

Engine Mechanical System

GENERAL

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



EM -2

ENGINE MECHANICAL SYSTEM

GENERAL

SPECIFICATIONS(2.0 VVT) E25CDFDD

Description	Specifications	Limit
General Type Number of cylinder Bore Stroke Total displacement Compression ratio Firing order	In-line, Double Overhead Camshaft 4 82mm (3.228in.) 93.5mm (3.681in.) 1975cc (120.52cu.in.) 10.1 1-3-4-2	
Valve timing Intake valve Opens (ATDC) Closes (ABDC) ExhaustOpens (BBDC) Closes (ATDC)	11° 59° 42° 6°	
Valve Valve length Intake Exhaust Stem O.D. Intake Exhaust	114.34mm (4.5016in.) 116.8mm (4.598in.) 5.965 ~ 5.98mm (0.2348 ~ 0.2354in.) 5.950 ~ 5.965mm (0.2343 ~ 0.2348in.)	
Face angle thickness of valve head (Margin) Intake Exhaust	1.15mm (0.0452in.) 1.35mm (0.0531in.)	0.8mm (0.031in.) 1.0mm (0.039in.)
Valve stem to valve guide clearance Intake Exhaust	0.02 ~ 0.05mm (0.0008 ~ 0.0019in.) 0.035 ~ 0.065mm (0.0014 ~ 0.0026in.)	0.10mm (0.0039in.) 0.13mm (0.0051in.)
Valve guide Installed dimension O.D Intake Exhaust Service oversize	46mm (1.811in.) 54.5mm (2.146in.) 0.05, 0.25, 0.50mm (0.002, 0.010, 0.020in.) oversize	
Valve seat Width of seat contact Intake Exhaust Seat angle Oversize	1.1 ~ 1.5mm (0.043 ~ 0.059in.) 1.3 ~ 1.7mm (0.051 ~ 0.066in.) 45° 0.3, 0.6mm (0.012, 0.024in.) oversize	
Valve spring Free length Load Installed height Squaresnces	48.86mm (1.9236in.) 18.8 ± 0.9kg/39mm 39mm (1.5354in.) 1.5° or less	

GENERAL

EM -3

Valve clearance Cold (20°C[68°F]) Intake Exhaust Hot (80°C[176°F]) : only for reference Intake Exhaust	0.20mm (0.0079in.) 0.28mm (0.0110 in.) 0.29mm (0.0014in.) 0.34mm (0.0134in.)	0.12 ~ 0.28mm (0.0047 ~ 0.0110in.) 0.20 ~ 0.38mm (0.0079 ~ 0.0150in.)
Cylinder head Flatness of gasket surface Flatness of manifold mounting surface Oversize rework dimensions of valve seat hole Intake 0.3mm (0.012in.) O.S. 0.6mm (0.024in.) O.S. Exhaust 0.3mm (0.012in.) O.S. 0.6mm (0.024in.) O.S. Oversize rework dimensions of valve guide hole (both intake and exhaust) 0.05mm (0.002in.) O.S 0.25mm (0.010in.) O.S 0.50mm (0.020in.) O.S	Max. 0.03mm (0.0012in.) Max. 0.15mm (0.0059in.) 33.300 ~ 33.325mm (1.3110 ~ 1.3120in.) 33.600 ~ 33.625mm (1.3228 ~ 1.3238in.) 28.800 ~ 28.821mm (1.1338 ~ 1.1346in.) 29.100 ~ 29.121mm (1.1456 ~ 1.1465in.) 11.05 ~ 11.068mm (0.435 ~ 0.4357in.) 11.25 ~ 11.268mm (0.443 ~ 0.4436in.) 11.50 ~ 11.518mm (0.453 ~ 0.4535in.)	0.06mm (0.0024in.) 0.03mm (0.0012in.)
Cylinder block Cylinder bore Out-of-round and taper of cylinder bore Clearance with piston(To set limits to new parts)	82.00 ~ 82.03mm (3.2283 ~ 3.2295in.) Less than 0.01mm (0.0004in.) 0.02 ~ 0.04mm (0.0008 ~ 0.0016in.)	
Piston O.D (To set limits to new parts) Service oversize	81.97 ~ 82.00mm (3.2271 ~ 3.2283in.) 0.25, 0.50mm (0.010, 0.020in.) oversize	
Piston ring Side clearance No.1 No.2 End gap No.1 No.2 Oil ring side rail Service oversize	0.04 ~ 0.08mm (0.0015 ~ 0.0031in.) 0.03 ~ 0.07mm (0.0012 ~ 0.0027in.) 0.23 ~ 0.38mm (0.0090 ~ 0.0149in.) 0.45 ~ 0.60mm (0.0177 ~ 0.0236in.) 0.20 ~ 0.60mm (0.0078 ~ 0.0236in.) 0.25, 0.50mm(0.010, 0.020in.) oversize	0.1mm (0.004in.) 1mm (0.039in.) 1mm (0.039in.) 1mm (0.039in.)
Connecting rod Bend Twist Connecting rod big end to crankshaft side clearance	0.05mm (0.0020in.) or less 0.1mm (0.004in.) or less 0.100 ~ 0.250mm (0.0039 ~ 0.010in.)	0.4mm (0.0157in.)
Connecting rod bearing Oil clearance (To seat limits to new parts) Undersize	0.024 ~ 0.044mm (0.0009 ~ 0.0017in.) 0.25mm (0.01in.)	

