

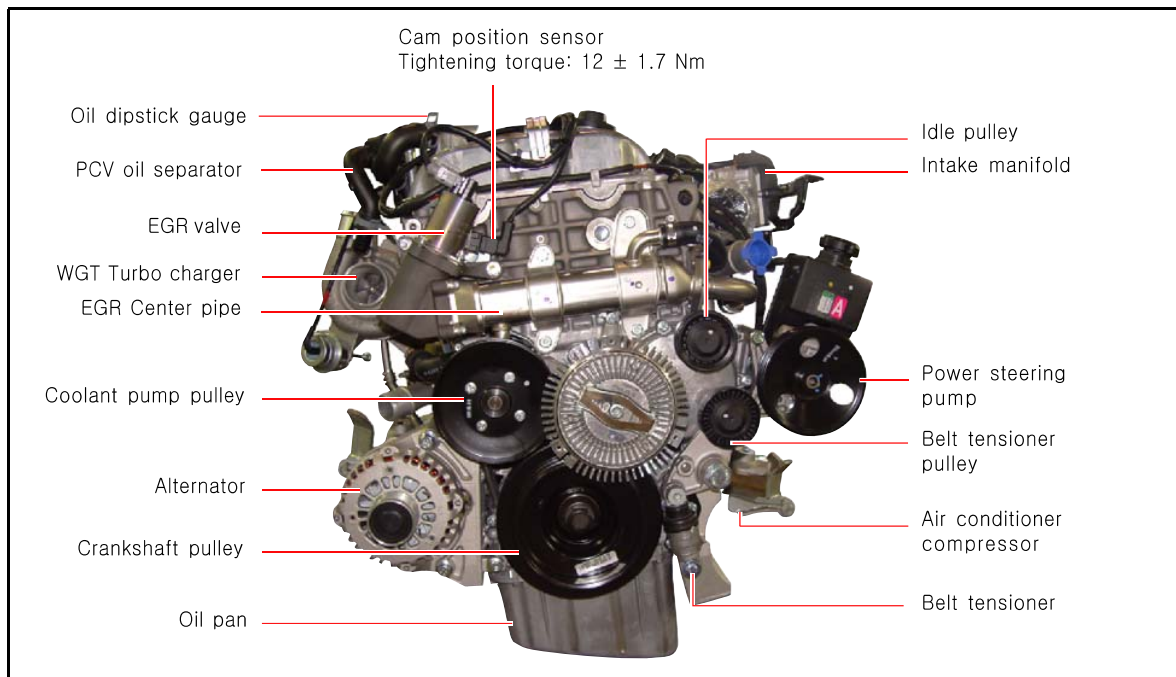
# ENGINE GENERAL

0000-00

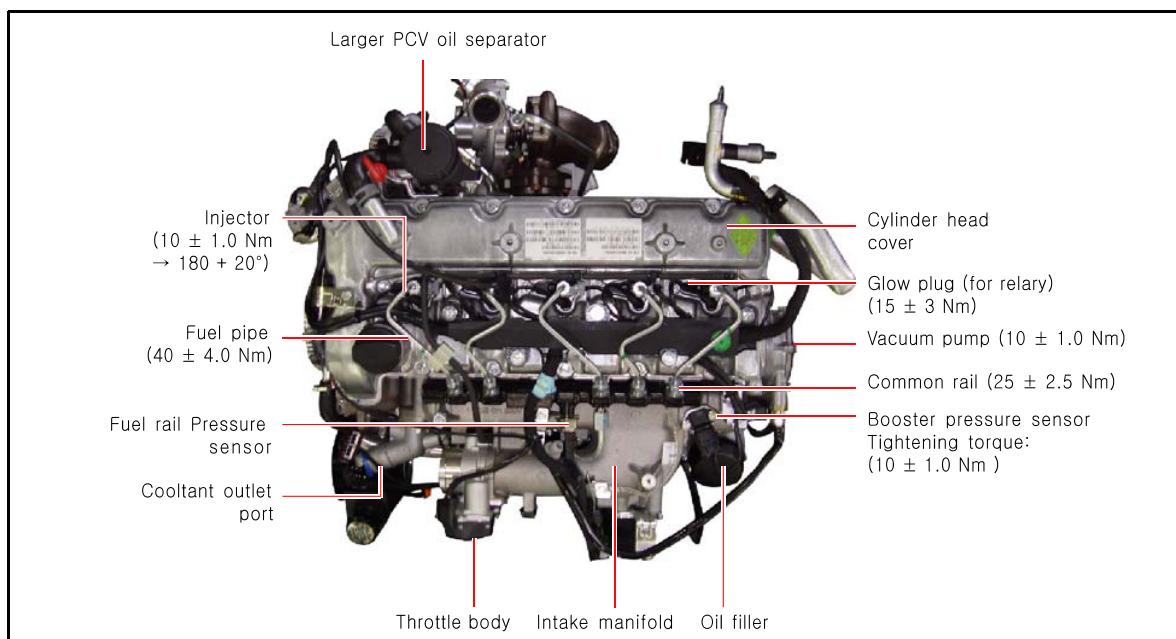
## GENERAL

### 1. STRUCTURE AND COMPARISON

#### ► D27DT (EU IV) Engine - Front View



#### ► D27DT (EU IV) Engine - Top View



|                    |  |
|--------------------|--|
| Modification basis |  |
| Application basis  |  |
| Affected VIN       |  |

ENGINE GENERAL

REXTON W 2012.06

ENGINE  
GENERAL

ENGINE  
ASSEMBL

ENGINE  
FUEL

ENGINE  
INTAKE

ENGINE  
EXHAUST

CDPF  
(EURO IV)

ENGINE  
LUBRICAT

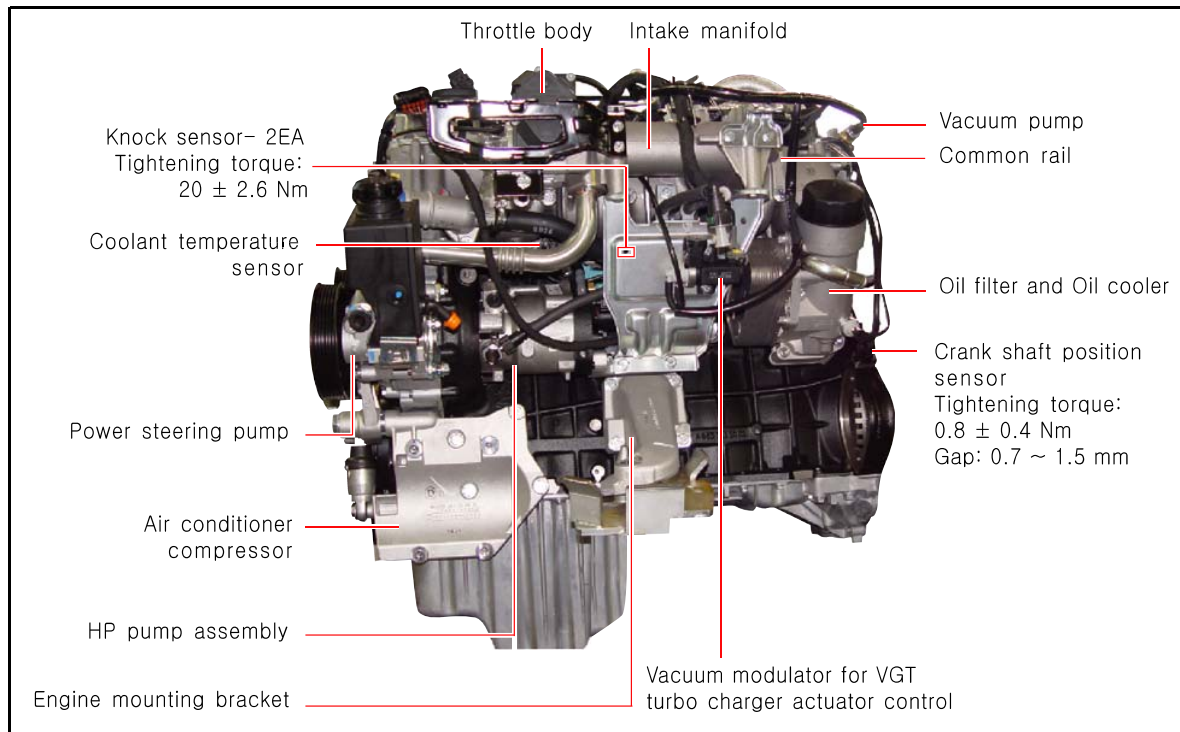
ENGINE  
COOLING

ENGINE  
ELECTRI

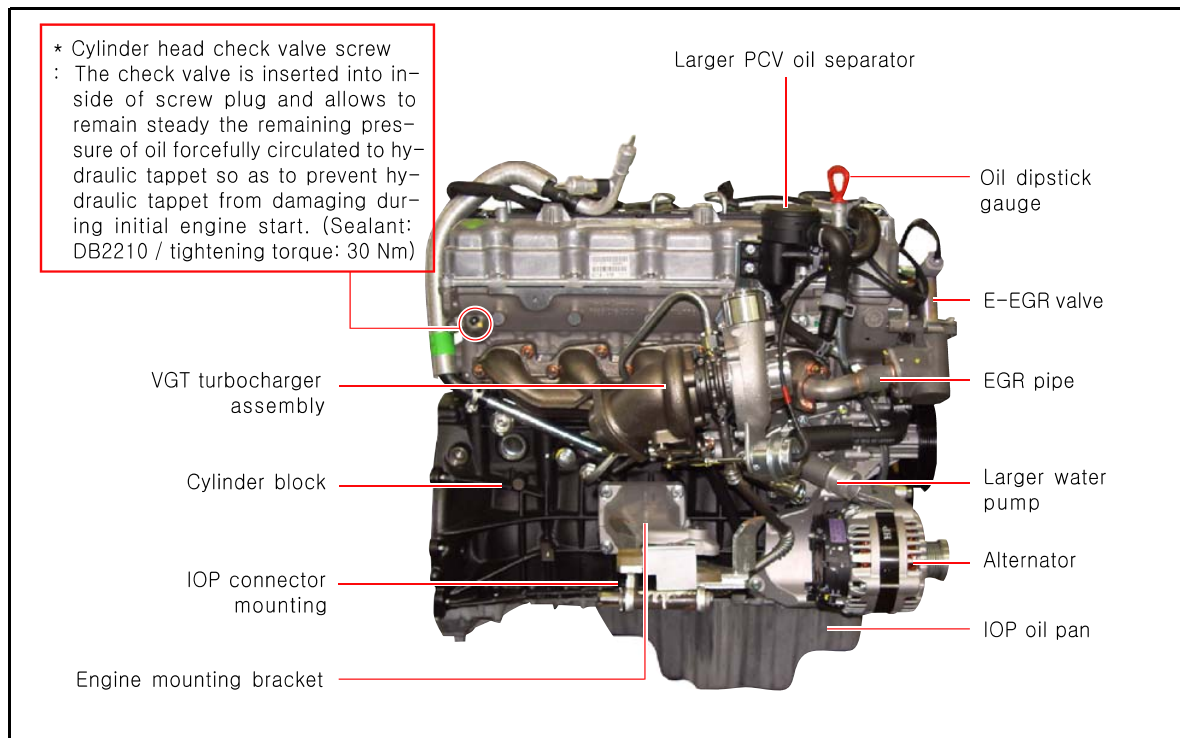
ENGINE  
CONTROL

CRUISE  
CONTROL

### ► D27DT (EU IV) Engine - Side View

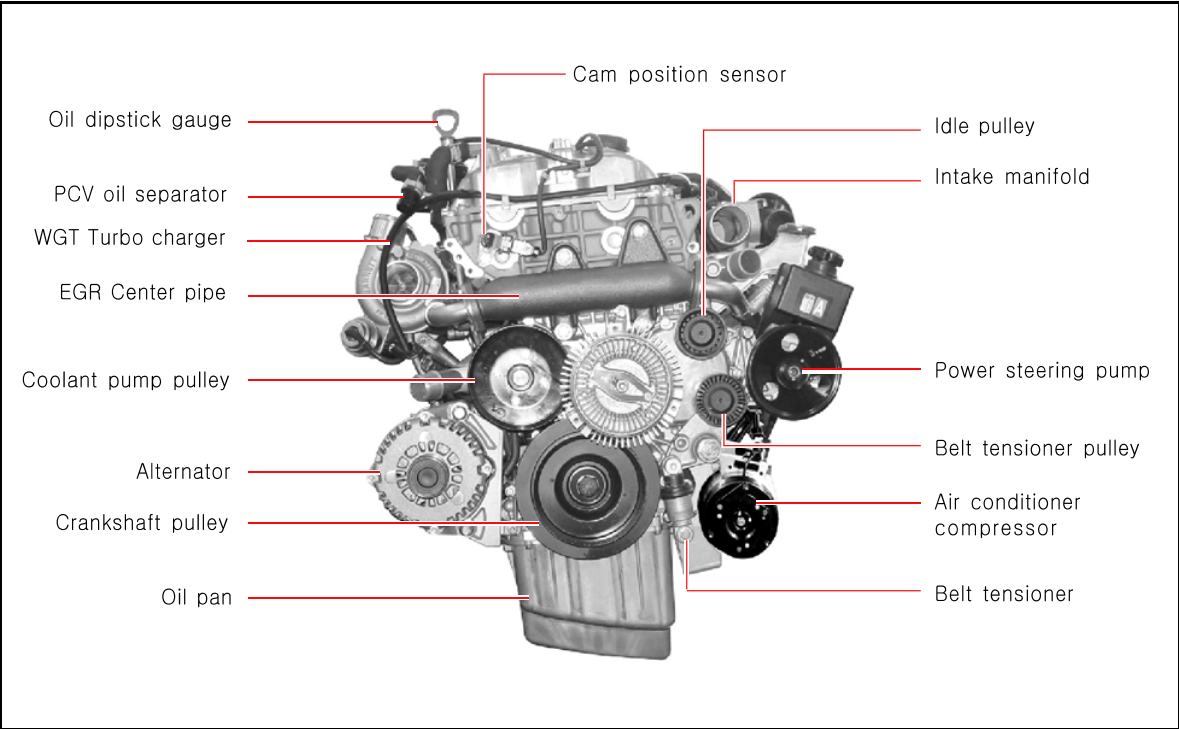


### ► D27DT (EU IV) Engine - Left Side View

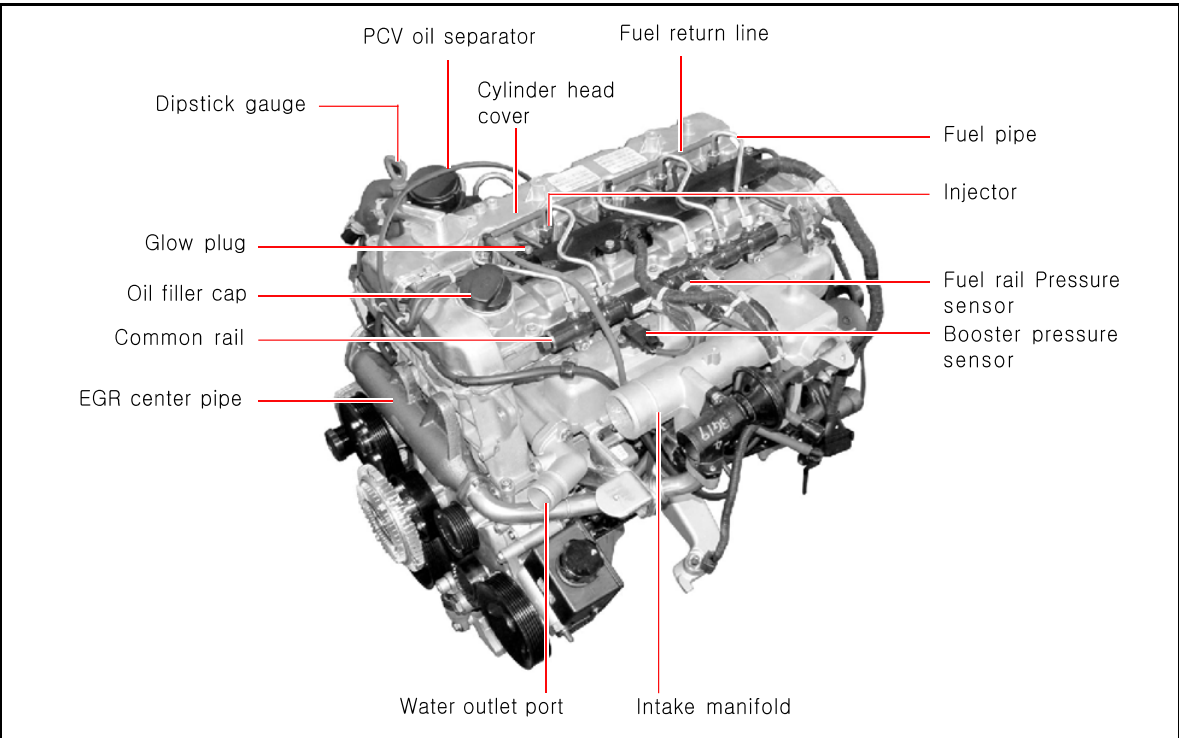


|                    |  |
|--------------------|--|
| Modification basis |  |
| Application basis  |  |
| Affected VIN       |  |

