55 SPECIFICATIONS[1]

55.1 Basic engine components

Unit: mm (in.)

Item		Standard		Limit	Correction-Remarks
Compression pressure		30 kgf/cm² (427 psi) [2 942 kPa]		27 kgf/cm² (384 psi) [2 648 kPa]	Repair or replace.
Maximum permissible difference between average compression pressure of all cylinders in one engine		3 kgf/cm² (42.7 psi) [294 kPa]		—	Repair or replace.
Fuel injection timing (BTDC)[a]		17°			
Clearance between rocker arm and shaft (oil clearance)		0.012 to 0.050 (0.000 47 to 0.001 97)		0.200 (0.007 87)	Replace rocker arm.
Valve clearance		0.25 (0.009 8)			Adjust.
Clearance between valve stem and valve guide	Inlet valve	0.02 to 0.05 (0.000 8 to 0.002 0)		0.10 (0.003 9)	Replace valve and valve guide.
	Exhaust valve	0.05 to 0.085 (0.002 0 to 0.003 35)		0.15 (0.005 9)	
Valve margin (valve lip thickness)		1.0 (0.039)		0.5 (0.020)	Replace valve.
Valve sinkage		0.5 ± 0.25 (0.020 ± 0.009 8)		1.5 (0.059)	Recondition valve seat or replace cylinder head.
Valve seat	Angle	45°		—	Recondition.
	Width	1.3 to 1.8 (0.051 to 0.071)		2.5 (0.098)	
Valve spring	Free length	47 (1.85)		46 (1.81)	Replace.
	Length under test force	39.1 (1.54)	30.5 (1.20)	—	
	Test force, kgf (lbf) [N]	13.9 ± 0.7 (30.6 ± 1.5) [136 ± 7]	29 ± 2 (64 ± 4.4) [284 ± 20]	-15%	
Warpage of cylinder head bottom face		0.05 (0.0020) maximum		0.10 (0.003 9)	Repair.
Bend (dial indicator reading) of valve push rod		—		0.3 (0.012)	Replace.

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

Item		Standard	Limit	Correction-Remarks
Timing gear backlash	Crankshaft gear and idler gear	0.04 to 0.12 (0.001 6 to 0.004 7)	0.30 (0.011 8)	Replace.
	Idler gear and camshaft gear			
	Idler gear and fuel injection pump camshaft gear			
	Camshaft gear and P.T.O. gear	0.08 to 0.19 (0.003 1 to 0.007 5)		
	Fuel injection pump cam-shaft gear and oil pump gear	0.07 to 0.20 (0.0028 to 0.0079)		
Lobe height of camshaft		35.72 (1.406 3)	34.72 (1.366 9)	Replace.
Lobe height of fuel injection pump camshaft		44 (1.73)	43 (1.69)	Replace.
Flatness of flywheel		0.15 (0.005 9) maximum	0.50 (0.019 7)	Replace.
Clearance between tappet and cylinder block		—	0.15 (0.005 9)	Replace tappet.
Clearance between camshaft journal and bushing		—	0.15 (0.005 9)	Replace bushing.
Clearance between idler gear and shaft		0.03 to 0.07 (0.001 2 to 0.002 8)	0.20 (0.007 9)	Replace idler gear or shaft.
Warpage of cylinder block top face		0.05 (0.002 0) maximum	0.10 (0.003 9)	Repair.
Bore in cylinder block		$78.0\ ^{+0.03}_{0}$ ($3.07\ ^{+0.0012}_{0}$)	78.2 (3.079)	Hone out bore for oversize piston or replace cylinder block.
Taper and out-of-round of cylinder		0.01 (0.000 4) maximum	—	
Diameter of piston	Standard	77.93 to 77.95 (3.068 1 to 3.068 9)	77.80 (3.063 0)	
	0.25 (0.0098) oversize	78.18 to 78.20 (3.077 9 to 3.078 7)	78.05 (3.072 8)	
	0.50 (0.0197) oversize	78.43 to 78.45 (3.087 8 to 3.088 6)	78.30 (3.082 7)	
Clearance between piston pin and piston		0.006 to 0.018 (0.000 24 to 0.000 71)	0.050 (0.001 97)	
Clearance between piston ring and groove	No. 1 compression ring	0.06 to 0.10 (0.002 4 to 0.003 9)	0.30 (0.011 8)	Replace piston ring.
	No. 2 compression ring	0.05 to 0.09 (0.002 0 to 0.003 5)	0.20 (0.007 9)	
	Oil ring	0.03 to 0.07 (0.001 2 to 0.002 8)	0.20 (0.007 9)	
Clearance between ends of piston ring	No. 1 compression ring	0.15 to 0.30 (0.005 9 to 0.011 8)	1.50 (0.059)	Replace piston ring
	No. 2 compression ring	0.15 to 0.35 (0.005 9 to 0.013 8)		
	Oil ring	0.20 to 0.40 (0.007 9 to 0.015 7)		
Clearance between piston and cylinder		0.035 to 0.086 (0.001 38 to 0.003 39)	0.300 (0.011 81)	Hone out bore for oversize piston or replace cylinder block.

