SERVICE MANUAL

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Cursor 11
Tier 4B (final) and Stage IV
Engine

See the following page for engine model numbers

Part number 47608463
1st edition English
September 2015

CNH INDUSTRIAL

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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.

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Torque - Minimum tightening torques for normal assembly

METRIC NON-FLANGED HARDWARE

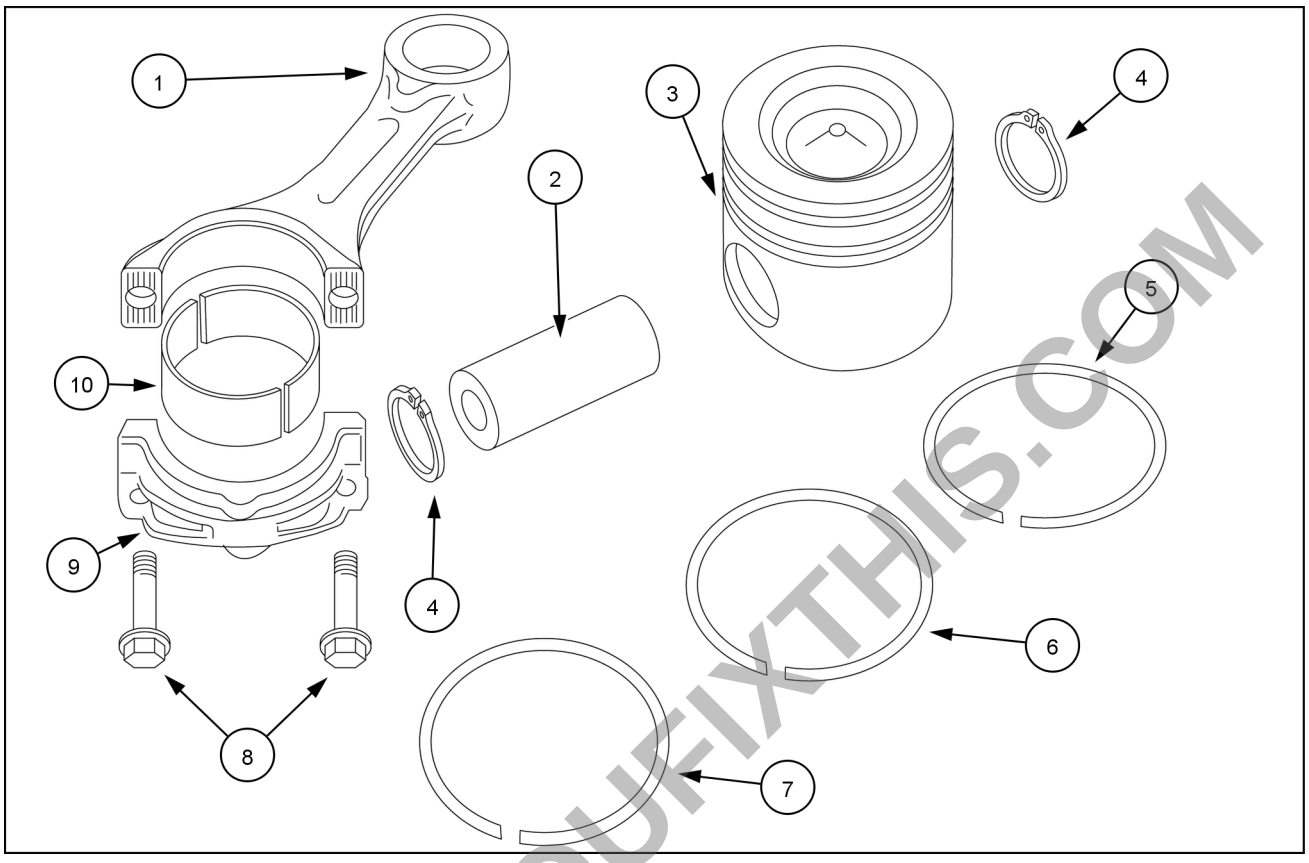
NOM. SIZE	CLASS 8.8 BOLT and CLASS 8 NUT		CLASS 10.9 BOLT and CLASS 10 NUT		LOCKNUT CL.8 W/CL8.8 BOLT	LOCKNUT CL.10 W/CL10.9 BOLT
	UNPLATED	PLATED W/ZnCr	UNPLATED	PLATED W/ZnCr		
M4	2.2 N·m (19 lb in)	2.9 N·m (26 lb in)	3.2 N·m (28 lb in)	4.2 N·m (37 lb in)	2 N·m (18 lb in)	2.9 N·m (26 lb in)
M5	4.5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

