]		
Ring side clearance			
Compression No.1	—		
Compression No.2	0.05 to 0.09 [0.0020 to 0.0035]		0.2 [0.0079]
Oil ring	0.03 to 0.07 [0.0012 to 0.0028]		0.2 [0.0079]
Ring gap			
Compression No.1, No.2	0.15 to 0.30 [0.0059 to 0.0118]		1.5 [0.0591]
Oil ring	0.15 to 0.35 [0.0059 to 0.0138]		
Connecting rod			
Type	Forged I-beam		
Deflection and twist	Within 0.05 [0.0020]		0.15 [0.00591] max.
Big end thrust clearance	0.1 to 0.35 [0.0039 to 0.0138]		0.5 [0.0197]

Unit: mm (in.)

Description	Specification and Standard	Repair Limit	Service Limit
Connecting rod bearing Type Oil clearance Under size	Aluminum metal with back metal 0.25 [0.0098], 0.50 [0.0197]		0.15 [0.0059]
Crankshaft Type Deflection End play Journal outside diameter Pin outside diameter Undersize finishing Journal U.S. 0.25 [0.0098] 0.50 [0.0197] Pin U.S. 0.25 [0.0098] 0.50 [0.0197]	Fully counterbalanced Within 0.03 [0.0012] 0.05 to 0.175 [0.0020 to 0.0069] 43 [1.6929] 40 [1.5748] 42.715 to 42.730 [1.6817 to 1.6823] 42.465 to 42.480 [1.6718 to 1.6724] 39.715 to 39.730 [1.5636 to 1.5642] 39.465 to 39.480 [1.5537 to 1.5543]	-0.15 [-0.0059] -0.15 [-0.0059]	0.05 [0.0020] 0.08 [0.0031] -0.70 [-0.0276] -0.70 [-0.0276]
Main bearing Type Oil clearance Undersize	Aluminum metal with back metal (No.2: Flanged metal) 0.25 [0.0098], 0.50 [0.0197]		0.10 [0.0039]
Camshaft Driving method Front journal Journal to cylinder block hole clearance Major diameter of cam (IN and EX) Oil clearance	Gear drive Ball bearing 27.37 [1.0776]		0.15 [0.0059] -1.0 [-0.0394] 0.15 [0.0059]
Piston pin Type Outside diameter Piston pin to piston clearance Piston pin to connecting rod clearance	Semi-floating type Outside diameter Press-fit load: 1000±500 kg [2204.6±1102.3 lb]		0.08 [0.0031] (Within standard range)
Injection pump camshaft Driving method Bearing Major diameter of cam	Gear drive Ball bearing (Front and rear) 30 [1.1811]		-0.7 [-0.0276]
Tappet Outside diameter Clearance between tappet and crankcase	19 [0.7480]		0.15 [0.0059]
Pushrod Deflection	Within 0.3 [0.0118]		

38.2 Lubrication System

Unit: mm (in.)

Description	Specification and Standard	Repair Limit	Service Limit
Oil specification API service classification Viscosity above 20°C [68°F] 5 to 20°C [41 to 68°F] below 5°C [41°F]	Class CD or higher SAE30 or 10W – 30 SAE20 or 10W – 30 SAE10W – 30		
Oil capacity L2 (standard): Upper limit/Lower limit L3 (standard): Upper limit/Lower limit L3 (large): Upper limit/Lower limit : Upper limit/Lower limit	2.4/1.4 l [0.6341/0.3699 U.S.gal] (excl. 0.5 l [0.1321 U.S.gal] in oil filter) 3.0/1.5 l [0.7926/0.3963 U.S.gal] (excl. 0.5 l [0.1321 U.S.gal] in oil filter) 0.05 to 0.175 [0.0020 to 0.0069] (excl. 0.5 l [0.1321 U.S.gal] in oil filter) 4.8/3.0 l [1.2682/0.7926 U.S.gal] (excl. 0.5 l [0.1321 U.S.gal] in oil filter)		
Oil pump Type Check valve opening pressure Outer rotor to Housing clearance Outer rotor thrust clearance	Gear type 0.3±0.03 MPa (3.0±0.3 kgf/cm ²) [42.68±4.27 psi] (1000 RPM) 0.100 to 0.196 [0.0039 to 0.0077] 0.04 to 0.10 [0.0016 to 0.0039]	0.3 [0.0118] 0.25 [0.0098]	
Oil pressure switch Contact closing pressure (Standard type)	0.05±0.01 MPa (0.5±0.1 kgf/cm ²) [7.11±1.42 psi]		

38.3 Fuel System

Unit: mm (in.)

