

ENGINE

Engine - Tightening Torques - X6 (N63)

ENGINE BLOCK

11 11 ENGINE BLOCK

ENGINE BLOCK-TIGHTENING TORQUE SPECIFICATIONS

		Type	Thread	Description	Tightening Specification
1AZ	Bearing cap to crankcase (ASA collar screw)	N63	M11x102	Replace screws	
				Jointing torque	20 Nm
				Torque angle	100°
2AZ	Bearing cap to crankcase (ASA collar screw 10.9)	N63	M8x70	Replace screws	
				Jointing torque	10 Nm
				Torque angle	55°
3AZ	Threaded support sleeves	N63		Jointing torque	6 Nm
4AZ	Angled screw connection to crankcase	N63	M8x37	Flanged head screw 10.9	34 Nm
5AZ	Spacer bolt, oil pump	N63	M8		34 Nm
6AZ	Screw plug, water drain	N63	M14x1.5	Replace seal	25 Nm
7AZ	Screw plug, main oil gallery rear and in V-space right	N63	M18x1.5	Replace seal	25 Nm
8AZ	Oil nozzle to crankcase	N63	M12x1		10 Nm
9AZ	Special tool to crankcase	N63	M8x35		20 Nm
10AZ	Special tool to crankcase	N63	M10x35		40 Nm
10AZ	Special tool 11 8 930 to special tool 00 2 300	N63	M14x35		160 Nm

CYLINDER HEAD WITH COVER

11 12 CYLINDER HEAD WITH COVER

CYLINDER HEAD WITH COVER-TIGHTENING TORQUE SPECIFICATIONS

		Type	thread	Tightening Specification
11AZ	Cylinder head cover	All	M6	10 Nm
		All	M7	15 Nm
		M21	M8	15 Nm
12AZ	Oil trap to cylinder head cover	M21	M8	17 Nm
13AZ	Timing case to cylinder head	All	M7	15 Nm
		All	M8	20 Nm
14AZ	Plug for oil channel (micro-encapsulated)	M47/M57	M12 x 1.5	20 Nm
15AZ	Vent plugs to cylinder head (coolant)	M67		2 Nm

11 12 CYLINDER HEAD WITH CYLINDER HEAD COVER

CYLINDER HEAD WITH CYLINDER HEAD COVER-TIGHTENING TORQUE SPECIFICATIONS

		Type	Thread	Description	Tightening Specification
1AZ	Cylinder head bolt	N63	M11 x 1.5	Replace screws.	
				Jointing torque	30 Nm
				1st angle of rotation	90 °
				2. Angle of rotation	90 °
2AZ	Cylinder head bolt	N63	M8		23 Nm
3AZ	Cylinder head cover to cylinder head.	N63	M6		10 Nm
4AZ	Metal bracket to cylinder head.	N63	M6 x 16		8 Nm
5AZ	Lifting eye to cylinder head.	N63	M8		20 Nm
6AZ	Ignition coil	N63	M6 x 20		4 Nm

	cover to cylinder head cover.				
7AZ	Non-return valve	N63	M14 x 1.5		20 Nm
8AZ	Vent connection	N63	M8 x 1	Replace sealing ring.	15 Nm
9AZ	ASA screw (2 x) Oil filler neck to cylinder head cover.	N63	M6 x 20	Replace sealing ring.	10 Nm

OIL SUMP

11 13 OIL PAN

OIL PAN-TIGHTENING TORQUE SPECIFICATIONS

		Type	Thread	Description	Tightening Specification
1AZ	Oil drain plug	N63	M18 x 1.5	Replace sealing ring	40 Nm
2AZ	Oil sump top section to crankcase	N63	M8		25
3AZ	Oil sump bottom section to oil sump top section	N63	M8	Replace micro-encapsulated screws	27 Nm
4AZ	Oil deflector to oil sump top section	N63	M6		10 Nm
5AZ	Screw plug, oil channel, to oil sump top section	N63	M24x1.5	Replace sealing ring	50 Nm
6AZ	Oil condition sensor to oil sump bottom section	N63	M6	Replace O-ring	8.5 Nm

