Lecture-22

Fasteners, Gaskets, Seals, and Sealants (Part C)

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Contents

- Thread repairs
- Removing damaged fasteners
- Gaskets and seals

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Thread Repairs

Threaded holes in parts can become damaged, requiring repairs. A technician must be capable of repairing damaged threads quickly and properly.

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Minor Thread Repairs

- Minor thread damage includes nicks, partial flattening, and other less serious problems
- Minor damage can be repaired with a thread chaser or a thread file
  - the thread chaser is run through or over the threads to restore them

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Major Thread Repairs

- Badly smashed or stripped threads may be repaired with either a tap or die
- Tap
  - threaded tool for cutting internal threads in holes
- Die
  - cuts external threads on metal rods, bolts, shafts, and pins

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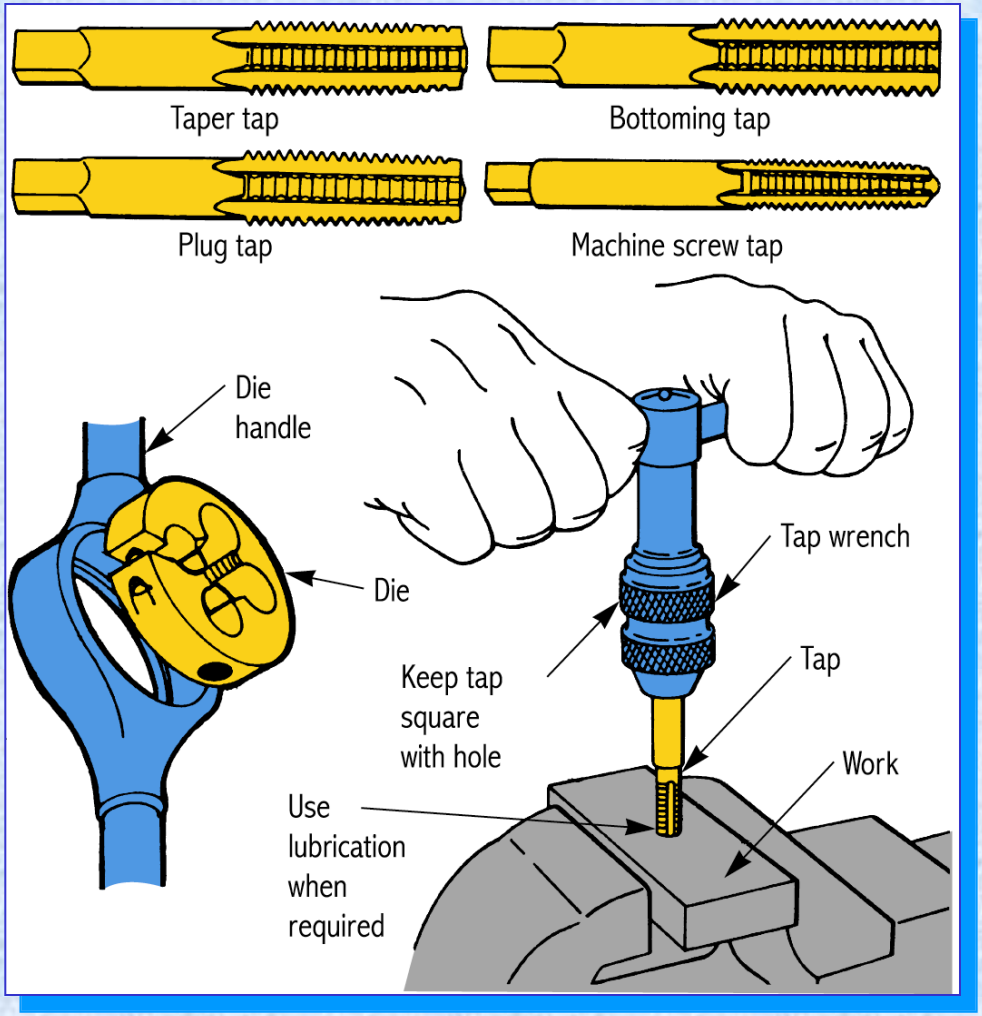
Tap and Die



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Using a Tap and Die

- Hold the handle squarely with the work
- Back the handle off to clean metal out of the threads
- Use a taper tap to start the threads
- Use a plug tap and a bottoming tap to cut the threads to the bottom of the hole

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Tap and Die Rules

- Never force a tap handle or the tool may break
- Keep the tap and die well oiled to ease cutting
- Use coarse threads when threading or tapping into soft metal, like aluminum
  - coarse threads will hold better than fine threads

