

2050M
TIER2/TIER3
Crawler Dozer

SERVICE MANUAL

Part number 48037321

English

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CASE
CONSTRUCTION



SERVICE MANUAL

**2050M PAT
2050M PAT TIER 3
2050M BD TIER 3
2050M Bulldozer**

Link Product / Engine

Product	Market Product	Engine
2050M PAT	Latin America	F4HFA613N*E002
2050M Buldózer	Latin America	F4HFA613N*E002

Contents

INTRODUCTION

Engine	10
[10.001] Engine and crankcase	10.1
[10.216] Fuel tanks	10.2
[10.250] Turbocharger and lines.....	10.3
[10.254] Intake and exhaust manifolds and muffler	10.4
[10.400] Engine cooling system	10.5
[10.414] Fan and drive	10.6
[10.310] Aftercooler.....	10.7
[10.304] Engine lubrication system.....	10.8
Rear axle system	27
[27.120] Planetary and final drives	27.1
Hydrostatic drive	29
[29.218] Pump and motor components.....	29.1
Brakes and controls	33
[33.110] Parking brake or parking lock	33.1
[33.202] Hydraulic service brakes	33.2
Hydraulic systems	35
[35.300] Reservoir, cooler, and filters.....	35.1
[35.104] Fixed displacement pump.....	35.2
[35.106] Variable displacement pump	35.3
[35.105] Charge pump.....	35.4
[35.359] Main control valve	35.5
[35.741] Dozer blade cylinders	35.6
[35.752] Hydraulic fan drive cooling system.....	35.7
[35.000] Hydraulic systems.....	35.8

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Frames and ballasting	39
[39.100] Frame	39.1
Tracks and track suspension	48
[48.140] Dropbox and final drive	48.1
Cab climate control	50
[50.100] Heating	50.1
[50.104] Ventilation	50.2
Electrical systems	55
[55.000] Electrical system	55.1
[55.011] Fuel tank system	55.2
[55.014] Engine intake and exhaust system.....	55.3
[55.015] Engine control system.....	55.4
[55.030] Service brake electrical system	55.5
[55.050] Heating, Ventilation, and Air-Conditioning (HVAC) control system.....	55.6
[55.100] Harnesses and connectors.....	55.7
[55.201] Engine starting system	55.8
[55.202] Cold start aid	55.9
[55.301] Alternator	55.10
[55.302] Battery.....	55.11
[55.512] Cab controls.....	55.12
[55.518] Wiper and washer system.....	55.13
[55.DTC] FAULT CODES.....	55.14
Tools	89
[89.128] Ripper assembly	89.1
Platform, cab, bodywork, and decals	90
[90.150] Cab.....	90.1
[90.114] Operator protections	90.2

[90.100] Engine hood and panels 90.3



INTRODUCTION

Contents

INTRODUCTION

Safety rules (*)	3
Safety rules - Ecology and the environment (*)	4
Safety rules - Do not operate tag (*)	5
Safety rules - Personal safety (*)	6
Basic instructions - Important notice regarding equipment servicing (*)	8
Basic instructions - Shop and assembly (*)	9
Torque - Special torques (*)	11
General specification (*)	13
Conversion factors (*)	17
Consumables - Loctite® product chart (*)	19
Hydraulic contamination (*)	25

(*) See content for specific models

Safety rules

2050M


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

2050M

Soil, air, and water quality is important for all industries and life in general. When legislation does not yet rule the treatment of some of the substances that advanced technology requires, sound judgment should govern the use and disposal of products of a chemical and petrochemical nature.

Familiarize yourself with the relative legislation applicable to your country, and make sure that you understand this legislation. Where no legislation exists, obtain information from suppliers of oils, filters, batteries, fuels, anti-freeze, cleaning agents, etc., with regard to the effect of these substances on man and nature and how to safely store, use, and dispose of these substances.