EM -4

ENGINE MECHANICAL SYSTEM

Camshaft Cam height Intake Exhaust Journal O.D. Bearing oil clearance End play	44.618mm (1.7566in.) 44.518mm (1.7527in.) 28mm (1.1023in.) 0.02 ~ 0.061mm (0.0008 ~ 0.0024in.) 0.1 ~ 0.2mm (0.004 ~ 0.008in.)	44.518mm (1.7527in.) 44.418mm (1.7487in.) 0.1mm (0.0039in.)
Crankshaft Pin O.D. Journal O.D. Bend Out-of-round, taper of journal and pin End play Undersize rework dimension of pin 0.25mm (0.010in.) Undersize rework dimension of journal 0.25mm (0.010in.)	45mm (1.77in.) 57mm (2.244in.) 0.03mm (0.0012in.) or less 0.05mm (0.0002in.) or less 0.06 ~ 0.260mm (0.0023 ~ 0.010in.) 44.725 ~ 44.740mm (1.7608 ~ 1.7614in.) 56.727 ~ 56.742mm (2.2333 ~ 2.2339in.)	0.030mm (0.0012in.)
Crankshaft bearing Oil clearance	0.028 ~ 0.046mm (0.0011 ~ 0.0018in.)	
Flywheel Runout	0.1mm (0.0039in.)	0.13mm (0.0051in.)
Cooling method	Water-cooled, pressurized. Forced circulation with electrical fan	
Coolant Quantity	6 liter (6.3U.S qts, 5.2Imp. qts)	
Radiator Type	Pressurized corrugated fin type	
Radiator cap Main valve opening pressure Vacuum valve opening pressure	83 ~ 110kpa (12 ~ 16psi, 0.83 ~ 1.1kg/cm ²) -7kpa (-100psi, -0.07kg/cm ²) or less	
Thermostat Type Valve opening temperature Full-opening temperature	Wax pellet type with jiggle valve 82°C (177°F) 95°C (201°F)	
Coolant pump	Centrifugal type impeller	
Drive belt Type	V-ribbed belt	
Engine coolant temperature sensor Type Resistance	Heat-sensitive thermistor type 2.31 ~ 2.59KΩ at 20°C (68°F)	
Oil pump Clearance between outer circumference and front case. Front case tip clearance Side clearance Inner gear Outer gear Engine oil pressure at 1500 RPM [Oil temperature is 90 to 110°C (194 to 230°F)]	0.120 ~ 0.185mm (0.0049 ~ 0.0073in.) 0.025 ~ 0.069mm (0.0009 ~ 0.0027in.) 0.04 ~ 0.085mm (0.0016 ~ 0.0033in.) 0.04 ~ 0.09mm (0.0016 ~ 0.0035in.) 245KPa (2.5kg/cm ² , 35.5psi)	

GENERAL

EM -5

Relief spring Free height Load	43.8mm (1.725in.) 3.7 ± 0.4kg at 40.1mm (3.15lb/1.578in.)	
Air cleaner Type Element	Dry type Unwoven cloth type	
Exhaust pipe Muffler Suspension system	Expansion resonance type Rubber hangers	

SERVICE STANDARDS

Standard value	
Antifreeze	Maxturity ratio of anti-freeze in coolant
ETHYLENE GLYCOL BASE FOR ALUMINUM	50%

