

GROUP 12

**ENGINE
LUBRICATION**

CONTENTS

| | | | |
|-----------------------------------|-------------|--------------------------------|-------------|
| GENERAL DESCRIPTION | 12-2 | ENGINE OIL COOLER | 12-5 |
| | | REMOVAL AND INSTALLATION | 12-5 |
| ON-VEHICLE SERVICE | 12-2 | SPECIFICATIONS | 12-6 |
| ENGINE OIL CHECK | 12-2 | FASTENER TIGHTENING | |
| ENGINE OIL REPLACEMENT | 12-3 | SPECIFICATIONS..... | 12-6 |
| ENGINE OIL FILTER REPLACEMENT ... | 12-3 | LUBRICANT | 12-6 |
| OIL PRESSURE CHECK | 12-4 | | |

GENERAL DESCRIPTION

M1121000100283

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

| ITEMS | SPECIFICATIONS |
|---------------|----------------|
| 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 adapt working practices which prevent, as far as practical, the risk of skin contact with mineral oils i.e. use enclosed systems for handling used engine oil and decrease components, where practical, before handling them.

Other precautions:

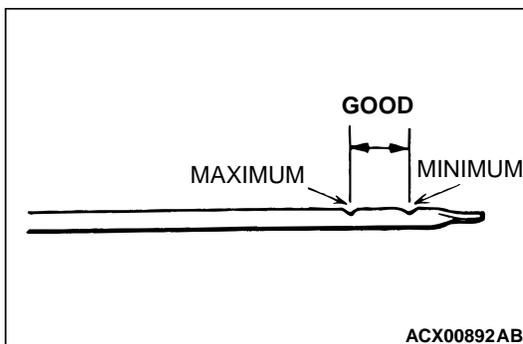
- Avoid prolonged and repeated contact with oil, particularly used engine oil.
- Wear protective clothing, including impervious gloves where practical.
- Avoid contaminating clothes, particularly under wear, with oil.
- Do not put oily rags in pockets.
- Do not wear heavily soiled clothing and oil-soaked 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, especially before meals (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 to help clean the skin after work.
- If skin disorders develop, obtain medical advice immediately.

ON-VEHICLE SERVICE

ENGINE OIL CHECK

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1. Pull out the oil dipstick slowly and check that the oil level is within the marks on the oil dipstick.
2. Check that the 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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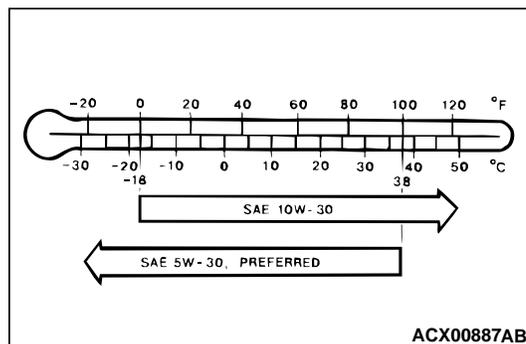
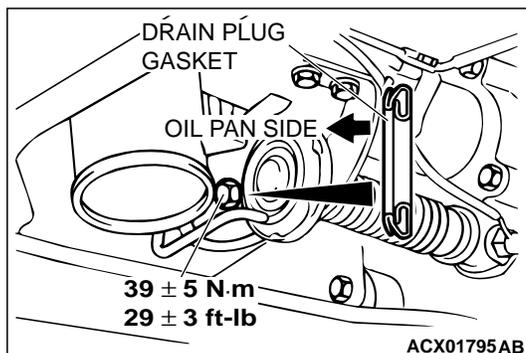
Start the engine and allow it to warm up until the temperature of the coolant reaches 80°C (176°F) to 90°C (194°F).

⚠ WARNING

Use care as oil could be hot.

1. Remove the engine oil filler cap.
2. Remove the drain plug to drain oil.
3. 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)



4. Refill the specified quantity of oil.

Specified Engine Oil: Engine oils displaying ILSAC certification symbol ("Starburst" symbol) or conforming the API classification SJ EC or SJ/CD EC

Total quantity: 4.9 dm³ (5.14 quarts)

5. Install the engine oil filler cap.
6. Check oil level.

ENGINE OIL FILTER REPLACEMENT

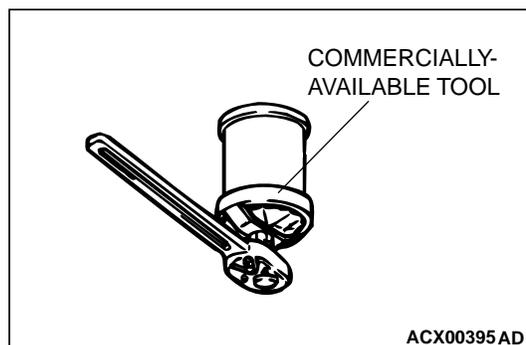
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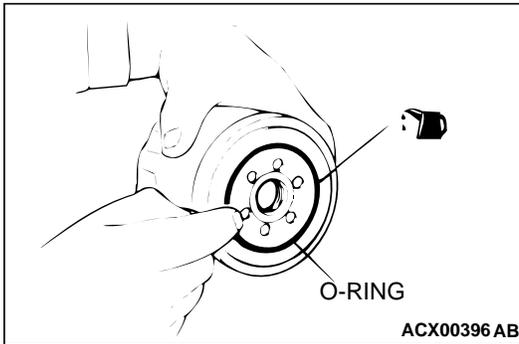
Start the engine and allow it to warm up until the temperature of the coolant reaches 80°C (176°F) to 90°C (194°F).

