

**N843H / N843L / N843 / N844LT /  
N844L / N844T / N844  
ISM Tier 3  
Engine**

**SERVICE MANUAL**

**Part number 47632257**

2<sup>nd</sup> edition English

April 2014

*Replaces part number 84392585*



# Contents

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## INTRODUCTION

Engine.....	10
[10.001] Engine and crankcase .....	10.1
[10.102] Pan and covers .....	10.2
[10.106] Valve drive and gears .....	10.3
[10.101] Cylinder heads .....	10.4
[10.105] Connecting rods and pistons.....	10.5
[10.103] Crankshaft and flywheel.....	10.6
[10.110] Balancer and damper .....	10.7
[10.114] Pump drives .....	10.8
[10.218] Fuel injection system.....	10.9
[10.250] Turbocharger and lines.....	10.10
[10.254] Intake and exhaust manifolds and muffler .....	10.11
[10.400] Engine cooling system .....	10.12
[10.304] Engine lubrication system.....	10.13
Electrical systems.....	55
[55.525] Cab engine controls.....	55.1
[55.201] Engine starting system.....	55.2
[55.301] Alternator.....	55.3
[55.202] Cold start aid .....	55.4
[55.010] Fuel injection system.....	55.5
[55.012] Engine cooling system .....	55.6
[55.013] Engine oil system .....	55.7



## **INTRODUCTION**

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# Contents

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## INTRODUCTION

Foreword .....	3
Foreword - Important notice regarding equipment servicing .....	4
Safety rules .....	5
Safety rules - Ecology and the environment .....	6

## Foreword

This publication contains data, features instructions and methods for performing repair operations on the assembly and its components and is addressed to qualified, specialized personnel.

Check to make sure you have the right publication related to the component you are about to work on before you start. Make sure that you have all the necessary safety equipment: safety glasses, helmet, gloves, footwear, etc. Check that the working lifting and transport equipment is available and in working order. Make sure that vehicle is secured. Proceed by carefully observing the instructions contained in this publication and use the indicated specific tools to ensure correct repair procedures and safety of operators.

**NOTE:** *This manual applies to multiple applications, therefore images may not all be accurate.*

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## **Foreword - Important notice regarding equipment servicing**

All repair and maintenance work listed in this manual must be carried out only by qualified dealership personnel, strictly complying with the instructions given, and using, whenever possible, the special tools.

Anyone who performs repair and maintenance operations without complying with the procedures provided herein shall be responsible for any subsequent damages.

The manufacturer and all the organizations of its distribution chain, including - without limitation - national, regional, or local dealers, reject any responsibility for damages caused by parts and/or components not approved by the manufacturer, including those used for the servicing or repair of the product manufactured or marketed by the manufacturer. In any case, no warranty is given or attributed on the product manufactured or marketed by the manufacturer in case of damages caused by parts and/or components not approved by the manufacturer.

The information in this manual is up-to-date at the date of the publication. It is the policy of the manufacturer for continuous improvement. Some information could not be updated due to modifications of a technical or commercial type, or changes to the laws and regulations of different countries.

In case of questions, refer to your CNH Sales and Service Networks.

## Safety rules


### Personal safety





This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible death or injury.

Throughout this manual you will find the signal words DANGER, WARNING, and CAUTION followed by special instructions. These precautions are intended for the personal safety of you and those working with you.

Read and understand all the safety messages in this manual before you operate or service the machine.

 DANGER indicates a hazardous situation that, if not avoided, will result in death or serious injury.

 WARNING indicates a hazardous situation that, if not avoided, could result in death or serious injury.

 CAUTION indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.

**FAILURE TO FOLLOW DANGER, WARNING, AND CAUTION MESSAGES COULD RESULT IN DEATH OR SERIOUS INJURY.**

### Machine safety

**NOTICE:** Notice indicates a situation that, if not avoided, could result in machine or property damage.

Throughout this manual you will find the signal word Notice followed by special instructions to prevent machine or property damage. The word Notice is used to address practices not related to personal safety.

### Information

**NOTE:** Note indicates additional information that clarifies steps, procedures, or other information in this manual.

Throughout this manual you will find the word Note followed by additional information about a step, procedure, or other information in the manual. The word Note is not intended to address personal safety or property damage.

## Safety rules - Ecology and the environment

Soil, air, and water are vital factors of agriculture and life in general. When legislation does not yet rule the treatment of some of the substances required by advanced technology, sound judgment should govern the use and disposal of products of a chemical and petrochemical nature.