Description	Specification and Standard	Repair Limit	Service Limit
Fuel specification	Diesel-fuel JIS No.2 (JIS No.3 in cold weather)		
Fuel filter Type	Paper-element type		
Fuel feed pump Type Delivery	Electromagnetic diaphragm type 0.37 l [0.0977 U.S.gal]/min (12V, at 20°C [68°F])		
Fuel feed pump Type Delivery: Common type Compact type	Electromagnetic diaphragm type Electromagnetic diaphragm type 0.37 l [0.0977 U.S.gal]/min (12V, at 20°C [68°F]) 0.37 l [0.0977 U.S.gal]/min (12V, at 20°C [68°F])		
Fuel feed pump Type Delivery	Mechanical drive type 0.225 l [0.0594 U.S.gal]/min		
Fuel injection pump Type	For exclusive L2 or L3 use Model ND-PFR2NC or ND-PFR3NC		
Nozzle Type Injection start pressure	Throttle type 13.7 ^{+1.0} ₋₀ MPa (140 ⁺¹⁰ ₋₀ kgf/cm ²) [1992 psi]	Within Standard range	

38.4 Governor System

Unit: mm (in.)

Description	Specification and Standard	Repair Limit	Service Limit
Governor Type	Centrifugal weight type		

38.5 Cooling System

Unit: mm (in.)

Description	Specification and Standard	Repair Limit	Service Limit
Cooling fan Type L2: Standard L3: Standard	uneven pitch, pusher or suction 4-blade or 5-blade, (ø 290 [11.4173]) 5-blade or 6-blade, (ø 320 [12.5984])		
Fan belt Type Length (Standard)	HM type 890 [35.0393]		
Water pump Type	Centrifugal impeller type		
Thermostat (76.5°C specification) Type Valve cranking temperature Full-opening temperature at 6 mm [0.2362 in.] valve lift	Wax type 76.5 ± 1.5°C [169.7±2.7°F] 90°C [194°F]		
Thermostat (71°C specification) Type Valve cranking temperature Full-opening temperature at 6 mm [0.2362 in.] valve lift	Wax type 71°C [159.8°F] 85°C [185°F]		
Thermo switch Type Model (Part No.) Contact closing temperature	Bimetal type FW065102G220 (MM432104) 111±3.5°C [231.8±6.3°F]		
Temperature gage unit Type Model (Part No.) Standard (°C [°F]/Ω)	Thermistor type A20 – WEu (MD001380) 70 [158]/104±13.5, 115 [239]/23.8±2.5		
Temperature gage unit Type Model (Part No.) Standard (°C [°F]/Ω)	Thermistor type YM-016-02-Wo = Tu (MM435133) (35 [95.0]/670), (50[122.0]/350), 80 [176.0]/118±6, (100 [212.0]/63.5), (105 [221.0]/54.5), 115 [239.0]/42±2.5, (120 [248.0]/36.2, (140 [284.0]/22)		
Thermometer unit Type Model (Part No.) Standard (°C [°F]/Ω)	Thermistor type 51400-K002-0 (0452510100) 50 [122.0]/80±10, 60 [140.0]/56.3±5, 80 [176.0]/29.5±2.5, 100 [212.0]/16.5±2.5, 106 [222.8]/14.3±0.5		

38.6 Electrical System

Unit: mm (in.)

