

Section 10

Chapter 20

24 Valve, 8.3 Liter Engine

Specifications

Note: All coding used in the 8.3 Liter and 9 Liter engine manuals are Cummins engine codes. These engine codes have no meaning to New Holland warranty codes and should only be used for procedure steps.

Specifications

Contents

Air Intake System - Specifications	18
Air Intake Restriction (010-003)	18
Axial Clearance (010-038)	18
Radial Bearing Clearance (010-047)	18
Air Intake System - Torque Values	18
Air Crossover (010-019)	18
Air Leaks, Air Intake and Exhaust Systems (010-024)	18
Turbocharger (010-033)	18
Turbocharger Axial Clearance (010-038)	19
Turbocharger Blade Damage (010-039)	19
Turbocharger Radial Bearing Clearance (010-047)	19
Turbocharger Turbine Seal Leaks (010-049)	19
Cam Followers/Tappets	10
Capscrew Markings and Torque Values	25
Capscrew Markings and Torque Values - Metric	26
Capscrew Markings and Torque Values - U.S. Customary	27
Cooling System - Specifications	17
Coolant Thermostat (008-013)	17
Cooling System - Torque Values	17
Coolant Filter Head (008-007)	17
Coolant Heater (008-011)	17
Coolant Thermostat (008-013)	17
Fan Spacer and Pulley (008-039)	17
Water Pump (008-062)	17
Cylinder Block - Specifications	1
Bearings, Connecting Rod (001-005)	1
Camshaft (001-008)	1
Camshaft Bushings (001-010)	2
Camshaft Gear (Camshaft Removed) (001-013)	2
Connecting Rod (001-014)	2
Cylinder Liner (001-028)	3
Measure (001-010)	2
Piston (001-043)	4
Piston and Connecting Rod Assembly (001-054)	4
Piston Rings (001-047)	4

Cylinder Block - Torque Values	5
Bearings, Connecting Rod (001-005)	5
Bearings, Main (001-006)	5
Camshaft (001-008)	5
Connecting Rod (001-014)	5
Crankshaft Wear Sleeve, Rear (001-067)	6
Cylinder Liner (001-028)	5
Gear Housing, Front (001-033)	5
Piston and Connecting Rod Assembly (001-054)	6
Vibration Damper (001-052)	6
Vibration Damper, Rubber (001-051)	5
Cylinder Head - Specifications	7
Cylinder Head (002-004)	7
Valve, Cylinder Head (002-020)	7
Cylinder Head - Torque Values	8
Cylinder Head (002-004)	8
Exhaust System - Specifications	20
Exhaust Manifold, Dry (011-007)	20
Exhaust Restriction (011-009)	20
Exhaust System - Torque Values	20
Exhaust Manifold Dry (011-007)	20
Fraction, Decimal, Millimeter Conversions	29
Fuel System - Torque Values	11
Fuel Pump (005-016)	11
Rotor, CAPS Fuel Injection Pump (005-072)	11
Snubber, Rate Shape (005-081)	11
Injectors and Fuel Lines - Torque Values	12
Air in Fuel (006-003)	12
Fuel Drain Line Restriction (006-012)	12
Fuel Drain Lines (006-013)	12
Fuel Filter Head Bracket (006-018)	12
Fuel Supply Lines (006-024)	12
Injector (006-026)	13
Injector Supply Lines (High Pressure) (006-051)	13
Lubricating Oil System - Specifications	14
Lubricating Oil Cooler (007-003)	14
Lubricating Oil Pump (007-031)	14
Lubricating Oil System - Torque Values	14
Engine Oil Heater (007-001)	14
Lubricating Oil Cooler (007-003)	15
Lubricating Oil Pan (007-025)	15
Lubricating Oil Pressure Regulator (Main Rifle) (007-029)	15
Lubricating Oil Pump (007-031)	15
Lubricating Oil Suction Tube (Block-Mounted) (007-035)	16
Lubricating Oil Thermostat (007-039)	16

Newton-Meter to Foot-Pound Conversion Chart	28
Pipe Plug Torque Values	24
Rocker Levers - Specifications	9
Overhead Set (003-004)	9
Rocker Lever (003-008)	9
Rocker Levers - Torque Values	9
Rocker Lever (003-008)	9
Rocker Lever Cover (003-011)	9
Tap-Drill Chart - U.S. Customary and Metric	23
Weights and Measures - Conversion Factors	22

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Component or Assembly (Procedure) Ref. No./Steps Metric

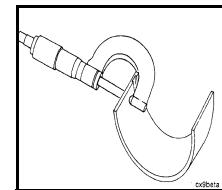
U.S.

Cylinder Block - Specifica-
tions

Bearings, Connecting Rod (001-005)

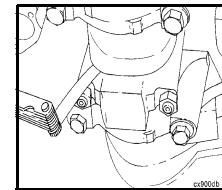
2.454 mm	MIN	0.0966 in
2.471 mm	MAX	0.0973 in

Connecting Rod Bearing Dimensions
Standard



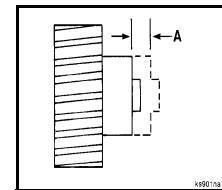
Connecting Rod Side Clearance Limits

0.10 mm	MIN	0.004 in
0.33 mm	MAX	0.013 in



Dimension A End Play Limits

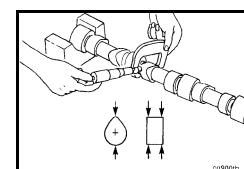
0.127 mm	MIN	0.005 in
0.330 mm	MAX	0.013 in



Camshaft (001-008)

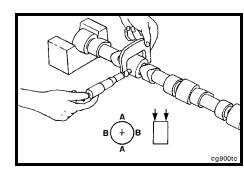
Diameter of Peak of Lobe

Intake	51.774 mm	MIN	2.038 in
Exhaust	51.596 mm	MAX	2.031 in



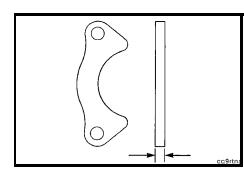
Journal Diameter

59.962 mm	MIN	2.3607 in
60.013 mm	MAX	2.3627 in



Camshaft Thrust Plate

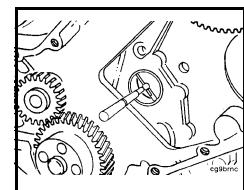
9.34 mm	MIN	0.368 in
9.58 mm	MAX	0.377 in