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Connecting rod and piston - Overview



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(1) Connecting rod
(2) Piston pin
(3) Piston
(4) Snap ring
(5) Trapazoidal combustion ring
(6) Bevel cut intermediate ring
(7) Oil control ring
(8) Cap bolts
(9) Connecting rod cap
(10) Half bearings

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Engine - Technical Data

Engine	Power	RPM @ speed	Torque	RPM @ speed1
F3GFE613A*B001	**365 kW** (**496 Hp**)	**2100 RPM**	**2000 N·m** (**1475 lb ft**)	**1500 RPM**
F3GFE613B*B001	**345 kW** (**469 Hp**)	**2100 RPM**	**2082 N·m** (**1536 lb ft**)	**1500 RPM**

Engine specifications	
Compression ratio	16.5 : 1
Bore	**128 mm** (**5 in**)
Stroke	**144 mm** (**6 in**)
Displacement	**11120 cm³**
Turbocharging	Inter-cooled, Direct injection
Turbocharger type	Honeywell
Lubrication	Forced by gear pump, relief valve single action
Oil pressure (Warm engine) - Idling - Peak RPM	 **3 bar** (**43.5 psi**) **4.5 bar** (**65.3 psi**)
Cooling	Liquid cooled
Water pump control	Belt driven
Thermostat (Start of opening)	**81 °C** (**177.8 °F**)
Intake valve timing - Opens before TDC - Closes after BDC Exhaust valve timing - Opens before BDC - Closes after TDC	 **17 °** **32 °** **50 °** **9 °**
Valve lash setting (when engine is cold) - Intake - Exhaust	 **0.35 - 0.45 mm** (**0.01 - 0.02 in**) **0.55 - 0.65 mm** (**0.02 - 0.03 in**)
Firing order	1 - 4 - 2 - 6 - 3 - 5
Injection pressure	**2000 bar** (**29000 psi**)
Injector calibration	
Cylinder block and piston	
Bores for cylinder liners Cylinder liners external diameter: Cylinder liner protrusion	**128.000 - 128.020 mm** (**5.039 - 5.040 in**) **142.085 - 142.110 mm** (**5.594 - 5.595 in**) **0.080 - 0.140 mm** (**0.003 - 0.006 in**)
Pistons - Measuring dimension - External diameter - Pin bore	 **23 mm** (**1 in**) **127.930 mm** (**5.037 in**) **58.070 mm** (**2.286 in**)
OD of piston - ID of cylinder liner	**0.050 mm** (**0.002 in**)
Piston protrusion	**0.045 - 0.075 mm** (**0.002 - 0.003 in**)
Piston pin diameter	**57.994 - 58.000 mm** (**2.283 - 2.283 in**)
Piston pin OD - pin bore	**0.070 - 0.086 mm** (**0.003 - 0.003 in**)
Piston ring grooves - Top - Middle - Bottom	 **2.460 mm** (**0.097 in**) **2.580 - 2.600 mm** (**0.102 - 0.102 in**) **4.030 - 4.050 mm** (**0.159 - 0.159 in**)
Piston rings - Combustion ring - Intermediate ring - Oil control ring	 **2.296 - 2.340 mm** (**0.090 - 0.092 in**) **2.470 - 2.500 mm** (**0.097 - 0.098 in**) **3.970 - 3.990 mm** (**0.156 - 0.157 in**)
Clearance between piston rings and grooves - Combustion ring - Intermediate ring	 **0.120 - 0.164 mm** (**0.005 - 0.006 in**) **0.080 - 0.130 mm** (**0.003 - 0.005 in**)

