Contents

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

[10.114] Pump drives 10.7

[10.206] Fuel filters 10.8

[10.218] Fuel injection system 10.9

[10.202] Air cleaners and lines 10.10

[10.250] Turbocharger and lines 10.11

[10.254] Intake and exhaust manifolds and muffler 10.12

[10.501] Exhaust Gas Recirculation (EGR) exhaust treatment 10.13

[10.400] Engine cooling system 10.14

[10.304] Engine lubrication system 10.15

[10.408] Oil cooler and lines 10.16

Electrical systems 55

[55.015] Engine control system 55.1

[55.202] Cold start aid 55.2

[55.010] Fuel injection system 55.3

[55.014] Engine intake and exhaust system 55.4

[55.989] Exhaust Gas Recirculation (EGR) electrical system 55.5

[55.012] Engine cooling system 55.6

[55.013] Engine oil system 55.7

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

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.

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

Torque - Minimum tightening torques for normal assembly

METRIC NON-FLANGED HARDWARE

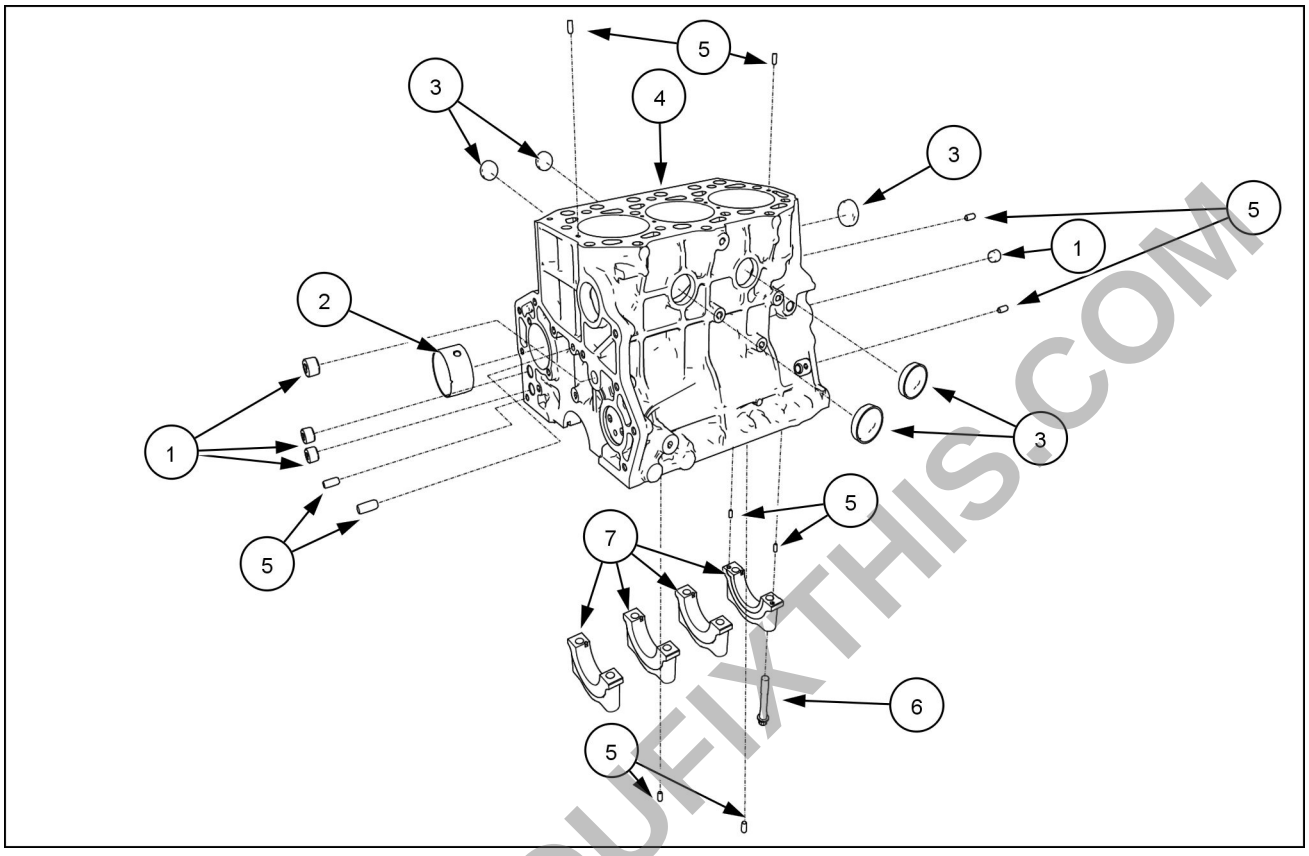
NOM. SIZE	CLASS 8.8 BOLT and CLASS 8 NUT		CLASS 10.9 BOLT and CLASS 10 NUT		LOCKNUT CL.8 W/CL8.8 BOLT	LOCKNUT CL.10 W/CL10.9 BOLT
	UNPLATED	PLATED W/ZnCr	UNPLATED	PLATED W/ZnCr		
M4	2.2 N·m (19 lb in)	2.9 N·m (26 lb in)	3.2 N·m (28 lb in)	4.2 N·m (37 lb in)	2 N·m (18 lb in)	2.9 N·m (26 lb in)
M5	4.5 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.*

