

General Description

MECHANICAL

1. General Description

A: SPECIFICATION

1. ENGINE TYPE FB25####A

Engine	Model			2.5 L			
	Cylinder arrangement			Horizontally opposed, liquid cooled, 4-cylinder, 4-stroke gasoline engine			
	Valve system mechanism			Chain driven, double overhead camshaft, 4-valve/cylinder			
	Bore × Stroke			mm (in)	94.0 × 90.0 (3.70 × 3.54)		
	Displacement			cm ³ (cu in)	2.498 (152.43)		
	Compression ratio			10			
	Compression pressure (at 200 — 300 rpm)		kPa (kg/cm ² , psi)	Standard	1,050 — 1,400 (11 — 14, 152 — 203)		
	Number of piston rings			Compression ring: 2 Oil ring: 1			
	Intake valve timing		Open	Max. retard	ATDC 16°		
				Min. advance	BTDC 39°		
			Close	Max. retard	ABDC 80°		
				Min. advance	ABDC 25°		
	Exhaust valve timing			Open	BBDC 35°		
				Open	ATDC 13°		
	Cam clearance		mm (in)		Intake	Standard	0.13 ^{+0.02} _{-0.03} (0.0051 ^{+0.0008} _{-0.0012})
Idle speed (For CVT model, select lever in “P” or “N” range. For MT model, gear shift lever in neutral position.)				rpm	No load	Standard	CVT model: 675±100 MT model: 650±100
					A/C ON	Standard	850±100
Ignition order					1 → 3 → 2 → 4		
Ignition timing				BTDC/rpm	Standard	CVT model: 16°±10°/675 MT model: 16°±10°/650	

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NOTE:

OS: Oversize US: Undersize

Camshaft	Bending		mm (in)	Limit	0.020 (0.00079)	
	Cam lobe height	mm (in)	Intake	Standard	40.77 — 40.87 (1.605 — 1.609)	
			Exhaust	Standard	40.15 — 40.25 (1.581 — 1.585)	
	Cam base circle diameter		mm (in)	Standard	34.0 (1.339)	
	Journal outer diameter		mm (in)	Standard	25.946 — 25.963 (1.0215 — 1.0222)	
	Thrust clearance		mm (in)	Standard	0.068 — 0.116 (0.0027 — 0.0047)	
	Oil clearance		mm (in)	Standard	0.037 — 0.072 (0.0015 — 0.0028)	
Cylinder head	Warpage (mating surface with cylinder block)		mm (in)	Limit	0.035 (0.0014)	
	Grinding limit			mm (in)	To 98.4 (3.874)	
	Height		mm (in)	Standard	98.5 (3.878)	
Valve & valve guide	Valve overall length	mm (in)	Intake		103.3 (4.067)	
			Exhaust		94.1 (3.705)	
	Valve head edge thickness	mm (in)	Intake		0.8 — 1.2 (0.031 — 0.047)	
			Exhaust		1.0 — 1.4 (0.039 — 0.055)	
	Valve stem outer diameter	mm (in)	Intake		5.455 — 5.470 (0.2148 — 0.2154)	
			Exhaust		5.445 — 5.460 (0.2144 — 0.2150)	
	Valve guide inner diameter		mm (in)	Standard	5.500 — 5.512 (0.2165 — 0.2170)	
	Clearance between valve and valve guide	mm (in)	Intake		0.030 — 0.057 (0.0012 — 0.0022)	
			Exhaust		0.040 — 0.065 (0.0016 — 0.0026)	
Valve guide protrusion amount			mm (in)	Standard	11.4 — 11.8 (0.449 — 0.465)	
Valve & valve shim	Valve stem end outer diameter	mm (in)	Intake		5.455 — 5.470 (0.2148 — 0.2154)	
			Exhaust		5.445 — 5.460 (0.2148 — 0.2150)	
	Valve shim inner diameter		mm (in)	Standard	5.500 — 5.560 (0.2165 — 0.2189)	
	Clearance between valve and valve shim	mm (in)	Intake		0.030 — 0.105 (0.0012 — 0.0041)	
Exhaust			0.040 — 0.115 (0.0016 — 0.0045)			
Valve seat	Seating width between valve and valve seat	mm (in)	Intake		0.8 — 1.6 (0.031 — 0.063)	
			Exhaust		1.1 — 1.7 (0.043 — 0.067)	
	Seating angle between valve and valve seat				45°	
Seating position between valve and valve seat				Valve face center		
Valve spring	Free length			mm (in)	Standard	41.68 (1.641)
	Tension/spring height	N (kgf, lb)/mm (in)	Set		Standard	182 — 210 (18.56 — 21.41, 40.92 — 47.22)/ 33.0 (1.299)
			Lift		Standard	520 — 554 (53.02 — 56.49, 116.92 — 124.56)/ 22.0 (0.866)
	Squareness			Standard		2.5°, 1.8 mm (0.071 in) or less

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Cylinder block & piston	Cylinder block warpage (Mating surface with cylinder head)			mm (in)	Limit	0.025 (0.00098)	
	Grinding limit of cylinder block			mm (in)		To 204.9 (8.067)	
	Height of cylinder block			mm (in)	Standard	205.0 (8.071)	
	Inner diameter of cylinder liner		mm (in)	Cylinder bore size mark A	Standard	94.005 — 94.015 (3.7010 — 3.7014)	
				Cylinder bore size mark B	Standard	93.995 — 94.005 (3.7006 — 3.7010)	
	Cylindricity of cylinder liner			mm (in)	Limit	0.015 (0.0006)	
	Out-of-roundness of cylinder liner			mm (in)	Limit	0.010 (0.0004)	
	Piston grade point			mm (in)		13.3 (0.52)	
	Piston outer diameter		mm (in)	Standard Size	Grade A	Standard	93.980 — 93.990 (3.7000 — 3.7004)
					Grade B	Standard	93.970 — 93.980 (3.6996 — 3.7000)
				0.25 (0.0098) OS		Standard	94.220 — 94.240 (3.7094 — 3.7102)
				0.50 (0.0197) OS		Standard	94.470 — 94.490 (3.7193 — 3.7201)
Clearance between cylinder liner and piston			mm (in)	Standard	0.015 — 0.035 (0.00059 — 0.00138)		
Inner diameter of cylinder liner boring limit (diameter)			mm (in)		To 94.505 (3.7207)		
Piston and piston pin	Degree of fit					Piston pin must be fitted into position with thumb at 20°C (68°F).	
	Clearance between piston and piston pin			mm (in)	Standard		0.004 — 0.008 (0.0002 — 0.0003)
Piston ring	Closed gap	mm (in)	Compression ring	Top ring	Standard	0.20 — 0.30 (0.0079 — 0.0118)	
				Second ring	Standard	0.30 — 0.45 (0.0118 — 0.0177)	
			Oil ring (upper rail and lower rail)			Standard	0.20 — 0.50 (0.0079 — 0.0197)
	Clearance between compression ring and piston			mm (in)	Top ring	Standard	0.040 — 0.080 (0.0016 — 0.0031)
Second ring					Standard	0.030 — 0.070 (0.0012 — 0.0028)	
Connecting rod and connecting rod bearing	Bend or twist per 100 mm (3.94 in) in length			mm (in)	Limit	0.10 (0.0039)	
	Thrust clearance			mm (in)	Standard	0.070 — 0.330 (0.0028 — 0.0130)	
	Connecting rod bearing thickness (at center)		mm (in)	Standard size		Standard	1.492 — 1.508 (0.0587 — 0.0594)
				0.03 (0.0012) US		Standard	1.511 — 1.515 (0.0595 — 0.0596)
				0.05 (0.0020) US		Standard	1.521 — 1.525 (0.0599 — 0.0600)
				0.25 (0.0098) US		Standard	1.621 — 1.625 (0.0638 — 0.0640)
Oil clearance			mm (in)	Standard	0.017 — 0.047 (0.0007 — 0.0019)		
Piston pin & connecting rod bushing	Clearance between piston pin and connecting rod bushing			mm (in)	Standard	0.004 — 0.026 (0.0002 — 0.0010)	

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Crankshaft and crankshaft bearing	Bending		mm (in)	Limit	0.035 (0.0014)	
	Crankshaft pin	Cylindricality	mm (in)	Limit	0.006 (0.0002)	
		Out-of-roundness	mm (in)	Limit	0.005 (0.0002)	
		Grinding limit (dia.)		mm (in)	To 47.726 (1.8790)	
		Crankshaft journal	Cylindricality	mm (in)	Limit	0.006 (0.0002)
	Out-of-roundness		mm (in)	Limit	0.005 (0.0002)	
	Grinding limit (dia.)		mm (in)	To 67.735 (2.6667)		
	Crankshaft pin outer diameter		mm (in)	Standard size	Standard	47.976 — 48.000 (1.8888 — 1.8898)
		0.03 (0.0012) US		Standard	47.946 — 47.970 (1.8876 — 1.8886)	
		0.05 (0.0020) US		Standard	47.926 — 47.950 (1.8868 — 1.8878)	
		0.25 (0.0098) US		Standard	47.726 — 47.750 (1.8790 — 1.8799)	
	Crankshaft journal outer diameter	mm (in)	Standard size	Standard	67.985 — 68.009 (2.6766 — 2.6775)	
			0.03 (0.0012) US	Standard	67.955 — 67.979 (2.6754 — 2.6763)	
			0.05 (0.0020) US	Standard	67.935 — 67.959 (2.6746 — 2.6755)	
			0.25 (0.0098) US	Standard	67.735 — 67.759 (2.6667 — 2.6677)	
	Crankshaft bearing thickness (at center)	#1, #2, #3, #4	mm (in)	Standard size	Standard	2.495 — 2.513 (0.0982 — 0.0989)
				0.03 (0.0012) US	Standard	2.519 — 2.522 (0.0992 — 0.0993)
				0.05 (0.0020) US	Standard	2.529 — 2.532 (0.0996 — 0.0997)
				0.25 (0.0098) US	Standard	2.629 — 2.632 (0.1035 — 0.1036)
		#5	Standard size	Standard	2.493 — 2.511 (0.0981 — 0.0989)	
			0.03 (0.0012) US	Standard	2.517 — 2.520 (0.0991 — 0.0992)	
			0.05 (0.0020) US	Standard	2.527 — 2.530 (0.0995 — 0.0996)	
			0.25 (0.0098) US	Standard	2.627 — 2.630 (0.1034 — 0.1035)	
	Thrust clearance			mm (in)	Standard	0.130 — 0.308 (0.00512 — 0.01213)
	Oil clearance			mm (in)	Standard	0.013 — 0.031 (0.00051 — 0.00122)