Helpful hints

- Avoid the use of cans or other inappropriate pressurized fuel delivery systems to fill tanks. Such delivery systems may cause considerable spillage.
- In general, avoid skin contact with all fuels, oils, acids, solvents, etc. Most of these products 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 you drain fluids such as used engine coolant mixtures, engine oil, hydraulic fluid, brake fluid, etc. Do not mix drained brake fluids or fuels with lubricants. Store all drained fluids safely until you can dispose of the fluids in a proper way that complies with all local legislation and available resources.
- Do not allow coolant mixtures to get into the soil. Collect and dispose of coolant mixtures properly.
- The air-conditioning system contains gases that should not be released into the atmosphere. Consult an air-conditioning specialist or use a special extractor to recharge the system properly.
- Repair any leaks or defects in the engine cooling system 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. Penetrating weld splatter may burn a hole or weaken hoses, allowing the loss of oils, coolant, etc.

Battery recycling

Batteries and electric accumulators contain several substances that can have a harmful effect on the environment if the batteries are not properly recycled after use. Improper disposal of batteries can contaminate the soil, groundwater, and waterways. CASE CONSTRUCTION strongly recommends that you return all used batteries to a CASE CONSTRUCTION dealer, who will dispose of the used batteries or recycle the used batteries properly. In some countries, this is a legal requirement.



Mandatory battery recycling

NOTE: *The following requirements are mandatory in Brazil.*

Batteries are made of lead plates and a sulfuric acid solution. Because batteries contain heavy metals such as lead, CONAMA Resolution 401/2008 requires you to return all used batteries to the battery dealer when you replace any batteries. Do not dispose of batteries in your household garbage.

Points of sale are obliged to:

- Accept the return of your used batteries
- Store the returned batteries in a suitable location
- Send the returned batteries to the battery manufacturer for recycling

Safety rules - Do not operate tag

2050M

⚠ WARNING

Maintenance hazard!

Before you start servicing the machine, attach a DO NOT OPERATE warning tag to the machine in a visible area.

Failure to comply could result in death or serious injury.

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Attach a DO NOT OPERATE (TAG) to the machine in an area that is clearly visible whenever the machine is not operating properly and/or requires service.

Complete the tag information for the "REASON" the tag is attached by describing the malfunction or service required. Validate the reason for attaching the tag by signing your name in the designated area on the tag.

The tag should only be removed by the person who signed and attached the tag, after validating the repairs or services have been completed.



Tag Components

- A. DO NOT REMOVE THIS TAG! - (Warning) The tag should only be removed by the person who signed and attached the tag, after validating the repairs or services have been completed.
- B. See Other Side - (Reference to additional information on opposite side of the tag.)
- C. CNH Part Number - (Request this part number from you Service Parts Dealer to obtain this DO NOT OPERATE tag.)
- D. DO NOT OPERATE - (Warning!)
- E. REASON - (Area for describing malfunction or service required before operation.)
- F. Signed by - (Signature area - to be signed by the person validating the reason for installation of the tag.)

Safety rules - Personal safety

2050M	
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General maintenance safety

Keep the area used for servicing the machine clean and dry. Clean up spilled fluids.

Service the machine on a firm, level surface.

Install guards and shields after you service the machine.

Close all access doors and install all panels after servicing the machine.

Do not attempt to clean, lubricate, clear obstructions, or make adjustments to the machine while it is in motion or while the engine is running.

Always make sure that working area is clear of tools, parts, other persons and pets before you start operating the machine.

Unsupported hydraulic cylinders can lose pressure and drop the equipment, causing a crushing hazard. Do not leave equipment in a raised position while parked or during service, unless the equipment is securely supported.

Jack or lift the machine only at jack or lift points indicated in this manual.

Incorrect towing procedures can cause accidents. When you tow a disabled machine follow the procedure in this manual. Use only rigid tow bars.

Stop the engine, remove the key, and relieve pressure before you connect or disconnect fluid lines.

Stop the engine and remove the key before you connect or disconnect electrical connections.

Scalding can result from incorrect removal of coolant caps. Cooling systems operate under pressure. Hot coolant can spray out if you remove a cap while the system is hot. Allow the system to cool before you remove the cap. When you remove the cap, turn it slowly to allow pressure to escape before you completely remove the cap.

Replace damaged or worn tubes, hoses, electrical wiring, etc.

The engine, transmission, exhaust components, and hydraulic lines may become hot during operation. Take care when you service such components. Allow surfaces to cool before you handle or disconnect hot components. Wear protective equipment when appropriate.

When welding, follow the instructions in the manual. Always disconnect the battery before you weld on the machine. Always wash your hands after you handle battery components.