11 13 OIL SUMP

OIL SUMP-TIGHTENING TORQUE SPECIFICATIONS

		Type	Thread	Description	Tightening Specification
1AZ	Oil drain plug	N57	M12 x 1.5	Replace sealing ring	25 Nm

2AZ	Oil sump to crankcase	N57	M8x 30 M8x110	Replace seal	25 Nm
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HOUSING COVER

11 14 CASE COVERS

CASE COVERS-TIGHTENING TORQUE SPECIFICATIONS

		Type	Thread	Description	Tightening Specification
1AZ	Jump guard to crankcase	N63	M6		10 Nm
2AZ	Timing case cover to crankcase, bottom	N63	M8		21 Nm
3AZ	Timing case to cylinder head, top	N63	M6		10 Nm
4AZ	End cover (oil) to crankcase (transmission side)	N63	M6	Observe tightening sequence (liquid gasket required)	10 Nm
5AZ	End cover (water) to crankcase (transmission side)	N63	M6	Observe tightening sequence (liquid gasket required)	10 Nm

11 15 CASE COVERS

CASE COVERS-TIGHTENING TORQUE SPECIFICATIONS

		Type	Thread	Tightening Specification
1AZ	Connection to cylinder head cover	N63	M6	10 Nm

CRANKCASE VENTILATION

11 15 CASE COVERS

CASE COVERS-TIGHTENING TORQUE SPECIFICATIONS

		Type	Thread	Tightening Specification
1AZ	Connection to	N63	M6	10 Nm

CRANKSHAFT WITH BEARING

11 11 ENGINE BLOCK

ENGINE BLOCK-TIGHTENING TORQUE SPECIFICATIONS

		Type	Thread	Description	Tightening Specification
1AZ	Bearing cap to crankcase (ASA collar screw)	N63	M11x102	Replace screws	
				Jointing torque	20 Nm
				Torque angle	100 °
2AZ	Bearing cap to crankcase (ASA collar screw 10.9)	N63	M8x70	Replace screws	
				Jointing torque	10 Nm
				Torque angle	55 °
3AZ	Threaded support sleeves	N63		Jointing torque	6 Nm
4AZ	Angled screw connection to crankcase	N63	M8x37	Flanged head screw 10.9	34 Nm
5AZ	Spacer bolt, oil pump	N63	M8		34 Nm
6AZ	Screw plug, water drain	N63	M14x1.5	Replace seal	25 Nm
7AZ	Screw plug, main oil gallery rear and in V-space right	N63	M18x1.5	Replace seal	25 Nm
8AZ	Oil nozzle to crankcase	N63	M12x1		10 Nm
9AZ	Special tool to crankcase	N63	M8x35		20 Nm
10AZ	Special tool to crankcase	N63	M10x35		40 Nm
10AZ	Special tool 11 8 930 to special tool 00 2 300	N63	M14x35		160 Nm

11 24 CONNECTING RODS AND BEARINGS

CONNECTING RODS AND BEARINGS-TIGHTENING TORQUE SPECIFICATIONS

		Type	Thread	Description	Tightening Specification
1AZ	Connecting rod bolts	N63	M9	Replace, wash and oil screws	
				1. Jointing torque	5 Nm
				2. Jointing torque	20 Nm
				3. Angle of rotation	70 °

11 21 CRANKSHAFT AND BEARINGS

CRANKSHAFT AND BEARINGS-TIGHTENING TORQUE SPECIFICATIONS

		Type	Thread	Description	Tightening Specification
1AZ	Increment wheel on crankshaft	S54	M5 10.9	Replace screws	
				Jointing torque	5.0 Nm
				Torque angle	45 °
	Increment wheel on crankshaft		M5 10.9	Replace screws	13 Nm
	Increment wheel on crankshaft		M5 8.8	Replace screws	5.5 Nm