Description	Specification and Standard	Repair Limit	Service Limit
Starter for L2 Type Model Voltage–output Direction of rotation No-load characteristics Terminal voltage Current Speed Load characteristics Terminal voltage Current (torque) Speed Pinion gap Thrust gap	Solenoid shift type M000T60481 (30L66-10600) 12V–1.2 kW Clockwise as viewed from pinion side 11V 90A or less 2500 RPM or more 7.5V 300A (10.5 N·m (1.07 kgf·m) [7.7 lbf·ft] or more) 850 RPM or more 0.5 to 2.0 [0.0197 to 0.0787] 0.5 [0.0197] or less		 11.5 [0.4528] 0.7 [0.0276]
Starter for L3 Type Model Voltage–output Direction of rotation No-load characteristics Terminal voltage Current Speed Load characteristics Terminal voltage Current (torque) Speed Pinion gap Thrust gap	Solenoid shift type M001T68381 (30L66-10500) 12V–1.7 kW Clockwise as viewed from pinion side 11V 110A or less 2400 RPM or more 7.7V 400A (16.0 N·m (1.63 kgf·m) [11.8 lbf·ft] or more) 740 RPM or more 0.5 to 2.0 [0.0197 to 0.0787] 0.5 [0.0197] or less		 11.5 [0.4528] 0.7 [0.0276]
Alternator Type Model Voltage–output Direction of rotation Output characteristic (Hot) Terminal voltage Current/Speed Regulated voltage	AC type with built-in IC regulator A007TA01718 (30A68-00801) 12V–40 A Clockwise as viewed from pulley side 13.5V 21A/ 2500 RPM 37A/5000 RPM 14.7±0.3V		
Glow plug (Quick-heat type) Type Model: Y-145T Voltage–current Resistance	Sheath type (With hex nut) 10.5V–9.7A 0.2 Ω		
Glow plug indicator (Quick-heat type) for L2 Type Model Rated current Voltage across terminals (at 19A)	Red-hot type DH-139V-19 19A 1.5V±0.2V		

Unit: mm (in.)

Description	Specification and Standard	Repair Limit	Service Limit
Glow plug indicator (Quick-heat type) for L3 Type Model Rated current Voltage across terminals (at 29A)	Red-hot type DH-139V-29 29A 1.7V±0.2V		
Fuel cutoff solenoid Type Coil resistance Working voltage Stroke Temperature range	Electromagnetic ETS push type 1.6 Ω±10% (at 20°C [68°F]) 10 to 15V DC 10±0.5 [0.3937±0.0197] -30 to 120°C [-22 to 248°F]		
Fuel cutoff solenoid Type Rated voltage Rated temperature Coil resistance Rated pull current Rated hold current	Electromagnetic ETR pull type 12V DC 20°C [68°F] Pull 0.25 Ω±10% Hold 13.5 Ω±10% 55A 1A		
Control timer Input voltage Load Working temperature	9V to 15V DC Solenoid (Coil resistance 1.7 Ω or more) -30 to 80°C [-22 to 176°F]		
Glow timer Model Rated voltage Working temperature Initial characteristic (Normal temperature, normal humidity, Vcc = 12V) Environmental characteristic (-30°C to 70°C [-22°F to 158°F], Vcc = 7 to 15V)	S81NJ 12V DC -40 to 85°C [-40 to 185°F] 6 ^{+1.4} ₋₀ sec. 6 ^{+2.0} _{-0.6} sec.		
Glow relay Model Rated voltage Continuous rating Coil resistance Inductance Working temperature	G71S P 12 V DC 1 minute 13 Ω 24 mH (at 1 KHz) -40 to 100°C [-40 to 212°F] (70 to 100°C [158 to 212°F] for 20 sec. or less continued use)		