**NOTE:** *The following are recommendations that may be of assistance:*

- Become acquainted with and ensure that you understand the relative legislation applicable to your country.
- Where no legislation exists, obtain information from suppliers of oils, filters, batteries, fuels, antifreeze, cleaning agents, etc., with regard to their effect on man and nature and how to safely store, use, and dispose of these substances.
- Agricultural consultants will, in many cases, be able to help you as well.

### Helpful hints

- Avoid filling tanks using cans or inappropriate pressurized fuel delivery systems that may cause considerable spillage.
- In general, avoid skin contact with all fuels, oils, acids, solvents, etc. Most of them contain substances that may be harmful to your health.
- Modern oils contain additives. Do not burn contaminated fuels and or waste oils in ordinary heating systems.
- Avoid spillage when draining off used engine coolant mixtures, engine, gearbox and hydraulic oils, brake fluids, etc. Do not mix drained brake fluids or fuels with lubricants. Store them safely until they can be disposed of in a proper way to comply with local legislation and available resources.
- Modern coolant mixtures, i.e. antifreeze and other additives, should be replaced every two years. They should not be allowed to get into the soil, but should be collected and disposed of properly.
- Do not open the air-conditioning system yourself. It contains gases that should not be released into the atmosphere. Your CNH dealer or air conditioning specialist has a special extractor for this purpose and will have to recharge the system properly.
- Repair any leaks or defects in the engine cooling or hydraulic system immediately.
- Do not increase the pressure in a pressurized circuit as this may lead to a component failure.
- Protect hoses during welding as penetrating weld splatter may burn a hole or weaken them, allowing the loss of oils, coolant, etc.



# **SERVICE MANUAL**

## **Engine**

**N843H , N843L , N843 , N844LT , N844L , N844T , N844**

# Contents

---

## Engine - 10

[10.001] Engine and crankcase .....	10.1
[10.102] Pan and covers .....	10.2
[10.106] Valve drive and gears .....	10.3
[10.101] Cylinder heads .....	10.4
[10.105] Connecting rods and pistons .....	10.5
[10.103] Crankshaft and flywheel.....	10.6
[10.110] Balancer and damper .....	10.7
[10.114] Pump drives .....	10.8
[10.218] Fuel injection system.....	10.9
[10.250] Turbocharger and lines.....	10.10
[10.254] Intake and exhaust manifolds and muffler .....	10.11
[10.400] Engine cooling system .....	10.12
[10.304] Engine lubrication system.....	10.13

# CONSUMABLES INDEX

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<b>Consumable</b>	<b>Reference</b>	<b>PAGE</b>
Molykote® G-N Metal assembly paste	Camshaft Tappets - Install	10.3 / 19
Molykote®	Cylinder head - Install	10.4 / 14
Loctite® 243	Crankshaft oil seal Rear seal - Install	10.6 / 10



## **Engine - 10**

### **Engine and crankcase - 001**

**N843H , N843L , N843 , N844LT , N844L , N844T , N844**

# Contents

---

## Engine - 10

### Engine and crankcase - 001

#### TECHNICAL DATA

##### Engine

General specification .....	3
General specification .....	3
Torque .....	4
Torque - Minimum tightening torques for normal assembly .....	4
Special tools .....	8

