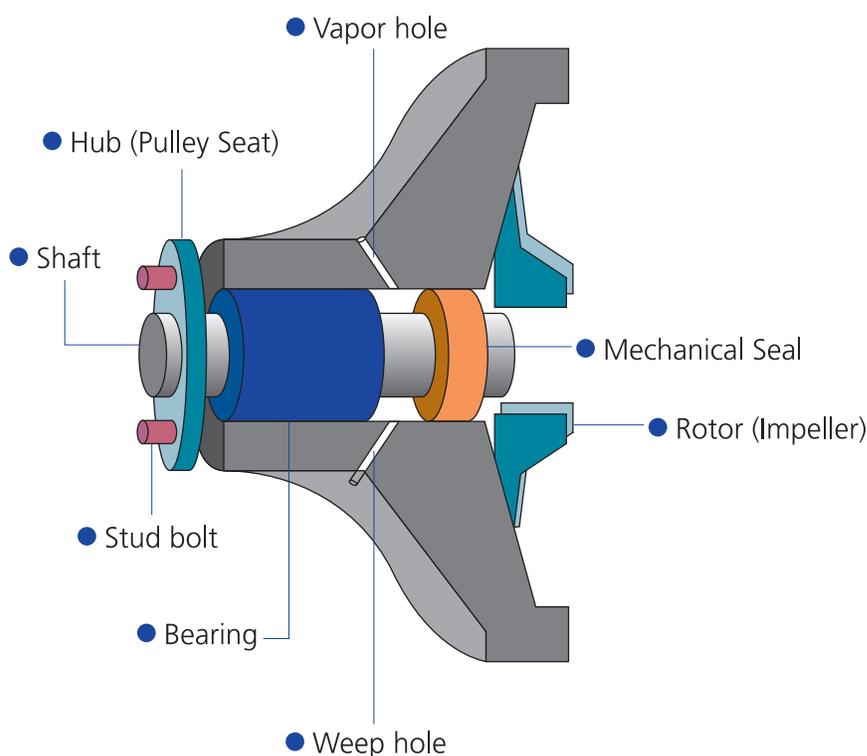




II Structure and Components

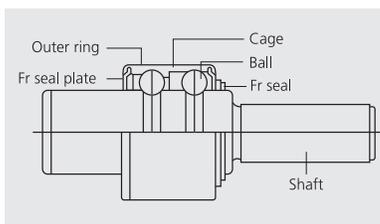
The structure of the water pump is comprised of the following components: pulley hub, body, shaft, bearing, mechanical seal and rotor (impeller). The shaft is mounted onto a bearing which is pressed into the water pump body. On one end of the shaft, a pulley hub is attached, while the other end is a rotor (impeller). The pulley hub transfers energy from the fan or timing belt into a rotation, spinning the shaft, therefore spinning the rotor. The rotor then circulates the coolant. A mechanical seal is installed to prevent leakage of coolant into the bearing and also supports the shaft for smooth rotation.



The body of the water pump is equipped with a vapor hole and a weep hole. The vapor hole relieves excess gas pressure seeping through the mechanical seal. The weep hole bleeds off excess coolant seeping through the mechanical seal. Both holes function as a safety to protect the shaft and the bearing from contamination.

Bearing

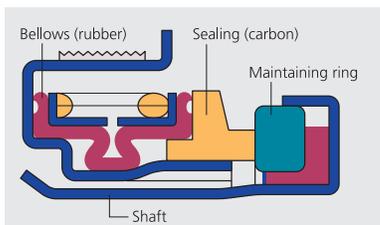
●Wear Resistance



The bearing relieves pressure on the shaft from the tension created by the fan or timing belt. Since pressure is continuously applied, a high quality bearing is of the utmost importance to protect the water pump from failing.

Mechanical Seal

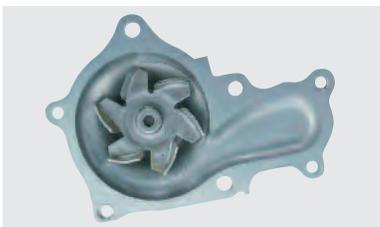
● Leakage Resistance



The mechanical seal prevents coolant leak as well as support the rotation of the shaft. The structure of the airtight seal and durable materials used also prevents unneeded noise and vibrations.