FLYWHEEL

11 22 FLYWHEEL

FLYWHEEL-TIGHTENING TORQUE SPECIFICATIONS

		Type	Thread	Description	Tightening Specification
1AZ	Flywheel to crankshaft (automatic transmission)	N63	M12x1.5	Replace screws	105 Nm
2AZ	DM flywheel to crankshaft (manual transmission)	N63	M12x1.5	Replace screw	105 Nm
3AZ	Hybrid: DM flywheel to crankshaft (manual	N63	M12x1.5	Replace screw	120 Nm

transmission)				
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VIBRATION DAMPER

11 23 VIBRATION DAMPER

VIBRATION DAMPER-TIGHTENING TORQUE SPECIFICATIONS

		Type	Thread	Description	Tightening Specification
3AZ	Belt pulley/vibration damper to hub	S38/B36	M8 10.9		34 Nm
		N40/N42/N45/N46/S38/B38	M8 10.9		34 Nm
		All/others	M8		22 Nm
4AZ	Belt pulley to vibration damper	S38/B35	M8 8.8		22 Nm
		S50	M8 8.8		22 Nm
5AZ	Sprocket with hub or hub to crankshaft	M40	M16 x 1.5	Replace screw	310 Nm
		M42/M43/M43TU/M44	M16 x 1.5	Replace screw	330 Nm
6AZ	Hub to crankshaft	N40/N42/N45/N46	M16 x 1.5	Replace screw	300 Nm

11 23 VIBRATION DAMPER

VIBRATION DAMPER-TIGHTENING TORQUE SPECIFICATIONS

		Type	Thread	Description	Tightening Specification
1AZ	Hub to crankshaft (head surface oiled)	N63	M18x1.5	Replace screw	
				1. Jointing torque	100 Nm
				2. Angle of rotation	60 °
				3. Angle of rotation	60 °
				4. Angle of rotation	60 °

CONNECTING ROD

11 11 ENGINE BLOCK

ENGINE BLOCK-TIGHTENING TORQUE SPECIFICATIONS

		Type	Thread	Description	Tightening Specification
1AZ	Bearing cap to crankcase (ASA collar screw)	N63	M11x102	Replace screws	
				Jointing torque	20 Nm
				Torque angle	100 °
2AZ	Bearing cap to crankcase (ASA collar screw 10.9)	N63	M8x70	Replace screws	
				Jointing torque	10 Nm
				Torque angle	55 °
3AZ	Threaded support sleeves	N63		Jointing torque	6 Nm
4AZ	Angled screw connection to crankcase	N63	M8x37	Flanged head screw 10.9	34 Nm
5AZ	Spacer bolt, oil pump	N63	M8		34 Nm
6AZ	Screw plug, water drain	N63	M14x1.5	Replace seal	25 Nm
7AZ	Screw plug, main oil gallery rear and in V-space right	N63	M18x1.5	Replace seal	25 Nm
8AZ	Oil nozzle to crankcase	N63	M12x1		10 Nm
9AZ	Special tool to crankcase	N63	M8x35		20 Nm
10AZ	Special tool to crankcase	N63	M10x35		40 Nm
10AZ	Special tool 11 8 930 to special tool 00 2 300	N63	M14x35		160 Nm

11 24 CONNECTING RODS AND BEARINGS

CONNECTING RODS AND BEARINGS-TIGHTENING TORQUE SPECIFICATIONS

		Type	Thread	Description	Tightening Specification
1AZ	Connecting rod	N63	M9	Replace, wash	

bolts			and oil screws	
			1. Jointing torque	5 Nm
			2. Jointing torque	20 Nm
			3. Angle of rotation	70 °

V-RIBBED BELT

11 28 V-RIBBED BELT WITH TENSION AND DEFLECTION ELEMENT

V-RIBBED BELT WITH TENSION AND DEFLECTION ELEMENT-TIGHTENING TORQUE SPECIFICATIONS

		Type	Thread	Tightening Specification
1AZ	Belt tensioner with deflection pulley to crankcase	N63	M10	40 Nm
2AZ	Belt pulley to torsion vibration damper	N63	M10	40 Nm

