

System design / Liquid refrigerant

Liquid refrigerant is one of the major causes of compressor breakdown particularly for higher capacity compressors (AJ's and up). It can happen during both operation and the off cycle.

During operation

If the correct amount is not known, a rough estimate can be made according to the type of application:

- air conditioning or positive evaporating temperature:

380 g per kW of refrigeration output;

- negative evaporating temperature (approx. -10°C to -15°C):

1000 g per kW of refrigeration output;

- low temperature:

2700 g per kW of refrigeration output.

During the off cycle

In cases where the compressor is colder than any other part of the system, there is a risk that refrigerant will migrate to the compressor (this can occur even when the evaporator and the compressor are at the same temperature).

The presence of liquid refrigerant in the compressor oil will reduce its lubricating capability.

It can also occur when cleaning the evaporator with hot water, or even by direct sunlight on the evaporator (heat pump).

The most usual solution is to use a crankcase heater to keep the compressor at a higher temperature.

It is also possible to initiate a pump-down cycle before switching off the compressor: the closing of a solenoid valve at the evaporator inlet makes it possible to hold almost all the charge in the liquid receiver, condenser and liquid line.

- Check that the receiver is large enough to hold at least 90% of the charge

- and that there is not a vacuum in the compressor at start-up to avoid creating an arc at the terminals inside the casing.

This solution however does have disadvantages against crankcase heaters: when the compressor is pumping down the

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velocity of the gas is low, if the pipe diameter is too large the oil in the system will not return to the compressor.

There are two options, to keep pipe sizes as small as possible or secondly, to run the system for a short time at start up bypassing the expansion device at restart.