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Tapping Oversize

- When threads cannot be restored, the hole can be drilled and tapped oversize
- Use a “drill and tap size chart” to choose a drill bit and tap
- Drill the hole one size larger than the original hole
- Cut new threads in the drilled hole
- Use a larger bolt in the threaded hole

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Thread Repair Insert

- Used when the use of an oversize hole and fastener is not acceptable
- Takes place of damaged internal threads
- Allows the use of the original-size bolt

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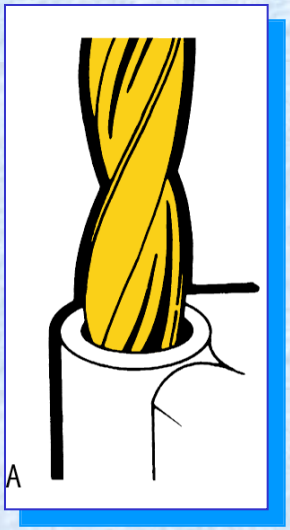
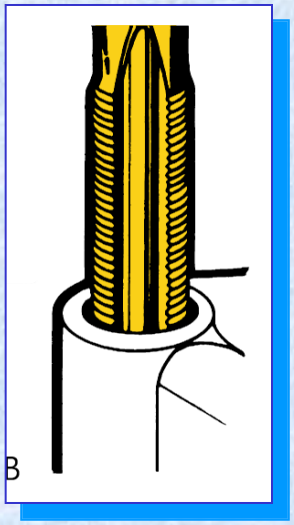
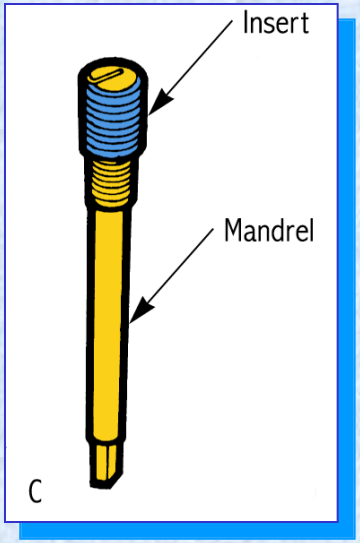
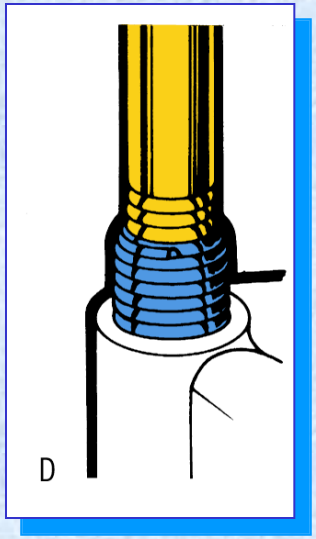
Using an Insert

A. Drill the hole oversize
B. Tap the hole oversize
C. Mount the insert on a mandrel
D. Thread the insert into the hole









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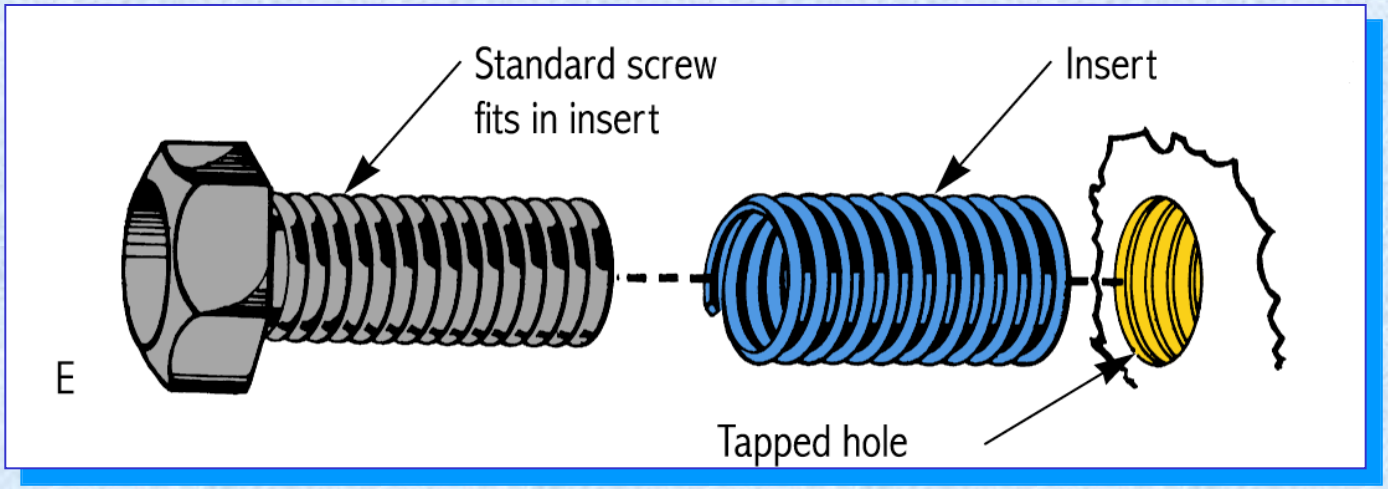
Using an Insert



