

GROUP 12

ENGINE LUBRICATION

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GENERAL INFORMATION

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The lubrication method is a fully force-fed, full-flow filtration type.

Item	Specification
Oil pump type	Trochoid type
Drive method	Crankshaft

ENGINE OILS

⚠ WARNING

Prolonged and repeated contact with mineral oil will result in the removal of natural fats from the skin, leading to dryness, irritation and dermatitis.

In addition, used engine oil contains potentially harmful contaminants which may cause skin cancer. Adequate means of skin protection and washing facilities must be provided.

Recommended Precautions

The most effective precaution is to prevent, as far as practical, the risk of skin contact with mineral oils i.e. use enclosed systems for handling used engine oil and degrease components, where practical, before handling them.

Other precautions:

- Avoid prolonged and repeated contact with oil, particularly used engine oil.
- Wear protective clothing, including impervious gloves where practical.
- Avoid contaminating clothes with oil.
- Do not put oily rags in pockets.
- Do not wear heavily soiled clothing and oil-soaked foot-wear. Overalls must be cleaned regularly and kept separate from personal clothing.

- Where there is a risk of eye contact, eye protection should be worn i.e. chemical goggles or face shields. In addition, an eye wash facility should be provided.
- Obtain first aid treatment immediately for open cuts and wounds.
- Wash regularly with soap and water to ensure all oil is removed (skin cleansers and nail brushes will help). After cleaning, apply lotion, etc., containing lanolin to replace natural skin oils is advised.
- Do not use gasoline, kerosene, diesel fuel, gas oil, thinners or solvents for cleaning skin.
- Apply barrier creams before each work period.
- If skin disorders develop, obtain medical advice immediately.

SERVICE SPECIFICATIONS

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ITEM		STANDARD VALUE
Engine oil pressure kPa (psi)	at idle	29 (4.2) or more
	at 3,500 r/min	294 - 686 (43 - 100)

LUBRICANTS

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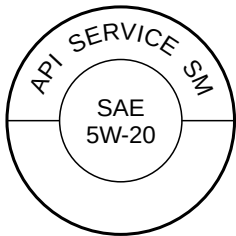
Item	Engine oil	Quantity dm ³ (qt)
Oil filter	Engine oils displaying ILSAC certification symbol	0.3 (0.32)
Total quantity	("Starburst" symbol) or conforming to the API classification SM or higher	4.3 (4.5)

ILSAC certification symbol
("Starburst" symbol)



ZC6011140000

API service symbol



ZC604408AA00

ENGINE OIL

CAUTION

Never use nondetergent or straight mineral oil.

Use only engine oils displaying the ILSAC certification symbol ("Starburst" symbol) on the container.

If these oils are not available, an API classification SM or higher can be used.

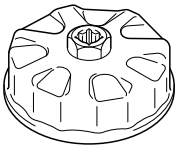
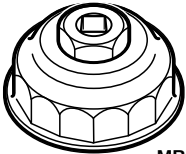
SEALANT

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ITEM	SPECIFIED SEALANT
Engine oil pressure switch	3M™ AAD Part No. 8672 or equivalent

SPECIAL TOOLS

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Tool	Tool number and name	Supersession	Application
 B991396	MB991396 Oil filter wrench	Oil filter wrench	Removal and installation of engine oil filter (when using oil filter MD360935)
 MB991828	MB991828 Oil filter wrench	Oil filter wrench	Removal and installation of engine oil filter (when using oil filter MD332687 or MD365876)

ON-VEHICLE SERVICE

ENGINE OIL CHECK

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1. Pull out the oil dipstick, clean off the engine oil on the oil dipstick, and then reinsert the oil dipstick.
2. Pull out the oil dipstick, and check the engine oil level is within the marks on one side of the oil dipstick (engine cover side).