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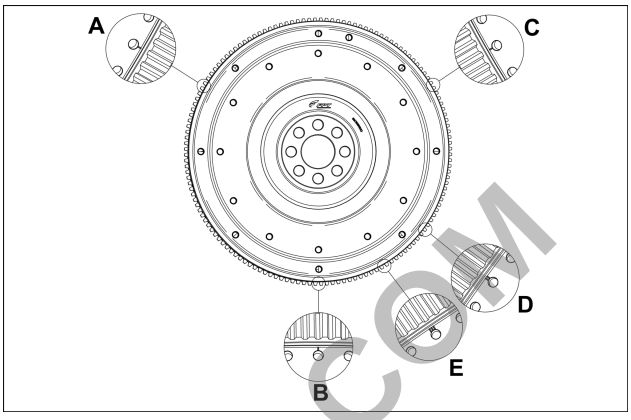
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Engine - Service instruction - Finding Top Dead Center (TDC)

1. Use the tool **380000137** to rotate the engine flywheel in the direction of normal rotation until you see the hole with three reference marks **(E)** through the inspection window at the bottom of the housing.

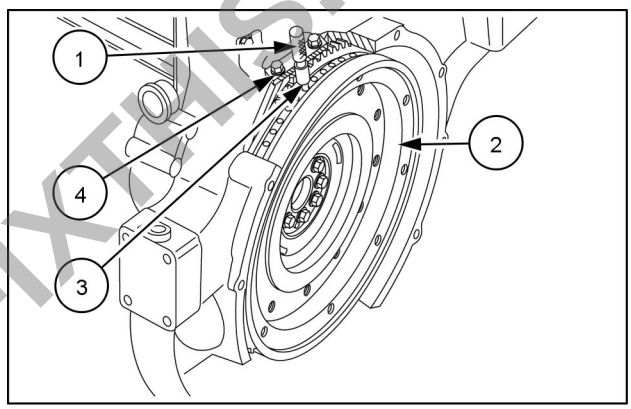
***NOTE: (E)** marks **30 °** before Top Dead Center (TDC).*

2. Continue to turn the flywheel until the following hole with one reference mark **(B)** can be seen. This marks TDC of the number one cylinder.



NHIL14ENG1086FA 1

3. The exact position of piston number one at TDC is obtained when the tool **380000150 (1)** can be inserted through the hole **(4)** of the flywheel speed sensor and engage the hole **(3)** in the engine flywheel **(2)**.
4. Remove the tool **380000150 (1)**.