##### Crankcase

Dimension .....	9
-----------------	---

#### FUNCTIONAL DATA

##### Engine

Identification .....	10
----------------------	----

#### SERVICE

##### Engine

Compression test .....	11
------------------------	----

##### Crankcase

Remove - Port block .....	12
Inspect .....	13
Install - Port block .....	14

#### DIAGNOSTIC

##### Engine

Troubleshooting .....	15
-----------------------	----

## Engine - General specification

Engine model	N843	N843L
Number of cylinders	3	3
Bore x stroke	<b>84 mm x 90 mm ( 3.31 in x 3.54 in)</b>	<b>84 mm x 100 mm ( 3.31 in x 3.94 in)</b>
Displacement	<b>1496 cm<sup>3</sup> (91.3 in<sup>3</sup>)</b>	<b>1662 cm<sup>3</sup> (101.4 in<sup>3</sup>)</b>
Compression ratio	22:1	22.4:1
Engine speed (Low idle no load)	<b>950 - 1050 RPM</b>	<b>950 - 1050 RPM</b>
Engine speed (High idle no load)	<b>3130 - 3180 RPM</b>	<b>3420 - 3500 RPM</b>
PTO engine horsepower	<b>28.3 kW (38.5 Hp)</b>	<b>26.1 kW (35.5 Hp)</b>
Firing order	1-2-3	1-2-3
Cylinder arrangement	In-Line vertical	In-Line vertical
Valve arrangement	Overhead	Overhead
Compression pressure at <b>200 RPM</b> (cylinder speed)	<b>2944 ± 345 kPa (427 ± 50 psi)</b>	<b>2944 ± 345 kPa (427 ± 50 psi)</b>
Variation between cylinders	<b>345 kPa (50 psi)</b>	<b>345 kPa (50 psi)</b>

**NOTE:** If bore size exceeds **85.2 mm (3.3543 in)** replace with long block.

## Engine - General specification

Engine model	N844	N844T	N844L	N844LT
Number of cylinders	4	4	4	4
Bore x stroke	<b>84 mm x 90 mm ( 3.31 in x 3.54 in)</b>	<b>84 mm x 90 mm ( 3.31 in x 3.54 in)</b>	<b>84 mm x 100 mm ( 3.31 in x 3.94 in)</b>	<b>84 mm x 100 mm ( 3.31 in x 3.94 in)</b>
Displacement	<b>1995 cm<sup>3</sup> (121.7 in<sup>3</sup>)</b>	<b>1995 cm<sup>3</sup> (121.7 in<sup>3</sup>)</b>	<b>2216 cm<sup>3</sup> ( 135.2 in<sup>3</sup>)</b>	<b>2216 cm<sup>3</sup> ( 135.2 in<sup>3</sup>)</b>
Compression ratio	22:1	22:1	22.4:1	22.4:1
Aspiration			Indirect naturally aspirated	Indirect turbocharged with waste gate
Emissions control			N/A	Internal Exhaust Gas Recirculation (EGR)
Engine speed (Low idle no load)	<b>900 - 1000 RPM</b>	<b>900 - 1000 RPM</b>	<b>1200 RPM +/- 50</b>	<b>1050 - 1150 RPM</b>
Engine speed (Rated - full load)			<b>2800 RPM</b>	
Engine speed (High idle no load)	<b>3090 - 3190 RPM</b>	<b>3090 - 3190 RPM</b>	<b>3000 RPM +/- 40</b>	<b>3090 - 3190 RPM</b>
Horsepower @ <b>2800 RPM</b>	<b>29.8 kW (40.5 Hp)</b>	<b>38.8 kW (52.8 Hp)</b>	<b>35.9 kW (48.8 Hp)</b>	<b>44.1 kW (60.0 Hp)</b>
Peak torque @ <b>1800 RPM</b>			<b>143 N·m (105.5 lb ft)</b>	<b>171 N·m (126 lb ft)</b>
Firing order	1-3-4-2	1-3-4-2	1-3-4-2	1-3-4-2
Cylinder arrangement	In-Line vertical	In-Line vertical	In-Line vertical	In-Line vertical
Valve arrangement	Overhead	Overhead	Overhead	Overhead
Compression pressure at <b>200 RPM</b> (cylinder speed)	<b>2944 ± 345 kPa (427 ± 50 psi)</b>	<b>2944 ± 345 kPa (427 ± 50 psi)</b>	<b>2944 ± 345 kPa (427 ± 50 psi)</b>	<b>2944 ± 345 kPa (427 ± 50 psi)</b>
Variation between cylinders	<b>345 kPa (50 psi)</b>	<b>345 kPa (50 psi)</b>	<b>345 kPa (50 psi)</b>	<b>345 kPa (50 psi)</b>
Oil filtration	Replaceable full flow spin on cartridge			
Oil capacity with filter			<b>10.4 L (11 US qt)</b>	
Water pump (Style)			Centrifugal	
Water pump (Flow @ rated RPM)			<b>57.5 L/min (15.2 US gpm)</b>	
Injection pump			Bosch In-Line mechanical injection	

