Fastener Tightening Specifications

Application	Specification	
	Metric	English
A/C Compressor Bracket Bolt	50 N·m	37 lb ft
Camshaft Position Actuator Assembly Bolt	16 N·m	12 lb ft
Camshaft Position Actuator Magnet Bolt	10 N·m	89 lb in
Camshaft Position Sensor Bolt	10 N·m	89 lb in
Camshaft Thrust Plate Screw	10 N·m	89 lb in
Clutch Pressure Plate Bolt	25 N·m	18 lb ft
Connecting Rod Bearing Cap Bolt		
- First Pass	25 N·m	18 lb ft
- Final Pass	110 degrees	
Coolant Crossover Pipe Bolt - Front	50 N·m	37 lb ft
Coolant Crossover Pipe Bolt - Side	10 N·m	89 lb in
Coolant Drain Plug	19 N·m	14 lb ft
Coolant Temperature Sensor	23 N·m	17 lb ft
Crankshaft Balancer Bolt		
- Installation Pass Using the Old Bolt to Ensure the Balancer is Completely Installed	125 N·m	92 lb ft
- First Pass - Install a NEW Bolt After the Installation Pass and Tighten as Described in the First and Final Passes	125 N·m	92 lb ft
- Final Pass	130 degrees	
Crankshaft Main Bearing Cap Bolt/Stud		
- First Pass	50 N·m	37 lb ft
- Final Pass	77 degrees	
Crankshaft Oil Deflector Nut	25 N·m	18 lb ft
Crankshaft Position Sensor Shield Nut	11 N·m	98 lb in
Crankshaft Position Sensor Stud	11 N·m	98 lb in
Cylinder Head Bolt		
- First Pass	60 N·m	44 lb ft
- Final Pass	95 degrees	
Drive Belt Idler Pulley Bolt - 13 mm	30 N·m	22 lb ft
Drive Belt Idler Pulley Bolt - 15 mm	50 N·m	37 lb ft
Drive Belt Tensioner Bolt	50 N·m	37 lb ft
Engine Block Heater	50 N·m	37 lb ft
Engine Block Plug	60 N·m	44 lb ft
Engine Front Cover Bolt	25 N·m	18 lb ft
Engine Lift Bracket Bolt	70 N·m	52 lb ft

Engine Mount Bolts	110 N·m	81 lb ft
Engine Mount Bracket Bolts		
- M10	50 N·m	37 lb ft
- M12	110 N·m	81 lb ft
Engine Mount Nuts	85 N·m	63 lb ft
Engine Oil Pressure Switch	16 N·m	12 lb ft
Engine Wiring Harness Bracket Bolt	13 N·m	115 lb in
EVAP Canister Purge Solenoid Valve Bolts	16 N·m	12 lb ft
EVAP Purge Valve Bolt	12 N·m	106 lb in
Exhaust Crossover Heat Shield Bolts	10 N·m	89 lb in
Exhaust Crossover Pipe Nuts	25 N·m	18 lb ft
Exhaust Crossover Pipe Studs	25 N·m	18 lb ft
Exhaust Manifold Bolt	20 N·m	15 lb ft
Exhaust Manifold Heat Shield Bolt	10 N·m	89 lb in
Exhaust Manifold Lower Heat Shield Bolt	10 N·m	89 lb in
Flywheel Bolt		
- Automatic Transmission	70 N·m	52 lb ft
- Manual Transmission - First Pass	50 N·m	37 lb ft
- Manual Transmission - Final Pass	70 degrees	
Front Oil Gallery Plug	33 N·m	24 lb ft
Fuel Injector Rail Bolt	10 N·m	89 lb in
Heated Oxygen Sensor	42 N·m	31 lb ft
Heater Inlet and Outlet Pipe Bolt - 10 mm	10 N·m	89 lb in
Heater Inlet and Outlet Pipe Bolt/Nut - 13 mm	25 N·m	18 lb ft
Heater Inlet Pipe Stud	35 N·m	26 lb ft
Ignition Coil Bracket Bolt/Nut/Stud	25 N·m	18 lb ft
Knock Sensor	25 N·m	18 lb ft
Lower Intake Manifold Bolt - Center		
- First Pass	7 N·m	62 lb in
- Final Pass	13 N·m	115 lb in
Lower Intake Manifold Bolt - Corner		
- First Pass	7 N·m	62 lb in
- Final Pass	25 N·m	18 lb ft
MAP Sensor Bracket Bolts	25 N·m	18 lb ft
Oil Filter	30 N·m	22 lb ft
Oil Filter Adapter Bolt	25 N·m	18 lb ft
Oil Filter Adapter Heat Shield Nuts	25 N·m	18 lb ft
Oil Filter Fitting	39 N·m	29 lb ft
Oil Level Indicator Tube Bolt	25 N·m	18 lb ft
Oil Pan Bolt	25 N·m	18 lb ft

