



## Flushing

### Flushing the air-conditioning system and its components

Air-conditioning systems are flushed to remove impurities and damaging substances from the refrigerant cycle. The following information has been drawn up to provide support for users new to the subject of "flushing air-conditioning systems" by answering important points such as:

- Why air-conditioning systems need flushing at all
- What the term "flushing" means in connection with vehicle climate systems
- What types of impurities are eliminated by "flushing" or what effects these kinds of impurities have
- Which methods of flushing exist and how they are used.

#### **Why should a vehicle air-conditioning system be flushed at all?**

Faulty system components (old filter-dryers (photo), compressor damage etc.) can lead to dirt particles that are swept along by the refrigerant being distributed in the whole air-conditioning system. If, for example, only the compressor is replaced following compressor damage, dirt particles can collect in the new compressor in no time and lead to the destruction of the newly installed system components as well as the expansion valve/orifice tube or multi-flow component – with expensive follow-on repairs the logical consequence. To avoid this, the system must always be flushed out following component damage that could lead to soiling of the refrigerant cycle through metal filings, rubber abrasion etc.! In the meantime, the process of flushing is also required by many vehicle or compressor manufacturers (e.g. Ford + GM / Sanden + Visteon).





## What does the term "flushing" mean in connection with vehicle climate systems?

The term "flushing" is used to describe the process of removing impurities or damaging substances from the refrigerant cycle. Flushing is necessary for professional repairs to be carried out, expensive follow-on repairs to be avoided, guarantee claims against suppliers to be upheld and customer satisfaction to be ensured.

## What types of impurities are eliminated by "flushing" or what effects do these kinds of impurities have?

- Abrasion with compressor damage:  
The material particles block expansion valves, orifice tubes or multi-flow components (condenser, evaporator).
- Humidity:  
Expansion valves and orifice tubes can freeze up. As a result of chemical reactions between refrigerants and refrigerant oils and humidity, acids can be formed that make pipes and O-rings porous. System components are damaged by corrosion.
- Elastomers (rubber):  
The elastomer particles block expansion valves, orifice tubes or multi-flow components.
- Soiled refrigerant oil or refrigerant:  
Soiled refrigerant or the mixing of different refrigerant oils can also lead to acids being formed. These can make pipes and O-rings porous. Further system components can be damaged by corrosion.





## Which methods of flushing exist and how are they used?

1. Chemical agent
2. Refrigerant

### **1.) Chemical agent (flushing liquid):**

The connection pipes or system components must be flushed **individually**. They are flushed using a chemical agent (flushing liquid) with the aid of a universal adapter on a flushing pistol. Following the flushing process, nitrogen must be used to remove the flushing medium residue from the refrigerant circuit and to dry the refrigerant circuit. The air-conditioning nitrogen set 150 (part no. 8PE 351 310-111) is suitable for this purpose



### **Recommendation:**

**Maximum efficiency is achieved by combining the use of flushing liquid and nitrogen. First, even stubborn particles and hardened deposits are eliminated by flushing with flushing liquid. The subsequent blowing out with nitrogen dries the refrigerant circuit and the components again.**

### **Disadvantage:**

Costs for the chemical cleaning agent and its professional disposal, as well as additional installation costs for removing and replacing pipes and components.

### **2.) Refrigerant:**

When flushing with refrigerant (R134a), the existing air-conditioning service station is upgraded by adapter and filter elements in order to flush liquid refrigerant through the refrigerant circuit.



Disadvantage:

Only loose dirt particles and oil can be removed from the system. In addition, adaptation panels are required for flushing to be carried out properly. These adaptation panels increase the costs for this method on account of the additional installation and removal work involved. The service station is not available for other vehicles during the application.



Tube&fin

**Note:**

Whereas tube & fin and serpentine components are usually easy to clean, it is often not possible to clean components using "multi-flow" technology at all. If there is any doubt about the cleaning success where these components are involved, the components must be replaced.



Serpentine

After the refrigerant circuit has been flushed, care must always be taken that a sufficient quantity of new oil is filled into the system. The following quantities (% of the total oil content) serve as a reference:

<b>denser:</b>		10%
<b>Dryer/accumulator:</b>	10%	
<b>Evaporator:</b>		20%
<b>Hoses/pipes:</b>	10%	



Multi-flow



**Flushing set 100** (part no.: 8PE 351 310-001) has been designed for flushing with flushing liquid and comprises the following items:

- Pistol with plastic tapered connection (resistant to oil and acids)
- A spiral hose that can be stretched to up to 2 m for connection to the supply bottle
- Supply bottle (1 litre, operating pressure 4.5 to 6.5 bar) with suspension bracket and pressure relief valve (24 bar), quick connector with manometer in bar and psi and bleeding valve
- Wall bracket with dowels and screws
- Plastic tank (5 litres) for collecting the used flushing liquid used
- Connection cover for the plastic tank, with 2.5 m transparent hose and tapered connector
- 2 attachment clips for tapered connector
- Operating instructions in 8 languages



To be able to apply compressed air to the air-conditioning system flushing set 100, a ¼" adapter with right-hand thread is required, which is not included in the scope of delivery on account of different hose and adapter systems used in the European countries.

**Behr Hella Service supplies the following flushing liquid for the flushing process:**

Part no.: 8FX 351 310-081: (1000 ml)

Part no.: 8FX 351 310-071: (3785 ml)



## **Air-conditioning system nitrogen set 150**

(part no. 8PE 351 310-111) for drying the flushed system is described in the Technical Information "Air-conditioning system nitrogen set 150".





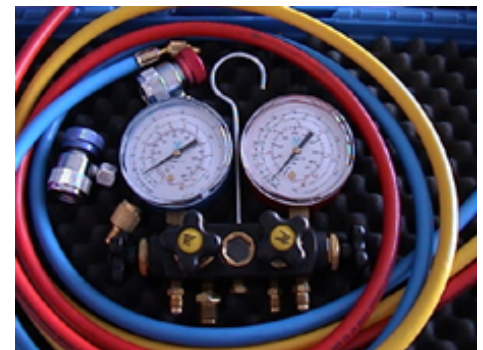
## **General notes on flushing:**

- Always read the respective operating manuals, instruction leaflets, vehicle manufacturers's specifications, safety data sheets etc. carefully
- Before and during work, always observe the respective safety regulations, including the Technical Information "Handling refrigerants" and "Removal and installation instructions".
- Compressors, dryers/accumulators, expansion valves and orifice tubes cannot be flushed.
- Please make sure that all dirt or damaged components have been removed from the refrigerant circuit.
- Make sure that there is no residual flushing agent residue in the system by blowing the system components sufficiently dry with nitrogen (do not use compressed air). Use the air-conditioning system nitrogen set 150 (part no. 8PE 351 310-111)
- Fill the compressor with the correct quantity/specification of oil (PAO-Oil 68 is particularly suitable). Make sure you fill the correct quantities for the components flushed.
- Before starting operation, spin the compressor 10 times by hand first.
- After installing the compressor, start the engine first and then run the air-conditioning system at idling speed for a few minutes.
- Replace the filter-dryer or accumulator and the expansion valve or orifice tube.
- Following correct evacuation, fill the refrigerant circuit with the prescribed quantity of refrigerant.
- Only R134a may be used as a refrigerant.
- Carry out system pressure, function and leak tests.
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**If the above-mentioned points are not kept, warranty will expire!**



**PAO-Oil 68**



**4-valve manifold gauge set**  
Part no.: 8PE 351 216-131  
(To be used with: 2x 8PE 351 216-111)