

Ozone Depleting Gas Phase Out



Regulations and Future Options

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Typical R22 Air Conditioning Systems

General Overview

- A variety of R22 based Air Conditioning Systems are widely used in commercial buildings. These can be divided into two distinct categories as follows:
- 1. Direct Expansion Systems
R22 is used as the cooling agent and distributed throughout the building in copper pipework. Examples include 'one to one' Split Systems, VRF Systems & Computer Room Close Control Systems.
- 2. Chilled Water Systems
A packaged R22 Chiller generates 'Chilled Water' which is then distributed throughout the building. Examples include Chilled Water Fan Coil Units and Chilled Ceilings.

1. Direct Expansion Systems



← Outdoor Condensing Units
The obtained heat is released by means of a fan which blows the outdoor air over a heat exchanging coil.

← Copper Pipework
The **R22** refrigerant circulates through the units and the piping and takes the heat from the indoor unit to the outdoor unit.

← Indoor Air Conditioning Units
The cold **R22** refrigerant absorbs the heat from the air and cooled air is blown into the room.

2. Chilled Water Systems



- Chillers have their own integral refrigeration circuit. All of the **R22** gas is contained within the packaged chiller.
- The chiller exchanges heat between **R22** and water. This chilled water is circulated throughout the building where it passes through piping and coils.

EC Regulation 2037/2000 - The Ozone Regulation

Phase out dates – The law

- EC legislation 2037/2000 (commonly referred to as the Ozone Regulations) prohibits the use of all virgin (new) hydrochlorofluorocarbons (HCFCs) for servicing and maintenance of refrigeration and air conditioning equipment after 31st December 2009.
- R22 is the most commonly used HCFC in air conditioning systems on a global basis.
- Only recycled & reclaimed R22 will be available from 31st December 2009.
- The use of recycled & reclaimed R22 will be banned from 31st December 2014.

Categories of R22 Gas

- Replacement R22 Gas can be divided into 3no. Categories as follows:
 - Ø Virgin R22
 - Ø Reclaimed R22
 - Ø Recycled R22
- The following table shows the distinction between each of the categories of R22 and the different rules that apply to each:

Categories of R22 Gas

GAS	DESCRIPTION	USE / AVAILABILITY
Virgin R22	Virgin R22 is newly manufactured R22 gas.	Virgin R22 will not be available after 31 st December 2009.
Reclaimed R22	Reclaimed R22 would be recovered R22 that has gone through an upgrading process such as filtering, drying, distillation and chemical treatment in order to restore it to a specified quality akin to virgin R22	Reclaimed R22 would be able to be purchased on the open market until 31 st December 2014 and used for the servicing of existing air-conditioning equipment.
Recycled R22	Recycled R22 would be recovered R22 that may have gone through a basic cleaning process such as filtering or drying.	Recycled R22 would be able to be used for the servicing of existing air-conditioning equipment “provided that it has been recovered from such equipment by the undertaking concerned”.

Availability of R22 after 31st Dec 2009

- Manufacturers and suppliers of R22 want zero stock entering 2010.
- Towards the end of 2009 stock levels will be reduced and supplies are likely to run out.
- It is estimated that the supply of reclaimed R22 after 31st December 2009 will only satisfy 30% of demand.
- It is anticipated that there will be significant cost increases in R22 gas between 2010 and 2015 due to a shortfall in supply.

Summary of Regulations

- It will be illegal to use virgin R22 after 31st December 2009.
- The use of recycled and reclaimed R22 will be permitted until 31st December 2014.
- It will be illegal to use R22 gas in any form after 31st December 2014.
- Due to the estimated shortfall in the supply of reclaimed R22 from 2010 it may be more realistic to consider 2009 to be the last year in which R22 will be readily available.

Future Options

Options Available

- There are a number of options available to the end user that can be divided into 3no. Categories:
 1. React as and when problems occur – Do nothing now and react as required if a problem occurs.
 2. Replacement of R22 Equipment – Decommission and remove existing equipment and replace with new, more efficient equipment.
 3. Use ‘Drop In’ replacement Refrigerants – There are refrigerants being developed and tested that aim to reproduce the performance of R22.

Advantages & Disadvantages

1. React as and when problems occur

ADVANTAGES

- Lowest initial capital outlay

DISADVANTAGES

- Relies on availability of non virgin R22
- Downtime can't be planned
- Potential for disruption to services
- Spares will become difficult to source in the future
- Final cost is likely to be higher

Advantages & Disadvantages

2. Replacement of R22 Equipment

ADVANTAGES

- Downtime can be planned
- Warranties will be in place
- Running costs and CO2 output will be minimised resulting in an improved Building Energy Rating (BER)
- The future performance of the system and manufacturer back-up is guaranteed

DISADVANTAGES

- Highest Initial Capital Outlay

Advantages & Disadvantages

3. Use “Drop in” Replacement Refrigerant

ADVANTAGES

- Low capital outlay and short downtime

DISADVANTAGES

- Running costs & CO2 output will not be significantly reduced
- No warranties will exist from suppliers / manufacturers
- Equipment life will not be extended and may actually be reduced
- Future output capacity of the systems cannot be guaranteed
- Still unsupported by most equipment manufacturers

Company Policy

Recommendations

- To react as and when problems occur is very risky and will most likely lead to the highest costs in the medium to long term. We would strongly recommend that this option is not considered and that a plan is implemented to deal with the situation before it becomes a problem.
- The use of “Drop In” replacement refrigerants is unproven and does not provide a long term solution. Initial tests by equipment manufacturers are indicating a 15% drop in system output capacities. This option should only be considered as a temporary solution where the capital outlay required for replacement is not available.

Recommendations

- The replacement of R22 equipment with new equipment is generally the best option for the end user for the following reasons:
 - Ø Reduced running costs
 - Ø Reduced CO2 output
 - Ø Improved Building Energy Rating (BER)
 - Ø Full Warranty and manufacturer back-up

Site Surveys

- We intend to propose specific recommendations for all our maintained sites containing R22 equipment.
- Each site will require an individual site survey to make an assessment of the specific requirements regarding the issue of R22 and its replacement.
- Following each site survey we will propose a plan of action taking into account our knowledge of the installed systems, recommendations of the relevant manufacturers and the needs of the end user.