Insert allows the use of the original-size bolt

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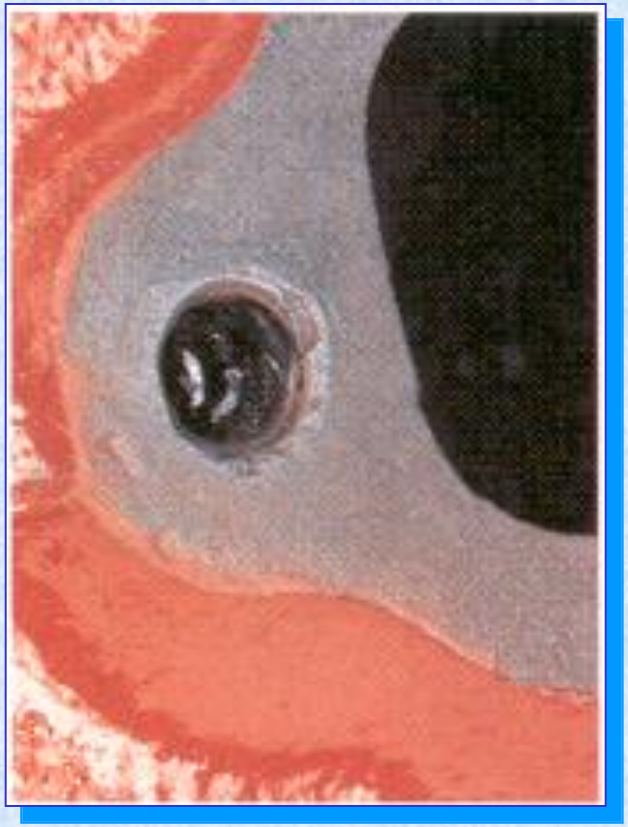
Using an Insert



Damaged threads before a repair

Installed insert

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Removing Damaged Fasteners

- An automotive technician must be able to remove broken bolts, screws, and studs, as well as fasteners having rusted or rounded-off heads
- Specific tools and methods are needed for removing problem fasteners

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Removal Methods

- Grasp a rusted or rounded head with locking pliers
- Use a stud puller or stud wrench
  - removes studs and bolts broken off above the surface of the part

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Removal Methods

- Cut a slot in the fastener with a hacksaw or weld on a nut to grasp
- Use a hammer and punch
  - angle the punch so that blows from the hammer can drive out the broken fastener
- Drill a hole almost as large as the inside diameter of the threads
  - use a tap or punch to remove the thread shell

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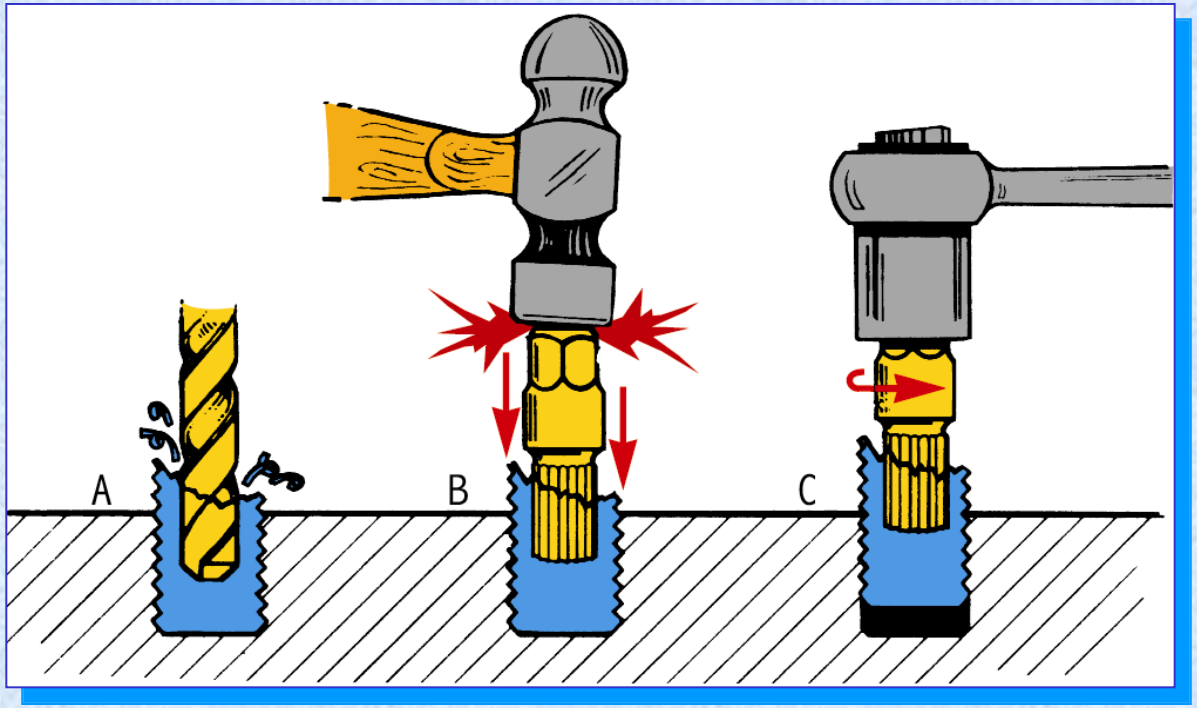
Removal Methods