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

Crankcase - Exploded view



NHIL16ENG0181FA(1) 1

Components

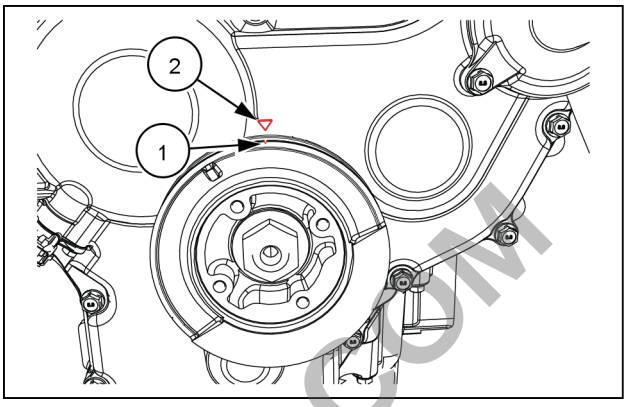
Item	Description	Item	Description
(1)	Plug-taper	**(5)**	Pin-dowe
(2)	Cam bearing	**(6)**	Bolt-main bearing cap
(3)	Cap sealing	**(7)**	Main bearing cap
(4)	Block		

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

Engine - Service instruction Finding Top Dead Center (TDC)

1. Turn the engine in the normal direction of travel using a ratchet and a **36 mm** socket.
2. Turn the engine until the timing mark **(1)** on the crankshaft pulley lines up with the arrow **(2)** on the timing gear cover.



NHIL16ENG0432AA 1

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

Engine - Technical Data

Engine	Power @ rated speed	Rated speed	Maximum torque	Maximum torque speed
L3C19-T5	**26.0 kW** (**35.4 Hp**)	**2800 RPM**	**119.4 N·m** (**88.1 lb ft**)	**1600 RPM**
L3C19-T4	**29.8 kW** (**40.5 Hp**)	**2800 RPM**	**133.5 N·m** (**98.5 lb ft**)	**1600 RPM**
L3C19-T3	**33.5 kW** (**45.5 Hp**)	**2800 RPM**	**150.1 N·m** (**110.7 lb ft**)	**1600 RPM**
L3C19-T2	**37.3 kW** (**50.7 Hp**)	**2800 RPM**	**167.1 N·m** (**123.2 lb ft**)	**1600 RPM**
L3C19-T1	**41.0 kW** (**55.7 Hp**)	**2800 RPM**	**180.7 N·m** (**133.3 lb ft**)	**1600 RPM**