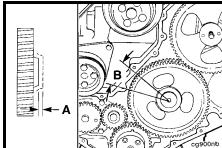
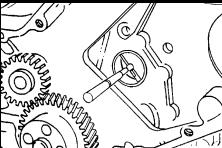
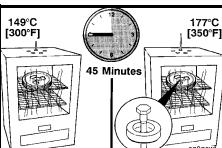
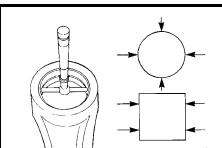


Camshaft Bore Inside Diameter

With Bushing

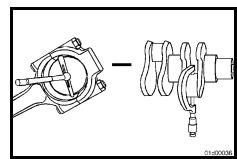
60.12 mm	MAX	2.367 in
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Component or Assembly (Procedure) Ref. No./Steps	Metric	U.S.	
Camshaft End Play (A)	0.12 mm 0.46 mm	MIN MAX	0.005 in 0.018 in
Camshaft Gear Backlash Limits (B)	0.08 mm 0.33 mm	MIN MAX	0.003 in 0.013 in
Camshaft Bushings (001-010)			
Camshaft Bore Diameter (Maximum)			
without bushing	64.01 mm	MIN	2.520 in
with bushing	60.12 mm	MAX	2.367 in
Measure (001-010)			
Camshaft Bore (Bushing Installed)	60.058 mm	MIN	2.3645 in
Camshaft Gear (Camshaft Removed) (001-013)			
Camshaft Gear Temperature	149 °C	300 °F	
Connecting Rod Piston Pin Bushing Diameter	45.023 mm 45.035 mm	MIN MAX	1.7726 in 1.7730 in
Connecting Rod (001-014)			
Connecting Rod Crank Bore Diameter (Bearings Removed)	80.987 mm 81.013 mm	MIN MAX	3.1885 in 3.1895 in
Crankshaft Rod Journal Diameter	75.962 mm 76.013 mm	MIN MAX	2.9906 in 2.9926 in

Component or Assembly (Procedure) Ref. No./StepsMetric **U.S.**

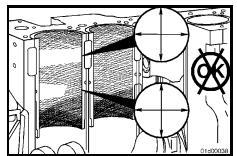
Bearing Clearance	0.038 mm 0.116 mm	MIN MAX	0.0015 in 0.0045 in
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Cylinder Liner (001-028)

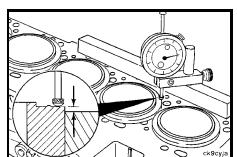
Cylinder Liner Dimensions

Maximum Out Of Round	0.04 mm	0.0016 in
Maximum Taper	0.04 mm	0.0016 in
Maximum Bore Diameter	114.04 mm	4.4897 in



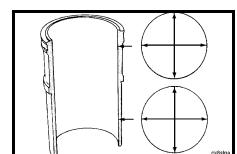
Cylinder Liner Protrusion

0.25 mm 0.122 mm	MIN MAX	0.0098 in 0.0048 in
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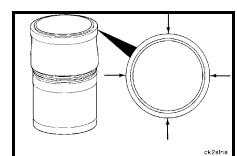
Cylinder Liner I.D.

114.000 mm 114.040 mm	MIN MAX	4.4882 in 4.4897 in
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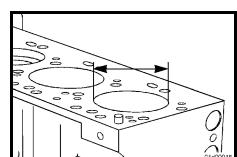
Cylinder Liner O.D. (Top Press Fit)

130.838 mm 130.958 mm	MIN MAX	5.1511 in 5.1558 in
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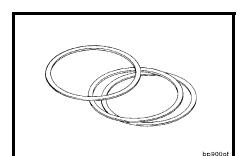
**Cylinder Liner Bore in Block
(Press Fit Bore)**

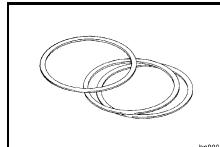
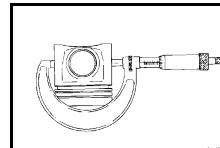
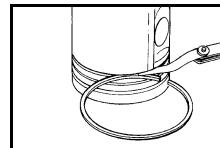
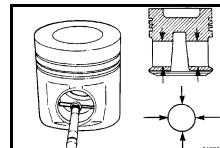
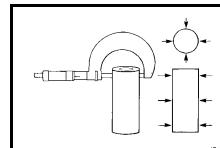
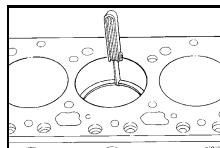
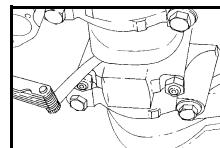
130.900 mm 130.950 mm	MIN MAX	5.1535 in 5.1555 in
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Cylinder Liner to Block Clearance

0.229 mm	MIN	0.009 in
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Component or Assembly (Procedure) Ref. No./Steps	Metric		U.S.	
Cylinder Liner Shim Thickness				
J924445	0.25 mm		0.010 in	
J924446	0.38 mm		0.015 in	
J924447	0.51 mm		0.020 in	
J924448	0.76 mm		0.030 in	
J924449	1.00 mm		0.040 in	
				
Piston (001-043)				
Piston Skirt Diameter	113.863 mm 113.877 mm	MIN MAX	4.4828 in 4.4833 in	
Ring Clearance				
Oil Control Ring	0.040 mm 0.0995 mm	MIN MAX	0.0016 in 0.0037 in	
Piston Pin Bore Diameter				
	45.006 mm 45.012 mm	MIN MAX	1.7719 in 1.7721 in	
Pin Diameter				
	44.997 mm 45.003 mm	MIN MAX	1.7715 in 1.7718 in	
Piston Rings (001-047)				
Ring Gap				
Top Ring:	0.35 mm 0.60 mm	MIN MAX	0.014 in 0.024 in	
Intermediate Ring:	0.35 mm 0.60 mm	MIN MAX	0.014 in 0.024 in	
Oil Control Ring:	0.30 mm 0.60 mm	MIN MAX	0.012 in 0.024 in	
Piston and Connecting Rod Assembly (001-054)				
Connecting Rod and Crankshaft Side Clearance	0.10 mm 0.33 mm	MIN MAX	0.004 in 0.013 in	

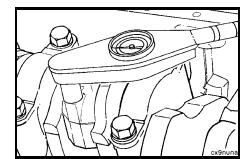
Component or Assembly (Procedure) Ref. No./StepsMetric

U.S.

