

# SERVICE MANUAL

## NEF Four Cylinder Mechanical Tier 2 and Stage II Engine

*See the following page for engine model numbers*



## **SERVICE MANUAL**

**F4GE0404B\*D602**

**F4GE0454B\*D601**

**F4GE0454B\*D651**

**F4GE0454E\*D601**

# Contents

---

## INTRODUCTION

Engine.....	10
[10.001] Engine and crankcase .....	10.1
[10.101] Cylinder heads .....	10.2
[10.102] Pan and covers .....	10.3
[10.103] Crankshaft and flywheel.....	10.4
[10.105] Connecting rods and pistons.....	10.5
[10.106] Valve drive and gears .....	10.6
[10.110] Balancer and damper .....	10.7
[10.114] Pump drives .....	10.8
[10.206] Fuel filters .....	10.9
[10.210] Lift pump and lines .....	10.10
[10.218] Fuel injection system.....	10.11
[10.250] Turbocharger and lines.....	10.12
[10.254] Intake and exhaust manifolds and muffler .....	10.13
[10.304] Engine lubrication system.....	10.14
[10.400] Engine cooling system .....	10.15
[10.408] Oil cooler and lines.....	10.16
[10.414] Fan and drive .....	10.17
Electrical systems.....	55
[55.010] Fuel injection system.....	55.1
[55.012] Engine cooling system .....	55.2
[55.013] Engine oil system .....	55.3
[55.201] Engine starting system.....	55.4
[55.202] Cold start aid .....	55.5
[55.301] Alternator.....	55.6



## INTRODUCTION

# Contents

---

## INTRODUCTION

Foreword - Important notice regarding equipment servicing .....	3
Safety rules .....	4
Safety rules - Ecology and the environment .....	5
Torque .....	6
Torque - Minimum tightening torques for normal assembly .....	8
Basic instructions - Shop and assembly .....	13

---

## **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 manufacturer reserves the right to make improvements in design and changes in specifications at any time without notice and without incurring any obligation to install them on units previously sold. Specifications, descriptions, and illustrative material herein are as accurate as known at time of publication but are subject to change without notice.

In case of questions, refer to your CNH Industrial 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 and on machine decals, 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 which, if not avoided, will result in death or serious injury. The color associated with DANGER is RED.

 WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury. The color associated with WARNING is ORANGE.

 CAUTION, used with the safety alert symbol, indicates a hazardous situation which, if not avoided, could result in minor or moderate injury. The color associated with CAUTION is YELLOW.

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

### Machine safety

**NOTICE:** Notice indicates a situation which, if not avoided, could result in machine or property damage. The color associated with Notice is BLUE.

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 which 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 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. CNH Industrial strongly recommends that you return all used batteries to a CNH Industrial 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