► D27DT Engine (General) - Front View

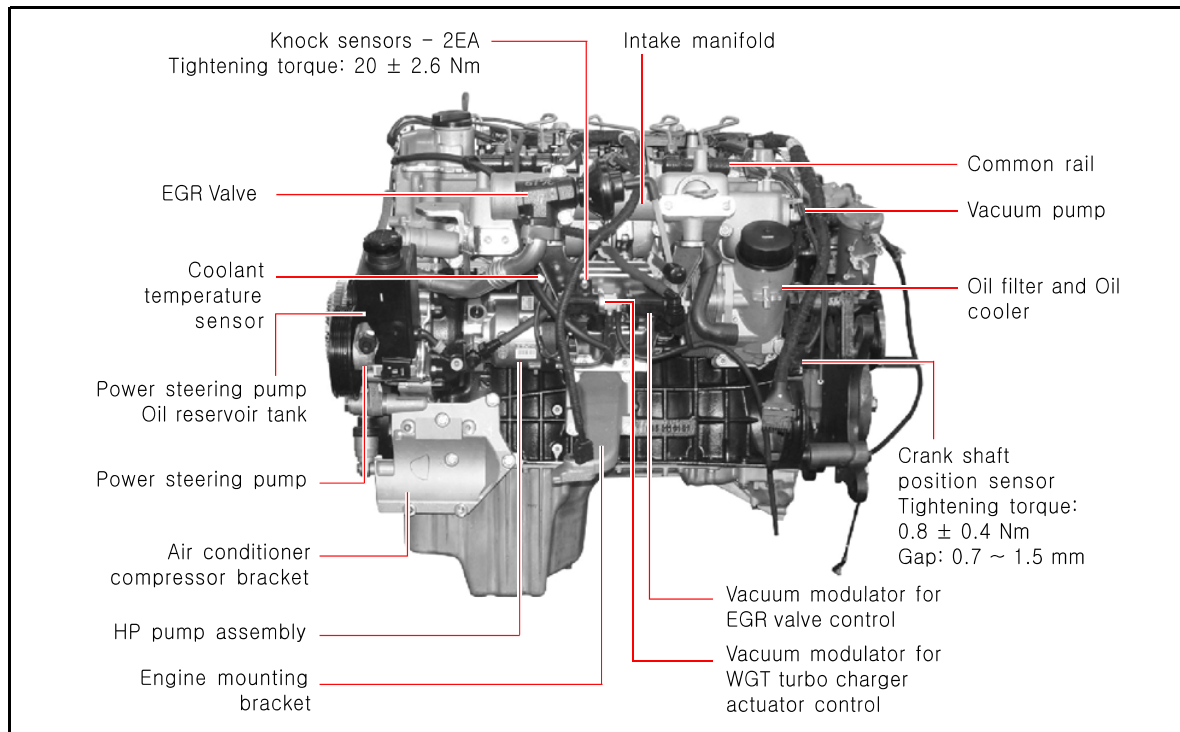


► D27DT Engine (General) - Top View

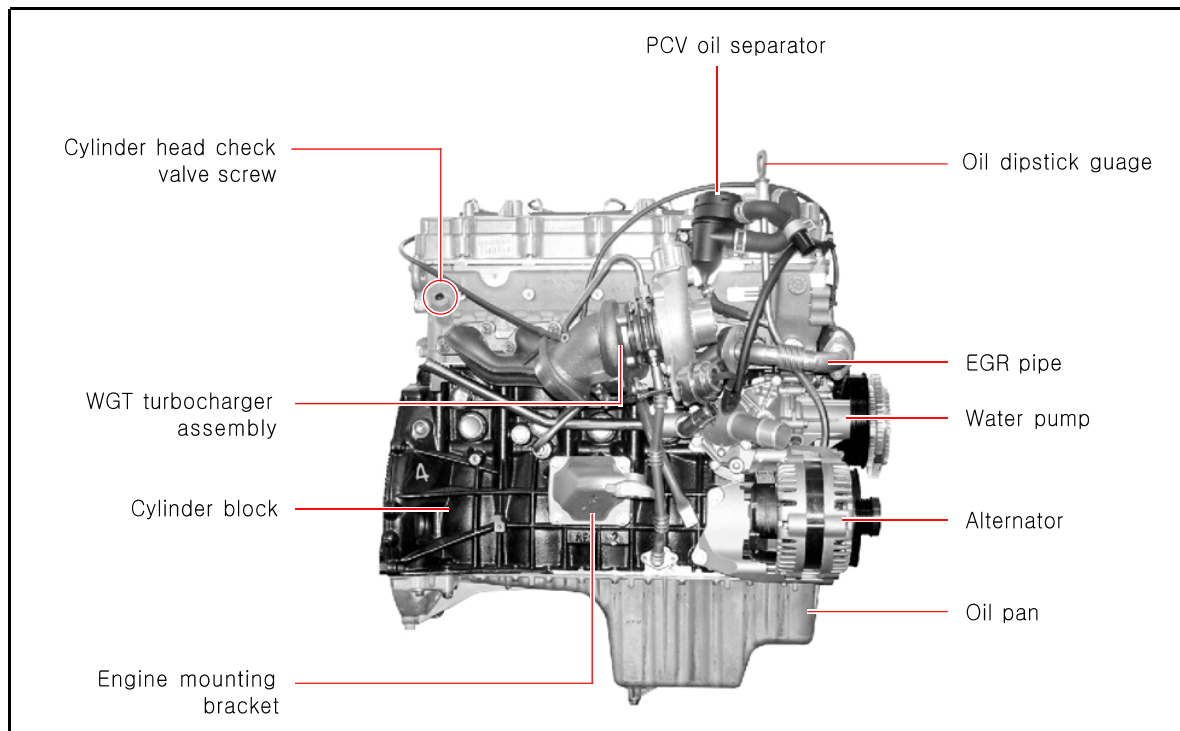


|                    |  |
|--------------------|--|
| Modification basis |  |
| Application basis  |  |
| Affected VIN       |  |

### ► D27DT Engine (General) - Side View



### ► D27DT Engine (General) - Left Side View



|                    |  |
|--------------------|--|
| Modification basis |  |
| Application basis  |  |
| Affected VIN       |  |

## 2. ENGINE SPECIFICATIONS AND PERFORMANCE CURVE

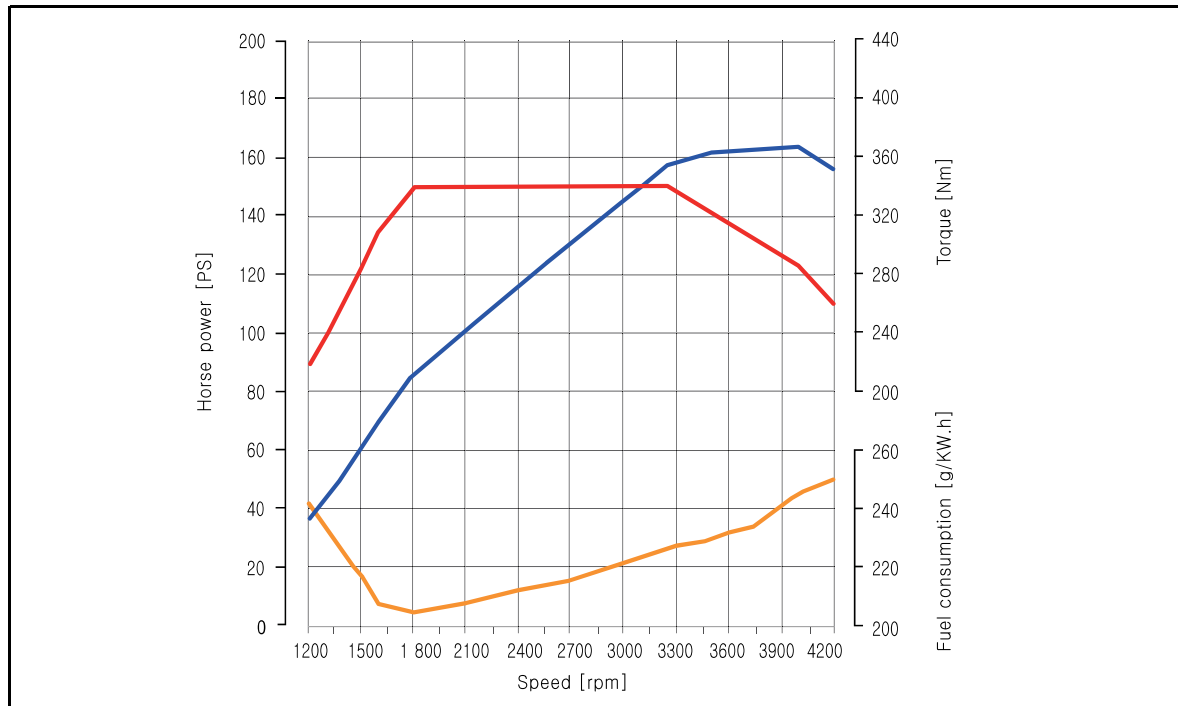
### 1) Specifications

| Descriptions               |                                               | D27DTP (POWER UP) +<br>CDPF Engine<br>* ( ) : CDPF | D27DT (EU IV)<br>Engine                              | D27DT Engine    |
|----------------------------|-----------------------------------------------|----------------------------------------------------|------------------------------------------------------|-----------------|
| Engine                     | Type/Number of cylinders                      | D27DT/5-cylinder                                   | ←                                                    | ←               |
| Cylinder                   | Inner diameter (mm)                           | 86.2                                               | ←                                                    | ←               |
|                            | Stroke (mm)                                   | 92.4                                               | ←                                                    | ←               |
| Displacement (cc)          |                                               | 2696                                               | ←                                                    | ←               |
| Compression ratio          |                                               | 17.5:1                                             | ←                                                    | ←               |
| Maximum output (ps/rpm)    | For Automatic                                 | 186 (180) / 4,000                                  | 165 / 4,000                                          | ←               |
|                            | Transmission                                  | -                                                  | 165 / 4,000                                          | ←               |
| Maximum torque (kg ·m/rpm) | For Manual                                    | 41 / 1,600 ~ 3,000                                 | 35.7 / 1,800 ~ 3,250                                 | ←               |
|                            | Transmission                                  | -                                                  | 34.7 / 1,800 ~ 3,250                                 | ←               |
| Idle speed                 | For Manual Transmission                       | -                                                  | 750 ± 20 rpm                                         | 760 ± 50 rpm    |
|                            | For Automatic Transmission                    | 750 ± 20 rpm                                       | ←                                                    | ←               |
| Valve                      | Intake                                        | Opens (btdc)                                       | 9°                                                   | ←               |
|                            |                                               | Closes (abdc)                                      | 26°                                                  | ←               |
|                            | Exhaust                                       | Opens (bbdc)                                       | 38°                                                  | ←               |
|                            |                                               | Closes (atdc)                                      | 16°                                                  | ←               |
| Camshaft                   | Type                                          | DOHC                                               | ←                                                    | ←               |
| Fuel system                | Fuel type                                     | Low sulfur diesel                                  | ←                                                    | ←               |
|                            | Fuel pump type                                | Vane pump in HP pump                               | ←                                                    | ←               |
|                            | Fuel supply pressure                          | HP pump Inlet port                                 | -0.4 ~ 0 mbar                                        | Max. 400 mbar   |
|                            |                                               | HP pump outlet port (with IMV fully open)          | Below 1,600 bar                                      | Above 1,050 bar |
|                            | Water separation in fuel filter               |                                                    | Every 10,000 km                                      | ←               |
|                            | Fuel tank capacity (ℓ)                        |                                                    | 78                                                   | ←               |
| Lubrication system         | Oil specification                             |                                                    | SAE 10W40, 5W40 (MB Sheet 229.1, 229.3 approved oil) | ←               |
|                            | Lubrication type                              |                                                    | Gear pump Forced circulation                         | ←               |
|                            | Oil filter type                               |                                                    | Full flow type, filter element type                  | ←               |
|                            | Oil capacity (ℓ)                              |                                                    | ≒ 8.5                                                | ←               |
| Cooling system             | Cooling type                                  |                                                    | Water cooling type/<br>Forced circulation            | ←               |
|                            | Cooling fan operation type                    |                                                    | Belt operated type                                   | ←               |
|                            | Thermostat<br>(* Note: Fully opened at 100°C) | Opening temperature                                | 85 °C                                                | ←               |
|                            |                                               | Type                                               | WAX Pellet Type                                      | ←               |
|                            | Coolant capacity (ℓ)                          |                                                    | ≒ 11.0 ~ 11.5                                        | ←               |