Engine specifications	
Architecture	Three cylinder, in-line
Compression ratio	17.1:1
Bore	**88 mm** (**3 in**)
Stroke	**103 mm** (**4 in**)
Displacement	**1879.0 cm³** (**114.7 in³**)
Aspiration	Turbocharged
Turbocharger type	Exhaust turbocharger
Lubrication	Forced circulation (pressure feed by oil pump)
Oil Pressure	
Cooling	Liquid cooled, forced circulation
Water pump control	Belt driven
Thermostat (start of opening)	**76 °C** (**169 °F**)
Intake valve timing	
Open	BTDC **16°**
Close	ABDC **44°**
Exhaust valve timing	
Open	BBDC **56°**
Close	ATDC **12°**
Valve clearance (when engine is cold)	**0.250 mm** (**0.010 in**)
Firing order	1-3-2
Fuel injection	Delphi Common Rail Direct Injection (CRDI)
Maximum injection pressure	**1800 bar** (**26100 psi**)
Cylinder block and piston	
Cylinder bore	**88.005 – 88.025 mm** (**3.465 – 3.466 in**)
Cylinder roundness	**0.0100 mm** (**0.0004 in**) or less
Cylinder taper	**0.0150 mm** (**0.0006 in**) or less
Piston outside diameter standard size	**87.9280 – 87.9420 mm** (**3.4617 – 3.4623 in**)
Piston protrusion	**0.050 mm** (**0.002 in**)
Cylinder deck flatness distortion	**0.0500 mm** (**0.0020 in**) or less
Clearance between the piston and the cylinder bore	**0.9700 mm** (**0.0382 in**)
Clearance between the piston ring and the piston ring groove	
Top	**0.0600 – 0.1000 mm** (**0.0024 – 0.0039 in**)
Middle	**0.0700 – 0.1050 mm** (**0.0028 – 0.0041 in**)
Bottom	**0.0250 – 0.0650 mm** (**0.0010 – 0.0026 in**)
Piston ring end gap	
Top	**0.2000 – 0.4000 mm** (**0.0079 – 0.0157 in**)
Middle	**0.6000 – 0.4000 mm** (**0.0236 – 0.0157 in**)
Bottom	**0.2000 – 0.4000 mm** (**0.0079 – 0.0157 in**)
Piston pin	
Outside diameter	**30.994 – 31.0000 mm** (**1.220 – 1.2205 in**)
Clearance between the piston and the piston pin	**0.0080 – 0.0200 mm** (**0.0003 – 0.0008 in**)
Clearance between the piston pin and the connecting rod bushing	**0.0200 – 0.0510 mm** (**0.0008 – 0.0020 in**)
Connecting rod	
Small end bushing inside diameter	**31.0200 – 31.0450 mm** (**1.2213 – 1.2222 in**)

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

Engine - Compression test

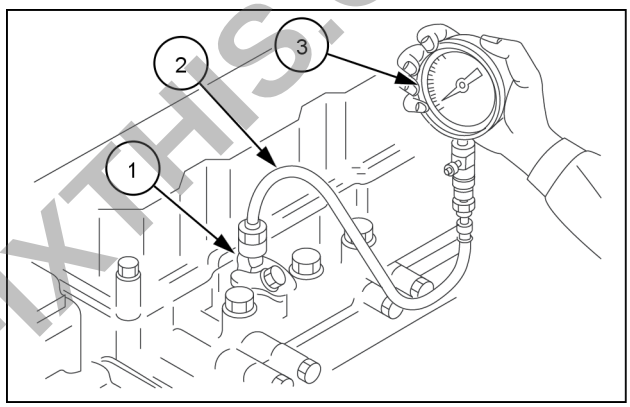
Prior operation:
Remove fuel injectors and cap off the fuel rail fittings

A compression test should be performed any time the engine performance is in question and all other performance related maintenance items are checked or corrected.

1. Remove glow plugs. See **Glow plug system - Remove (55.202)**.
2. Disconnect the electrical connectors from the fuel injectors, to prevent the engine from trying to start.

NOTE: *There will be active codes during this test due to the fuel injectors being disconnected.*

3. Install the compression test adaptor **(1)** into the glow plug port.
4. Connect the compression test hose **(2)** and gauge **(3)** to the adaptor.
5. Crank the engine over with the starter until the highest reading is observed on the gauge. Record the reading.
6. Complete the procedure for the other cylinders.