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



EM -6

ENGINE MECHANICAL SYSTEM

TIGHTENING TORQUE

Item	N.m	kgf.cm	lb.ft
Cylinder Block			
Front engine support bracket bolt and nut	35 ~ 50	350 ~ 500	25 ~ 37
Front roll stopper bracket bolt	70 ~ 90	700 ~ 900	51 ~ 65
Rear roll stopper bracket bolt	70 ~ 90	700 ~ 900	51 ~ 65
Rear engine stopper bracket bolt	35 ~ 50	350 ~ 500	25 ~ 37
Engine Mounting			
Right mounting insulator (large) nut	90 ~ 110	900 ~ 1100	65 ~ 80
Right mounting insulator (small) nut	45 ~ 60	450 ~ 600	33 ~ 44
Right mounting bracket to engine nuts and bolts	50 ~ 65	00 ~ 650	36 ~ 48
Transmission mount insulator nut	90 ~ 110	900 ~ 1100	65 ~ 80
Transmission insulator bracket to side member bolt	40 ~ 50	400 ~ 500	30 ~ 36
Rear roll stopper insulator nut	50 ~ 65	500 ~ 650	36 ~ 48
Rear roll stopper bracket to center member bolts	40 ~ 50	400 ~ 500	30 ~ 36
Front roll stopper insulator nut	50 ~ 65	500 ~ 650	36 ~ 48
Front roll stopper bracket to center member bolts.	40 ~ 50	400 ~ 500	30 ~ 36
Main Moving			
Connecting rod cap nut	50 ~ 53	500 ~ 530	36 ~ 39
Crankshaft bearing cap bolt	27~33 + (60°~65°)	270~330 + (60°~65°)	20~24 + (60°~65°)
Fly wheel M/T bolt	120 ~ 130	1200 ~ 1300	88 ~ 95
Drive plate A/T bolt	120 ~ 130	1200 ~ 1300	88 ~ 95
Engine cover	4 ~ 61	40 ~ 60	3 ~ 4
Heat protector	5 ~ 20	150 ~ 200	11 ~ 15
Water pipe bracket bolts	12 ~ 15	120 ~ 150	9 ~ 11
Cooling system			
Alternator support bolt and nut	20 ~ 25	200 ~ 250	14 ~ 18
Alternator lock bolt	12 ~ 15	120 ~ 150	9 ~ 11
Alternator brace mounting bolt	20 ~ 27	200 ~ 270	15 ~ 20
Coolant pump pulley bolts	8 ~ 10	80 ~ 100	6 ~ 7
Coolant pump bolts	20 ~ 27	200 ~ 270	14 ~ 19
Coolant temperature sensor	20 ~ 40	200 ~ 400	15 ~ 30
Coolant inlet fitting nuts	15 ~ 20	150 ~ 200	11 ~ 14
Thermostat housing bolts and nuts	15 ~ 20	150 ~ 200	11 ~ 14
Lubrication system			
Oil filter	12 ~ 16	120 ~ 160	9 ~ 12
Oil pan bolts	10 ~ 12	100 ~ 120	7 ~ 9
Oil pan drain plug	40 ~ 45	400 ~ 450	30 ~ 33
Oil screen bolts	15 ~ 22	150 ~ 220	11 ~ 16
Oil pressure switch	13 ~ 15	130 ~ 150	9.7 ~ 11