Cylinder Block - Torque Values

Bearings, Connecting Rod (001-005)

Connecting Rod Capscrew	35 N·m	
Torque Value:	70 N·m	
	60	
1	degrees	
2		
3		

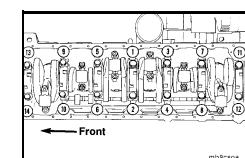


26 ft-lb
52 ft-lb

Bearings, Main (001-006)

Main Bearing Capscrew

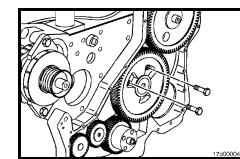
Torque Value:	50 N·m	
1	95 N·m	
2	90	
3	degrees	



37 ft-lb
70 ft-lb

Camshaft (001-008)

Thrust Plate Capscrew	24 N·m	
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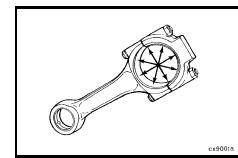


18 ft-lb

Connecting Rod (001-014)

120 N·m

89 ft-lb

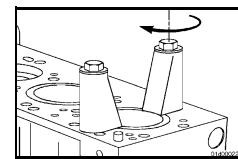


cx90014

Cylinder Liner (001-028)

68 N·m

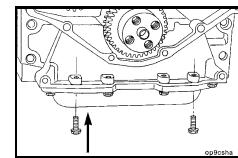
50 ft-lb

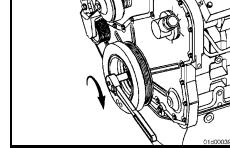
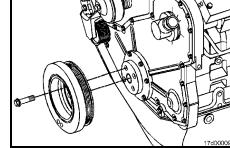
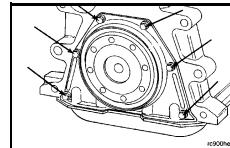


Gear Housing, Front (001-033)

Capscrew Torque	24 N·m	
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18 ft-lb



Component or Assembly (Procedure) Ref. No./Steps	Metric	U.S.
Vibration Damper, Rubber (001-051)	125 N·m	92 ft-lb
		
Vibration Damper (001-052)		
Crankshaft Damper Capscrew Torque	125 N·m	92 ft-lb
		
Piston and Connecting Rod Assembly (001-054)		
Torque Value:		
1	35 N·m	26 ft-lb
2	70 N·m	52 ft-lb
3	60 degrees	
Crankshaft Wear Sleeve, Rear (001-067)	9 N·m	80 in-lb
Rear Cover Capscrew Torque		
		

Component or Assembly (Procedure) Ref. No./Steps Metric

U.S.

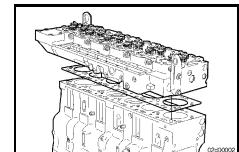
Cylinder Head - Specifications

Cylinder Head (002-004)

Cylinder Head Weight

71.2 kg

165 lb



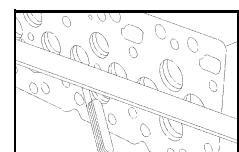
Cylinder Head Flatness

End to End
Side to Side

0.075 mm
0.075 mm

MIN
MAX

0.003 in
0.003 in



Valve, Cylinder Head (002-020)

Approx. Free Length (L):

V942095

55 mm

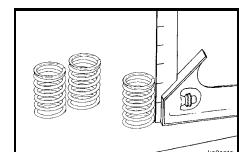
2.165 in

Maximum Inclination:

V943161

1.5 mm

0.059 in

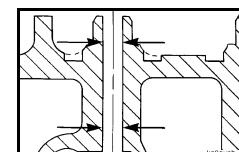


Valve Guide Bore Diameter

8.018 mm
8.071 mm

MIN
MAX

0.3157 in
0.3178 in

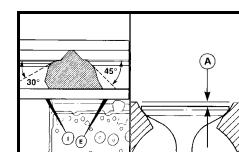


Valve Depth (Installed)

0.859 mm
1.21 mm

MIN
MAX

0.0338 in
0.0476 in

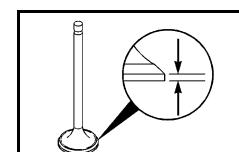


Valve Rim Thickness Limit

0.79 mm

MIN

0.031 in



Component or Assembly (Procedure) Ref. No./StepsMetric

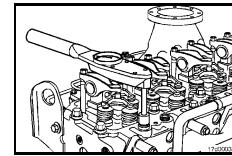
U.S.

**Cylinder Head - Torque Val-
ues**

Cylinder Head (002-004)

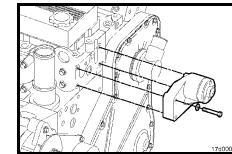
Torque Value:	148 N·m	
All Capscrews	Step 1	148 N·m
Recheck All	Step 2	90
All Capscrews	Step 3	degrees

108 ft-lb
108 ft-lb



24 N·m

18 ft-lb

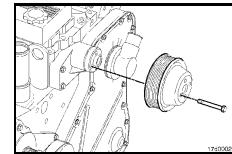


Fan Hub Capscrew

Torque Value:

8 mm

Capscrew	24 N·m	18 ft-lb
10 mm	43 N·m	32 ft-lb



Capscrew
10 mm
Capscrew

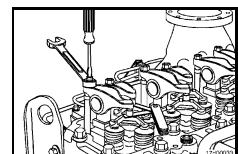
Component or Assembly (Procedure) Ref. No./Steps

**Rocker Levers - Specifica-
tions**

U.S.

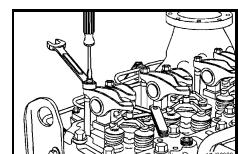
Overhead Set (003-004)

Lash Check Limits	0.152 mm	MIN	0.006 in
Intake	0.559 mm	MAX	0.022 in
	0.381 mm	MIN	0.015 in
Exhaust	0.813 mm	MAX	0.032 in



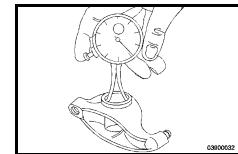
Lash Reset Specifications

Intake	0.254 mm	Nominal	0.012 in
Exhaust	0.508 mm	Nominal	0.022 in



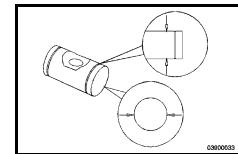
Rocker Lever (003-008)

Rocker Lever Bore	22.027 mm	MIN	0.867 in
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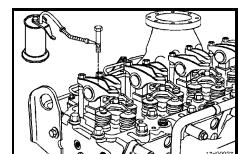
Rocker Lever Shaft

21.965 mm	MIN	0.865 in
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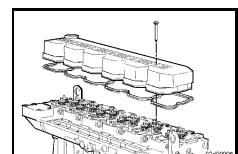
**Rocker Levers - Torque Val-
ues**

Rocker Lever (003-008)	60 N·m	44 ft-lb
Pedestal Capscrew		



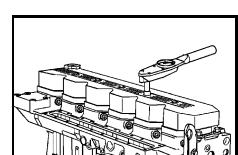
Rocker Lever Capscrew

24 N·m	18 ft-lb
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Rocker Lever Cover (003-011)

Rocker Lever Capscrew	24 N·m	18 ft-lb
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Component or Assembly (Procedure) Ref. No./Steps Metric

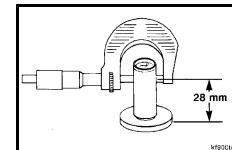
U.S.

