

# SHOP MANUAL

## **KOMATSU**

# **108 SERIES**

## **DIESEL ENGINE**

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Category	Komatsu code	Part No.	Q'ty	Container	Main applications, features
Gasket sealant	LG-4	790-129-9020	200 g	Tube	<ul style="list-style-type: none"> <li>• Features: Resistance to water, oil</li> <li>• Used as sealant for flange surface, thread.</li> <li>• Also possible to use as sealant for flanges with large clearance.</li> <li>• Used as sealant for mating surfaces of final drive case, transmission case.</li> </ul>
	LG-5	790-129-9080	1 kg	Polyethylene container	<ul style="list-style-type: none"> <li>• Used as sealant for various threads, pipe joints, flanges.</li> <li>• Used as sealant for tapered plugs, elbows, nipples of hydraulic piping.</li> </ul>
	LG-6	09940-00011	250 g	Tube	<ul style="list-style-type: none"> <li>• Features: Silicon based, resistance to heat, cold</li> <li>• Used as sealant for flange surface, tread.</li> <li>• Used as sealant for oil pan, final drive case, etc.</li> </ul>
	LG-7	09920-00150	150 g	Tube	<ul style="list-style-type: none"> <li>• Features: Silicon based, quick hardening type</li> <li>• Used as sealant for flywheel housing, intake manifold, oil an, thermostat housing, etc.</li> </ul>
	Three bond 1211	790-129-9090	100 g	Tube	<ul style="list-style-type: none"> <li>• Used as heat-resisting sealant for repairing engine.</li> </ul>
Molybdenum disulphide lubricant	LM-G	09940-00051	60 g	Can	<ul style="list-style-type: none"> <li>• Used as lubricant for sliding portion (to prevent from squeaking).</li> </ul>
	LM-P	09940-00040	200 g	Tube	<ul style="list-style-type: none"> <li>• Used to prevent seizure or scuffing of the thread when press fitting or shrink fitting.</li> <li>• Used as lubricant for linkage, bearings, etc.</li> </ul>
Grease	G2-LI	SYG2-400LI SYG2-350LI SYG2-400LI-A SYG2-160LI SYGA-160CNLI	Various	Various	<ul style="list-style-type: none"> <li>• General purpose type</li> </ul>
	G2-CA	SYG2-400CA SYG2-350CA SYG2-400CA-A SYG2-160CA SYGA-160CNCA	Various	Various	<ul style="list-style-type: none"> <li>• Used for normal temperature, light load bearing at places in contact with water or steam.</li> </ul>
	Molybdenum disulphide lubricant	SYG2-400M	400 g (10 per case)	Belows type	<ul style="list-style-type: none"> <li>• Used for places with heavy load</li> </ul>

**Temperature**

Fahrenheit-Centigrade Conversion ; a simple way to convert a Fahrenheit temperature reading into a Centigrade temperature reading or vice versa is to enter the accompanying table in the center or boldface column of figures.

These figures refer to the temperature in either Fahrenheit or Centigrade degrees.

If it is desired to convert from Fahrenheit to Centigrade degrees, consider the center column as a table of Fahrenheit temperatures and read the corresponding Centigrade temperature in the column at the left.

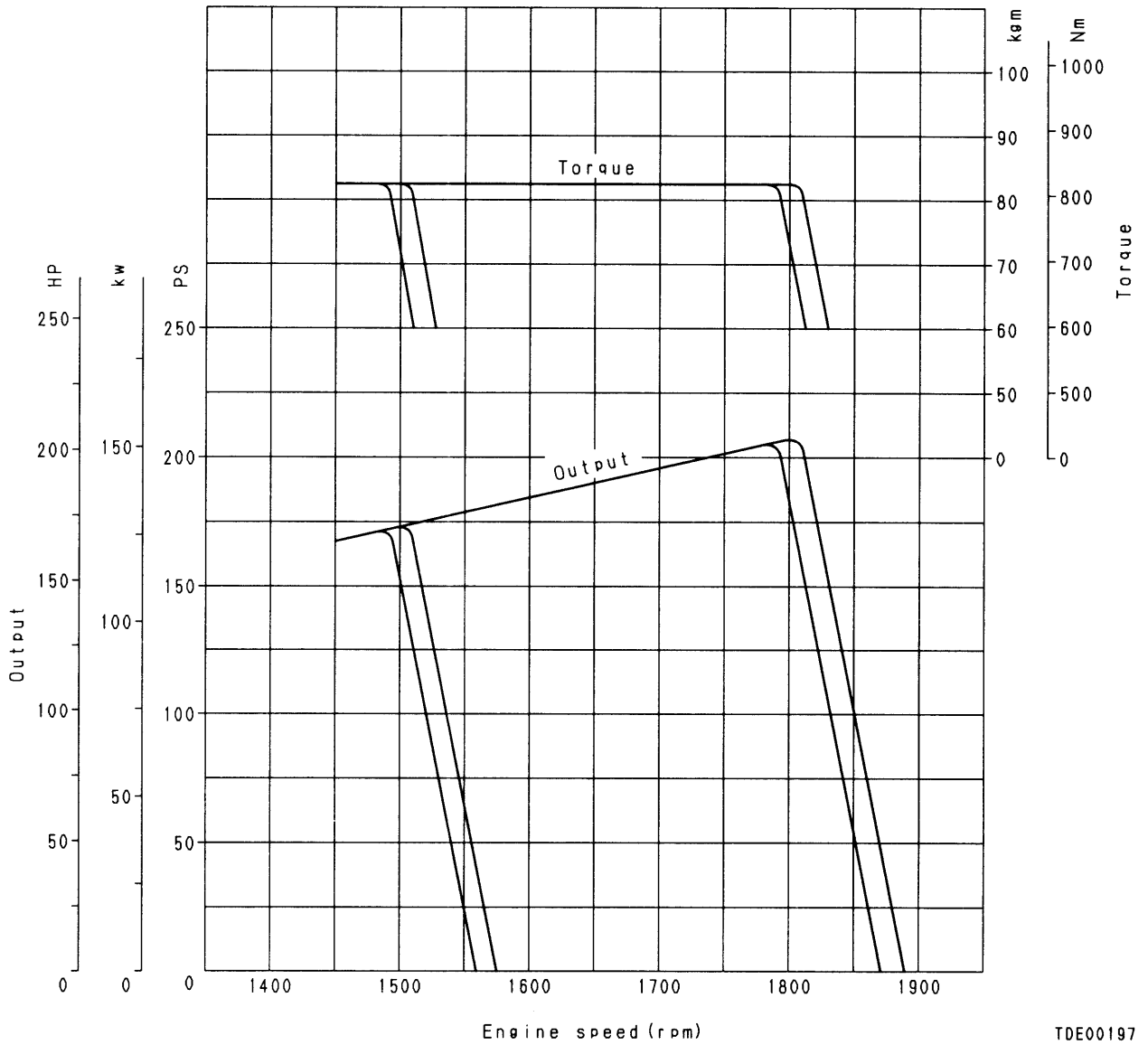
If it is desired to convert from Centigrade to Fahrenheit degrees, consider the center column as a table of Centigrade values, and read the corresponding Fahrenheit temperature on the right.