⚠ WARNING

Use care as oil could be hot.

1. Remove the engine oil filler cap.
2. Remove the drain plug to drain oil.
3. Use the commercially-available tool to remove the engine oil filter.
4. Clean the filter bracket side mounting surface and ensure the old O-ring has been removed.





5. Apply a small amount of engine oil to the O-ring of the new oil filter.
6. Where the oil filter O-ring touches the oil pan flange, tighten the oil filter to the specified torque using the commercially-available tool.

Tightening torque: Approximately 3/4 turn [14 ± 2 N·m (124 ± 18 in-lb)]

7. Install the drain plug and refill engine oil. (Refer to Engine Oil Replacement P.12-3.)
8. Rev the engine a few times, and check to be sure that no engine oil leaks from the installation section of the oil filter.

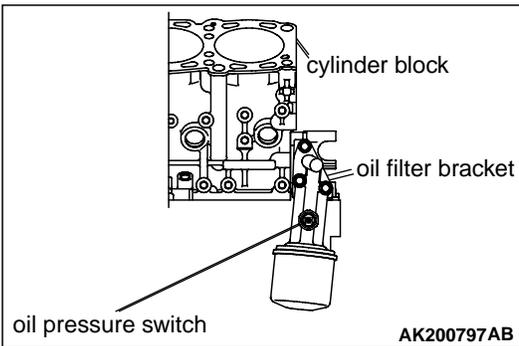
OIL PRESSURE CHECK

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Required Special Tool:

MD998054: Oil Pressure Switch Wrench

1. Check engine oil quantity.
2. Remove the oil pressure switch terminal.



⚠ CAUTION

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

3. Use special tool MD998054 to remove the oil pressure switch.
4. Install the oil pressure gauge.

NOTE: Use a 1/8 pipe thread adapter.

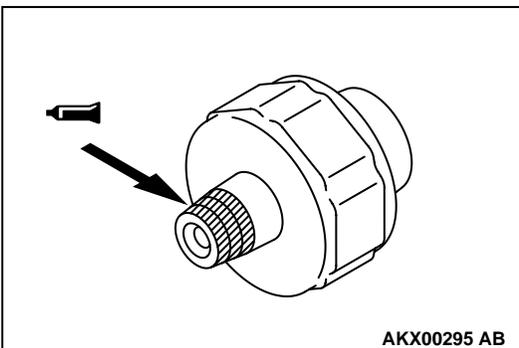
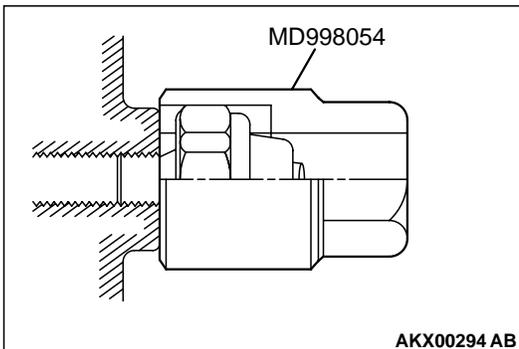
5. Run the engine to warm it.
6. After the engine has been warmed up, check that oil pressure is within the standard value.

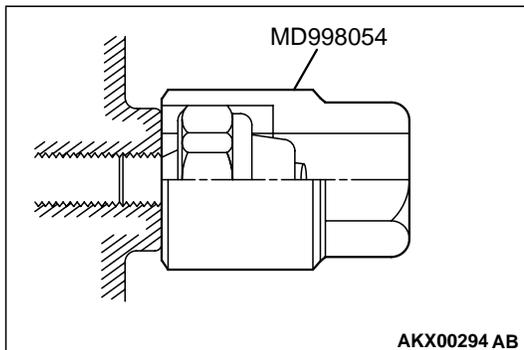
Standard value:

At idle: 29 kPa (4.2 psi) or more

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

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





CAUTION

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

9. Use special tool MD998054 to tighten the oil pressure switch to the specified torque.

Tightening torque: 10 ± 2 N·m (87 ± 17 in-lb)