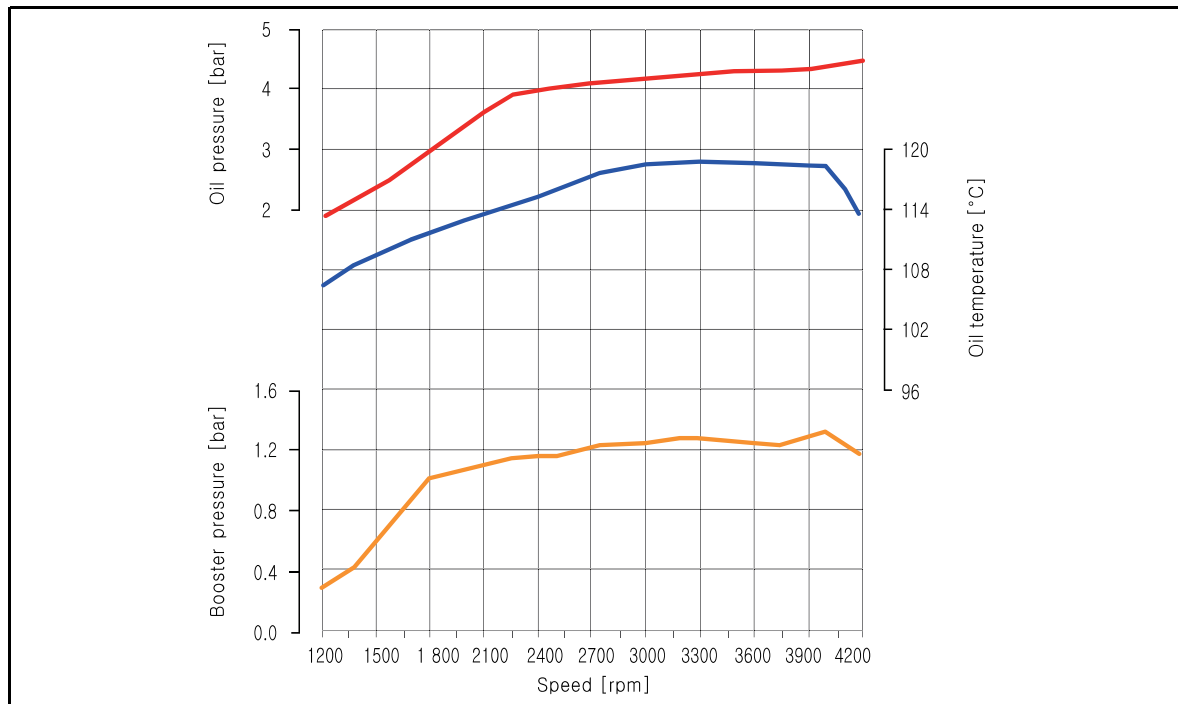
|                    |  |
|--------------------|--|
| Modification basis |  |
| Application basis  |  |
| Affected VIN       |  |

## 2) D27DT Engine Performance Curve

### (1) Output and Torque



### (2) Oil Temperature/Pressure and Boost Pressure



|                    |  |
|--------------------|--|
| Modification basis |  |
| Application basis  |  |
| Affected VIN       |  |

### 3. TIGHTENING TORQUE

This table shows the tightening torques for removal/mounting and disassembly/reassembly of the engine.

| Name                                             | Size         | Quantity | Tightening Torque (Nm) |       |        |
|--------------------------------------------------|--------------|----------|------------------------|-------|--------|
|                                                  |              |          | D20DT                  | D27DT | D27DTP |
| Main bearing cap                                 | M11 x 67     | 10       | 55 ± 5<br>120° ± 10°   | ←     | ←      |
| Connecting rod cap                               | M9 x 51      | 8        | 40 ± 5<br>90° ± 10°    | ←     | ←      |
| Rear cover                                       | M6 x 20      | 6        | 10 ± 1                 | ←     | ←      |
| Oil pump                                         | M8 x 35SOC   | 3        | 25 ± 2.5               | ←     | ←      |
| T.G.C.C                                          | M6 x 40      | 6        | 10 ± 1                 | ←     | ←      |
|                                                  | M6 x 60      | 3        | 10 ± 1                 | ←     | ←      |
|                                                  | M6 x 70      | 2        | 10 ± 1                 | ←     | ←      |
| Flywheel                                         | M10 x 22     | 8        | 45 ± 5<br>90° ± 10°    | ←     | ←      |
| Crankshaft hub                                   | M20 x 85     | 1        | 200<br>180° ± 10°      | ←     | ←      |
| Oil pan                                          | M6 x 20      | 24       | 10 ± 1                 | ←     | ←      |
|                                                  | M6 x 35      | 3        | 10 ± 1                 | ←     | ←      |
|                                                  | M6 x 85      | 3        | 10 ± 1                 | ←     | ←      |
|                                                  | M8 x 40      | 4        | 25 ± 2.5               | ←     | ←      |
| High pressure pump mounting bolt                 | M8 x 55      | 3        | 25 ± 2.5               | ←     | ←      |
| High pressure pump main nut (Intermediate shaft) | M14 x 1.5    | 1        | 65 ± 5                 | ←     | ←      |
| Cylinder head                                    | M8 x 25      | 2        | 25 ± 2.5               | ←     | ←      |
|                                                  | M8 x 50      | 2        |                        |       |        |
|                                                  | M10 x 158    | 1        | 85 ± 5                 | ←     | ←      |
|                                                  | M10 x 177    | 9        | 270° ± 10°             |       |        |
| Camshaft sprocket (Intake)                       | M11 x 40     | 1        | 25 ± 2.5               | ←     | ←      |
| Camshaft sprocket (Exhaust)                      |              |          | 90° ± 10°              |       |        |
| Chain tensioner                                  | M24          | 1        | 65 ± 5                 | ←     | ←      |
| Auto tensioner                                   | M12 x 90(UP) | 1        | 82 ± 6                 | ←     | ←      |
|                                                  | M8 x 45(Low) | 1        | 32 ± 3                 | ←     | ←      |
| Water pump                                       | M6 x 50      | 7        | 10 ± 1                 | ←     | ←      |
| Water pump pulley                                | M6 x 10      | 4        | 10 ± 1                 | ←     | ←      |
| Hot water inner pipe                             | M6 x 12      | 2        | 10 ± 1                 | ←     | ←      |
| Alternator bracket                               | M8 x 80      | 1        | 25 ± 2.5               | ←     | ←      |
|                                                  | M8 x 34      | 2        | 25 ± 2.5               | ←     | ←      |
|                                                  | M8 x 30      | 2        | 25 ± 2.5               | ←     | ←      |
| Alternator                                       | M10 x 90     | 1        | 46 ± 4.6               | ←     | ←      |
|                                                  | M10 x 116    | 1        | 46 ± 4.6               | ←     | ←      |

|                    |  |
|--------------------|--|
| Modification basis |  |
| Application basis  |  |
| Affected VIN       |  |

| Name                                   | Size                 | Quantity | Tightening Torque (Nm) |       |          |
|----------------------------------------|----------------------|----------|------------------------|-------|----------|
|                                        |                      |          | D20DT                  | D27DT | D27DTP   |
| Air conditioner compressor bracket     | M8 x 25              | 1        | 25 ± 2.5               | ←     | ←        |
|                                        | M8 x 60              | 3        | 25 ± 2.5               | ←     | ←        |
| Air conditioner compressor sub bracket | M6 x 16              | 1        | 10 ± 1.0               | ←     | ←        |
|                                        | M8 x 20              | 1        | 25 ± 2.5               | ←     | ←        |
| Intake manifold                        | M8 x 50              | 5        | 25 ± 2.5               | ←     | ←        |
|                                        | M8 x 133             | 5        | 25 ± 2.5               | ←     | ←        |
| Acoustic cover bracket                 | M6 x 16              | 2        | 25 ± 2.5               | ←     | ←        |
|                                        | M8 x 105             | 1        | 25 ± 2.5               | ←     | ←        |
| Knock sensor                           | M8 x 28              | 1        | 20 ± 2.6               | ←     | ←        |
| Camshaft position sensor               | M8 x 14              | 1        | 12 ± 1.7               | ←     | ←        |
| Booster pressure sensor                | M6 x 20              | 2        | 10 ± 1.0               | ←     | ←        |
| Exhauster manifold stud bolt           | M8 x 46              | 10       | 15 ± 1.5               | ←     | ←        |
|                                        | M8 x 35              | 2        | 15 ± 1.5               | ←     | ←        |
| Exhaust manifold nut                   | M8                   | 10       | 40 ± 4.0               | ←     | ←        |
| Turbo charger assembly                 | M8                   | 3        | 25 ± 2.5               | ←     | ←        |
| Turbo charger hollow bolt              | M10 x 1.0            | 1        | 18 ± 1.8               | ←     | 15 ± 1.0 |
| Turbo charger oil supply pipe          | M16 (BLOCK side)     | 1        | 25 ± 2.5               | ←     | ←        |
| Turbo charger support bar (nut)        | M8                   | 1        | 23 ± 2.3               | ←     | ←        |
| Turbo charger support bar (bolt)       | M8 x 20              | 1        | 25 ± 2.5               | ←     | ←        |
| Turbo charger return pipe              | M6 x 16 (T/C side)   | 2        | 10 ± 1.0               | ←     | ←        |
|                                        | M6 x 16 (BLOCK side) | 2        | 10 ± 1.0               | ←     | ←        |
| EGR Valve                              | M6 x 16              | 4        | 10 ± 1.0               | ←     | —        |
| EGR pipe (RH) nut                      | M8                   | 2        | 35 ± 3.5               | ←     | —        |
| EGR pipe (RH) bolt                     | M6 x 16              | 2        | 10 ± 1.0               | ←     | —        |
| EGR cooler bolt                        | M8 x 16              | 4        | 25 ± 1.0               | ←     | —        |
| EGR valve & EGR cooler                 | M6 x 20              | 3        | 25 ± 2.5               | ←     | —        |
|                                        | M6 x 20              | 2        | 25 ± 2.5               | ←     | —        |
| Glow plug                              | M5                   | 5        | 15 ± 3.0               | ←     | ←        |
| Vacuum pump                            | M6 x 20              | 3        | 10 ± 1.0               | ←     | ←        |
| Cooling pan bracket                    | M6 x 25              | 5        | 10 ± 1.0               | ←     | ←        |
|                                        | M6 x 55              | 1        | 10 ± 1.0               | ←     | ←        |
|                                        | M6 x 85              | 3        | 10 ± 1.0               | ←     | ←        |
| Cylinder head cover                    | M6 x 35              | 21       | 10 ± 1.0               | ←     | ←        |
| Vacuum modulator                       | M6 x 16              | 4        | 10 ± 1.0               | ←     | ←        |
| Oil dipstick gage                      | M6 x 16              | 1        | 10 ± 1.0               | ←     | ←        |
| Oil filter                             | M8 x 35              | 1        | 25 ± 2.5               | ←     | ←        |
|                                        | M8 x 55              | 2        | 25 ± 2.5               | ←     | ←        |
|                                        | M8 x 125             | 1        | 25 ± 2.5               | ←     | ←        |

| Name                      | Size     | Quantity | Tightening Torque (Nm) |                  |        |
|---------------------------|----------|----------|------------------------|------------------|--------|
|                           |          |          | D20DT                  | D27DT            | D27DTP |
| Fuel rail                 | M8 x 35  | 2        | 25 ± 2.5               | ←                | ←      |
| Injector                  | M6 x 60  | 4        | 10 ± 1.0<br>180° ± 20° | ←                | ←      |
| Fuel pipe nut (H → C)     | M14      | 2        | 40 ± 4.0               | ←                | ←      |
| Fuel pipe nut (C → I)     | M14      | 8        | 40 ± 4.0               | ←                | ←      |
| Crank position sensor     | M6 x 14  | 1        | 0.8 ± 0.4              | ←                | ←      |
|                           | Gap      | –        | 0.7 ± 1.5 mm           | ←                | ←      |
| Power steering pump       | M8 x 100 | 2        | 25 ± 2.5               | ←                | ←      |
| Head screw plug           | –        | 1        | 25 ± 2.5               | ←                | ←      |
| Camshaft cap bolt         | M8 x 60  | 20       | 25 ± 2.5               | ←                | ←      |
| Piston topping            | –        | –        | 0.765 mm ~ 1.055 mm    |                  |        |
| Connecting rod end play   | –        | –        | 0.500 mm ~ 1.500 mm    |                  |        |
| Camshaft end play         | –        | –        | 0.100 mm ~ 0.350 mm    |                  |        |
| Crank shaft end play      | –        | –        | 0.100 mm ~ 0.254 mm    |                  |        |
| E-EGR valve assembly      | M8 x 60  | 1        | –                      | 25 ± 2.5 (EU IV) | ←      |
|                           | M8 x 35  | 1        | –                      | 25 ± 2.5 (EU IV) | ←      |
|                           | M6 x 20  | 3        | –                      | 10 ± 1.0 (EU IV) | ←      |
| E-EGR cooler              | M8 x 16  | 4        | –                      | 25 ± 2.5 (EU IV) | ←      |
| EGR pipe combination bolt | M6 x 16  | 6        | –                      | 10 ± 1.0 (EU IV) | ←      |
| Throttle body             | M6 x 45  | 3        | –                      | 10 ± 1.0 (EU IV) | ←      |

ENGINE  
GENERAL

ENGINE  
ASSEMBL

ENGINE  
FUEL

ENGINE  
INTAKE

ENGINE  
EXHAUST

CDPF  
(EURO IV)

ENGINE  
LUBRICAT

ENGINE  
COOLING

ENGINE  
ELECTRI

ENGINE  
CONTROL

CRUISE  
CONTROL

|                    |  |
|--------------------|--|
| Modification basis |  |
| Application basis  |  |
| Affected VIN       |  |

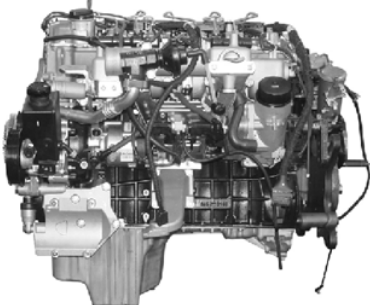
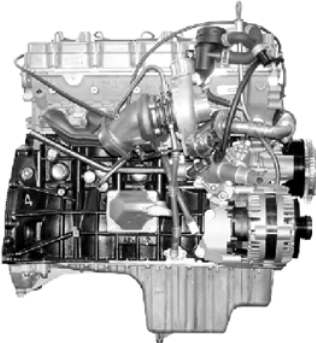
ENGINE GENERAL

REXTON W 2012.06

## 4. MAJOR CHANGES IN D27DTP (POWER UP) ENGINE (COMPARED TO D27DT)

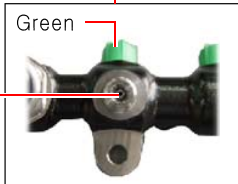
The shape and size of D27DTP (POWER UP) are slightly different from those of D27DT engine but the basic configuration of two systems is almost same.