CAMSHAFT

11 31 CAMSHAFT

CAMSHAFT-TIGHTENING TORQUE SPECIFICATIONS

		Type	Thread	Description	Tightening Specification
1AZ	Tensioning rail and guide rail, cyl. 1 to 4, to crankcase	N63	M10x1.25	Insert screws dry	46 Nm
2AZ	Tensioning rail and guide rail, cyl. 5 to 8, to crankcase	N63	M8x1.25		20 Nm
3AZ	Guide rail to cylinder head	N63	M14x1.5	Replace sealing ring	25 Nm
4AZ	Sliding rail to cylinder head	N63	M7		15 Nm
5AZ	Chain tensioner to cylinder head	N63	M7		13 Nm
6AZ	Camshaft	N63	M7		15 Nm

	bearing cap to cylinder head				
7AZ	Camshaft step bearing cap to cylinder head	N63	M7		15 Nm

VARIABLE CAMSHAFT

11 36 VARIABLE CAMSHAFT CONTROL

VARIABLE CAMSHAFT CONTROL-TIGHTENING TORQUE SPECIFICATIONS

		Type	Thread	Description	Tightening Specification
1AZ	VANOS gear to inlet and exhaust camshafts	N63	M10x1	Replace screw	
				Jointing torque	30 Nm
				Torque angle	90 °
2AZ	Non-return valve VANOS to cylinder head	N63	M14 x 1.5		13 Nm
3AZ	Solenoid valve holder to cylinder head	N63	M6		10 Nm

OIL PUMP WITH FILTER

11 41 OIL PUMP WITH STRAINER AND DRIVE

OIL PUMP WITH STRAINER AND DRIVE-TIGHTENING TORQUE SPECIFICATIONS

		Type	Thread	Description	Tightening Specification
1AZ	Intake manifold to oil pump	N63	M6		10 Nm
2AZ	Oil pump to bearing cap	N63	M8		24 Nm
3AZ	Oil pump cover to housing	N63	M6		10 Nm
4AZ	Sprocket to oil pump	N63	M10	Important - left- hand thread	
				1. Jointing torque	20 Nm
				2. Angle of rotation	40 °

5AZ	Oil pump sprocket wheel to hub	N63	M6		10 Nm
6AZ	Oil deflector to oil pump	N63	M6		10 Nm

11 43 OIL FILLING

OIL FILLING-TIGHTENING TORQUE SPECIFICATIONS

		Type	Thread	Tightening Specification
1AZ	Oil cooler thermostat to oil sump top section	N63	M33x2	95 Nm

OIL FILTER AND LINES

11 42 OIL FILTER AND PIPES

OIL FILTER AND PIPES-TIGHTENING TORQUE SPECIFICATIONS

		Type	Thread	Description	Tightening Specification
1AZ	Oil filter cover to oil sump top section	N63			25 Nm
2AZ	Oil drain plug to oil filter cover	N63	M12	Replace sealing ring	10 Nm
3AZ	Turbocharger oil line to crankcase	N63	M12x1.5	Replace sealing ring	27 Nm
4AZ	Oil line to turbocharger	N63	M10x1	Replace sealing ring	16 Nm
5AZ	Oil line to turbocharger (return)	N63	M6x16	Replace seal	10 Nm
6AZ	Oil line to crankcase (return)	N63	M6x16	Replace seal	10 Nm
7AZ	Holder, oil line to coolant line	N63	M6	Screw, captive	10 Nm
8AZ	Oil return cover to crankcase	N63	M6x20	Replace seal	10 Nm
9AZ	Oil return line to turbocharger	N63	M6x16		10 Nm
10AZ	Oil return line to oil return cover	N63	M6		10 Nm