**NOTE:** If bore size exceeds **85.2 mm (3.3543 in)** replace with long block.

## Engine - Torque

Connecting rod cap bolts	49 - 54 N·m (36 - 40 lb ft)
Main bearing retaining bolts	49 - 54 N·m (36 - 40 lb ft)
Relief valve assembly	59 - 69 N·m (43 - 51 lb ft)
Crankshaft rear main bearing bolts	25 - 29 N·m (18 - 22 lb ft)
Crankshaft center main bearing bolts	49 - 54 N·m (36 - 40 lb ft)
Engine rear mounting plate	12 - 17 N·m (9 - 12 lb ft)
Flywheel retaining bolts	68 - 78 N·m (51 - 58 lb ft)
Engine front plate	9 - 12 N·m (6 - 9 lb ft)
Crankshaft pulley nut	274 - 333 N·m (202 - 246 lb ft)
Cylinder head bolts	98 - 103 N·m (72.3 - 76 lb ft)
Rocker arm assembly	27 - 39 N·m (20 - 29 lb ft)
Rocker arm locknut	11 - 16 N·m (8 - 12 lb ft)
Oil tube banjo bolt	9 - 13 N·m (7 - 9 lb ft)
Oil pressure switch	14 - 20 N·m (10 - 14 lb ft)
Rocker cover bolts	7 - 12 N·m (6 - 9 lb ft)
Glow plugs	14 - 20 N·m (10 - 14 lb ft)
Cooling fan bolts	9 - 13 N·m (7 - 9 lb ft)
Balancer retaining bolts (4 cylinder models only)	49 - 53.9 N·m (36 - 39 lb ft)

## Engine - Torque - Minimum tightening torques for normal assembly

### METRIC NON-FLANGED HARDWARE

NOM. SIZE	CLASS 8.8 BOLT and CLASS 8 NUT		CLASS 10.9 BOLT and CLASS 10 NUT		LOCKNUT CL.8 W/CL8.8 BOLT	LOCKNUT CL.10 W/CL10.9 BOLT
	UNPLATED	PLATED W/ZnCr	UNPLATED	PLATED W/ZnCr		
M4	2.2 N·m (19 lb in)	2.9 N·m (26 lb in)	3.2 N·m (28 lb in)	4.2 N·m (37 lb in)	2 N·m (18 lb in)	2.9 N·m (26 lb in)
M5	4.5 N·m (40 lb in)	5.9 N·m (52 lb in)	6.4 N·m (57 lb in)	8.5 N·m (75 lb in)	4 N·m (36 lb in)	5.8 N·m (51 lb in)
M6	7.5 N·m (66 lb in)	10 N·m (89 lb in)	11 N·m (96 lb in)	15 N·m (128 lb in)	6.8 N·m (60 lb in)	10 N·m (89 lb in)
M8	18 N·m (163 lb in)	25 N·m (217 lb in)	26 N·m (234 lb in)	35 N·m (311 lb in)	17 N·m (151 lb in)	24 N·m (212 lb in)
M10	37 N·m (27 lb ft)	49 N·m (36 lb ft)	52 N·m (38 lb ft)	70 N·m (51 lb ft)	33 N·m (25 lb ft)	48 N·m (35 lb ft)
M12	64 N·m (47 lb ft)	85 N·m (63 lb ft)	91 N·m (67 lb ft)	121 N·m (90 lb ft)	58 N·m (43 lb ft)	83 N·m (61 lb ft)
M16	158 N·m (116 lb ft)	210 N·m (155 lb ft)	225 N·m (166 lb ft)	301 N·m (222 lb ft)	143 N·m (106 lb ft)	205 N·m (151 lb ft)
M20	319 N·m (235 lb ft)	425 N·m (313 lb ft)	440 N·m (325 lb ft)	587 N·m (433 lb ft)	290 N·m (214 lb ft)	400 N·m (295 lb ft)
M24	551 N·m (410 lb ft)	735 N·m (500 lb ft)	762 N·m (560 lb ft)	1016 N·m (750 lb ft)	501 N·m (370 lb ft)	693 N·m (510 lb ft)

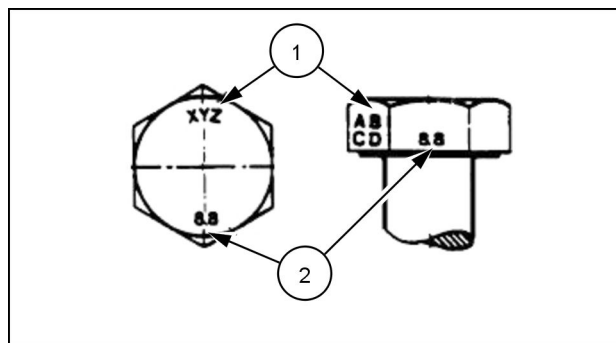
**NOTE:** M4 through M8 hardware torque specifications are shown in pound-inches. M10 through M24 hardware torque specifications are shown in pound-feet.