### 1) Engine Assembly

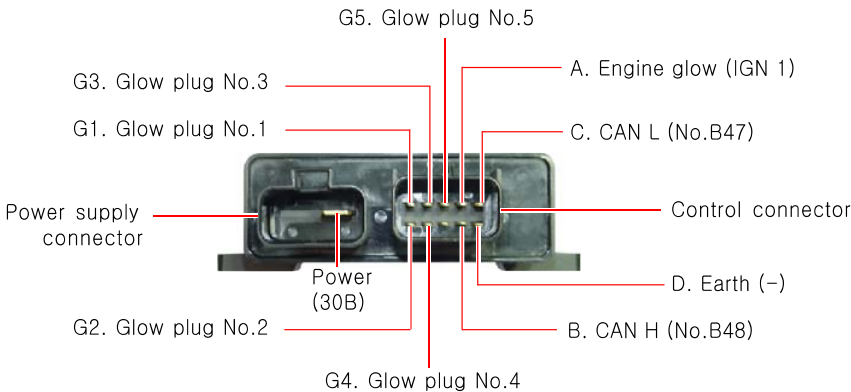
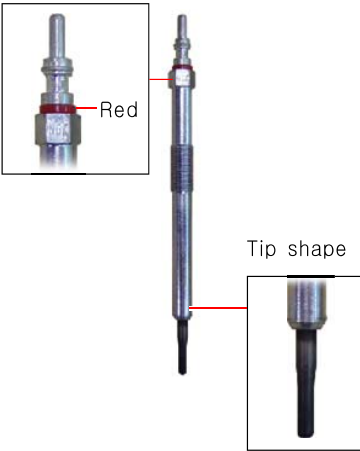
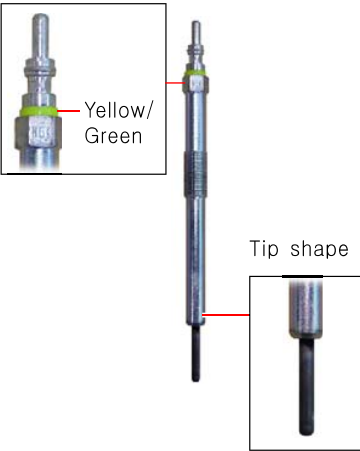
| D27DTP (POWER UP)<br>+ CDPF Engine                                                                     | D27DT (EU IV) Engine                                                                | D27DT Engine (General)                                                               |
|--------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| Front Side View<br>  |    |    |
| Right Side View<br> |  |  |
| Left Side View<br>  |  |  |

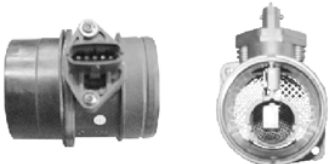
|                    |  |
|--------------------|--|
| Modification basis |  |
| Application basis  |  |
| Affected VIN       |  |

## 2) Major Changes and Summary

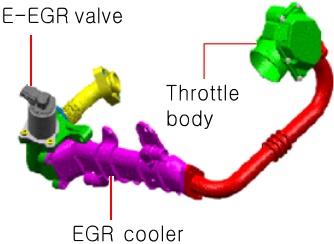
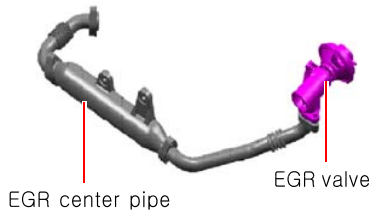
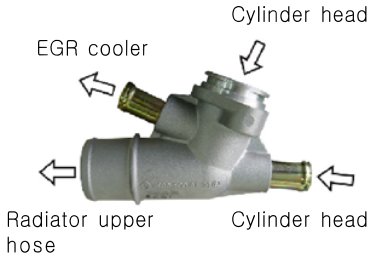
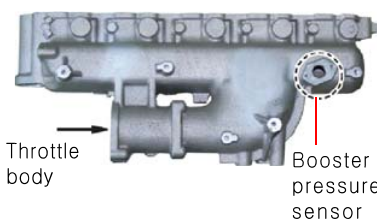
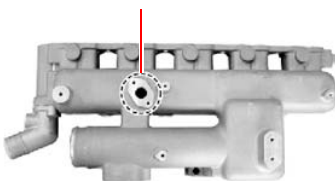
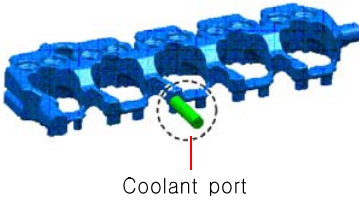
| D27DTP (POWER UP) + CDPF Engine<br>D27DT (EU IV) Engine                                                                                                                                                                | D27DT Engine (General)                                                                                                                                                                                   | Remarks                                                                                                                                                                                                                                                                                                                                                                            |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <div>ECU</div> <p>D27DTP Engine ECU – Ver. 3.2</p>   | <p>D27DT Engine ECU – Ver. 3.1</p>   | <p>ECU version of D27DTP (POWER UP) &amp; D27DT (EU IV) engine: Changed to 3.2 from 3.1.</p> <p>Number of connectors of D27DTP (POWER UP) &amp; D27DT (EU IV) engine: Changed to 2 from 1.</p> <ol style="list-style-type: none"> <li>1.E-EGR valve and related system</li> <li>2.Throttle body and related system</li> <li>3.AQGS and related system</li> </ol>                   |
| <div>Injector</div>                               |                                   | <ul style="list-style-type: none"> <li>* Injection nozzle (holes) <ul style="list-style-type: none"> <li>- D27DT (General) (5)</li> <li>- D27DTP &amp; D27DT (EU IV) (7)</li> </ul> </li> <li>* Injector label <ul style="list-style-type: none"> <li>- D27DT (General) (16 digits: C2I value)</li> <li>- D27DTP &amp; D27DT (EU IV) (20 digits: C3I value)</li> </ul> </li> </ul> |
| <div>Common rail</div>                           |                                  | <ul style="list-style-type: none"> <li>* D27DTP: Added damping orifice. (Orifice is added to fuel inlet/outlet ports in order to dampen the pulsation in fuel flow caused by multi-injections.)</li> </ul>                                                                                                                                                                         |

|                    |  |
|--------------------|--|
| Modification basis |  |
| Application basis  |  |
| Affected VIN       |  |

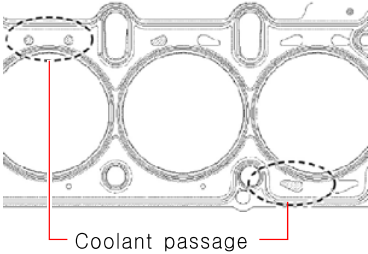
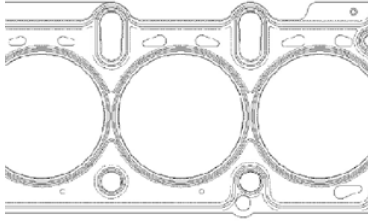
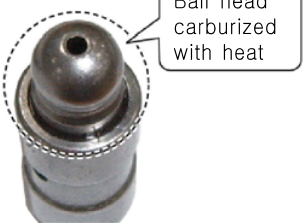
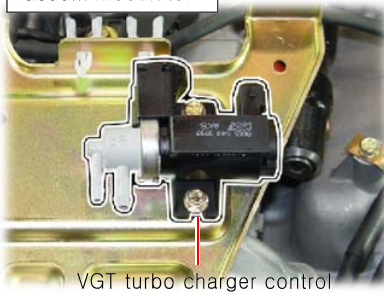
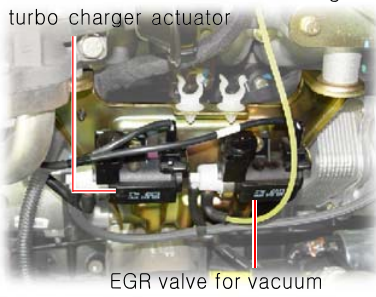
| D27DTP (POWER UP) + CDPF Engine<br>D27DT (EU IV) Engine                                                                                                                | D27DT Engine (General)                                                              | Remarks                                                                                                                                                                                                                                                                                                                                                                                                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <div data-bbox="191 359 310 394" data-label="Caption">Fuel pipe</div>                 |    | <ul style="list-style-type: none"> <li>* Surface coating color <ul style="list-style-type: none"> <li>- D27DT: Yellow</li> <li>- D27DTP &amp; D27DT (EU IV): Chrome</li> </ul> </li> <li>* Diameter increased <ul style="list-style-type: none"> <li>- D27DT: ID (2.4 mm), OD (6.0 mm)</li> <li>- D27DTP &amp; D27DT (EU IV): ID (3 mm), OD (6.35 mm)</li> </ul> </li> </ul>                                 |
| <div data-bbox="191 787 456 823" data-label="Caption">AQGS unit pin function</div>  |                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                              |
| <div data-bbox="191 1339 310 1375" data-label="Caption">Glow plug</div>             |  | <ul style="list-style-type: none"> <li>* Insulator color <ul style="list-style-type: none"> <li>- D27DT: Yellow (NGK) or green (BERU)</li> <li>- D27DTP &amp; D27DT (EU IV): Red</li> </ul> </li> <li>* Tip diameter and shape changed <ul style="list-style-type: none"> <li>- D27DT: <math>\phi</math> 3.5 / 4.0 mm</li> <li>- D27DTP &amp; D27DT (EU IV): <math>\phi</math> 4.4 mm</li> </ul> </li> </ul> |

| D27DTP (POWER UP) + CDPF Engine<br>D27DT (EU IV) Engine                                                                       | D27DT Engine (General)                                                                                                              | Remarks                                                                                                                                                                                                                                                                                                          |
|-------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <div>HFM 6.0</div>                           | <div>HFM 5.0</div>                                | <ul style="list-style-type: none"> <li>* Version up <ul style="list-style-type: none"> <li>- D27DT (General): HFM5-CI (Analog signal)</li> <li>- D27DTP &amp; D27DT (EU IV): HFM6-ID (Digital signal added)</li> </ul> </li> </ul>                                                                               |
| <div>Electric controlled E-EGR valve</div>  | <div>Vacuum modulator controlled EGR valve</div>  | <ul style="list-style-type: none"> <li>* E-EGR valve:<br/>ECU controls the EGR valve directly without any media. It provide more precise EGR control by transmitting the electric signal of EGR valve operating position.</li> </ul>                                                                             |
| <div>Throttle body</div>                   | N/A                                                                                                                                 | <ul style="list-style-type: none"> <li>* Throttle body is for future regulation requiring emission reductions. Currently, it is used to prevent the engine from turning off with fluttering noise at the moment the air to intake manifold is blocked by closed flap when the engine is switched off.</li> </ul> |
| <div>EGR cooler</div>                      | <div>EGR center pipe</div>                      | <ul style="list-style-type: none"> <li>* To enhance EGR function, coolant EGR cooler is adopted to reduce the temperature of exhaust gas into the intake manifold.</li> </ul>                                                                                                                                    |

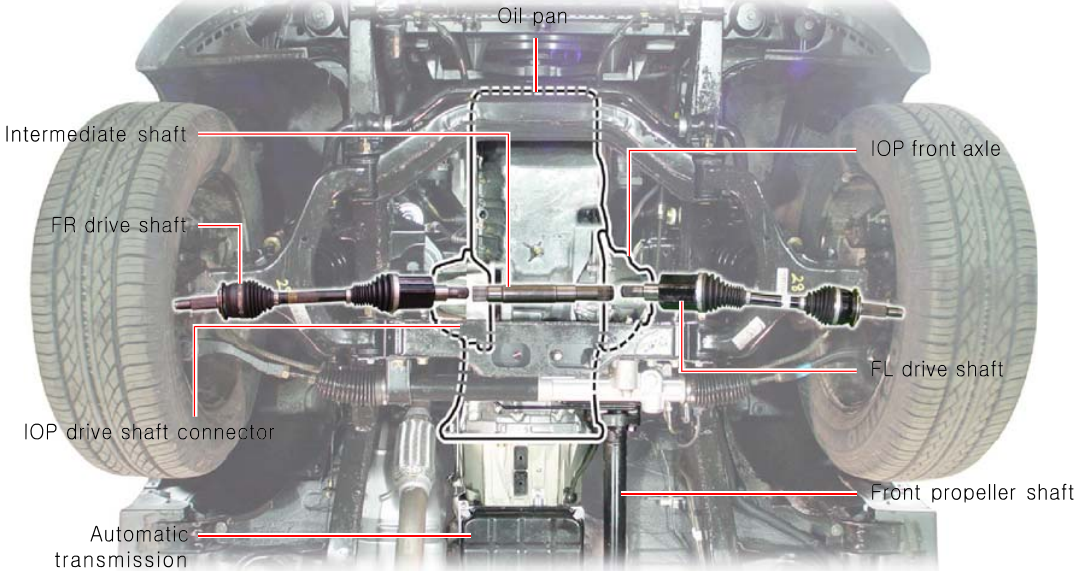
|                    |  |
|--------------------|--|
| Modification basis |  |
| Application basis  |  |
| Affected VIN       |  |

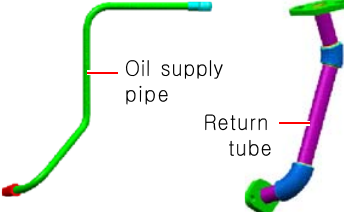
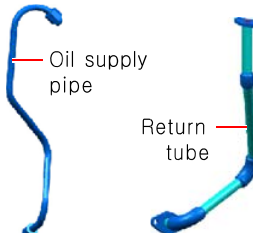
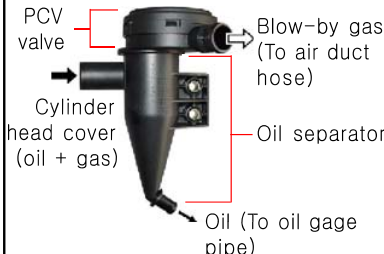
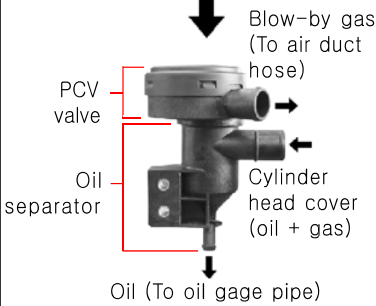
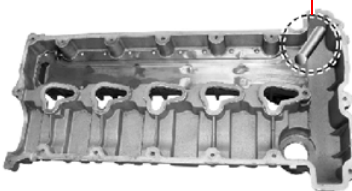
| D27DTP (POWER UP) + CDPF Engine<br>D27DT (EU IV) Engine                                                                                                                                                    | D27DT Engine (General)                                                                                                                             | Remarks                                                                                                                                                                |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>E-EGR system layout</p>  <p>E-EGR valve</p> <p>Throttle body</p> <p>EGR cooler</p>                                     | <p>EGR system layout</p>  <p>EGR center pipe</p> <p>EGR valve</p> | <p>* Reason of changes</p> <p>– To satisfy the emission regulation, E-EGR valve and EGR cooler are adopted. And the layout also has a great difference from D27DT.</p> |
| <p>Water pump</p>  <p>EGR cooler coolant port</p>                                                                         |                                                                   | <p>* For D27DTP engine:<br/>Additional connecting port for EGR cooler hose</p>                                                                                         |
| <p>Coolant outlet port</p>  <p>EGR cooler</p> <p>Cylinder head</p> <p>Radiator upper hose</p> <p>Cylinder head hose</p> |                                                                 | <p>* For D27DTP (POWER UP) engine: Additional port for coolant of EGR cooler</p>                                                                                       |
| <p>Intake manifold</p>  <p>Throttle body</p> <p>Booster pressure sensor</p>                                             | <p>Booster pressure sensor</p>                                  | <p>* The appearance of intake manifold is changed to the round type due to the throttle body. Also, the mounting location of booster pressure sensor is changed.</p>   |
| <p>Cylinder head</p>  <p>Coolant port</p>                                                                               |                                                                 | <p>* The cooling port is added to improve cooling performance for D27DTP (POWER UP) &amp; D27DT (EU IV) engine.</p>                                                    |

|                    |  |
|--------------------|--|
| Modification basis |  |
| Application basis  |  |
| Affected VIN       |  |