Cam Followers/Tappets

Tappet (004-015)

Valve Tappet Stem Diameter

15.936 mm	MIN	0.627 in
15.977 mm	MAX	0.629 in



Component or Assembly (Procedure) Ref. No./Steps Metric

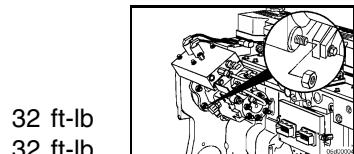
U.S.

Fuel System - Torque Values

Fuel Pump (005-016)

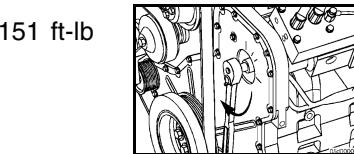
Torque Value:

Fuel Pump Mounting Nuts Support Bracket	44 N·m
Support Bracket	44 N·m
Fuel Pump Support Brackets	



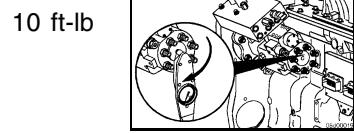
Torque Value:

Fuel Injection Pump Drive Gear Nut	205 N·m
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Rotor, CAPS Fuel Injection Pump (005-072)

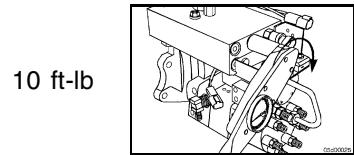
14 N·m



Snubber, Rate Shape (005-081)

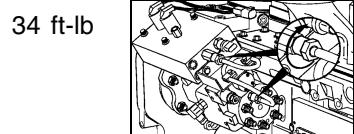
Snubber Assembly

Torque Value:	Step 1	14 N·m
	Step 2	120 degrees



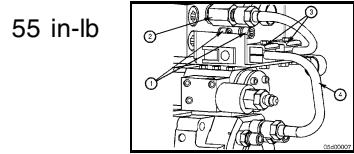
Rate Shape Tube Assembly

46 N·m



Rate Shape Tube Isolator Capscrew

6 N·m



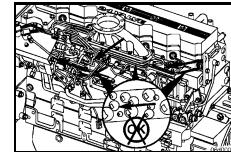
Component or Assembly (Procedure) Ref. No./Steps Metric
Injectors and Fuel Lines - Torque Values

U.S.

Air in Fuel (006-003)

Fuel Line Fitting 24 N·m

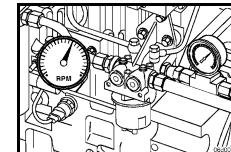
18 ft-lb



Fuel Drain Line Restriction (006-012)

Fuel Drain Line Pressure 254.0 mm Hg MAX

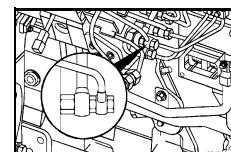
10.0 in Hg



Fuel Drain Lines (006-013)

24 N·m

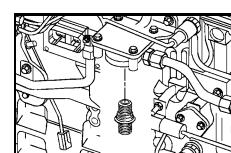
18 ft-lb



Fuel Filter Head Bracket (006-018)

Fuel Heater 3.4 N·m

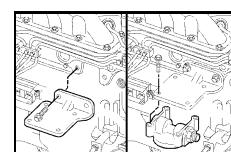
30 in-lb



Filter Head Bracket

14 mm 43 N·m

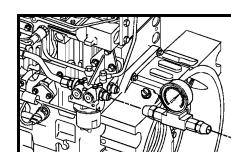
32 ft-lb



Fuel Inlet Restriction

8 mm Hg MAX

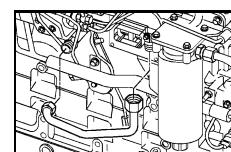
4 in Hg



Fuel Supply Lines (006-024)

37 N·m

27 ft-lb



Component or Assembly (Procedure) Ref. No./StepsMetric

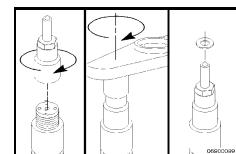
U.S.

Injector (006-026)

Retaining Nut

47 N·m

35 ft-lb



Injector Supply Lines (High Pressure) (006-051)

Fuel Pump Connection

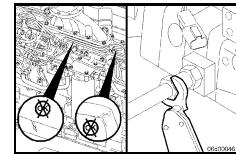
24 N·m

18 ft-lb

Cylinder Head Connection

38 N·m

28 ft-lb



Fuel Pump Connection

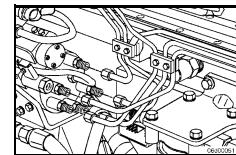
24 N·m

18 ft-lb

Cylinder Head Connection

38 N·m

28 ft-lb



Component or Assembly (Procedure) Ref. No./Steps Metric

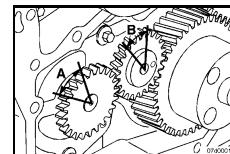
U.S.