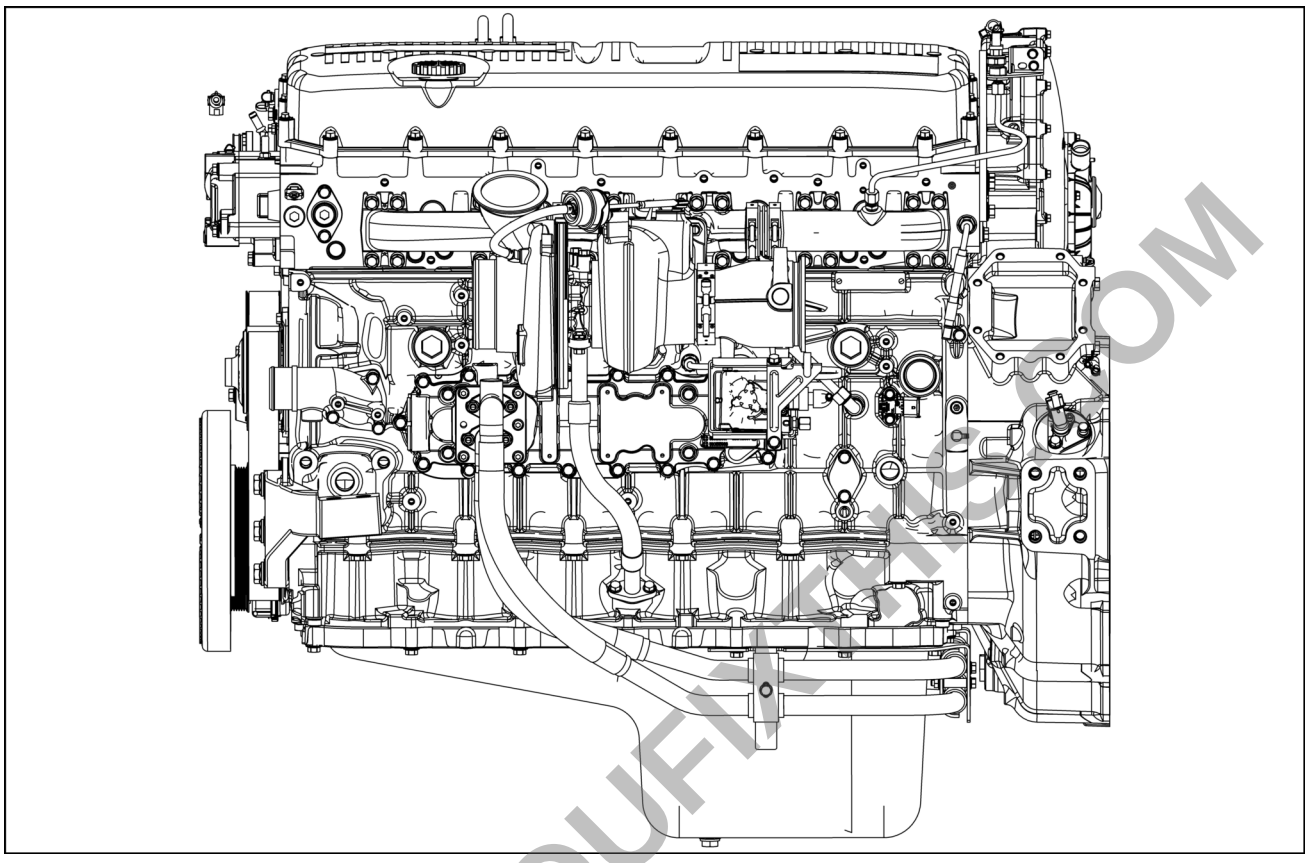


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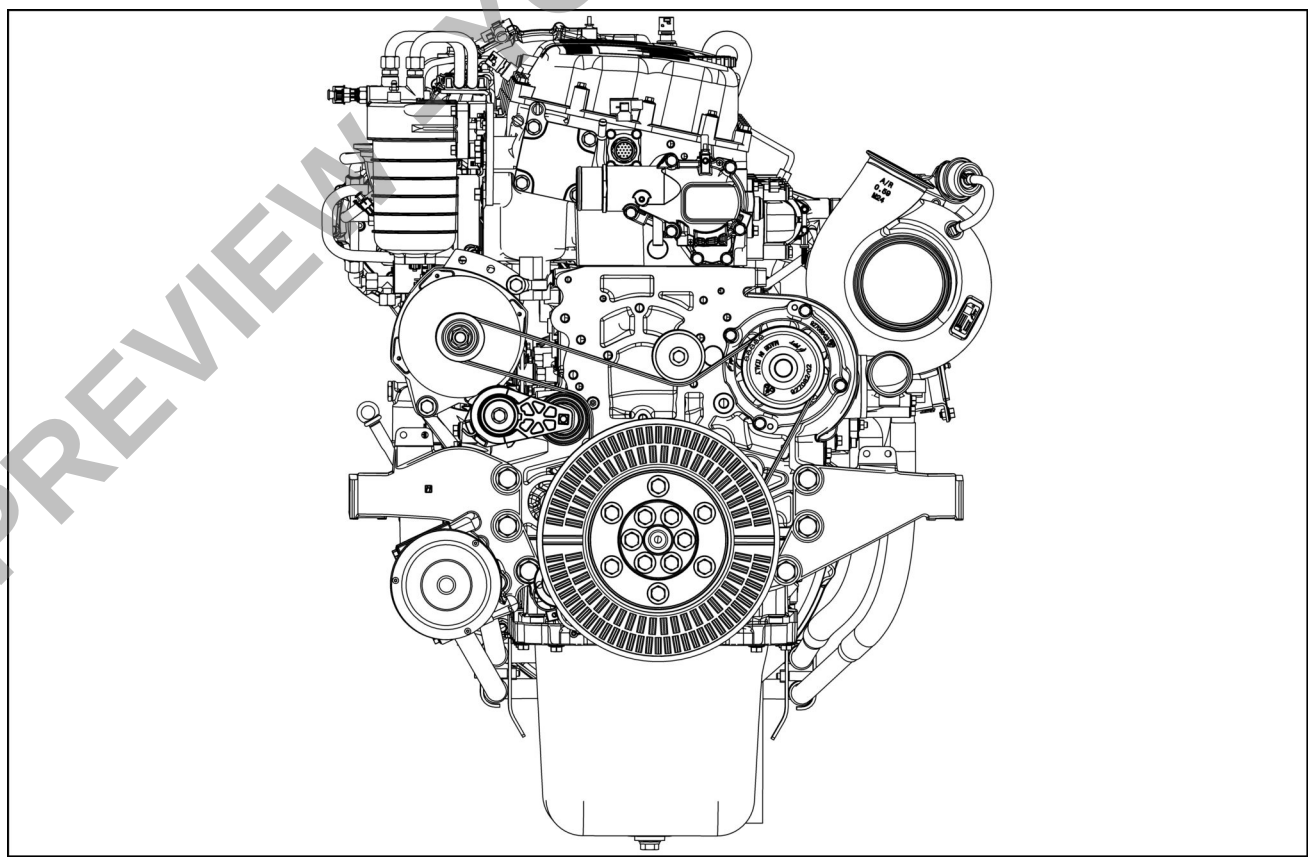
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Engine - Overview



NHIL14ENG0794FA 1

Left-hand view



NHIL14ENG0993FA 2

Front view

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Fuel temperature sensor - General specification

Temperature	Resistance (minimum)	Resistance (maximum)
-40 °C (-40 °F)	40490 Ω	50136 Ω
-30 °C (-22 °F)	23580 Ω	28647 Ω
-20 °C (-4 °F)	14096 Ω	16827 Ω
-10 °C (14 °F)	8642 Ω	10152 Ω
0 °C (32 °F)	5466 Ω	6326 Ω
10 °C (50 °F)	3542 Ω	4043 Ω
20 °C (68 °F)	2351 Ω	2649 Ω
25 °C (77 °F)	1941 Ω	2173 Ω
30 °C (86 °F)	1615 Ω	1798 Ω
40 °C (104 °F)	1118 Ω	1231 Ω
50 °C (122 °F)	798 Ω	870 Ω
60 °C (140 °F)	573 Ω	618 Ω
70 °C (158 °F)	421 Ω	451 Ω
80 °C (176 °F)	313 Ω	332 Ω
90 °C (194 °F)	237 Ω	250 Ω
100 °C (212 °F)	182 Ω	191 Ω
110 °C (230 °F)	140 Ω	148 Ω
120 °C (248 °F)	109 Ω	116 Ω
130 °C (266 °F)	86 Ω	93 Ω

