SPECIAL TORQUE CHART

COMPONENT	STANDARD	METRIC
Air inlet duct clamp	44 lbf/in	5 Nm
Camshaft follower retaining device bolt	10 lbf/ft	13 Nm
Camshaft position (CMP) sensor	96 lbf/in	11 Nm
Camshaft thrust plate mounting bolts	23 lbf/ft	31 Nm
Connecting rod bolt (Initial)	33 lbf/ft	45 Nm
(Final)	50 lbf/ft	68 Nm
Coolant (block) heater	30 lbf/ft	41 Nm
Crankcase breather nuts (under valve cover)	62 lbf/in	7 Nm
Crankcase Plug (M16)	15 lbf/ft	20 Nm
Crankshaft position (CKP) sensor	96 lbf/in	11 Nm
Cylinder head bolts (see figure A)	figure A	figure A
EGR cooler coolant supply port cover (on oil filter base) (M6)	89 lbf/in	10 Nm
EGR cooler V-band clamp	53 lbf/in	6 Nm
EGR cooler flange (studs) (see note 1)	10 lbf/ft	13 Nm
EGR cooler support (see note 1)	23 lbf/ft	31 Nm
EGR valve mounting bolts	10 lbf/ft	13 Nm
Engine coolant temperature sensor (ECT)	106 lbf/in	12 Nm
Engine oil pressure switch (EOP)	106 lbf/in	12 Nm
Exhaust manifold flange (to up pipe) (see note 2)	20 lbf/ft	27 Nm
Exhaust manifold (see note 2)	28 lbf/ft	38 Nm
Exhaust pressure (EP) sensor bracket	106 lbf/in	12 Nm
Exhaust pressure (EP) sensor	106 lbf/in	12 Nm
Exhaust pressure (EP) tube nuts (see note 2)	22 lbf/ft	30 Nm
Exhaust up pipe to EGR cooler (v-band)	20 lbf/ft	27 Nm
Exhaust up pipe coupling on right side	20 lbf/ft	27 Nm
Flywheel bolts (see figure B)	69 lbf/ft	94 Nm
Front cover module bolts	18 lbf/ft	24 Nm
Fuel check valve (banjo bolt)	28 lbf/ft	38 Nm
Fuel filter supply and return lines	32 lbf/ft	43 Nm
Fuel filter supply to head lines	19 lbf/ft	26 Nm
Fuel injector hold down	24 lbf/ft	33 Nm
Fuel rail plug (rear of head)	20 lbf/ft	27 Nm
Glow plug	14 lbf/ft	19 Nm
Glow plug control module (GPCM)	71 lbf/in	8 Nm
Heat shield for intake manifold (M6 nut)	96 lbf/in	11 Nm
Heat shield bolts for rear (M6 thread forming)	96 lbf/in	11 Nm
(M10)	36 lbf/ft	49 Nm
High pressure discharge tube mounting bolts	71 lbf/in	8 Nm
High pressure stand pipe	33 lbf/ft	45 Nm
High pressure oil rail check valve	25 lbf/ft	34 Nm
High pressure oil rail plug (M14)	33 lbf/ft	45 Nm
(M8)	96 lbf/in	11 Nm
High pressure oil rail bolt (see figure C)	96 lbf/in	11 Nm
High pressure pump cover bolts	96 lbf/in	11 Nm
High pressure pump cover plug	26 lbf/ft	35 Nm
High pressure pump drive gear bolt	95 lbf/ft	129 Nm
High pressure pump mounting bolts	18 lbf/ft	24 Nm
Injection control pressure (ICP) sensor	106 lbf/in	12 Nm
Injection pressure regulator (IPR)	37 lbf/ft	50 Nm
Intake air temperature 2 (IAT2) sensor	13 lbf/ft	17 Nm
Intake manifold (see figure D)	96 lbf/in	11 Nm
Lifting eye bolts	30 lbf/ft	41 Nm
Lower crankcase main bolts (see figure E)	figure A	figure A