Pump Rotor

●Corrosion Resistance



Quality materials for the rotor are a necessity to create and maintain complex geometry for the optimization of coolant flow, as well as resisting corrosion from rust, scaling of coolant and cavitation.

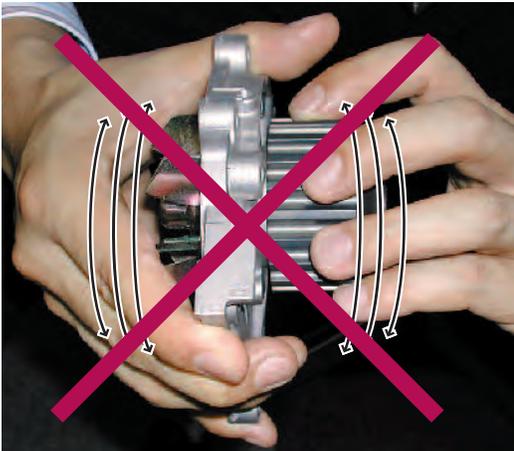
Pump Body



Quality materials are used to withstand heat, vibration and corrosion. Water channel is designed with optimal flow of coolant. Positioning of vapor hole and weep hole are key to prevent excess coolant from bearing and shaft contamination.

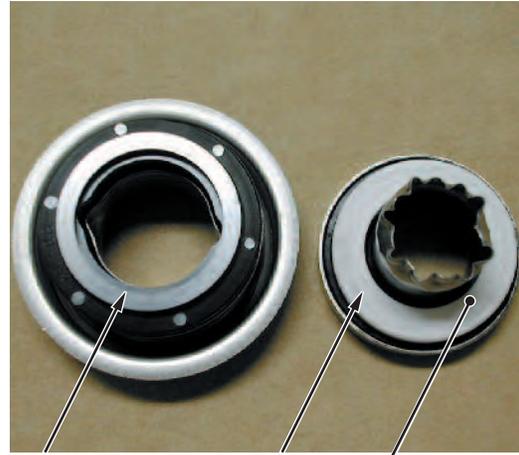
Do not manually turn the pulley before installation of the water pump. In the mechanical seal, the soft carbon block may create residue on the ceramic block, generating abnormal (squealing) noises during operation.

1. Do not dry turn the pulley!



WARNING!
Dry turning will damage the mechanical seal. Pre-lubricate before turning.

2. Seal Damage Example: Mechanical Seal Inner View



Dry turning will deposit carbon onto the ceramic block, causing squealing during operation.

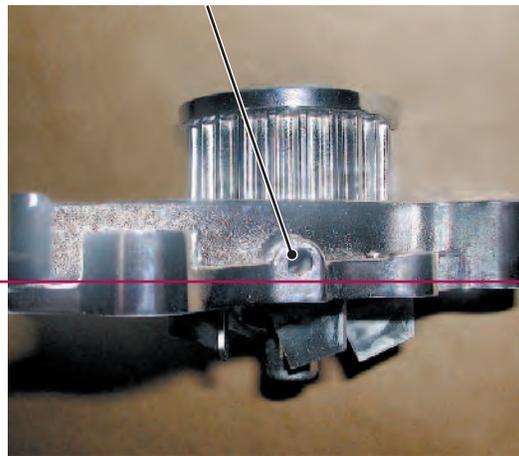
3. Pre-lubrication

Submerge the lower part of the pump body and the base of the rotor.



4. Water level

Caution: Do not submerge the weep hole or vapor hole in water.



Submerge the water pump body below the red line

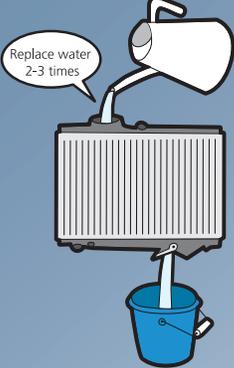
Precautions

It is recommended that the lower part of the water pump is submerged in water for approximately 3 minutes prior to installation. This is to form a layer of water between the carbon and ceramic blocks in the mechanical seal, and prevent abnormal (squealing) noises from being generated. (Some noise may be heard at initial start-up, but will disappear after engine warm-up.)

V Installation Procedure

1

Flush the radiator 2-3 times with water while letting the engine idle. This will remove scale, rust deposits and sludge from the coolant system.