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- Oil control ring	**0.040 - 0.080 mm** (**0.002 - 0.003 in**)
Piston ring end gap in cylinder liners	
- Combustion ring	**0.30 - 0.40 mm** (**0.01 - 0.02 in**)
- Intermediate ring	**0.65 - 0.80 mm** (**0.026 - 0.031 in**)
- Oil control ring	**0.40 - 0.75 mm** (**0.016 - 0.030 in**)
Connecting rod	
Small end bush housing	
- Nominal	**62 mm** (**2 in**)
Big end bearing housing	
- Nominal	**98.000 - 98.030 mm** (**3.858 - 3.859 in**)
- Class 1	**98.000 - 98.010 mm** (**3.858 - 3.859 in**)
- Class 2	**98.011 - 98.020 mm** (**3.859 - 3.859 in**)
- Class 3	**98.021 - 98.030 mm** (**3.859 - 3.859 in**)
Small end bush diameter	
- Outside	**62.360 - 62.976 mm** (**2.455 - 2.479 in**)
- Inside	**58.060 - 58.076 mm** (**2.286 - 2.286 in**)
Big end bearing shell thickness	
- Red	**2.465 - 2.475 mm** (**0.097 - 0.097 in**)
- Green	**2.475 - 2.485 mm** (**0.097 - 0.098 in**)
- Yellow	**2.485 - 2.495 mm** (**0.098 - 0.098 in**)
Clearance between piston pin and bush	**0.060 - 0.082 mm** (**0.002 - 0.003 in**)
Connecting rod weight	
- Class A	**5000 - 5033 g** (**176 - 178 oz**)
- Class B	**5034 - 5067 g** (**178 - 179 oz**)
- Class C	**5068 - 5100 g** (**179 - 180 oz**)
Maximum connecting rod axis misalignment tolerance	**0.08 mm** (**0.003 in**)
Crankshaft	
Main journals	
- Class 1	**99.970 - 99.977 mm** (**3.936 - 3.936 in**)
- Class 2	**99.978 - 99.985 mm** (**3.936 - 3.936 in**)
- Class 3	**99.986 - 99.993 mm** (**3.936 - 3.937 in**)
- Class 4	**99.994 - 100.000 mm** (**3.937 - 3.937 in**)
Crankpins	
- Class 1	**92.970 - 92.979 mm** (**3.660 - 3.661 in**)
- Class 2	**92.980 - 92.989 mm** (**3.661 - 3.661 in**)
- Class 3	**92.990 - 93.000 mm** (**3.661 - 3.661 in**)
Main bearing shells	
- Red	**3.115 - 3.122 mm** (**0.123 - 0.123 in**)
- Green	**3.123 - 3.130 mm** (**0.123 - 0.123 in**)
- Yellow	**3.131 - 3.138 mm** (**0.123 - 0.124 in**)
Main bearing housings	
- Rated value	**106.300 - 106.330 mm** (**4.185 - 4.186 in**)
- Class 1	**106.300 - 106.307 mm** (**4.185 - 4.185 in**)
- Class 2	**106.308 - 106.315 mm** (**4.185 - 4.186 in**)
- Class 3	**106.316 - 106.323 mm** (**4.186 - 4.186 in**)
Clearance between bearing shells and main journals	**0.020 - 0.140 mm** (**0.001 - 0.006 in**)
Clearance between bearing shells and big ends	**0.060 - 0.100 mm** (**0.002 - 0.004 in**)
Main journal, thrust bearing	**45.95 - 46.00 mm** (**1.81 - 1.81 in**)
Main bearing housing, thrust bearing	**38.94 - 38.99 mm** (**1.53 - 1.54 in**)
Thrust bearing thickness	**3.350 - 3.400 mm** (**0.132 - 0.134 in**)
Crankshaft end play	**0.10 - 0.30 mm** (**0.0039 - 0.0118 in**)
Main journals and crankpins	
- Alignment	Less than or equal to **0.025 mm** (**0.0010 in**)
- Ovalization	**0.012 mm** (**0.00047 in**)