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2. ENGINE TYPE FB25#####F

Engine	Model			2.5 L	
	Cylinder arrangement			Horizontally opposed, liquid cooled, 4-cylinder, 4-stroke gasoline engine	
	Valve system mechanism			Chain driven, double overhead camshaft, 4-valve/cylinder	
	Bore × Stroke			mm (in)	
	Displacement			cm ³ (cu in)	
	Compression ratio			10	
	Compression pressure (at 200 — 300 rpm)		kPa (kg/cm ² , psi)	Standard	1,050 — 1,400 (11 — 14, 152 — 203)
	Number of piston rings			Compression ring: 2 Oil ring: 1	
	Intake valve timing		Open	Max. retard	ATDC 16°
				Min. advance	BTDC 39°
			Close	Max. retard	ABDC 80°
				Min. advance	ABDC 25°
	Exhaust valve timing			Open	BBDC 35°
				Open	ATDC 13°
	Cam clearance		mm (in)	Intake	Standard
Exhaust				Standard	
Idle speed (For CVT model, select lever in “P” or “N” range. For MT model, gear shift lever in neutral position.)		rpm	No load	Standard	CVT model: 675±100 MT model: 650±100
			A/C ON	Standard	850±100
Ignition order					1 → 3 → 2 → 4
Ignition timing			BTDC/rpm	Standard	CVT model: 16°±10°/675 MT model: 16°±10°/650

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NOTE:

OS: Oversize US: Undersize

Camshaft	Bending		mm (in)	Limit	0.020 (0.00079)	
	Cam lobe height	mm (in)	Intake	Standard	40.34 — 40.44 (1.588 — 1.592)	
			Exhaust	Standard	39.66 — 39.76 (1.561 — 1.565)	
	Cam base circle diameter		mm (in)	Standard	34.0 (1.339)	
	Journal outer diameter		mm (in)	Standard	25.946 — 25.963 (1.0215 — 1.0222)	
	Thrust clearance		mm (in)	Standard	0.068 — 0.116 (0.0027 — 0.0047)	
	Oil clearance		mm (in)	Standard	0.037 — 0.072 (0.0015 — 0.0028)	
Cylinder head	Warpage (mating surface with cylinder block)		mm (in)	Limit	0.035 (0.0014)	
	Grinding limit			mm (in)	To 98.4 (3.874)	
	Height		mm (in)	Standard	98.5 (3.878)	
Valve & valve guide	Valve overall length	mm (in)	Intake		104.95 (4.132)	
			Exhaust		96.5 (3.799)	
	Valve head edge thickness	mm (in)	Intake		0.8 — 1.2 (0.031 — 0.047)	
			Exhaust		1.0 — 1.4 (0.039 — 0.055)	
	Valve stem outer diameter	mm (in)	Intake		5.455 — 5.470 (0.2148 — 0.2154)	
			Exhaust		5.445 — 5.460 (0.2144 — 0.2150)	
	Valve guide inner diameter		mm (in)	Standard	5.500 — 5.512 (0.2165 — 0.2170)	
	Clearance between valve and valve guide	mm (in)	Intake		0.030 — 0.057 (0.0012 — 0.0022)	
			Exhaust		0.040 — 0.065 (0.0016 — 0.0026)	
Valve guide protrusion amount			mm (in)	Standard	11.4 — 11.8 (0.449 — 0.465)	
Valve & valve shim	Valve stem end outer diameter	mm (in)	Intake		5.455 — 5.470 (0.2148 — 0.2154)	
			Exhaust		5.445 — 5.460 (0.2148 — 0.2150)	
	Valve shim inner diameter		mm (in)	Standard	5.500 — 5.560 (0.2165 — 0.2189)	
	Clearance between valve and valve shim	mm (in)	Intake		0.030 — 0.105 (0.0012 — 0.0041)	
Exhaust			0.040 — 0.115 (0.0016 — 0.0045)			
Valve seat	Seating width between valve and valve seat	mm (in)	Intake		0.8 — 1.6 (0.031 — 0.063)	
			Exhaust		1.1 — 1.7 (0.043 — 0.067)	
	Seating angle between valve and valve seat				45°	
Seating position between valve and valve seat				Valve face center		
Valve spring	Free length			mm (in)	Standard	41.68 (1.641)
	Tension/spring height	N (kgf, lb)/mm (in)	Set		Standard	182 — 210 (18.56 — 21.41, 40.92 — 47.22)/ 33.0 (1.299)
			Lift		Standard	520 — 554 (53.02 — 56.49, 116.92 — 124.56)/ 22.0 (0.866)
	Squareness			Standard		2.5°, 1.8 mm (0.071 in) or less

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Cylinder block & piston	Cylinder block warpage (Mating surface with cylinder head)			mm (in)	Limit	0.025 (0.00098)	
	Grinding limit of cylinder block			mm (in)		To 204.9 (8.067)	
	Height of cylinder block			mm (in)	Standard	205.0 (8.071)	
	Inner diameter of cylinder liner		mm (in)	Cylinder bore size mark A	Standard	94.005 — 94.015 (3.7010 — 3.7014)	
				Cylinder bore size mark B	Standard	93.995 — 94.005 (3.7006 — 3.7010)	
	Cylindricity of cylinder liner			mm (in)	Limit	0.015 (0.0006)	
	Out-of-roundness of cylinder liner			mm (in)	Limit	0.010 (0.0004)	
	Piston grade point			mm (in)		13.3 (0.52)	
	Piston outer diameter		mm (in)	Standard Size	Grade A	Standard	93.980 — 93.990 (3.7000 — 3.7004)
					Grade B	Standard	93.970 — 93.980 (3.6996 — 3.7000)
				0.25 (0.0098) OS		Standard	94.220 — 94.240 (3.7094 — 3.7102)
				0.50 (0.0197) OS		Standard	94.470 — 94.490 (3.7193 — 3.7201)
Clearance between cylinder liner and piston			mm (in)	Standard	0.015 — 0.035 (0.00059 — 0.00138)		
Inner diameter of cylinder liner boring limit (diameter)			mm (in)		To 94.505 (3.7207)		
Piston and piston pin	Degree of fit					Piston pin must be fitted into position with thumb at 20°C (68°F).	
	Clearance between piston and piston pin			mm (in)	Standard		0.004 — 0.008 (0.0002 — 0.0003)
Piston ring	Closed gap	mm (in)	Compression ring	Top ring	Standard	0.20 — 0.30 (0.0079 — 0.0118)	
				Second ring	Standard	0.30 — 0.45 (0.0118 — 0.0177)	
			Oil ring (upper rail and lower rail)			Standard	0.20 — 0.50 (0.0079 — 0.0197)
	Clearance between compression ring and piston			mm (in)	Top ring	Standard	0.040 — 0.080 (0.0016 — 0.0031)
Second ring					Standard	0.030 — 0.070 (0.0012 — 0.0028)	
Connect-ing rod and connect-ing rod bearing	Bend or twist per 100 mm (3.94 in) in length			mm (in)	Limit	0.10 (0.0039)	
	Thrust clearance			mm (in)	Standard	0.070 — 0.330 (0.0028 — 0.0130)	
	Connecting rod bearing thickness (at center)		mm (in)	Standard size		Standard	1.492 — 1.508 (0.0587 — 0.0594)
				0.03 (0.0012) US		Standard	1.511 — 1.515 (0.0595 — 0.0596)
				0.05 (0.0020) US		Standard	1.521 — 1.525 (0.0599 — 0.0600)
				0.25 (0.0098) US		Standard	1.621 — 1.625 (0.0638 — 0.0640)
Oil clearance			mm (in)	Standard	0.017 — 0.047 (0.0007 — 0.0019)		
Piston pin & connect-ing rod bushing	Clearance between piston pin and connecting rod bushing			mm (in)	Standard	0.004 — 0.026 (0.0002 — 0.0010)	