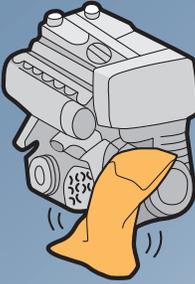


Replace water 2-3 times

Why? Prevents foreign materials from contaminating the new water pump mechanical seal.

2

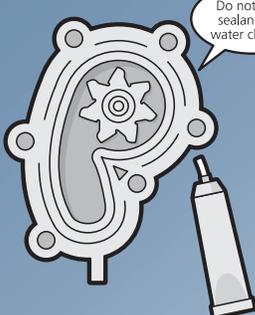
After engine is cooled down, drain water from step 1, remove old pump, gaskets and foreign materials left on the mounting surface. Thoroughly clean with non-abrasive solvent.



Why? Prevents leakage from the mounting surface.

3

If a sealant is needed, apply an even amount around the pump. Wipe off excess and make sure the sealant(RTV) does not intrude into the water channel.

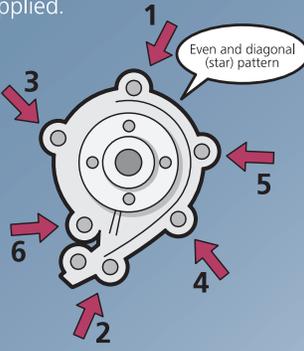


Do not allow sealant into water channel.

Why? Excess sealant material may damage the mechanical seal, which may cause pump failure.

4

Install the new water pump in a diagonal (star) pattern and apply torque specified by the vehicle manufacturer. Allow sealant(RTV) to cure if applied.



Even and diagonal (star) pattern

Why?

- Prevents leakage from the mounting surface.
- Prevents body damage from installation.
- Prevents body fractures caused by belt tension.

5

Confirm that the fan coupling is free of rust and contaminants. After installation, verify run-out tolerances specified by the manufacturer using a dial indicator.

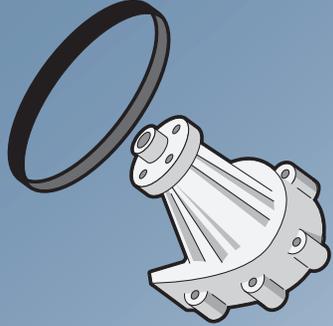


No foreign materials

Why? Prevents fractures and damage caused by belt tension.

6

Install the fan belt or timing belt and apply tension specified by the manufacturer.



Why?

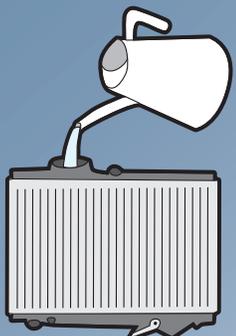
- Prevents fractures and damages caused by belt tension.
- Prevents noise.



V Installation Procedure

7

Refill with new coolant (LLC) to the mixture amount and volume specified by the vehicle manufacturer.



Why? Insufficient amount or incorrect mixture of coolant (LLC) will cause abnormal wear of the mechanical seal, which will cause coolant leak.

8

Bleed the air completely to ensure the engine, pump, radiator and reservoir are filled with the manufacturer specified amount of coolant.

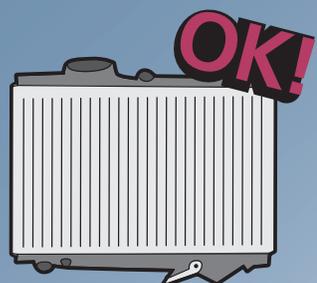


Why?

- Insufficient amount or incorrect mixture of coolant (LLC) will cause abnormal wear of the mechanical seal, which will cause coolant leak.
- Air bubbles may create additional cavitation which will corrode the rotor.

9

Reconfirm the amount of coolant(LLC) and belt tension. Start the engine and look for leaks.



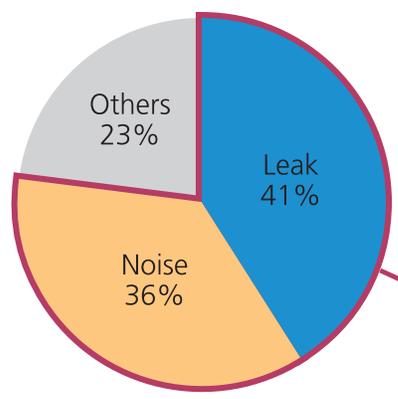
Why?

- Prevents coolant leak under normal operation.
- Prevents damage from installation



Caution Failure to follow recommended procedures may cause engine failure and injury.

