

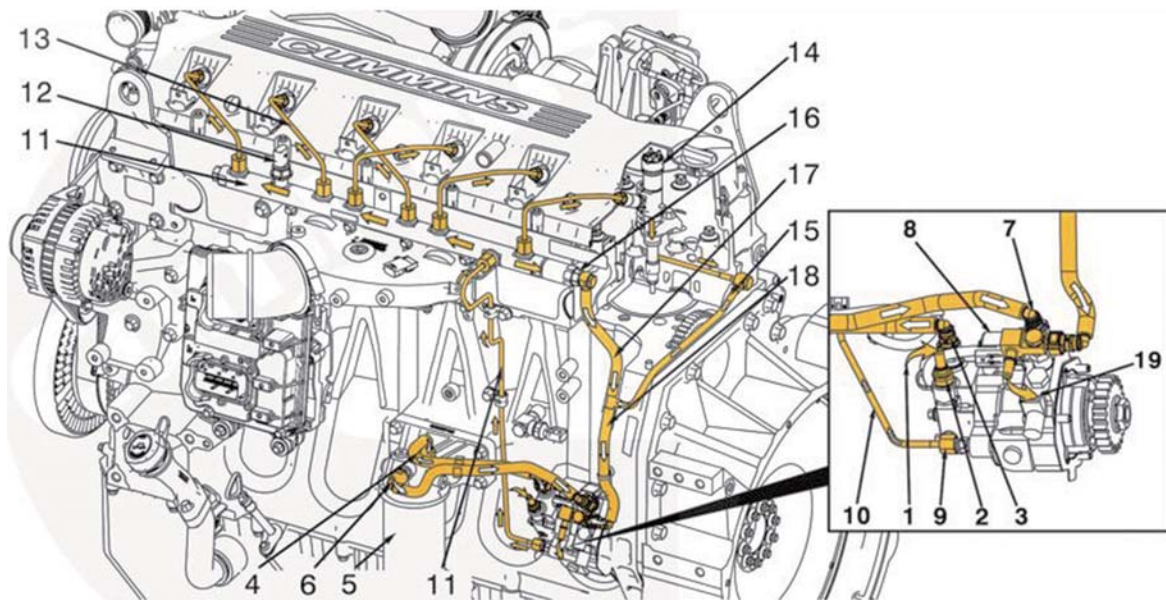
## SECTION 2 ENGINE

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## SECTION 2 ENGINE

### GROUP 1 STRUCTURE AND FUNCTION

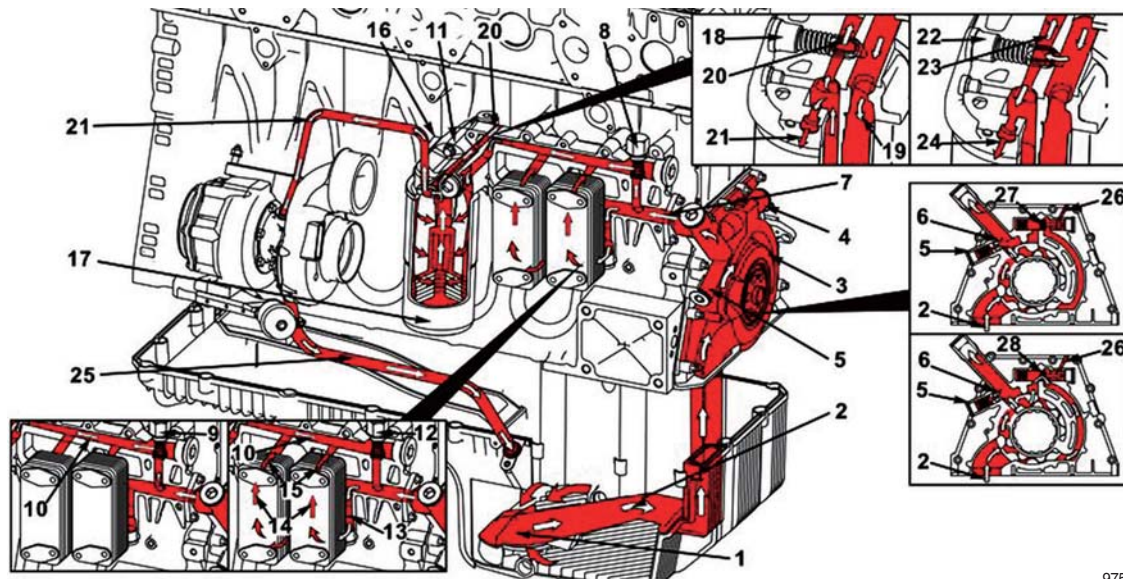
#### 1. FUEL SYSTEM



9752EG03

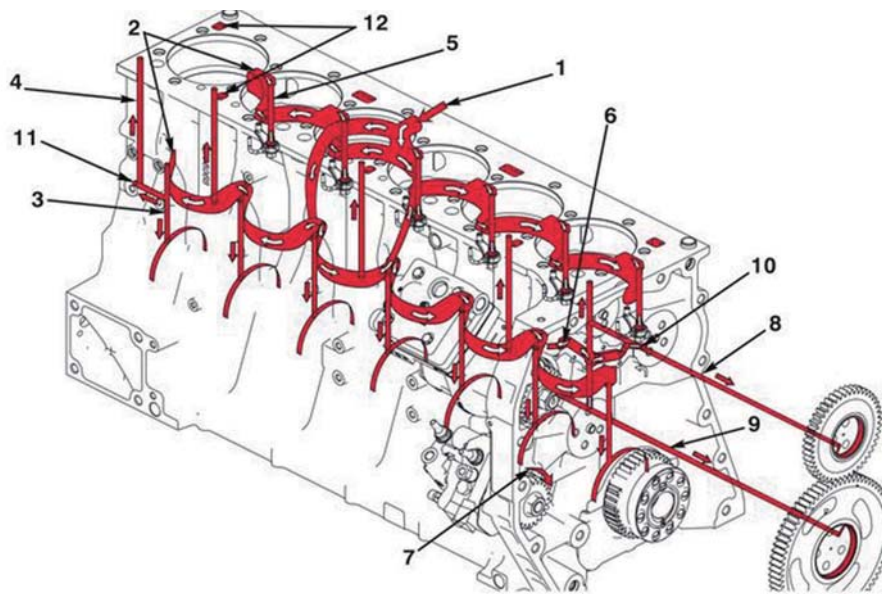
- |    |  |    |                                  |
|----|--|----|----------------------------------|
| 1  | Fuel supply - from suction side filter | 11 | Fuel rail                        |
| 2  | Fuel pump gear pump inlet              | 12 | Fuel rail pressure sensor        |
| 3  | Fuel pump gear pump outlet             | 13 | Injector supply lines            |
| 4  | Pressure side fuel filter inlet        | 14 | Injectors                        |
| 5  | Pressure side fuel filter              | 15 | Fuel drain from injectors        |
| 6  | Pressure side fuel filter outlet       | 16 | Fuel pressure relief valve       |
| 7  | High pressure fuel pump inlet          | 17 | Fuel pressure relief valve drain |
| 8  | Fuel pump actuator                     | 18 | Fuel drain line                  |
| 9  | High pressure fuel pump outlet         | 19 | Fuel return to tank.             |
| 10 | Fuel rail supply line                  |    |                                  |