39 TIGHTENING TORQUE CHART AND SEALANT CHART

39.1 Tightening Torque for Main Bolts

Parts to be tightened	Size (Width across flat of hex. head)	Tightening torque N·m (kgf·n) [lbf·ft]
Cylinder head bolt, main	M10 (14)	73.5 to 83.4 (7.5 to 8.5) [54.25 to 61.48]
Cylinder head bolt, sub	M8 (12)	19.6 to 29.4 (2.0 to 3.0) [14.47 to 21.70]
Connecting rod cap nut	M8 (14)	31.4 to 34.3 (3.2 to 3.5) [23.15 to 25.32]
Flywheel bolt	M10 (17)	83.4 to 93.2 (8.5 to 9.5) [61.48 to 68.71]
Crankshaft pulley nut	M16 (24)	98.1 to 117.7 (10.0 to 12.0) [72.33 to 86.80]
Main bearing cap bolt	M10 (17)	49.0 to 53.9 (5.0 to 5.5) [36.17 to 39.78]
Rocker stay bolt	M8 (12)	14.7 to 21.6 (1.5 to 2.2) [10.85 to 15.91]
Rocker cover nut	M6 (10)	4.9 to 6.9 (0.5 to 0.7) [3.62 to 5.06]
Nozzle holder (fitting to engine)	M20 (21)	49.0 to 58.8 (5.0 to 6.0) [36.17 to 43.40]
Nozzle union collar fixing nut	M12 (17)	19.6 to 29.4 (2.0 to 3.0) [14.47 to 21.70]
Nozzle retaining nut	M16 (21)	34.3 to 39.2 (3.5 to 4.0) [25.32 to 28.93]
Fuel injection pipe nut	M12 (17)	24.5 to 29.4 (2.5 to 3.0) [18.08 to 21.70]
Delivery valve holder	M16 (17)	34.3 to 38.2 (3.5 to 3.9) [25.32 to 28.21]
Injection pump hollow screw	M10 (14)	9.8 to 14.7 (1.0 to 1.5) [7.23 to 10.85]
Injection pump air vent screw	M6 (10)	4.9 to 6.9 (0.5 to 0.7) [3.62 to 5.06]
Solenoid locknut	M30 (36)	39.2 to 49.0 (4.0 to 5.0) [28.93 to 36.17]
Water temperature gage joint	M16 (23)	19.6 to 29.4 (2.0 to 3.0) [14.47 to 21.70]
Thermoswitch	M16 (19)	18.6 to 26.4 (1.9 to 2.7) [13.74 to 19.53]
Thermo gage unit	M16 (17)	18.6 to 26.4 (1.9 to 2.7) [13.74 to 19.53]
Oil filter	M20	10.8 to 12.7 (1.1 to 1.3) [7.96 to 9.40]
Oil relief plug	M18 (22)	39.2 to 49.0 (4.0 to 5.0) [28.93 to 36.17]
Oil drain plug	M18 (19)	49.0 to 58.8 (5.0 to 6.0) [36.17 to 43.40]
Glow plug	M10 (12)	14.7 to 19.6 (1.5 to 2.0) [10.85 to 14.47]
Glow plug lead wire fitting nut	M4 (7)	0.98 to 1.47 (0.1 to 0.15) [0.723 to 1.085]

39.2 Tightening Torque for Common Bolts and Nuts

Unit: kgf·m (lbf·ft) [N·m]

Thread diameter	Identification on head
	7T
M6	7.85 to 9.80 (0.8 to 1.0) [5.79 to 7.23]
M8	14.7 to 21.6 (1.5 to 2.2) [10.85 to 15.91]
M10	29.4 to 41.2 (3.0 to 4.2) [21.70 to 30.38]

39.3 Tightening Torque for Common Plugs

Unit: N·m(kgf·m)[lbf·ft]

Size	For aluminium materials	For ferrous materials
NPTF 1/16	—	7.85 to 11.8 (0.8 to 1.2) [5.79 to 8.68]
PT1/8	7.85 to 11.8 (0.8 to 1.2) [5.79 to 8.68]	14.7 to 21.6 (1.5 to 2.2) [10.85 to 15.91]
PT1/4, NPTF1/4	19.6 to 29.4 (2.0 to 3.0) [14.47 to 21.70]	34.3 to 44.1 (3.5 to 4.5) [25.32 to 32.55]

39.4 Sealant Chart

Parts requiring sealant application		Surface	Sealant	Where sealant-coated parts to be mounted
Threaded parts	Fuel cutoff solenoid	Effective screw threads	THREE-BOND 1212 or 1211	Crankcase
	Water drain joint		HERMESEAL H1 or THREE-BOND 1344	Crankcase
	Oil pressure switch			Crankcase
	Tapper plug (NPTF 1/16)			Crankcase
Press-fit part	Sealing cap	Periphery of press-fit part	HERMESEAL 52B	Cylinder head and crankcase
	Expansion plug			Crankcase
	Oil level gage guide			Crankcase
Others	Side seal	Periphery	THREE-BOND 1212 or 1211	Crankcase
	Bearing cap	Contact surface with block	THREE-BOND 1212	