Using a screw extractor



A. Drill a hole

B. Tap the extractor into the hole

C. Unscrew the extractor and bolt

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Removal Methods

Use rust penetrant to help ease turning and prevent fastener breakage

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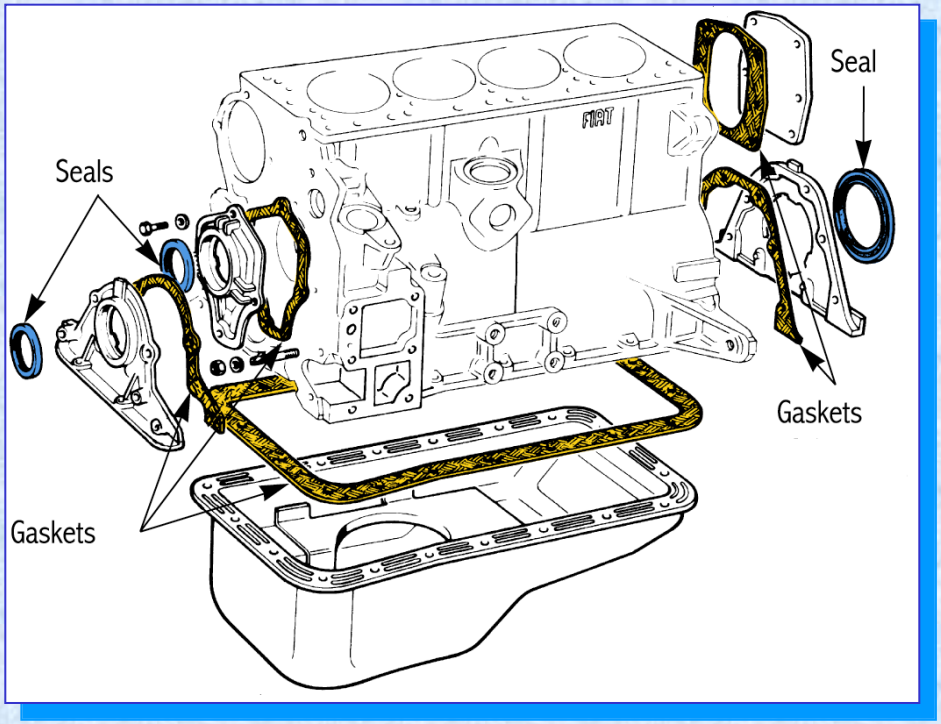
Gaskets and Seals



Used between parts to prevent leakage of engine oil, coolant, transmission fluid, and other fluids

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Gaskets

- Soft, flexible material placed between parts to prevent leakage
- Made of fiber materials, rubber, neoprene (synthetic rubber), cork, treated paper, or thin steel
- When parts are fastened together, the gasket material fills small gaps, dents, or scratches in the mating surfaces

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Gasket Rules

- Inspect for leaks before disassembly
- Be careful not to damage mating surfaces while removing parts
- Clean off old gaskets carefully
- Wash and dry parts thoroughly
- Compare the new gasket to the shape of the mating surface

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Gasket Rules

- Use a sealer if specified
- When assembling, start all bolts by hand
- Tighten fasteners in steps
- Use a crisscross tightening pattern
- Do not overtighten fasteners
  - apply only the specified torque