## 2. LUBRICATING OIL SYSTEM



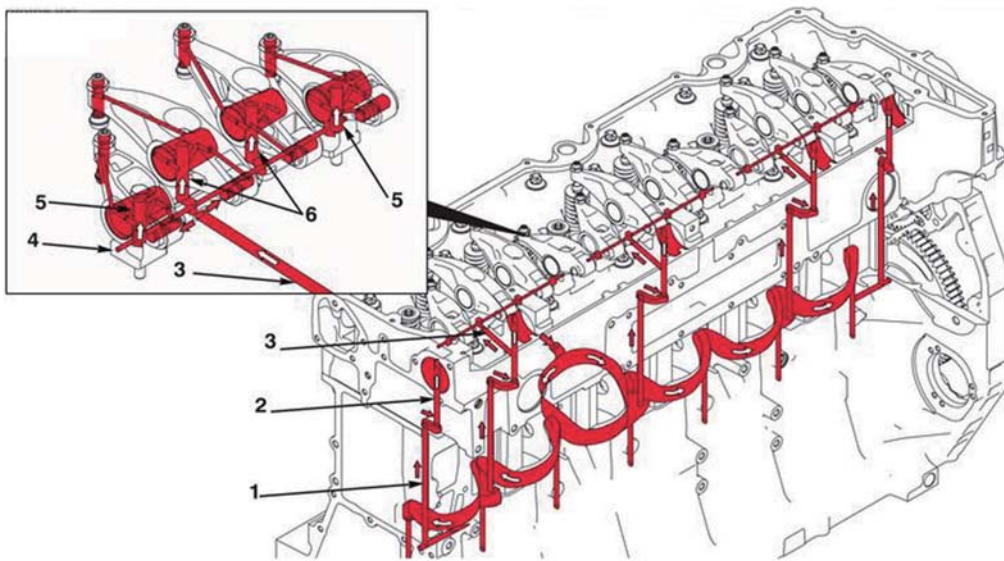
9752EG04

- 1 Flow from oil pan through suction tube
- 2 Flow from suction tube to lubricating oil pump
- 3 Lubricating oil pump
- 4 Lubricating oil pressure regulator valve
- 5 Lubricating oil high-pressure relief valve
- 6 Lubricating oil return to oil pan
- 7 Lubricating oil flow from lubricating oil pump to lubricating oil cooler module
- 8 Lubricating oil thermostat
- 9 Flow with lubricating oil thermostat open
- 10 Lubricating oil flow from lubricating oil cooler module main oil rifle to lubricating oil filter head
- 11 Lubricating oil filter head
- 12 Flow with lubricating oil thermostat closed
- 13 Lubricating oil flow to oil cooler
- 14 Lubricating oil flow through oil cooler elements
- 15 Lubricating oil flow from lubricating oil cooler to lubricating oil cooler main oil rifle
- 16 Lubricating oil filter bypass valve
- 17 Lubricating oil filter
- 18 Flow with lubricating oil filter bypass valve closed
- 19 Lubricating oil flow from filter head to filter
- 20 Filtered lubricating oil flow to engine block main oil rifle
- 21 Filtered lubricating oil flow to turbocharger
- 22 Flow with lubricating oil filter bypass valve open
- 23 Unfiltered lubricating oil flow to engine block main oil rifle
- 24 Unfiltered lubricating oil flow to turbocharger
- 25 Lubricating oil drain from turbocharger
- 26 Block oil rifle pressure sensing channel
- 27 Flow with pressure regulator valve closed
- 28 Flow with pressure regulator valve open