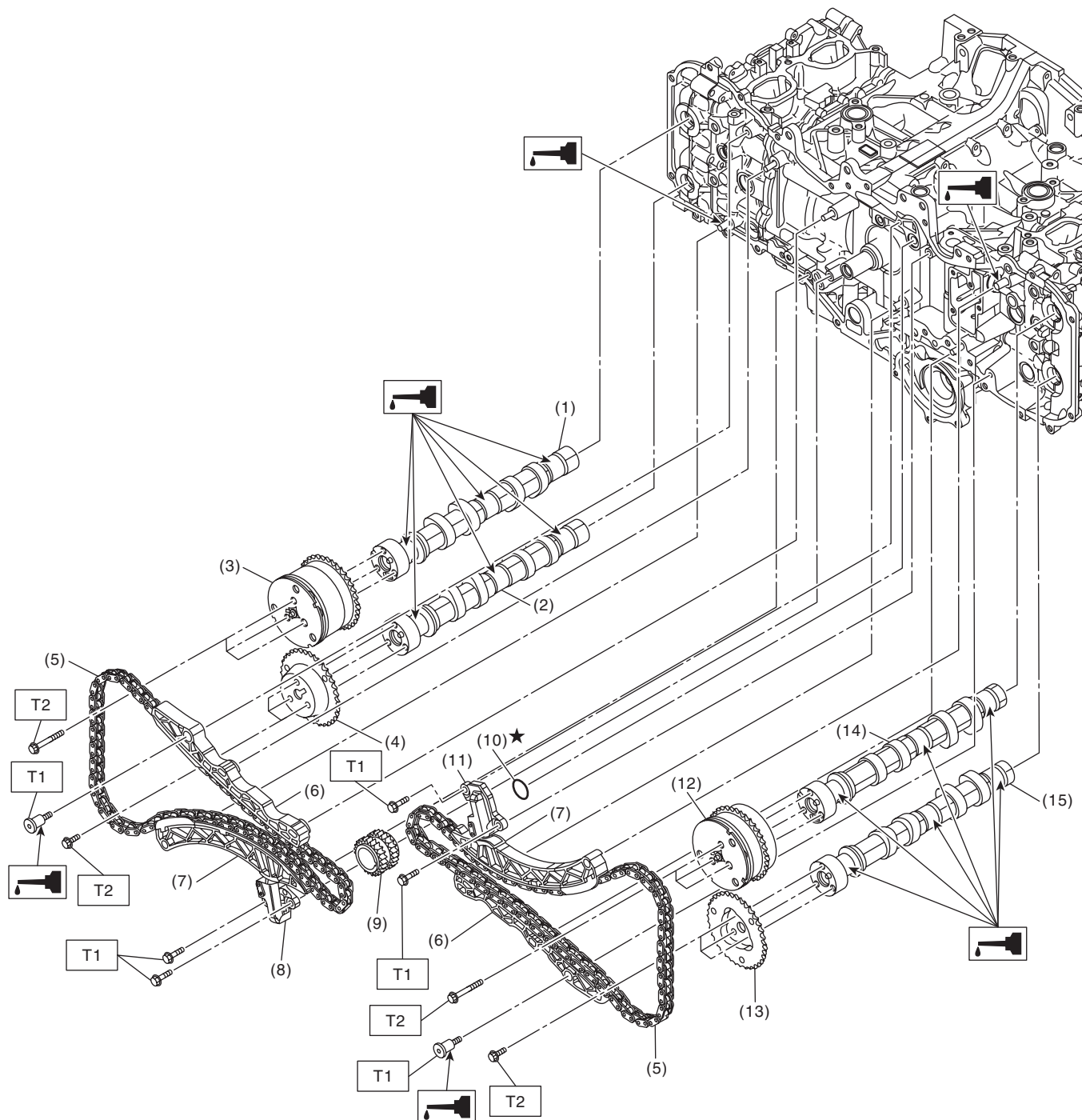
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Crankshaft and crankshaft bearing	Bending		mm (in)	Limit	0.035 (0.0014)
	Crankshaft pin	Cylindricality	mm (in)	Limit	0.006 (0.0002)
		Out-of-roundness	mm (in)	Limit	0.005 (0.0002)
		Grinding limit (dia.)		mm (in)	To 47.726 (1.8790)
		Crankshaft journal	Cylindricality	mm (in)	Limit
	Out-of-roundness		mm (in)	Limit	0.005 (0.0002)
	Grinding limit (dia.)		mm (in)	To 67.735 (2.6667)	
	Crankshaft pin outer diameter		mm (in)	Standard size	Standard
		0.03 (0.0012) US		Standard	47.946 — 47.970 (1.8876 — 1.8886)
		0.05 (0.0020) US		Standard	47.926 — 47.950 (1.8868 — 1.8878)
		0.25 (0.0098) US		Standard	47.726 — 47.750 (1.8790 — 1.8799)
	Crankshaft journal outer diameter	mm (in)	Standard size	Standard	67.985 — 68.009 (2.6766 — 2.6775)
			0.03 (0.0012) US	Standard	67.955 — 67.979 (2.6754 — 2.6763)
			0.05 (0.0020) US	Standard	67.935 — 67.959 (2.6746 — 2.6755)
			0.25 (0.0098) US	Standard	67.735 — 67.759 (2.6667 — 2.6677)
	Crankshaft bearing thickness (at center)	#1, #2, #3, #4	Standard size	Standard	2.495 — 2.513 (0.0982 — 0.0989)
			0.03 (0.0012) US	Standard	2.519 — 2.522 (0.0992 — 0.0993)
			0.05 (0.0020) US	Standard	2.529 — 2.532 (0.0996 — 0.0997)
			0.25 (0.0098) US	Standard	2.629 — 2.632 (0.1035 — 0.1036)
		#5	Standard size	Standard	2.493 — 2.511 (0.0981 — 0.0989)
			0.03 (0.0012) US	Standard	2.517 — 2.520 (0.0991 — 0.0992)
			0.05 (0.0020) US	Standard	2.527 — 2.530 (0.0995 — 0.0996)
			0.25 (0.0098) US	Standard	2.627 — 2.630 (0.1034 — 0.1035)
	Thrust clearance		mm (in)	Standard	0.130 — 0.308 (0.00512 — 0.01213)
	Oil clearance		mm (in)	Standard	0.013 — 0.031 (0.00051 — 0.00122)

B: COMPONENT

1. TIMING CHAIN



ME-06440

General Description

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|-----------------------------|------------------------------|--------------------------|
| (1) Intake camshaft RH | (8) Chain tensioner RH | (14) Intake camshaft LH |
| (2) Exhaust camshaft RH | (9) Crank sprocket | (15) Exhaust camshaft LH |
| (3) Intake cam sprocket RH | (10) O-ring | |
| (4) Exhaust cam sprocket RH | (11) Chain tensioner LH | |
| (5) Timing chain | (12) Intake cam sprocket LH | |
| (6) Chain guide | (13) Exhaust cam sprocket LH | |
| (7) Chain tension lever | | |

Tightening torque: N·m (kgf-m, ft-lb)

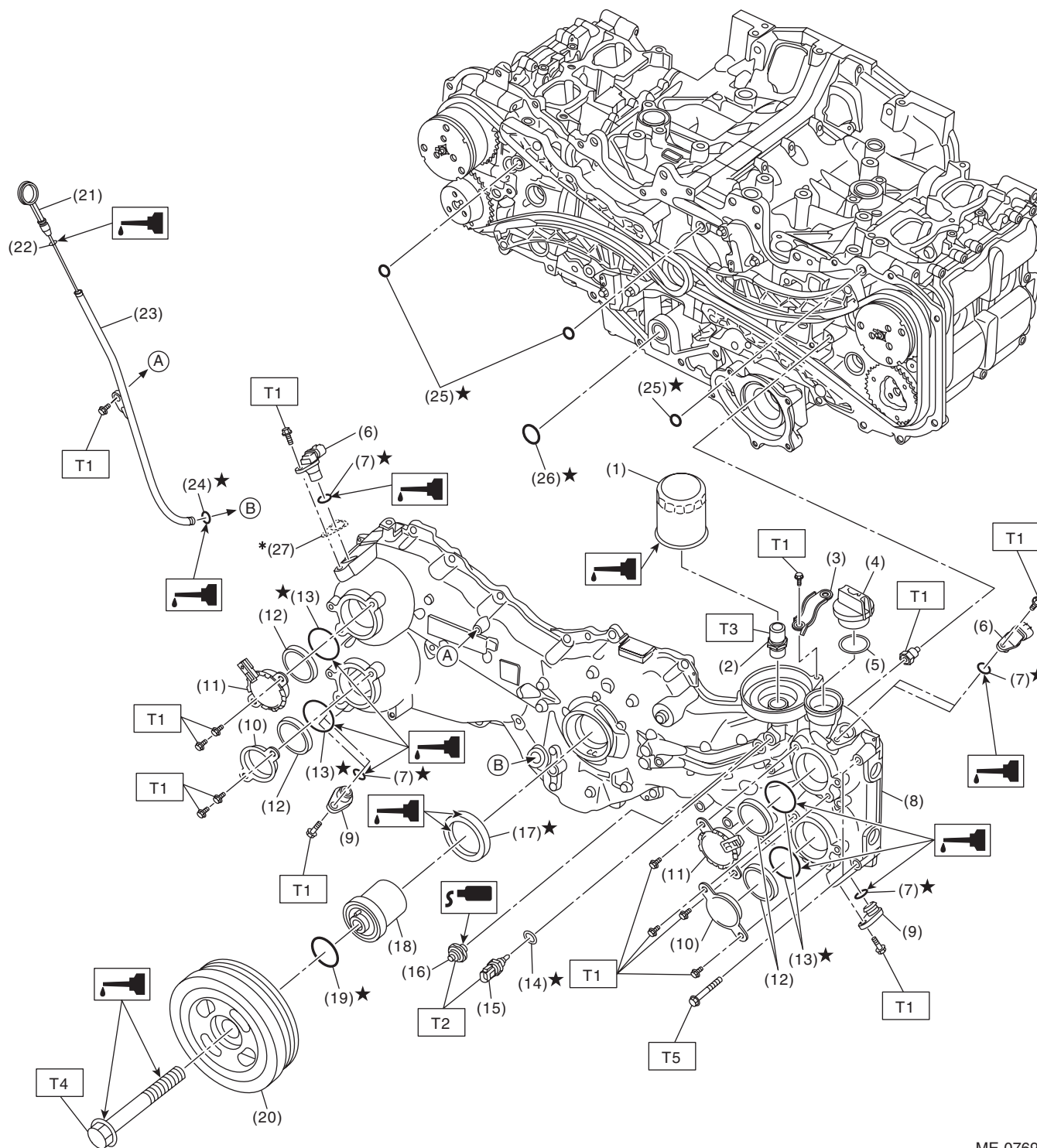
T1: 6.4 (0.7, 4.7)

T2: 18 (1.8, 13.3)

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2. CHAIN COVER



ME-07693

- | | | |
|------------------------------|------------------------------------|-------------|
| (1) Oil filter | (13) O-ring | (25) O-ring |
| (2) Oil pump union | (14) Gasket | (26) O-ring |
| (3) Generator cord stay | (15) Engine oil temperature sensor | (27) Spacer |
| (4) Oil filler cap | (16) Oil pressure switch | |
| (5) Gasket | (17) Front oil seal | |
| (6) Camshaft position sensor | (18) Crank pulley boss | |
| (7) O-ring | (19) O-ring | |
| (8) Chain cover | (20) Crank pulley | |
| (9) Sensor cover | (21) Oil level gauge | |
| (10) Actuator cover | (22) O-ring | |
| (11) Oil control solenoid | (23) Oil level gauge guide | |
| (12) Back-up ring | (24) O-ring | |

* Use one or no spacer to adjust the gap.