1°C = 33.8°F

°C		°F	°C		°F	°C		°F	°C		°F
-40.4	<b>-40</b>	-40.0	-11.7	<b>11</b>	51.8	7.8	<b>46</b>	114.8	27.2	<b>81</b>	117.8
-37.2	<b>-35</b>	-31.0	-11.1	<b>12</b>	53.6	8.3	<b>47</b>	116.6	27.8	<b>82</b>	179.6
-34.4	<b>-30</b>	-22.0	-10.6	<b>13</b>	55.4	8.9	<b>48</b>	118.4	28.3	<b>83</b>	181.4
-31.7	<b>-25</b>	-13.0	-10.0	<b>14</b>	57.2	9.4	<b>49</b>	120.2	28.9	<b>84</b>	183.2
-28.9	<b>-20</b>	-4.0	-9.4	<b>15</b>	59.0	10.0	<b>50</b>	122.0	29.4	<b>85</b>	185.0
-28.3	<b>-19</b>	-2.2	-8.9	<b>16</b>	60.8	10.6	<b>51</b>	123.8	30.0	<b>86</b>	186.8
-27.8	<b>-18</b>	-0.4	-8.3	<b>17</b>	62.6	11.1	<b>52</b>	125.6	30.6	<b>87</b>	188.6
-27.2	<b>-17</b>	1.4	-7.8	<b>18</b>	64.4	11.7	<b>53</b>	127.4	31.1	<b>88</b>	190.4
-26.7	<b>-16</b>	3.2	-7.2	<b>19</b>	66.2	12.2	<b>54</b>	129.2	31.7	<b>89</b>	192.2
-26.1	<b>-15</b>	5.0	-6.7	<b>20</b>	68.0	12.8	<b>55</b>	131.0	32.2	<b>90</b>	194.0
-25.6	<b>-14</b>	6.8	-6.1	<b>21</b>	69.8	13.3	<b>56</b>	132.8	32.8	<b>91</b>	195.8
-25.0	<b>-13</b>	8.6	-5.6	<b>22</b>	71.6	13.9	<b>57</b>	134.6	33.3	<b>92</b>	197.6
-24.4	<b>-12</b>	10.4	-5.0	<b>23</b>	73.4	14.4	<b>58</b>	136.4	33.9	<b>93</b>	199.4
-23.9	<b>-11</b>	12.2	-4.4	<b>24</b>	75.2	15.0	<b>59</b>	138.2	34.4	<b>94</b>	201.2
-23.3	<b>-10</b>	14.0	-3.9	<b>25</b>	77.0	15.6	<b>60</b>	140.0	35.0	<b>95</b>	203.0
-22.8	<b>-9</b>	15.8	-3.3	<b>26</b>	78.8	16.1	<b>61</b>	141.8	35.6	<b>96</b>	204.8
-22.2	<b>-8</b>	17.6	-2.8	<b>27</b>	80.6	16.7	<b>62</b>	143.6	36.1	<b>97</b>	206.6
-21.7	<b>-7</b>	19.4	-2.2	<b>28</b>	82.4	17.2	<b>63</b>	145.4	36.7	<b>98</b>	208.4
-21.1	<b>-6</b>	21.2	-1.7	<b>29</b>	84.2	17.8	<b>64</b>	147.2	37.2	<b>99</b>	210.2
-20.6	<b>-5</b>	23.0	-1.1	<b>30</b>	86.0	18.3	<b>65</b>	149.0	37.8	<b>100</b>	212.0
-20.0	<b>-4</b>	24.8	-0.6	<b>31</b>	87.8	18.9	<b>66</b>	150.8	40.6	<b>105</b>	221.0
-19.4	<b>-3</b>	26.6	0	<b>32</b>	89.6	19.4	<b>67</b>	152.6	43.3	<b>110</b>	230.0
-18.9	<b>-2</b>	28.4	0.6	<b>33</b>	91.4	20.0	<b>68</b>	154.4	46.1	<b>115</b>	239.0
-18.3	<b>-1</b>	30.2	1.1	<b>34</b>	93.2	20.6	<b>69</b>	156.2	48.9	<b>120</b>	248.0
-17.8	<b>0</b>	32.0	1.7	<b>35</b>	95.0	21.1	<b>70</b>	158.0	51.7	<b>125</b>	257.0
-17.2	<b>1</b>	33.8	2.2	<b>36</b>	96.8	21.7	<b>71</b>	159.8	54.4	<b>130</b>	266.0
-16.7	<b>2</b>	35.6	2.8	<b>37</b>	98.6	22.2	<b>72</b>	161.6	57.2	<b>135</b>	275.0
-16.1	<b>3</b>	37.4	3.3	<b>38</b>	100.4	22.8	<b>73</b>	163.4	60.0	<b>140</b>	284.0
-15.6	<b>4</b>	39.2	3.9	<b>39</b>	102.2	23.3	<b>74</b>	165.2	62.7	<b>145</b>	293.0
-15.0	<b>5</b>	41.0	4.4	<b>40</b>	104.0	23.9	<b>75</b>	167.0	65.6	<b>150</b>	302.0
-14.4	<b>6</b>	42.8	5.0	<b>41</b>	105.8	24.4	<b>76</b>	168.8	68.3	<b>155</b>	311.0
-13.9	<b>7</b>	44.6	5.6	<b>42</b>	107.6	25.0	<b>77</b>	170.6	71.1	<b>160</b>	320.0
-13.3	<b>8</b>	46.4	6.1	<b>43</b>	109.4	25.6	<b>78</b>	172.4	73.9	<b>165</b>	329.0
-12.8	<b>9</b>	48.2	6.7	<b>44</b>	111.2	26.1	<b>79</b>	174.2	76.7	<b>170</b>	338.0
-12.2	<b>10</b>	50.0	7.2	<b>45</b>	113.0	26.7	<b>80</b>	176.0	79.4	<b>175</b>	347.0