Failure Rate by Cause (Customer complaints)



More than 75% of failures are due to complaints related to coolant leaks and noise occurring from the water pump.

To prevent most water pump problems from occurring, follow the 4 key steps described in the installation procedures from steps:

- ① Flush the radiator and coolant system regularly
- ⑥ Apply vehicle manufacturer specified belt tension
- ⑦ Re-fill with new coolant (LLC)
- ⑧ Bleed air completely

Preventive Maintenance *can save you time and money*

Your service technician will tell you that replacing your timing belt is critical to your engine's life. If it fails, severe engine damage such as bent valves can occur.

This is also true with the water pump, which is the *heart* of the cooling system. If the water pump fails, it can also cause severe engine damage, leading to a blown head gasket, or in the worst case, the whole engine may need replacement.

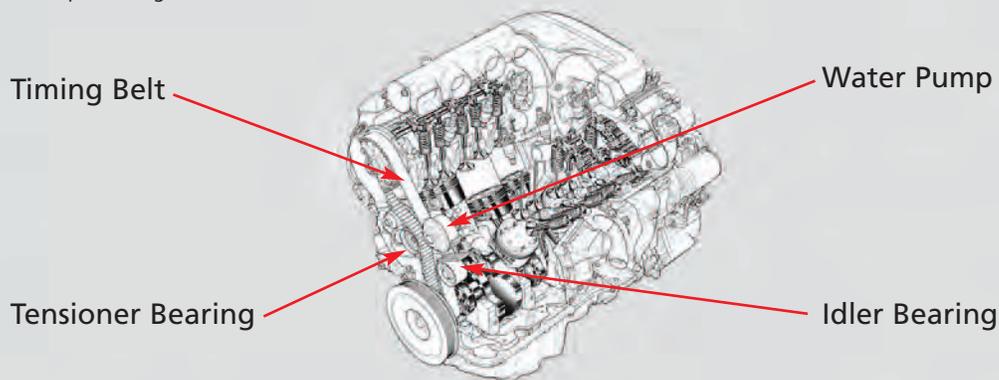
Did you know that the replacement of a typical timing belt is almost, bolt-for-bolt and nut-for-nut, the same process as for a water pump?

A typical timing belt replacement will include the timing belt and bearings. Since the life expectancies of these bearings (idler and tensioner) are about the same as the bearing inside your water pump, *it just makes sense* to replace these two critical engine parts at the same time, *saving you time, money and giving you peace of mind.*

Example Standard Labor Rate Comparisons

Vehicle Information				*Approximate Labor Time (Hours)				
Year	Make	Model	Motor	Timing Belt	Water Pump	Total	<i>Timing Belt & Water Pump</i>	<i>Hours Saved</i>
02-06	Toyota	Camry	3.0L V6	3.0	4.0	7.0	4.0	3.0
99-04	Honda	Odyssey	3.5L V6	5.0	5.0	10.0	5.0	5.0

* Time estimates per labor guides



- AISIN is the largest original equipment water pump manufacturer in the world.
- AISIN water pumps are original equipment on many European and Japanese vehicles.



VI Quick Reference

Water Pump Failures Abnormal noise

Location	Symptom	Cause
Bearing	Noise: Rumbling Locked bearing	<ul style="list-style-type: none"> ● Bearing fracture caused by excess belt tension ● Bearing fracture caused by excess vibration of the fan coupling pulley
Mechanical seal	Noise: Whining	<ul style="list-style-type: none"> ● Dry turning of the pulley caused carbon residue to form on the ceramic block ● Engine started without coolant
Pulley	Noise: Squeak	<ul style="list-style-type: none"> ● Slipping belt (insufficient belt tension)

Water Pump Failures Others

Location	Symptom	Cause
Impeller crimp	Damaged crimp	<ul style="list-style-type: none"> ● Corrosion caused by coolant degradation ● Insufficient flushing of the radiator
Impeller corrosion	Impeller wear/corrosion	<ul style="list-style-type: none"> ● Corrosion caused by coolant degradation ● Insufficient flushing of the radiator
Run-out of the pulley bearing	Pressure Leak	<ul style="list-style-type: none"> ● Excessive run-out of the fan coupling pulley ● Contamination (dirt/grime) on the mounting surface ● Sealant (RTV) applied unevenly

Water Pump Failures

Leakage