GENERAL

EM -7

Intake and Exhaust system			
Air cleaner body mounting bolts	8~ 10	80 ~ 100	6 ~ 7
Resonator mounting bolts	4 ~ 6	40 ~ 60	3 ~ 4
Intake manifold to cylinder head nuts and bolts	16 ~ 23	160 ~ 230	12 ~ 17
Intake manifold stay to cylinder block bolts	18 ~ 25	180 ~ 250	13 ~ 18
Throttle body to surge tank nuts	15 ~ 20	150 ~ 200	11 ~ 14
Exhaust manifold to cylinder head nuts	43 ~ 55	430 ~ 550	32 ~ 40
Exhaust manifold cover to exhaust manifold bolts	15 ~ 20	150 ~ 200	11 ~ 14
Oxygen sensor to front muffler	50 ~ 60	500 ~ 600	36 ~ 43
Oxygen sensor to exhaust manifold	50 ~ 60	500 ~ 600	36 ~ 43
Front exhaust pipe to exhaust manifold nuts	30 ~ 40	300 ~ 400	22 ~ 29
Front exhaust pipe bracket bolts	30 ~ 40	300 ~ 400	22 ~ 29
Front exhaust pipe to catalytic converter bolts	40 ~ 60	400 ~ 600	29 ~ 43
Main muffler hanger support bracket bolts	10 ~ 15	100 ~ 150	7 ~ 11
Cylinder head			
Cylinder head bolts - M10	25 + (60°~65°) + (60°~65°)	250 + (60°~65°) + (60°~65°)	18 + (60°~65°) + (60°~65°)
Cylinder head bolts - M12	30 + (60°~65°) + (60°~65°)	300 + (60°~65°) + (60°~65°)	22 + (60°~65°) + (60°~65°)
Intake manifold nuts	18 ~ 25	180 ~ 250	13 ~ 18
Exhaust manifold nuts	43 ~ 55	430 ~ 550	32 ~ 41
Cylinder head cover bolts	8 ~ 10	80 ~ 100	6 ~ 7
Camshaft bearing cap bolts	14 ~ 15	140 ~ 150	10 ~ 11
Oil control valve bolt	10 ~ 12	100 ~ 120	7.3 ~ 8.8
OCV Filter	41 ~ 51	410 ~ 510	30 ~ 37.6
CVVT unit to exhaust camshaft bolt	66 ~ 78	660 ~ 780	48.7~ 57.5
Rear plate bolts	8 ~ 10	80 ~ 100	6 ~ 7
Timing Belt			
Crankshaft pulley bolt	170 ~ 180	1700 ~ 1800	125 ~ 133
Camshaft sprocket bolt	100 ~ 120	1000 ~ 1200	74 ~ 89
Timing belt tensioner bolts	43 ~ 550	430 ~ 550	31 ~ 40
Timing belt cover bolts	8 ~ 10	80 ~ 100	6 ~ 7
Front case bolts	20 ~ 27	200 ~ 270	14 ~ 20
Timing belt idler bolt	43 ~ 55	430 ~ 550	31 ~ 40

M/T : Manual Transmission

A/T : Automatic Transmission

EM -8

ENGINE MECHANICAL SYSTEM

SPECIFICATIONS(2.7 GSL)

E3D66EEE

Description	Specifications	Limit
General Type Number of cylinder Bore Stroke Total displacement Compression ratio Firing order Valve timing Intake valve Opens (BTDC) Closes (ABDC) Exhaust valve Opens (BBDC) Closes (ATDC)	V-type, DOHC 6 86.7mm (3.4133in.) 75mm (2.9528in.) 2,656cc 10 : 1 1-2-3-4-5-6 6° 46° 44° 8	
Camshaft Drive mechanism Cam height Intake Exhaust Journal diameter Bearing oil clearance End play	Cogged type belt 43.95 ~ 44.15mm (1.7303 ~ 1.7382in.) 43.95 ~ 44.15mm (1.7303 ~ 1.7382in.) 25.964 ~ 25.980mm (1.0222 ~ 1.0228in.) 0.02 ~ 0.061mm (0.0007 ~ 0.0024in.) 0.1 ~ 0.15mm (0.0039 ~ 0.0059in.)	 43.45mm (1.7106in.) 43.45mm (1.7106in.) 25.914mm (1.0202in.) 0.1mm (0.0039in.)
Cylinder head Flatness of cylinder head surface Flatness of manifold mounting surface Intake Exhaust Valve guides hole diameter 0.05 (0.002) O.S. 0.25 (0.010) O.S. 0.50 (0.020) O.S. Intake valve seat ring hole diameter 0.3 (0.012) O.S. Exhaust valve seat ring hole diameter 0.3 (0.012) O.S.	Max. 0.03mm (0.0012in.) Max. 0.15mm (0.0059in.) Max. 0.15mm (0.0059in.) 11.05 ~ 11.068mm (0.435 ~ 0.436in.) 11.25 ~ 11.268mm (0.443 ~ 0.444in.) 11.50 ~ 11.518mm (0.453 ~ 0.453in.) 33.300 ~ 33.325mm (1.311 ~ 1.312in.) 28.600 ~ 28.621mm (1.126 ~ 1.127in.)	0.05mm (0.0020in.) 0.15mm (0.0059in.) 0.15mm (0.0059in.)
Valve Overall length Intake Exhaust Stem diameter Intake Exhaust Face angle Margin Intake Exhaust Clearance (Stem-to-guide) Intake Exhaust	96.1mm (3.783in.) 97.15mm (3.825in.) 5.965 ~ 5.98mm (0.235 ~ 0.2354in.) 5.95 ~ 5.965mm (0.234 ~ 0.235in.) 45° ~ 45.5° 1.0mm (0.0394in.) 1.3mm (0.0512in.) 0.02 ~ 0.05mm (0.008 ~ 0.0020in.) 0.030 ~ 0.065mm (0.0012 ~ 0.0026in.)	 0.5mm (0.0197in.) 0.8mm (0.0315in.) 0.10mm (0.0039in.) 0.13mm (0.0051in.)

