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Recovery Cylinders

This guide covers the recovery cylinders used for refrigerant removed from a system during service or decommissioning. The key points are listed below:

- The recovery cylinder must be suitable for the refrigerant and its pressure.
- The cylinder should be labelled with the refrigerant type and should include "recovered", as shown in the example:

  R404A - Recovered

- Recovery cylinders usually have a yellow top.
- If you need a clean cylinder, for example for temporary storage of the refrigerant while servicing a system (e.g. replacing a component), you should specify a "receiver" cylinder. Recovered refrigerant should not be charged into a different system.
- Different refrigerants should not be mixed, e.g. do not fill R404A and R134a in the same cylinder.
- Recovered refrigerant should be stored following the same regulations and guidance as for new refrigerant.
- Recovered refrigerant should be transported in accordance with the ADR Regulations. In addition, a Consignment Note is required in accordance with the Hazardous Waste Regulations. A list of the UN Shipping Numbers for the most common refrigerants is provided at the end of this document.
- Before recovery all lines should be purged or evacuated to remove air / other contaminants.

Maximum fill

You must not exceed the cylinder safe fill weight under any circumstances, so the cylinder should be weighed during recovery to ensure it is not overfilled. Additional cylinder(s) should be used as necessary.

Most recovery cylinders are clearly labelled by the supplier with the safe fill weight for a range of HFC refrigerants. **You must not exceed this fill weight.** The photo shows an example of a recovery cylinder with the safe fill weight for HFC refrigerant clearly marked:

Refrigerant maximum fill weight = 10 kg
Tare weight (empty cylinder weight) = 10.31 kg

Total maximum fill weight
= 10 + 10.31 kg = 20.31 kg.
Total weight of cylinder and refrigerant
= 16.595 kg.
Capacity for additional refrigerant
= 20.31 – 16.595 kg = 3.725 kg

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To calculate the safe fill weight (unmarked cylinders)

If the cylinder is labelled with the safe fill weight you should use this as the maximum fill. If it is not marked with the recovered refrigerant safe fill weight you will need to calculate it from the cylinder volume or its fill weight for new refrigerant.

EN378[1] provides guidance on the maximum fill weight of recovery cylinders. Recovered refrigerant is likely to be mixed with oil and this oil refrigerant mixture has a lower density than pure refrigerant. The maximum fill weight is less than for new, pure refrigerant, and will be whichever is the lesser, by weight, of the following two options:

Option 1, 80% of the maximum refrigerant charge, or
Option 2, 70% of the cylinder volume.

The photos below are for an example cylinder:

As an example for recovered R134a, you can work out the safe fill as follows:

Option 1, from the R134a new refrigerant safe fill weight (14 kg in the example);
Option 2, from the cylinder volume (14.3 litres in the example).

Option 1

0.8 x 14 kg = 11.2 kg

Option 2

0.7 x 14.3 litres = 10.01 litres.

The density of R134a at 30^{O}C is 1.19 kg / litre, so the safe fill weight is:

10.01 x 1.19 = 11.9 kg.

Option 1 gives the lowest value so this is the safe fill weight which should be used.

[1] EN378-4:2008 Refrigerating systems and heat pumps – Safety and environmental requirements, Part 4, Operation, maintenance, repair and recovery, section 6.3.2.4 (Container filling).

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Hydrocarbon recovery cylinders

The safe fill weight for hydrocarbon (HC) refrigerants such as R290 (propane) and R1270 (propene) is 45% of the HFC safe fill weight. For the example cylinder this would be 4.5 kg. If you are recovering HCs you should use the correct cylinder.

UN Shipping Numbers

The UN numbers listed below are four digit numbers that identify hazardous substances, as assigned by the United Nations Committee of Experts on the Transport of Dangerous Goods.

Refrigerant	UN Shipping Number
R22	1018
R134a	3159
R404A	3337
R407C	3340
R407A	3338
R410A	3163
R32	3252
R600a	1969
R290	1978
R1270	1077
Refrigerant gases N O S[2]	1078

Disclaimer

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[2] N O S means Not Otherwise Specified and it should only be used when a UN number is not available for the specific refrigerant.

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