


The EcoClimate News



 EcoClimate Services, LLC

ECS on the Edge of Technology

Recent Headlines from R744.com

- Brazilian Manufacturer Launches R744 Plug-In Refrigerator
- California to Regulate Refrigerant Emissions from Large Facilities
- Coca-Cola to eliminate HFCs in all New Coolers by 2015
- NaReCO₂ Handbook Now Available
- Read more at R744.com

Inside this issue:

- US Energy Bill H.R.6 – Energy Independence Act
- Exit the Walk-In, Enter the Controlled Environment
- Service and Maintenance—Solutions to Maintain Your Valuable Commodities
- Next Issue—Controlled Environment Clustering

As of January 1, 2010, HCFC-22 (CHF₂Cl) Monochlorodifluoromethane, otherwise known as R22, is no longer allowed for use in new equipment production.

New refrigeration systems and HVAC units will be required to use other compounds to produce the cooling effect needed for ventilation cooling and commodity refrigeration units. Currently, the US refrigeration market has little choice other than the use of HFC-404A which is a

blend of HFC-125, HFC-134a, and HFC-143a. HFC based refrigerants have answered the ozone depletion problem, but they have done little to help with regard to global warming potential (GWP).

The following table lists the blend components of R404A and their associated GWP values compared to the baseline potential of carbon dioxide (CO₂) with a value of 1.0.

Chemical	Blend %	GWP (compared to CO ₂)*	Atmospheric Lifetime (years)*
HFC-125	44	3450	29
HFC-134a	4	1320	14
HFC-143a	52	4400	52

*- Values from *Scientific Assessment of Ozone Depletion, 2002*.

While the debate about global warming rages on, there is no doubt that commercial refrigerants have an impact on our atmosphere.

Today the HVACR industry will use these HFCs to meet the demands for new installations of new equipment, but this is not the answer to our problems. Emissions of the blend compo-

nents of R404A to the atmosphere will continue to impact our environment for years to come leaving our footprint for future generations to mitigate.

What can we do about this?

The answer is here and extremely abundant. Carbon Dioxide (CO₂). Given the refrigerant number R744, Carbon Dioxide is



The world is in our hands. Let's make the best of it.

a byproduct of human respiration making it a naturally available compound almost everywhere.

EcoClimate Services LLC is committed to the implementation of R744 in critical controlled environment room processes.

-Derek Graves, ECS

Exit the Walk-In, Enter the Controlled Environment Room



Controlled Environment Evaporator, shown here with Ultrasonic Humidifier

“Put together refrigerant mass flow control and variable speed evaporator fans and voila...”

The days of the standard walk-in cooler/freezer are numbered if not in fact already obsolete. Current legislation and advances in technology have paved the way to higher efficiency and greater reliability for a wide range of cold storage products.

Yesterday’s walk-in units typically used compressor cycling (on/off control) to maintain storage temperatures between a cut-in and cut-out temperature. More advanced units even used rapid cycle solenoid valves to “modulate” the evaporator pressure (and therefore temperature) for greater precision and accuracy of temperature within the cold storage space. Systems designed around this principle of operation have certainly proven reliability over the years making them attractive for use as controlled environment rooms, but these designs no longer meet the current demands for reduced energy consumption. A typical “3-pipe” system utilizes two solenoid valves (liquid and discharge gas bypass) to cycle the evaporator pressure/temperature proportional to the heat load exerted on the walk-in unit. A 3-pipe system gives little regard to operational costs as the compressor runs at full load throughout its operational lifespan.

Additionally, conventional walk-in rooms do very little about moisture control as the humidity closely follows saturation and is entirely dependent on the coil temperature of the evaporator which rarely achieves the design standard of 10°F (Td). Further moisture level reductions with this solenoid design required the use of split coil evaporators where larger Td’s were created to trap moisture on the coil in the form of ice while being offset by discharge gas heat and even the use of electric heaters to “buck” the effect of this overcooling. All together this design concept is extremely energy dependent and it

provides little benefit compared to its operating cost.

More on moisture control. Cold storage rooms are exactly that, storage rooms. Take your standard walk-in cooler for example. Commodities placed inside the cooler have adverse effects when exposed to near-saturated conditions. Cardboard boxes become flimsy. Label adhesives break down and fall off of their containers. Defrost cycles are necessary returning moisture to the air it was removed from.

Enter the new age of Controlled Environment Rooms. Past and current legislation (The Montreal Protocol, US Energy Independence Act, US EPA SNAP, etc.) recognizes the need to reduce the effect of refrigeration on the global community with regard to its carbon footprint and the technologies are here to properly address these concerns.

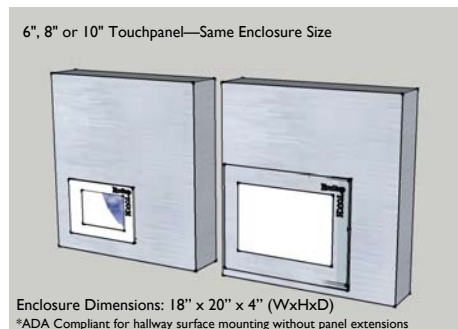
ECS utilizes Mass Flow Control of refrigerant allowing the refrigeration circuit to operate at less than full load whenever needed. Mass Flow regulation results in partial blocked suction back to the compressor so the energy consumption of the circuit is exactly the amount required to meet the heat load demand of the room. To achieve this Mass Flow Control, ECS uses commercially available stepper motor regulating valves that open and close to maintain precise evaporator temperature and pressure conditions and that comes with some significant inherent benefits when combined with other available technologies.