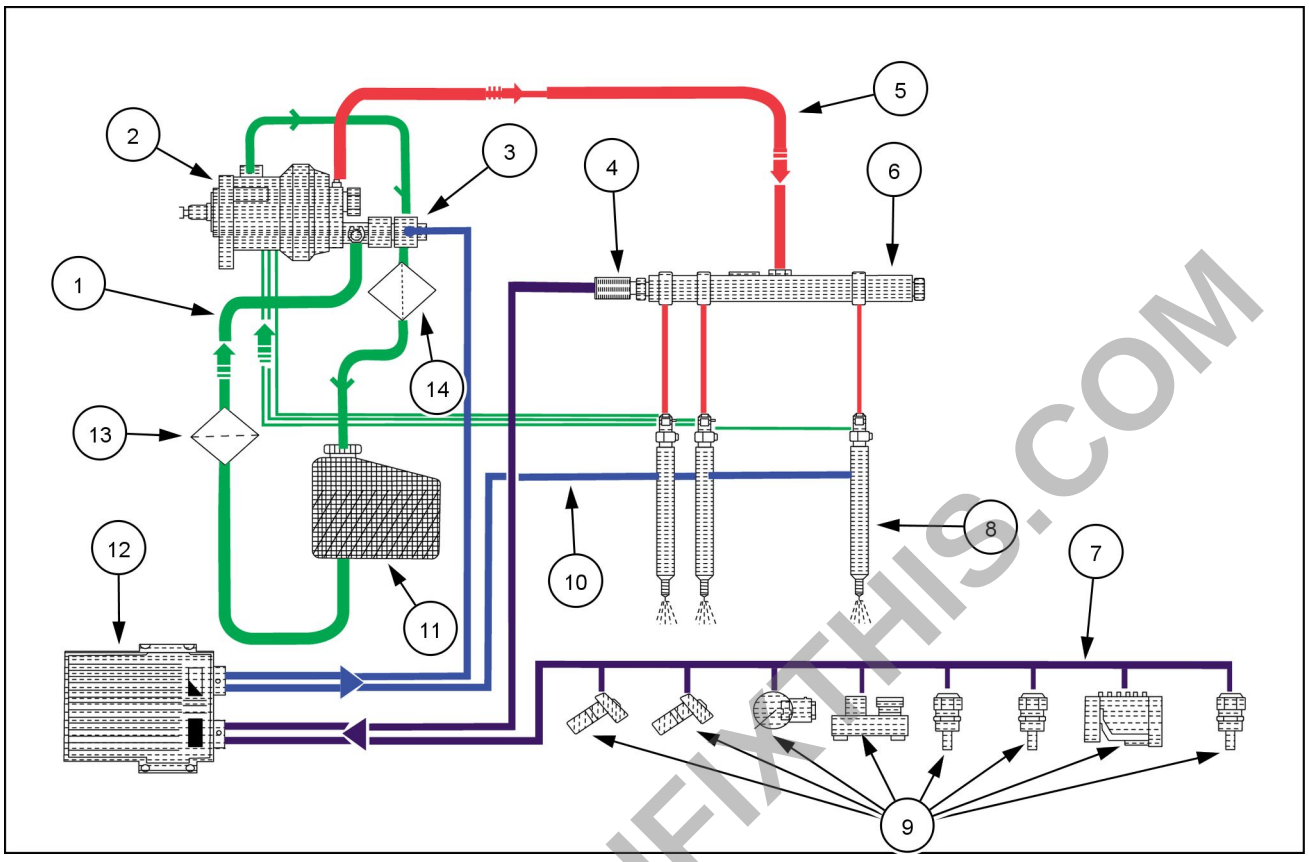
NHIL16ENG0060AA 1

Item	Standard value	Minimum value	Difference between cylinders
Compression Pressure	**29.4 bar** (**427.0 psi**)	**25.5 bar** (**370.0 psi**)	**3.0 bar** (**43.0 psi**)

NOTE: *The battery should be fully charged prior to performing this procedure.*

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com



NHIL16ENG0194FA 1

Item	Description	Item	Description
(1)	Low pressure fuel, green	**(8)**	Fuel injector
(2)	High pressure pump	**(9)**	Electrical sensor–inputs
(3)	IMV	**(10)**	ECU electrical outputs, blue
(4)	Fuel pressure sensor	**(11)**	Fuel tank
(5)	High pressure fuel, red	**(12)**	ECU
(6)	Common rail	**(13)**	Fuel filter
(7)	ECU electrical inputs, purple	**(14)**	Fuel cooler

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

Engine Control Unit (ECU) - Dynamic description - Diesel Particulate Filter (DPF) regeneration

The DPF captures soot in the exhaust. The DPF can only capture so much soot before it needs clean by regeneration (burning out the soot to ash). The ECU monitors the pressure differential between the upstream and downstream sides of the DPF. When the soot load reaches **100%** or if it has been **50 h** since the last regeneration, the ECU initiates a DPF regeneration. When a regeneration is requested, the ECU will heat the exhaust to **470 °C** (**878 °F**). This process should take approximately **5 min**. After the DPF is sufficiently heated, regeneration will occur for **5 – 15 min**. During DPF regeneration, the operating temperature of the DPF is **470 – 600.0 °C** (**878 – 1112.0 °F**).The DPF will then go through a **5 min** cool down period. The DPF soot level is reset to **0%**.