Tightening torque: N·m (kgf-m, ft-lb)

T1: 6.4 (0.7, 4.7)

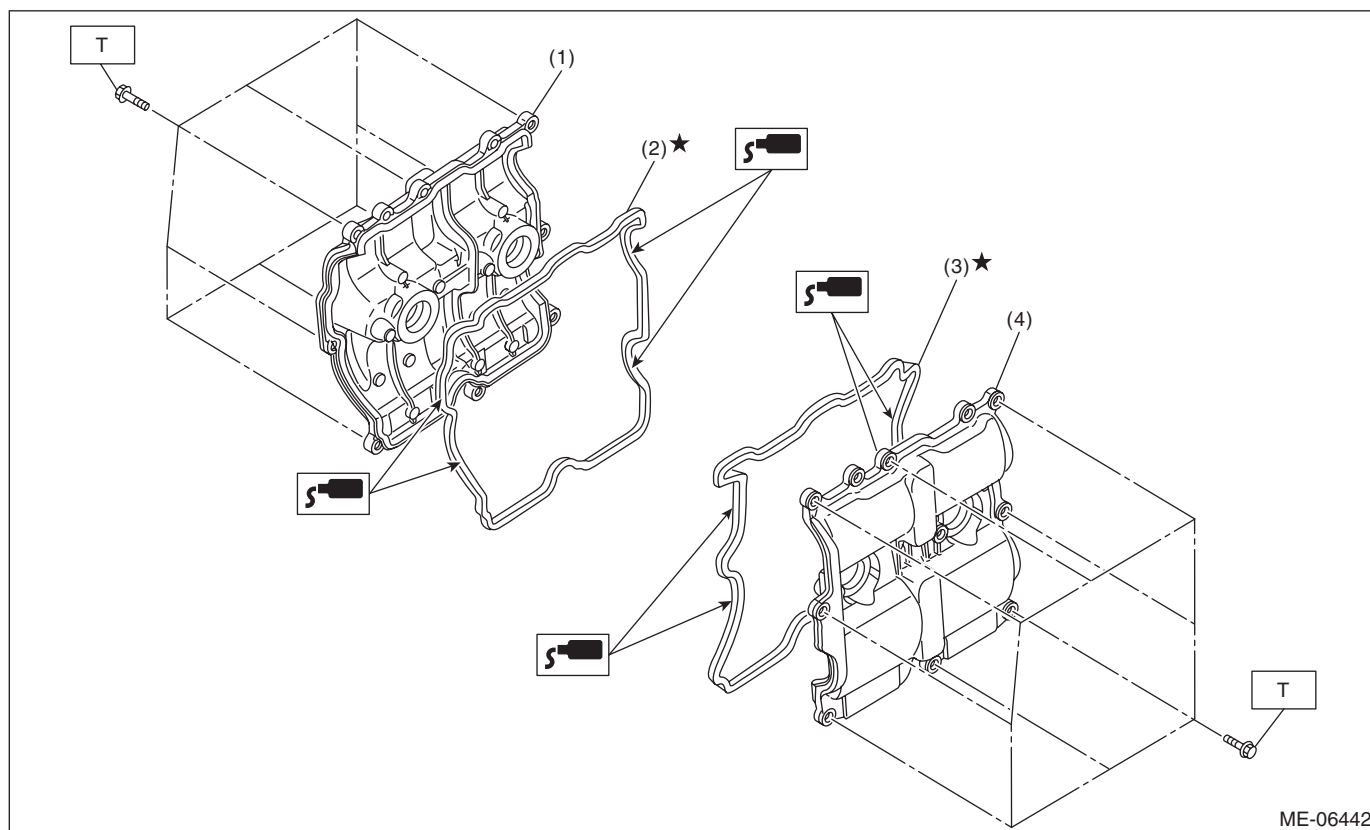
T2: 18 (1.8, 13.3)

T3: 45 (4.6, 33.2)

T4: <Ref. to ME(H4DO)-97, INSTALLATION, Crank Pulley.>

T5: <Ref. to ME(H4DO)-109, INSTALLATION, Chain Cover.>

3. ROCKER COVER



- | | |
|----------------------------|----------------------------|
| (1) Rocker cover RH | (3) Rocker cover gasket LH |
| (2) Rocker cover gasket RH | (4) Rocker cover LH |

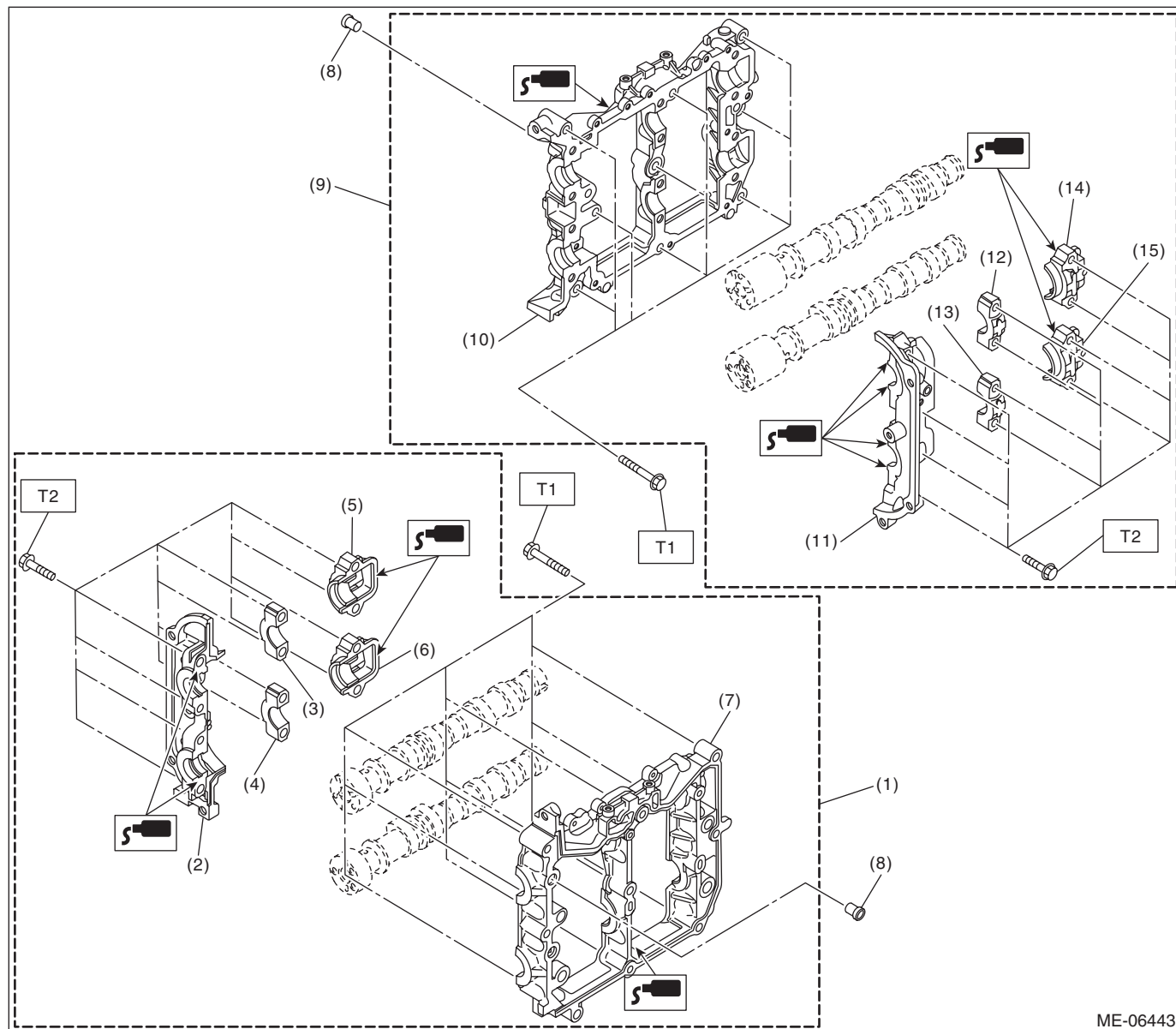
Tightening torque: N·m (kgf-m, ft-lb)

T: <Ref. to ME(H4DO)-157, INSTALLATION, Rocker Cover.>

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4. CAM CARRIER



ME-06443

- | | |
|------------------------------------|-------------------------------------|
| (1) Cam carrier ASSY | (8) Filter |
| (2) Front camshaft cap RH | (9) Cam carrier ASSY |
| (3) Intake center camshaft cap RH | (10) Cam carrier LH |
| (4) Exhaust center camshaft cap RH | (11) Front camshaft cap LH |
| (5) Intake rear camshaft cap RH | (12) Intake center camshaft cap LH |
| (6) Exhaust rear camshaft cap RH | (13) Exhaust center camshaft cap LH |
| (7) Cam carrier RH | |

