6.0L Powerstroke
Rebuild and Assembly Guide

Contents

SPECIAL TORQUE CHART

Component	Standard	Metric
Air inlet duct clamp	44 lbf/in	5 Nm
Camshaft follower retaining device bolt	10lbf/ft	13Nm
Camshaft position (CMP) sensor	96 lbf/in	11Nm
Camshaft thrust plate mounting bolts	23 lbf/ft	31Nm
Connecting rod bolt (initial)	33 lbf/ft	45Nm
Connecting rod bolt (final)	50 lbf/ft	68 Nm
Coolant (block) heater	30 lbf/ft	41Nm
Crankcase breather nuts (under valve cover)	62 lbf/in	7Nm
Crankcase plug (M16)	15 lbf/ft	20 Nm
Crankshaft position (CKP) sensor	96 lbf/in	11Nm
Cylinder head bolts	See Figure A	See Figure A

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EGR cooler coolant supply port cover (oil filter base) (M6)	89 lbf/in	10 Nm
EGR cooler V-band clamp	53 lbf/in	6Nm
EGR cooler flange (studs)	10 lbf/ft	13 Nm
EGR cooler support	23 lbf/ft	31 Nm
EGR valve mounting bolts	10 lbs/ft	13Nm
Engine coolant temperature sensor (ECT)	106 lbf/in	12 Nm
Engine oil pressure switch (EOP	106 lbf/in	12Nm
Exhaust manifold flange (to uppipe)	20 lbf/ft	27 Nm
Exhaust manifold	28 lbf/ft	38Nm
Exhaust pressure (EP) sensor bracket	106 lbf/in	12Nm
Exhaust pressure (EP) sensor	106 lbf/in	12 Nm
Exhaust pressure (EP) tube nuts	22 lbf/ft	30 Nm
Exhaust up-pipe to EGR cooler (Vband) | 20 lbf/ft | 27 Nm	20 lbf/ft	27Nm
Exhaust up-pipe coupling on right side | 20 lbf/ft | 27 Nm	20 lbf/ft	27 Nm
Flywheel bolts | 69 lbf/ft | 94 Nm	69 lbf/ft	94 Nm
Front cover module bolts | 18 lbf/ft | 24 Nm	18 lbf/ft	24 Nm
Fuel check valve (banjo bolt) | 28 lbf/ft | 38 Nm	28 lbf/ft	38 Nm
Fuel filter supply and return lines | 32 lbf/ft | 43 Nm	32 lbf/ft	43 Nm
Fuel filter supply to head lines	19 lbf/ft	26Nm
Fuel injector hold down	24 lbf/ft	33Nm
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/ft	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
Heat shield bolts (M10)	36 lbf/ft	49 Nm
High pressure discharge tube mounting bolts	17 lbf/ft	8 Nm
High pressure stand pipe | 33	33 lbf/ft	45 Nm
High pressure oil rail check valve	25 lbf/ft	34 Nm

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High pressure oil rail plug (M14)	33 lbf/ft	45 Nm
High pressure oil rail plug (M8)	96 lbf/in	11 Nm
High pressure oil rail bolt	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 pressure regulator (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	13 lbf/ft	17 Nm
Intake manifold | 96 lbf/in | 11 Nm	96 lbf/in	11 Nm
Lifting eye bolts | 30 lbf/ft | 41 Nm	30 lbf/ft	41 Nm
Lower crankcase main bolts	See Figure E See page 8	See page 8 See Figure E

Component	Standard	Metric
Lower crankcase outer bolts	18 lbf/in	24 Nm
Oil cooler mounting bolts (M8)	16 lbf/in	22 Nm
Oil cooler mounting bolts (M6)	89 lbf/in	10 Nm
Oil filter cap	18 lbf/ft	24 Nm

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Oil filter housing bolts	11 lbf/ft	15 Nm
Oil filter stand pipe bolt (new)	53 lbf/in	6 Nm
Oil pan drain plug (see note 3)	27 lbf/ft	37 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 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 (initial)	50 lbf/ft	68 Nm
Vibration damper (final)	Additional 90° rotation	—

