

COOLING SYSTEM - VEHICLE

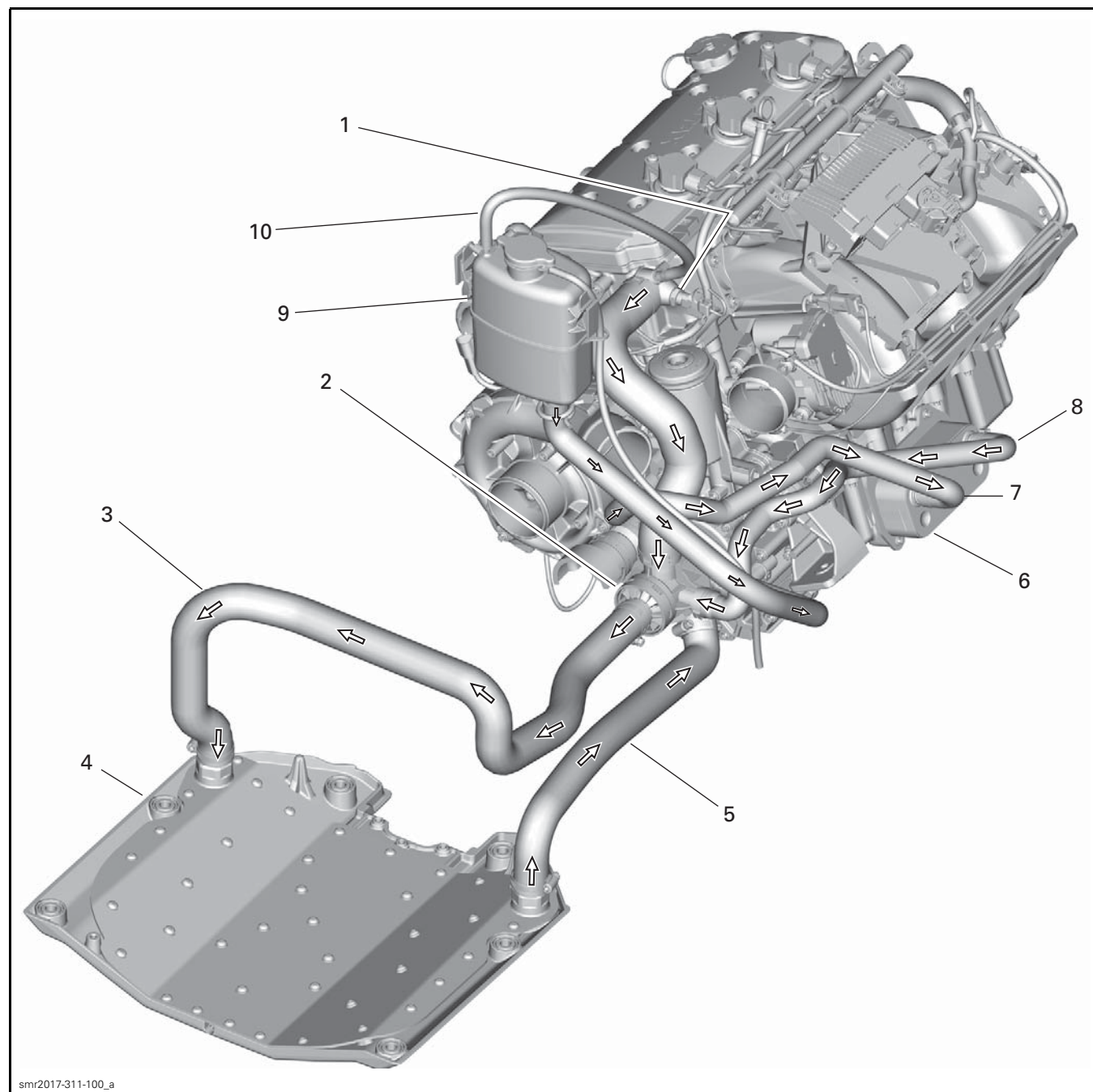
SERVICE TOOLS

Description	Part Number	Page
OETIKER PLIER.....	295 000 070	7
TEST CAP.....	529 035 991	6
VACUUM/PRESSURE PUMP	529 021 800	6

SERVICE PRODUCTS

Description	Part Number	Page
LOCTITE 567 (PIPE SEALANT)	293 800 013	5
LONG LIFE ANTIFREEZE(F)	619 590 204	4
LONG LIFE ANTIFREEZE	219 702 685	4