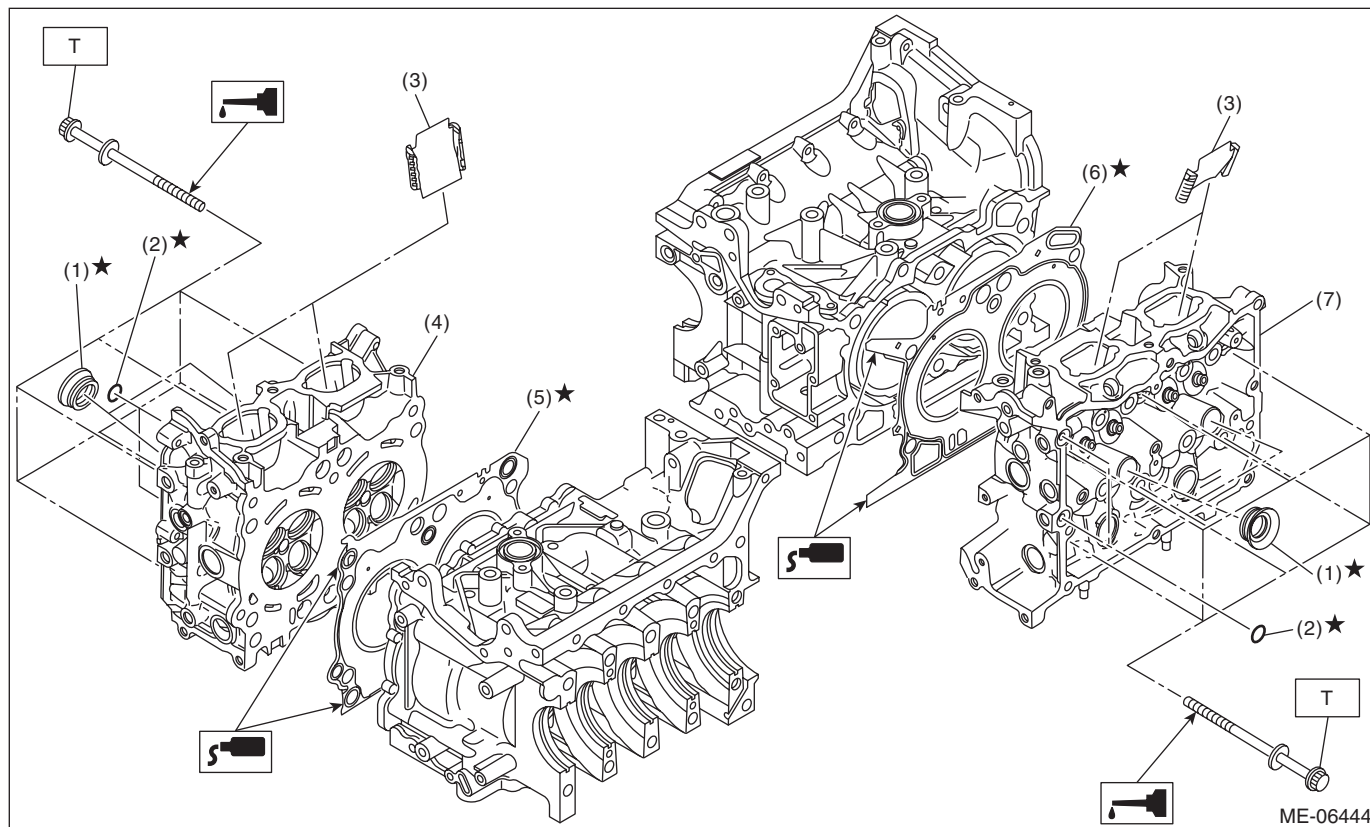
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|-----------------------------------|
| (14) Intake rear camshaft cap LH |
| (15) Exhaust rear camshaft cap LH |

Tightening torque: N·m (kgf·m, ft·lb)

T1: <Ref. to ME(H4DO)-201, ASSEMBLY, Cam Carrier.>

T2: <Ref. to ME(H4DO)-176, INSTALLATION, Cam Carrier.>

5. CYLINDER HEAD



- | | |
|----------------------------|-----------------------------|
| (1) Spark plug pipe gasket | (5) Cylinder head gasket RH |
| (2) O-ring | (6) Cylinder head gasket LH |
| (3) Cylinder head plate | (7) Cylinder head LH |
| (4) Cylinder head RH | |

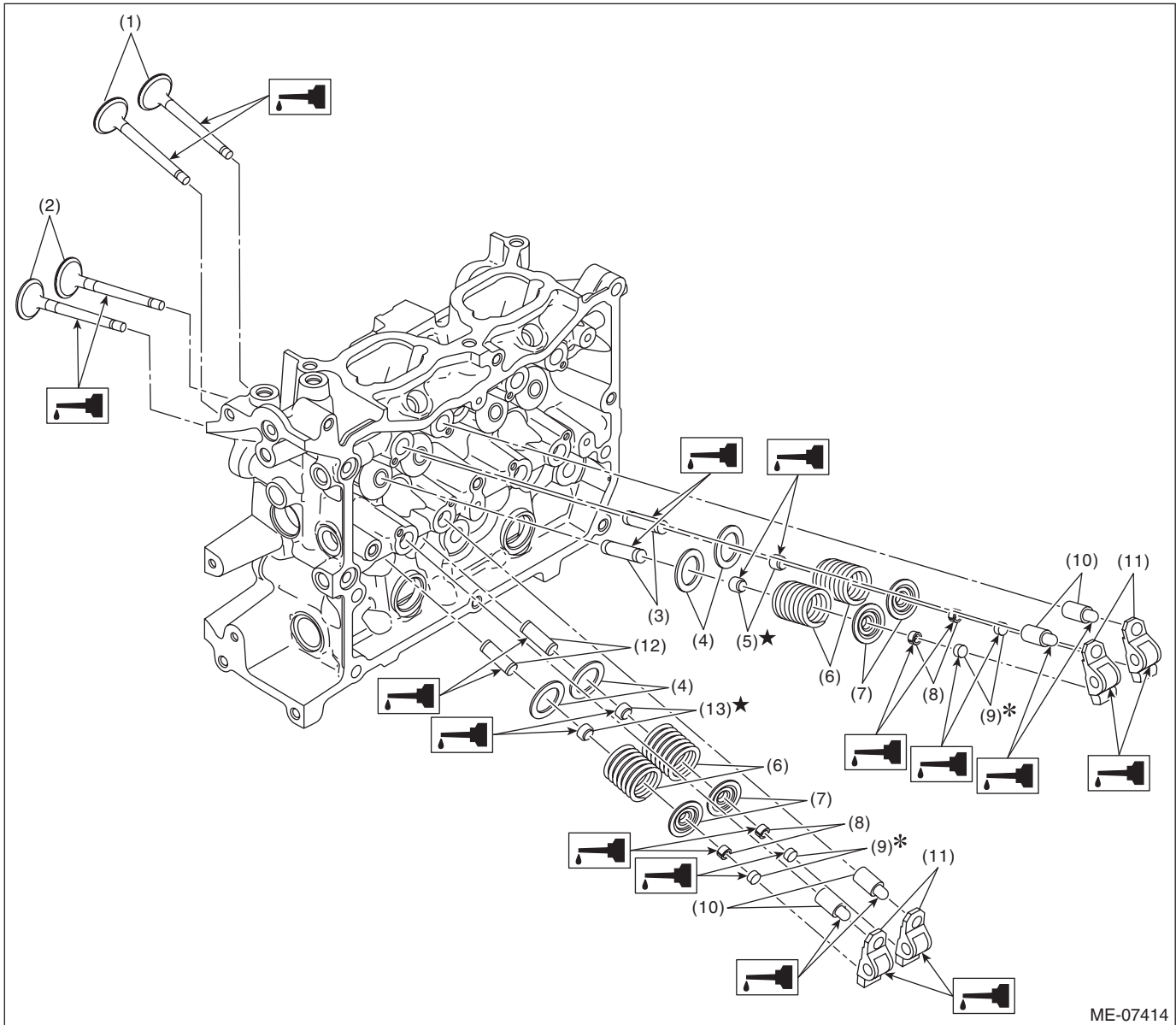
Tightening torque: N·m (kgf-m, ft-lb)

**T: <Ref. to ME(H4DO)-214,
INSTALLATION, Cylinder
Head.>**

General Description

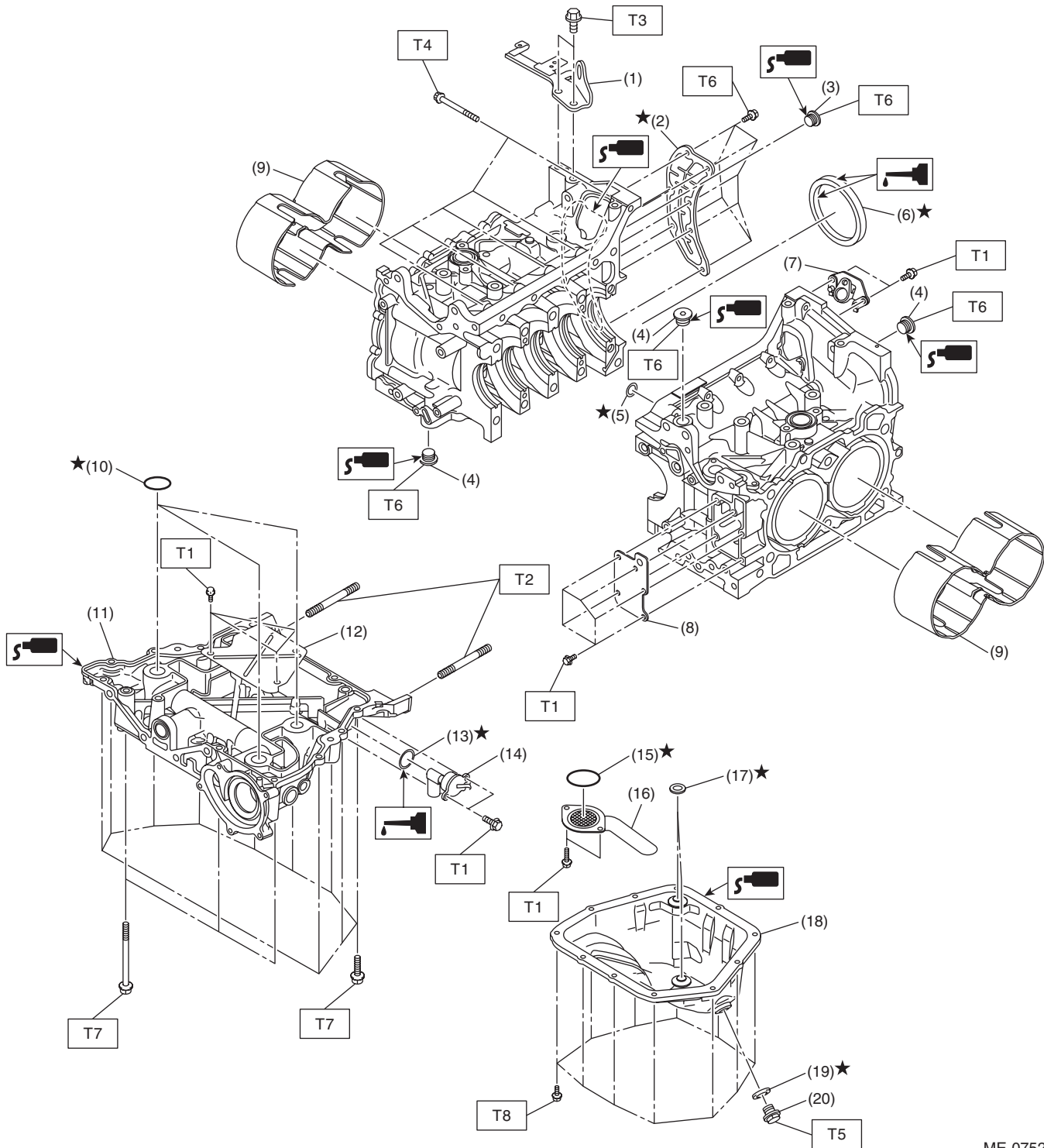
MECHANICAL

6. VALVE ASSY



- | | | |
|---------------------------|------------------------------|-----------------------------|
| (1) Exhaust valve | (6) Valve spring | (11) Roller rocker arm |
| (2) Intake valve | (7) Valve spring retainer | (12) Exhaust valve guide |
| (3) Intake valve guide | (8) Valve collet | (13) Exhaust valve oil seal |
| (4) Valve spring seat | (9) Valve shim | |
| (5) Intake valve oil seal | (10) Roller rocker arm pivot | |