Hex Flange Head Bolts

Thread Diameter	Torque (lbf/ft)	Torque (Nm)	Wrench Size (mm)
M6 x 1	8	11	8
M8 x 1.25	18	24	10
M10 x 1.5	36	49	15
M12 x 1.75	61	83	15
M16 x 2	154	208	21

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Hex Head Bolts

Thread Diameter	Torque (lbf/ft)	Torque (Nm)	Wrench Size (mm)
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 Bolts

Pipe Thread	Torque (lbf/ft)	Torque (Nm)
1/8" NPT	7.5	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

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Cylinder Head Bolts

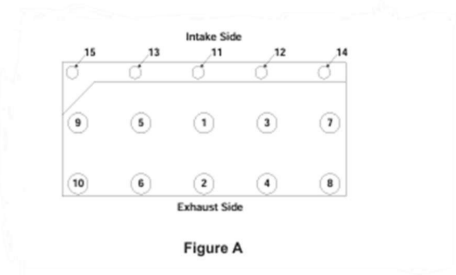

Figure A

ARP STD Grade 425 Studs 250-4202 Torque Specs

1. Stud Installation into Block
    - Studs are installed into the block by hand only — do not torque them down hard into the block threads. This avoids damaging block threads.
2. Head & Nut Torque Procedure (after head is seated)
    - Use ARP Ultra-Torque assembly lubricant on stud threads, nuts, and washers for consistent clamping force.
    - Tighten the head stud nuts in 3 equal steps to the final torque:
    - 膝 M14 head studs (numbers 1-10): ~210 ft-lb final torque.
3. Inner Row (OEM) Bolts
    - If any OEM style inner row bolts are used (number 11-15), torque those to ~23 ft-lb.

ARP High Grade 625 Studs 250-4205 Torque Specs (Head Studs) With ARP

Ultra-Torque assembly lubricant (included with the kit):

1. Main head studs (Studs 1–10):
    - First pass: 90 ft-lb
    - Second pass: 180 ft-lb

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- Final torque: 265 ft-lb

2. Inner M8 bolts (bolts 11–15):

- Torque: 25 ft-lb

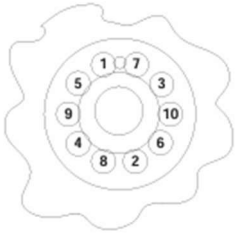

Figure B

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.

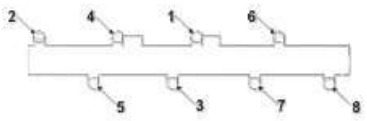

Figure C

High-Pressure Oil Rail Bolts

• Step 1: Install bolts 1, 2, and 3 finger-tight.

• Step 2: Press the rail down until seated.

• Final step: Install remaining bolts and torque to 96 lbf/in (11 Nm) in sequence shown above.

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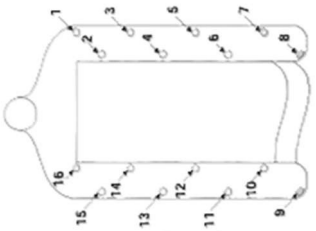

Figure D

Intake Manifold Bolts

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

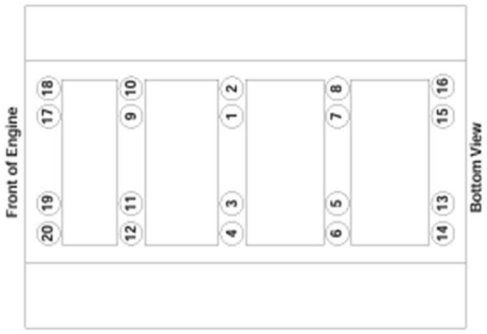

Figure E

Main Bearing Bolts

Bottom View

- 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.