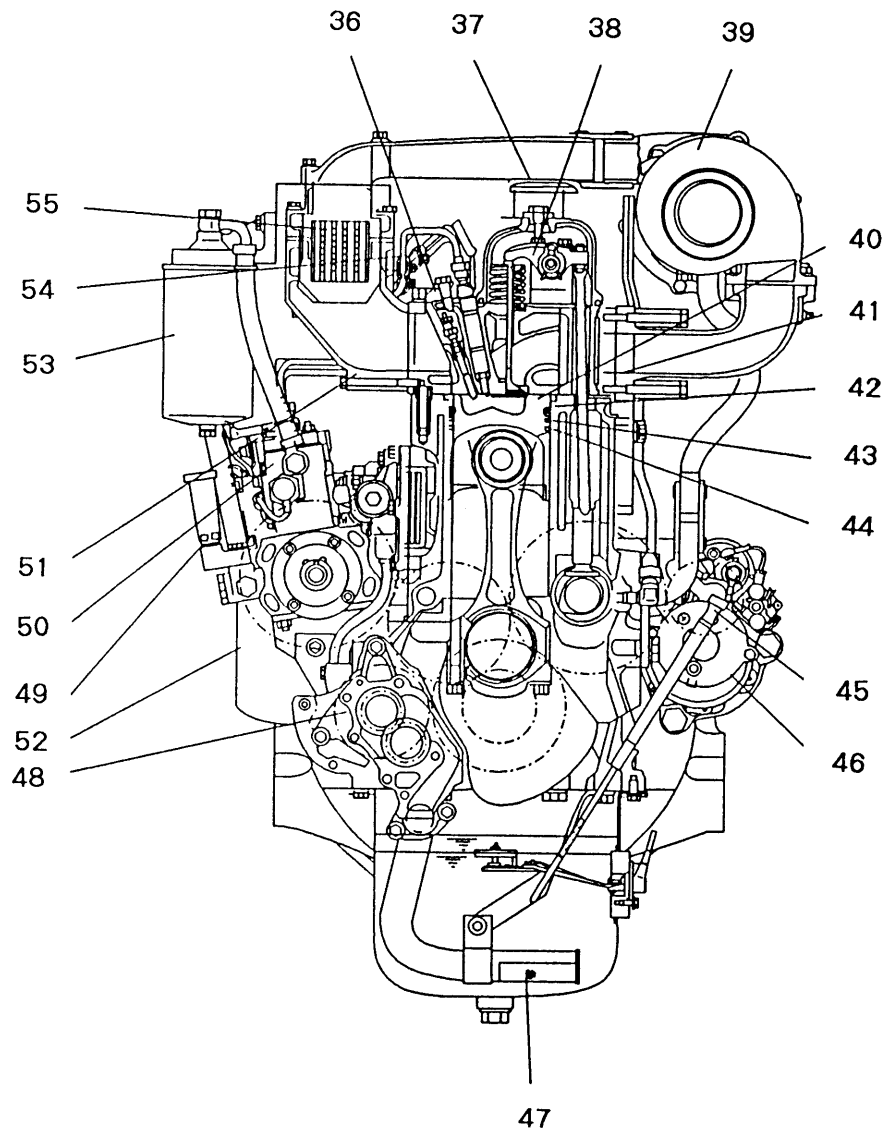
**S6D108-1 (EG150BS-5)**

	<b>Emergency</b>	<b>Normal</b>
Flywheel horsepower :	152 kW (204 HP)/1,800 rpm (60 Hz)	134 kW (180 HP)/1,800 rpm (60 Hz)
	128 kW (171 HP)/1,500 rpm (50 Hz)	113 kW (151 HP)/1,500 rpm (50 Hz)



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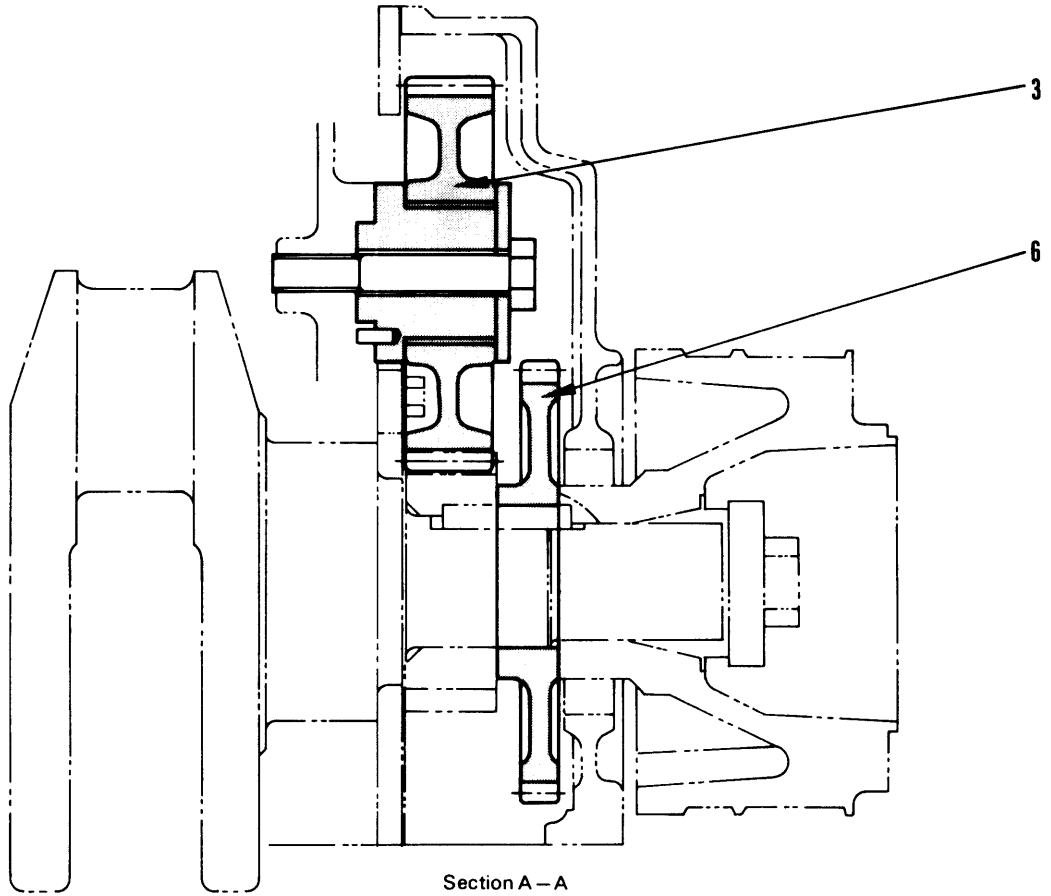
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- |                       |                         |                         |
|-----------------------|-------------------------|-------------------------|
| 31. Crankshaft pulley | 41. Exhaust manifold    | 51. Intake manifold     |
| 32. Front cover       | 42. Top ring            | 52. Oil filter          |
| 33. Cam gear          | 43. Second ring         | 53. Fuel filter         |
| 34. Connecting rod    | 44. Oil ring            | 54. Fuel injection pipe |
| 35. Piston pin        | 45. Oil level gauge     | 55. After-cooler        |
| 36. Nozzle holder     | 46. Starting motor      |                         |
| 37. Oil filler        | 47. Oil strainer        |                         |
| 38. Rocker arm        | 48. Oil pump            |                         |
| 39. Turbocharger      | 49. Feed pump           |                         |
| 40. Piston            | 50. Fuel injection pump |                         |



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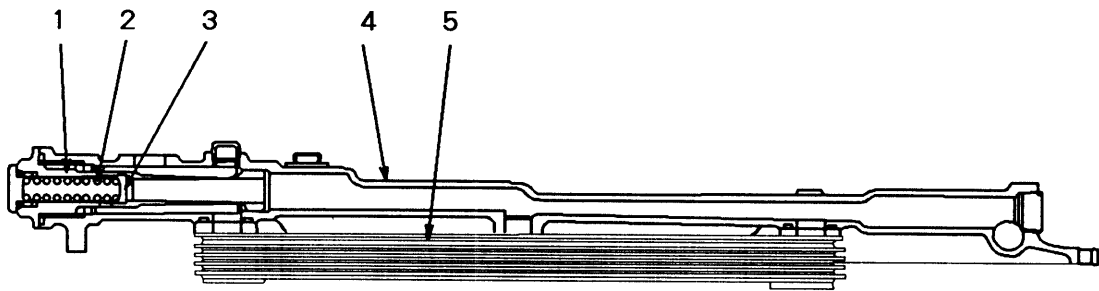
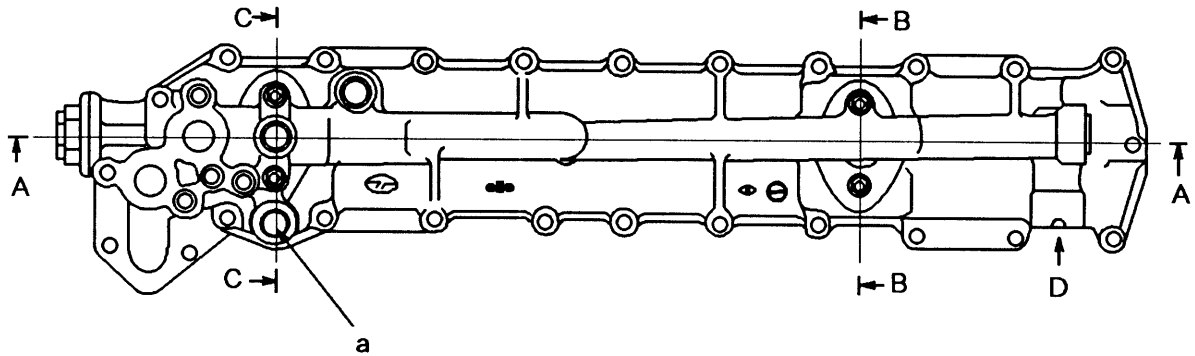
Section A-A

