



Myths and Facts of HVAC Refrigerants

A global commitment to a healthy, sustainable environment is changing the refrigerant landscape for the HVAC industry. Navigating that change has become difficult as regulatory pressure, media scrutiny and competitive forces combine to create a complex landscape of messages. At Daikin, we are committed to solving the problem of climate change by innovating rigorously and responsibly, and creating candid dialog based on facts that can help you make the most informed decision.

Myth: HCFCs are not being phased out.

FACT: HCFCs including R123 are being phased out.

Limitations in HCFC production actually began in 2004. The Montreal Protocol established a phase down schedule that mandates the 100% phase out of HCFCs including R123 by January 1, 2020, in new equipment. It allows 0.5% of base level consumption to service existing HVAC equipment until January 1, 2030.

The U.S. schedule for meeting the Montreal Protocol phase out is summarized in the following table.
<https://www.epa.gov/ods-phaseout/phaseout-class-ii-ozone-depleting-substances>

U.S. Action to Meet the Montreal Protocol Phaseout Schedule			
Year to Be Implemented	Implementation of HCFC Phaseout through Clean Air Act Regulations	Year to Be Implemented	Percent Reduction in HCFC Consumption and Production from Baseline
2003	No production or import of HCFC-141b	2004	35.0%
2010	No production or import of HCFC-142b and HCFC-22, except for use in equipment manufactured before January 1, 2010	2010	75.0%
2015	No production or import of any other HCFCs, except as refrigerants in equipment manufactured before January 1, 2020	2015	90.0%
2020	No production or import of HCFC-142b and HCFC-22	2020	99.5%
2030	No production or import of any HCFCs	2030	100.0%

Myth: A little ODP is OK.

FACT: No ODP is OK.

Stratospheric ozone protects us from ultraviolet rays. The ozone is depleted by chlorine containing compounds that reach the upper atmosphere. Because CFCs and HCFCs contain chlorine, which triggers ODP, or ozone depletion potential, the Montreal Protocol focused on phasing out CFCs and HCFCs. It mandates that all refrigerants with ODP will be phased out for new equipment by January 1, 2020.

The next generation refrigerant will require essentially zero ODP and low GWP.

Myth: Europe has banned HFC-134a

FACT: Europe has *NOT* banned R134a for chillers.

Europe has banned certain types of HFCs in highly emissive applications like automotive, where mobility makes cooling systems more susceptible to leaks. In these applications, they have set a limit on the HFC's global warming potential (GWP), not to exceed 150. Today in Europe, there is no restriction for chiller applications on HFCs with GWP less than 2500, including R410A or R134a.

Myth: A chiller's R123 can be switched out for R1233zd.

Fact: R1233zd is *NOT* a retrofit alternative for R123.

R1233zd is an A1 refrigerant with zero ODP and very low GWP. However, it is not a "drop-in" for R123; the equipment must be re-designed to use R1233zd because R1233zd requires higher pressures and operates at a different volumetric capacity than R123. New R1233zd chillers will require ASME code construction of the heat exchangers.

There is no such thing as a true "drop-in" alternative for R123. The identified retrofit alternative for R123 is R514A, which will require some changes to the equipment to operate. R514A carries the same undesirable higher toxicity "B" designation as defined by ASHRAE Standard 34 as R123. R514A will also reduce the capacity of an existing R123 machine.

Myth: Lower GWP is always better.

Fact: A lower GWP can come with trade-offs.

Many lower GWP refrigerants also have lower efficiency than the refrigerants we are using today. For chillers, the vast majority of impact on climate change will come from generating electricity to run the equipment, versus refrigerant emissions. Containment is also critical: there is no direct impact on global warming from refrigerants as long as they are contained and not released into the atmosphere.

A better indicator of the global warming impact than GWP is "Total Equivalent Warming Impact". TEWI measures direct and indirect emissions of greenhouse gases.

- *For more on TEWI, please refer to these sites:*

http://lit.daikinapplied.com/bizlit/DocumentStorage/WaterCooledChiller/Brochures/101.1_Daikin_EPD_Magnitude_centrifugal_chiller_v5.pdf

- More recent work has focused on the LCCP (Life Cycle Climate Performance) of products. LCCP is another way to measure overall environmental impact from manufacture to end of life.

<http://www.sciencedirect.com/science/article/pii/S1876610214030525>

- As an example of how the LCCP is used, the Magnitude® Chillers have achieved an Environmental Product Declaration in accordance with ISO 14025, see the link below:

<http://web.ornl.gov/~webworks/cpr/pres/91639.pdf>

Conclusion:

The facts on HCFCs prove that HFCs and R1233zd represent the best choices for new equipment today. At Daikin, we are working directly with code officials and industry associations to innovate next generation refrigerants with essentially zero ODP and reduced GWP. We are investing in the development of equipment and building systems that reduce our environmental impact.

Daikin fully supports bringing HFC refrigerants into the Montreal Protocol Framework; this model has been successful for CFCs and HCFCs. We are prepared, and want to help prepare you, to drive the future.

**For more information, please contact your local Daikin Sales Representative,
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