

AC System Maintenance - System Flushing



Flushing is considered as one of the most basic and important service procedures, especially when replacing the AC compressor or whenever the system has been diagnosed by inner clogs. A proper flushing is highly recommended by AC experts and the major manufacturers of compressors. Please notice, depending on the given market and AC service products available, there may be differences in type, shape and name of tools recommended for flushing in this poster. To find the most suitable solution available on your market, consult your local AC spare parts & service tools distributor or contact one of Nissens sales offices www.nissens.com/contact

Why flush the system?

REASONS



RIGHT-FIRST-TIME REPAIR

Avoid annoying and expensive repeat repairs of the system and compressor related issues. **Save your time and your customer's money.**



WHEN INSTALLING A NEW COMPRESSOR

Because of the importance of lubrication, it is strongly recommended (and required by many compressor producers) to flush the system whenever a new compressor has been installed. **Installing a new compressor to a contaminated system will cause the new part to fail quickly.**



PROPER SYSTEM PERFORMANCE

In general, to perform properly the AC system must be clinically clean inside the loop.

Refrigerant and lubricant working in high temperatures and pressures, as well as components with precise mechanisms, require cleanliness for the optimal operation. Impurities, refrigerant and oil contaminants, or improper use of additives can quickly cause clogs in the thin system channels, e.g. receiver dryer, condenser tubes, expansion devices, and compressors' ECU/MCV valves. This will lead to a decrease in the system's performance and will cause serious and costly component damage.

Whenever the system has been diagnosed with clogs, stoppages, receiver dryer failures, excessive or improper use of additives such as UV dye or stop leaks agents, it is highly recommended to perform a flushing.



PROPER LUBRICATION

Lubrication is absolutely crucial for the compressor's vitality. Precise mechanical parts of the compressor's inner mechanisms are designed to work in a tight fit, with a thin lubricating oil film on the surface enabling them to work properly and avoid seizing in high temperatures.

The only way to ensure the proper volume of the lubricant in the system during a service cycle is flushing and filling an empty system with the right type and volume of oil.

Besides the compressor, there are other components in the system that needs lubrication - expansion valve/ orifice tube, sealants.



Causes of the most common system contaminants that require an immediate flushing



Overheating causing oil to carbonize and clogging particles to arise

Application of wrong/universal oil or oil-mixing causing improper lubrication and compressor seizure

Improper use of additives or wrong additives that crystallize or cause particles to arise and clog the system/seize the compressor

Moisture in the system causing oxidation and seizure

How flush the system?

RECOMMENDED METHODS



FLUSHING DETERGENT

The process is performed by means of a specially composed flushing detergent. The agent is circulated throughout the loop by use of a dedicated flushing machine, or can be injected directly from a pressure container.

Excellent cleaning properties. Dissolves all sorts of particles, sludge, stubborn soil and residues. Highly recommended.

CAUTION! The cleaning agent residues must be thoroughly removed after flushing. Circuit must be dried by vacuum.



REFRIGERANT & FILING STATION

System is flushed by means of the R134a refrigerant circulated by the filling station. The station must be equipped with a flushing function, specially designed filters and a container to collect contaminants.

NB. Effectively cleans loose particles. Very ineffective for cleaning serious sludge and soils.



REFRIGERANT DIRECTLY FROM BOTTLE

System is flushed by means of the R134a refrigerant circulated in the loop by heating up the bottle. Additional bottle for contaminated gas is needed, as well as an adapter and hose set ensuring proper system connection.

Use a supplementary inspection glass tool to spot possible contaminants.