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Sealers

Gaskets are often coated with a sealer to help prevent leakage and to hold the gasket in place during assembly

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Types of Sealers

Type	Temperature range	Use	Resistant to	Characteristics
shellac	–65° to 350° F (–54° to 177° C)	general assembly: gaskets of paper, felt, cardboard, rubber, and metal	gasoline, kerosene, grease, water, oil, and antifreeze mixtures	dries slowly sets pliable alcohol soluble
hardening gasket sealant	–65° to 400° F (–54° to 205° C)	permanent assemblies: fittings, threaded connections, and for filling uneven surfaces	water, kerosene, steam, oil, grease, gasoline, alkali, salt solutions, mild acids, and antifreeze mixture	dries quickly sets hard alcohol soluble
nonhardening gasket sealant	–65° to 400° F (–54° to 205° C)	semipermanent assemblies: cover plates, flanges, threaded assemblies, hose connections, and metal-to-metal assemblies	water, kerosene, steam, oil, grease, gasoline, alkali, salt solutions, mild acids, and antifreeze solutions	dries slowly nonhardening alcohol soluble

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Form-in-Place Gaskets

- Used instead of conventional fiber or rubber gaskets
- Two common types are:
  - room temperature vulcanizing (RTV) sealer
  - anaerobic sealer

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RTV Sealer

- Also called silicone sealer
- Dries in contact with air
- Used to form a rubber-like gasket on thin, flexible flanges
- Available in tubes
  - has a shelf life of one to two years

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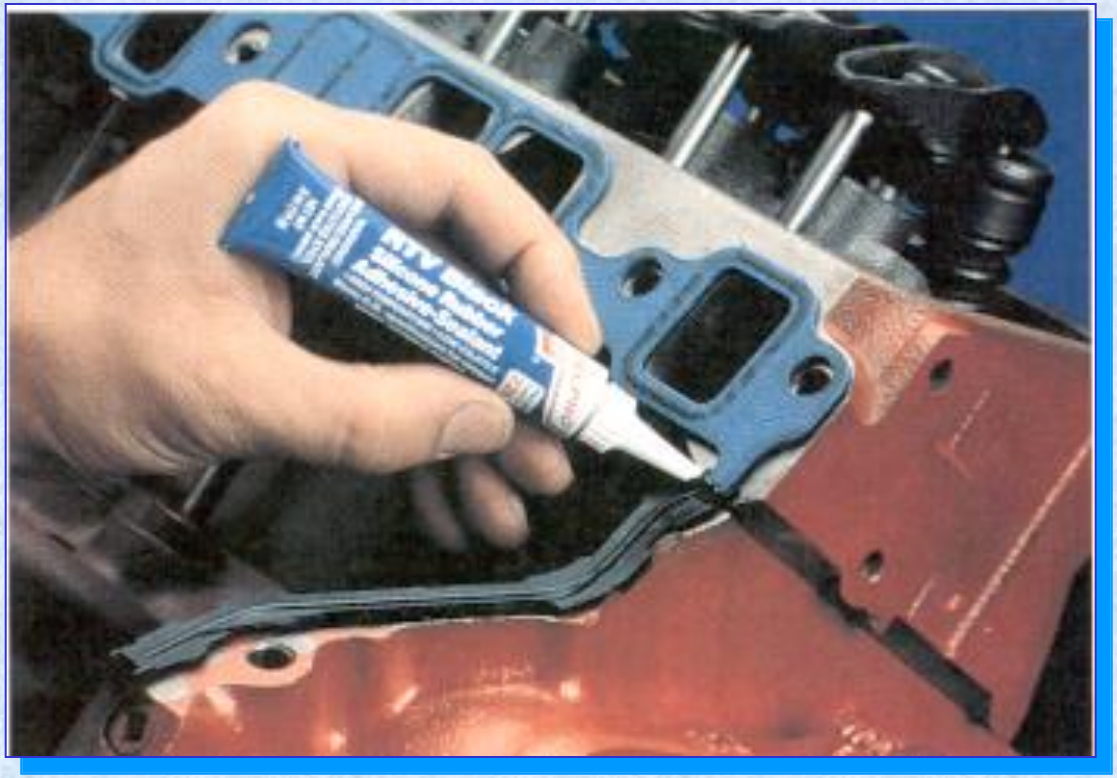
RTV Sealer



Commonly recommended where two different gaskets join

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Using RTV Sealer

- Apply in a continuous bead that is approximately 1/8” (3 mm) wide
- Circle all mounting holes
- Torque components in place while the RTV is still wet to the touch
  - within about 10 minutes of application