GENERAL

EM -9

Description	Specifications	Limit
Valve spring Free length Load Out of squareness	42.5mm (1.6732in.) 21kg/35mm (48.4lb/1.3780in.) Max. 1.5°	41.5mm (1.6339in.) 21.9kg/34mm (48.4lb/1.3386in.) Max. 3°
Piston Diameter (Standard) Clearance (Piston-to-cylinder) Ring groove width No.1 No.2 Oil Piston for service	86.68 ~ 86.71mm (3.413 ~ 3.414in.) 0.01 ~ 0.03mm (0.0004 ~ 0.0012in.) 1.230 ~ 1.250mm (0.0484 ~ 0.0492in.) 1.220 ~ 1.240mm (0.0480 ~ 0.0488in.) 2.515 ~ 2.535mm (0.0990 ~ 0.0998in.) 0.25mm (0.010in.), 0.50mm (0.020in.)	
Piston ring Number of rings per piston Compression ring Oil ring Compression ring type No.1 No.2 Oil ring type Ring end gap No.1 No.2 Oil ring side rail Ring side clearance No.1 No.2 Rings for service	3 2 1 Inner bevel type Taper type 3-piece type 0.20 ~ 0.35mm (0.0079 ~ 0.0138in.) 0.37 ~ 0.52mm (0.0146 ~ 0.0205in.) 0.2 ~ 0.7mm (0.0079 ~ 0.0276in.) 0.04 ~ 0.08mm (0.0016 ~ 0.0031in.) 0.03 ~ 0.07mm (0.0012 ~ 0.0028in.) 0.25mm (0.010in.), 0.50mm (0.020in.)	0.8mm (0.031in.) 0.8mm (0.031in.) 1.0mm (0.039in.) 0.1mm (0.004in.) 0.1mm (0.004in.)
Connecting rod Piston pin installation force Side clearance (big end) Bend Bearing oil clearance	2,450 ~ 12,225N (250 ~ 1,250kg, 551 ~ 2,755lb) 0.10 ~ 0.25mm (0.0039 ~ 0.0098in.) 0.05mm or less/100mm (0.0020in. or less/3.937in.) 0.018 ~ 0.036mm (0.0007 ~ 0.0014in.)	0.4mm (0.016in.) 0.1mm (0.004in.)
Crankshaft Journal O.D. Pin O.D. Out-of-round, taper of journal and pin Taper of journal and pin End play Main bearing of clearance	61.982 ~ 62.000mm (2.4402 ~ 2.4409in.) 47.982 ~ 48.000mm (1.8891 ~ 1.8898in.) Max. 0.003mm (0.0012in.) Max. 0.005mm (0.00020in.) 0.070 ~ 0.250mm (0.0028 ~ 0.0098in.) 0.004 ~ 0.022mm (0.0002 ~ 0.0009in.)	0.4mm (0.016in.) 0.1mm (0.004in.)
Cylinder block Cylinder bore Flatness of gasket surface Out-of-round of cylinder bore	86.7mm (3.4134in.) Max. 0.03mm (0.0012in.) Max. 0.02mm (0.0008in.)	0.05mm (0.002in.)
Oil pump Body clearance Side clearance	0.100 ~ 0.181mm (0.0039 ~ 0.0071in.) 0.040 ~ 0.095mm (0.0016 ~ 0.0037in.)	
Relief spring Free height Load	43.8mm (1.724in.) 4.6kg/39.3mm (10lb/1.548in.)	