Variable speed ECM motors. Having control of the fan speed at both the evaporator and condensing unit

(air-cooled of course), allows the control system to increase the residence time of the air across the evaporator coil to produce lower leaving air temperatures without high air volume movement. This effect reduces the moisture content of the air and it does not require split-coil design or electric heater “bucking”!

Put together refrigerant mass flow control and variable speed evaporator fans and voila, you have a 2-pipe refrigeration system with moisture control and reduced operational costs!

To learn more about the EcoStep® Refrigeration Controller, contact the engineering department at ECS. 443.393.2313



Enclosure Dimensions: 18" x 20" x 4" (WxHxD)
*ADA Compliant for hallway surface mounting without panel extensions

USEnergy Bill H.R.6—Energy Independence Act

Effective January 1, 2009, cold storage units with a useable area of 3000 sq. ft. or less must meet a set of minimum criteria with the exception of those products designed for medical, scientific, or research purposes. ECS and its suppliers extend these criteria to include these exempted products.

Insulated Panel R-values

Coolers – Controlled Environment Rooms with an operating temperature of 0°C and above shall have a minimum R-value of 25 for walls, ceilings and doors.

Freezers – Controlled Environment Rooms with an operating temperature of <0°C shall have a minimum R-value of 32 for walls, ceilings and doors. Freezer floors must have a minimum R-value of 28.

The R-value is a measure of a material's thermal resistance to heat transfer from an area of higher temperature to lower temperature.

More on Doors

The Energy Independence Act mandates the use of materials that limits the ambient air infiltration into the cold storage space unless self-closing

spring-hinged doors are used. Strip curtains, air curtains and other devices are available for high-traffic applications where standard self-closing doors are not suitable.

Door “ajar” situations are remediated through the use of additional closure devices that include mechanical closing devices, magnetic gaskets and the EcoStep® Refrigeration Controller comes standard with a door position sensor that alarms in the event of a prolonged door open event.

Glass display doors and viewports in standard doors must be double pane, gas-filled as a minimum. ECS only provides doors and viewports that exceed these minimum criteria.

Refrigeration Fan Motors

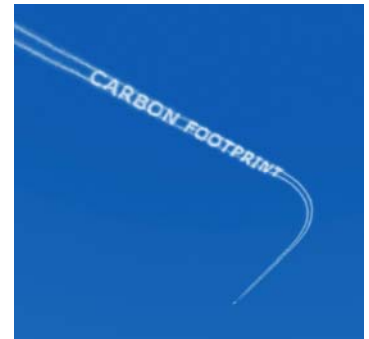
Evaporator fan motors under 1HP must be electronically commutated (EC). Shaded pole and permanent split capacitor AC induction motors are no longer acceptable due to their relative high energy consumption rates. This requirement does not apply to 460V applications nor 3-phase motors. ECS takes this to another level using variable speed motors to provide the customized controlled environment specified.

The commercial marketplace has struggled with this requirement. Early applications of EC motors have proven unreliable, however the EcoStep® Refrigeration Controller has been designed from the ground up to not only include the energy efficiency of the new motor design, but to utilize variable speed versions increasing the overall controlled environment room efficiency.

Air-cooled condenser fan motors also follow suit with regard to EC motors, however PSC motors are allowed for now. EcoClimate Services designs also include variable EC motors which allows for the deletion of head pressure control valves.

Lighting

In room lighting must have an efficacy of 40 lumens per watt as a minimum or the lights must be controlled so that they turn off automatically when the room is not occupied. The EcoStep® controller uses the door position sensor to turn on the interior lighting and a user adjustable timer automatically turns them off. Additional motion sensing devices are available and recommended where viewports are not included in the door.



Reduce the carbon footprint with Smart refrigeration by EcoClimate Services LLC.

EcoClimate Services applies these minimum standards to all Controlled Environment Room applications regardless of the room's use.

Service and Maintenance—Solutions to Maintain your Valuable Commodities

EcoClimate has maintenance and service options available to provide your existing cold storage rooms with outstanding reliability. Current legislation places an increased need to maintain refrigeration systems in order to avoid costly replacement of now obsolete HCFC based units. Contact ECS to discuss your individual service and maintenance options including the purchase of replacement HCFC refrigerants at today's prices. They aren't going to go anywhere but up!

- Preventative Maintenance (PM)
- System Upgrades regardless of manufacturer
- HCFC to HFC conversions
- EcoClimate Services monitoring of Critical Operational Parameters
- Reduced Emergency Service Rates for PM Customers



Purchase refrigerant today to avoid the inevitable price increases. We can deliver to any of the 48 contiguous states. Ask us about stockpiling and bulk procurement options.



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**Innovating the
Controlled
Environment Room
Community**

Visit us on the web.

<http://www.EcoClimateServices.com>

ECS is a limited liability company located in Elkridge, MD. We provide engineering services, regulatory guidance, touchpanel control systems, service and maintenance, and turn-key installation services of controlled environment rooms wherever the opportunity presents itself. Our customers cover a wide range of industries that include bio/pharma, university research, food storage/ripening, museum/archives, military, and governmental institutions.

Contact us to discuss your particular requirements. We strive to create a custom controlled environment that meets the current and future demands of this changing industry.

In the Next Issue of the EcoClimate News—Controlled Environment Clustering

Rack systems aren't just for supermarkets anymore. Centralize your cold storage rooms and benefit from the reduced operating costs associated with doing so. Additionally, clustering of controlled environment rooms provides inherent mechanical redundancies not available with standalone refrigeration circuits. ECS provides intelligent control of centralized rack configurations that seamlessly communicate with room clusters making this an ideal solution for high-rise architectures.

More coming in the next issue of the EcoClimate News.