Auto regeneration requirements:

1. Coolant temperature above **60 °C** (**140 °F**)
2. Soot level above **100%** or **50 h** since last regeneration
3. Engine RPM above **1500 RPM**
4. Inhibit regeneration OFF

Forced regeneration requirements:

1. Coolant temperature above **30 °C** (**86 °F**)
2. Soot level below **150%**
3. Engine RPM at idle
4. Inhibit regeneration OFF
5. Parking brake engaged
6. Foot throttle/hand throttle below **3%**

NOTE: *Engine speed will automatically increase **200 – 500 RPM** when forced regeneration is initiated.*

Combination of (DPF) indicator lights on the instrument panel					
Indicator symbol				**DPF Regeneration Mode**	**DPF Status and definition**
Engine Warning	**DPF Temper-ature**	**DPF Re-genera-tion**	**DPF Inhibitor**		
 OFF	 ON	 ON	 OFF	Auto-regeneration operation mode	The soot load in the DPF has reached **100%** and the DPF is regenerating automatically Normal state of operation.
 OFF	 OFF	 Blink (**1 s**)	 OFF	DPF requires regeneration	The soot load in the DPF is over **120%** . Press and hold the upper side of the DPF switch over three seconds for regeneration.
 ON	 OFF	 Blink (**0.5 s**)	 OFF	Power limit operation mode	The soot load in the DPF is over **150%** . Contact your CNH Industrial for assistance. Engine is derated to **1300 RPM**
 OFF	 OFF	 OFF	 ON	DPF inhibited operation mode	Press the upper side of the DPF switch for two seconds to allow regeneration after entering a safe area.

Download full manual at youfixthis.com
PREVIEW - YOUFIXTHIS.COM

INTRODUCTION

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

Contents

Engine - 10

Pan and covers - 102

FUNCTIONAL DATA

Engine oil pan
Pan and covers - Exploded view 4

Timing gear housing
Exploded view 5

SERVICE

Engine oil pan
Remove 6
Remove - Suction tube 7
Install - Suction tube 8
Install 9

Timing gear housing
Remove - Cover 10
Disassemble 11
Assemble 12
Install - Cover 14

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

Contents

Engine - 10

Cylinder heads - 101

FUNCTIONAL DATA

Cylinder heads
Exploded view 4

SERVICE

Valve cover
Remove 5
Install 6

Cylinder head
Remove 7
Disassemble 8
Inspect 9
Assemble 10
Install 11

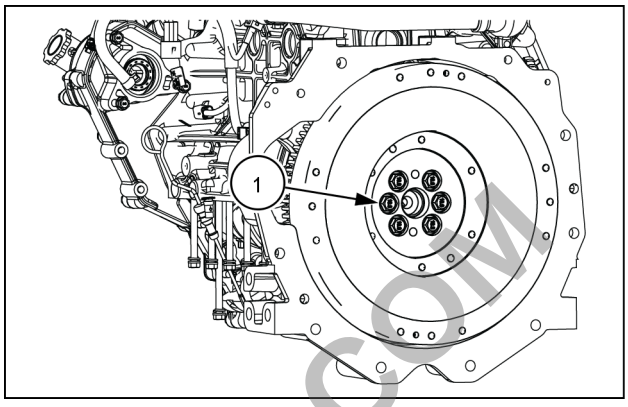
Valves
Adjust 12
Inspect 13
Spring - Inspect 14
Inspect valve guide 15

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

Engine flywheel - Remove

1. Remove the six M12 flange head bolts **(1)**.
2. Pull the flywheel off the dowel pins and remove the flywheel from the crankshaft.



