



Compressor Damage

Air Conditioning No Longer Operates After Eliminating Leakage or Following Air Conditioning Service

After replacing air conditioning components and following normal service to the air conditioner, frequently the air conditioning no longer operates properly either immediately after completion of the work or a short time later.

What does customer complaint about?

Originally the vehicles come to the garage with the customer indicating that “the air conditioning no longer cools properly” or “the air conditioning does not cool at all”.

What is done in the garage?

In such cases, it is usual to first check the quantity of refrigerant in the circuit. Here, it is frequently noted that the quantity of refrigerant in the system is insufficient. Since up to 10% of the refrigerant can diffuse out of the air conditioning system within a year, depending on the type of system, or leakage may be present in the system, the air conditioning is filled directly with refrigerant and a leak detection additive to check for leakage or the system is checked for any possible leak with the aid of nitrogen. Then, a leaky component (Figure 1) in the refrigerant circuit is replaced or only the filter/drier element is replaced depending on the results of the test. The system is then evacuated properly and charged with refrigerant and oil in conformance with the manufacturer’s specifications.

When the air conditioning is put back into operation, it is possible that the compressor no longer has any output. If the pressure values indicated in the service station are considered, it is noticeable that the values on the high and low pressure sides are virtually identical (Figure 2). This allows the suspicion that the flow through the refrigerant circuit is insufficient, e.g. at the expansion valve, or that the

Figure 1

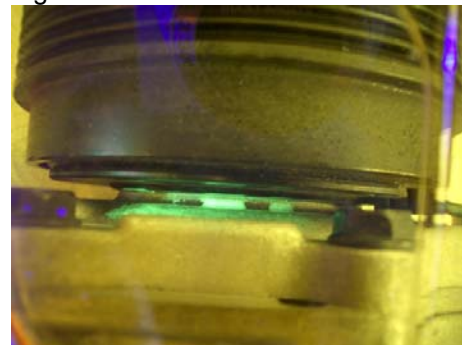


Figure 2





compressor is defective.

Strangely enough, there are also cases where the initial test on the air conditioning system indicate that the high and low pressure values are within the normal range and only the quantity of refrigerant is too low and that the problems will be solved after properly recharging the air conditioning system. As a result of the evacuation and recharging procedures, contamination particles or metal abrasion can become loose and deposited in the compressor control valve (Figure 3) or in the expansion valve/throttle valve (Figure 4) leading to malfunctions. This occurs particularly when the filter/drier is excessively old or the system has been "overcharged".

What can be done?

If problems arise, the compressor should be removed and the oil drained. If the oil has a "grey discoloration" (when contrast agent is used (grey-green or grey-yellow) resulting from fine metal particles (Figure 5), it is necessary to properly flush the refrigerant circuit due to the foreign particles, replace the expansion valve and filter/drier and evacuate the refrigerant circuit again in conformance with specifications and recharge the system with refrigerant and oil. The system should then operate properly.

Is customer sufficiently informed?

Since the garage only submitted a cost estimate for finding the leak and, where applicable, replacing the leaky components or for air conditioner service only, difficulties can arise with the customer when attempting to justify the cost. Frequently, the customer is not willing to pay the significant additional costs for items such as replacing the compressors and flushing the system. For this reason, a detailed discussion with the customer describing the technical facts and risks is particularly important.

What are the causes for compressor failure?

The compressor is the only moving component in the refrigerant circuit and must be supplied with a sufficient quantity of oil. Another purpose of the oil in the refrigerant circuit is to cool the compressor to prevent it from overheating. If a compressor is operated over a longer period of time with too little refrigerant (e.g. due to leakage), this leads to insufficient dissipation of the heat and lubrication of the compressor components because the oil is transported

Figure 3



Figure 4



Figure 5





through the air conditioning system by the refrigerant. The overload to the compressor components results in formation of metallic abrasion on the components leading to partial or complete clogging of the control valve contained in the compressor. This clogging of the control valve leads to the compressor no longer operating properly. This can only be corrected by proper replacement of the compressor which also includes “flushing” the system. Insufficient lubrication leads to damage on all types of compressors, however, output regulated compressors react particularly sensitively to lack of refrigerant or oil.

Note for garage and particularly for personnel receiving vehicles to be repaired

When receiving vehicles on which the customer complains about insufficient air conditioning performance, it is best to indicate that damage could have already occurred to the compressor due to lack of lubrication resulting from an insufficient quantity of refrigerant which could make it necessary to replace the compressor. In cases of doubt, always remove the compressor and if the oil is contaminated “flush” the system before replacing the compressor. If the customer requests you to proceed in any other manner, it is advantageous for the garage to note this on the repair bill or to have it confirmed by the customer in writing.

This technical information was compiled in cooperation with the compressor manufacturer SANDEN and applies to all known compressor manufacturers and compressor models presently on the market.