## Torque

Component	Size	Specification
<b>Cylinder Head and Components</b>		
Rocker Assembly	M8	20 - 28 Nm (14.8 - 20.7 lb ft)
Cylinder Head	M12x70	
Phase 1		50 Nm (36.9 lb ft)
Phase 2		90 °
Cylinder Head	M12x140	
Phase 1		40 Nm (29.5 lb ft)
Phase 2		180 °
Cylinder Head	M12x180	
Phase 1		70 Nm (51.6 lb ft)
Phase 2		180 °
Valve Cover	M8x1.25x25	20 - 28 Nm (14.8 - 20.7 lb ft)
Intake manifold	M8x1.25	20 - 28 Nm (14.8 - 20.7 lb ft)
Air intake elbow	M8x1.25	20 - 28 Nm (14.8 - 20.7 lb ft)
Exhaust manifold	M10x1.5x65	37 - 49 Nm (27.3 - 36.1 lb ft)
Rear lifting bracket	M12x1.75x30	65 - 89 Nm (47.9 - 65.6 lb ft)
Turbocharger	M10	37 - 49 Nm (27.3 - 36.1 lb ft)
<b>Front Case</b>		
Front cover assembly	M8x1.25x45	20 - 28 Nm (14.8 - 20.7 lb ft)
	M8x1.25x30	20 - 28 Nm (14.8 - 20.7 lb ft)
<b>Rear Case</b>		
Gear Case	M8x1.25x40	20 - 28 Nm (14.8 - 20.7 lb ft)
	M8x1.25x25	20 - 28 Nm (14.8 - 20.7 lb ft)
	M10x1.5	44 - 54 Nm (32.5 - 39.8 lb ft)
Flywheel housing	M12x120	75 - 95 Nm (55.3 - 70.1 lb ft)
	M12x80	75 - 95 Nm (55.3 - 70.1 lb ft)
	M10x80	44 - 54 Nm (32.5 - 39.8 lb ft)
	M10x40	44 - 54 Nm (32.5 - 39.8 lb ft)
Engine flywheel		
Phase 1	M12x1.25	26 - 34 Nm (19.2 - 25.1 lb ft)
Phase 2	M12x1.25	55 - 65 °
<b>Cylinder Block and Crankshaft Components</b>		
Main bearing cap		
Phase 1		44 - 56 Nm (32.5 - 41.3 lb ft)
Phase 2		74 - 86 Nm (54.6 - 63.4 lb ft)
Phase 3		85 - 95 °
Connecting rod		
Phase 1		50.0 - 55.0 N·m (36.9 - 40.6 lb ft)
Phase 2		55 - 65 °
Timing Pin		4 - 6 Nm (3.0 - 4.4 lb ft)
Crankshaft pulley	M12x1.75	105 - 115 Nm (77.4 - 84.8 lb ft)
Camshaft retaining plate	M8	20 - 28 Nm (14.8 - 20.7 lb ft)
Camshaft gear	M8	32 - 40 Nm (23.6 - 29.5 lb ft)
<b>Lubrication System and Components</b>		

INTRODUCTION

Component	Size	Specification
Piston Cooling Nozzles	M8x1.25x10	12 - 18 Nm (8.9 - 13.3 lb ft)
Oil pump	M8x1.25x30	7 - 9 Nm (5.2 - 6.6 lb ft)
Stiffening Plate	M10x1.25x25	38 - 48 Nm (28.0 - 35.4 lb ft)
Oil plug	M10x1	5 - 7 Nm (3.7 - 5.2 lb ft)
	M14x1.5	9 - 13 Nm (6.6 - 9.6 lb ft)
Oil Pick up tube	M8x1.25x20	20 - 28 Nm (14.8 - 20.7 lb ft)
Oil Pan	M8x1.25x25	20 - 28 Nm (14.8 - 20.7 lb ft)
	M18x1.50	51 - 69 Nm (37.6 - 50.9 lb ft)
Oil Bypass Valve	M22x1.5x10	72 - 88 Nm (53.1 - 64.9 lb ft)
<b>Turbo Lubrication Lines</b>		
Turbo end	M12x1.5	20 - 28 Nm (14.8 - 20.7 lb ft)
Filter base end		20 - 28 Nm (14.8 - 20.7 lb ft)
Drain	M8x1.25x16	20 - 28 Nm (14.8 - 20.7 lb ft)
<b>Electrical Components</b>		
Alternator		
	M8x1.25x30	20 - 28 Nm (14.8 - 20.7 lb ft)
	M10x1.25x25	20 - 28 Nm (14.8 - 20.7 lb ft)
	M10	44 - 54 Nm (32.5 - 39.8 lb ft)
	M12x1.75x120	37 - 49 Nm (27.3 - 36.1 lb ft)
Alternator wiring	M6x1.0 nut	8 - 11 Nm (5.9 - 8.1 lb ft)
Starter	M10	54 - 44 Nm (39.8 - 32.5 lb ft)
<b>Fuel System and Components</b>		
Fuel pump		
	M8 screw	20 - 28 Nm (14.8 - 20.7 lb ft)
	M6 screw	9 - 11 Nm (6.6 - 8.1 lb ft)
	M6 nut	9 - 11 Nm (6.6 - 8.1 lb ft)
Fuel Pump Drive Gear		
Phase 1		15 - 20 Nm (11.1 - 14.8 lb ft)
Phase 2		85 - 90 Nm (62.7 - 66.4 lb ft)
Timing Pin Cap		30 - 35 Nm (22.1 - 25.8 lb ft)
Fuel injectors		55 - 65 Nm (40.6 - 47.9 lb ft)
Fuel lift pump		20 - 28 Nm (14.8 - 20.7 lb ft)
<b>Cooling System and Components</b>		
Water Pump	M8x1.25x25	20 - 28 Nm (14.8 - 20.7 lb ft)
Water outlet connection	M8x1.25x35	20 - 28 Nm (14.8 - 20.7 lb ft)
	M8x1.25x70	20 - 28 Nm (14.8 - 20.7 lb ft)
Fan support	M10x1.5x20	28 - 38 Nm (20.7 - 28.0 lb ft)
Fan pulley	M6	8 - 12 Nm (5.9 - 8.9 lb ft)
	M10	27 - 49 Nm (19.9 - 36.1 lb ft)

