

SERVICE MANUAL

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

Part number 47632248

2nd edition English

April 2014

Replaces part number 84392572



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INTRODUCTION

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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.*

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

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Engine and crankcase - 001

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DIAGNOSTIC

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| | |
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Engine - General specification

| | | |
|--|--|---|
| Engine model | N843 | N843L |
| Number of cylinders | 3 | 3 |
| Bore x stroke | 84 mm x 90 mm (3.31 in x 3.54 in) | 84 mm x 100 mm (3.31 in x 3.94 in) |
| Displacement | 1496 cm³ (91.3 in³) | 1662 cm³ (101.4 in³) |
| Compression ratio | 22:1 | 22.4:1 |
| Engine speed (Low idle no load) | 950 - 1050 RPM | 950 - 1050 RPM |
| Engine speed (High idle no load) | 3130 - 3180 RPM | 3420 - 3500 RPM |
| PTO engine horsepower | 28.3 kW (38.5 Hp) | 26.1 kW (35.5 Hp) |
| Firing order | 1-2-3 | 1-2-3 |
| Cylinder arrangement | In-Line vertical | In-Line vertical |
| Valve arrangement | Overhead | Overhead |
| Compression pressure at 200 RPM (cylinder speed) | 2944 ± 345 kPa (427 ± 50 psi) | 2944 ± 345 kPa (427 ± 50 psi) |
| Variation between cylinders | 345 kPa (50 psi) | 345 kPa (50 psi) |

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 | 84 mm x 90 mm (3.31 in x 3.54 in) | 84 mm x 90 mm (3.31 in x 3.54 in) | 84 mm x 100 mm (3.31 in x 3.94 in) | 84 mm x 100 mm (3.31 in x 3.94 in) |
| Displacement | 1995 cm³ (121.7 in³) | 1995 cm³ (121.7 in³) | 2216 cm³ (135.2 in³) | 2216 cm³ (135.2 in³) |
| 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) | 900 - 1000 RPM | 900 - 1000 RPM | 1200 RPM +/- 50 | 1050 - 1150 RPM |
| Engine speed (Rated - full load) | | | 2800 RPM | |
| Engine speed (High idle no load) | 3090 - 3190 RPM | 3090 - 3190 RPM | 3000 RPM +/- 40 | 3090 - 3190 RPM |
| Horsepower @ 2800 RPM | 29.8 kW (40.5 Hp) | 38.8 kW (52.8 Hp) | 35.9 kW (48.8 Hp) | 44.1 kW (60.0 Hp) |
| Peak torque @ 1800 RPM | | | 143 N·m (105.5 lb ft) | 171 N·m (126 lb ft) |
| 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 200 RPM (cylinder speed) | 2944 ± 345 kPa (427 ± 50 psi) | 2944 ± 345 kPa (427 ± 50 psi) | 2944 ± 345 kPa (427 ± 50 psi) | 2944 ± 345 kPa (427 ± 50 psi) |
| Variation between cylinders | 345 kPa (50 psi) | 345 kPa (50 psi) | 345 kPa (50 psi) | 345 kPa (50 psi) |
| Oil filtration | Replaceable full flow spin on cartridge | | | |
| Oil capacity with filter | | | 10.4 L (11 US qt) | |
| Water pump (Style) | | | Centrifugal | |
| Water pump (Flow @ rated RPM) | | | 57.5 L/min (15.2 US gpm) | |
| 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) |

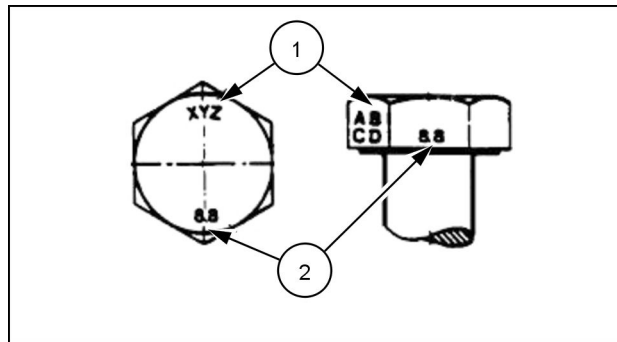
NOTE: M4 through M8 hardware torque specifications are shown in pound-inches. M10 through M24 hardware torque specifications are shown in pound-feet.

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

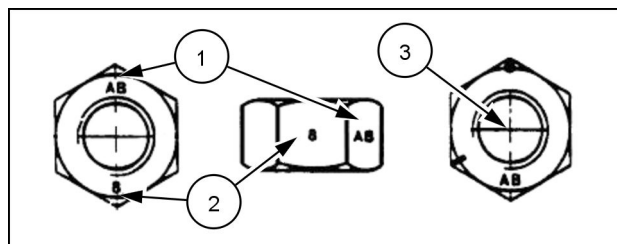


20083680 1

(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

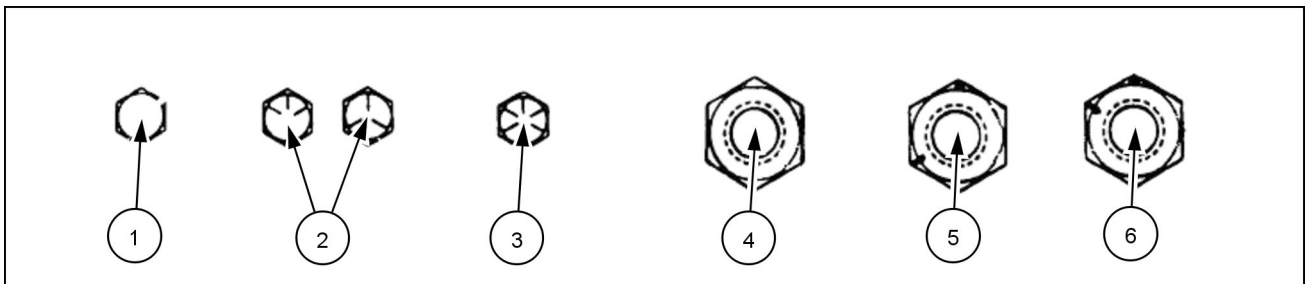
| NOMINAL SIZE | SAE GRADE 5 BOLT and NUT | | SAE GRADE 8 BOLT and NUT | | LOCKNUT GrB W/ Gr5 BOLT | LOCKNUT GrC W/ Gr8 BOLT |
|--------------|----------------------------|---------------------|----------------------------|----------------------|-------------------------|-------------------------|
| | 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 120 ° Apart |
| 3 | Grade 8 - Five Marks | 6 | Grade 8 Nut - Marks 60 ° Apart |

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