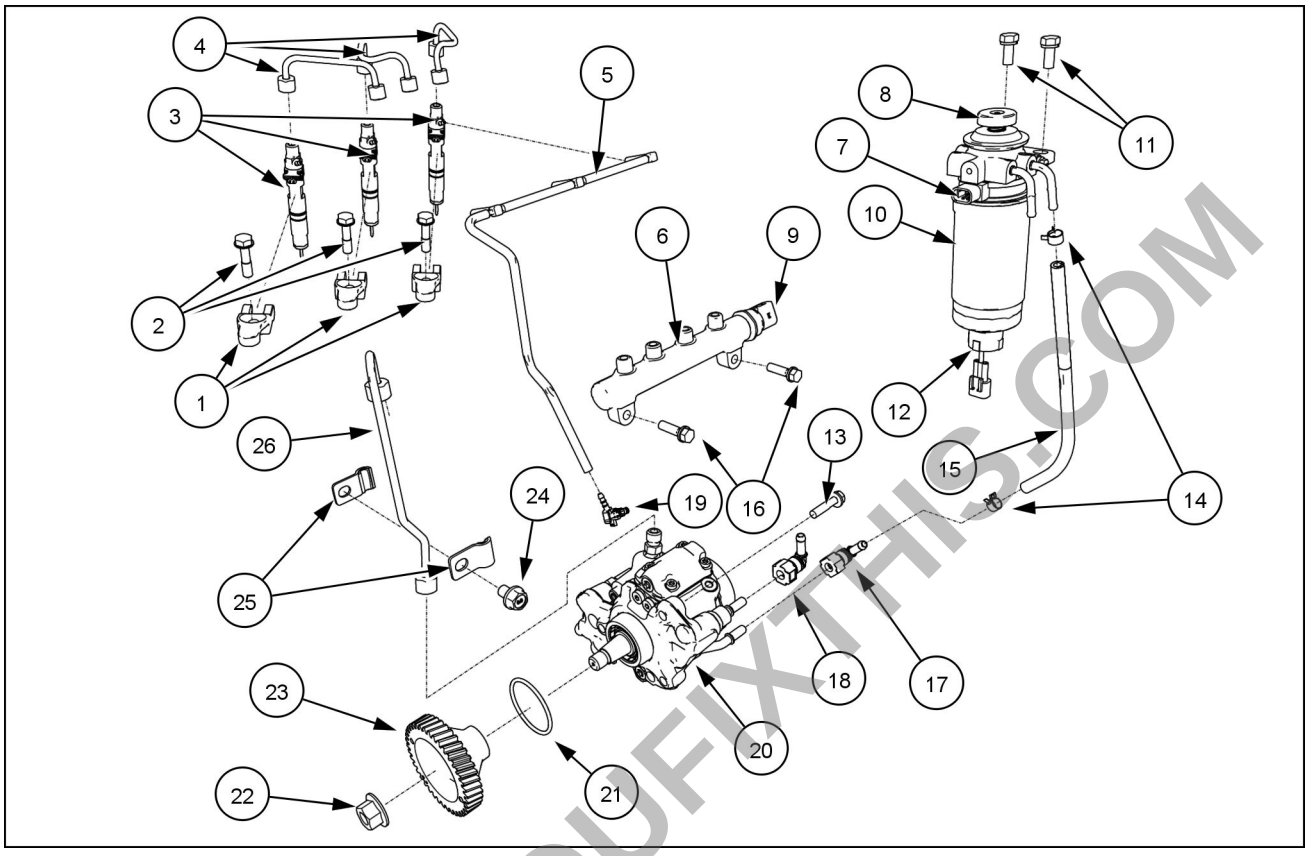
NHIL16ENG0068AA 1

Next operation:
Engine flywheel - Inspect (10.103)