7. CYLINDER BLOCK 1



ME-07529

General Description

MECHANICAL

- | | |
|---------------------------------------|------------------------|
| (1) Engine rear hanger | (11) Oil pan upper |
| (2) Oil separator cover | (12) Baffle plate |
| (3) Cylinder block plug | (13) O-ring |
| (4) Main gallery plug | (14) Oil level switch |
| (5) O-ring | (15) O-ring |
| (6) Rear oil seal | (16) Oil strainer |
| (7) Crankshaft position sensor holder | (17) Oil pan seal ring |
| (8) Cylinder block plate | (18) Oil pan |
| (9) Water jacket spacer | (19) Drain plug gasket |
| (10) O-ring | (20) Drain plug |

Tightening torque: N·m (kgf-m, ft-lb)

T1: 6.4 (0.7, 4.7)

T2: 10 (1.0, 7.4)

T3: 21 (2.1, 15.5)

T4: 25 (2.5, 18.4)

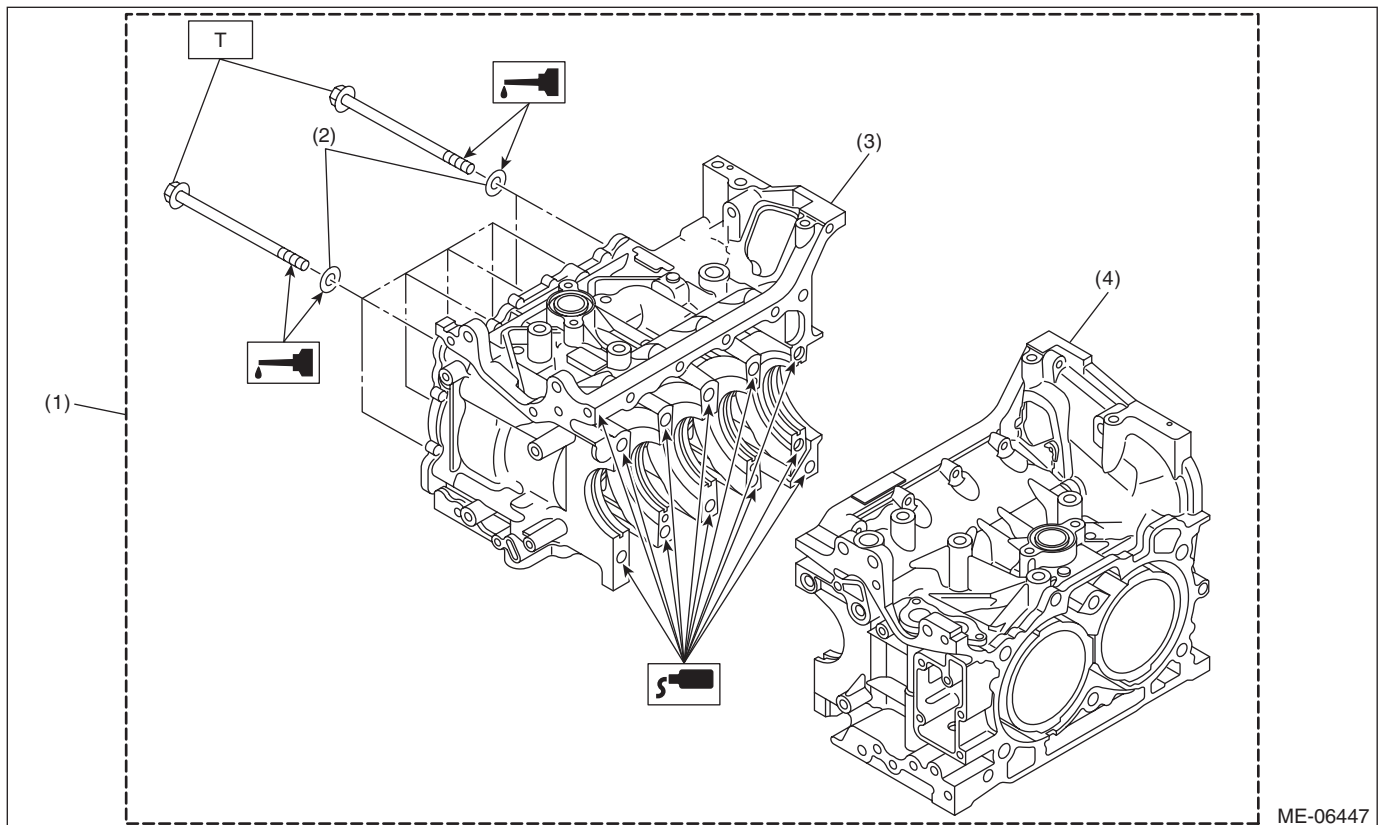
T5: 41.7 (4.3, 30.8)

T6: <Ref. to ME(H4DO)-317, CYLINDER BLOCK, ASSEMBLY, Cylinder Block.>

T7: <Ref. to ME(H4DO)-271, INSTALLATION, Cylinder Block.>

T8: <Ref. to LU(H4DO)-29, OIL PAN, INSTALLATION, Oil Pan and Strainer.>

8. CYLINDER BLOCK 2

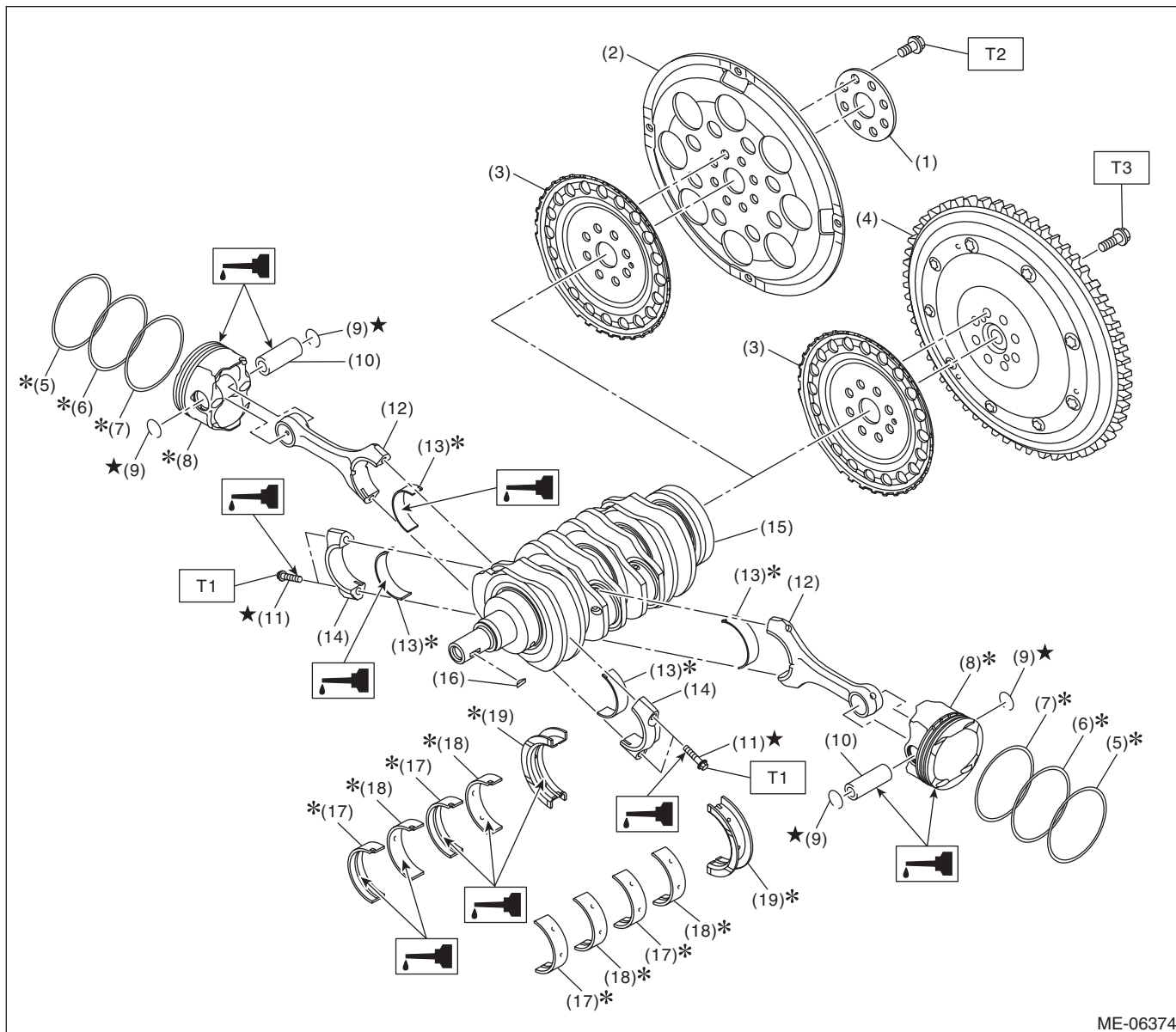


- | | |
|-------------------------|-----------------------|
| (1) Cylinder block ASSY | (3) Cylinder block RH |
| (2) Washer | (4) Cylinder block LH |

