

Advisory note

A service to A.G.Coombs Group clients

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R22 Refrigerant Phase-out

Widely used in air conditioning systems in buildings, artificial refrigerants including *chlorofluorocarbons (CFC)* and *hydrochlorofluorocarbons (HCFC)* have long been identified for their ozone depletion potential (ODP) and global warming potential (GWP). In 1996 the internationally agreed Montreal Protocol established a schedule for the phase out of these substances. The more harmful CFC's, including R11 and R12, are now virtually phased out and refrigerant stockpiles are nearly exhausted. HCFC's, the most prevalent of which is R22 widely used in small and packaged air conditioning equipment, are likely to be effectively phased out in Australia by 2016.

Whilst the protocol principally relates to refrigerant manufacture it is expected that all new equipment supplied to the Australian commercial market will be non HCFC based before 2010 with major manufacturers having already ceased production of R22 based equipment.

The issues presented by the R22 phase out for building owners include:

- Installation of new R22 equipment
- Parts and service support for R22 equipment
- Availability and price of R22 to support installed equipment
- R22 equipment conversions to alternative refrigerants
- R22 equipment retirement and replacement

Although R22 equipment will probably be available for a few more years and will be supported with parts and service expertise for some time to come, it is not recommended that new R22 equipment be installed. It is expected that R22 will become difficult and costly to source from 2010. In addition to this, because of its GWP, it is likely that its price would increase significantly with the introduction of an emissions trading scheme.

Alternative Refrigerants

Most replacement equipment use *hydrofluorocarbon (HFC)* refrigerants, including a number of blends. HFC's have no known effect on the ozone layer however when released have a GWP. A number are also suitable as 'drop-in' replacements for R22. The main HFC's are:

- R134a is a pure refrigerant, not a blend, and is generally the refrigerant of choice for water cooled chillers and larger air cooled chillers. As a drop-in replacement it results in a capacity de-rating of the equipment.
- R410a operates at a higher pressure than R22 and requires use of special polyol-ester lubricants. It is not a drop-in replacement for R22. It is a near azeotropic refrigerant blend.

- R407c is a drop-in replacement for R22 equipment but is a zeotropic blend and requires special poly-ester oils.

Azeotropic blends do not separate under normal circumstances and if systems leak, the blend components leak effectively in equal amounts meaning that only the leaked amount needs to be replaced. Zeotropic blends may separate and as such usually will leak one refrigerant component preferentially – this means a complete new charge must put into the system and there is a disposal issue with the reclaimed remaining charge.

The use of *hydrocarbon* refrigerants is also gaining market acceptance, particularly for smaller applications. These have no effect on the ozone layer and typically have a low GWP. In some circumstances these can also be drop-in replacements.

In general the suggested replacement refrigerants are R410a or R134a and all new equipment where possible should use these refrigerants however *hydrocarbon* refrigerant options should be considered for small applications.

In some instances equipment may be economically converted to a non HCFC refrigerant depending on the design, current condition and age, and future duty. It should be noted that refrigerant conversions are a specialist process requiring particular training and understanding and must be carried out by qualified and appropriate ARCTick licensed technicians. (see <http://www.arctick.org>)

To assist in forward planning, refrigerant management plans should be prepared, in particular for sites with large R22 installations such as data centres or commercial buildings with large central plant systems. This planning should identify replacement and conversion options and help manage exposure to unplanned equipment downtime.

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