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

Fuel injection system - Exploded view



NHIL16ENG0189FA 1

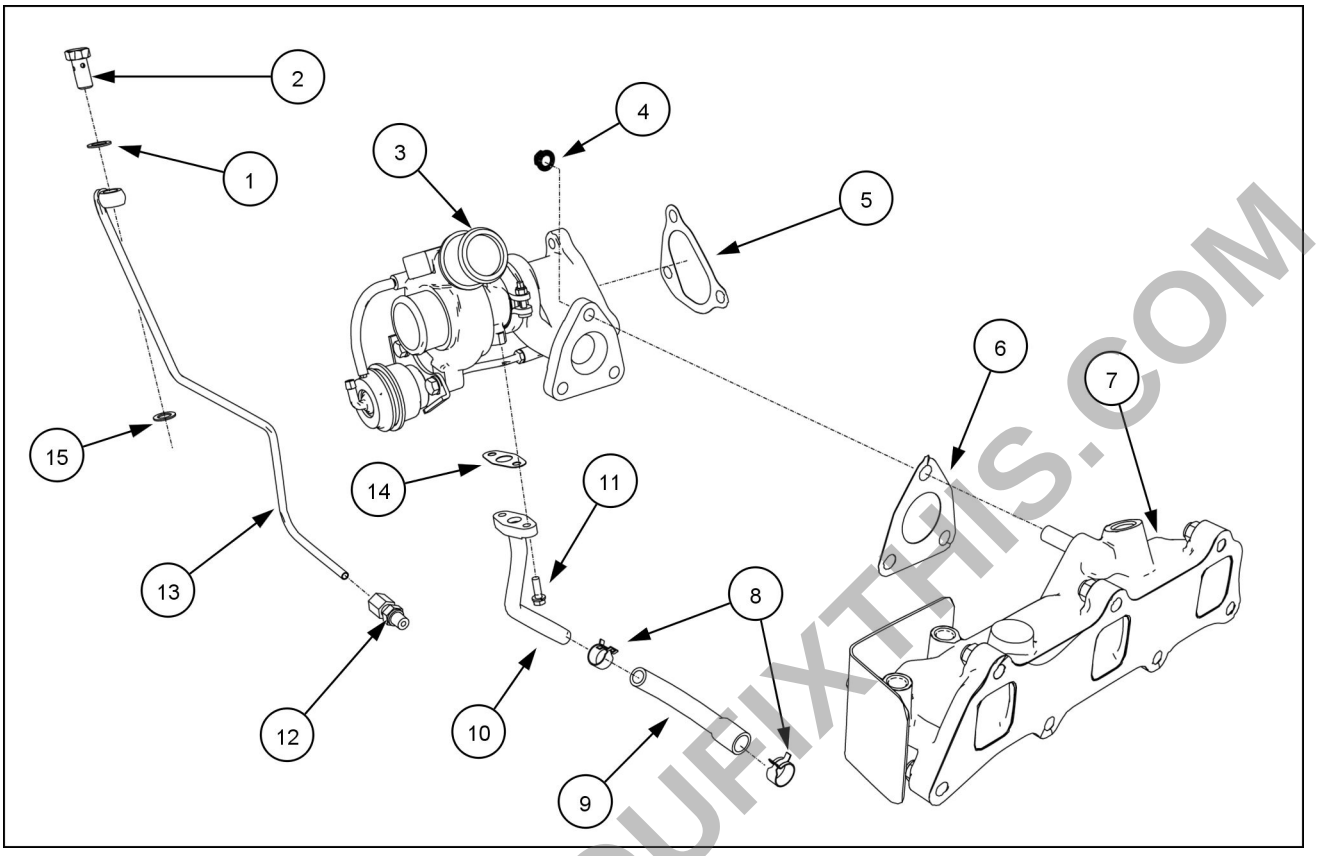
Components

Item	Description	Item	Description
(1)	Clamp–fuel injectors	**(14)**	Clamps–hose
(2)	Bolt–clamp	**(15)**	Hose–fuel supply
(3)	Fuel injectors	**(16)**	Bolts–mounting
(4)	Fuel lines–high pressure	**(17)**	Connector–fuel inlet
(5)	Line–fuel return	**(18)**	Connector–fuel
(6)	Common rail	**(19)**	Connector–fuel return
(7)	Heater–fuel	**(20)**	High pressure fuel pump
(8)	Pump-hand primer	**(21)**	O-ring
(9)	Sensor–fuel pressure	**(22)**	Nut
(10)	Filter–fuel	**(23)**	Gear-drive
(11)	Bolts–mounting	**(24)**	Bolt -mounting
(12)	Sensor–water in fuel	**(25)**	Clamp–line
(13)	Bolts–mounting	**(26)**	Line–high pressure fuel supply