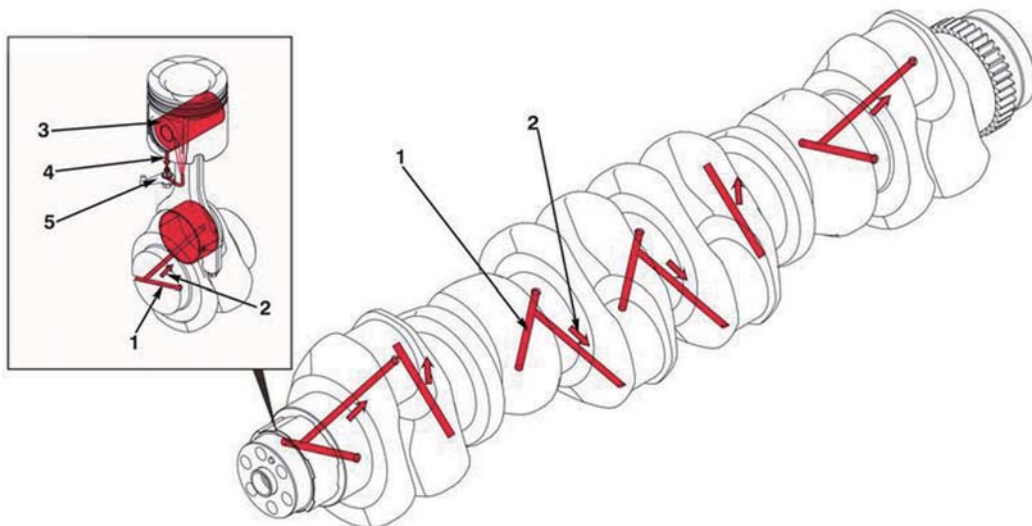
9752EG4-1

- 1 Lubricating oil flow from lubricating oil filter head to engine block main oil rifle
- 2 Main oil rifle
- 3 Flow to main bearings
- 4 Flow to cylinder head
- 5 Flow to piston cooling nozzle
- 6 Flow to air compressor
- 7 Flow to fuel pump
- 8 Flow to camshaft idler gear
- 9 Flow to crankshaft idler gear
- 10 Flow to REPTO idler gear (if applicable)
- 11 Block oil rifle pressure sensing channel
- 12 Oil drain to lubricating oil pan.



9752EG4-2

- 1 Flow from cylinder block to cylinder head
- 2 Flow to camshaft bushings
- 3 Flow to rocker lever shafts
- 4 Rocker lever shaft
- 5 Flow from rocker lever shaft to intake rocker levers
- 6 Flow from rocker lever shaft to exhaust rocker levers.

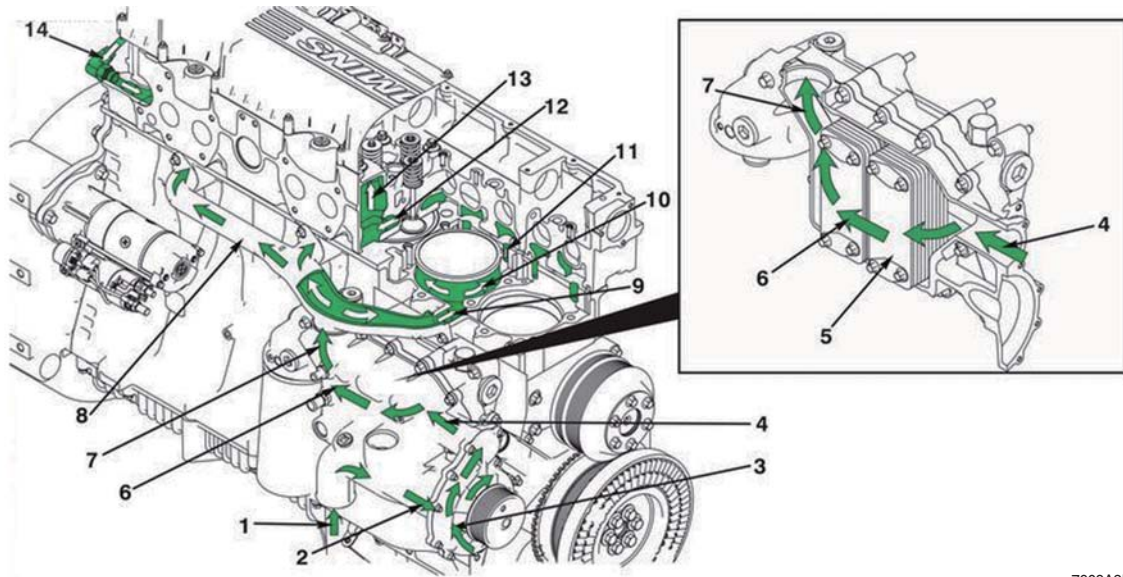


9752EG4-3

- 1 Main bearing flow from oil rifle
- 2 Flow to crankshaft connecting rod bearing
- 3 Piston pin
- 4 Flow from oil rifle to piston cooling nozzle
- 5 Piston cooling nozzle