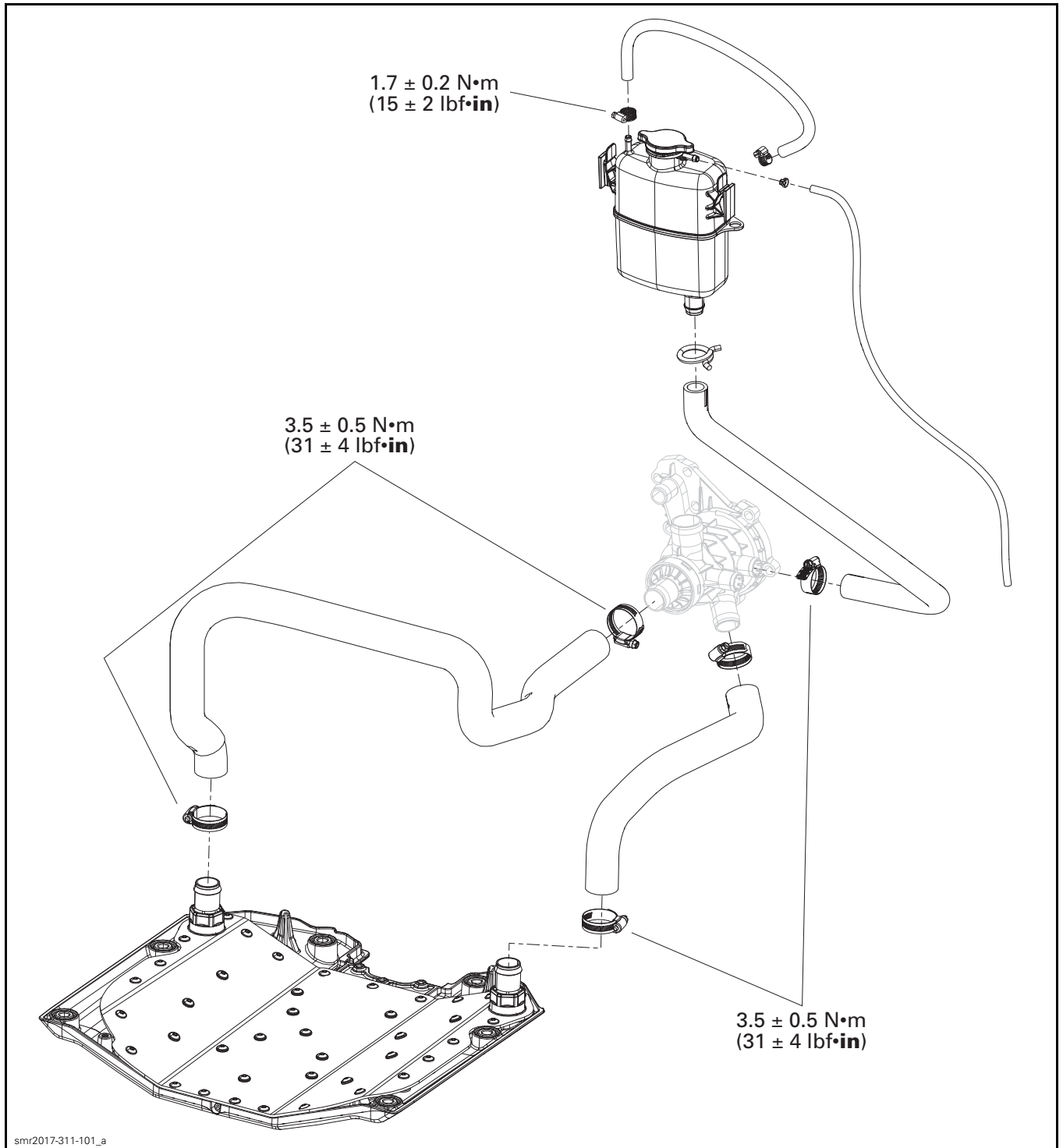
Cooling System (Closed loop)



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- | | |
|--|---|
| 1. Coolant temperature sensor (CTS) activates when monitoring beeper turns on at 110°C (230°F) | 6. Oil cooler |
| 2. Water pump cover / thermostat housing - Thermostat opens at 87°C (189°F) | 7. Coolant flows to oil cooler |
| 3. Coolant flows to ride plate | 8. Coolant returns from oil cooler |
| 4. Ride plate (operates as heat exchanger) | 9. Expansion coolant tank |
| 5. Coolant returns from ride plate | 10. Bleed hose from cylinder head to expansion coolant tank |

Cooling System Components



GENERAL

SYSTEM DESCRIPTION

A closed loop cooling system is utilized on the 1503 4-TEC engines, which offers an efficient engine cooling while keeping dirt and salt water out of the cooling system. This system keeps the temperature constant and prevents internal engine corrosion.