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Anaerobic Sealer

- Cures to a plastic-like substance in the absence of air
- Designed for tightly fitting, thick parts
- Used between two smooth, true surfaces

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Using Anaerobic Sealer

- Apply in a continuous bead that is approximately 1/16"–3/32" (1.5 mm–2 mm) wide
- Circle all mounting holes
- Torque components in place within 15 minutes of sealer application

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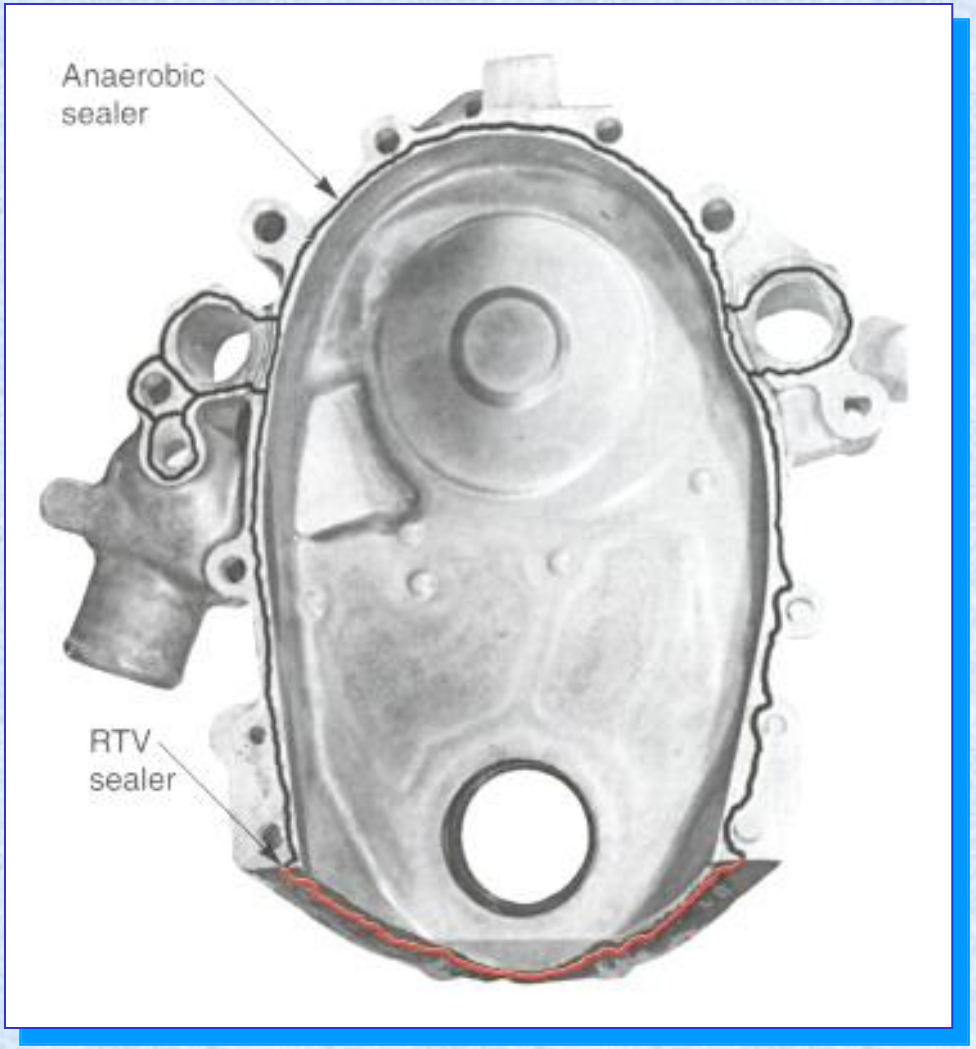
Using Sealers

Both anaerobic and RTV sealers are used on this water pump



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Seals

- Prevent leakage between a stationary part and a moving part
- Found in engines, transmissions, power steering units, and any part containing fluid and moving parts
- Made of synthetic rubber molded onto a metal body