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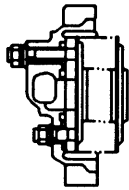
1. Timing gear case
2. Fuel injection pump gear (68 teeth)
3. Idler gear (51 teeth)
4. Oil pump gear (41 teeth)
5. Crankshaft gear (34 teeth)
6. Oil pump drive gear (58 teeth)
7. Camshaft gear (68 teeth)
8. PTO gear (34 teeth)

A,B,C: Match marks for timing gears

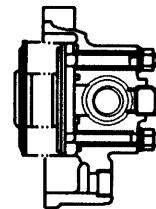
# OIL COOLER



Section A-A



Section B-B



Section C-C

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1. Valve case
2. valve spring
3. By-pass valve
4. Cooler cover
5. Cooler element

Oil cooler by-pass valve

Actuating pressure:  $4 \pm 0.2 \text{ kg/cm}^2$

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- D. From oil pump  
a. Water drain port

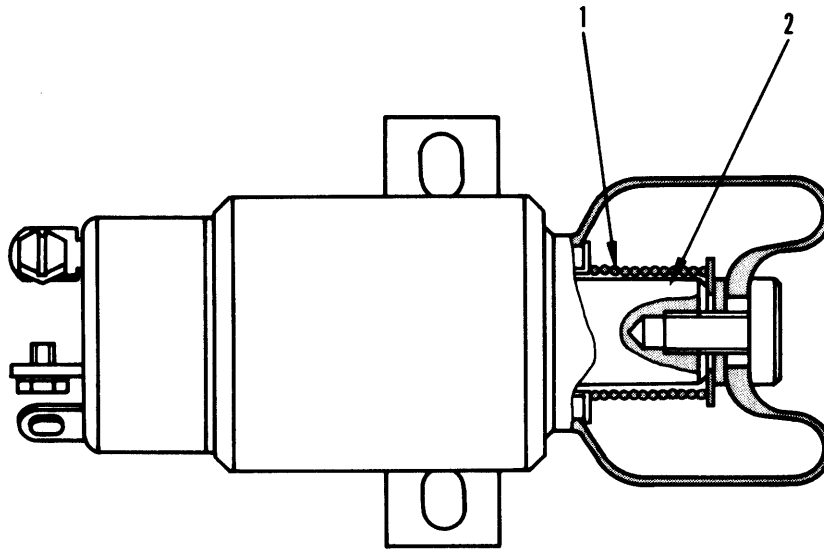
## Structure and function

- The oil cooler consists of element and cover. The oil flowing through the cooler element with the cooling fin is cooled properly by the engine cooling water flowing outside the element.



## FUEL CUT SOLENOID

### A. Contact method (continuous when stopped)



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- When the engine is stopped, electricity passes through the solenoid and the solenoid plunger is pulled electrically. This moves a rod, which moves the injection pump stop lever to the STOP position and cuts the fuel to stop the engine. Therefore, this solenoid is only used when stopping the engine; during normal operations, it is in the free position.
- When running the engine, no electricity passes through the solenoid. The solenoid has no magnetic force, so the solenoid shaft is pulled back by the return spring.

1. Return spring
2. Plunger



# ENGINE

## 12 TESTING AND ADJUSTING



### INTAKE AND EXHAUST SYSTEM

Adjusting valve clearance ..... 12-003

### ENGINE BODY

Measuring compression pressure ..... 12-004

### FUEL SYSTEM

Testing and adjusting  
fuel injection timing ..... 12-005  
Adjusting fuel cut solenoid link ..... 12-008  
Procedure for adjusting engine  
stop motor cable ..... 12-010  
Adjusting engine speed sensor ..... 12-012

### PERFORMANCE TEST

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### TESTING AND ADJUSTING DATA

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4. Tighten all bolts and nuts.
5. Turn the engine starting switch ON and OFF repeatedly, and check that engine stop motor (1) and the cable move smoothly. Then check the following points again.
- 1) When the engine is running, check visually that there is slack in cable (2) of engine stop motor cable (1), and that stop lever (4) of the fuel injection pump is fully returned to the RUN position.
  - 2) Check again that the clearance between stop lever (4) and STOP stopper (5) is 1 - 2 mm when the engine is stopped.
- ★ Engine stop motor (1) has limit switches built in on both sides of the cable stroke.
  - ★ Engine stop motor stroke: 35 mm  
Fuel injection pump stop lever stroke: 30 mm
  - ★ When the engine is running, there is slack in cable (2) of engine stop motor (1), and the RUN position is maintained by the action of a spring (this is frequently built into the fuel injection pump).
  - ★ There is a loose spring inside engine stop motor (1), and this absorbs the tolerance of stop motor (1) when the engine is stopped.  
However, if it is absorbed by the loose spring of engine stop motor (1), force is applied to the injection pump, so depending on the model, this may be impossible.  
With such models, if the clearance between stop lever (4) and the STOP stopper is made 0 when the engine is stopped, there is a risk that problems may occur with the injection pump.

★ Problems caused by defective adjustment of the engine stop motor cable.

• When the clearance between the stop lever and STOP stopper is excessive with the engine stop motor cable pulled	• Engine does not stop
• When the clearance between the stop lever and the RUN stopper is excessive at the free position	• Fuel injection amount drops, causing loss of engine output power

### Injection Pump Assembly Number

6221-71-1310 (101605-3990)

( ): Injection pump manufacturer's part No.