Lubricating Oil System - Specifications

Lubricating Oil Pump (007-031)

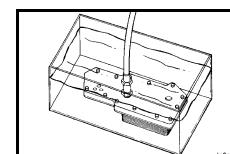
Backlash Limits

A	0.076 mm 0.330 mm	MIN MAX	0.003 in 0.013 in
B	0.076 mm 0.330 mm	MIN MAX	0.003 in 0.013 in



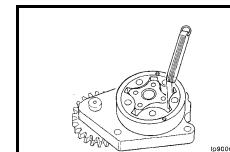
Lubricating Oil Cooler (007-003)

Air Pressure Test	449 kPa 518 kPa	MIN MAX	65 psi 75 psi
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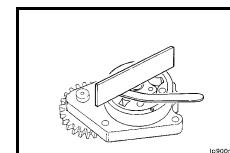
Tip Clearance

Tip Clearance	0.025 mm 0.1778 mm	MIN MAX	0.001 in 0.007 in
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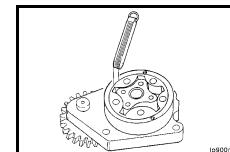
Gerotor Clearance

Gerotor Clearance	0.025 mm 0.127 mm	MIN MAX	0.001 in 0.005 in
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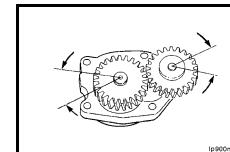
Limit

Limit	0.1778 mm 0.381 mm	MIN MAX	0.007 in 0.015 in
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Limits (Used Pump)

Limits (Used Pump)	0.076 mm 0.330 mm	MIN MAX	0.003 in 0.013 in
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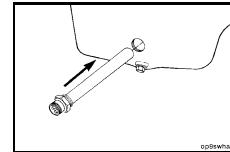


Lubricating Oil System - Torque Values

Engine Oil Heater (007-001)

120 N·m

88 ft-lb



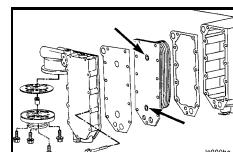
Component or Assembly (Procedure) Ref. No./StepsMetric

U.S.

Lubricating Oil Cooler (007-003)

24 N·m

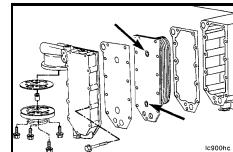
18 ft-lb



10 mm

24 N·m

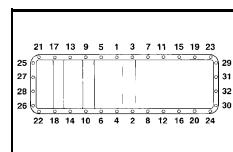
18 ft-lb



Lubricating Oil Pan (007-025)

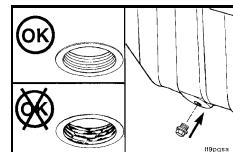
24 N·m

18 ft-lb



80 N·m

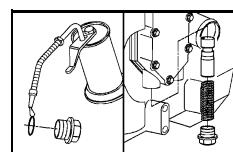
60 ft-lb



Lubricating Oil Pressure Regulator (Main Rifle) (007-029)

80 N·m

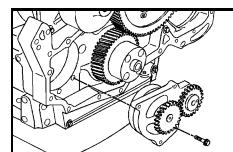
60 ft-lb



Lubricating Oil Pump (007-031)

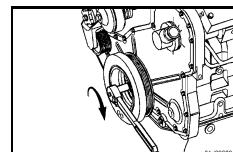
24 N·m

18 ft-lb



125 N·m

92 ft-lb

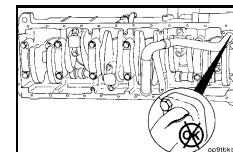


Component or Assembly (Procedure) Ref. No./StepsMetric U.S.

Lubricating Oil Suction Tube (Block-Mounted) (007-035)

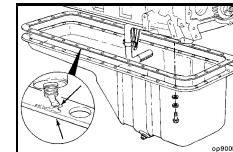
24 N·m

18 ft-lb



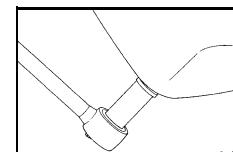
24 N·m

18 ft-lb



80 N·m

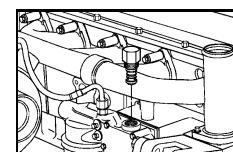
60 ft-lb



Lubricating Oil Thermostat (007-039)

50 N·m

37 ft-lb



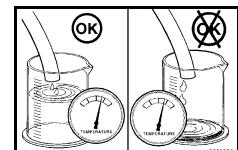
Component or Assembly (Procedure) Ref. No./Steps Metric

U.S.

Cooling System - Specifications

Coolant Thermostat (008-013)

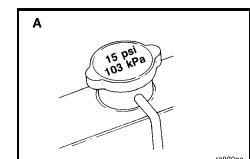
Thermostat Initial opening Temperature	81 °C 83 °C	MIN MAX	178 °F 182 °F
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Radiator Cap Pressure Test

A (Normal Duty)	System 104 °C [220 °F]
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Cap 103 kPa [15 psi]

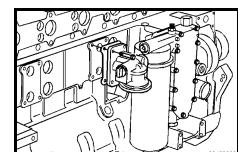


Cooling System - Torque Values

Coolant Filter Head (008-007)

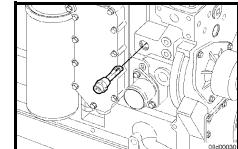
Filter Head

24 N·m	18 ft-lb
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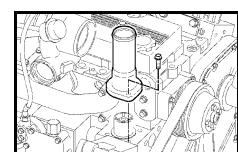
Coolant Heater (008-011)

24 N·m	18 ft-lb
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Coolant Thermostat (008-013)

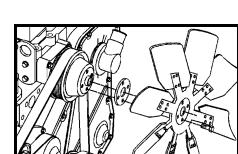
24 N·m	18 ft-lb
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Fan Spacer and Pulley (008-039)

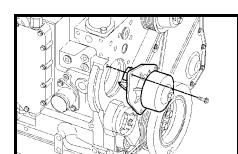
Fan Capscrew

51 to 62 N·m	37 to 45 ft-lb
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Water Pump (008-062)

24 N·m	18 ft-lb
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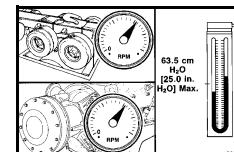
Component or Assembly (Procedure) **Metric**

U.S.