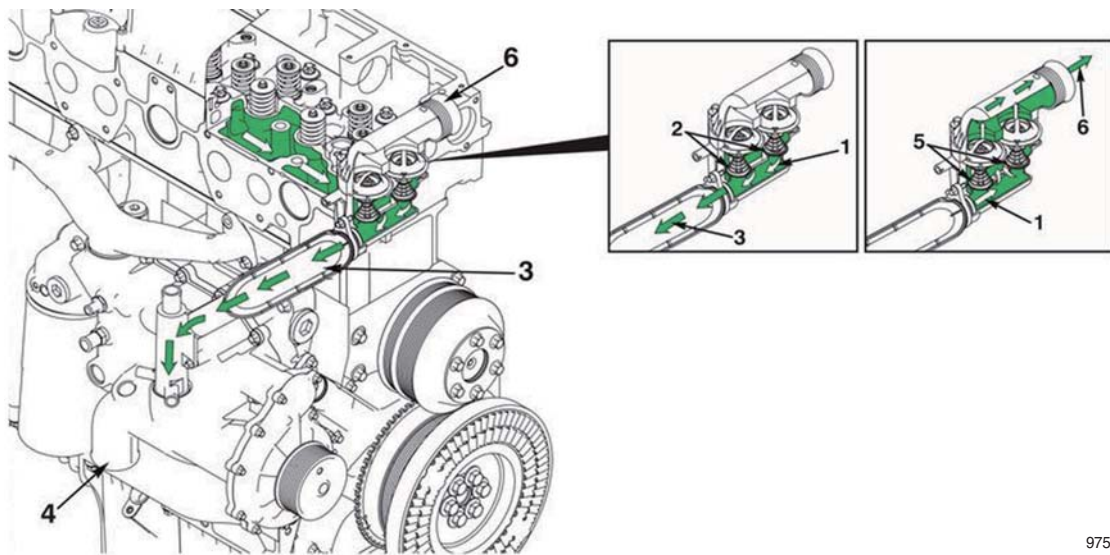


### 3. COOLING SYSTEM



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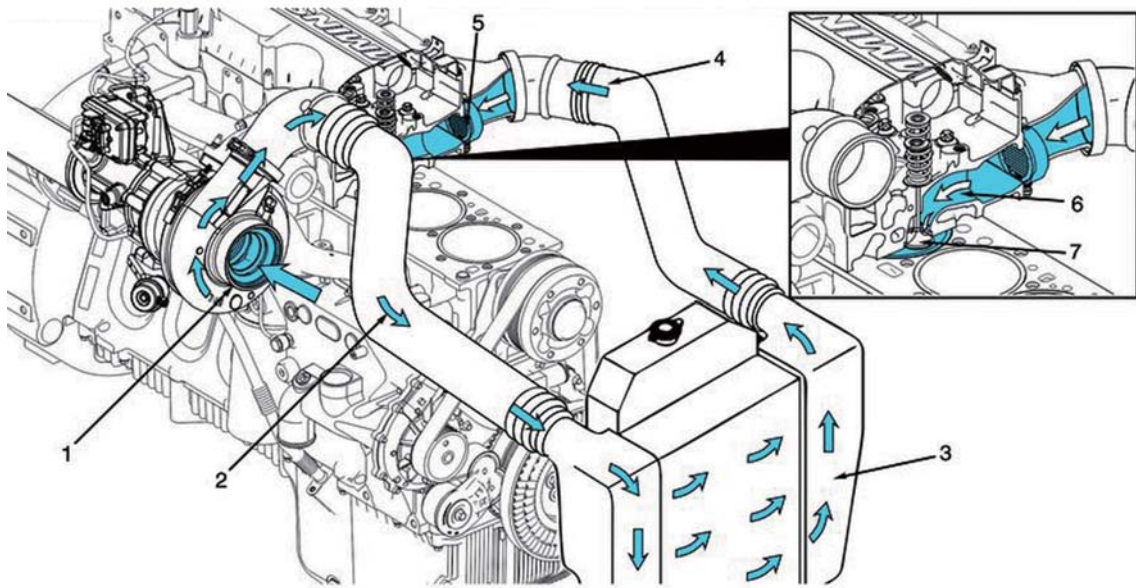
- |   |  |
|---|--|
| 1 Coolant from radiator                                   | 9 Coolant flow from coolant manifold to cylinder block           |
| 2 Coolant flow to water pump                              | 10 Coolant flow around cylinders                                 |
| 3 Water pump  | 11 Coolant flow from cylinder block to lower cylinder head       |
| 4 Coolant flow from water pump to oil cooler module       | 12 Coolant flow to upper cylinder head                           |
| 5 Oil cooler element                                      | 13 Coolant flow to rocker lever housing                          |
| 6 Coolant flow around oil cooler element                  | 14 Coolant flow from air compressor return line to cylinder head |
| 7 Coolant flow from oil cooler module to coolant manifold |  |
| 8 Coolant manifold  |  |