General battery safety

Always wear eye protection when you work with batteries.

Do not create sparks or have open flame near a battery.

Ventilate the area when you charge a battery or use a battery in an enclosed area.

Disconnect the negative (-) terminal first and reconnect the negative (-) terminal last.

When you weld on the machine, disconnect both terminals of the battery.

Do not weld, grind, or smoke near a battery.

When you use auxiliary batteries or connect jumper cables to start the engine, use the procedure shown in the operator's manual. Do not short across terminals.

Follow the manufacturer's instructions when you store and handle batteries.

Battery post, terminals, and related accessories contain lead and lead compounds. Wash hands after handling. This is a California Proposition 65 warning.

Battery acid causes burns. Batteries contain sulfuric acid. Avoid contact with skin, eyes, or clothing. Antidote (external): Flush with water. Antidote (eyes): flush with water for 15 minutes and seek medical attention immediately. Antidote (internal): Drink large quantities of water or milk. Do not induce vomiting. Seek medical attention immediately.

Keep out of reach of children and other unauthorized persons.

Air-conditioning system

The air-conditioning system is under high pressure. Do not disconnect any lines. The release of high pressure can cause serious injury.

The air-conditioning system contains gases that are harmful to the environment when released into the atmosphere. Do not attempt to service or repair the system.

Only trained service technicians can service, repair, or recharge the air-conditioning system.

Personal Protective Equipment (PPE)

Wear Personal Protective Equipment (PPE) such as hard hat, eye protection, heavy gloves, hearing protection, protective clothing, etc.

Do Not Operate tag

Before you start servicing the machine, attach a 'Do Not Operate' warning tag to the machine in an area that will be visible.

Basic instructions - Important notice regarding equipment servicing

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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 CASE CONSTRUCTION Sales and Service Networks.

Basic instructions - Shop and assembly

2050M	
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Shimming

For each adjustment operation, select adjusting shims and measure the adjusting shims individually using a micrometer, then add up the recorded values. Do not rely on measuring the entire shimming set, which may be incorrect, or the rated value shown on each shim.

Rotating shaft seals

For correct rotating shaft seal installation, proceed as follows:

1. Before assembly, allow the seal to soak in the oil it will be sealing for at least thirty minutes.
2. Thoroughly clean the shaft and check that the working surface on the shaft is not damaged.
3. Position the sealing lip facing the fluid.

NOTE: *With hydrodynamic lips, take into consideration the shaft rotation direction and position the grooves so that they will move the fluid towards the inner side of the seal.*

4. Coat the sealing lip with a thin layer of lubricant (use oil rather than grease). Fill the gap between the sealing lip and the dust lip on double lip seals with grease.
5. Insert the seal in its seat and press down using a flat punch or seal installation tool. Do not tap the seal with a hammer or mallet.
6. While you insert the seal, check that the seal is perpendicular to the seat. When the seal settles, make sure that the seal makes contact with the thrust element, if required.
7. To prevent damage to the seal lip on the shaft, position a protective guard during installation operations.

O-ring seals

Lubricate the O-ring seals before you insert them in the seats. This will prevent the O-ring seals from overturning and twisting, which would jeopardize sealing efficiency.

Sealing compounds

Apply a sealing compound on the mating surfaces when specified by the procedure. Before you apply the sealing compound, prepare the surfaces as directed by the product container.

Spare parts

Only use CNH Original Parts or CASE CONSTRUCTION Original Parts.

Only genuine spare parts guarantee the same quality, duration, and safety as original parts, as they are the same parts that are assembled during standard production. Only CNH Original Parts or CASE CONSTRUCTION Original Parts can offer this guarantee.

When ordering spare parts, always provide the following information:

- Machine model (commercial name) and Product Identification Number (PIN)
- Part number of the ordered part, which can be found in the parts catalog

Protecting the electronic and/or electrical systems during charging and welding

To avoid damage to the electronic and/or electrical systems, always observe the following practices:

1. Never make or break any of the charging circuit connections when the engine is running, including the battery connections.
2. Never short any of the charging components to ground.
3. Always disconnect the ground cable from the battery before arc welding on the machine or on any machine attachment.
 - Position the welder ground clamp as close to the welding area as possible.
 - If you weld in close proximity to a computer module, then you should remove the module from the machine.
 - Never allow welding cables to lie on, near, or across any electrical wiring or electronic component while you weld.
4. Always disconnect the negative cable from the battery when charging the battery in the machine with a battery charger.