Oil Pan Drain Plug	25 N·m	18 lb ft
Oil Pan Side Bolt		
- First Pass	50 N·m	37 lb ft
- Final Pass	50 degrees	
Oil Pan Support Bracket Bolt	50 N·m	37 lb ft
Oil Pump Cover Bolt	10 N·m	89 lb in
Oil Pump Drive Gear Clamp Bolt	36 N·m	27 lb ft
Oil Pump Mounting Bolt	41 N·m	30 lb ft
Piston Oil Nozzle Bolt	10 N·m	89 lb in
Rear Oil Gallery Plug - 3/8 inch	33 N·m	24 lb ft
Spark Plug	15 N·m	11 lb ft
Throttle Body Bolt/Nut	10 N·m	89 lb in
Throttle Body Heater Coolant Inlet and Outlet Hose Pipe Nuts	10 N·m	89 lb in
Throttle Body Stud	6 N·m	53 lb in
Timing Chain Tensioner Bolt	21 N·m	15 lb ft
Torque Converter Cover Bolts	12 N·m	106 lb in
Torque Converter to Flexplate Bolts	62 N·m	46 lb ft
Transaxle to Engine Bolts	75 N·m	55 lb ft
Upper Intake Manifold Bolt/Stud	25 N·m	18 lb ft
Valve Lifter Guide Bolt	10 N·m	89 lb in
Valve Lifter Oil Manifold Cover Plate Bolt	25 N·m	18 lb ft
Valve Rocker Arm Bolt	34 N·m	25 lb ft
Valve Rocker Arm Cover Bolt	10 N·m	89 lb in
Water Inlet Bolt/Stud	10 N·m	89 lb in
Water Pump Bolt	25 N·m	18 lb ft
Water Pump Pulley Bolt	25 N·m	18 lb ft

Engine Mechanical Specifications

Application	Specification	
	Metric	English
General Data		
Engine Type	60 degree V-6	
Displacement	3.5L	214 cu in
RPO	LZ4	
VIN	N	
Bore	99 mm	3.90 in
Stroke	76 mm	2.99 in
Compression Ratio	9.8:1	
Firing Order	123456	
Spark Plug Gap	1.00 mm	0.040 in
Block		
Camshaft Bearing Bore Diameter - Front and Rear	51.03-51.08 mm	2.009-2.011 in
Camshaft Bearing Bore Diameter - Middle #2, #3	50.77-50.82 mm	1.999-2.001 in
Crankshaft Main Bearing Bore Diameter	72.1535-72.1695 mm	2.840-2.841 in
Crankshaft Main Bearing Bore Out-of-Round	0.008 mm	0.00031 in
Cylinder Bore Diameter	99.000-99.018 mm	3.897-3.898 in
Cylinder Bore Out-of-Round - Diameter - Production	0.020 mm	0.0008 in
Cylinder Bore Out-of-Round - Diameter - Service	0.025 mm	0.001 in
Cylinder Bore Taper - Production	0.020 mm	0.0008 in
Cylinder Bore Taper - Service	0.025 mm	0.001 in
Cylinder Head Deck Height	224 mm	8.818 in
Cylinder Head Deck Surface Flatness	0.05 mm per 152 mm	0.0019 in per 6 in
Valve Lifter Bore Diameter	21.417-21.455 mm	0.843-0.844 in
Camshaft		
Camshaft Bearing Inside Diameter	51.500-51.525 mm	2.028-2.029 in
Camshaft Journal Diameter	51.415-51.440 mm	2.024-2.025 in
Camshaft Journal Out-of-Round	0.025 mm	0.001 in
Camshaft Lobe Lift - Exhaust	6.9263 mm	0.2727 in
Camshaft Lobe Lift - Intake	6.9263 mm	0.2727 in
Cooling System		

