



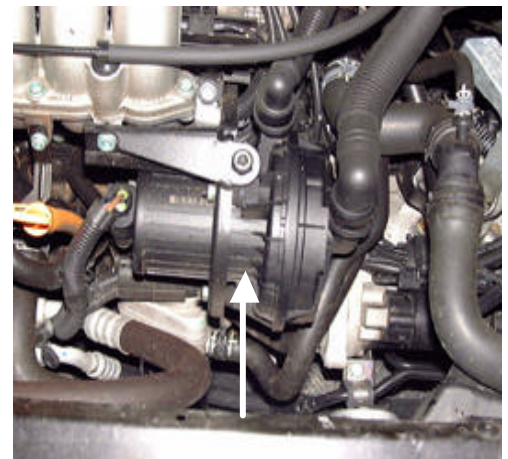
Secondary air injection system (SAI)

General

To achieve a further reduction of the exhaust emission during the cold start and warm up, some vehicles have an additional secondary air system fitted. This system reduces the CO and HC emissions.

Function

Under the condition that enough residual oxygen is present in the exhaust and that the temperature is high enough, the CO and HC react in a secondary reaction to produce CO₂ and H₂O. To ensure that during the cold start and warm up, when the mixture is rich, enough oxygen is available for this reaction, additional oxygen is supplied to the exhaust. On vehicles with a 3 way catalytic converter and a lambda system the secondary air system is switched off when the engine operation temperature is reached. Additionally, the secondary reaction developed heats the catalytic converter and it reaches operating temperature faster. The secondary air can be supplied actively or passively. The passive system uses the pressure change in the exhaust pipe. Through the vacuum, developed through the flow speed, the additional air is drawn in through a switching valve. The active system uses an additional pump by which the air is blown in. The active system has the better control possibility.



Secondary air pump

Causes of failure

A faulty secondary air system can produce the following fault symptoms:

- High emissions after the cold start and during the warm up



Causes of failure:

- Faulty pump
- Missing supply voltage / ground
- Plugged / leaking Hoses
- Faulty switching valve

Fault diagnosis

For the fault diagnosis consider the following steps:

- After the cold start the secondary air pump must be heard.
- Visual check of all electrical connections for damage and correct size.
- Visual check of the air hoses for damage and correct routing / fitting.
- Check of the vacuum hoses for damage correct size / routing.
- Check of the control valve with a manual vacuum pump. The control valve must open and close smoothly.
- Check the supply voltage and ground/earth of the secondary air pump. Usually the voltage supply is carried out via a relay, which is switched by the ECU (for example Ford Galaxy 2,0)