9752EG5-1

- |  |                            |
|--|----------------------------|
| 1 Coolant flow from rocker lever housing                       | 4 Coolant inlet connection |
| 2 Thermostat closed  | 5 Thermostat open          |
| 3 Coolant flow through bypass tube to coolant inlet connection | 6 Coolant flow to radiator |

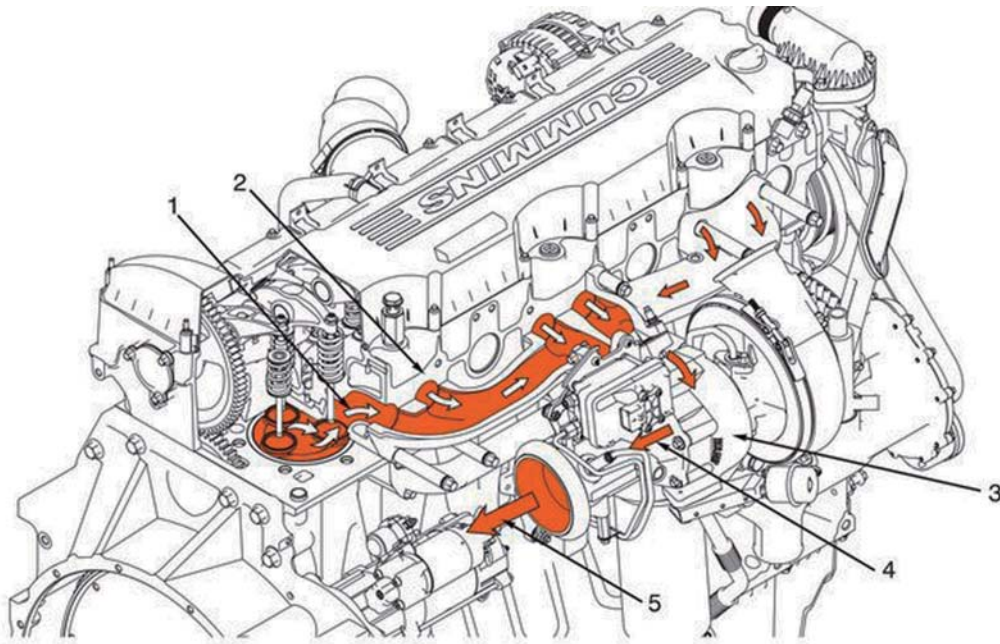
#### 4. AIR INTAKE SYSTEM



9752EG06

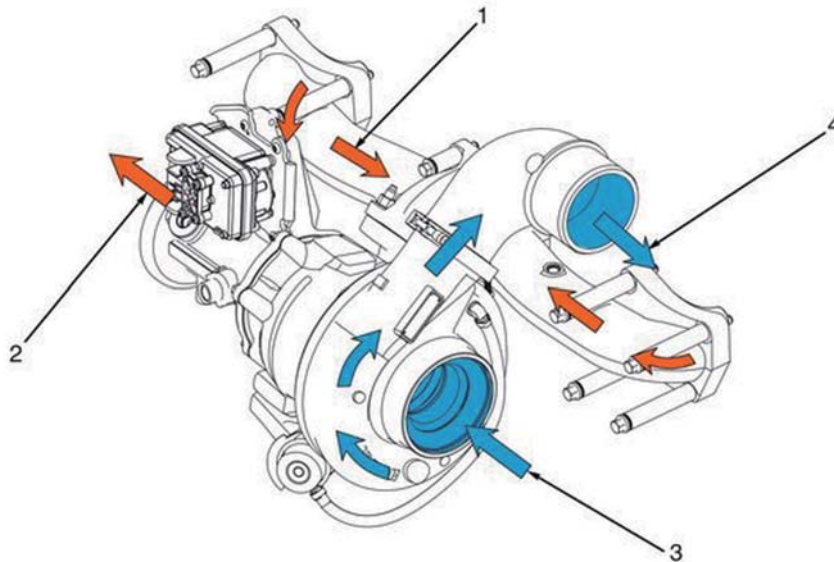
- |   |   |   |                   |
|---|---|---|-------------------|
| 1 | Intake air inlet to turbocharger                | 5 | Cold starting aid |
| 2 | Turbocharger air to charge-air cooler           | 6 | Intake port       |
| 3 | Charge-air cooler                               | 7 | Intake valve      |
| 4 | From charge-air cooler to intake air connection |   |                   |