DO NOT FLUSH, DETACH BEFORE FLUSHING



COMPRESSOR

DO NOT FLUSH, BYPASS, INSTALL NEW AFTER FLUSHING

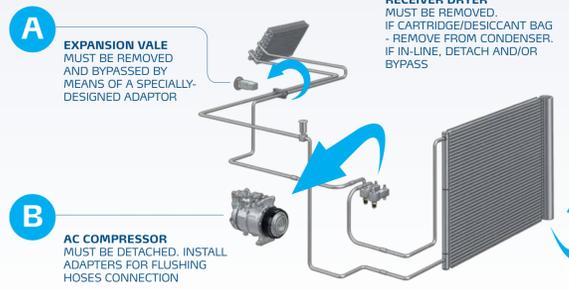


EXPANSION DEVICES

RECEIVER DRYER OR ACCUMULATOR

STEP-BY-STEP FLUSHING PROCEDURE BY MEANS OF R134 / R1234YF REFRIGERANT

1 DETACH / BYPASS COMPONENTS THAT ARE NOT TO BE FLUSHED

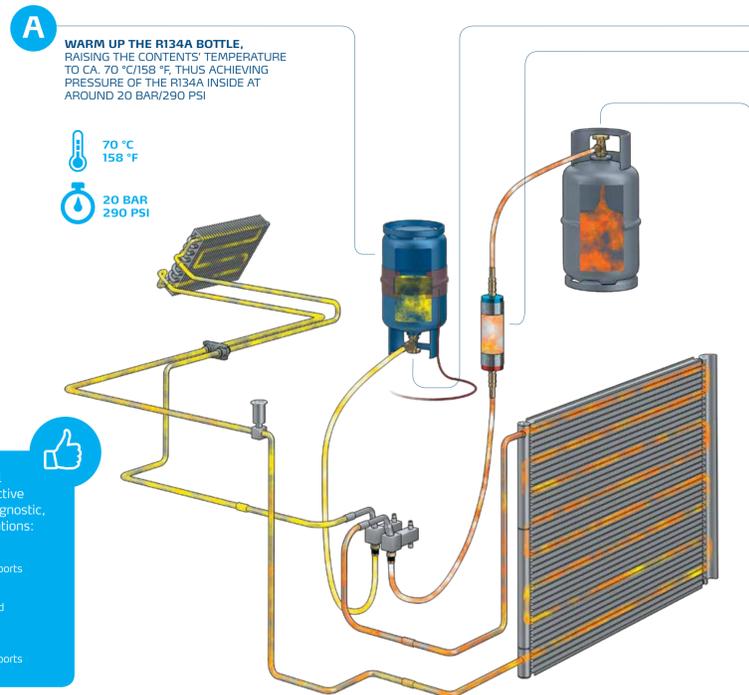


A EXPANSION VALE MUST BE REMOVED AND BYPASSED BY MEANS OF A SPECIALLY-DESIGNED ADAPTOR

B AC COMPRESSOR MUST BE DETACHED. INSTALL ADAPTERS FOR FLUSHING HOSES CONNECTION

C RECEIVER DRYER MUST BE REMOVED. IF CARTRIDGE/DESICCANT BAG - REMOVE FROM CONDENSER. IF IN-LINE, DETACH AND/OR BYPASS

3 WARM UP THE REFRIGERANT AND START FLUSHING. OBSERVE AND DOCUMENT POSSIBLE CONTAMINANTS



A WARM UP THE R134A BOTTLE, RAISING THE CONTENTS' TEMPERATURE TO CA. 70 °C/158 °F. THUS ACHIEVING PRESSURE OF THE R134A INSIDE AT AROUND 20 BAR/290 PSI

B OPEN THE VALVE TO START FLUSHING - HAVING ACHIEVED THE REQUIRED PRESSURE, VALVE OPENING WILL START THE FLUSHING

FLUSH THE SYSTEM UNTIL THE BOTTLE IS EMPTY. IT TAKES AROUND 3-5 MINUTES

C OBSERVE THE INSPECTION GLASS TO ASSESS THE LEVEL OF CONTAMINATION, AND TO SPOT POSSIBLE PARTICLES AND IMPURITIES BEING WASHED OUT FROM THE SYSTEM