A separate coolant tank ensures that enough engine coolant is in the circuit during any operating condition.

The coolant flow comes from the water pump impeller into the cylinder block. It goes around the cylinders and straight up to the cylinder head. A smaller quantity of engine coolant enters the cylinder block on the exhaust side for a better cooling. In the cylinder head the water channels flow around the exhaust and then the intake valves and leave the engine through a large hose. From there the coolant goes back to the water pump housing and depending on the engine temperature, it flows through the thermostat directly back to the water pump impeller, or it takes its way through the heat exchanger.

Engine coolant is also directed towards the oil cooler (coolant type).

Coolant temperature sensor and bleed hose fitting are located on the cylinder head.

Technical Specifications

TYPE	Closed loop cooling system.
COOLANT FLOW	Flow from water pump.
TEMPERATURE CONTROL	Thermostat.
SYSTEM BLEEDING	Self-bleed type through coolant tank (hose at uppermost point of circuit).
MONITORING BEEPER	Turns on at 110°C (230°F).

MAINTENANCE

ENGINE COOLANT

 **WARNING**

To avoid potential burns, do not remove the coolant tank cap or loosen the ride plate drain plug if the engine is hot.

Recommended Coolant

COOLANT		
BRP recommended product	Finland, Norway and Sweden	LONG LIFE ANTIFREEZE(F) (P/N 619 590 204)
	All Other Countries	LONG LIFE ANTIFREEZE (P/N 219 702 685)
Alternative, or if not available	–	Distilled water and antifreeze solution (50% distilled water, 50% antifreeze)

If the recommended coolant is not available, use a low silicate, extended life ethylene-glycol premixed coolant (50%-50%) specifically formulated for internal combustion aluminum engines.

To prevent antifreeze deterioration, always use the same brand and grade. Never mix different brands or grades unless cooling system is completely flushed and refilled.

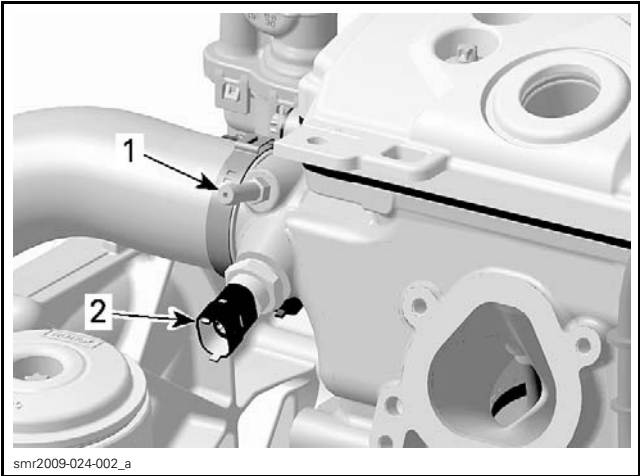
Draining the System

 **WARNING**

Never drain or refill cooling system when engine is hot.

Remove seat.

Install a drain pan underneath the ride plate.

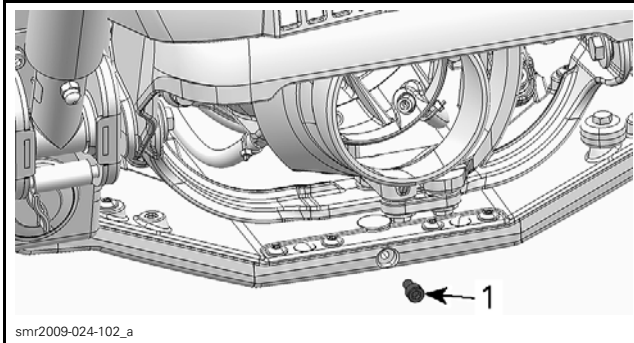


1. Bleed hose nipple
2. Coolant temperature sensor (CTS)

NOTICE Never modify cooling system arrangement, otherwise serious engine damage could occur.

Unscrew the drain plug on ride plate.

NOTE: Raising the front of the watercraft will contribute to drain the cooling system.



1. Coolant drain plug

Remove the coolant tank cap.

Dispose coolant as per local regulations.

Do not reinstall drain plug at this time.

Cleaning the System

NOTICE Cleaning the cooling system as per the following procedure is required when engine overheats (assuming everything else is operating normally) or each time coolant is replaced.

Drain the cooling system.

Add a cleaning product such as the Zerex® Super Cleaner by Valvoline (or an equivalent) in coolant tank then fill cooling system with demineralized water.

Reinstall cap on coolant tank.

Install watercraft in a test basin or ride on a water plane. Start engine and run for approximately 15 minutes.