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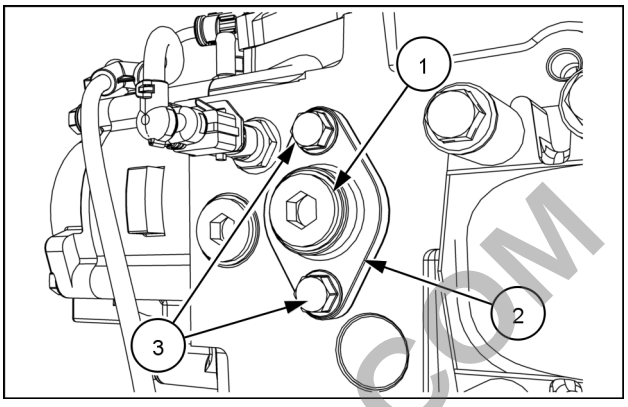
INTRODUCTION

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Cylinder head - Remove – Outlet to cabin heater

1. Remove the male threaded plug **(1)** along with the seal collar.
2. Remove the two bolts **(3)** from the flange **(2)**.
3. Remove the flange **(2)** along with the gasket from the cylinder head.



NHIL14ENG0500AA 1

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Engine oil pan - Install (10.102)

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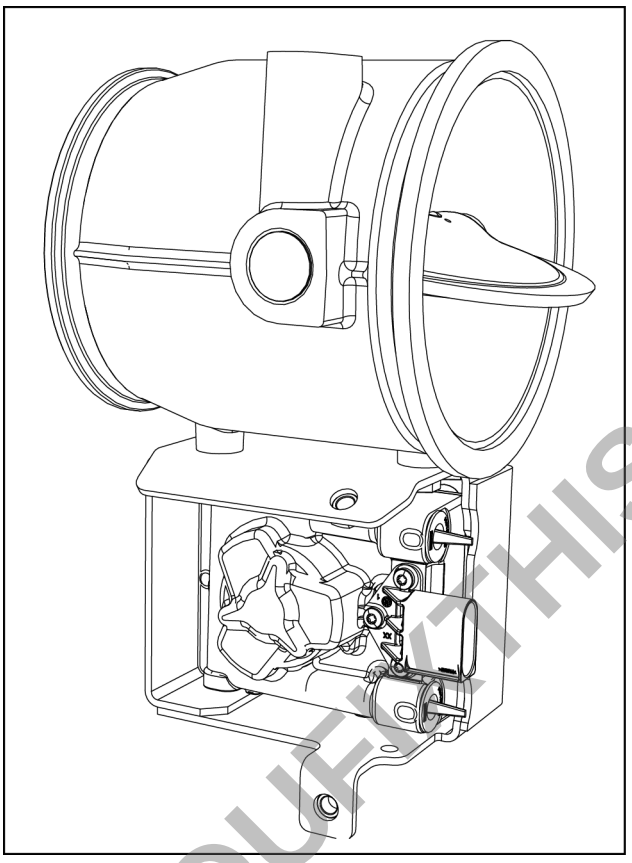
SERVICE

Fuel filters
Remove 3
Install 4

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Exhaust flap - Overview



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The exhaust flap is an electrically controlled throttling valve located in the exhaust plumbing at the outlet of the turbocharger. This valve is opened or closed by the Engine Control Unit (ECU) based upon the temperature in the exhaust stream at the Diesel Oxidation Catalyst (DOC) and the Selective Catalytic Reduction (SCR). Data between the exhaust flap and the ECU is transmitted via the engine CAN data bus.

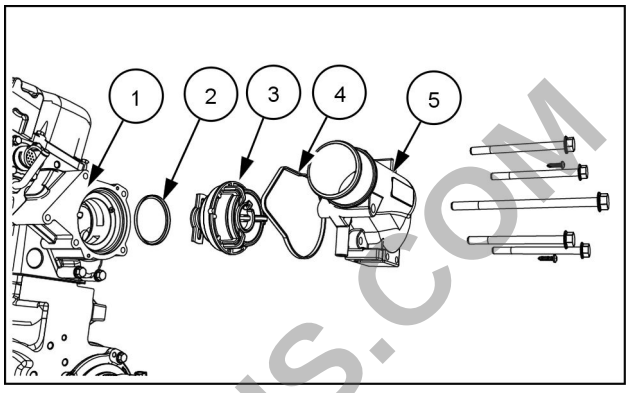
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Coolant thermostat - Install