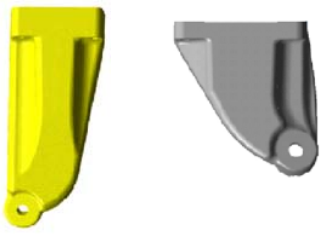
| D27DTP (POWER UP) + CDPF Engine<br>D27DT (EU IV) Engine                                                                                      | D27DT Engine (General)                                                                                                                                                                    | Remarks                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|----------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Cylinder head gasket</p>  <p>Coolant passage</p>         |                                                                                                         | <p>* The appearance of gasket is changed and the coolant passages are added to improve cooling performance for D27DTP (POWER UP) &amp; D27DT (EU IV) engine.</p>                                                                                                                                                                                                                                                                                                                                          |
| <p>Piston</p> <p>X 17</p>                                  | <p>X 21</p>                                                                                            | <p>* Changed compression ratio</p> <ul style="list-style-type: none"> <li>- D27DT (General) (18:1)</li> <li>- D27DTP &amp; D27DT (EU IV) (17.5:1)</li> </ul> <p>(The appearance of bowl is changed and the color mark is added due to the new compression ratio.)</p> <p>* The appearance of bowl is changed and the color mark is added due to the new compression ratio (18 → 17.5).</p> <p>* The piston pin bending side and the appearance of piston pin hole taper is changed for reinforcement.</p> |
| <p>Lash adjuster</p> <p>Ball head coated with plasma</p>  | <p>Ball head carburized with heat</p>                                                                 | <p>* The ball head is coated with plasma to prevent the lash adjuster from wearing.</p>                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <p>Vacuum modulator</p>  <p>VGT turbo charger control</p> | <p>Vacuum modulator for controlling turbo charger actuator</p>  <p>EGR valve for vacuum modulator</p> | <p>* D27DTP (POWER UP) &amp; D27DT (EU IV) engine uses electric ally controlled E-EGR valve. Thus, the vacuum modulator for controlling EGR valve has been deleted.</p>                                                                                                                                                                                                                                                                                                                                   |

|                    |  |
|--------------------|--|
| Modification basis |  |
| Application basis  |  |
| Affected VIN       |  |

| D27DTP (POWER UP)<br>+ CDPF Engine                                                                                  | D27DT Engine (General)<br>D27DT (EU IV) Engine                                                                                | Remarks                                                                                                                                                              |
|---------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <div>IOP oil pan</div>             | <div>Oil pan</div>                           | <p>* The vehicle with D27DTP (POWER UP) engine is equipped with IOP axle. Refer to the figure below.</p>                                                             |
| <div>Glow system- AQGS unit</div>  | <div>Glow system - Glow control relay</div>  | <p>* D27DTP (POWER UP) engine adopts AQGS (Advanced Quick Glow System), which controls the quick preheating of glow plugs and CAN communication with engine ECU.</p> |
|                                  |                                                                                                                               |                                                                                                                                                                      |
| <div>VGT turbocharger</div>      | <div>WGT turbocharger</div>                | <p>* D27DTP (POWER UP) engine is equipped with the enhanced VGT turbocharger.</p>                                                                                    |

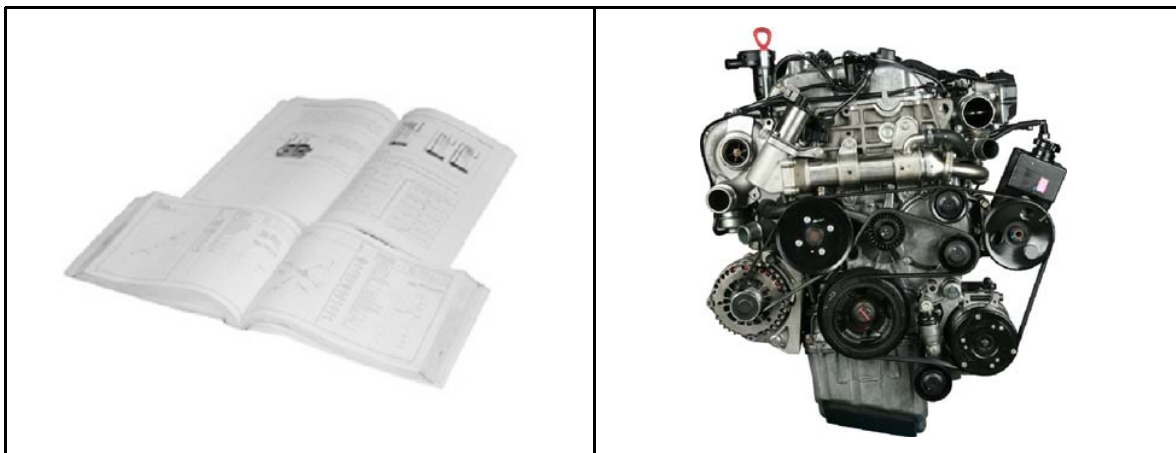
| D27DTP (POWER UP)<br>+ CDPF Engine                                                                                                                                                                                                                                                                                                                | D27DT Engine (General)<br>D27DT (EU IV) Engine                                                                                                                                                                                                                                                                            | Remarks                                                                                                                                                                       |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>1.Support bar of Turbocharger</p>                                                                                                                                                                                                                             |                                                                                                                                                                                                                                          | <p>* Support bar is changed due to VGT turbocharger mounting.</p>                                                                                                             |
| <p>2.Oil supply pipe and return tube of Turbocharger</p>  <p>Oil supply pipe</p> <p>Return tube</p>                                                                                                                                                              |  <p>Oil supply pipe</p> <p>Return tube</p>                                                                                                                                                                                               | <p>* The shape of oil supply pipe and return tube is changed due to VGT turbocharger mounting.</p>                                                                            |
| <p>PCV oil separator</p>   <p>PCV valve</p> <p>Blow-by gas (To air duct hose)</p> <p>Cylinder head cover (oil + gas)</p> <p>Oil separator</p> <p>Oil (To oil gage pipe)</p> |   <p>Blow-by gas (To air duct hose)</p> <p>PCV valve</p> <p>Oil separator</p> <p>Cylinder head cover (oil + gas)</p> <p>Oil (To oil gage pipe)</p> | <p>* Increase of Oil separator capacity (approx. 10%)</p> <ul style="list-style-type: none"> <li>- D27DT &amp; D27DT (EU IV): 120ℓ/min</li> <li>- D27DTP: 160ℓ/min</li> </ul> |
| <p>Cylinder head cover</p>  <p>Port</p>                                                                                                                                                                                                                        |  <p>Port</p>                                                                                                                                                                                                                          | <p>* The direction of blow-by outlet port is changed due to the introduction of larger oil separator.</p>                                                                     |

|                    |  |
|--------------------|--|
| Modification basis |  |
| Application basis  |  |
| Affected VIN       |  |

| D27DTP (POWER UP)<br>+ CDPF Engine                                                                                            | D27DT Engine (General)<br>D27DT (EU IV) Engine                                                               | Remarks                                                                                                                                                                                                                                                                         |
|-------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <div>Switchable engine mounting</div>        | <div>Engine mounting</div>  | <p>* The switchable engine mounting system (SEM) controls the engine in soft mode or hard mode by dividing the speed to the low speed range and mid-high speed range according to the vehicle speed and the engine rpm. This is only available in D27DTP (POWER UP) engine.</p> |
| <div>Engine bracket</div> <div>LH RH</div>  | <div>LH RH</div>           | <p>* The bracket is changed due to the mounting location of D27DTP (POWER UP) engine and the switchable engine mounting.</p>                                                                                                                                                    |

## 5. GUIDELINES FOR SERVICE WORKS

### 1) For Safety



To perform the service works easily and safely, the service technicians must keep the proper working procedures and rules.

This manual provides the useful instructions to the service technicians so that they can perform the service works with standard working process, skills, tips in time.

Please read this manual and follow the instructions carefully.

Signal words such as “CAUTION” and “NOTE” have special meanings.



#### NOTE

indicates information to assist maintenance and instructions.



#### WARNING

indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



#### CAUTION

indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or property damage.

However, above references and cautions cannot be inclusive measures, so should have habits of paying attentions and cautions based on common senses.

|                    |  |
|--------------------|--|
| Modification basis |  |
| Application basis  |  |
| Affected VIN       |  |

## 2) Cautions on Service Procedures

1. Before lifting up the vehicle with a lift, correctly support the lifting points.
2. When using a jack, park the vehicle on a level ground and place the wheel chocks under the tires. Position the jack under the frame and lift up the vehicle and then support with chassis stand before service work.
3. Make sure to disconnect the negative (-) cable from the battery to prevent any damage to electric systems.
4. If you have to work on vehicle, cover the seats and floor with protection covers to avoid any damage and contamination.
5. Brake fluid and anti-freeze can damage the painted surface of body. So carefully handle them during service work.
6. To improve the efficiency of service work, use only recommended and specified tools.
7. Use only Ssangyong genuine spare parts.
8. Never reuse the cotter pin, gasket, O-ring, oil seal, lock washer and self-locking nut. Replace them with new ones. If reused, normal functions cannot be maintained.
9. Store the disassembled parts as a set based on disassembly order and unit.
10. Pay particular attention not to miss or mix the fasteners.
11. If necessary, especially for inspection, clean the removed parts completely.
12. Apply the oil or grease on the running and sliding surfaces before installation. Use the specified sealant and gasket to prevent leakage if necessary.
13. Tighten the fasteners with the specified tightening torque.
14. As a final stage of service work, check if the serviced system is working properly and the problem has been eliminated clearly.

|                    |  |
|--------------------|--|
| Modification basis |  |
| Application basis  |  |
| Affected VIN       |  |

### 3) Guidelines on Engine Service

To prevent personal injuries and vehicle damages that can be caused by mistakes during engine and unit inspection/repair and to secure optimum engine performance and safety after service works, basic cautions and service work guidelines that can be easily forgotten during engine service works are described in.

#### ► Cautions before service works

- For safe and correct works, you must observe the working procedures and instructions in this manual. And, use the designated tools as follow:  
Engine stand / Heavy duty engine jack
- To prevent the engine from starting abruptly, do not allow anybody to get in the vehicle while servicing in engine compartment.
- Before work on engine and electrical equipment, be sure to disconnect battery negative (-) terminal.
- Before service works, be sure to prepare the works by cleaning and aligning work areas.  
Do not allow the foreign material get into the fuel injection system.
- When removing the engine, use only the safety hook on engine and engine hanger. Do not support the bottom of oil pan with a jack.

#### ► Engine and accessories

- Completely drain the engine oil, coolant and fuel from engine before removal.
- Before disassembling/assembling the engine components, carefully read the working procedures in this manual.
- Make sure to keep the specified tightening torques during installation.
- Clean and properly lubricate the parts before reassembly.
- Carefully check that there is not any interference while servicing.

|                    |  |
|--------------------|--|
| Modification basis |  |
| Application basis  |  |
| Affected VIN       |  |

### ► Fuel and lubrication system

- Do not allow the fluid and engine oil to make contact with the body paintwork and hoses.
- If work on the fluid system such as fuel and oil, working area should be well ventilated and smoking should be prohibited.
- Gasket or seal on the fuel/lubrication system should be replaced with new ones and bolts and nuts should be tightened as specified.
- After removal/installation works, be sure to check whether there is leak on the connecting section.



#### NOTE

1. If fine dust or foreign material enters into DI engine's fuel system, there can be serious damages between HP pump and injectors. So, be sure to cover removed fuel system components with cap and protect removed parts not to be contaminated with dirt. (Refer to cleanness in this manual while working on DI engine fuel system)
2. When working on the fuel line between priming pump and injector (including return line), always plug the openings with caps to prevent foreign materials or dust from entering to the openings and connections.
3. The HP fuel supply pipe (HP pump to fuel rail) and HP fuel pipe (Fuel rail to injector) should be replaced with new ones when removed.

### ► Electrical equipment

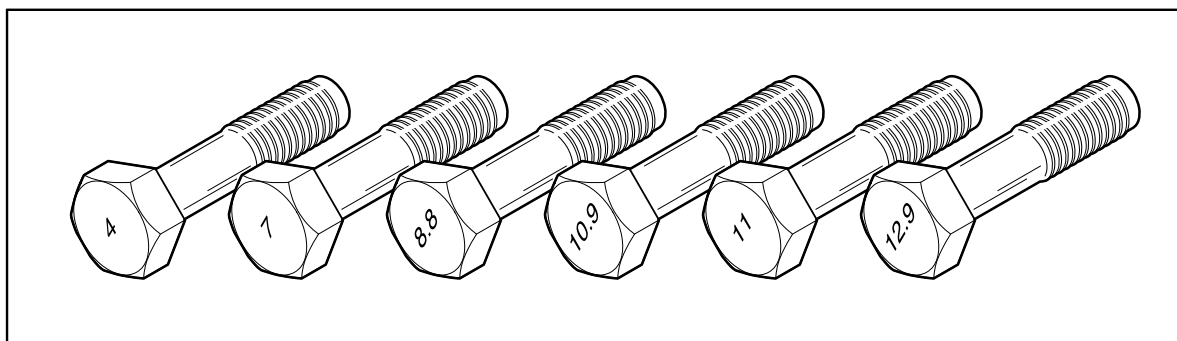
Electric devices should be handled more carefully.

Currently, the engine has a lot of electric devices. There could be poor engine performance, incomplete combustion and other abnormal symptoms due to short circuit or poor contact.

- Before work on engine and electrical equipment, be sure to disconnect battery negative (-) terminal.
- When replacing the electric device, use only genuine part and check the conditions of connections and grounds. Loosened connection or ground makes cause a fire and personal injury.

## 6. STANDARD BOLTS SPECIFICATIONS

| Bolt | Pitch | Tightening torque(kgf.cm) |       |       |       |       |       |
|------|-------|---------------------------|-------|-------|-------|-------|-------|
|      |       | Standard                  |       |       | Limit |       |       |
|      |       | 4T                        | 7T    | 9T    | 4T    | 7T    | 9T    |
| M3   | 0.5   | 5                         | 9     | 13    | 7     | 12    | 17    |
| M4   | 0.7   | 12                        | 20    | 30    | 16    | 27    | 40    |
| M5   | 0.8   | 24                        | 40    | 57    | 32    | 53    | 77    |
| M6   | 1.0   | 41                        | 68    | 99    | 55    | 91    | 130   |
| M8   | 1.25  | 88                        | 160   | 230   | 130   | 210   | 310   |
| M10  | 1.25  | 190                       | 330   | 470   | 260   | 430   | 620   |
|      | 1.5   | 190                       | 310   | 450   | 250   | 420   | 600   |
| M12  | 1.25  | 350                       | 580   | 840   | 460   | 770   | 1,100 |
|      | 1.75  | 330                       | 550   | 790   | 440   | 730   | 1,000 |
| M14  | 1.5   | 550                       | 910   | 1,300 | 730   | 1,200 | 1,900 |
| M16  | 1.5   | 830                       | 1,100 | 2,000 | 1,100 | 1,900 | 2,700 |
| M18  | 1.5   | 1,200                     | 2,000 | 2,900 | 1,600 | 2,700 | 3,800 |
| M20  | 1.5   | 1,700                     | 2,800 | 4,000 | 2,200 | 3,700 | 5,300 |
| M22  | 1.5   | 2,300                     | 3,800 | 5,400 | 3,000 | 5,000 | 7,200 |
| M24  | 1.5   | 2,900                     | 4,900 | 7,000 | 3,900 | 6,500 | 9,400 |
|      | 2.0   | 2,800                     | 4,700 | 6,800 | 3,800 | 6,300 | 9,100 |



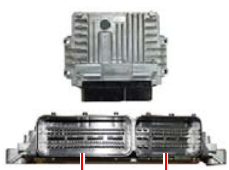
1. Metric bolt strength is embossed on the head of each bolt. The strength of bolt can be classified as 4T, 7T, 8.8T, 10.9T, 11T and 12.9T in general.
2. Observe standard tightening torque during bolt tightening works and can adjust torque to be proper within 15 % if necessary. Try not to over max. allowable tightening torque if not required to do so.
3. Determine extra proper tightening torque if tightens with washer or packing.
4. If tightens bolts on the below materials, be sure to determine the proper torque.
  - Aluminum alloy: Tighten to 80 % of above torque table.
  - Plastics: Tighten to 20 % of above torque table.