D CLOSE THE CONTAINER BOTTLE AFTER THE FLUSHING PROCESS IS DONE

THE CONTAMINATED GAS CAN NOW BE RECOVERED AND CLEANED BY AN AC SERVICE STATION

E PULL A VACUUM TO REMOVE ALL RESIDUAL GAS/MOISTURE FROM THE LOOP

F REPEAT THE PROCESS IN CASE OF VERY STUBBORN DIRT AND SOIL CONTAMINATING THE LOOP

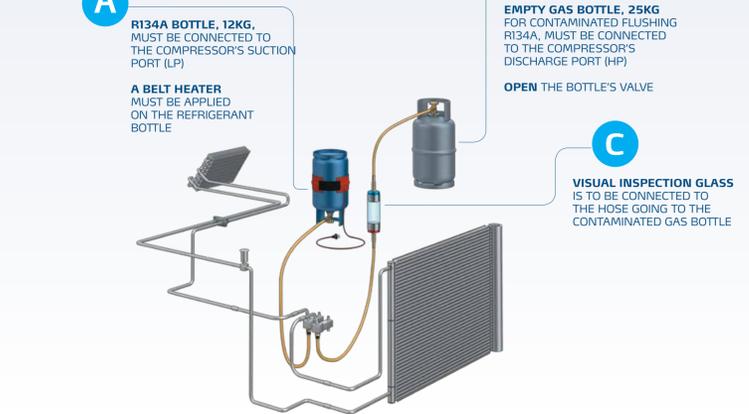
A low-cost and useful tool recommended for an effective system contamination diagnostic, performed in various situations:

BEFORE FLUSHING
Connected to vehicle's service ports

DURING FLUSHING
Connected before contaminated refrigerant container

AFTER FLUSHING
Connected to vehicle's service ports

2 CONNECT THE AC LOOP WITH THE FLUSHING SET AND EVACUATE THE SYSTEM



A R134A BOTTLE, 12KG, MUST BE CONNECTED TO THE COMPRESSOR'S SUCTION PORT (LP)

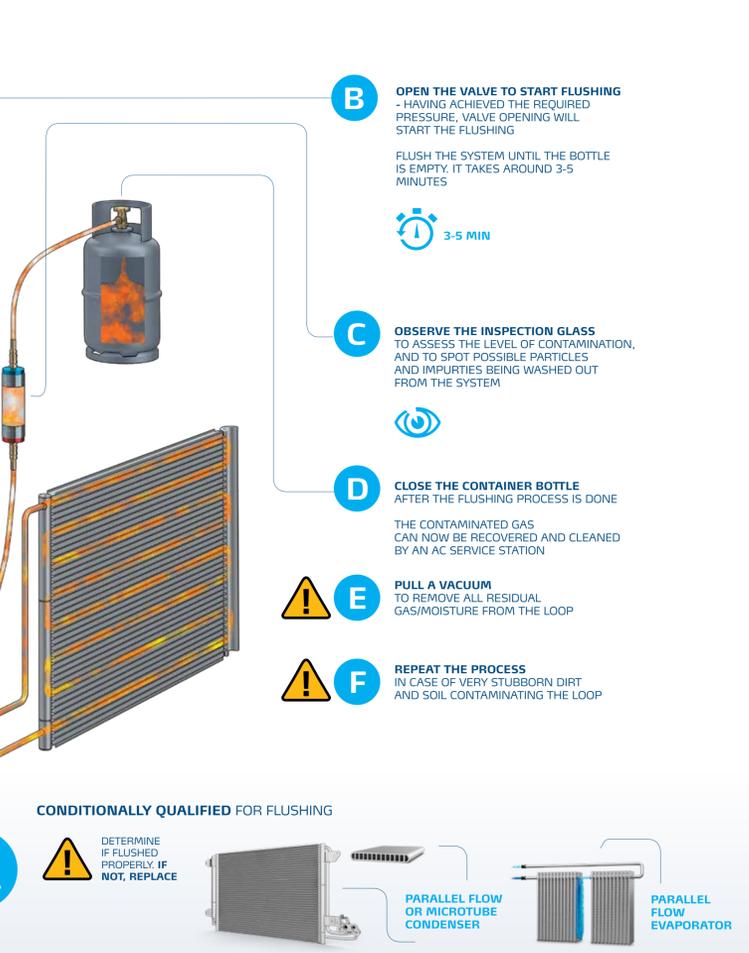
B EMPTY GAS BOTTLE, 25KG FOR CONTAMINATED FLUSHING R134A, MUST BE CONNECTED TO THE COMPRESSOR'S DISCHARGE PORT (HP)