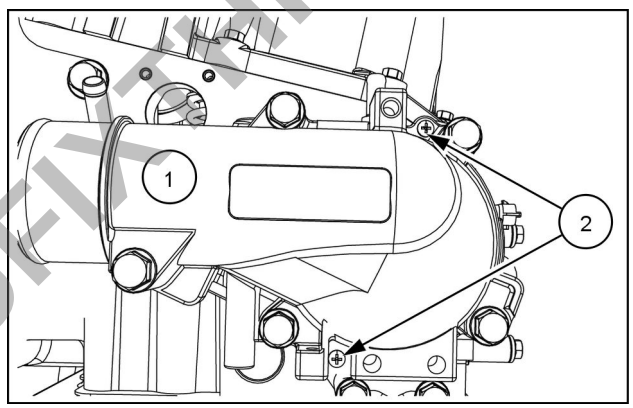
Prior operation:
Coolant thermostat - Remove (10.400)

1. Install a new thermostat seal **(2)** onto the thermostat **(3)**.
2. Install the thermostat **(3)** into the rear thermostat housing **(1)**.
3. Install a new thermostat cover gasket **(4)**.
4. Install the thermostat cover **(5)**.



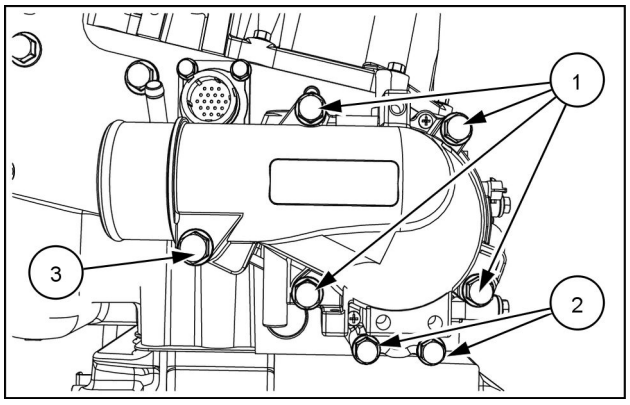
NHIL14ENG0384AA 1

5. Use the two phillips head screws **(2)** to secure the thermostat cover **(1)** to the rear thermostat housing.



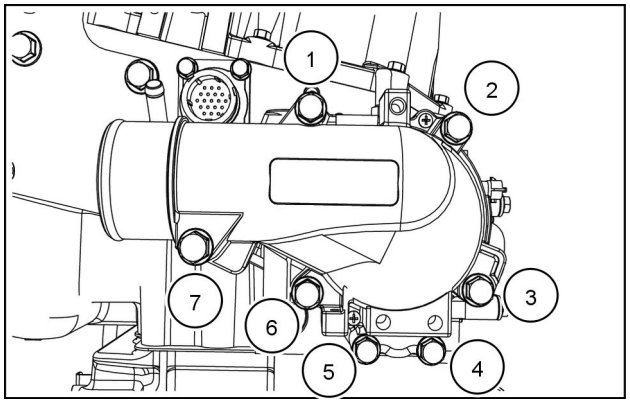
NHIL14ENG0381AA 2

6. Install the four M8 x 100 bolts **(1)** into the thermostat cover.
7. Install the two M8 x 50 bolts **(2)** into the thermostat housing.
8. Install the one M8 x 140 bolt **(3)** into the thermostat cover.



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9. Torque the M8 bolts to **27 - 33 N·m** (**20 - 24 lb ft**) in the following sequence:
   1. Stage 1: **(1)**, **(3)**, **(2)**, **(6)**, **(7)**, **(4)**, **(5)**
   2. Stage 2: **(1)**, **(2)**, **(3)**, **(4)**, **(5)**, **(6)**, **(7)**



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