|                    |  |
|--------------------|--|
| Modification basis |  |
| Application basis  |  |
| Affected VIN       |  |

# OVERVIEW AND OPERATION PROCESS

## 1. ENGINE COMPARTMENT

The major changes due to the newly adopted engine compared to D27DT engine are as follows:

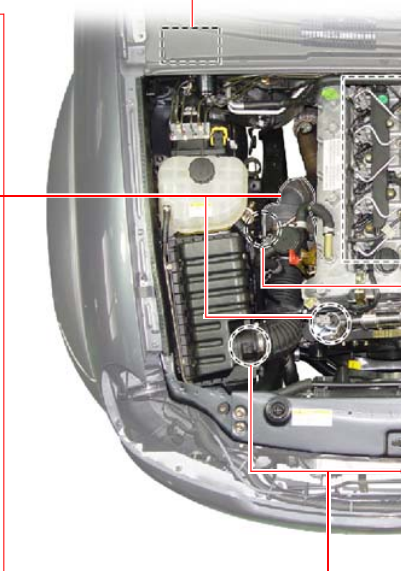
| Intake System                                                                                                                                   |                                                                                                                    | Engine Control (Engine ECU-3.2)                                                                                                                      |                                                                                                                                   |
|-------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| <b>D27DTP &amp; D27DT (EU IV)</b><br>HFM sensor (Ver. 6.0)<br> | <b>D27DT</b><br>Throttle body<br> | <b>D27DTP &amp; D27DT (EU IV)</b><br><br>Connector A    Connector B | <b>D27DT</b><br><br>Connector A    Connector B |

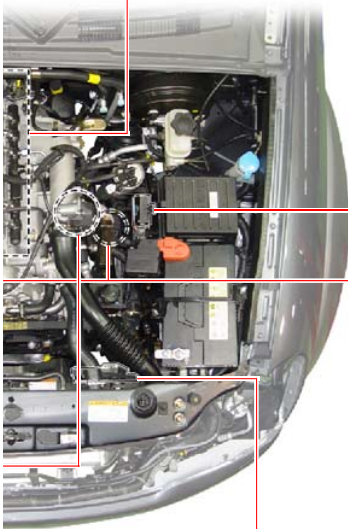
  

| Exhaust System                                                                                          |                                                                                                   |                                                                                                  |
|---------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| VGT turbo charger<br> | E-EGR valve<br> | EGR cooler<br> |

| Lubrication System                                                                                                                                                     |                                                                                                                 |                                                                                                                           |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| <b>D27DTP</b><br>Cylinder head cover<br><br>Modification in blow-by gas outlet port | Larger PCV oil separator<br> | OP oil pan<br><br>* Axle integral type |
| <b>D27DT (EU IV) &amp; D27DT</b><br>                                                |                              |                                        |



| Fuel System                                                                                                              |                                                                                                 |                                                                                                                         |
|--------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| D27DTP & D27DT (EU IV)                                                                                                   | D27DTP & D27DT (EU IV)                                                                          | D27DTP & D27DT (EU IV)                                                                                                  |
| Injector<br><br>C3I<br>Nozzle holes (7) | Fuel pipe<br> | Common rail<br><br>Pulsation orifice |
| D27DT                                                                                                                    | D27DT                                                                                           | D27DT                                                                                                                   |
| <br>C2I                                 |               | <br>Pulsation orifice                |

| Preheat System                                                                     |                                                                                                          |                                                                                                |
|------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
| AQGS unit                                                                          | D27DTP & D27DT (EU IV)                                                                                   | D27DT                                                                                          |
|  | Glow plug<br><br>Red | <br>Yellow |

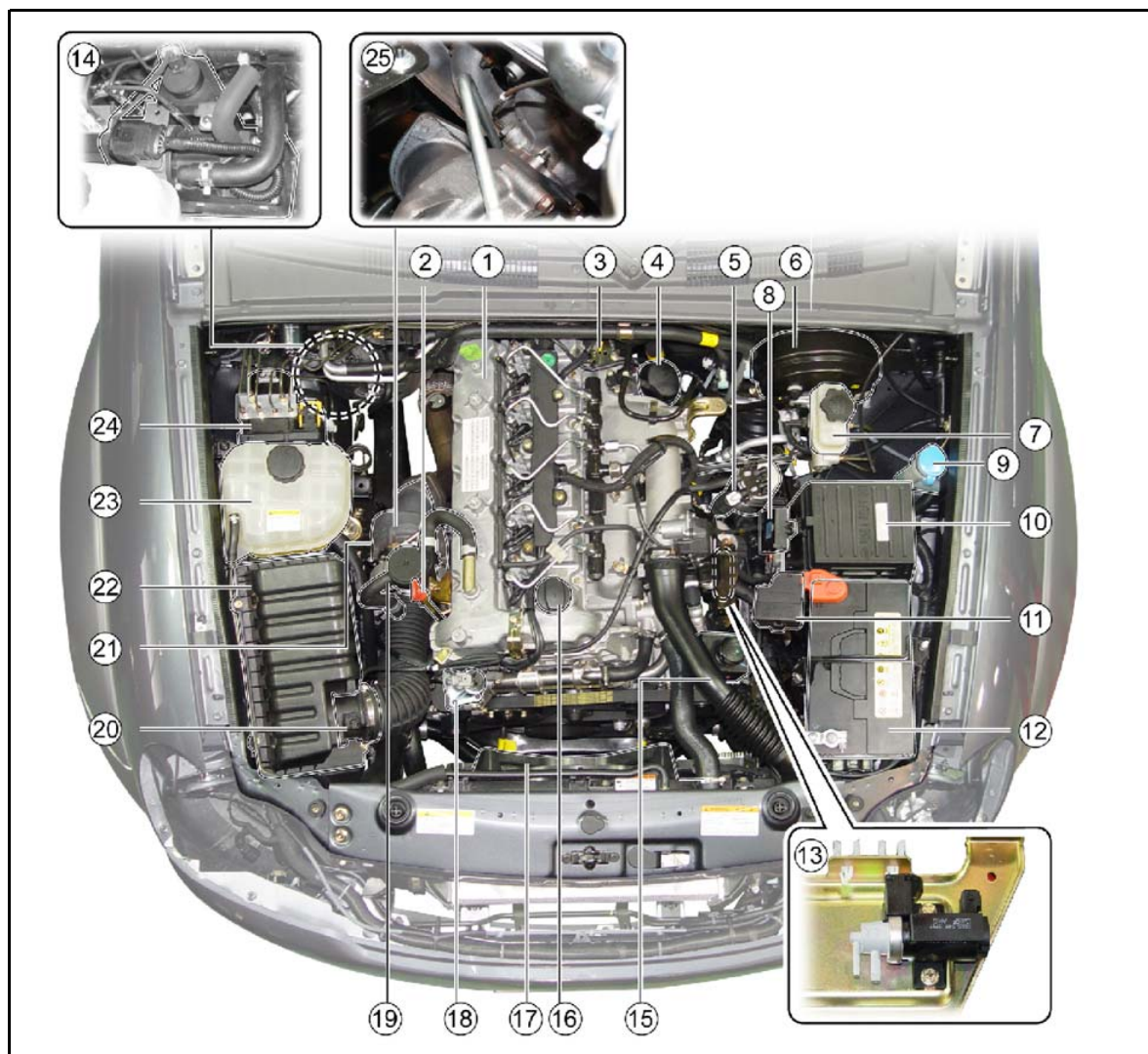
| Switchable Engine Mounting (SEM)                                                           |                                                                                       |
|--------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| D27DTP                                                                                     | RH                                                                                    |
| LH<br> |  |
| D27DT (EU IV) & D27DT                                                                      |                                                                                       |
|       |                                                                                       |

| Cooling System                                                                                                                        |                                                                                     |
|---------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| D27DTP & D27DT (EU IV)                                                                                                                | D27DT                                                                               |
| Large water pump<br><br>* EGR cooler port included |  |

|                   |
|-------------------|
| ENGINE GENERAL    |
| ENGINE ASSEMBLY   |
| ENGINE FUEL       |
| ENGINE INTAKE     |
| ENGINE EXHAUST    |
| CDPF (EURO IV)    |
| ENGINE LUBRICAT   |
| ENGINE COOLING    |
| ENGINE ELECTRICAL |
| ENGINE CONTROL    |
| CRUISE CONTROL    |

|                    |  |
|--------------------|--|
| Modification basis |  |
| Application basis  |  |
| Affected VIN       |  |

## ► Engine Compartment Layout



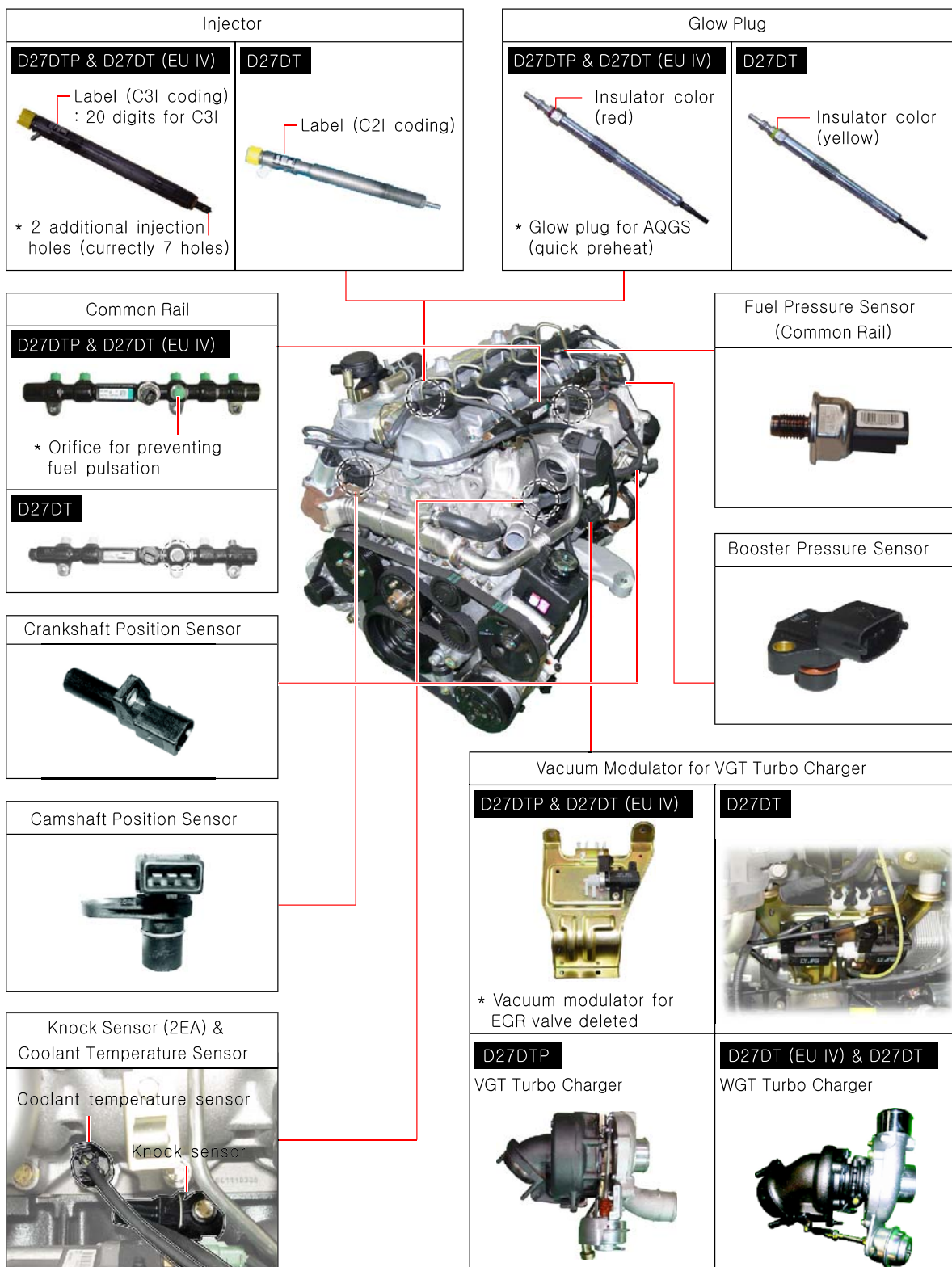
- |                                              |                                                      |
|----------------------------------------------|------------------------------------------------------|
| 1. Engine assembly                           | 14. FFH Assembly (Only for vehicle with FFH)         |
| 2. Engine oil dipstick                       | 15. Power steering oil tank                          |
| 3. Vacuum pump                               | 16. Engine oil filler cap                            |
| 4. Oil filter and cooler                     | 17. Fan shroud                                       |
| 5. Fuel filter and priming pump              | 18. E-EGR Valve                                      |
| 6. Brake booster                             | 19. High-capacity PCV oil separator                  |
| 7. Brake oil tank                            | 20. HFM sensor (6.0)                                 |
| 8. AQGS unit                                 | 21. VGT turbo charger                                |
| 9. Washer fluid filler cap                   | 22. Air cleaner housing                              |
| 10. Engine compartment fuse box              | 23. Coolant surge tank                               |
| 11. PTC relay box                            | 24. ABS/ESP HECU (Including TPMS function: optional) |
| 12. Battery                                  | 25. Exhaust gas FRT Temp. sensor (T3)                |
| 13. Vacuum modulator (for VGT turbo charger) |                                                      |

### ENGINE GENERAL

REXTON W 2012.06

|                    |  |
|--------------------|--|
| Modification basis |  |
| Application basis  |  |
| Affected VIN       |  |

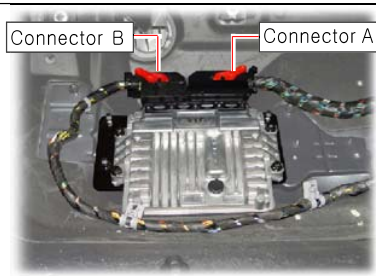
## ► Major Sensors and Components

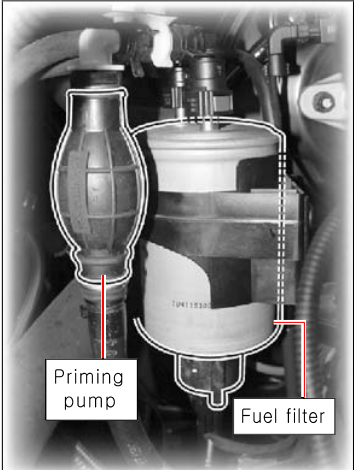


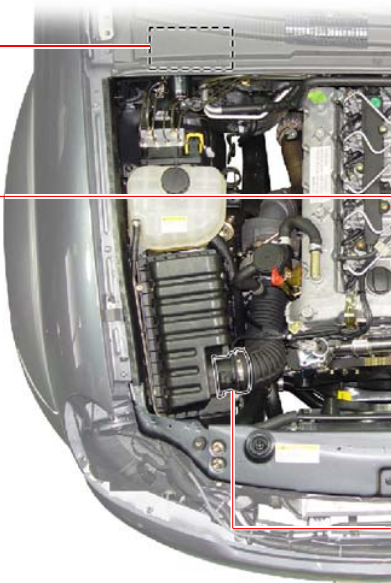
|                    |  |
|--------------------|--|
| Modification basis |  |
| Application basis  |  |
| Affected VIN       |  |

