



Tightening Torques

Item	N·m	kgf·m	lb·ft	lb·in
Engine mounting				
Mounting support bracket mounting bolts (RH/LH)	49.0 - 58.8	5.0 - 6.0	36.2 - 43.4	
Engine mounting support bracket to engine mounting insulator mounting nut (RH/LH)	63.7 - 83.4	6.5 - 8.5	47.0 - 61.5	
Engine mounting bracket to sub frame mounting bolts (RH/LH)	49.0 - 63.7	5.0 - 6.5	36.2 - 47.0	
Transmission mounting bracket to transmission nuts (2WD)	29.4 - 34.3	3.0 - 3.5	21.7 - 25.3	
Transmission mounting bracket to transmission nuts (AWD)	63.7 - 83.4	6.5 - 8.5	47.0 - 61.5	
Transmission mounting bracket to body bolts	58.8 - 73.5	6.0 - 7.5	43.4 - 54.2	
Drive belt System				
Drive belt idler bolt	53.9 - 55.9	5.5 - 5.7	39.8 - 41.2	
Drive belt auto tensioner bolt (M12)	81.4 - 85.3	8.3 - 8.7	60.0 - 62.9	
Drive belt auto tensioner bolt (M8)	17.7 - 21.6	1.8 - 2.2	13.0 - 15.9	
Crankshaft pulley bolt	421.7 - 431.5	43.0 - 44.0	311.0 - 318.3	
Timing system				
Timing chain cover bolts A	18.6 - 21.6	1.9 - 2.2	13.7 - 15.9	
Timing chain cover bolts B	24.5 - 26.5	2.5 - 2.7	18.1 - 19.5	
Timing chain cover bolts C	58.8 - 68.6	6.0 - 7.0	43.4 - 50.6	
Timing chain cover bolts D	9.8 - 11.8	1.0 - 1.2	7.2 - 8.7	
Timing chain auto tensioner bolt [RH/LH]	9.8 - 11.8	1.0 - 1.2	7.2 - 8.7	
Timing chain auto tensioner nut [RH/LH]	9.8 - 11.8	1.0 - 1.2	7.2 - 8.7	
Timing chain guide bolts [RH/LH]	19.6 - 24.5	2.0 - 2.5	14.5 - 18.1	
Timing chain cam to cam guide bolts [RH/LH]	9.8 - 11.8	1.0 - 1.2	7.2 - 8.7	
Oil pump chain sprocket bolt	19.6 - 24.5	2.0 - 2.5	14.5 - 18.1	
Oil pump chain tensioner bolt	9.8 - 11.8	1.0 - 1.2	7.2 - 8.7	
Variable force solenoid (VFS) valve bolts	9.8 - 11.8	1.0 - 1.2	7.2 - 8.7	
Cylinder head				
Cylinder head cover bolts (LH/RH)	[4.9 - 5.9] + [9.8 - 11.8]	[0.5 - 0.6] + [1.0 - 1.2]	[3.6 - 4.3] + [7.2 - 8.7]	[43.4 - 52.1] + [86.8 - 104.2]
Exhaust CVVT bolt (LH/RH)	64.7 - 76.5	6.6 - 7.8	47.7 - 56.4	
Intake CVVT OCV & center bolt (LH/RH)	[24.5] + [55 - 61°]	[2.5] + [55 - 61°]	[18.1] + [55 - 61°]	
Camshaft bearing cap bolts (LH/RH)	[5.8] + [9.8 - 11.8]	[0.6] + [1.0 - 1.2]	[4.3] + [7.2 - 8.7]	
Cylinder head bolts (LH/RH)	[37.3 - 41.2] + [118 - 122°] + [88 - 92°]	[3.8 - 4.2] + [118 - 122°] + [88 - 92°]	[27.5 - 30.4] + [118 - 122°] + [88 - 92°]	
Cylinder head bolt (RH rear)	18.6 - 23.5	1.9 - 2.4	13.7 - 17.4	
Center engine hanger bolt	44.1 - 53.6	4.5 - 5.5	32.5 - 39.8	
RH engine hanger bolts	18.6 - 23.5	1.9 - 2.4	13.7 - 17.4	
Exhaust OCV(oil control valve) bolts (LH/RH)	9.8 - 11.8	1.0 - 1.2	7.2 - 8.7	
Fuel pump bracket bolt	18.6 - 23.5	1.9 - 2.4	13.7 - 17.4	
Cylinder block				
Connecting rod bolts	[27.5-31.3] + [68-72°]	[2.8-3.2] + [68-72°]	[20.2-23.1] + [68-72°]	
Main bearing cap inner bolts (M11)	[49.0] + [90°]	[5.0] + [90°]	[36.2] + [90°]	
Main bearing cap outer bolts (M8)	[19.6] + [120°]	[2.0] + [120°]	[14.5] + [120°]	
Main bearing cap side bolts (M8)	29.4 - 31.4	3.0 - 3.2	21.7 - 23.1	
Connecting rod bearing cap bolt				