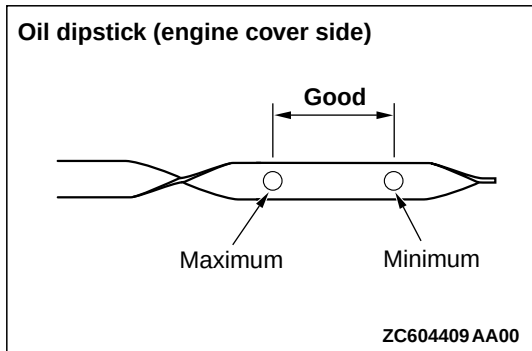
NOTE:

*Checking the oil might be difficult shortly after stopping the engine or engine oil replacement.

*If difficult, take some time (approx. 30 sec.) and try again.

*Refer to the information label indicating the engine oil check process on the rocker cover.

3. Check that the engine oil is not excessively dirty, that there is no coolant or gasoline mixed in, and that it is sufficiently thick and slippery.



ENGINE OIL REPLACEMENT

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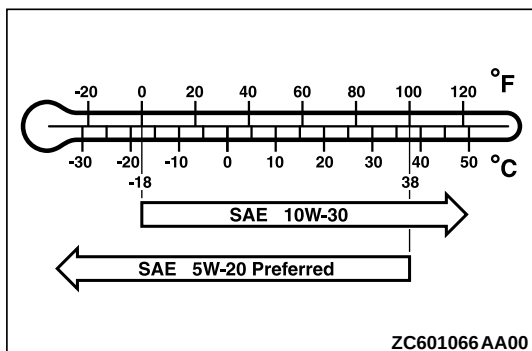
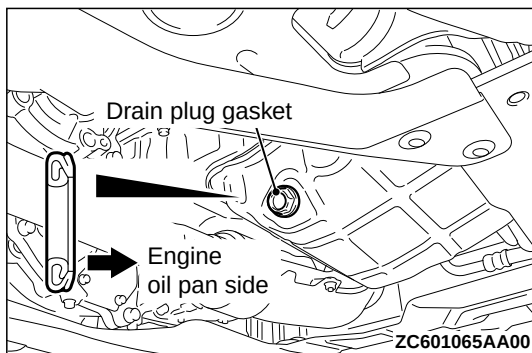
1. Start the engine and allow it to warm up until the temperature of the coolant reaches 80 - 90°C (176 - 194°F).

⚠ WARNING

Use care as oil could be hot.

2. Remove the engine oil filler cap.
3. Remove the drain plug to drain oil.
4. Install a new drain plug gasket so that it faces in the direction shown in the illustration, and then tighten the drain plug to the specified torque.

Tightening torque: 39 ± 5 N·m (29 ± 3 ft·lb)



5. Refill the specified quantity of oil.

Specified Engine Oil: Engine oils displaying ILSAC certification symbol ("Starburst" symbol) or conforming to the API classification SM or higher

Total quantity: 4.3 dm³ (4.5 quarts)

NOTE: SAE 5W-20 engine oil is strongly recommended for optimum fuel economy and cold starting. If the ambient temperature is not within the usable temperature range of SAE 5W-20 shown in the above illustration, use SAE 10W-30 engine oil.

- 6. Install the engine oil filler cap.
- 7. Let the engine run for a few minutes.
- 8. Stop the engine, and then check the oil level using the oil dipstick after a few minutes.

ENGINE OIL FILTER REPLACEMENT

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- 1. Start the engine and allow it to warm up until the temperature of the coolant reaches 80 - 90°C (176 - 194°F)

⚠ WARNING

Use care as oil could be hot.

- 2. Remove the engine oil filler cap.
- 3. Remove the drain plug to drain oil.
- 4. Use the respective tool in the following table to remove the engine oil filter.

Number	Special tool
MD332687 or MD365876	Oil filter wrench (MB991828) or equivalent
MD360935	Oil filter wrench (MB991396) or equivalent

- 5. Clean the filter bracket side mounting surface and ensure the old O-ring has been removed.
- 6. Apply a small amount of engine oil to the O-ring of the new oil filter.
- 7. Screw on the oil filter by hand until it touches the surface of the flange and then tighten it with an oil filter wrench.