Air Intake System - Specifications

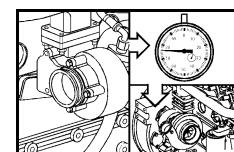
Air Intake Restriction (010-003)

Inlet Air Restriction	63.5 mm H_2O	MAX	25.0 in H_2O
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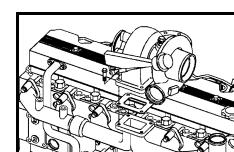
Axial Clearance (010-038)

Axial Clearance	0.038 mm 0.089 mm	MIN MAX	0.0015 in 0.0035 in
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Radial Bearing Clearance (010-047)

Radial Bearing Clearance	0.15 mm 0.64 mm	MIN MAX	0.006 in 0.025 in
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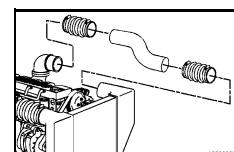


Air Intake System - Torque Values

Air Crossover (010-019)

5 N·m

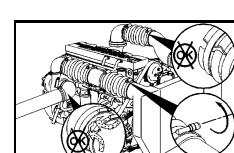
44 in-lb



Air Leaks, Air Intake and Exhaust Systems (010-024)

8 N·m

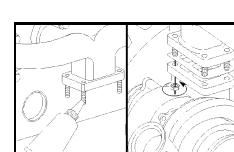
71 in-lb



Turbocharger (010-033)

45 N·m

33 ft-lb

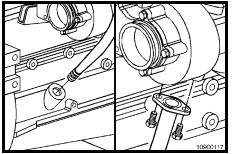
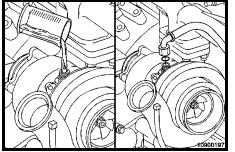
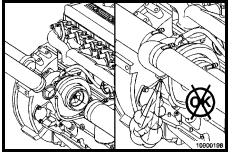
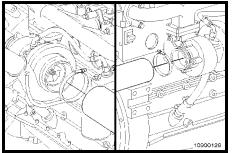
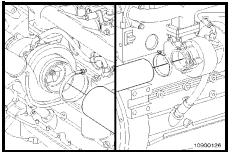
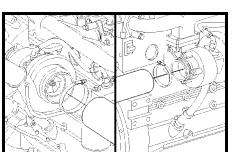
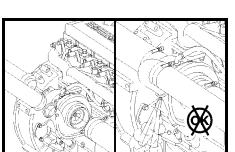


Air Inlet Pipe Clamp

8 N·m

71 in-lb



Component or Assembly (Procedure)	Metric	U.S.	
Turbocharger Oil Drain Line	27 N·m	20 ft-lb	
Turbocharger Oil Supply Line	20 N·m	15 ft-lb	
Exhaust Pipe Clamp	8 N·m	71 in-lb	
Turbocharger Axial Clearance (010-038)	8 N·m	71 in-lb	
Turbocharger Blade Damage (010-039)	8 N·m	71 in-lb	
Turbocharger Radial Bearing Clearance (010-047)	8 N·m	71 in-lb	
Turbocharger Turbine Seal Leaks (010-049)	8 N·m	71 in-lb	

Component or Assembly (Procedure) Ref.No./StepsMetric

U.S.

Exhaust System - Specifications

Exhaust Restriction (011-009)

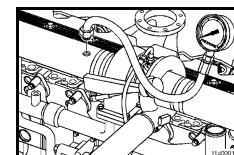
Exhaust Restriction

Maximum Exhaust Restriction

76 mm
Hg

MAX

3 in Hg



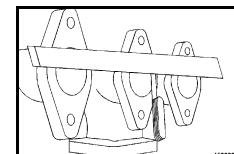
Exhaust Manifold, Dry (011-007)

Exhaust manifold Flatness

0.20 mm

MAX

0.008 in



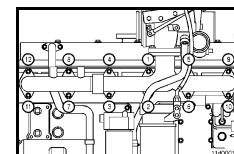
Exhaust System - Torque Values

Exhaust Manifold Dry (011-007)

Exhaust Manifold Capscrew Torque

43 N·m

32 ft-lb



Weights and Measures - Conversion Factors

Quantity	U.S. Customary		Metric		From U.S. Customary To Metric Multiply By	From Metric To U.S. Customary Multiply By
	Unit Name	Abbr.	Unit Name	Abbr.		
Area	sq. inch	in ²	sq. millimeters	mm ²	645.16	0.001550
			sq. centimeters	cm ²	6.452	0.155
	sq. foot	ft ²	sq. meter	m ²	0.0929	10.764
Fuel Consumption	pounds per horsepower hour	lb/hp-hr	grams per kilowatt hour	g/kW-hr	608.277	0.001645
Fuel Performance	miles per gallon	mpg	kilometers per liter	km/l	0.4251	2.352
	gallons per mile	gpm	liters per kilometer	l/km	2.352	0.4251
Force	pounds force	lbf	Newton	N	4.4482	0.224809
Length	inch	in	millimeters	mm	25.40	0.039370
	foot	ft	millimeters	mm	304.801	0.00328
Power	horsepower	hp	kilowatt	kW	0.746	1.341
Pressure	pounds force per sq. inch	psi	kilopascal	kPa	6.8948	0.145037
	inches of mercury	in Hg	kilopascal	kPa	3.3769	0.29613
	inches of water	in H ₂ O	kilopascal	kPa	0.2488	4.019299
	inches of mercury	in Hg	millimeters of mercury	mm Hg	25.40	0.039370
	inches of water	in H ₂ O	millimeters of water	mm H ₂ O	25.40	0.039370
	bars	bars	kilopascals	kPa	100.001	0.00999
	bars	bars	millimeters of mercury	mm Hg	750.06	0.001333
Temperature	fahrenheit	°F	centigrade	°C	(°F-32) 1.8	(1.8 x °C) +32
Torque	pound force per foot	ft-lb	Newton-meter	N·m	1.35582	0.737562
	pound force per inch	in-lb	Newton-meter	N·m	0.113	8.850756
Velocity	miles/hour	mph	kilometers/hour	kph	1.6093	0.6214
Volume: liquid displacement	gallon (U.S.)	gal.	liter	l	3.7853	0.264179
	gallon (Imp*)	gal.	liter	l	4.546	0.219976
	cubic inch	in ³	liter	l	0.01639	61.02545
	cubic inch	in ³	cubic centimeter	cm ³	16.387	0.06102
Weight (mass)	pounds (avoir.)	lb	kilograms	kg	0.4536	2.204623
Work	British Thermal Unit	BTU	joules	J	1054.5	0.000948
	British Thermal Unit	BTU	kilowatt-hour	kW-hr	0.000293	3414
	horsepower hours	hp-hr	kilowatt-hour	kW-hr	0.746	1.341

Tap-Drill Chart - U.S. Customary and Metric

NOTE ON SELECTING TAP-DRILL SIZES: The tap drill sizes shown on this card give the theoretical tap drill size for approximately 60% and 75% of full thread depth. Generally, it is recommended that drill sizes be selected in the 60% range as these sizes will provide about 90% of the potential holding power. Drill sizes in the 75% range are recommended for shallow hole tapping (less than 1 1/2 times the hole diameter) in soft metals and mild steel.