Injection Pump Type	Injection pump Manufacturer
PE-AD	ZEXEL

Applicable Machine		Applicable Engine	
Model	Serial No.	Model	Serial No.
D57S-1		S6D108-1	

### Injection Pump Specification

Rotating direction	Clockwise
Injection order	1 - 5 - 3 - 6 - 2 - 4
Injection interval	59°30' - 60°30'
Plunger pre-stroke (mm)	3.55 - 3.65
Delivery valve (mm <sup>3</sup> /st) retraction volume	70

### Engine Specification

Flywheel horsepower (kW {HP}) / rpm	107 {143}/1,900 (Gross)
Maximum torque (Nm {kgm})/ rpm	635 (64.7)/1,400 (Gross)
High idling speed (rpm)	2,050 - 2,150
Low idling speed (rpm)	800 - 850
Pump tester capacity for Service standard	Motor 7.5 kW

### Calibration Standard

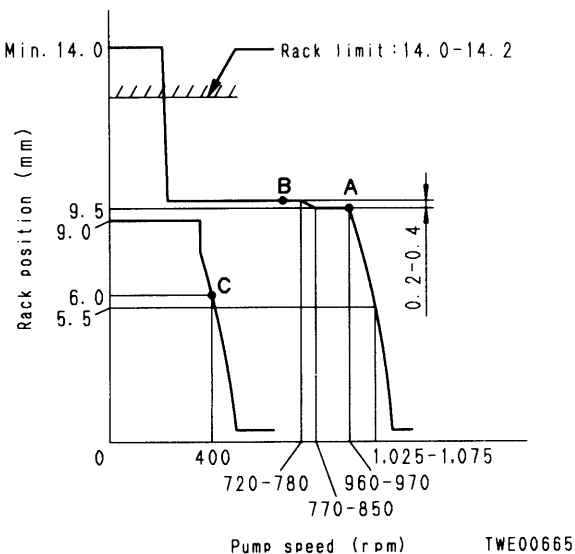
( ): Injection pump manufacturer's part number

Conditions	Service standard		Manufacturer standard	
	<ul style="list-style-type: none"> <li>● Service standard indicates data using calibration test parts.</li> <li>● Manufacturer standard is data for factory test.</li> </ul>	Nozzle & nozzle holder part No.		
	Nozzle part No.	(105780-0000)		6221-11-3120 (105017-1120)
	Nozzle holder part No.	(105780-8140)		6221-11-3100 (105118-5100)
	Injection pipe (mm) (Outside dia. x inside dia. x length)	6 x 2 x 600		6 x 2 x 690
	Test oil	ASTM D975 No. 2 diesel fuel or equivalent		
	Oil temperature (°C)	40 to 45		
	Nozzle opening pressure (MPa(kg/cm <sup>2</sup> ))	17.2 {175}		23.5 {239}
	Transfer pump pressure (kPa(kg/cm <sup>2</sup> ))	157 {1.60}		157 {1.60}

Injection volume	Rack point	Rack position (mm)	Pump speed (rpm)	Service standard (cc/1000 st.)		Manufacturer standard (cc/1000 st.)	
				Injection volume	Maximum variance between cylinder	Injection volume	Maximum variance between cylinder
<ul style="list-style-type: none"> <li>● Rack positions B to E are the reference volume when adjusting the injection volume.</li> <li>● Marks ★ are average volumes.</li> </ul>	A (Basic point)	9.5	950	★82.3 - 84.3	max. 3.3	★80.4 - 83.6	max. 3.2
	B	9.8	700	★88.4 - 94.4	-	★90.1	-
	C	6.0	400	★12.8 - 15.2	max. 2.8	★11.2 - 13.8	max. 2.6
	D						
	E						

### Governor performance curve



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**Injection Pump Assembly Number**  
6222-75-1311 (092000-3500)

( ): Injection pump manufacturer's part No.

Injection Pump Type	Injection pump Manufacturer
NB (EP-9)	DENSO

Applicable Machine		Applicable Engine	
Model	Serial No.	Model	Serial No.
SA6D108-M-1		SA6D108-1	

**Injection Pump Specification**

Rotating direction	Clockwise
Injection order	1 - 5 - 3 - 6 - 2 - 4
Injection interval	59°30' - 60°30'
Plunger pre-stroke (mm)	3.65 - 3.75
Delivery valve (mm <sup>3</sup> /st) retraction volume	100

**Engine Specification**

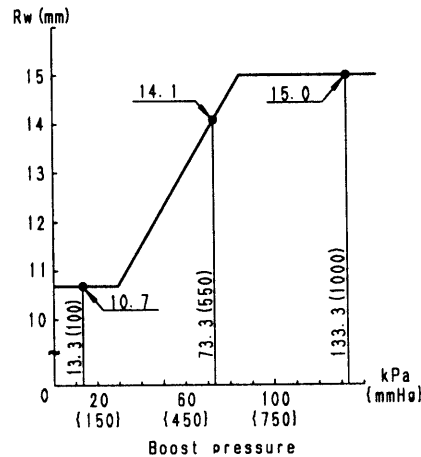
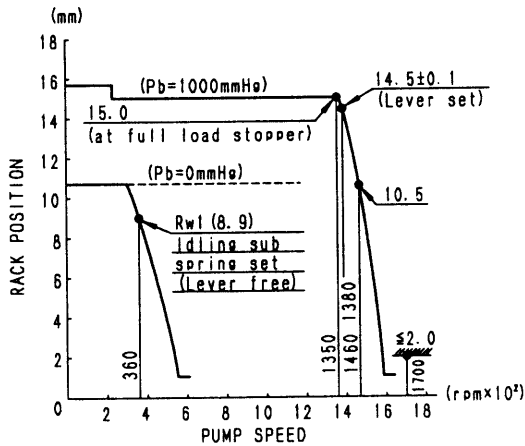
Maximum flywheel horsepower (kW (HP)/ rpm)	309 (420)/2,700 (Gross)
Maximum torque (Nm (kgm)/ rpm)	-
High idling speed (rpm)	2,920 - 3,020
Low idling speed (rpm)	700 - 750
Pump tester capacity for Service standard	

**Calibration Standard**

( ): Injection pump manufacturer's part number

Conditions	Service standard		Manufacturer standard				
	<ul style="list-style-type: none"> <li>• Service standard indicates data using calibration test parts.</li> <li>• Manufacturer standard is data for factory test.</li> </ul>	Nozzle & nozzle holder part No.					
Nozzle part No.		(093400-0540)					
Nozzle holder part No.		(093100-0190)					
Injection pipe (mm) (Outside dia. x inside dia. x length)		6 x 2 x 600					
Test oil		ASTM D975 No. 2 diesel fuel or equivalent					
Oil temperature (°C)		40 to 45					
Nozzle opening pressure (MPa(kg/cm <sup>2</sup> ))		17.2 (175)					
Transfer pump pressure (kPa(kg/cm <sup>2</sup> ))		157 (1.60)					
Injection volume	Rack point	Rack position (mm)	Pump speed (rpm)	Service standard (cc/1000 st.)		Manufacturer standard (cc/1000 st.)	
				Injection volume	Maximum variance between cylinder	Injection volume	Maximum variance between cylinder
<ul style="list-style-type: none"> <li>• Rack positions B to E are the reference volume when adjusting the injection volume.</li> <li>• Marks ★ are average volumes.</li> </ul>	A (Basic point)	15.0	1,350	197.0 - 207.0	max. 8		
	B	8.9	360	27.0 - 31.0	max. 5		
	C						
	D						
	E						

**Governor performance curve**



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# POINTS TO REMEMBER WHEN TROUBLESHOOTING

Troubleshooting means locating the basic cause of the failure, and carrying out swift repairs, and ensuring that the failure does not occur again.

When carrying out troubleshooting, it is of course important to understand the structure and function. But to carry out the troubleshooting effectively, a quick method is to carry out troubleshooting using the problems mentioned by the operator as a guide in locating the cause.

## 1. Do not disassemble the machine simply because there is a failure

If the machine is disassembled immediately just because there is a failure:

- Unrelated or unnecessary places are also disassembled
- It becomes difficult to locate the cause of the failure

This means that there is not only a waste of time and money on replacement parts, oil, and grease, but this action will also lose the confidence of the user and operator.