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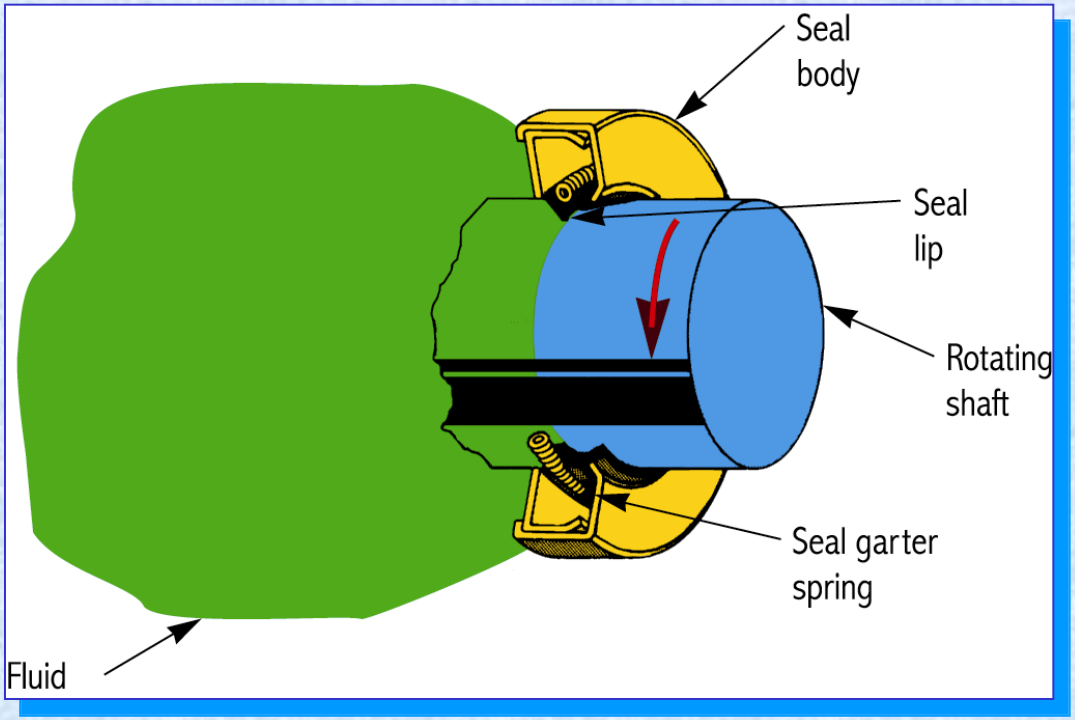
Seal Application



Seal lip faces the fluid and keeps it inside the part

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Seal Rules

- Inspect the seal for leakage before disassembly
  - if the seal is leaking, look for a bent shaft, misaligned seal housing, or damaged parts
- Remove the old seal carefully, without scratching the seal housing

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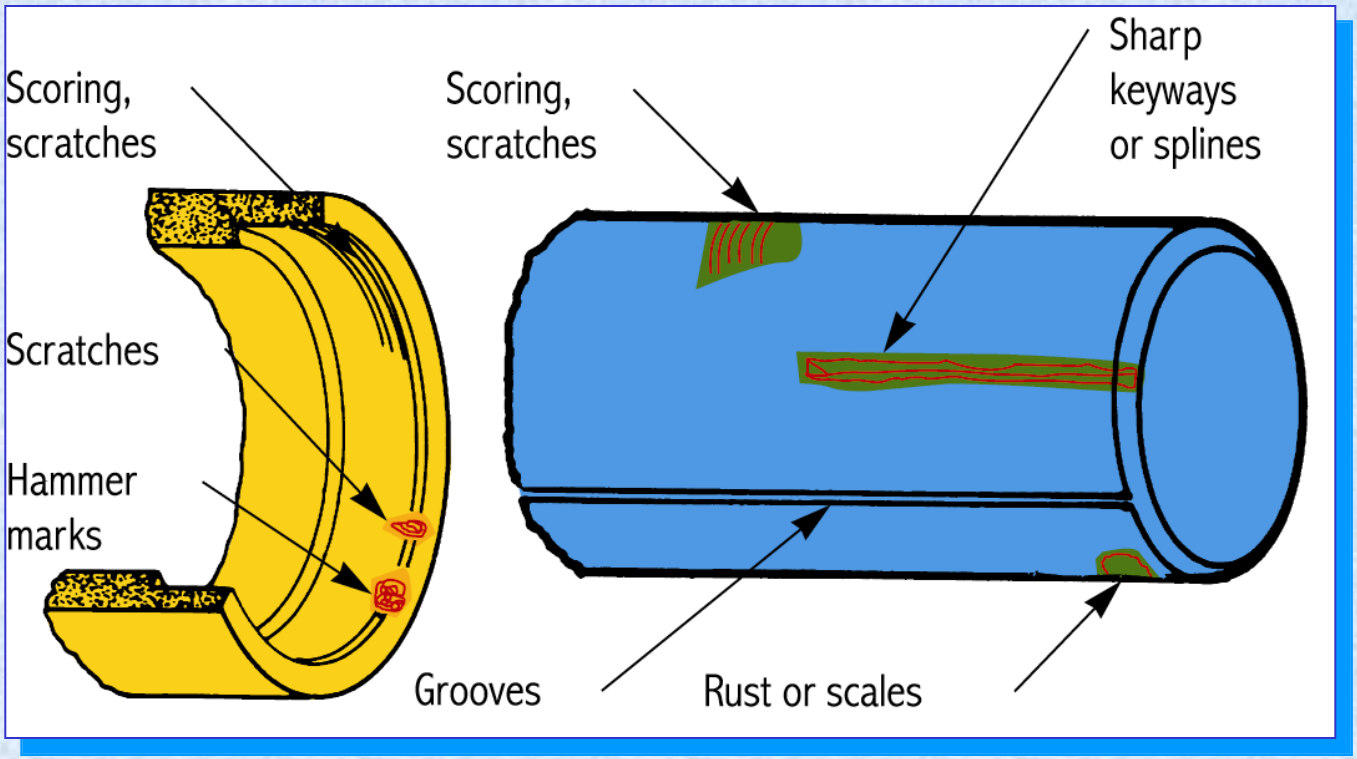
Seal Rules