Thermostat Full Open Temperature	195 degrees	
Connecting Rod		
Connecting Rod Bearing Clearance	0.018-0.062 mm	0.0007-0.017 in
Connecting Rod Bore Diameter	60.322-60.338 mm	2.375-2.376 in
Connecting Rod Bore Out-of-Round	0.006 mm	0.00023 in
Connecting Rod Length - Center to Center	150 mm	5.9 in
Connecting Rod Side Clearance	0.200-0.241 mm	0.008-0.009 in
Crankshaft		
Connecting Rod Journal Diameter	57.122-57.138 mm	2.2489-2.2495 in
Connecting Rod Journal Out-of-Round	0.005 mm	0.0002 in
Connecting Rod Journal Taper	0.005 mm	0.0002 in
Connecting Rod Journal Width	21.92-22.08 mm	0.863-0.869 in
Crankshaft End Play	0.060-0.210 mm	0.0024-0.0083 in
Crankshaft Main Bearing Journal Width	23.9-24.1 mm	0.941-0.949 in
Crankshaft Main Bearing Clearance - Except #3	0.019-0.064 mm	0.0008-0.0025 in
Crankshaft Main Bearing Clearance - #3 Thrust Bearing	0.032-0.077 mm	0.0012-0.0030 in
Crankshaft Main Journal Diameter	67.239-67.257 mm	2.6473-2.6483 in
Crankshaft Main Journal Out-of-Round	0.005 mm	0.0002 in
Crankshaft Main Journal Taper	0.005 mm	0.0002 in
Crankshaft Rear Flange Runout	0.04 mm	0.0016 in
Cylinder Head		
Combustion Chamber Depth - at Measurement Point	2.2 mm	0.087 in
Surface Finish - Maximum	2.8 RA	
Surface Flatness - Block Deck	0.08 mm Per 152 mm	0.003 in Per 6 in
Surface Flatness - Exhaust Manifold Deck	0.1 mm	0.004 in
Surface Flatness - Intake Manifold Deck	0.1 mm	0.004 in
Valve Guide Bore - Exhaust	8.01 mm	0.315 in
Valve Guide Bore - Intake	8.01 mm	0.315 in
Valve Guide Installed Height	16.6 mm	0.654 in
Lubrication System		
Oil Capacity - with Filter	3.8 liter	4.0 quarts
Oil Capacity - without Filter	3.3 liter	3.5 quarts
Oil Pressure - @ 1850 RPM	207-310 kPa	30-45 PSI
Oil Pump		
Gear Diameter	50.749-50.800 mm	1.997-1.999 in
Gear Pocket - Depth	26.274-26.332 mm	1.034-1.036 in
Gear Pocket - Diameter	50.902-50.952 mm	2.004-2.005 in

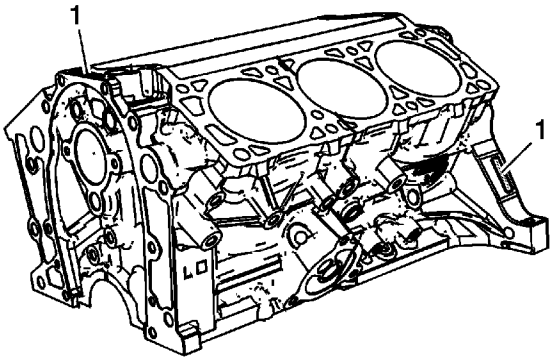
Gears Lash	0.094-0.195 mm	0.0037-0.0077 in
Relief Valve-to-Bore Clearance	0.038-0.089 mm	0.0015-0.0035 in
Piston Ring End Gap		
First Compression Ring	0.18-0.39 mm	0.007-0.015 in
Second Compression Ring	0.48-0.74 mm	0.019-0.029 in
Oil Control Ring	0.25-0.74 mm	0.010-0.029 in
Piston Ring to Groove Clearance		
First Compression Ring	0.03-0.076 mm	0.001-0.003 in
Second Compression Ring	0.04-0.078 mm	0.002-0.003 in
Oil Control Ring	0.09 mm	0.004 in
Piston Ring Thickness		
First Compression Ring	1.164-1.190 mm	0.046-0.047 in
Second Compression Ring	1.472-1.490 mm	0.058 in
Oil Control Ring - Maximum	2.440 mm	0.096 in
Piston		
Piston Diameter - Production	98.970-99.008 mm	3.896-3.897 in
Piston Diameter - Service Limit	98.950 mm	3.895 in
Piston Pin Bore Diameter	24.008-24.013 mm	0.9452-0.9454 in
Piston Ring Groove Width	1.23-1.255 mm	0.048-0.049 in
Piston to Bore Clearance - Production	-0.029 to 0.029 mm	-0.0011 to 0.011 in
Piston to Bore Clearance - Service Limit - Maximum	0.080 mm	0.003 in
Pin		
Piston Pin Clearance to Connecting Rod Bore - Press Fit	-0.022 to -0.044 mm	-0.0008 to -0.0017 in
Piston Pin Clearance to Piston Pin Bore	0.008-0.016 mm	0.0003-0.0006 in
Piston Pin Diameter	23.997-24.000 mm	0.9447-0.9448 in
Piston Pin Length	59.87-60.13 mm	2.35-2.36 in
Valves		
Valve Face Angle	45 degrees	
Valve Seat Angle	46 degrees	
Valve Seat Depth - Exhaust - from Deck Face	8.9-9.1 mm	0.350-0.358 in
Valve Seat Depth - Intake - from Deck Face	7.9-8.1 mm	0.311-0.318 in
Valve Seat Width - Exhaust	1.70-2.0 mm	0.067-0.079 in
Valve Seat Width - Intake	1.55-1.80 mm	0.061-0.071 in
Valve Stem-to-Guide Clearance	0.024-0.064 mm	0.0009-0.0025 in
Valve Lifters/Push Rods		
Push Rod Length - Intake	147.51 mm	5.81 in
Push Rod Length - Exhaust	154.87 mm	6.1 in