For this reason also, it is important to carry out troubleshooting based on full investigation before starting and troubleshooting following the correct order.

## 2. Questions to ask the user and operator

- 1) Are there any problems other than those already reported?
- 2) Did anything unusual happen before the failure occurred?
- 3) Did the failure occur suddenly, or had the condition of the machine been poor before the failure occurred?
- 4) What were the conditions when the failure occurred?
- 5) Had any repairs been carried out before the failure occurred?
- 6) Had any similar failure occurred before?

## 3. Checks before troubleshooting

- 1) Check the oil level.
- 2) Check for any external leakage of oil from the piping and hydraulic equipment.
- 3) Check the travel of the control levers.
- 4) Other maintenance items can also be carried out visually, so carry out any check that is considered necessary.

## 4. Confirming failure

Check the degree of the problem to judge for yourself if it is really a failure, or if there is some problem in the handling or operation of the machine.

- ★ When driving the machine and re-enacting the failure, be sure that the investigation or measurement does not make the failure worse.

## 5. Troubleshooting

Narrow down the causes of the failure from the results of the questions and checks in the above Items 2 – 4, then follow the troubleshooting flow chart to locate the failure.

- ★ Basic procedure for troubleshooting
  - 1) Start from the simple places.
  - 2) Start from the most probable places.
  - 3) Investigate related parts also.

## 6. Basic action to remedy cause of failure

Even if the failure is repaired, if the root cause of the failure is not repaired, the same failure will occur again.

To prevent this, it is necessary to investigate why the failure occurred, and to remove the root cause of the failure.



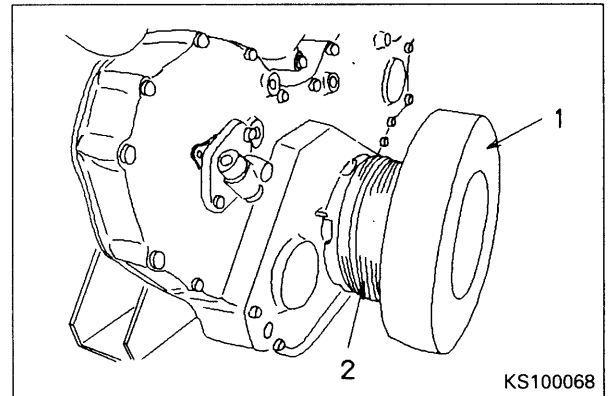


**18. Vibration damper**

Remove vibration damper (1).

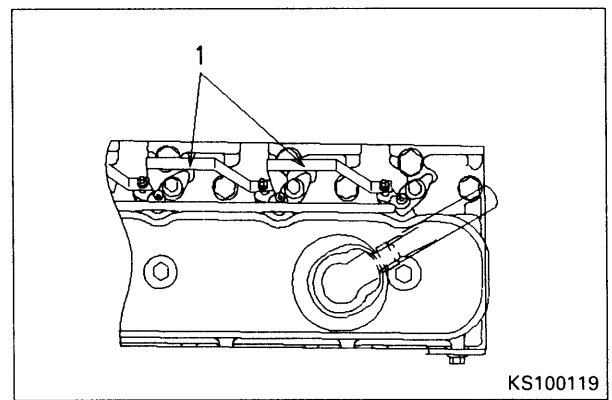
**19. Crankshaft pulley**

Remove crankshaft pulley (2).



**20. Lead**

Remove lead (1).

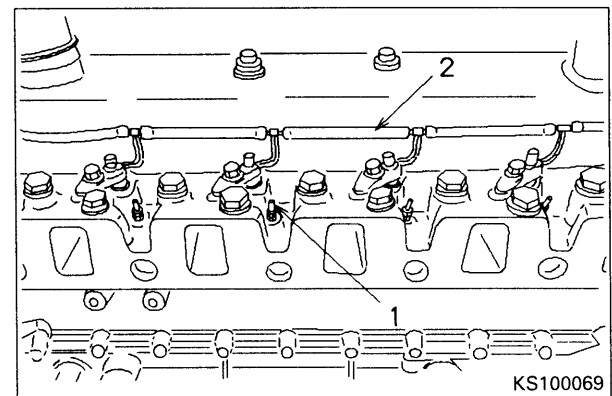


**21. Glow plug**

Remove glow plug (1).

**22. Spill hose**

Remove spill hose (2).

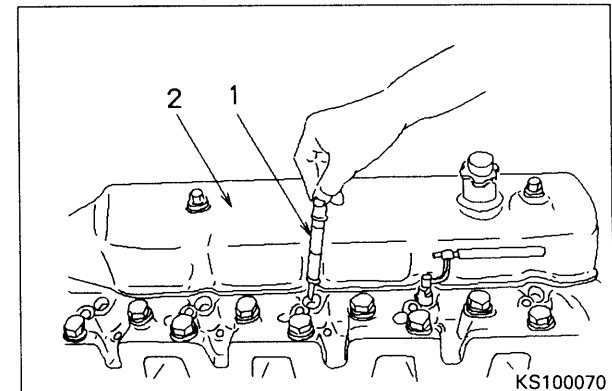


**23. Nozzle holder**

Remove nozzle holder (1).

**24. Cylinder head cover**

Remove cylinder head cover (2).



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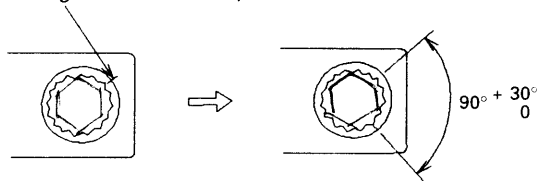
- 4) Align lug of lower main bearing (5) with slot in main bearing cap and install bearing in cap.
- 5) Assemble lower thrust bearings (6) on both sides of No. 7 main cap bearing.
  - ★ Check that the protrusion of the roll pin is 1.5 to 1.9 mm.
  - ★ Install the thrust bearing with the grooved face to the outside.
- 6) Assemble main bearing cap (1).
  - ★ Coat the sliding surface of the bearing with engine oil before installing.
  - ★ Match bearing No. and block No., and install the main bearing cap with the raising letter "F" facing the front of the engine.
- 7) Tighten bolts of main bearing cap as follows.
  - ★ Coat the threads of the bolts and the seat face with engine oil (EO-30) before tightening the bolts.
  - ★ Tighten bolts beginning from the center cap and continue to the outside caps in turn.
  - ★ Tighten according to the next steps as follows.