NOTICE: *If you must weld on the unit, you must disconnect the battery ground cable from the machine battery. The electronic monitoring system and charging system will be damaged if this is not done.*

5. Remove the battery ground cable. Reconnect the cable when you complete welding.

WARNING

Battery acid causes burns. Batteries contain sulfuric acid.

Avoid contact with skin, eyes or clothing. Antidote (external): Flush with water. Antidote (eyes): flush with water for 15 minutes and seek medical attention immediately. Antidote (internal): Drink large quantities of water or milk. Do not induce vomiting. Seek medical attention immediately. Failure to comply could result in death or serious injury.

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Special tools

The special tools that CASE CONSTRUCTION suggests and illustrate in this manual have been specifically researched and designed for use with CASE CONSTRUCTION machines. The special tools are essential for reliable repair operations. The special tools are accurately built and rigorously tested to offer efficient and long-lasting operation.

By using these tools, repair personnel will benefit from:

- Operating in optimal technical conditions
- Obtaining the best results
- Saving time and effort
- Working in safe conditions

Torque - Special torques

2050M

Ripper

Component	Torque
Ripper mounting bolts	1016 – 1375 N·m (749 – 1014 lb ft)
Ripper pin retaining and tube cover bolts	301 – 407 N·m (222 – 300 lb ft)

Fuse and Relay Blocks

Component	Torque
Fuse block mounting	6.5 N·m (4.8 lb ft)

Pumps and Motors

Component	Torque
Pump mount bolts to cover	587 – 690 N·m (433 – 509 lb ft)
Motor mount bolts to final drives	250 – 280 N·m (184 – 207 lb ft)
Pump to motor hoses spit flange clamps	90 – 100 Nm (66 – 74 lb ft)
Inlet hose clamps	6.5 – 7.6 Nm (58 – 68 lb in)

Rear Frame Cover

Component	Torque
M24 hex bolts	449 – 725 N·m (331 – 535 lb ft)
M16 hex bolts	230 – 371 N·m (170 – 274 lb ft)

Track

Component	Torque
Master link bolts (Use LOCTITE® 242® on master link bolts.)	610 – 670 N·m (450 – 494 lb ft)
Standard link shoe bolts	610 – 670 N·m (450 – 494 lb ft)

Final Drives

Component	Torque
Drive Hub Rolling Torque	10 – 24 N·m (7 – 18 lb ft)
Input Shaft Bearing Retainer Plate Mounting Bolts	77 – 87 N·m (57 – 64 lb ft)
Park Brake Housing Plate	77 – 87 N·m (57 – 64 lb ft)
Brake Housing Cover - M20 X 50 12 pnt	650 – 730 N·m (479 – 538 lb ft)
Brake Line Fitting	55 – 60 N·m (41 – 44 lb ft)
Brake Bleeder Fitting	24 – 30 N·m (18 – 22 lb ft)
Counter Shaft Bearing Retainer Plate Mounting Bolts	135 – 150 N·m (100 – 111 lb ft)
Spindle Housing	335 – 375 N·m (247 – 277 lb ft)
Ring Gear Retaining Plate	335 – 375 N·m (247 – 277 lb ft)
Sun Gear Shaft Retaining Plate	135 – 150 N·m (100 – 111 lb ft)
Output Gear Bearing Retainer Plate Mounting Bolts	135 – 150 N·m (100 – 111 lb ft)
Planetary Carrier to Drive Hub	335 – 375 N·m (247 – 277 lb ft)
Final Drive Housing to Frame Mounting Bolts	656 – 725 N·m (484 – 535 lb ft)
Fill Check Plug	24 – 30 N·m (18 – 22 lb ft)
Drain Plug	24 – 30 N·m (18 – 22 lb ft)

Cab Mounting

Component	Torque
Support mount bolts	733 – 854 N·m (541 – 630 lb ft)
Brush guard mount bolts (if equipped)	587 – 794 N·m (433 – 586 lb ft)

Air Conditioning Compressor

Component	Torque
Compressor rotor shaft nut	15 – 20 Nm (11 – 15 lb ft)
Oil filler plug	15 – 24 Nm (11 – 18 lb ft)
Dust cover screws	7 – 11 Nm (5 – 8 lb ft)

