

## 1 Weep Hole Coolant Leak

### Condition

- The weep hole protects bearings from corrosion damage by preventing seepage of coolant into the pump body.
- In normal operation, traces of dried coolant may be visible around the hole. Coolant leak may be occurring if there is fluid around the weep hole or if the reservoir tank reaches low coolant levels within about a month.

### Cause

- Contamination and sludge has damaged the mechanical seal, reducing sealing performance.

### Cure

- Before installing the new water pump, flush the cooling system 2 - 3 times and let engine idle for about 3 minutes with the old pump to remove any sludge deposit.
- Replace the anti-freeze regularly at the specified mixture and fluid level.
- Do not use sealants (RTV) when gaskets are supplied.
- When sealants are necessary, apply evenly and do not allow excess to enter the water channel.

### ① Coolant degradation



New



38,000 km (23,000 miles) 4 years old

### ATTENTION

Older coolants have higher risks of leakage.

- Always flush the radiator and replace with new coolant.
- Replace coolant regularly.



## ② Fair and Poor, leak from the weep hole



**Normal** Dried coolant residue.



**Damaged** Large coolant bleed mark, dampness or dripping.

## ③ Fair and Poor, mechanical seal ceramic



**Normal** Clean ceramic.



**Damaged** Accumulated sludge (Contaminated coolant).

## 2 Seepage

### Condition

- Seepage from the mounting surface
- Fractured/deformed gasket
- Unevenly tightened bolts (one side)

### Cause

- Deterioration of the sealing performance caused by unevenly applied sealant (RTV)
- Deterioration of the sealing performance caused by the use of adhesives
- Sealants used on the O-ring deteriorated the elasticity of the rubber
- Bolts tightened unevenly
- Contamination (dirt/grime) on mounting surface
- Mounting surface dented caused by mishandling

### Cure

- Use manufacturer specified sealant
- Do not use sealants when gaskets are supplied
- Do not use adhesives in place of sealants or gaskets
- Install the new water pump in a diagonal (star) pattern and apply torque specified by the vehicle manufacturer
- Clean mounting surface free of contaminants
- Do not re-use old gaskets and previously applied sealant

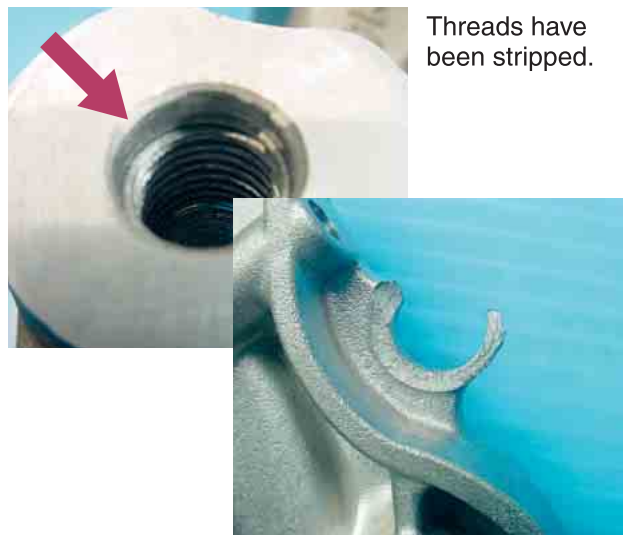


① Poor application of sealant



Sealant has interfered with the mechanical seal causing leaks.

② Excess torque of the mounting bolt



Threads have been stripped.

Unevenly tightened or over torqued.

③ Poor cleaning of the mounting surface



Insufficient accuracy on the mounting surface.

④ Sealant used on supplied gasket



Gasket performance has degraded.

## 3 Overheating

### Condition

- Corrosion of the impeller
- Fracture of the bearing
- Internal corrosion of the water pump body

### Cause

- Old/used coolant
- Coolant deterioration
- Insufficient flushing of the radiator

### Cure

- Discontinue use of old coolant
- Fully flush the radiator
- Replace coolant with manufacturer's specified mixture and fluid level

### ① Coolant degradation



Contamination of water pump body      Impeller corrosion

### ② Cavitation



Cavitation      Corrosion around crimp



## 4 Abnormal Noises

### Condition

- Rumbling sound heard when manually turning the pulley
- Abnormal wear at the base of the stud bolts
- Scratches and flecks found around the bearing during disassembly
- Contamination of the pulley seat

### Cause

- **Bearing fracture caused by excess belt tension**
- Bearing was fractured due to excess vibrations caused by misalignment of parts such as the fan coupling pulley
- Uneven torque of bolts resulted in bearing failure
- Contamination of the pulley seat

### Cure

- Tighten belt tension to vehicle manufacturer specifications
- If the fan coupling pulley is reused, confirm the run-out with a dial indicator
- Replace fan coupling pulley with new on older vehicles or high mileage engines
- Confirm that the bearing is lubed and free of rust, and replace if necessary