IMPORTANT: Ensure thermostat opens so that the cleaning product flows in ride plate properly.

Stop engine and let the cleaning product work for 12 to 16 hours.

Thereafter, engine can be run one last time to soak off deposits.

Drain and thoroughly rinse the cooling system with clean fresh water.

Refill cooling system as described below.

Refilling the System

Watercraft should be level, engine cold and drain plug removed for refilling.

Place a container under drain plug to collect antifreeze.

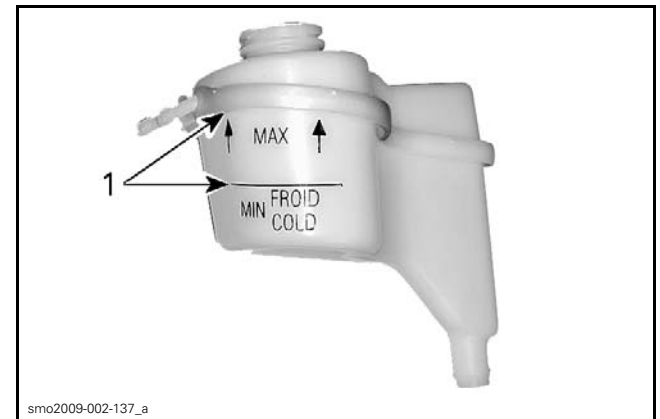
Apply LOCTITE 567 (PIPE SEALANT) (P/N 293 800 013) on drain plug threads.

Ask someone to pour recommended antifreeze in coolant tank.

When antifreeze flows out from the ride plate drain hole, reinstall drain plug. Torque drain plug to specification.

TIGHTENING TORQUE	
Drain plug	8.5 N•m ± 0.5 N•m (75 lbf•in ± 4 lbf•in)

Continue to pour and fill coolant tank between marks.



1. Level between marks when engine is cold

Do not install pressure cap at this time.

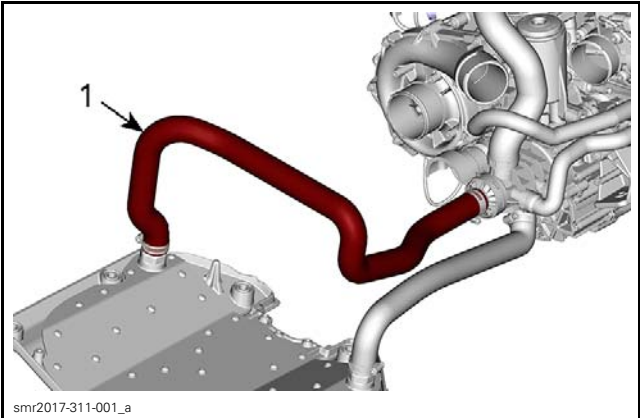
Link a garden hose to the hose adapter at the back of the watercraft. Refer to *FLUSHING THE EXHAUST SYSTEM* in the *EXHAUST SYSTEM* subsection.

NOTICE Never run engine without supplying water to the exhaust system.

Start engine and let run for a maximum of 2 minutes. Stop engine and wait 15 minutes to cool down. Refill tank as necessary.

NOTICE Never run engine longer than 2 minutes. Drive line seal has no cooling when watercraft is out of water.

Repeat this run-stop cycle 2-3 times until thermostat opens and stop engine.



1. This hose becomes hot when thermostat opens

Last, refill coolant tank and install pressure cap.
When engine has completely cooled down, recheck coolant level in the coolant tank and top up if necessary.

INSPECTION

COOLING SYSTEM LEAK TEST

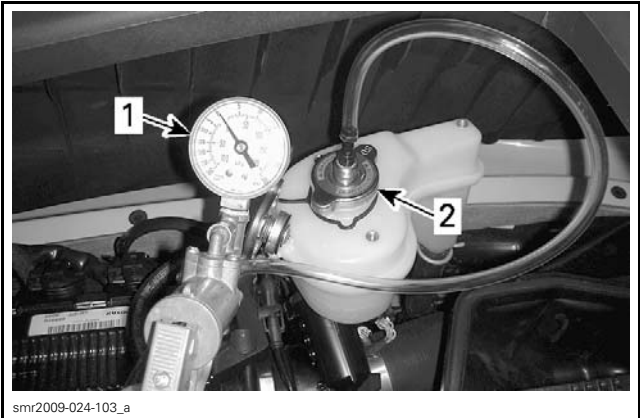
 **WARNING**

To avoid potential burns, do not remove the coolant tank cap if the engine is hot.

NOTE: This test confirms if there is a leak in the cooling system, including the engine.
Pressurize cooling system through coolant reservoir.