OIL FILLING, DIPSTICK

11 43 OIL FILLING

OIL FILLING-TIGHTENING TORQUE SPECIFICATIONS

		Type	Thread	Tightening Specification
1AZ	Oil cooler thermostat to oil sump top section	N63	M33x2	95 Nm

WATER PUMP WITH DRIVE

11 51 COOLANT PUMP

COOLANT PUMP-TIGHTENING TORQUE SPECIFICATIONS

		Type	Thread	Description	Tightening Specification
1AZ	Coolant pump to timing case.	N63	M6x25 M6x70 M6x90	Replace seal.	10 Nm
2AZ	Coolant temperature sensor to coolant pump.	N63	M12 x 1.5		13 Nm
3AZ	Pipe to coolant pump.	N63	M6	Replace sealing ring.	10 Nm
4AZ	Supplementary coolant pump to bracket.	N63	M6 x 12		10 Nm

11 65 TURBOCHARGER AND CONTROL

TURBOCHARGER AND CONTROL-TIGHTENING TORQUE SPECIFICATIONS

		Type	Thread	Tightening Specification
1AZ	Exhaust turbocharger H.P. to exhaust manifold	N57S	M8x22	25 Nm
2AZ	Exhaust turbocharger L.P. to exhaust manifold	N57S	M10x25	40 Nm
3AZ	Compressor bypass to low-pressure stage	N57S	M8	8 Nm

FAN

11 52 FAN

FAN-TIGHTENING TORQUE SPECIFICATIONS

		Type	Tightening Specification
1AZ	Fan clutch on water pump Coupling nut (left-hand threads)	All	40 Nm
		M54	45 Nm
2AZ	Fan to fan clutch	All	10 Nm

THERMOSTAT AND CONNECTIONS

11 53 THERMOSTAT AND CONNECTIONS

THERMOSTAT AND CONNECTIONS-TIGHTENING TORQUE SPECIFICATIONS

		Type	thread	Tightening Specification
1AZ	Thermostat housing	All	M6	10 Nm
2AZ	Bleeder screw	All	M8	8 Nm

11 53 THERMOSTAT AND CONNECTIONS

THERMOSTAT AND CONNECTIONS-TIGHTENING TORQUE SPECIFICATIONS

		Type	Thread	Tightening Specification
1AZ	Thermostat housing to coolant pump	N63	M6	10 Nm
2AZ	Coolant line to turbocharger	N63	M14x1.5	38 Nm
3AZ	Coolant line to turbocharger	N63	M6x16	10 Nm

INTAKE MANIFOLD

11 61 AIR INTAKE MANIFOLD

AIR INTAKE MANIFOLD-TIGHTENING TORQUE SPECIFICATIONS

		Type	Thread	Tightening Specification
1AZ	Intake manifold to cylinder head	N63	M7	15 Nm
2AZ	Holder, intake	N63	M6	10 Nm

module, to cylinder head			
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11 61 INTAKE MANIFOLD

INTAKE MANIFOLD-TIGHTENING TORQUE SPECIFICATIONS

		Type	thread	Tightening Specification
1AZ	Intake manifold on cylinder head	All	M8	22 Nm
		All	M7	15 Nm
		All	M6	10 Nm
2AZ	Soundproofing hood to holder	M60/1/M60/2/M62	M6	8 Nm

11 65 TURBOCHARGER AND CONTROL

TURBOCHARGER AND CONTROL-TIGHTENING TORQUE SPECIFICATIONS

		Type	Thread	Description	Tightening Specification
1AZ	Exhaust manifold to turbocharger (D80 V-band clamp).	N63	M8	Replace V-band clamp	20 Nm
2AZ	Turbocharger to primary catalyst (D108 V-band clamp).	N63	M8	Replace V-band clamp	20 Nm
3AZ	Heat shield	N63	M6 x 12		10 Nm
4AZ	Heat shield to crankcase, oil return cover or cylinder head.	N63	M6 x 14		10 Nm
5AZ	Heat shield to crankcase.	N63	M6 x 22		10 Nm
6AZ	Vacuum reservoir to crankcase and cylinder head.	N63	M6 x 14		10 Nm
7AZ	Bracket, electropneumatic pressure converter, to cylinder head.	N63	M6 x 18		10 Nm
8AZ	Hexagon nut (2 x) Electropneumatic pressure converter to bracket.	N63	BM6		10 Nm