**METRIC FLANGED HARDWARE**

NOM. SIZE	CLASS 8.8 BOLT and CLASS 8 NUT		CLASS 10.9 BOLT and CLASS 10 NUT		LOCKNUT CL.8 W/CL8.8 BOLT	LOCKNUT CL.10 W/CL10.9 BOLT
	UNPLATED	PLATED W/ZnCr	UNPLATED	PLATED W/ZnCr		
M4	2.4 N·m (21 lb in)	3.2 N·m (28 lb in)	3.5 N·m (31 lb in)	4.6 N·m (41 lb in)	2.2 N·m (19 lb in)	3.1 N·m (27 lb in)
M5	4.9 N·m (43 lb in)	6.5 N·m (58 lb in)	7.0 N·m (62 lb in)	9.4 N·m (83 lb in)	4.4 N·m (39 lb in)	6.4 N·m (57 lb in)
M6	8.3 N·m (73 lb in)	11 N·m (96 lb in)	12 N·m (105 lb in)	16 N·m (141 lb in)	7.5 N·m (66 lb in)	11 N·m (96 lb in)
M8	20 N·m (179 lb in)	27 N·m (240 lb in)	29 N·m (257 lb in)	39 N·m (343 lb in)	18 N·m (163 lb in)	27 N·m (240 lb in)
M10	40 N·m (30 lb ft)	54 N·m (40 lb ft)	57 N·m (42 lb ft)	77 N·m (56 lb ft)	37 N·m (27 lb ft)	53 N·m (39 lb ft)
M12	70 N·m (52 lb ft)	93 N·m (69 lb ft)	100 N·m (74 lb ft)	134 N·m (98 lb ft)	63 N·m (47 lb ft)	91 N·m (67 lb ft)
M16	174 N·m (128 lb ft)	231 N·m (171 lb ft)	248 N·m (183 lb ft)	331 N·m (244 lb ft)	158 N·m (116 lb ft)	226 N·m (167 lb ft)
M20	350 N·m (259 lb ft)	467 N·m (345 lb ft)	484 N·m (357 lb ft)	645 N·m (476 lb ft)	318 N·m (235 lb ft)	440 N·m (325 lb ft)
M24	607 N·m (447 lb ft)	809 N·m (597 lb ft)	838 N·m (618 lb ft)	1118 N·m (824 lb ft)	552 N·m (407 lb ft)	

**IDENTIFICATION**

**Metric Hex head and carriage bolts, classes 5.6 and up**

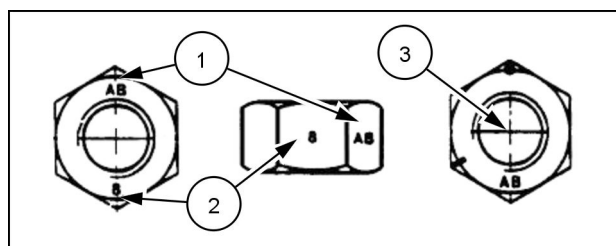


20083680 1

(1) Manufacturer's Identification

(2) Property Class

**Metric Hex nuts and locknuts, classes 05 and up**



20083681 2

(1) Manufacturer's Identification

(2) Property Class

(3) Clock Marking of Property Class and Manufacturer's Identification (Optional), i.e. marks 60 ° apart indicate Class 10 properties, and marks 120 ° apart indicate Class 8.