## 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)

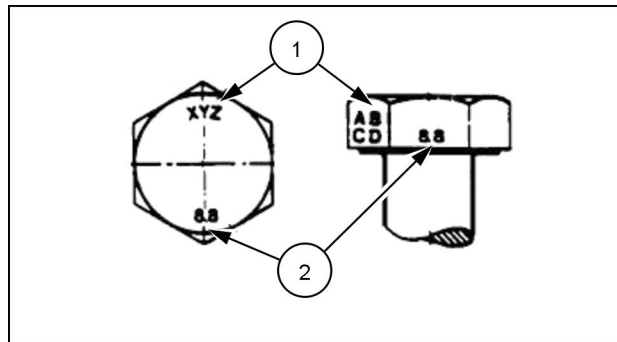
**NOTE:** M4 through M8 hardware torque specifications are shown in pound-inches. M10 through M24 hardware torque specifications are shown in pound-feet.

**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**

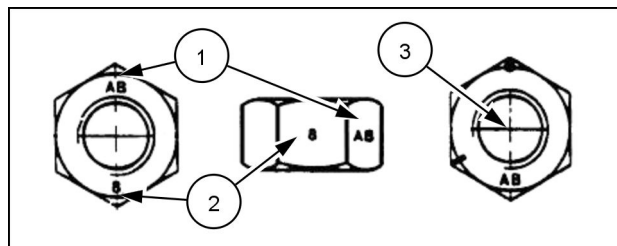
**Metric Hex head and carriage bolts, classes 5.6 and up**



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)

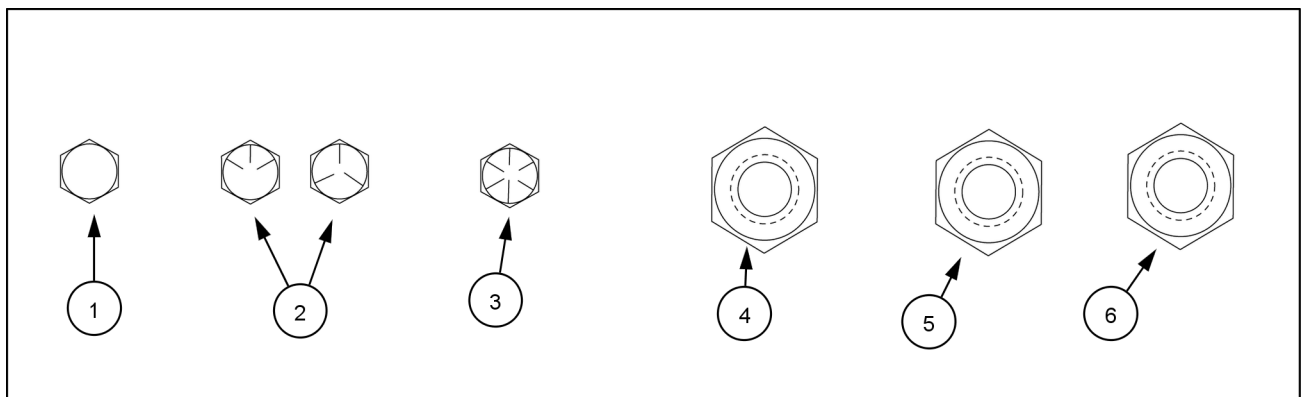
**NOTE:** For Imperial Units, *1/4 in* and *5/16 in* hardware torque specifications are shown in pound-inches. *3/8 in* through *1 in* hardware torque specifications are shown in pound-feet.