## 5. EXHAUST SYSTEM



9752EG07

- |   |                               |   |                                      |
|---|-------------------------------|---|--------------------------------------|
| 1 | Exhaust flow from cylinder    | 4 | Exhaust pressure regulator           |
| 2 | Exhaust manifold (pulse type) | 5 | Flow from exhaust pressure regulator |
| 3 | Dual-entry turbocharger       |   |                                      |



9752EG06-1

- |   |   |
|---|---|
| 1 | Exhaust gas inlet to turbocharger turbine housing   |
| 2 | Exhaust gas outlet from exhaust pressure regulator  |
| 3 | Intake air inlet to turbocharger compressor housing |
| 4 | Intake air outlet from compressor housing           |



## GROUP 2 ENGINE SPEED & STALL RPM

### 1. TEST CONDITION

- 1) Normal temperature of the whole system
  - Coolant : Approx 80°C (176°F)
  - Transmission oil : 75 ± 5°C (167 ± 10°F)
  - Hydraulic oil : 45 ± 5°C (113 ± 10°F)
- 2) Normal operating pressure : See page 6-57.

### 2. SPECIFICATION

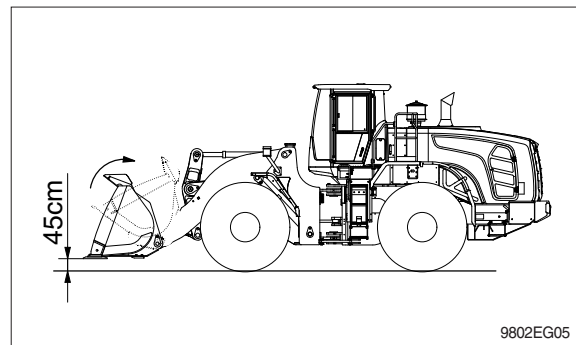
Engine speed, rpm (P mode)						Remark
Low idle	High idle	Pump stall	Converter stall	Full stall	Fan motor	
800 ± 25	2130 ± 50	2130 ± 70	2030 ± 70 (4-speed) 2020 ± 70 (5-speed)	1980 ± 70 (4-speed) 1970 ± 70 (5-speed)	850 ± 50	

### 3. ENGINE RPM CHECK

Remark : If the checked data is not normal, it indicates that the related system is not working properly. Therefore, it is required to check the related system pressure : See page 6-57.

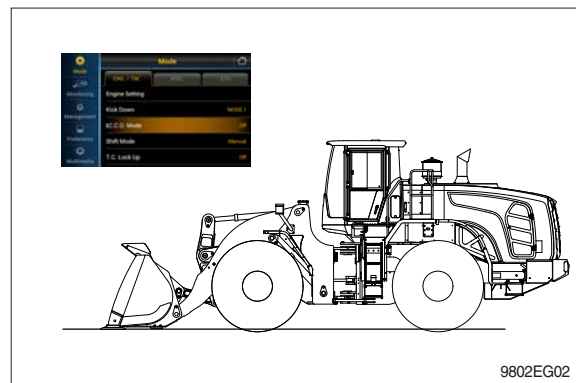
#### 1) Pump stall rpm

- Start the engine and raise the bucket approx 45 cm (1.5 ft) as the figure.
- Press the accelerator pedal fully and operate the bucket control lever to the retract position fully.
- Check the engine rpm at the above condition.



#### 2) Converter stall rpm

- Start the engine and lower the bucket on the ground as the figure.
- Set the clutch cut off mode at the OFF position.
- Press the brake pedal and accelerator pedal fully.
- Shift the transmission lever to the 4th forward position.
- Check the engine rpm at the above condition.



#### 3) Full stall rpm

- Start the engine and raise the bucket approx 45 cm (1.5 ft) as the figure.
- Set the clutch cut off mode at the OFF position.
- Press the brake pedal and accelerator pedal fully .
- Shift the transmission lever to the 4th forward position and operate the bucket lever to the retract position fully.
- Check the engine rpm at the above condition.