Tap Size		Drill Size	Tap Size		Drill Size	Tap Size		Drill Size	Tap Size		Drill Size
60%	75%		60%	75%		60%	75%		60%	75%	
	48				4.40mm			7.50mm			13.25mm
	1.95mm				16			19/64			5/8-11
	5/64				4.50mm			7.60mm			17/32
	47				15			N			M15x1.5
	2.00mm				4.60mm			7.70mm			13.50mm
	2.05mm				14			7.75mm			13.75mm
	46				13			7.80mm			35/64
3-48	3056				4.70mm			7.90mm			M15x1.5
	45				4.75mm			3/8-16			5/8-11
	2.10mm				3/16			5/16			M16x2
M2.5x.45	M2.6x.45				12			8.00mm			14.00mm
3-56	4-36				4.80mm			O			14.25mm
	44				11			8.10mm			5/8-18
	2.20mm				4.90mm			8.20mm			9/16
M2.6x.45	4-36				10			P			M16x1.5
	43				9			8.25mm			14.50mm
	2.30mm				5.00mm			8.30mm			37/64
4-40	4-48				8			8.40mm			14.75mm
	42				5.10mm			Q			15.00mm
	3/32				7			8.50mm			19.32
4-48	M3x.6				13/64			8.60mm			15.25mm
	41				6			R			39/64
	2.45mm				5.20mm			8.70mm			M17x1.5
M3x.6	M3x.5				5			11/32			M18x2.5
	40				5.25mm			21/64			5/8
	39				5.30mm			8.75mm			M18x2.5
M3x.5	5-40				4			Q			16.00mm
	37				5.40mm			10x1.5			16.25mm
5-44	6-32				3			10x1.25			3/4-10
	36				5.50mm			11/32			41/64
	2.75mm				7/32			M18x1.5			21/32
	7/64				5.60mm			M19x2.5			16.50mm
	35				2			S			16.75mm
	2.80mm				5.70mm			8.70mm			17.00mm
6-32	6-40				5.75mm			T			43/64
	33				1			9.10mm			17.25mm
	M3.5x6				5.80mm			23/64			17.50mm
M3.5x6	6-40				5.90mm			9.20mm			45/64
	31				A			9.30mm			23/32
	3.10mm				15/64			U			M20x2.5
	1/8				6.00mm			11x1.5			M20x2
	3.20mm				B			9.40mm			18.00mm
	3.25mm				6.10mm			9.50mm			18.25mm
M4x.75	M4x.7				C			3/8			18.50mm
	3.30mm				6.20mm			V			47/64
	3.40mm				D			9.60mm			18.75mm
M4x.75	8-32				6.25mm			9.70mm			19.00mm
M4x.7	8-36				6.30mm			9.75mm			3/4
	29				E			9.80mm			19.25mm
	3.50mm				1/4			9.90mm			7/8-9
	28				6.40mm			10.20mm			M22x2.5
8-32	9/64				6.50mm			13/32			19.50mm
	3.60mm				F			Z			25/32
8-36	27				6.60mm			W			19.75mm
	3.70mm				G			9.90mm			M22x2
	26				H			10.20mm			20.00mm
	3.75mm				I			X			51/64
	25				J			Y			20.25mm
	3.80mm				K			1/2-13			20.50mm
M4.5x.75	24				L			12x1.75			13/16
	3.90mm				M			10.20mm			20.75mm
	23				N			1/2-13			21.00mm
	5/32				O			12x1.25			53/64
10-24	5.16-24				P			10.50mm			21/25mm
	5/16-18				Q			27/64			27/32
	M8x1.25				R			10.75mm			21.50mm
	5.16-24				S			11.00mm			21.75mm
	M8x1				T			7/16			55/64
	5.16-24				U			11.25mm			M24x2
	M8x1.25				V			11.50mm			17/32
	5.16-24				W			11.75mm			22.25mm
	M8x1				X			15/32			22.50mm
	5.16-24				Y			29/64			1*8
	M8x1				Z			15/32			7/8
	5.16-24				M			31/64			M24x1.5
	M8x1				N			1/2			M25x2
	5.16-24				O			29/64			1*12
	M8x1				P			15/32			29/32
	5.16-24				Q			12.00mm			1*14
	M8x1				R			12.25mm			M25x1.5
	5.16-24				S			31/64			1*14
	M8x1				T			1/2			57/64
	5.16-24				U			12.50mm			22.75mm
	M8x1				V			1/2			23.00mm
	5.16-24				W			13.00mm			23.25mm
	M8x1				X			33/64			23.50mm
	5.16-24				Y						23.75mm
	M8x1				Z						15/16
	5.16-24				M						

17800013

Pipe Plug Torque Values

Thread	Size		Torque		Torque	
	in	Actual Thread O.D.	In Aluminum Components		In Cast Iron or Steel Components	
			N·m	ft-lb	N·m	ft-lb
1/16	0.32		5	45 in-lb	15	10
1/8	0.41		15	10	20	15
1/4	0.54		20	15	25	20
3/8	0.68		25	20	35	25
1/2	0.85		35	25	55	40
3/4	1.05		45	35	75	55
1	1.32		60	45	95	70
1-1/4	1.66		75	55	115	85
1-1/2	1.90		85	65	135	100

Capscrew Markings and Torque Values

△ CAUTION △

When replacing capscrews, always use a capscrew of the same measurement and strength as the capscrew being replaced. Using the wrong capscrews can result in engine damage.

Metric capscrews and nuts are identified by the grade number stamped on the head of the capscrew or on the surface of the nuts. U.S. Customary capscrews are identified by radial lines stamped on the head of the capscrew.

The following examples indicate how capscrews are identified:

METRIC - M8-1.25 X 25

M8 - 1.25 x 25

Major thread diameter in millimeters

Distance between threads in millimeters

Length in millimeters

17800016

U.S. Customary [5/16 X 18 X 1-1/2]

5/16 18 1-1/2

Major thread diameter in inches

Number of threads per inch

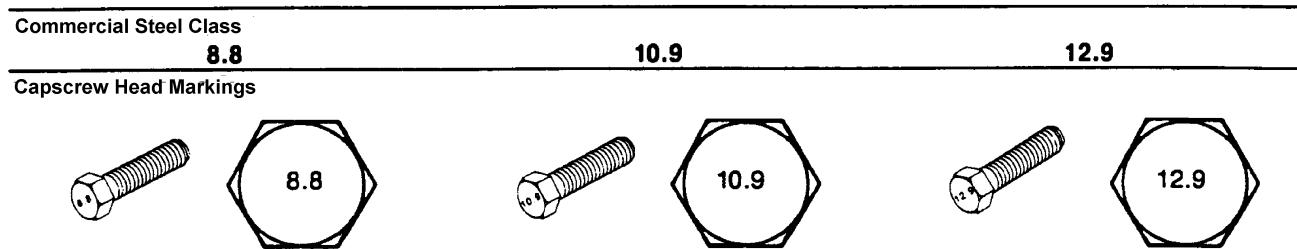
Length in inches

17800017

NOTES:

Always use the torque values listed in the following tables when specific torque values are not available.
Do not use the torque values in place of those specified in other sections of this manual.
The torque values in the table are based on the use of lubricated threads.
When the ft-lb value is less than 10, convert the ft-lb value to in-lb to obtain a better torque with an in-lb torque wrench. Example: 6 ft-lb equals 72 in-lb.