Item		Standard	Limit	Correction-Remarks
Clearance between crankpin and connecting rod bearing		0.025 to 0.072 (0.000 98 to 0.002 83)	0.150 (0.005 91)	Replace connecting rod bearing.
Thrust clearance for connecting rod big end		0.10 to 0.35 (0.003 9 to 0.013 8)	0.50 (0.019 7)	Replace connecting rod.
Crankshaft	Diameter of journal	51.985 to 52.000 (2.046 65 to 2.047 24)	—	
	Diameter of crankpin	47.950 to 47.965 (1.887 79 to 1.888 38)	—	
	Runout	0.025 (0.000 98)	0.05 (0.002 0)	Repair or replace.
	Clearance between journal and main bearing	0.030 to 0.077 (0.001 18 to 0.003 03)	0.100 (0.003 94)	Replace main bearing.
	Clearance between crankpin and connecting rod bearing	0.025 to 0.072 (0.000 98 to 0.002 83)	0.150 (0.005 91)	Replace connecting rod bearing.
	End play	0.050 to 0.175 (0.001 97 to 0.006 89)	0.500 (0.019 69)	Replace No. 3 flanged bearing

a. Please refer to the applicable engine model specification sheet for actual data

55.2 Lubrication system

Unit: mm (in.)

Item	Standard	Limit	Correction-Remarks
Pressure relief valve setting	3.5 ± 0.5 kgf/cm^2 (50 ± 7 psi) [343 ± 49 kPa]	—	Replace.
Pressure difference at which oil pressure switch is closed (indicator light comes on)	0.5 ± 0.1 kgf/cm^2 (7 ± 1.4 psi) [49 ± 10 kPa]	—	Replace.

55.3 Fuel system

Unit: mm (in.)

Item	Standard	Limit	Correction-Remarks
Injection pressure (valve opening pressure)	140_{0}^{+5} kgf/cm^2 ($1\ 991_{0}^{+71}$ psi) [$13\ 729_{0}^{+490}$ kPa]	—	Adjust with washer.

55.4 Air inlet system and exhaust system

Unit: mm (in.)

Item	Standard	Limit	Correction-Remarks
Paper-element type air cleaner element	Clean every 100 service hours	Change every 500 service hours.	
Warpage of mounting faces of manifolds	—	0.15 (0.005 9)	Repair or replace.

55.5 Cooling system (standard)

Unit: mm (in.)

Item		Standard	Limit	Correction-Remarks
Thermostat	Temperature at which valve starts opening	82 ± 1.5°C (180 ± 2.7°F)	—	Replace.
	Temperature at which valve lift is more than 8 mm (0.3 in.)	95°C (203°F)	—	
Thermo-switch	Temperature at which switch is turned ON	111 ± 3.5°C (232 ± 6.3°F)	—	Replace.
	Resistance at oil temperature of 120°C (284°F)	30 mΩ maximum	—	
Resistance in thermounit	At 50°C (122°F)	80 ± 10 Ω	—	Replace.
	At 80°C (176°F)	29.5 ± 2.5 Ω	—	
	At 120°C (248°F)	10 ± 0.3 Ω	—	
Deflection of fan belt under 10 kgf (22 lbf) [98 N] force applied midway between alternator pulley and crankshaft pulley		10 to 12 (0.4 to 0.5)	—	Replace.

55.6 Electrical system

Unit: mm (in.)

Item			Standard		Limit	Correction-Remarks
Starter	Pinion clearance		0.5 to 2.0 (0.020 to 0.079)		—	Adjust with packing.
	No-load charac-teristics		S3L/S3L2	S4L/S4L2		Test.
		Terminal voltage	11.5 V	11 V	—	
		Current draw	100 A maximum	130 A maximum	—	
		rpm	3 000 minimum	3 600 minimum	—	
	Brush length		—		Wear limit line	Replace.
	Brush spring tension		3.0 kgf (6.6 lbf) [29.4 N]		1.8 kgf (4.0 lbf) [17.7 N]	Replace.
	Runout of commutator		0.03 (0.001 2)		0.10 (0.003 9)	Repair or replace.
	Diameter of commutator		32 (1.26)		31 (1.22)	Replace.
	Undercut of mica		0.5 (0.020)		0.2 (0.008)	Repair.

Item				Standard	Limit	Correction-Remarks
Alternator	Regulated voltage at 20°C (68°F)			14.7 ± 0.3 V	—	
	Output characteristics (at operating temperature)	At 2500 rpm	Terminal voltage	13.5 V	—	Test.
			Current	33 A min.	—	
		At 500 rpm	Terminal voltage	13.5 V	—	
			Current	47 A min.	—	
	Brush length			—	Wear limit line	Replace.
Resistance in glow plug				0.55 Ω	—	Replace.

56 TIGHTENING TORQUES

56.1 Major bolts and nuts

Unit: mm (in.)