**INCH NON-FLANGED HARDWARE**

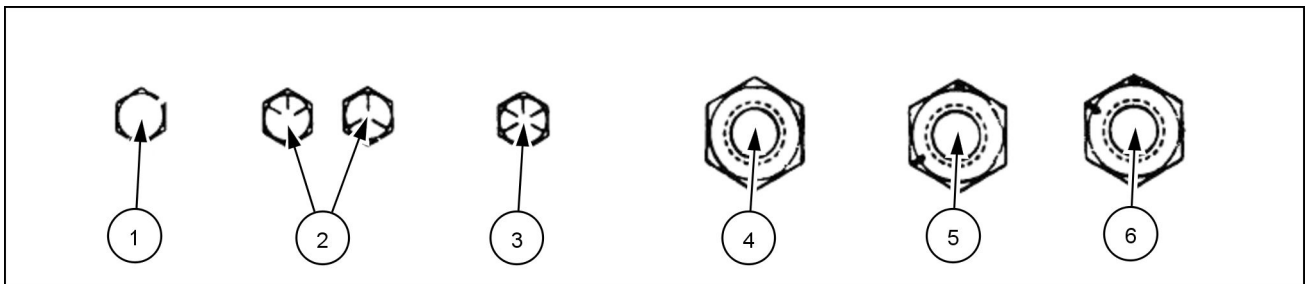
NOMINAL SIZE	SAE GRADE 5 BOLT and NUT		SAE GRADE 8 BOLT and NUT		LOCKNUT GrB W/ Gr5 BOLT	LOCKNUT GrC W/ Gr8 BOLT
	UN-PLATED or PLATED SILVER	PLATED W/ZnCr GOLD	UN-PLATED or PLATED SILVER	PLATED W/ZnCr GOLD		
1/4	8 N·m (71 lb in)	11 N·m (97 lb in)	12 N·m (106 lb in)	16 N·m (142 lb in)	8.5 N·m (75 lb in)	12.2 N·m (109 lb in)
5/16	17 N·m (150 lb in)	23 N·m (204 lb in)	24 N·m (212 lb in)	32 N·m (283 lb in)	17.5 N·m (155 lb in)	25 N·m (220 lb in)
3/8	30 N·m (22 lb ft)	40 N·m (30 lb ft)	43 N·m (31 lb ft)	57 N·m (42 lb ft)	31 N·m (23 lb ft)	44 N·m (33 lb ft)
7/16	48 N·m (36 lb ft)	65 N·m (48 lb ft)	68 N·m (50 lb ft)	91 N·m (67 lb ft)	50 N·m (37 lb ft)	71 N·m (53 lb ft)
1/2	74 N·m (54 lb ft)	98 N·m (73 lb ft)	104 N·m (77 lb ft)	139 N·m (103 lb ft)	76 N·m (56 lb ft)	108 N·m (80 lb ft)
9/16	107 N·m (79 lb ft)	142 N·m (105 lb ft)	150 N·m (111 lb ft)	201 N·m (148 lb ft)	111 N·m (82 lb ft)	156 N·m (115 lb ft)
5/8	147 N·m (108 lb ft)	196 N·m (145 lb ft)	208 N·m (153 lb ft)	277 N·m (204 lb ft)	153 N·m (113 lb ft)	215 N·m (159 lb ft)
3/4	261 N·m (193 lb ft)	348 N·m (257 lb ft)	369 N·m (272 lb ft)	491 N·m (362 lb ft)	271 N·m (200 lb ft)	383 N·m (282 lb ft)
7/8	420 N·m (310 lb ft)	561 N·m (413 lb ft)	594 N·m (438 lb ft)	791 N·m (584 lb ft)	437 N·m (323 lb ft)	617 N·m (455 lb ft)
1	630 N·m (465 lb ft)	841 N·m (620 lb ft)	890 N·m (656 lb ft)	1187 N·m (875 lb ft)	654 N·m (483 lb ft)	924 N·m (681 lb ft)

**NOTE:** For Imperial Units, 1/4 in and 5/16 in hardware torque specifications are shown in pound-inches. 3/8 in through 1 in hardware torque specifications are shown in pound-feet.