Tightening torque: N·m (kgf-m, ft-lb)

T: <Ref. to ME(H4DO)-271, INSTALLATION, Cylinder Block.>

9. CRANKSHAFT AND PISTON



ME-06374

- | | |
|--------------------------------------|------------------------------|
| (1) Reinforcement (CVT model) | (9) Circlip |
| (2) Drive plate (CVT model) | (10) Piston pin |
| (3) Crankshaft position sensor plate | (11) Connecting rod cap bolt |
| (4) Flywheel (MT model) | (12) Connecting rod |
| (5) Top ring | (13) Connecting rod bearing |
| (6) Second ring | (14) Connecting rod cap |
| (7) Oil ring | (15) Crankshaft |
| (8) Piston | (16) Woodruff key |

- | |
|--------------------------------|
| (17) Crankshaft bearing #1, #3 |
| (18) Crankshaft bearing #2, #4 |
| (19) Crankshaft bearing #5 |

Tightening torque: N·m (kgf-m, ft-lb)

T1: <Ref. to ME(H4DO)-271, INSTALLATION, Cylinder Block.>

T2: <Ref. to CVT(TR580)-161, INSTALLATION, Drive Plate.>

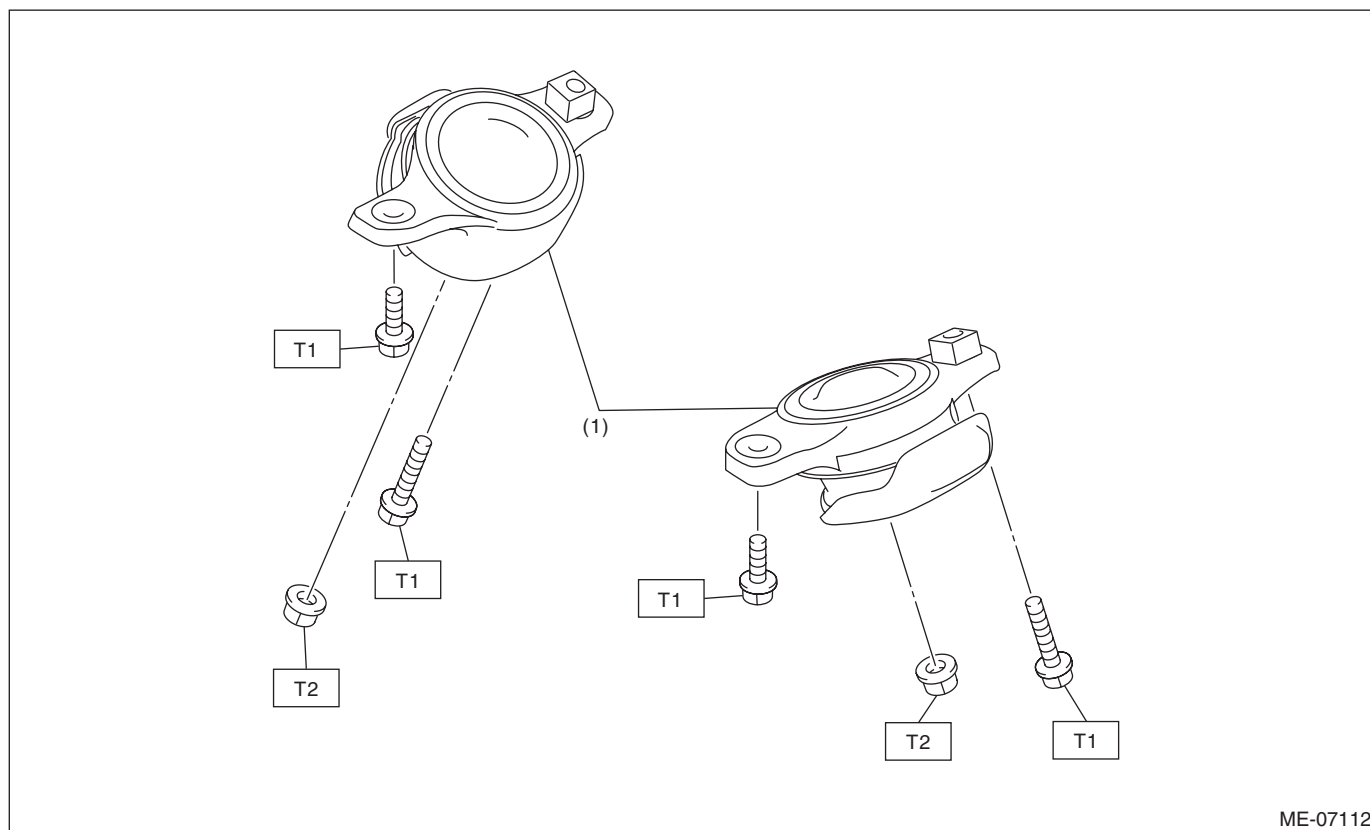
T3: <Ref. to CL-13, INSTALLATION, Flywheel.>

General Description

MECHANICAL

10.ENGINE MOUNTING

- Hydraulic engine mounting model



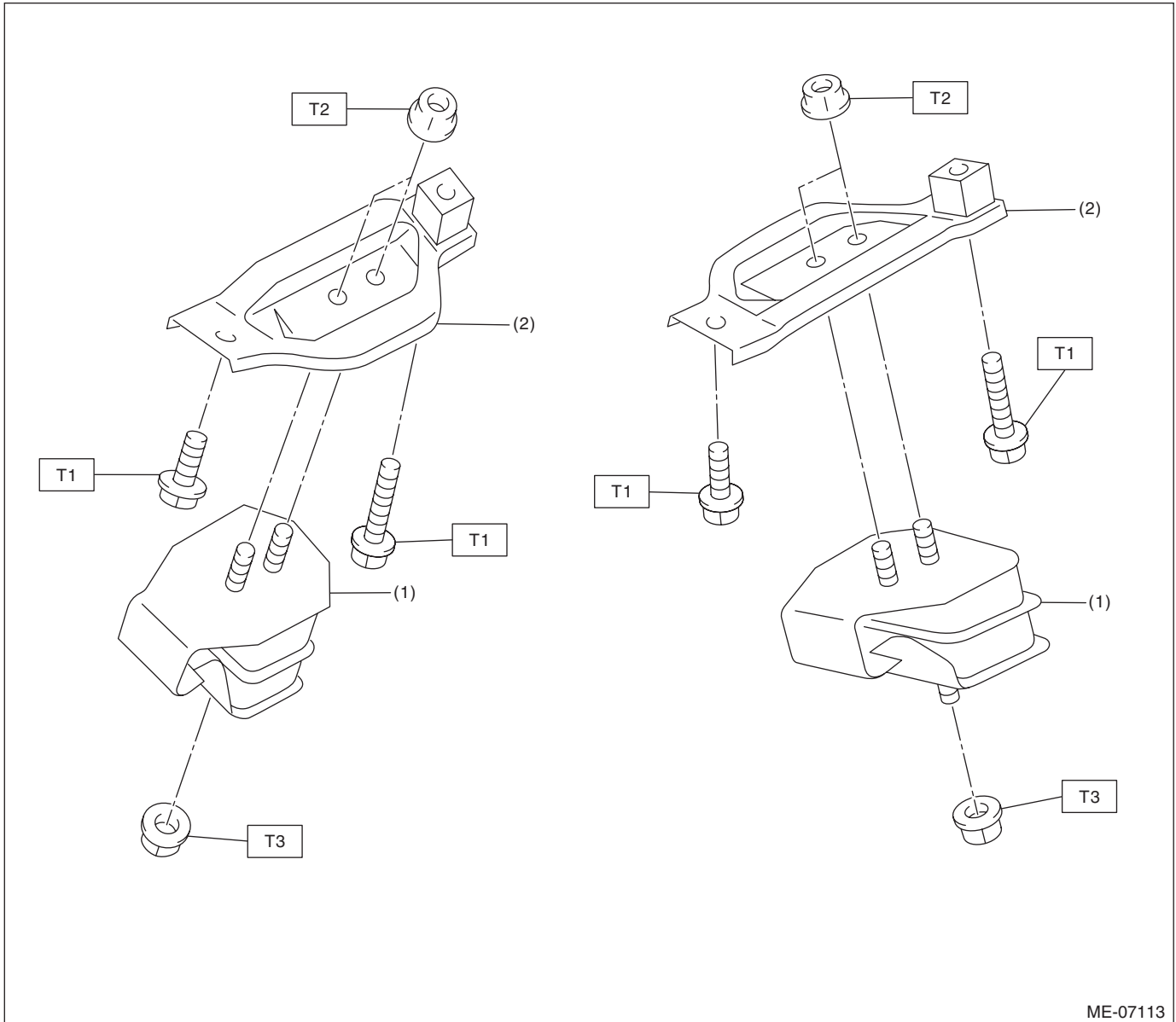
(1) Front cushion rubber

Tightening torque: N·m (kgf-m, ft-lb)

T1: 35 (3.6, 25.8)

T2: 45 (4.6, 33.2)

- Solid engine mounting model



ME-07113

(1) Front cushion rubber

(2) Front engine mounting bracket

Tightening torque: N·m (kgf·m, ft·lb)

T1: 35 (3.6, 25.8)

T2: 42 (4.3, 31.0)

T3: 45 (4.6, 33.2)

General Description

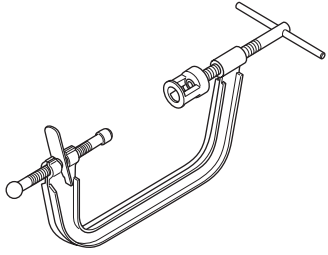
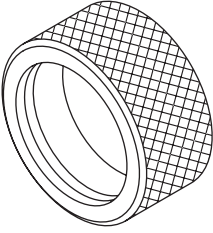
MECHANICAL

C: CAUTION

- Prior to starting work, pay special attention to the following:
 1. Always wear work clothes, a safety cap, protective shoes. Additionally, wear a helmet, protective goggles, etc. if necessary.
 2. Protect the vehicle using a seat cover, fender cover, etc.
 3. Prepare the service tools, clean cloth, containers to catch grease and oil, etc.
- Vehicle components are extremely hot immediately after driving. Be wary of receiving burns from heated parts.
- When performing a repair, identify the cause of trouble and avoid unnecessary removal, disassembly and replacement.
- Before disconnecting connectors of sensors or units, be sure to disconnect the ground cable from battery.
- Always use the jack-up point when the shop jacks or rigid racks are used to support the vehicle.
- Remove or install the engine in an area where chain hoists, lifting devices, etc. are available for ready use. When lifting up the vehicle, make sure to support the vehicle at the jack-up points.
- Be careful not to let any oil or grease contact the clutch disc or flywheel.
- Remove contamination including dirt and corrosion before removal, installation, disassembly or assembly.
- Keep the removed parts in order and protect them from dust and dirt.
- All removed parts, if to be reused, should be reinstalled in the original positions with attention to the correct directions, etc.
- Rotating parts and sliding parts such as piston, bearing and gear should be coated with oil when being assembled.
- Bolts, nuts and washers should be replaced with new parts as required.
- Be sure to tighten the fasteners including bolts and nuts to the specified torque.