Lift Cylinder

Component	Torque
Piston bolt	2160 – 2450 N·m (1593 – 1807 lb ft)
Gland	135 – 542 Nm (100 – 400 lb ft)

Tilt Cylinder

Component	Torque
Piston bolt	2160 – 2450 N·m (1593 – 1807 lb ft)
Gland	135 – 542 Nm (100 – 400 lb ft)

Angle Cylinder

Component	Torque
Piston bolt	2160 – 2450 N·m (1593 – 1807 lb ft)
Gland	135 – 542 Nm (100 – 400 lb ft)

Ripper Cylinder

Component	Torque
Piston bolt	2830 – 3210 N·m (2087 – 2368 lb ft)
Gland	135 – 542 Nm (100 – 400 lb ft)

Starter

Component	Torque
Mounting bolts	68 – 77 Nm (50 – 57 lb ft)
Battery terminal nut	17.7 – 24.5 Nm (13 – 18 lb ft)
Solenoid + screw	2.6 – 4.5 Nm (23 – 40 lb in)

Multifunction valve

Component	Torque
Brake valve	3 – 4 N·m (2 – 3 lb ft)
Brake valve screws	3 – 4 N·m (2 – 3 lb ft)
Cartridge valve	32.6 – 35.4 N·m (24.0 – 26.1 lb ft)
Check valve	150 – 177 N·m (111 – 131 lb ft)

Powertrain specifications

Component	Torque
Cradle to chassis front	185 – 200 N·m (136 – 148 lb ft)
Cradle to chassis rear	70 – 80 N·m (52 – 59 lb ft)
Hydrostatic motor mounting bolts to park brake housing	250 – 280 N·m (184 – 207 lb ft)
Engine to coupler	41 – 50 N·m (30 – 37 lb ft)
Tandem pump to cradle rear mounting bracket	265 – 305 N·m (195 – 225 lb ft)
Hydrostatic pump to pump mounting plate	587 – 690 N·m (433 – 509 lb ft)
Pump coupler retainer plate	136 – 156 N·m (100 – 115 lb ft)
Cradle mid mount	225 – 305 N·m (166 – 225 lb ft)
Engine to cradle front	107 – 123 N·m (79 – 91 lb ft)

General specification

2050M

Bolt torque information

Decimal Hardware

1. Replace the fasteners with the same or higher grade. If you use a higher grade fastener, tighten to the strength of the original.
2. Clean the threads of the fasteners and start the thread engagement. This will prevent failure of the fasteners when you tighten them.
3. Tighten the plastic insert or the crimped steel-type lock nuts to approximately **50%** of the dry torque, applied to the nut, not to the bolt head. Tighten the toothed or the serrated-type lock nuts to the full torque value.
4. The L9 (Alloy) fasteners torque values are for a bolt, nut, and two washers.
When you use the L9 (Alloy) fasteners, do not use the values in this table for tapped holes.

	Grade						
	1 or 2	5	5.1	5.2	8	8.2	L9 (Alloy)
SAE markings for bolts and cap screws							
SAE markings for hex nuts							

Size	Grade 2 *		Grade 5, 5.1 or 5.2				Grade 8 or 8.2				Grade L9 (Alloy)					
	Dry **		Lubricated **		Dry**		Lubricated **		Dry**		Lubricated **		Head		Nut	
	Nm	lb/ft	Nm	lb/ft	Nm	lb/ft	Nm	lb/ft	Nm	lb/ft	Nm	lb/ft	Nm	lb/ft	Nm	lb/ft
1/4 UNF	7.5	5.5	5.7	4.2	10.8	8	8.5	6.3	16.3	12	12.2	9	13.6	10	14.9	11
1/4 UNC	8.5	6.3	6.4	4.7	13.6	10	9.8	7.2	19	14	13.6	10	16.3	12	17.6	13
5/16 UNF	15	11	11	8	23	17	18	13	33	24	24	18	26	19	28	21
5/16 UNC	16	12	12	9	26	19	19	14	37	27	27	20	27	20	31	23
3/8 UNF	27	20	20	15	41	30	31	23	61	45	47	35	41	30	45	33
3/8 UNC	31	23	23	17	47	35	34	25	68	50	47	35	47	35	52	38
7/16 UNF	43	32	33	24	68	50	47	35	95	70	68	50	75	55	81	60
7/16 UNC	49	36	37	27	75	55	54	40	108	80	81	60	81	60	88	65
1/2 UNF	68	50	47	35	102	75	75	55	149	110	108	80	115	85	129	95
1/2 UNC	75	55	54	40	115	85	88	65	163	120	122	90	129	95	142	105
9/16 UNF	95	70	75	55	149	110	108	80	203	150	149	110	163	120	190	140
9/16 UNC	108	80	81	60	163	120	122	90	231	170	176	130	183	135	203	150