EM -10

ENGINE MECHANICAL SYSTEM

Description	Specifications	Limit
Oil filter Type Engine oil pressure Cooling method Cooling system quantity	Cartridge, full flow 50kPa (7.3psi) or more [Conditions : Oil temperature is 75 to 90°C (167 to 194°F)] Engine coolant cooling, forced circulation with electric fan 7.0lit (7.4U.S.qts., 6.1Imp.qts)	
Thermostat Type Normal opening temperature Opening temperature range Wide open temperature	Wax pellet type with jiggle valve 82 ± 2.0°C (179.6 ± 3.6°F) 80 ~ 84°C (176 ~ 183.2°F) 95°C (203°F)	
Radiator cap Main valve opening pressure Main valve closing pressure Vacuum valve opening pressure	107.9 ± 14.7kPa (1.1 ± 0.15kg/cm², 15.65 ± 2.13psi) 83.4kPa (0.85kg/cm², 12.1psi) -6.86kPa (-0.07kg/cm², -1.00psi)	
Air cleaner Type Element	Dry Paper type	
Exhaust pipe Muffler Suspend system	Expansion resonance type Rubber hangers	

SERVICE STANDARDS

Standard value	
Coolant concentration	
Tropical areas	40%
Other areas	50%

COOLANT

Engine coolant	Ethlylen glycol base for aluminum radiator
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SEALANT

Engine coolant temperature sensor	LOCTITE 262 or equivalent, Three bond No.1324 or equivalent.
Oil pressure switch	3M ATD No.8660 or Three bond No.1141E
PCV valve	LOCTITE 242 or equivalent

GENERAL

EM -11

TIGHTENING TORQUE

Item	N.m	kgf.cm	lbf.ft
Camshaft sprocket bolt	90 ~ 110	900 ~ 1,100	65 ~ 85
Cylinder head cover bolt	8 ~ 10	80 ~ 100	5.8 ~ 7.2
Main bearing cap bolt M10 M8	27~33 + (90°~94°) 13~19 + (90°~94°)	270~300 + (90°~94°) 130~190 + (90°~94°)	19.5~24 + (90°~94°) 10~14 + (90°~94°)
Connecting rod bolt	16~20 + (90°~94°)	160~200 + (90°~94°)	12~15 + (90°~94°)
Cylinder head bolt(Cold engine)	25 + (58°~62°) + (43°~47°)	250 + (58°~62°) + (43°~47°)	18 + (58°~62°) + (43°~47°)
Oil pan drain plug	35 ~ 45	350 ~ 450	25 ~ 33
Lower oil pan bolt	10 ~ 12	100 ~ 120	7 ~ 9
Upper oil pan bolt [10 × 38mm (0.937 × 1.4961in.)] [8 × 22mm (0.3150 × 0.8661in.)] [161.5mm (6.3582in.)] [152.5mm (6.0039in.)]	30 ~ 42 19 ~ 28 5 ~ 7 5 ~ 7	300 ~ 420 190 ~ 280 50 ~ 70 50 ~ 70	22 ~ 30 14 ~ 20 4 ~ 5 4 ~ 5
Oil screen bolt	15 ~ 22	150 ~ 220	11 ~ 16
Oil pump case bolt	12 ~ 15	120 ~ 150	9 ~ 11
Oil relief valve plug	40 ~ 50	400 ~ 500	29 ~ 36
Oil pressure switch	15 ~ 22	150 ~ 220	11 ~ 16
Oil pressure cover screw	8 ~ 12	80 ~ 120	6 ~ 9
Oil filter	12 ~ 16	120 ~ 160	9 ~ 12
Drive plate and adapte	73 ~ 77	730 ~ 770	53 ~ 56
Air cleaner body installation bolt	8 ~ 12	80 ~ 120	6 ~ 9
Surge tank stay	15 ~ 20	150 ~ 200	11 ~ 14
Air intake surge tank to intake manifold(bolt)	15 ~ 20	150 ~ 200	11 ~ 14
Air intake surge tank to intake manifold(nut)	15 ~ 20	150 ~ 200	11 ~ 14
Intake manifold to cylinder head	19 ~ 21	190 ~ 210	14 ~ 15
Heat protector exhaust manifold	17 ~ 22	170 ~ 220	12 ~ 16
Exhaust manifold to cylinder head (Self-locking nut)	30 ~ 35	300 ~ 350	22 ~ 26
Oil level gauge guide to engine	12 ~ 15	120 ~ 150	9 ~ 11
Water outlet fitting bolt	17 ~ 20	170 ~ 200	12 ~ 14
Power steering oil pump bracket to cylinder head	17 ~ 26	170 ~ 260	12 ~ 19
Crank position sensor wheel screw	5 ~ 6	50 ~ 60	3.6 ~ 4.3
Engine mounting insulator bolt	50 ~ 65	500 ~ 650	36 ~ 47
Engine mounting bracket nut	60 ~ 80	600 ~ 800	43 ~ 58
Engine mounting bracket bolt	60 ~ 80	600 ~ 800	43 ~ 58
Engine support bracket bolt	60 ~ 70	600 ~ 700	43 ~ 51
Front roll stopper bracket sub frame bolt	50 ~ 65	500 ~ 650	36 ~ 47