Bolt or nut	Thread, mm				Torque, kgf·m (lbf·ft) [N·m]
	Dia-meter	Pitch	Width	Clamp length	
Cylinder head bolt	M10	1.25	14	87	9 ± 0.5 (65 ± 4) [88 ± 5]
Rocker cover bolt	M8	1.25	12	40	1.15 ± 0.15 (8.3 ± 1.1) [11.3 ± 1.5]
Rocker shaft bracket bolt	M8	1.25	12	58	1.5 ± 0.5 (11 ± 4) [14.7 ± 5]
Thermoswitch	M16	1.5	17	31.5	2.3 ± 0.4 (16.6 ± 3) [22.6 ± 4]
Crankshaft pulley nut	M18	1.5	27	—	17.5 ± 2.5 (127 ± 18) [172 ± 25]
Main bearing cap bolt	M10	1.25	17	81	5.25 ± 0.25 (38 ± 2) [51.5 ± 2.5]
Connecting rod cap nut	M9	1.0	14	—	3.55 ± 0.25 (25.7 ± 2) [34.8 ± 2.5]
Rear plate bolt (for tractor engine)	M12	1.25	17	28	9.5 ± 1 (69 ± 7) [93 ± 10]
Rear plate bolt (standard)	M12	1.25	17	28	6.5 ± 1 (47 ± 7) [64 ± 10]
Rear plate bolt (stamping)	M8	1.25	12	16	1.15 ± 0.15 (8.3 ± 1.1) [11.3 ± 1.5]
Flywheel bolt	M12	1.25	19	29	13.5 ± 0.5 (98 ± 4) [132 ± 5]
Oil pan bolt (for tractor engine)	M8	1.25	12	25	2.8 ± 0.3 (20.3 ± 2.2) [27.5 ± 3]
Oil pan drain plug	M14	1.5	22	10	4 ± 0.5 (29 ± 4) [39 ± 5]
Pressure relief valve	M22	1.5	22	33	5 ± 0.5 (36 ± 4) [49 ± 5]
Oil filter	M20	1.5	—	—	1.2 ± 0.1 (8.7 ± 0.7) [12 ± 1]
Oil pressure switch	PT1/8	—	26	11	1 ± 0.2 (7.2 ± 1.4) [10 ± 2]
Fuel injection pipe nut	M12	1.5	—	—	3 ± 0.5 (22 ± 4) [29 ± 5]
Fuel leak-off pipe nut	M12	1.5	18	—	2.75 ± 0.25 (20 ± 2) [27 ± 2.5]
Delivery valve holder	—	—	19	—	4.5 ± 0.5 (32.5 ± 4) [44 ± 5]
Fuel injection nozzle holder	M20	1.5	21	—	5.5 ± 0.5 (40 ± 4) [54 ± 5]
Retaining nut for delivery valve holder body	M16	0.75	19	—	3.75 ± 0.25 (27 ± 2) [37 ± 2.5]
Sliding sleeve shaft	M10	1.25	14	29.5	3.6 ± 0.6 (26 ± 4) [35 ± 6]
Special nut for torque spring set	M12	1.0	17	—	2 ± 0.5 (14 ± 4) [20 ± 5]
Glow plug	M10	1.25	12	60	1.75 ± 0.25 (12.7 ± 2) [17.2 ± 2.5]
Glow plug connection plate	M4	0.7	8	—	0.125 ± 0.025 (0.9 ± 0.2) [1.2 ± 0.2]
Stop solenoid nut	M30	1.5	36	—	4.5 ± 0.5 (32.5 ± 4) [44 ± 5]
Starter B terminal	M8	1.25	12	—	1.1 ± 0.1 (8 ± 0.7) [10.8 ± 1]

56.2 Torques for bolts and nuts with standard threads

Unit: kgf·m (lbf·ft) [N·m]

Thread diameter	Identification on head		
	4	7	
M6	0.4 ± 0.1 (3 ± 0.7) [3.9 ± 1]	0.9 ± 0.1 (6.5 ± 0.7) [8.8 ± 1]	
M8	1.1 ± 0.1 (8 ± 0.7) [10.8 ± 1]	1.85 ± 0.35 (13.4 ± 2.5) [18 ± 3]	
M10	2.15 ± 0.35 (15.6 ± 2.5) [21 ± 3]	3.6 ± 0.6 (26 ± 4.3) [35.3 ± 6]	
M12	3.6 ± 0.6 (26 ± 4.3) [35.3 ± 6]	6.5 ± 1 (47 ± 7) [63.7 ± 10]	
M14	6 ± 1 (43 ± 7) [59 ± 10]	9.5 ± 1.5 (69 ± 11) [93.2 ± 15]	

56.3 Torques for plugs with taperlock threads

Unit: kgf·m (lbf·ft) [N·m]

Size	For aluminium materials	For ferrous materials
NPTF 1/16	0.65 ± 0.15 (4.7 ± 1) [6.4 ± 1]	1 ± 0.2 (7.2 ± 1) [10 ± 2]
PT 1/8	1 ± 0.2 (7.2 ± 1) [10 ± 2]	1.85 ± 0.35 (13.4 ± 2.5) [18 ± 3]
PT 1/4, NPTF 1/4	2.5 ± 0.5 (18 ± 4) [25 ± 5]	4 ± 0.5 (29 ± 4) [39 ± 5]
PT 3/8	—	6.5 ± 1 (47 ± 7) [64 ± 10]