## 2. SYSTEMS IN ENGINE COMPARTMENT

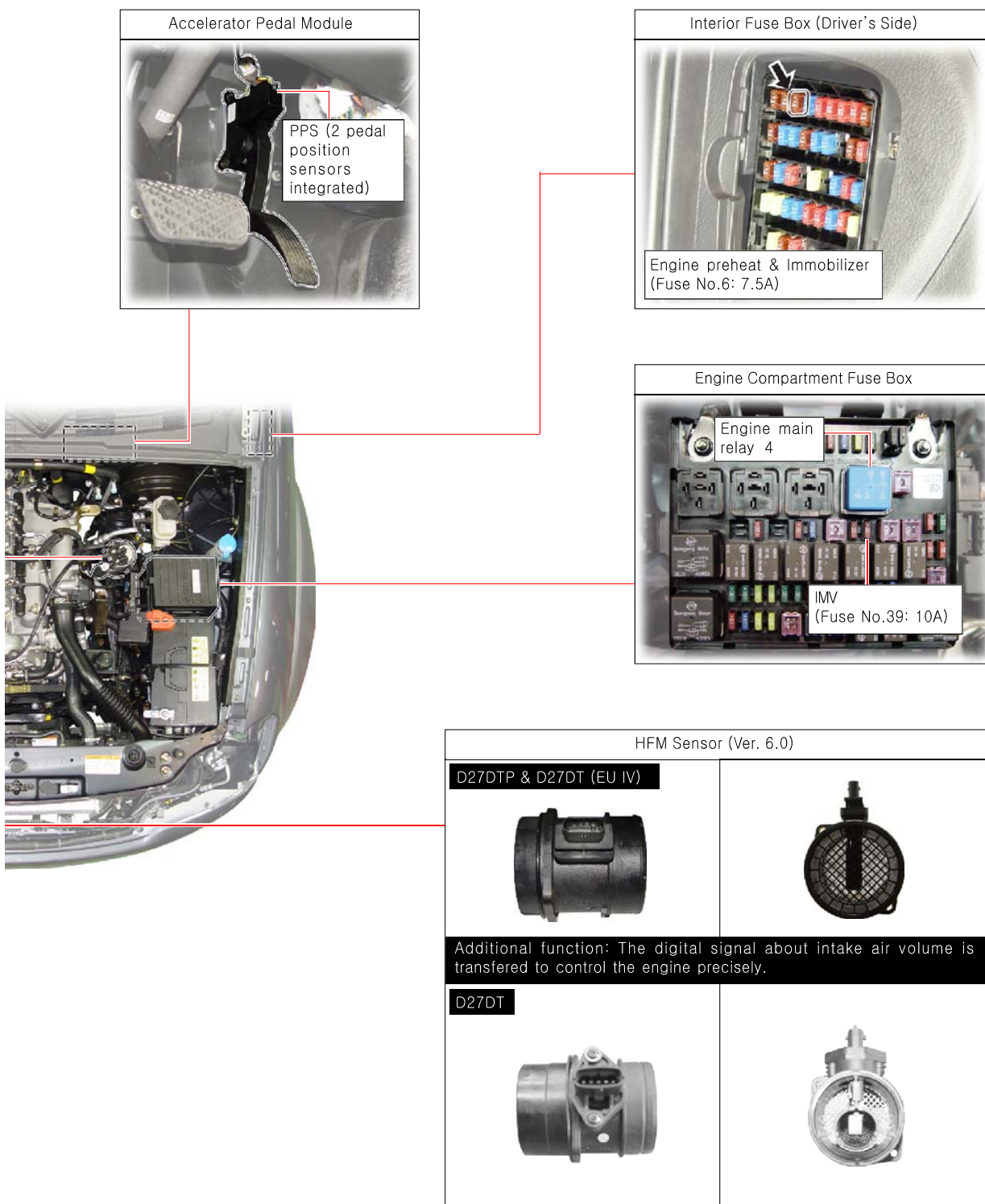
### 1) Engine Accessories Related to ECU

| Engine ECU – Ver. 3.2  | Engine ECU Mounting Location                                                                                                    |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| D27DTP & D27DT (EU IV) | <div>Connector B</div> <div>Connector A</div>  |
| D27DT                  |                                                |

| Fuel Filter (Water Detecting) Senear                                                                                                                                                                        |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <div><div>Priming pump</div><div>Fuel filter</div></div> <div>Draining water from fuel filter:<br/>every 10,000 km</div> |



|                    |  |
|--------------------|--|
| Modification basis |  |
| Application basis  |  |
| Affected VIN       |  |



ENGINE  
GENERAL

ENGINE  
ASSEMBLY

ENGINE  
FUEL

ENGINE  
INTAKE

ENGINE  
EXHAUST

CDPF  
(EURO IV)

ENGINE  
LUBRICAT

ENGINE  
COOLING

ENGINE  
ELECTRI

ENGINE  
CONTROL

CRUISE  
CONTROL

|                    |  |
|--------------------|--|
| Modification basis |  |
| Application basis  |  |
| Affected VIN       |  |

2) Preheat System

Preheat Warning Lamp (Cluster)

Interior Fuse Box

AQGS Unit for D27DTP (Power Up) Engine

Status

G1. Glow plug No.1

G2. Glow plug No.2

G3. Glow plug No.3

G4. Glow plug No.4

G5. Glow plug No.5

Connector for power supply

Power

Connector for control

A. IGN.1

C. CAN L (No.B47)

D. Ground

B. CAN H (No.B48)

Preheat Control Unit for D27DT

Glow Plug

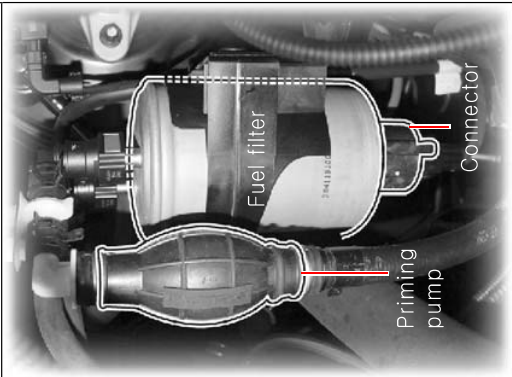
D27DTP & D27DT (EU IV)

D27DT

|                    |  |
|--------------------|--|
| Modification basis |  |
| Application basis  |  |
| Affected VIN       |  |

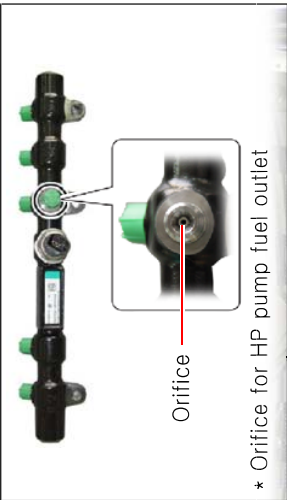
3) Fuel System

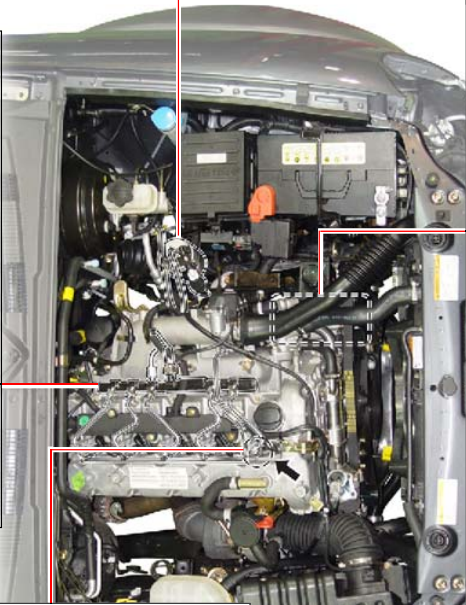
Fuel filter Priming Pump



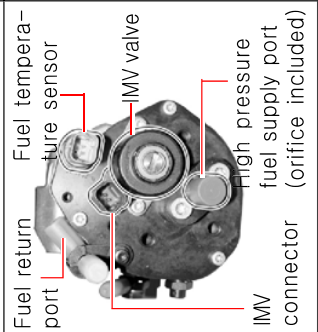


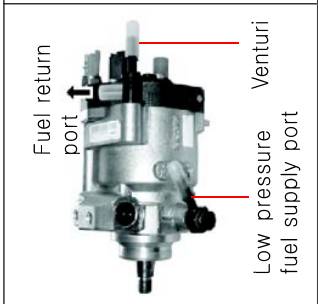
Common Rail (Orifice for Preventing Fuel Pulsation Added)





HP Pump



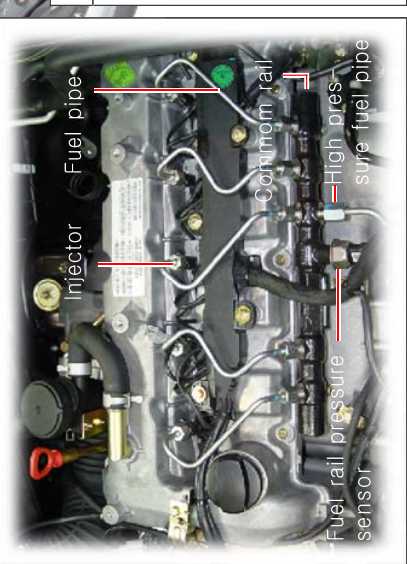


Injector (7-way Injection and C3I Coding)





Fuel Line (Increase in I.D and O.D)



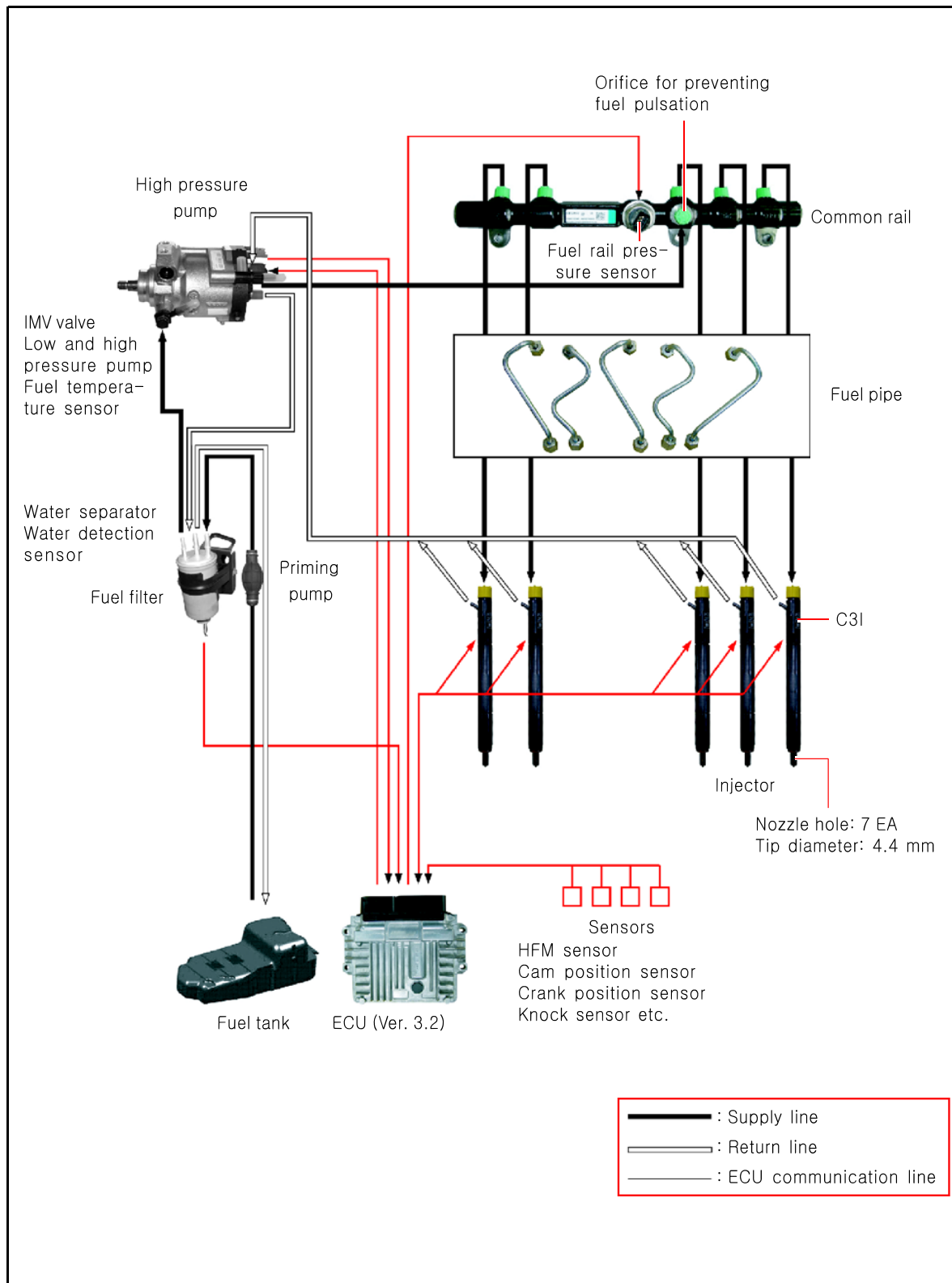
|                   |
|-------------------|
| ENGINE GENERAL    |
| ENGINE ASSEMBLY   |
| ENGINE FUEL       |
| ENGINE INTAKE     |
| ENGINE EXHAUST    |
| CDPF (EURO IV)    |
| ENGINE LUBRICANT  |
| ENGINE COOLING    |
| ENGINE ELECTRICAL |
| ENGINE CONTROL    |
| CRUISE CONTROL    |

|                    |  |
|--------------------|--|
| Modification basis |  |
| Application basis  |  |
| Affected VIN       |  |

ENGINE GENERAL  
REXTON W 2012.06

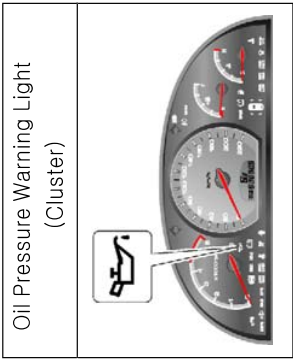
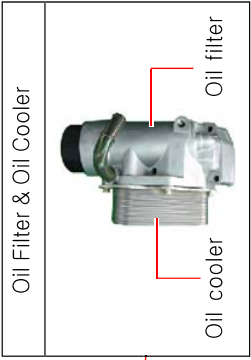
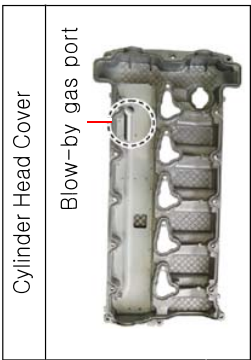
Downloaded from [www.Manualslib.com](http://www.Manualslib.com) manuals search engine

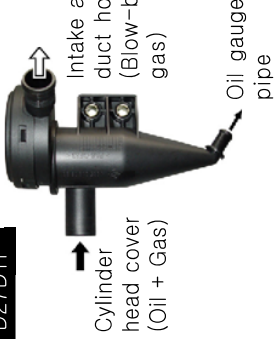
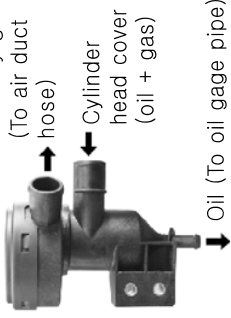
## ► Fuel Supply System



