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## Guide to Flame Testing R-134a for Chlorine Contamination

### Flame Halide Detector

The method is to check a small quantity of gas from each of the refrigerant bottles in stock using the described Flame Halide Detector. At present no other method has been found that will satisfactorily find mixtures of gases containing chlorinated products.

This test will detect if there are chlorine contaminants in the refrigerant, sensitivity 300ppm (parts per million). R-134a is fluorinated and does not change the colour of the flame. A green flame indicates the presence of chlorine. R-22, for example, will show a green flame. Halide detectors were commonly used by service engineers for more than twenty years but became largely obsolete when chlorine-free refrigerants, (like R-134a), were introduced.



To familiarise yourselves with this, try a test using a bottle of R-22. This link shows what you should expect: <http://www.youtube.com/watch?v=jHJU6UYM6Ug>

**Any refrigerant bottles marked R-134a that show a green flame should be quarantined and NOT USED.**

It is recommended that the contents be sent to a laboratory for analysis.

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## Procedure



To minimise the risks associated with the product of degradation fumes, fabricate a fume cupboard using an enclosure and extractor fan.

Vessels and depots could use existing air extraction devices such as welding or exhaust extractors.



To minimise the risks associated with flammable gases and to comply with F-gas regulations, use a set of service gauges and a capillary as shown.

Bubble the gas through some water to ensure the flow rate is minimal. Just a few bubbles will suffice, as the test is very sensitive.

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**OK! Blue flame = R-134a**



**Bad! Green flame = contamination**

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## List of Decomposition Products

Small quantities of the following chemicals may be produced as a result of the flame test. The following data could be used in any necessary risk assessment:

Chemical	Formulae	TLV ppm	Comments
Hydrofluoric acid	HF	5	Degradation acid from fluorinated chemicals
Hydrochloric acid	HCL	3	Degradation acid from chlorinated chemicals
Phosgene	COCl <sub>2</sub>	0.1	Toxic gas degradation from chlorinated chemicals
Carbonyl fluoride	COF <sub>2</sub>	2	Toxic gas degradation from fluorinated chemicals
Carbon monoxide	CO	25	Product of incomplete combustion

The threshold limit value (TLV) of a chemical substance is a level to which it is believed a worker can be exposed day after day for a working lifetime without adverse health effects. Strictly speaking, TLV is a reserved term of the American Conference of Governmental Industrial Hygienists (ACGIH). However, it is sometimes loosely used to refer to other similar concepts used in occupational health and toxicology. TLV's, along with biological exposure indices (BEI's), are published annually by the ACGIH.

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This guide is provided as a guideline only and should be used in conjunction with all other legal requirements and safety procedures.

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