OPEN THE BOTTLE'S VALVE

C VISUAL INSPECTION GLASS IS TO BE CONNECTED TO THE HOSE GOING TO THE CONTAMINATED GAS BOTTLE

D EVACUATE THE SYSTEM USING A FILLING STATION OR OTHER SERVICE EQUIPMENT. EVACUATE THE CONNECTED EMPTY BOTTLE AND REMAINING COMPONENTS OF THE AC LOOP AT THE END, CARRY OUT TIGHTNESS CONTROL

E DETERMINE IF FLUSHED PROPERLY. IF NOT, REPLACE



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CONDITIONALLY QUALIFIED FOR FLUSHING

PARALLEL FLOW OR MICROTUBE CONDENSER

PARALLEL FLOW EVAPORATOR

What must be flushed out?

POSSIBLE CONTAMINANTS

- CARBONIZED OIL PARTICLES** - a side effect of oil exposed to excessively high operating temperatures
- ELASTOMER (RUBBER) PARTICLES** - arising due to aggressive acids causing the porosity of rubber parts
- MOISTURE** - caused by leakages, improper or insufficient vacuum, and improper or bad quality additives
- METAL SLIVERS / CHIPS** - typically in case of compressor seizure and metal parts abrasion
- AGGRESSIVE ACIDS** - as a result of chemical reaction between moisture/ and refrigerant/oil or wrong oil mixtures
- VARIOUS PARTICLES** - sludge or soiling compounds created by wrong use or poor quality additives such as leak stop agents, UV dye or wrong/different oil mixtures composites



INCORRECT CONTENTS CONDITION
Various scenarios of improper look of the AC loop contents spotted in inspection glass and indicating serious system/component problems and urgent need for flushing

- DARK GREEN COLOR**
Visibly too much UV dye in the system
- RED / ORANGE COLOR**
Visibly too much red leak tracing dye in the system
- LIGHT BROWN COLOR**
System/compressor exposed to overheating
- DARK BROWN OR BLACK COLOR**
System/compressor exposed to excessive overheating
- VISIBLE METAL CHIPS/PARTICLES**
Compressor seizure caused by oil starvation or improper lubrication
- VISIBLE RUBBER / PLASTIC COMPOUNDS**
Aged seals, aggressive additives reacting with seals and hoses, receiver dryer failure or excessive dryer wear
- VISIBLE BUBBLES / PEARLS**
Moisture in the system, contamination caused by bad quality additives, improper vacuum pulled during last services
- JELLY-LIKE, CRYSTALLIZED CONSISTENCY**
Bad quality leak stop agents reacting with refrigerant/oil or UV dye, no/improper vacuum was pulled before leak stops application
- MILKY, UNCLEAR CONSISTENCY**
Aggressive flushing agent residues reacting with aluminum and Teflon coating the compressor's inner parts, improper flushing and no proper vacuum pulled after flushing
- UNEVEN LIQUIDS MIXTURE**
Application of universal/improper oils, uneven, non-homogeneous mixture of different oils

- CORRECT CONDITION**
Clean mix of refrigerant and lubricant
- CORRECT CONDITION**
Visually acceptable mix of refrigerant, lubricant and UV dye

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