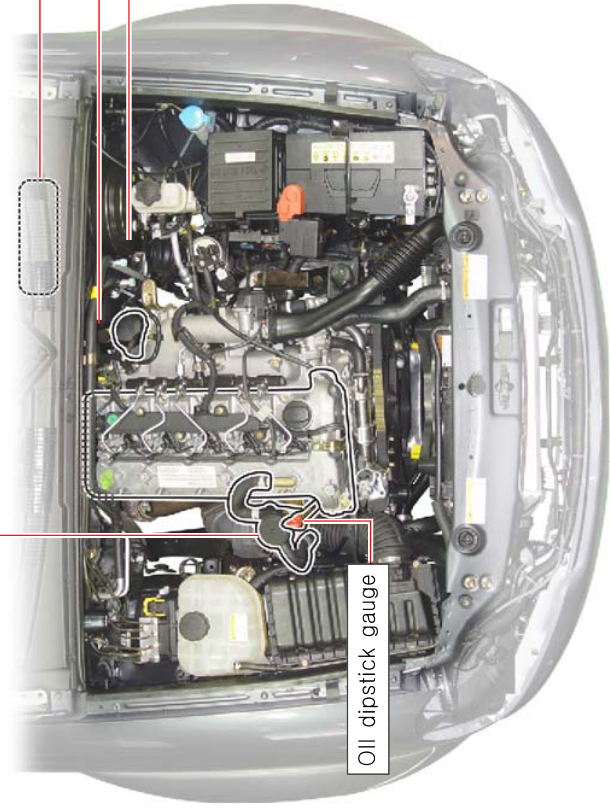
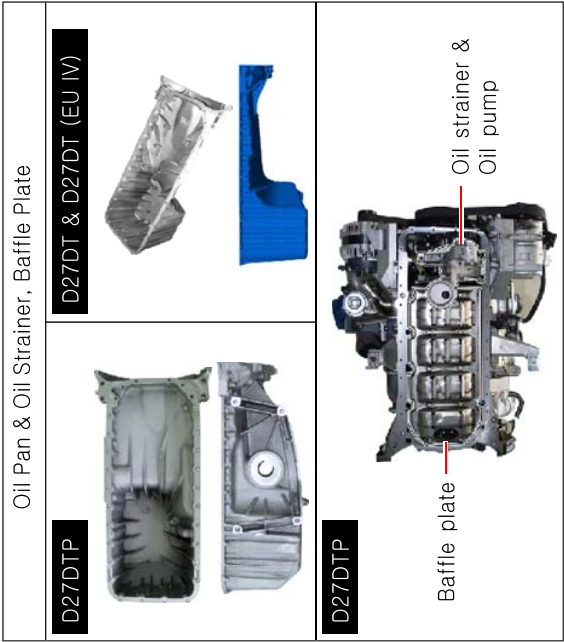
|                    |  |
|--------------------|--|
| Modification basis |  |
| Application basis  |  |
| Affected VIN       |  |

4) Lubrication System



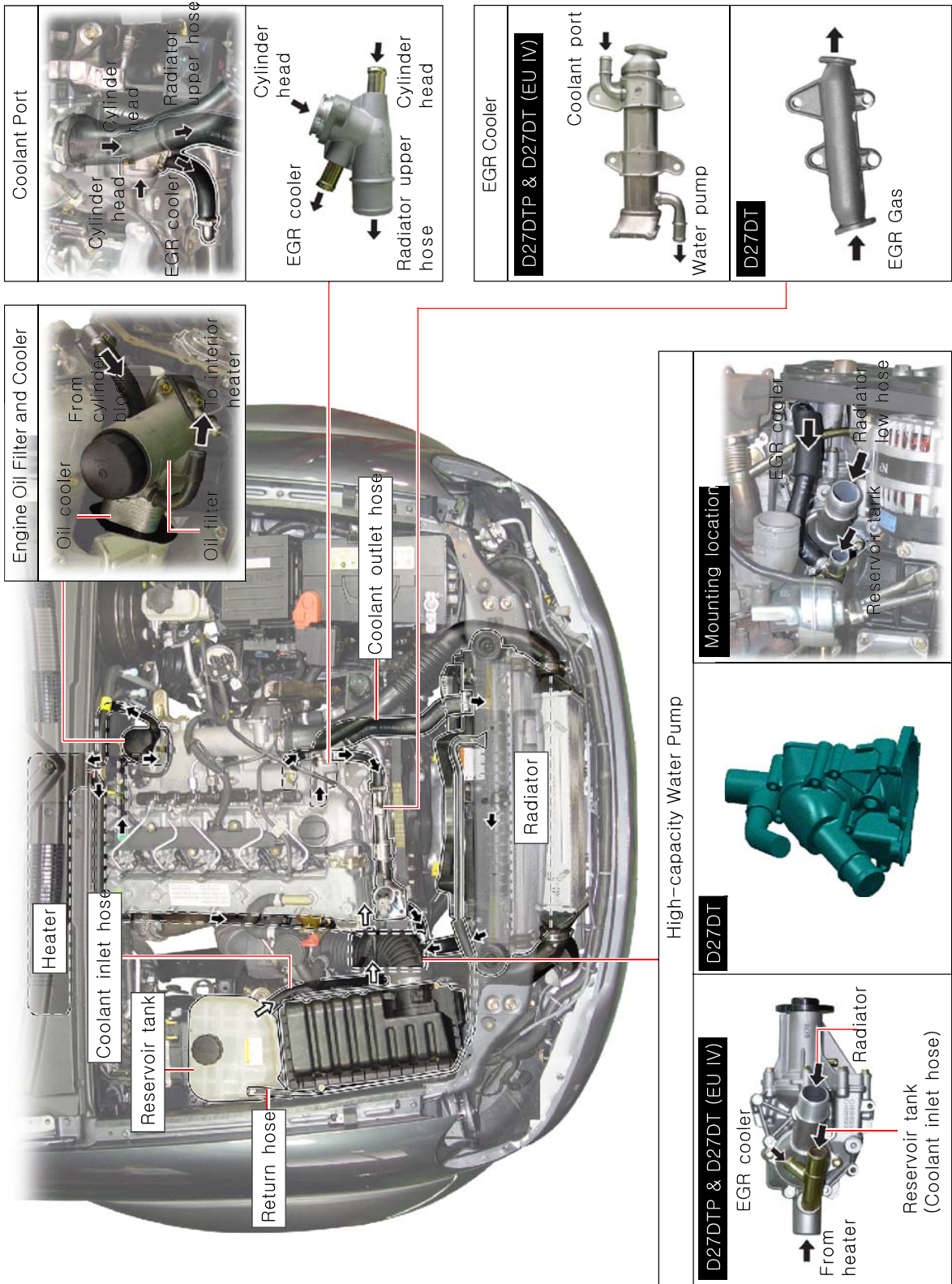
|                                                                                     |                                                                                     |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Large PCV Oil Separator                                                             |                                                                                     |
|  |  |

The first separation will happen when blow-by gas passes through baffle plates in cylinder head cover. Then oil and gas will be separated due to cyclone effect after entering the oil separator inlet port. Separated oil returns to oil pan via oil drain port and the gas will be burnt again after entering the combustion chamber through air duct hose via PCV valve that opens/closes due to pressure differences between the intake side and crankcase.



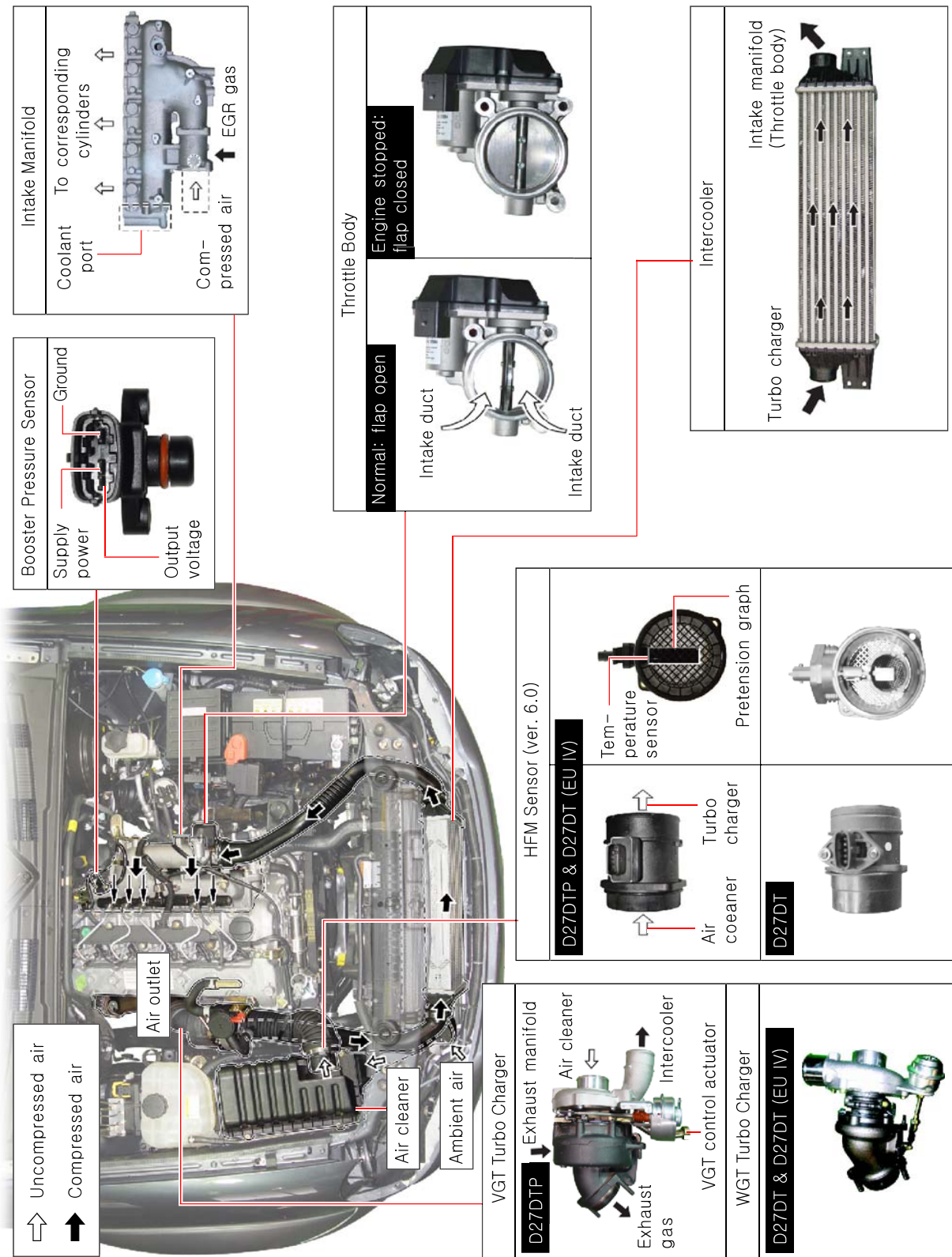
|                    |  |
|--------------------|--|
| Modification basis |  |
| Application basis  |  |
| Affected VIN       |  |

5) Cooling System



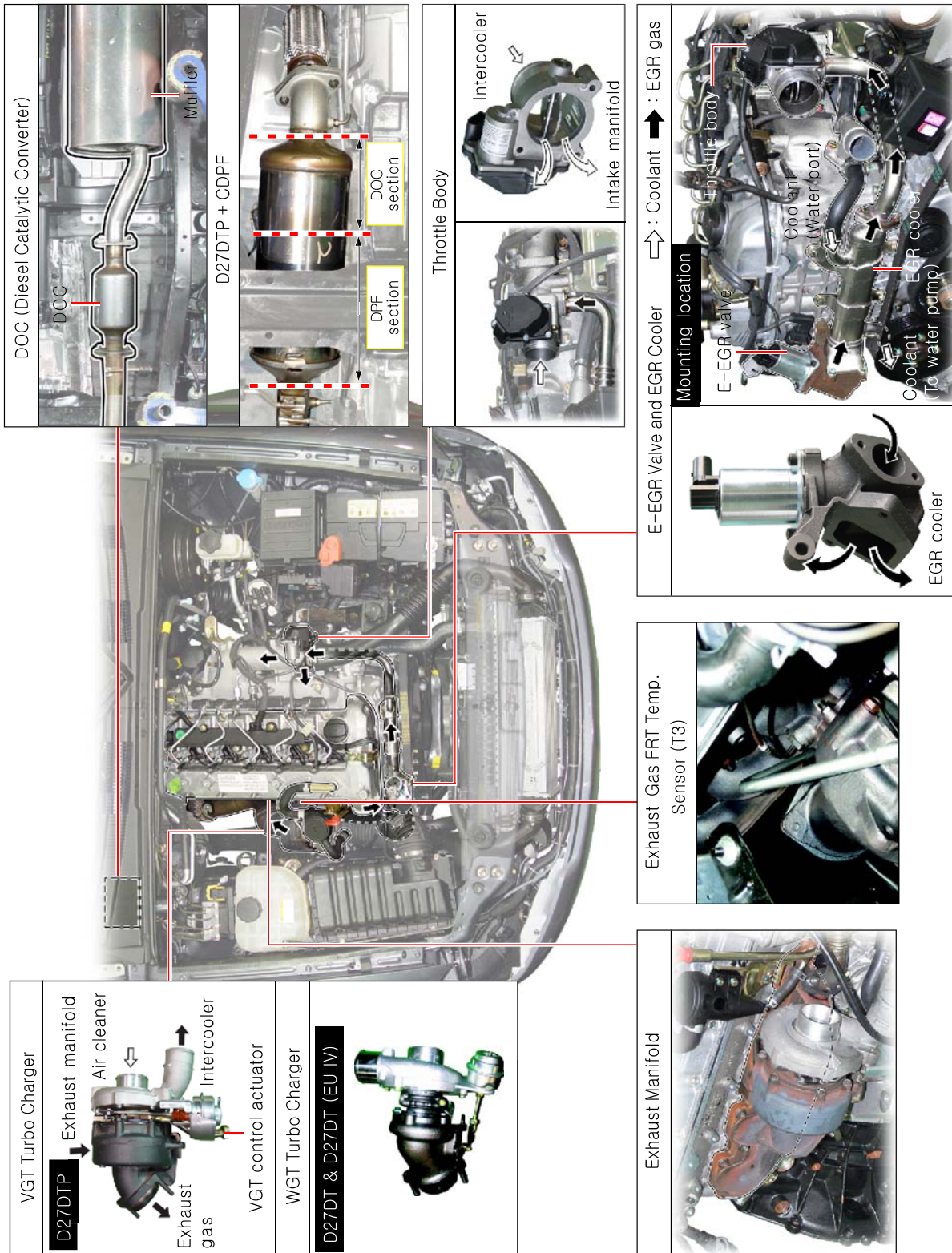
|                    |  |
|--------------------|--|
| Modification basis |  |
| Application basis  |  |
| Affected VIN       |  |

6) Intake System



|                    |  |
|--------------------|--|
| Modification basis |  |
| Application basis  |  |
| Affected VIN       |  |

## 7) Exhaust System



|                    |  |
|--------------------|--|
| Modification basis |  |
| Application basis  |  |
| Affected VIN       |  |