EXHAUST MANIFOLD

11 62 EXHAUST MANIFOLD

EXHAUST MANIFOLD-TIGHTENING TORQUE SPECIFICATIONS

		Type	Thread	Description	Tightening Specification
1AZ	Exhaust manifold to cylinder head Coat screw connections with CRC copper paste	All	M6	Replace nuts	10 Nm
		M50/M52/M52TU/M54/M56/S52/S50 US	M7	Replace nuts	20 Nm
		All/others	M7	Replace nuts	15 Nm
		M10	M8	Upper row of stay bolts installed with bolt cement	23 Nm
		M21	M8		12 Nm
				Replace nuts Retighten after 2000 km Slacken nuts by a 1/4 turn	
					12 Nm
		M41/M47/M47TU/M51/M57/M57TU	M8	Replace nuts	20 Nm
		All/others	M8	Replace nuts	23 Nm

SUPERCHARGER

11 65 TURBOCHARGER AND CONTROL

TURBOCHARGER AND CONTROL-TIGHTENING TORQUE SPECIFICATIONS

		Type	Thread	Tightening Specification
1AZ	Exhaust turbocharger H.P. to exhaust manifold	N57S	M8x22	25 Nm
2AZ	Exhaust	N57S	M10x25	40 Nm

	turbocharger L.P. to exhaust manifold			
3AZ	Compressor bypass to low-pressure stage	N57S	M8	8 Nm

11 65 TURBOCHARGER AND CONTROL

TURBOCHARGER AND CONTROL-TIGHTENING TORQUE SPECIFICATIONS

		Type	Thread	Description	Tightening Specification
1AZ	Exhaust manifold to turbocharger (D80 V-band clamp).	N63	M8	Replace V-band clamp	20 Nm
2AZ	Turbocharger to primary catalyst (D108 V-band clamp).	N63	M8	Replace V-band clamp	20 Nm
3AZ	Heat shield	N63	M6 x 12		10 Nm
4AZ	Heat shield to crankcase, oil return cover or cylinder head.	N63	M6 x 14		10 Nm
5AZ	Heat shield to crankcase.	N63	M6 x 22		10 Nm
6AZ	Vacuum reservoir to crankcase and cylinder head.	N63	M6 x 14		10 Nm
7AZ	Bracket, electropneumatic pressure converter, to cylinder head.	N63	M6 x 18		10 Nm
8AZ	Hexagon nut (2 x) Electropneumatic pressure converter to bracket.	N63	BM6		10 Nm

VACUUM PUMP

11 66 VACUUM PUMP

VACUUM PUMP-TIGHTENING TORQUE SPECIFICATIONS

		Type	Thread	Tightening Specification
1AZ	Vacuum pump to	N63	M6	10 Nm

cylinder head (1- 4)			
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EMISSION CONTROL

11 78 EMISSIONS CONTROL, CONTROL SENSOR/MONITOR SENSOR

EMISSIONS CONTROL, CONTROL SENSOR/MONITOR SENSOR-TIGHTENING TORQUE SPECIFICATIONS

		Type	Thread	Tightening Specification
1AZ	Control sensor/monitor sensor	N63	M18 x 1.5	50 Nm
2AZ	Bracket, oxygen sensor, to cylinder head cover	N63	M6	10 Nm

11 78 EMISSIONS-CONTROL, LAMBDA OXYGEN SENSOR

EMISSIONS-CONTROL, LAMBDA OXYGEN SENSOR-TIGHTENING TORQUE SPECIFICATIONS

		Type	Thread	Tightening Specification
1AZ	Oxygen control sensor; oxygen monitor sensor	All	M18 x 1.5	50 Nm