 Main bearing cap

Unit : kgm

Order	Target	Range
1st step	8	7 - 9
2nd step	16	15.5 - 16.5
3rd step	After marking the bolts and cap by felt pen. Turn over the bolt more 90°-120°	

Marking the bolt and cap

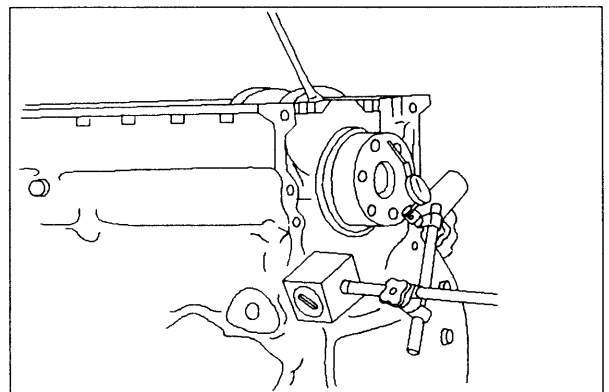
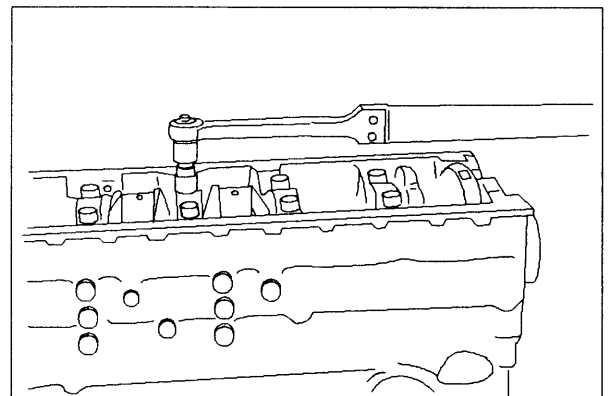
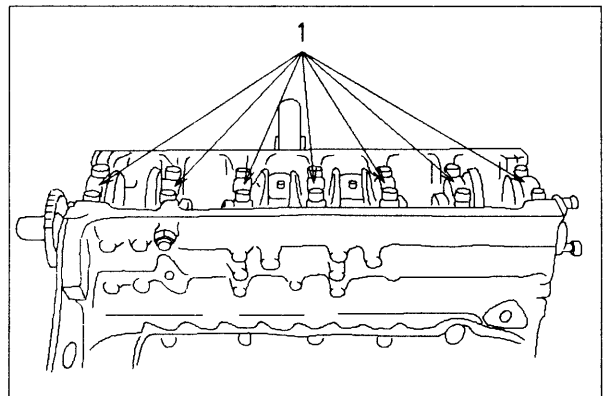
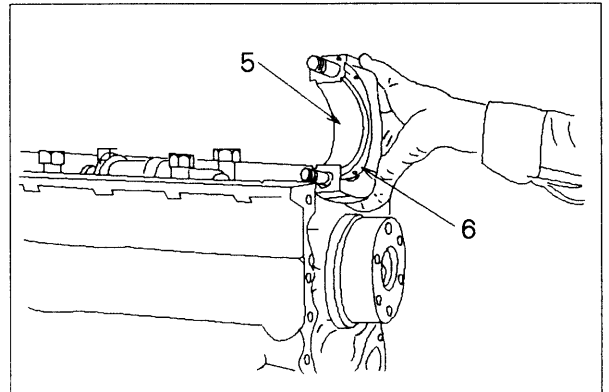


- ★ After tightening the bolts, put one mark on the bolt head with the pointer. If the No. of mark exceeds 5, discard the old bolt and replace with the new bolt.
- ★ After tightening the bolts, check that the crankshaft rotates smoothly.

- 8) Measure end play of crankshaft.
 

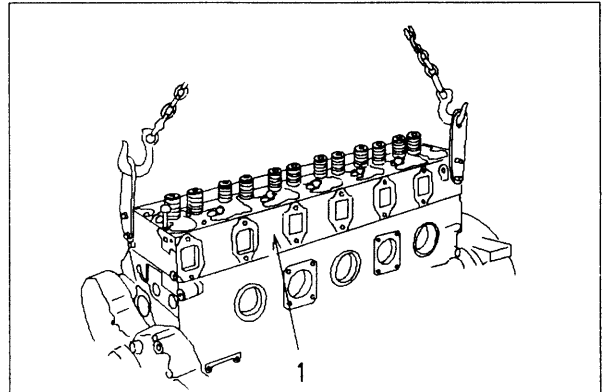
After tightening the main bearing cap, measure the end play of the crankshaft.

  - ★ End play of the crankshaft : 0.14 to 0.315 mm




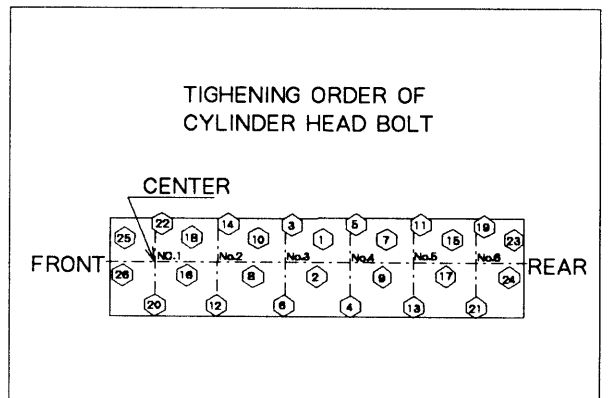
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- ★ Check that the respective mounting surface of the cylinder head and cylinder block are clean and that there is no dirt or foreign material inside the cylinder.
- 1) Fit cylinder head gasket.  
Install cylinder head assembly (1) on the cylinder block.



- 2) Coat thread of mounting bolts and washer seats with antifriction compound or engine oil. Tighten mounting bolts in order shown in diagram to the following tightening torques.

 Mounting bolts : Antifriction compound (LM-P)

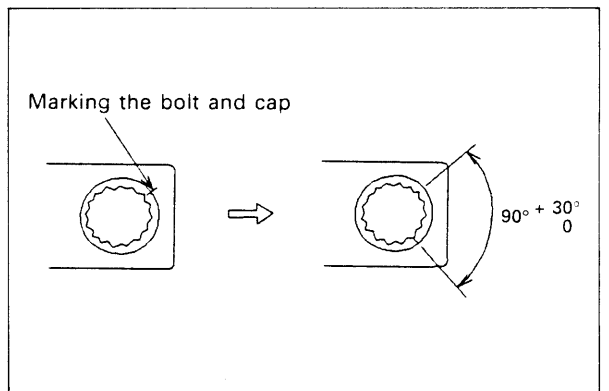


 **kgm** Cylinder head:

Unit : kgm

Order	Target	Range
1st step	10	9 - 11
2nd step	15	14.5 - 15.5
3rd step	more 90° turn	90° - 120°

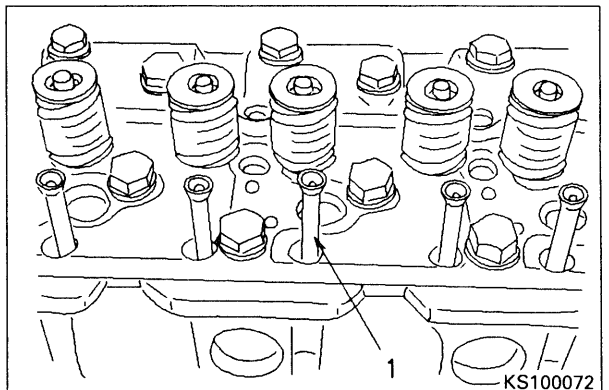
- ★ After tightening the bolts put one mark on the bolt head with the pointer. If the number of marks exceeds 5, replace with the new bolt.



## 20. Push rods

Assemble push rod (1).

- ★ Check that the push rod is properly fitted into the tappet.