Inspect shafts for wear and burrs

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Seal Rules

- Compare the old seal to the new seal
  - make sure the inner and outer diameters match before installation
- Install the new seal correctly
  - coat the outside with an approved sealer
  - coat the inner lip of the seal with system fluid
  - install the seal with the sealing lip toward the inside of the part

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O-Ring Seal

- Stationary seal that fits into a groove between two parts
- When the parts are assembled, the synthetic rubber seal is partially compressed to form a leakproof joint

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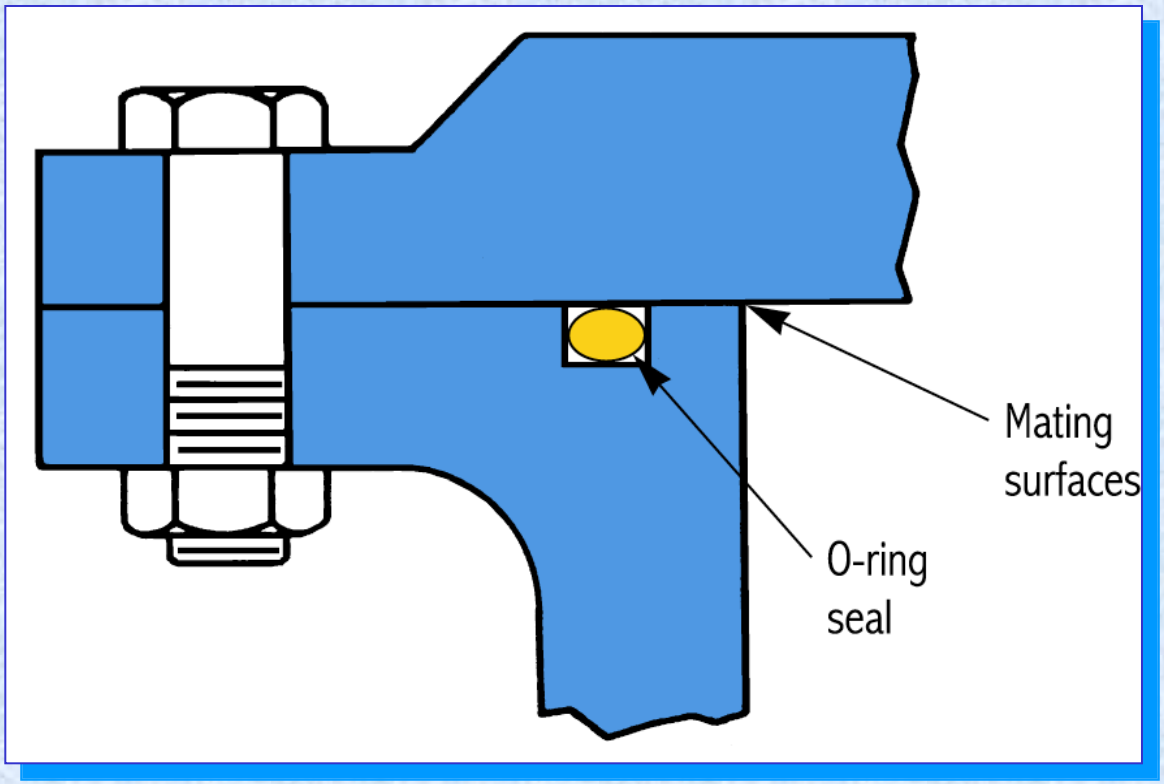
O-Ring Seal



Normally, the O-ring seal is coated with system fluid before installation

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Synthetic Seal

Specially-shaped seal that fits down into a groove formed in the part

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