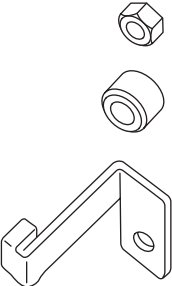
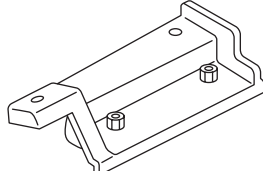
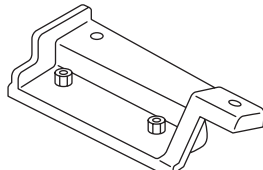
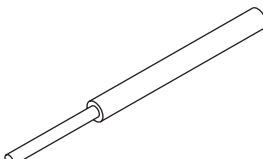
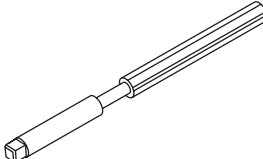
D: PREPARATION TOOL

1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST0920287002000	0920287002000	REMOVER AND REPLACER	Used for removing and installing valve spring.
 ST-398437700	398437700	OIL SEAL INSTALLER	Used for installing the front oil seal of engine.

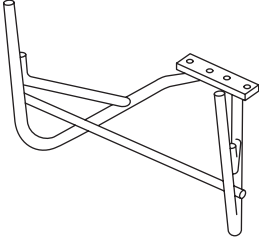
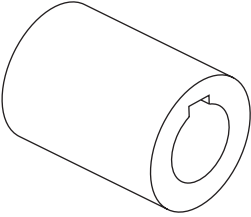
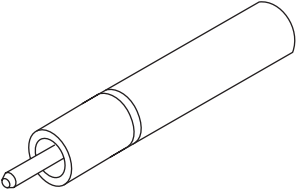
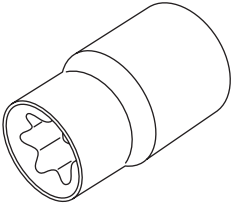
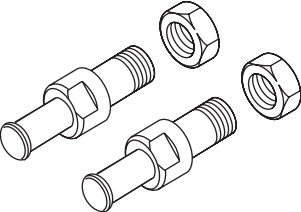
General Description

MECHANICAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498277200	498277200	STOPPER SET	Used for preventing the torque converter from falling when removing and installing the engine.
 ST-498457000	498457000	ENGINE STAND ADAPTER RH	• Used for disassembling and assembling engine. • Used together with ENGINE STAND (499817100) and ADAPTER (18362AA020).
 ST-498457100	498457100	ENGINE STAND ADAPTER LH	• Used for disassembling and assembling engine. • Used together with ENGINE STAND (499817100) and ADAPTER (18362AA020).
 ST-499765700	499765700	VALVE GUIDE REMOVER AND INSTALLER	Used for removing and installing valve guide.
 ST-499765900	499765900	VALVE GUIDE REAMER	Used for reaming valve guides.

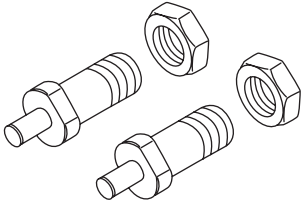
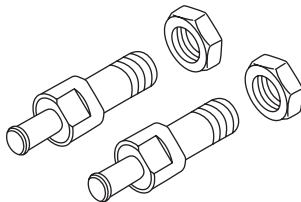
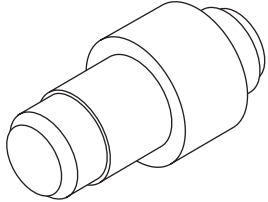
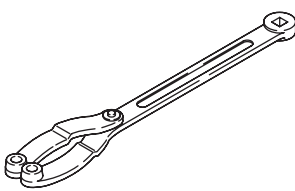
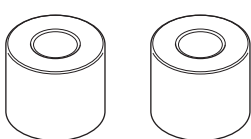
General Description

MECHANICAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499817100	499817100	ENGINE STAND	- Used for disassembling and assembling engine. - Used together with ADAPTER (18362AA020), ENGINE STAND ADAPTER RH (498457000) and LH (498457100).
 ST18252AA000	18252AA000	CRANKSHAFT SOCKET	Used for rotating crankshaft.
 ST18261AA010	18261AA010	VALVE OIL SEAL GUIDE	Used for press-fitting of intake valve guide stem seals and exhaust valve guide stem seals.
 ST18270AA020	18270AA020	SOCKET	Used for removing and installing connecting rod.
 ST18334AA000	18334AA000	PULLEY WRENCH PIN SET	- Used for removing and installing the crank pulley. - Used together with PULLEY WRENCH (18355AA000).

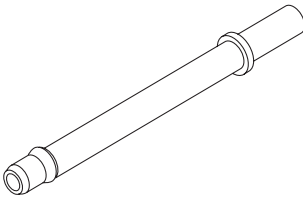
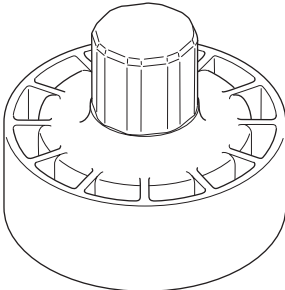
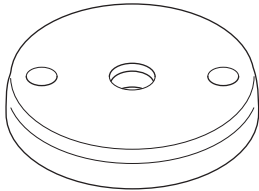
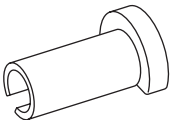
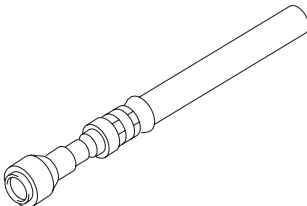
General Description

MECHANICAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18334AA020	18334AA020	PULLEY WRENCH PIN SET	- Used for removing and installing exhaust cam sprocket LH. - Used together with PULLEY WRENCH (18355AA000).
 ST18334AA030	18334AA030	PULLEY WRENCH PIN SET	- Used for removing and installing water pump pulley and intake cam sprocket. - Used together with PULLEY WRENCH (18355AA000).
 ST18350AA000	18350AA000	CONNECTING ROD BUSHING REMOVER AND INSTALLER	Used for removing and installing the connecting rod bushing at connecting rod small end.
 ST18355AA000	18355AA000	PULLEY WRENCH	- Used for removing and installing the crank pulley. - Used for installing and removing the water pump pulley. - Used for removing and installing intake cam sprocket and exhaust cam sprocket. - Used together with PULLEY WRENCH PIN SET (18334AA000), PULLEY WRENCH PIN SET (18334AA020) or PULLEY WRENCH PIN SET (18334AA030).
 ST18362AA020	18362AA020	ADAPTER	- Used for disassembling and assembling engine. - Used together with STAND (499817100), ENGINE STAND ADAPTER RH (498457000) and LH (498457100). - Bolt used: M10 × 50 (SUBARU genuine Part No.: 010410500)

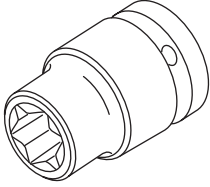
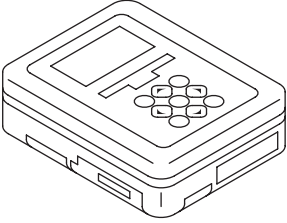
General Description

MECHANICAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18471AA000	18471AA000	FUEL PIPE ADAPTER	Used for inspecting the fuel pressure.
 ST18657AA030	18657AA030	OIL SEAL INSTALLER	- Used for installing the rear oil seal of engine. - Used together with OIL SEAL GUIDE (18671AA020).
 ST18671AA020	18671AA020	OIL SEAL GUIDE	- Used for installing the rear oil seal of engine. - Used together with OIL SEAL INSTALLER (18657AA030).
 ST42099AE000	42099AE000	QUICK CONNECTOR RELEASE	Used for removing the quick connector.
 ST42075AG690	42075AG690	FUEL HOSE	Used for inspecting the fuel pressure. NOTE: This is the SUBARU genuine part.

General Description

MECHANICAL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18270KA010	18270KA010	SOCKET	Used for installing and removing intake cam sprocket and exhaust cam sprocket.
 ST1B022XU0	1B022XU0	SUBARU SELECT MONITOR III KIT	Used for various inspections.

2. GENERAL TOOL

TOOL NAME	REMARKS
Compression gauge	Used for measuring compression.
Vacuum gauge	Used for measuring intake manifold vacuum.
Oil pressure gauge	Used for measuring engine oil pressure.
Fuel pressure gauge	Used for measuring fuel pressure.
Piston ring compressor	Used for installing the piston into the cylinder block.
Thickness gauge	Used for various inspections.
Angle gauge	Used for angle tightening.