Capscrew Markings and Torque Values - Metric



Body Size	Torque				Torque				Torque			
	Diam.	Cast Iron		Aluminum	Cast Iron		Aluminum	Cast Iron		Aluminum	Cast Iron	
mm	N·m	ft-lb	N·m	ft-lb	N·m	ft-lb	N·m	ft-lb	N·m	ft-lb	N·m	ft-lb
6	9	5	7	4	12	9	7	4	14	9	7	4
7	14	9	11	7	18	14	11	7	23	18	11	7
8	25	18	18	14	33	25	18	14	40	29	18	14
10	45	33	30	25	60	45	30	25	70	50	30	25
12	80	60	55	40	105	75	55	40	125	95	55	40
14	125	90	90	65	165	122	90	65	195	145	90	65
16	180	130	140	100	240	175	140	100	290	210	140	100
18	230	170	180	135	320	240	180	135	400	290	180	135

Capscrew Markings and Torque Values - U.S. Customary

SAE Grade Number	5	8
Capscrew Head Markings These are all SAE Grade 5 (3 line)		
	Capscrew Torque - Grade 5 Capscrew	Capscrew Torque - Grade 8 Capscrew

Capscrew Body Size	Cast Iron		Aluminum		Cast Iron		Aluminum	
	N·m	ft-lb	N·m	ft-lb	N·m	ft-lb	N·m	ft-lb
1/4 - 20	9	7	8	6	15	11	8	6
- 28	12	9	9	7	18	13	9	7
5/16 - 18	20	15	16	12	30	22	16	12
- 24	23	17	19	14	33	24	19	14
3/8 - 16	40	30	25	20	55	40	25	20
- 24	40	30	35	25	60	45	35	25
7/16 - 14	60	45	45	35	90	65	45	35
- 20	65	50	55	40	95	70	55	40
1/2 - 13	95	70	75	55	130	95	75	55
- 20	100	75	80	60	150	110	80	60
9/16 - 12	135	100	110	80	190	140	110	80
- 18	150	110	115	85	210	155	115	85
5/8 - 11	180	135	150	110	255	190	150	110
- 18	210	155	160	120	290	215	160	120
3/4 - 10	325	240	255	190	460	340	255	190
- 16	365	270	285	210	515	380	285	210
7/8 - 9	490	360	380	280	745	550	380	280
- 14	530	390	420	310	825	610	420	310
1 - 8	720	530	570	420	1100	820	570	420
- 14	800	590	650	480	1200	890	650	480

Newton-Meter to Foot-Pound Conversion Chart

N·m	ft-lb	N·m	ft-lb	N·m	ft-lb
1	8.850756 in-lb	55	41	155	114
5	44 in-lb	60	44	160	118
6	53 in-lb	65	48	165	122
7	62 in-lb	70	52	170	125
8	71 in-lb	75	55	175	129
9	80 in-lb	80	59	180	133
10	89 in-lb	85	63	185	136
1	0.737562 ft-lb	90	66	190	140
12	9	95	70	195	144
14	10	100	74	200	148
15	11	105	77	205	151
16	12	110	81	210	155
18	13	115	85	215	159
20	15	120	89	220	162
25	18	125	92	225	165
30	22	130	96	230	170
35	26	135	100	235	173
40	30	140	103	240	177
45	33	145	107	245	180
50	37	150	111	250	184

NOTE: To convert from Newton-Meters to Kilogram-Meters divide Newton-Meters by 9.803.

Fraction, Decimal, Millimeter Conversions

Fraction	inch	mm	Fraction	inch	mm
1/64	0.0156	0.397	33/64	0.5156	13.097
1/32	0.0313	0.794	17/32	0.5313	13.494
3/64	0.0469	1.191	35/64	0.5469	13.891
1/16	0.0625	1.588	9/16	0.5625	14.288
5/64	0.0781	1.984	37/64	0.5781	14.684
3/32	0.0938	2.381	19/32	0.5938	15.081
7/64	0.1094	2.778	39/64	0.6094	15.478
1/8	0.1250	3.175	5/8	0.6250	15.875
9/64	0.1406	3.572	41/64	0.6406	16.272
5/32	0.1563	3.969	21/32	0.6563	16.669
11/64	0.1719	4.366	43/64	0.6719	17.066
3/16	0.1875	4.763	11/16	0.6875	17.463
13/64	0.2031	5.159	45/64	0.7031	17.859
7/32	0.2188	5.556	23/32	0.7188	18.256
15/64	0.2344	5.953	47/64	0.7344	18.653
1/4	0.2500	6.350	3/4	0.7500	19.050
17/64	0.2656	6.747	49/64	0.7656	19.447
9/32	0.2813	7.144	25/32	0.7813	19.844
19/64	0.2969	7.541	51/64	0.7969	20.241
5/16	0.3125	7.938	13/16	0.8125	20.638
21/64	0.3281	8.334	53/64	0.8281	21.034
11/32	0.3438	8.731	27/32	0.8438	21.431
23/64	0.3594	9.128	55/64	0.8594	21.828
3/8	0.3750	9.525	7/8	0.8750	22.225
25/64	0.3906	9.922	57/64	0.8906	22.622
13/32	0.4063	10.319	29/32	0.9063	23.019
27/64	0.4219	10.716	59/64	0.9219	23.416
7/16	0.4375	11.113	15/16	0.9375	23.813
29/64	0.4531	11.509	61/64	0.9531	24.209
15/32	0.4688	11.906	31/32	0.9688	24.606
31/64	0.4844	12.303	63/64	0.9844	25.003
1/2	0.5000	12.700	1	1.0000	25.400

Conversion Factor: 1 inch = 25.4 mm