**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)

**IDENTIFICATION**

**Inch Bolts and free-spinning nuts**

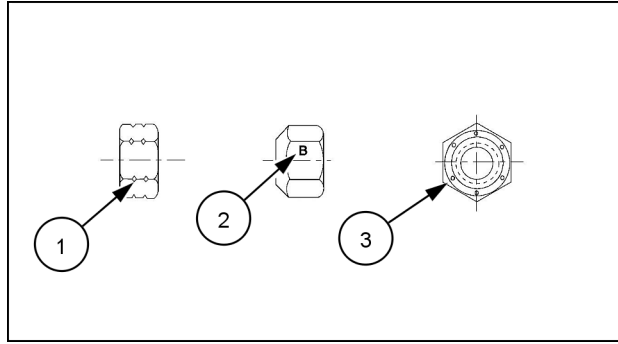


NHIL13ENG1271EA 3

**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

**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

---

## Basic instructions - Shop and assembly

### 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 CNH Industrial 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 CNH Industrial 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.**

W0111A

## Special tools

The special tools that CNH Industrial suggests and illustrate in this manual have been specifically researched and designed for use with CNH Industrial 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



## **SERVICE MANUAL**

### **Engine**

**F4GE0404B\*D602**

**F4GE0454B\*D601**

**F4GE0454B\*D651**

**F4GE0454E\*D601**

# Contents

---

## Engine - 10

[10.001] Engine and crankcase .....	10.1
[10.101] Cylinder heads .....	10.2
[10.102] Pan and covers .....	10.3
[10.103] Crankshaft and flywheel.....	10.4
[10.105] Connecting rods and pistons .....	10.5
[10.106] Valve drive and gears .....	10.6
[10.110] Balancer and damper .....	10.7
[10.114] Pump drives .....	10.8
[10.206] Fuel filters .....	10.9
[10.210] Lift pump and lines .....	10.10
[10.218] Fuel injection system.....	10.11
[10.250] Turbocharger and lines.....	10.12
[10.254] Intake and exhaust manifolds and muffler .....	10.13
[10.304] Engine lubrication system.....	10.14
[10.400] Engine cooling system .....	10.15
[10.408] Oil cooler and lines.....	10.16
[10.414] Fan and drive .....	10.17