10. Install the oil pressure switch terminal.

ENGINE OIL COOLER

REMOVAL AND INSTALLATION

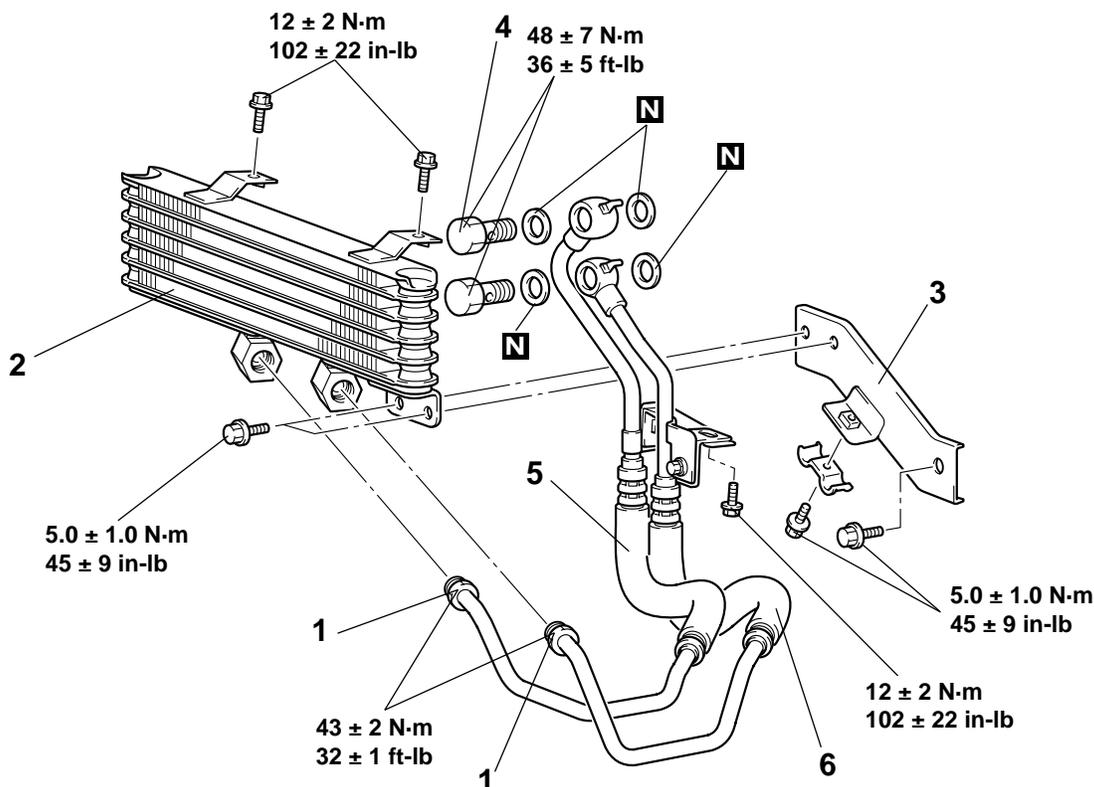
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Pre-removal Operation

- Skid Plate Under Cover Removal
- Radiator Shroud Lower Cover Removal (Refer to GROUP 14, Radiator P.14-8.)

Post-installation Operation

- Skid Plate Under Cover Installation
- Radiator Shroud Lower Cover Installation (Refer to GROUP 14, Radiator P.14-8.)
- Engine Oil Refilling and Level Check (Refer to P.12-3.)



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REMOVAL STEPS

1. OIL COOLER HOSE CONNECTION
A/T COOLER SIDE
2. OIL COOLER ASSEMBLY
3. BRACKET

REMOVAL STEPS (Continued)

4. EYE BOLTS
5. OIL COOLER RETURN HOSE
6. OIL COOLER FEED HOSE

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

M1121002200242

| ITEM | SPECIFICATION |
|---------------------------|------------------------------|
| Engine oil pan drain plug | 39 ± 5 N·m (29 ± 3 ft-lb) |
| Oil pressure switch | 10 ± 2 N·m (87 ± 17 in-lb) |
| Engine oil cooler | |
| Oil cooler bolt | 12 ± 2 N·m (102 ± 22 in-lb) |
| Oil cooler bracket bolt | 5.0 ± 1.0 N·m (45 ± 9 in-lb) |
| Oil cooler eye bolt | 48 ± 7 N·m (36 ± 5 ft-lb) |
| Oil cooler hose bolt | 43 ± 2 N·m (32 ± 1 ft-lb) |

LUBRICANT

M1121000400314

| ITEMS | ENGINE OIL | QUANTITY dm ³ (qt) |
|----------------|--|-------------------------------|
| Oil cooler | Engine oils displaying ILSAC certification symbol ("Starburst" symbol) or conforming to the API classification SJ EC or SJ/CD EC | 0.3 (0.32) |
| Oil filter | | 0.3 (0.32) |
| Total quantity | | 4.9 (5.14) |

ENGINE OIL

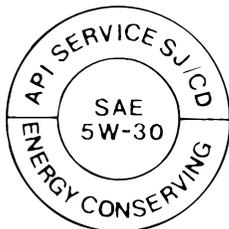
 CAUTION**Never use nondetergent or straight mineral oil.**

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

ILSAC CERTIFICATION MARK
("STARBURST" SYMBOL)

ACX00394AI

API SERVICE SYMBOL



ACX00886AB

If these oils are not available, an API classification SJ EC or SJ/CD EC can be used.