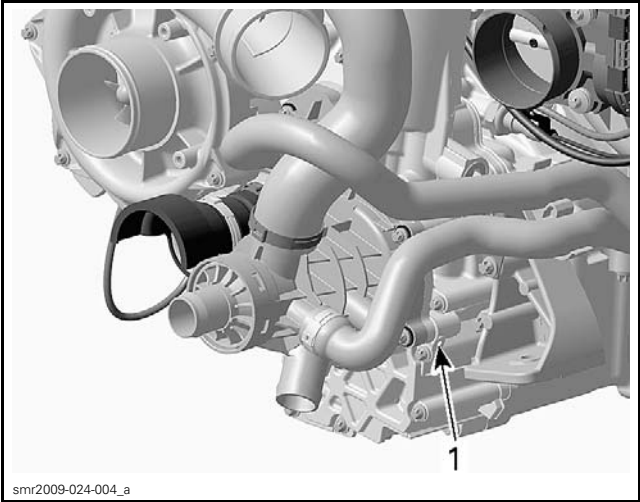
REQUIRED TOOL	
TEST CAP (P/N 529 035 991)	
VACUUM/PRESSURE PUMP (P/N 529 021 800)	

COOLING SYSTEM LEAK TEST
110 kPa (16 PSI)



TYPICAL
1. Vacuum/pressure pump
2. Test cap

If pressure drops, check all hoses, heat exchanger and engine for coolant leaks. Spray a soap/water solution and look for air bubbles.
Check the leak indicator hole if there is oil or coolant leaking.
NOTE: In general leaking coolant indicates a damaged rotary seal. Leaking oil indicates a damaged oil seal. If either seal is leaking, both seals must be replaced at the same time. Refer to *WATER PUMP* in *COOLING SYSTEM - ENGINE* in the appropriate engine shop manual.



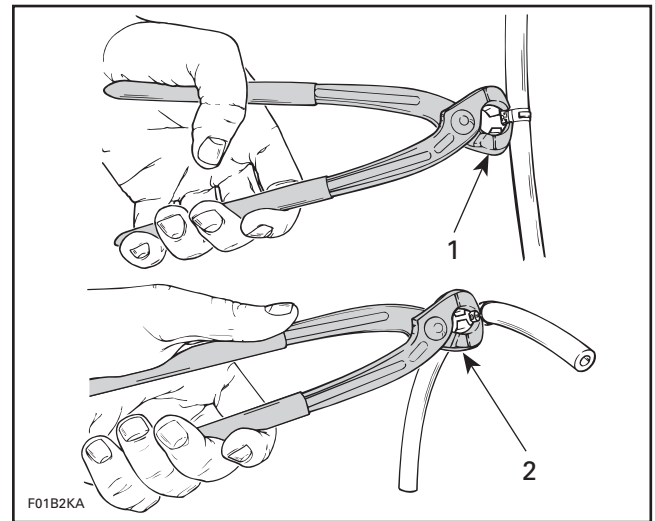
1. Leak indicator hole

TROUBLESHOOTING

The following is provided to help in diagnosing the probable source of troubles. It is a guideline and it should not be assumed to list all possible problems.
Always check for fault codes. If a fault code is detected, service the fault code first. Refer to *DIAGNOSTIC AND FAULT CODES* subsection.

ENGINE OVERHEATING

1. Low coolant level.
- Refill and check for leaks (coolant leaking out of engine leak indicator hole, hoses or clamps missing/defective, cylinder head gaskets leaks, ride plate leaking, etc.). Repair or replace.
2. Air in cooling system
- Refill and bleed cooling system.
3. Thermostat defective (does not open when engine gets hot)
- Replace thermostat housing.
4. Water pump failure
- Inspect and replace defective components.
5. Water temperature sensor defective
- Check or replace. Refer to *ELECTRONIC FUEL INJECTION (EFI)*.
6. Ride plate or hoses damaged
- Check or replace damaged components.
7. Exhaust system clogged
- Flush exhaust system.
8. Internal passage blocked in cooling system
- Inspect and clean.



1. Cutting clamp
2. Securing clamp

NOTE: Always check general condition of hoses and clamp tightness.

PROCEDURES

PRESSURE CAP

Testing the Coolant Reservoir Cap

Using a pressure cap tester, check cap opening pressure. If opening pressure is out of range, install a new pressure cap.

CAP OPENING PRESSURE	
Opening range	90 kPa $\pm$ 10 kPa (13 PSI $\pm$ 1.5 PSI)

CLAMPS

Replacing the Oetiker Clamp

REQUIRED TOOL	
OETIKER PLIER (P/N 295 000 070)	