	[27.5 - 31.3] + [68 ~ 72°]	[2.8 - 3.2] + [68 ~ 72°]	[20.2 - 23.1] + [68 ~ 72°]	
Oil jet bolts	27.5 - 31.3	2.8 - 3.2	20.2 - 23.1	
Rear oil seal case bolts	9.8 - 11.8	1.0 - 1.2	7.2 - 8.7	
Baffle plate bolts	9.8 - 11.8	1.0 - 1.2	7.2 - 8.7	
Knock sensor bolts (LH/RH)	15.7 - 23.5	1.6 - 2.4	11.6 - 17.4	
Drive plate bolts	71.54 - 75.46	7.3 - 7.7	52.80 - 55.69	
Lubrication system				
Oil drain bolt	34.3 - 44.1	3.5 - 4.5	25.3 - 32.5	
Oil pump bolts	20.6 - 22.6	2.1 - 2.3	15.2 - 16.6	
Oil filter body bolts	19.6 - 21.6	2.0 - 2.2	14.5 - 15.9	
Oil cooler bolts	9.8 - 11.8	1.0 - 1.2	7.2 - 8.7	
Oil filter cap	34.3	3.5	25.3	
Oil level gauge bolt	17.7 - 21.6	1.8 - 2.2	13.0 - 15.9	
Lower oil pan bolts	11.8 - 13.7	1.2 - 1.4	8.7 - 10.1	
Upper oil pan bolts	19.6 - 21.6	2.0 - 2.2	14.5 - 15.9	
Upper oil pan preassembled washer bolts	11.8 - 13.7	1.2 - 1.4	8.7 - 10.1	
Cooling system				
Water pump bolts B	9.8 - 11.8	1.0 - 1.2	7.2 - 8.7	
Water pump bolt C	21.6 - 26.5	2.2 - 2.7	15.9 - 19.5	
Water pump bolt D	21.6 - 23.5	2.2 - 2.4	15.9 - 17.4	
Water pump bolt E	9.8 - 11.8	1.0 - 1.2	7.2 - 8.7	
Water pump bolt F	9.8 - 11.8	1.0 - 1.2	7.2 - 8.7	
Water pump pulley bolts	7.8 - 9.8	0.8 - 1.0	5.8 - 7.2	
Water temperature control assembly bolts & nuts	24.5 - 28.4	2.5 - 2.9	18.1 - 21.0	
Water center pipe bolt	9.8 - 11.8	1.0 - 1.2	7.2 - 8.7	
Water inlet pipe bolts	24.5 - 28.4	2.5 - 2.9	18.1 - 21.0	
Water outlet pipe bolts	24.5 - 28.4	2.5 - 2.9	18.1 - 21.0	
Electric thermostat (ECT)	16.7 - 19.6	1.7 - 2.0	12.3 - 14.5	
Intake and exhaust system				
Air cleaner assembly bolts (LH/RH)	7.8 - 9.8	0.8 - 1.0	5.8 - 7.2	
Intake manifold bolts	[3.9 - 5.9] + [26.5 - 31.4]	[0.4 - 0.6] + [2.7 - 3.2]	[2.9 - 4.3] + [19.5 - 23.1]	[34.7 - 52.1] + [234.3 - 277.7]
Surge tank bolts & nuts	9.8 - 11.8	1.0 - 1.2	7.2 - 8.7	
Surge tank stay bolts	26.5 - 31.4	2.7 - 3.2	19.5 - 23.1	
Turbo manifold module nuts (RH/LH)	58.8 - 63.7	6.0 - 6.5	43.4 - 47.0	
Turbocharger water pipe eye bolts (RH/LH)	33.3 - 39.2	3.4 - 4.0	24.6 - 28.9	
Turbocharger water pipe bolts (RH/LH)	9.8 - 11.8	1.0 - 1.2	7.2 - 8.7	
RH turbocharger oil feed pipe eye bolt (Turbo charger side)	11.8 - 17.6	1.2 - 1.8	8.7 - 13.0	
RH turbocharger oil feed pipe eye bolt (Cylinder block side)	66.7 - 70.6	6.8 - 7.2	49.2 - 52.1	
LH turbocharger oil feed pipe eye bolt	11.8 - 17.6	1.2 - 1.8	8.7 - 13.0	
LH turbocharger oil feed pipe nuts	9.8 - 11.8	1.0 - 1.2	7.2 - 8.7	
Turbocharger oil drain pipe bolts & nuts (RH/LH)	9.8 - 11.8	1.0 - 1.2	7.2 - 8.7	
Turbo manifold module stay bolts (RH/LH)	26.5 - 31.4	2.7 - 3.2	19.5 - 23.1	
RH Turbo manifold module stay A bolts	18.6 - 23.5	1.9 - 2.4	13.7 - 17.4	
Warm-up catalytic converter (WCC) nuts	35.3 - 41.2	3.6 - 4.2	26.0 - 30.4	
Warm-up catalytic converter (WCC) stay bolts	34.3 - 41.2	3.5 - 4.2	25.3 - 30.4	
Intercooler inlet joint nuts	49.0 - 53.9	5.0 - 5.5	36.2 - 39.8	
Intercooler outlet pipe bolt	18.6 - 23.5	1.9 - 2.4	13.7 - 17.4	

Intercooler upper/lower mounting bracket bolts & nuts	21.6 - 26.5	2.2 - 2.7	15.9 - 19.5	
Front muffler nuts (LH/RH)	39.2 - 58.8	4.0 - 6.0	28.9 - 43.4	
Front muffler bracket bolts (LH/RH)	29.4 - 39.2	3.0 - 4.0	21.7 - 28.9	
Center muffler nuts	39.2 - 58.8	4.0 - 6.0	28.9 - 43.4	
Rear muffler nuts	39.2 - 58.8	4.0 - 6.0	28.9 - 43.4	
Rear muffler bracket nuts	29.4 - 39.2	3.0 - 4.0	21.7 - 28.9	

NOTICE

Torque-to-yield cylinder head, connecting rod cap and crankshaft main bearing cap bolts must be replaced once removed because the bolts are designed to be permanently elongated beyond the state of elasticity when torqued.

If removed bolts are reused, the bolts may break or fail to maintain clamping force.