**INCH FLANGED HARDWARE**

NOM- INAL SIZE	SAE GRADE 5 BOLT and NUT		SAE GRADE 8 BOLT and NUT		LOCKNUT GrF W/ Gr5 BOLT	LOCKNUT GrG W/ Gr8 BOLT
	UNPLATED or PLATED SILVER	PLATED W/ZnCr GOLD	UNPLATED or PLATED SILVER	PLATED W/ZnCr GOLD		
1/4	9 N·m (80 lb in)	12 N·m (106 lb in)	13 N·m (115 lb in)	17 N·m (150 lb in)	8 N·m (71 lb in)	12 N·m (106 lb in)
5/16	19 N·m (168 lb in)	25 N·m (221 lb in)	26 N·m (230 lb in)	35 N·m (310 lb in)	17 N·m (150 lb in)	24 N·m (212 lb in)
3/8	33 N·m (25 lb ft)	44 N·m (33 lb ft)	47 N·m (35 lb ft)	63 N·m (46 lb ft)	30 N·m (22 lb ft)	43 N·m (32 lb ft)
7/16	53 N·m (39 lb ft)	71 N·m (52 lb ft)	75 N·m (55 lb ft)	100 N·m (74 lb ft)	48 N·m (35 lb ft)	68 N·m (50 lb ft)
1/2	81 N·m (60 lb ft)	108 N·m (80 lb ft)	115 N·m (85 lb ft)	153 N·m (113 lb ft)	74 N·m (55 lb ft)	104 N·m (77 lb ft)
9/16	117 N·m (86 lb ft)	156 N·m (115 lb ft)	165 N·m (122 lb ft)	221 N·m (163 lb ft)	106 N·m (78 lb ft)	157 N·m (116 lb ft)
5/8	162 N·m (119 lb ft)	216 N·m (159 lb ft)	228 N·m (168 lb ft)	304 N·m (225 lb ft)	147 N·m (108 lb ft)	207 N·m (153 lb ft)
3/4	287 N·m (212 lb ft)	383 N·m (282 lb ft)	405 N·m (299 lb ft)	541 N·m (399 lb ft)	261 N·m (193 lb ft)	369 N·m (272 lb ft)
7/8	462 N·m (341 lb ft)	617 N·m (455 lb ft)	653 N·m (482 lb ft)	871 N·m (642 lb ft)	421 N·m (311 lb ft)	594 N·m (438 lb ft)
1	693 N·m (512 lb ft)	925 N·m (682 lb ft)	979 N·m (722 lb ft)	1305 N·m (963 lb ft)	631 N·m (465 lb ft)	890 N·m (656 lb ft)

**Inch Bolts and free-spinning nuts**



20083682 3

**Grade Marking Examples**

SAE Grade Identification			
1	Grade 2 - No Marks	4	Grade 2 Nut - No Marks
2	Grade 5 - Three Marks	5	Grade 5 Nut - Marks <b>120</b> ° Apart
3	Grade 8 - Five Marks	6	Grade 8 Nut - Marks <b>60</b> ° Apart



**Suggest:**

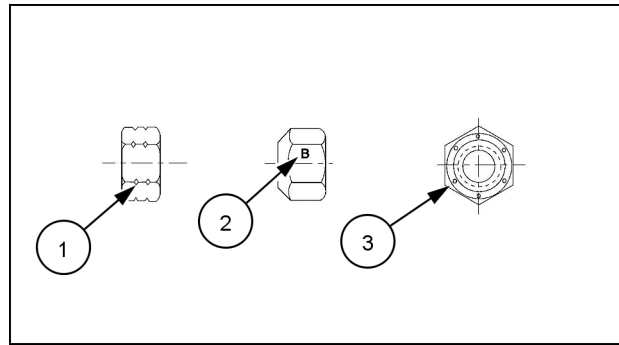
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## Inch Lock Nuts, All Metal (Three optional methods)



20090268 4

### Grade Identification

Grade	Corner Marking Method (1)	Flats Marking Method (2)	Clock Marking Method (3)
Grade A	No Notches	No Mark	No Marks
Grade B	One Circumferential Notch	Letter B	Three Marks
Grade C	Two Circumferential Notches	Letter C	Six Marks

## Engine - Special tools

Tool number	Description
<b>FNH01728</b>	Injector tester
<b>FNH00120</b>	Adapter - Compression tester
<b>FNH01728</b>	Injector adapter set
<b>OEM1074</b>	Compression test gauge assembly
<b>FNH01720</b>	Injector cleaning kit
<b>380002887</b>	Port block installer
<b>FNH11044</b>	Port block installer pins
<b>380002888</b>	Port block remover
<b>FNH00011</b>	Oil pressure test fitting
Micrometer, outside	<b>0 - 25 mm (0 - 1 in)</b>
Micrometer, outside	<b>25 - 51 mm (1 - 2 in)</b>
Micrometer, outside	<b>76.2 - 101.6 mm (3 - 4 in)</b>
Small hole gauge	<b>19 - 25 mm (0.75 - 1 in)</b>
Cylinder bore gauge	<b>76.2 - 101.6 mm (3 - 4 in)</b>
Cylinder bore gauge	<b>25 - 51 mm (1 - 2 in)</b>

## Crankcase - Dimension

Bore	
Standard	<b>84 - 84.019 mm (3.3071 - 3.3078 in)</b>
Head surface warp	
Standard	<b>0.05 mm (0.002 in)</b>
Maximum	<b>0.12 mm (0.005 in)</b>

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