INTRODUCTION

Size	Grade 2 *				Grade 5, 5.1 or 5.2				Grade 8 or 8.2				Grade L9 (Alloy)			
	Dry **		Lubricated **		Dry**		Lubricated **		Dry**		Lubricated **		Head		Nut	
	Nm	lb/ft	Nm	lb/ft	Nm	lb/ft	Nm	lb/ft	Nm	lb/ft	Nm	lb/ft	Nm	lb/ft	Nm	lb/ft
5/8 UNF	136	100	102	75	203	150	149	110	285	210	217	160	231	170	251	185
5/8 UNC	149	110	115	85	231	170	176	130	325	240	244	180	258	190	278	205
3/4 UNF	237	175	176	130	353	260	271	200	515	380	380	280	359	265	393	290
3/4 UNC	271	200	190	140	407	300	298	220	570	420	420	310	447	330	481	355
7/8 UNF	231	170	170	125	583	430	434	320	814	600	610	450	644	475	685	505
7/8 UNC	244	180	190	140	637	470	475	350	909	670	678	500	705	520	793	585
1 UNF	339	250	258	190	868	640	651	480	1234	910	922	680	746	550	1051	775
1 UNC	380	280	285	210	976	720	732	540	1383	1020	1031	760	949	700	1220	900
1-1/8 UNF	475	350	366	270	1071	790	800	590	1749	1290	1315	970	1390	1025	1559	1150
1-1/8 UNC	542	400	407	300	1207	890	909	670	1953	1440	1464	1080	1559	1150	1797	1325
1-1/4 UNF	678	500	515	380	1519	1120	1139	840	2468	1820	1844	1360	1898	1400	2170	1600
1-1/4 UNC	746	550	570	420	1681	1240	1261	930	2726	2010	2048	1510	2170	1600	2373	1750
1-1/2 UNF	1180	870	881	650	2644	1950	1980	1460	4285	3160	3214	2370	3932	2900	4407	3250
1-1/2 UNC	1329	980	990	730	2983	2200	2224	1640	4827	3560	3621	2670	4475	3300	4949	3650

NOTICE: DO NOT use these values if a different torque value or tightening procedure is given for a specific application. Torque values listed are for general use only. Check tightness of fasteners periodically. Shear bolts are designed to fail under predetermined loads. Always replace the shear bolts with the identical grade.

- * - Grade 2 applies for hex caps (not hex bolts) up to **152 mm (6 in)** long. Grade 1 applies for hex cap screws over **152 mm (6 in)** long, and for all other types of bolts and screws of any length.
- ** - "Lubricated" means coated with a lubricant such as engine oil, or fasteners with phosphate and oil coatings. "Dry" means plain or zinc plated without any lubrication.

Torque specifications- Metric Hardware

Grade 8.8 Bolts, Nuts and Studs				Grade 10.9 Bolts, Nuts and Studs		
Dry				Dry		
Size	Nm	lb/in	lb/ft	Nm	lb/in	lb/ft
M4	3 to 4	31 to 35		5 to 6	44 to 49	
M5	5 to 6	49 to 55		8 to 9	71 to 79	
M6	10 to 11	84 to 94		14 to 15	120 to 136	
M8	23 to 26	229 to 277		33 to 37	293 to 329	
M10	46 to 51	408 to 460		65 to 74		48 to 54
M12	80 to 90		59 to 66	114 to 128		85 to 94
M14	128 to 145		94 to 106	183 to 205		136 to 153
M16	200 to 220		149 to 161	285 to 320		208 to 235
M20	400 to 450		293 to 330	555 to 620		406 to 460