## **Engine - 10**

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

**F4GE0404B\*D602  
F4GE0454B\*D601  
F4GE0454B\*D651  
F4GE0454E\*D601**

# Contents

---

## Engine - 10

### Engine and crankcase - 001

#### TECHNICAL DATA

Engine	
General specification .....	3

#### FUNCTIONAL DATA

Engine	
Component localization .....	7

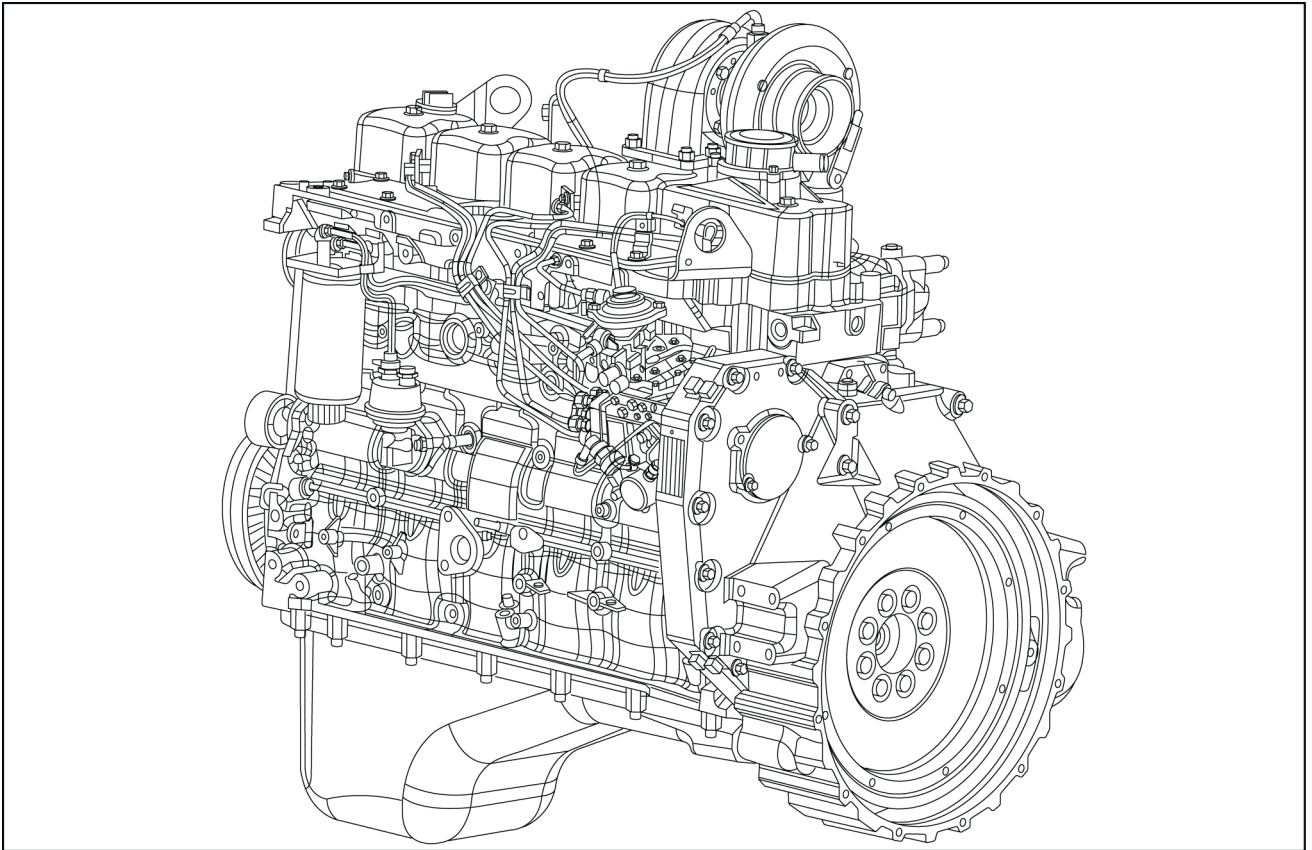
#### SERVICE

Engine	
Compression test .....	8
Crankcase	
Bore - Check .....	9
Check .....	10

#### DIAGNOSTIC

Engine	
Troubleshooting .....	11

## Engine - General specification



NHIL13ENG0292FA 1

NEF engines have been designed and developed by FPT specifically for transportation by land and farming equipment in general.

They are characterized by diesel cycle 4 stroke atmospheric or turbocharged 4 and 6 cylinders each with 2 valves. Fuel is provided by a rotary mechanical pump or in line fuel pump according to the equipment application. It differs from other applications because of the provision of different power, power take-off for the different collector configuration, priming pump, oil pan and boost turbine.

**NOTE:** The picture shows application designed for 6 cylinder versions, 2 valves per cylinder, having fuel feed by a mechanical pump.

**NOTICE:** Data, technical specifications and performances granted shall be valid only if the setter will follow and comply with all installation prescriptions provided by FPT.

Furthermore, the use of the unit after overhaul should conform to the original specified power and engine RPM for which the engine has been designed.

Thank you so much for reading.  
Please click the “Buy Now!”  
button below to download the  
complete manual.



After you pay.

You can download the most  
perfect and complete manual in  
the world immediately.

Our support email:

[ebooklibonline@outlook.com](mailto:ebooklibonline@outlook.com)