Valve Springs		
Valve Spring Free Length	52.88 mm	2.08 in
Valve Spring Assembly Installed Height	46.75 mm	1.84 in
Valve Spring Load - Closed - Without Damper	340 ± 19 N 43.2 mm	76.4 lb 1.701 in
Valve Spring Load - Open - Without Damper	1023 ± 44 N 32 mm	230 lb 1.260 in
Valve Spring Total Number of Coils	8.01	

Adhesives, Fluids, Lubricants, and Sealers

Application	Type of Material	GM Part Number	
		United States	Canada
Camshaft Rear Bearing Hole Plug	Sealant	12377901	10953504
Coolant Drain Plug	Sealant	12346004	10953480
Coolant Temperature Sensor Threads	Sealant	12346004	10953480
Crankshaft Balancer Keyway	Sealant	12378521	88901148
Crankshaft Position Sensor Bolt/Stud Threads	Threadlock	12345382	10953489
Engine Block Coolant Drain Plug Threads	Sealant	12346004	10953480
Engine Block Oil Gallery Plug Threads	Sealant	12346004	10953480
Engine Front Cover Bolt Threads	Sealant	12346004	10953480
Engine Oil	5W-30 Oil	12345610	993193
Engine Oil Cooler Fitting Threads	Sealant	12346004	10953480
Engine Oil Supplement	Lubricant	1052367	992869
Intake Manifold Bolt Threads - Upper and Lower	Threadlock	12345382	10953489
Intake Manifold Coolant Pipe	Sealant	12345493	10953488
Intake Manifold to Engine Block Mating Surface	Sealant	12378521	88901148
Intake Manifold Tuning Valve	Lubricant	1051344	993037
Oil Filter Bypass Hole Plug Threads	Sealant	12346004	10953480
Oil Pan Surface at Front Cover - Block Mating Area	Sealant	12378521	88901148
Oil Pan Surface at Rear Crankshaft Main Bearing Cap	Sealant	12378521	88901148
Oil Pressure Switch Threads	Sealant	12346004	10953480
Oil Pan Side Bolts	Sealant	12346004	10953480
Oil Pump Suction Pipe	Sealant	12346004	10953480
Piston and Piston Pin	5W-30 Oil	12345610	993193
Rear Crankshaft Main Bearing Cap	Sealant	1052942	10953466
Throttle Body Stud and Bolts	Threadlock	12345382	10953489
Valve Lifter and Camshaft Prelube	Lubricant	12345501	992704
Valve Lifter Guide Bolt Threads	Threadlock	12345382	10953489
Valve Rocker Arm Cover Notch at Cylinder Head and Lower Intake Manifold	Sealant	12378521	88901148

Engine Identification



The Vehicle Identification Number - VIN derivative (1) for 3500 LZ4 is stamped or laser etched on the front and left side of the engine block. The Vehicle Identification Number - VIN derivative is nine digits long and can be used to determine if a vehicle contains the original engine.

- The first digit identifies the division.
- The second digit identifies the model year.
- The third digit identifies the assembly plant.
- The fourth through ninth digits are the last six digits of the Vehicle Identification Number - VIN.