SPECIAL TORQUE CHART

COMPONENT	STANDARD	METRIC
Lower crankcase outer bolts	18 lbf/in	24 Nm
Oil cooler mounting bolts (M8)	16 lbf/ft	22 Nm
(M6)	89 lbf/in	10 Nm
Oil filter cap	18 lbf/ft	24 Nm
Oil filter housing bolts	11 lbf/ft	15 Nm
Oil filter stand pipe bolt (new)	53 lbf/in	6 Nm
(reinstallation)	27 lbf/in	3 Nm
Oil pan drain plug (see note 3)	18 lbf/ft	25 Nm
Oil pickup tube flange bolts	18 lbf/ft	24 Nm
Oil pump housing bolts	72 lbf/in	8 Nm
Oil pressure regulator plug	19-21 lbf/ft	26-29 Nm
Piston cooling jet (see note 4)	10 lbf/ft	13 Nm
Rocker arm fulcrum bolts	23 lbf/ft	31 Nm
Water pump bolts (M8)	17 lbf/ft	23 Nm
Water pump plugs	26-28 lbf/ft	35-38 Nm
Water pump pulley bolts	23 lbf/ft	31 Nm
Thermostat housing bolts	17 lbf/ft	23 Nm
Turbo exhaust adapter v-band clamp	80 lbf/in	9 Nm
Turbo oil supply bolts	18 lbf/ft	24 Nm
Turbo oil supply snap to connect fitting	8-13 lbf/ft	11-18 Nm
Turbo to mounting bracket bolts (see note 2)	28 lbf/ft	38 Nm
Turbo bracket to crankcase mounting bolts	23 lbf/ft	31 Nm
Valve cover bolts	71 lbf/in	8 Nm
Vibration damper (see note 5) (initial)	50 lbf/ft	68 Nm
(Final)	additional 90 degrees rotation	

STANDARD TORQUE CHART

Thread Diameter	Torque lbf/ft	Torque Nm	Wrench Size (mm)
Hex Flange Head			
M6 x 1	8	11	8
M8 x 1.25	18	24	10
M10 x 1.5	36	49	13
M12 x 1.75	61	83	15
M16 x 2	154	208	21
Hex Head			
M6 x 1	6	8	10
M8 x 1.25	15	20	13
M10 x 1.5	30	40	16
M12 x 1.75	51	69	18
M16 x 2	128	173	24
Pipe Thread			
1/8” NPT	7	10.2	
1/4” NPT	10	13.6	
3/8” NPT	15	20.4	
1/2” NPT	25	34.0	
3/4” NPT	30	40.8	

Special Torque Chart Notes

- 1) Tighten 2 M6 studs in front EGR cooler flange first then install M8 EGR cooler support bolt.
- 2) Apply High Temperature Nickel Anti-Seize Lubricant (F6AZ-9L494-AA) to threads of bolts prior to assembly.
- 3) Lightly coat o-ring with engine oil before installing.
- 4) Apply Threadlock 262 to bolt threads prior to assembly
- 5) Tighten bolts across center of crankshaft. **Always use new bolts in vibration damper!**

- **All Figures on next page.**

SPECIAL TORQUE CHART

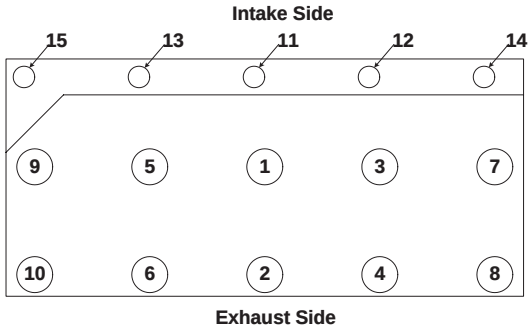

Figure A

Cylinder Head Bolts

- Step 1: Torque the M14 (1-10) cylinder head bolts to 65 lbf/ft (88 Nm) in the numerical sequence shown.
- Step 2: Torque the M14 cylinder head bolts 1, 3, 5, 7, & 9 to 85 lbf/ft (115 Nm) in the numerical sequence shown.
- Step 3: Tighten the M14 cylinder head bolts an additional 90^{o} clockwise in the numerical sequence shown.
- Step 4: Tighten the M14 cylinder head bolts an additional 90^{o} clockwise in the numerical sequence shown.
- Step 5: Tighten the M14 cylinder head bolts an additional 90^{o} clockwise in the numerical sequence shown.
- Step 6: Torque the M8 (11-15) cylinder head bolts to 18 lbf/ft (24 Nm) in the numerical sequence shown.
- Final Step: Torque the M8 cylinder head bolts to 24 lbf/ft (32 Nm) in the numerical sequence shown.
- **Note: Always use new head bolts.**