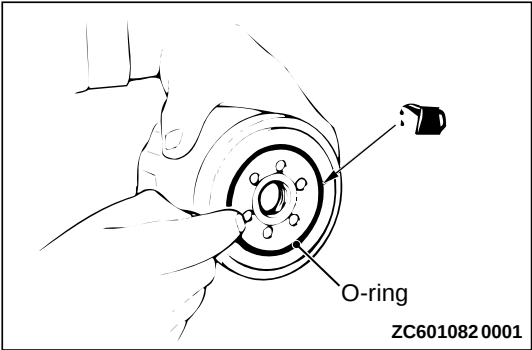
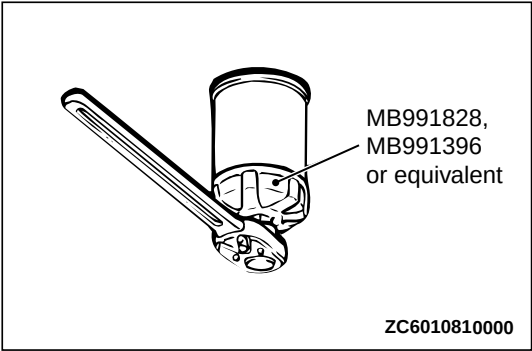
Number	Special tool	Tightening torque
MD332687 or MD365876	MB991828 or equivalent	Approximately 3/4 turn [16 ± 4 N·m (12 ± 3 ft-lb)]
MD360935	MB991396 or equivalent	Approximately one turn [14 ± 2 N·m (124 ± 18 in-lb)]

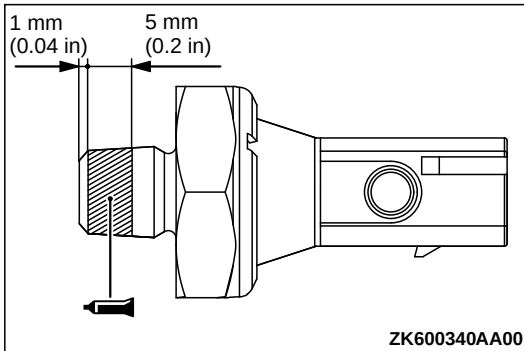
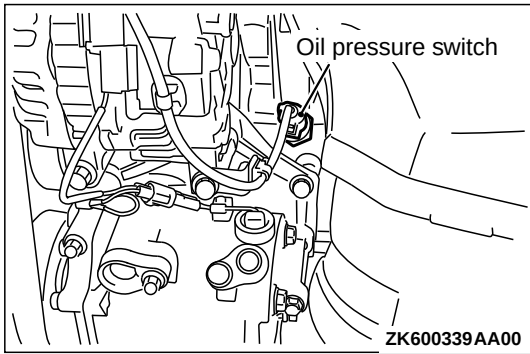
- 8. Install the drain plug and refill engine oil (Refer to P.12-4).
- 9. Rev the engine a few times, and check to be sure that no engine oil leaks at the oil filter.

ENGINE OIL PRESSURE CHECK

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- 1. Check engine oil quantity.



**⚠ CAUTION**

Since sealant is applied to the thread of the engine oil pressure switch, take care not to damage the engine oil pressure switch when removing it.

2. Remove the engine oil pressure switch.
3. Install the engine oil pressure gauge.

NOTE: Use a 1/8 pipe thread adapter.

4. Run the engine to warm it.
5. After the engine has been warmed up, check that engine oil pressure is within the standard value.

Standard value:

At idle: 29 kPa (4.2 psi) or more

At 3,500 r/min: 294 - 686 kPa (43 - 100 psi)

6. Remove the engine oil pressure gauge.
7. Apply the specified sealant 3M™ AAD Part number 8672 or equivalent to the threads of the engine oil pressure switch.

⚠ CAUTION

Do not start the engine within one hour after the engine oil pressure switch has been installed.

8. Tighten the engine oil pressure switch to the specified torque.

Tightening torque:

10 ± 2 N·m (87 ± 17 in-lb)