Bearing Clearances – Shop, Performance & Race

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MAIN BEARINGS – CLEARANCE TARGETS	
Build Type	Oil Clearance
Stock / Daily	0.0023" – 0.0028"
Heavy Tow	0.0027" – 0.0032"
Performance / Tuned	0.0030" – 0.0035"
Race / Extreme	0.0035" – 0.0040"
CONNECTING ROD BEARINGS – CLEARANCE TARGETS	
Build Type	Oil Clearance
Stock / Daily	0.0018" – 0.0023"
Heavy Tow	0.0022" – 0.0027"
Performance / Tuned	0.0025" – 0.0030"
Race / Extreme	0.0030" – 0.0035"
THRUST & SIDE CLEARANCE	
Component	Specification
Thrust Bearing (Race)	0.007" – 0.009"
Rod Side Clearance (Race)	0.014" – 0.018"
Crankshaft End Play (Standard)	0.005" – 0.007" (0.04 – 0.20 mm)
Crankshaft End Play (High HP)	0.0065" – 0.010"

MEASUREMENT & ASSEMBLY NOTES

Measure at 90° to the parting line

Dial bore gauge and micrometer required (0.0001" resolution)

Torque caps to the final specification during measurement

Log each journal individually

Verify oil pressure mechanically on first fire

Measure crankshaft end play using a feeler gauge or dial indicator

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6.0L POWERSTROKE – CYLINDER BORE SPECIFICATIONS

Category	Specification
Standard Bore Size	3.740" – 3.742" (MAX)
Oversize – .010"	3.750"
Oversize – .020"	3.760"
Oversize – .030"	3.770"
Oversize – .040"	3.780"
High Output Note	Add 0.001" clearance for applications exceeding 800 HP
Cylinder Finish	37° crosshatch angle
Final Hone	280-grit stone
Final Finish	Plateau brush

PISTON RING END GAP SPECIFICATIONS

Application	Ring Type	End Gap Range	Typical Target / Notes
Standard / Performance	Top Compression Ring	0.012" – 0.020"	Typical target ~0.016"
Standard / Performance	Second Compression Ring	0.056" – 0.076"	Large gap to prevent pressure stacking
Standard / Performance	Oil Control Ring Rails	0.015" – 0.035"	Typical target 0.056" – 0.076"
High Horsepower (1000+ HP)	Top Compression Ring	0.020" – 0.024"	Increased gap for high boost and heat
High Horsepower (1000+ HP)	Second Compression Ring	0.056" – 0.076"	Large gap to prevent pressure stacking
High Horsepower (1000+ HP)	Oil Control Ring Rails	0.009" – 0.029"	Usually not filed unless out of spec

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Engine Break-In Guidance – 6.0L Power Stroke

Oil Type Recommendations

Use standard engine oil only during the break-in period.

- 15W-40 for bearing clearances under 0.0035"
- 20W-50 for bearing clearances 0.0040" and greater
  (race or loose-clearance engines)

Special break-in oils or additives are not required. Modern diesel engine oils already contain su icient anti-wear additives to protect bearings and piston rings during break-in.

Running Guidelines – First 1,000 Miles

- Do not allow the engine to idle for more than 10 minutes at a time
- Operate the engine at moderate RPM
- Avoid heavy load, towing, or sustained high RPM
- Change the engine oil at 1,000 miles to remove break-in debris and metal particles

Camshaft Note:
The 6.0L Power Stroke uses a hydraulic roller camshaft, which does not require a camshaft break-in procedure. No special cam break-in oil or process is necessary.

Oil Filter & Debris Inspection

Inspect the oil filter periodically during the first 1,000 miles.

- A small amount of fine metal particles in the filter is normal during break-in
- Excessive metal debris is a serious warning sign If excessive metal is found:

- Stop running the engine immediately
- Disassemble the engine to determine the source of binding or failure
- Continuing to operate the engine may result in catastrophic engine damage

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Key Break-In Notes

- Focus on proper clearances, clean oil, and consistent oil flow
- Correct break-in depends on controlled operation, inspection, and early issue detection
- Specialty break-in products are far less important than correct assembly and monitoring

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IMPORTANT NOTICE

Failure to follow proper break-in procedures may result in premature engine wear or failure.