# ENGINE

## 14 MAINTENANCE STANDARD



### INTAKE AND EXHAUST SYSTEM

Turbocharger ..... 14-002

### ENGINE BODY

Cylinder head ..... 14-004

Valve and valve guide ..... 14-006

Rocker arm, push rod and tappet ..... 14-008

Cylinder liner ..... 14-009

Cylinder block ..... 14-010

Crankshaft ..... 14-012

Camshaft ..... 14-013

Piston, piston ring and piston pin ..... 14-014

Connecting rod ..... 14-015

Timing gear ..... 14-016

Flywheel and flywheel housing ..... 14-017

### LUBRICATION SYSTEM

Oil pump ..... 14-018

Regulator valve ..... 14-019

Safety valve ..... 14-019

### COOLING SYSTEM

Water pump and thermostat ..... 14-020

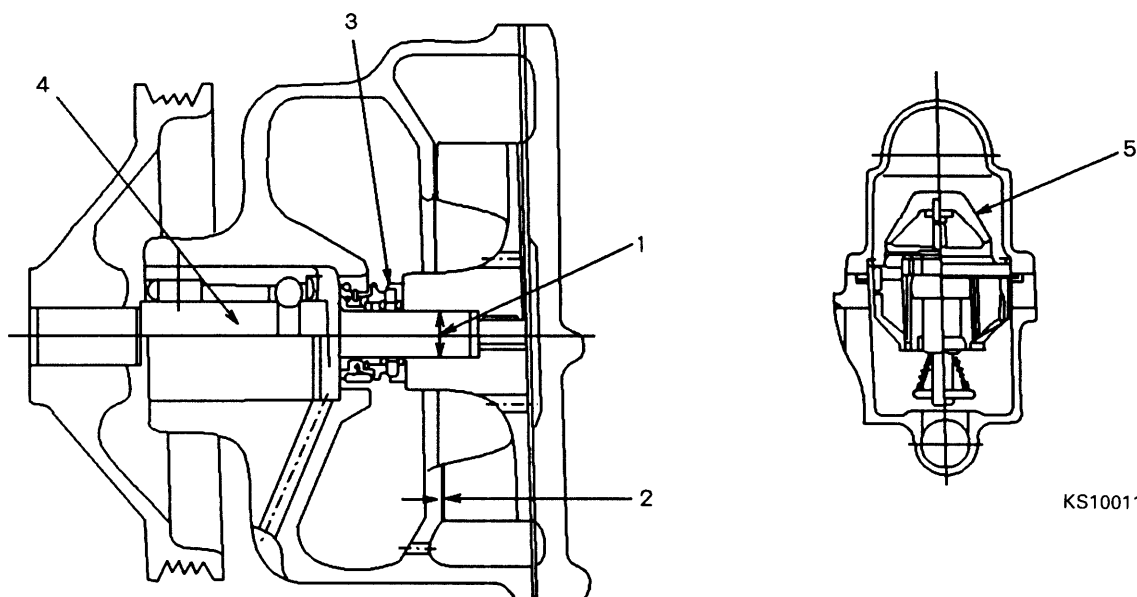
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Unit:mm

No.	Check item	Criteria			Remedy
1	Distortion of cylinder head mounting surface	Standard size	Repair limit		Repair by grinding or replace
		0 - 0.080	0.12		
2	Inside diameter of main bearing mounting hole	Standard size	Tolerance		Replace main bearing cap
		101	+ 0.022 0		
	Straightness of main bearing mounting hole	Repair limit : 0.010			
		Roundness of main bearing mounting hole			
Repair limit : 0.005					
3	Inside diameter of main bearing	Standard size	Tolerance	Repair limit	Replace main bearing
		95	+ 0.050 + 0.006	95.15	
4	Inside diameter of bushing mounting hole	Standard size	Tolerance		Replair or replace
		62	+ 0.030 0		
5	Inside diameter of camshaft bushing	Standard size	Tolerance	Repair limit	Replace camshaft bearing
		59	+ 0.088 + 0.009	59.3	
6	Difference between cylinder block lower face and flywheel housing	Repair limit : 0.13			Repair by reassembling
7	Difference between cylinder block lower face and front cover	Repair limit : 0.11			
8	Difference between cylinder block lower face and front plate	Repair limit	Plate protrusion : 0.04 Plate inset : 0.22		
9	Tightening torque of main bearing cap mounting bolt (Coat bolt thread with engine oil) (Tightening using plastic range turning angle)	Order	Target	Range	Tighten
		1st step	78.5 Nm (8 kgm)	68.6 - 88.3 Nm (7 - 9 kgm)	
		2nd step	156.9 Nm (16 kgm)	152.0 - 161.8 Nm (15.5 - 16.5 kgm)	
		3rd step	105°	90° - 120°	
10	Tightening torque of oil pan mounting bolt		18.6 Nm (1.9 kgm)	13.7 - 23.5 Nm (1.4 - 2.4 kgm)	
11	Tightening torque of crankshaft pulley mounting bolt		451 Nm (46 kgm)	421.4 - 480.2 Nm (43 - 49 kgm)	

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# WATER PUMP AND THERMOSTAT (D75S-1, PC300-5)



KS100115

KS100116

Unit : mm

No.	Check item	Criteria				Remedy
		Standard size	Shaft O.D.	Impeller I.D.	Standard interference	
1	Interference between impeller and shaft	12	0 -0.013	-0.030 -0.055	0.017-0.055	Replace (usually replace impeller, shaft O.D. rarely changes)
2	Clearance between body and impeller	Standard clearance : 0.3-1.3				
3	Abrasion of seal ring in water seal	 14F035		A dimension repair limit : 0		Replace
4	Curvature of shaft	Repair limit : 0.1mm	Total variation of indicator, measure by face run-out at point 40mm from center of pulley			
5	Full open lift of thermostat	Permissible range	Min.10	Inspect after immersion for 4-5 minutes in water at 85°C		Replace
	Opening and closing of thermostat	Valve should be fully closed after immersion for 4-5 min in water from fully open (85°C) to fully closed (65°C).				

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# GRINDING THE VALVE

## Special tools

	Part No.	Part Name	Q'ty
A	-(Purchase)	Valve refacer	1

### 1. Grinding the seat surface

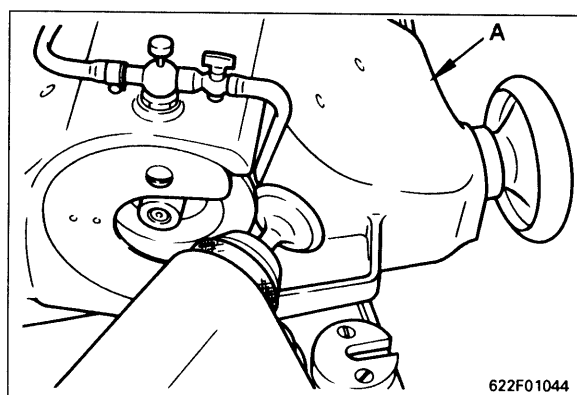
Grind the seat surface with valve refacer A.

- ★ Angle of valve seat
  - Intake valve : 30°
  - Exhaust valve : 45°

### 2. Checking after grinding

Confirm that the thickness of the valve head, protrusion of the valve, and the contact surface of the valve seat are within specification.

- ★ Allowable thickness of valve head
  - Intake valve :  $2 \pm 0.1$  mm
  - Exhaust valve :  $1.5 \pm 0.1$  mm
- ★ Sinking distance of valve :  $1.12 \pm 0.18$  mm
- ★ Contact width of valve seat
  - Intake valve : 3.20 mm
  - Exhaust valve : 2.01 mm



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