EM -12

ENGINE MECHANICAL SYSTEM

Item	N.m	kgf.cm	lbf.ft
Front roll stopper insulator bolt and nut	50 ~ 65	500 ~ 650	36 ~ 47
Rear roll stopper bracket to sub frame	50 ~ 65	500 ~ 650	36 ~ 47
Rear roll stopper insulator bolt and nut	50 ~ 65	500 ~ 650	36 ~ 47
Transaxle mounting bracket bolt	50 ~ 65	500 ~ 650	36 ~ 47
Transaxle mounting insulator bolt	90 ~ 110	900 ~ 1,100	65 ~ 80
Fuel hose clamp to rear cylinder head assembly	12 ~ 15	120 ~ 150	9 ~ 11
Transaxle mounting plate	10 ~ 12	100 ~ 120	7 ~ 9
Rear plate	10 ~ 12	100 ~ 120	7 ~ 9
Oil seal case	10 ~ 12	100 ~ 120	7 ~ 9
Crankshaft pulley bolt	180 ~ 190	1,800 ~ 1,900	130 ~ 138
Timing belt cover bolt	10 ~ 12	100 ~ 120	7 ~ 9
Engine hanger bracket to engine	20 ~ 27	200 ~ 270	14 ~ 20
Alternator mounting bracket to engine	20 ~ 30	200 ~ 300	14 ~ 22
Alternator mounting nut (Engine front case side)	20 ~ 30	200 ~ 300	14 ~ 22
Alternator mounting bolt (Alternator mounting bracket side)	20 ~ 30	200 ~ 300	14 ~ 22
Starter to transmission(nut)	20 ~ 30	200 ~ 300	14 ~ 22
Starter to transmission(bolt)	27 ~ 34	270 ~ 340	20 ~ 25
Drive belt pulley bolt	35 ~ 55	350 ~ 550	25 ~ 40
Drive belt tensioner bolt	20 ~ 27	200 ~ 270	14 ~ 20
Engine coolant pump to cylinder block bolt (Head mark "7" mark)	15 ~ 22	150 ~ 220	11 ~ 16
Engine coolant temperature sensor	20 ~ 40	200 ~ 400	14 ~ 29
Engine coolant inlet fitting attaching bolt	17 ~ 20	170 ~ 200	12 ~ 14
Throttle body to surge tank bolt	15 ~ 20	150 ~ 200	11 ~ 14
Oxygen sensor to exhaust manifold	40 ~ 50	400 ~ 500	29 ~ 36
Front exhaust pipe to exhaust manifold nut	30 ~ 40	300 ~ 400	22 ~ 29
Front exhaust pipe to catalytic converter bolt	40 ~ 60	400 ~ 600	29 ~ 43
Catalytic converter to center exhaust pipe nut	40 ~ 60	400 ~ 600	29 ~ 43
Center exhaust pipe to main muffler nut	40 ~ 60	400 ~ 600	29 ~ 43
Main muffler hanger support bracket bolt	10 ~ 15	100 ~ 150	7 ~ 11
Delivery pipe installation bolt	10 ~ 15	100 ~ 150	7 ~ 11
Timing belt tensioner pulley bolt	43 ~ 55	430 ~ 550	31 ~ 40
Timing belt idler pulley bolt	50 ~ 60	500 ~ 600	36 ~ 43
Timing belt tensioner arm fixed bolt	35 ~ 55	350 ~ 550	25 ~ 40
Auto tensioner fixed bolt	20 ~ 27	200 ~ 270	14 ~ 20
Accelerator cable bracket	4 ~ 6	40 ~ 60	3 ~ 4
Spark plug	20 ~ 30	200 ~ 300	14 ~ 22