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

Turbocharger and lines - Exploded view



NHIL16ENG0197FA 1

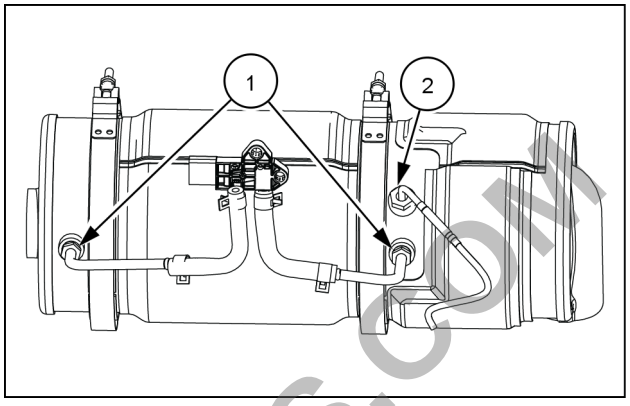
Item	Description	Item	Description
(1)	Gasket	**(9)**	Hose–drain
(2)	Bolt–banjo	**(10)**	Pipe–drain
(3)	Turbo charger assembly	**(11)**	Bolt
(4)	Nut	**(12)**	Fitting
(5)	Gasket	**(13)**	Pipe–pressure
(6)	Gasket	**(14)**	Gasket
(7)	Exhaust manifold	**(15)**	Gasket
(8)	Clamp		

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

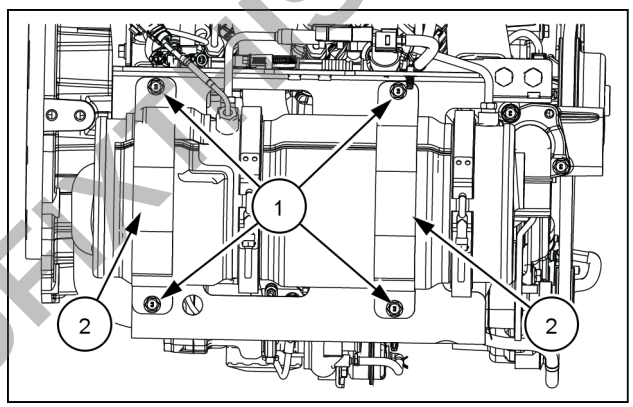
Diesel Oxidation Catalyst (DOC) - Assemble Catalyzed Continuously Regenerating Trap (CCRT)

1. Install the temperature sensor **(2)** in the Catalyzed Continuously Regenerating Trap (CCRT) and torque to **49 N·m** (**36 lb ft**).
2. Install the two differential pressure tubes **(1)** in the CCRT. Tighten the tubes.



NHIL16ENG0088AA 1

3. Install the CCRT on the bracket using the two band clamps **(2)**.
4. Install the four M8 bolts **(1)**. Hand tighten the hardware only.



NHIL16ENG0087AA 2

Next operation:
Diesel Oxidation Catalyst (DOC) - Install Catalyzed Continuously Regenerating Trap (CCRT) (10.501)

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

Index

Engine - 10

Oil cooler and lines - 408

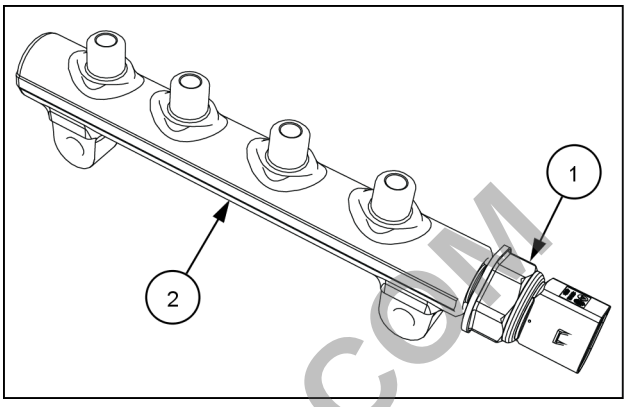
Engine oil cooler - Install 4
Engine oil cooler - Remove 3

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

Common rail pressure sensor - Replace

1. The common rail pressure sensor **(1)** is not a serviceable item. If the common rail pressure sensor is removed or has failed, the complete common rail **(2)** will need to be replaced. See **Common rail - Remove (10.218)**.



NHIL16ENG0436AA 1

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

PREVIEW ONLY

You're viewing 18 of 309 pages

The full manual includes:

- All 309 pages, complete
- Searchable PDF (find any keyword)
- No watermarks
- Instant download
- Print-ready quality

GET FULL MANUAL NOW

Cnh Industrial L3C19-T1, L3C19-T2, L3C19-T3, L3C19-T4, L3C19-T5 Service Manual



Scan or click anywhere
youfixthis.com

Click anywhere on this page to get the full manual