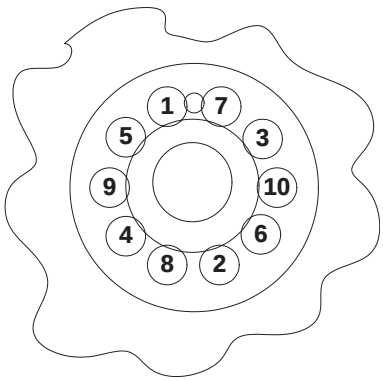

Figure B

Flywheel Bolts

- Step 1: Torque the bolts to 1-5 lbf/ft (1.4-7 Nm) in the numerical sequence shown above.
- Final step: Torque the bolts to 69 lbf/ft (94 Nm) in the numerical sequence shown above.

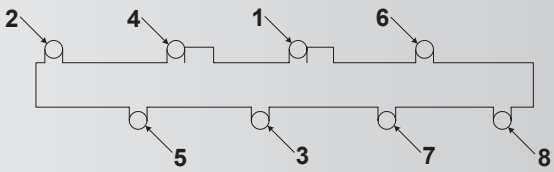

Figure C

High Pressure Oil Rail Bolts

- Step 1: Install bolts 1, 2 and 3 finger tight.
- Step 2: Press rail down until seated.
- Final step: Install remaining bolts and torque to 96 lbf/in (11 Nm) in sequence shown above.

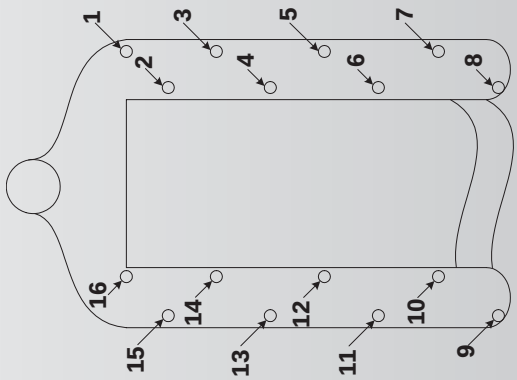

Figure D

Intake Manifold Bolts

- Step 1: Install bolts 1 through 8 finger tight.
- Step 2: Torque bolts 9 though 16 to 8 lbf/ft (11 Nm).
- Final step: Torque all bolts to 8 lbf/ft (11 Nm) in the numerical sequence shown.

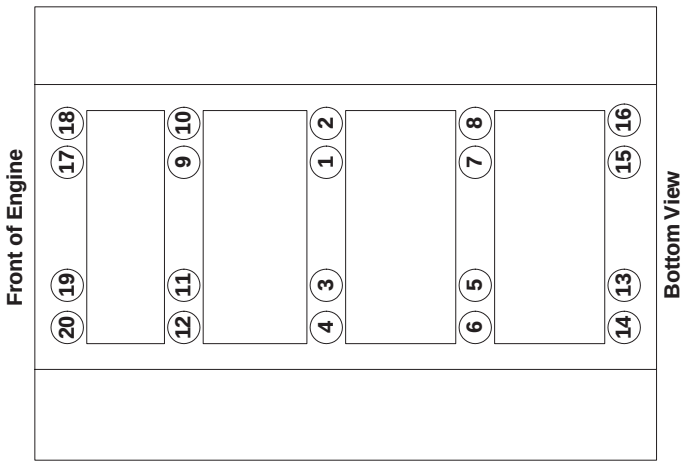

Figure E

Main Bearing Bolts

- Step 1: Torque the bolts to 110 lbf/ft (149 Nm) in the numerical sequence shown.
- Step 2: Torque the bolts to 130 lbf/ft (176 Nm) in the numerical sequence shown.
- Final step: Torque the bolts to 170 lbf/ft (231 Nm) in the numerical sequence shown.