### ① Flecking at the pulley seat

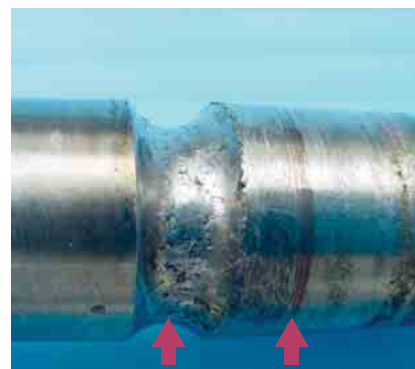


Flecking at the pulley seat



Damage at the stud bolt ends

### ② Flecking at the bearing



Damage due to  
overload and seepage

Damage due to  
excess backlash

**5 Other ① Failure arisen from coolant****Condition**

- Corrosion of the water pump due to poor flushing of the radiator, lack of regular replacement or reuse of old coolant

**Cause**

- Insufficient flushing of the radiator
- Coolant was not replaced or had been reused
- Incorrect coolant mixture or fluid level

**Cure**

- Fully flush the radiator
- Replace with new coolant when changing the water pump
- Use correct coolant mixture
- Fill system to the correct fluid level
- Bleed cooling system of air



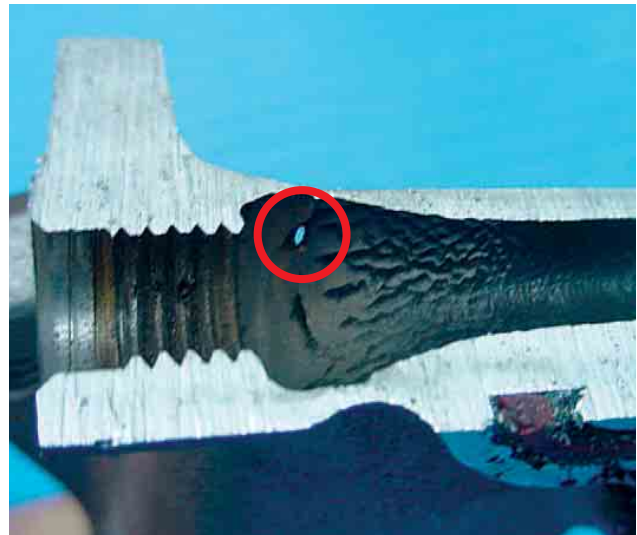
## Coolant

When replacing the water pump, flush the coolant system 2 to 3 times to wash out sludge, scale and rust deposits. Replace coolant to the manufacturer's specified mixture and fluid level. Re-using or using degraded coolant will corrode the body, impeller, and mechanical seals.

### ① Severely corroded impeller



### ② Fracture caused by cavitation



## Corrosion of impeller

No corrosion can be seen on the impeller when the coolant is clean.



Mileage: 48,000 km (30,000 miles)  
Period: Approximately 1.6 years  
Total mileage: 149,000 km (92,500 miles)

Corrosion can be seen on the impeller when the coolant is degraded (contaminated / deteriorated).



Mileage: 7,500 km (4,700 miles)  
Period: Approximately 1 year  
Total mileage: 105,000 km (65,000 miles)



## ② Trouble caused by incorrectly installed or damaged fan coupling

### Condition

- Fracture of the water pump body
- Fracture of the water pump bearing

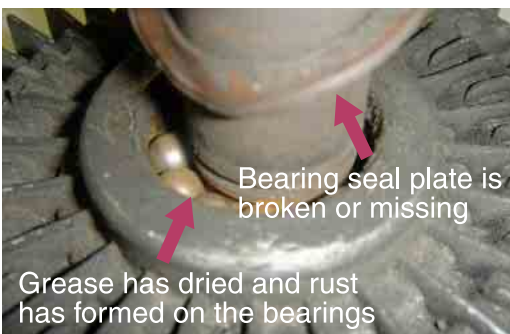
### Cause

- **Damaged fan coupling was reused**
- Fan coupling was not installed correctly (off-centered)

### Cure

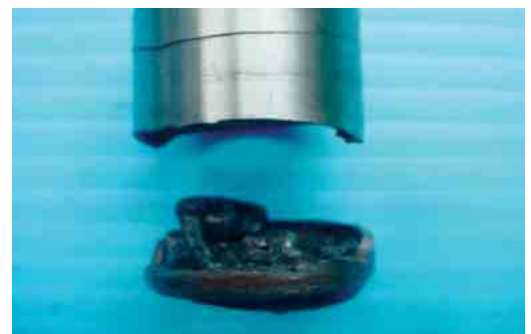
- Install new fan coupling when replacing water pump
- If fan coupling is reused, ensure that:
  - there is no binding or play in the bearing
  - the components are free of rust and debris
  - check for run-out with a dial indicator

### ① Enlarged view of a fan coupling



If usage is continued

### ② Fractured bearing



### ③ Fractured body

