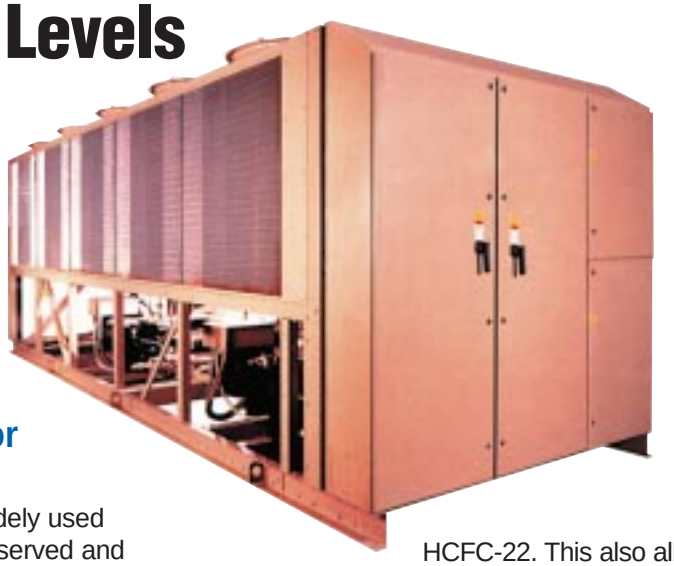
HVAC&R ENGINEERING

preview

YORK® Optimized HFC-407C DX Chillers:

Engineered for New Levels of Performance



New refrigerants for direct expansion

As the world's most widely used refrigerant, HCFC-22 has served and continues to serve both the residential and commercial markets, from small window units to large water chillers. Equipment designers like its particular combination of efficiency, capacity, and pressure. However, because of its Ozone Depletion Potential (ODP), international law set forth in the Montreal Protocol and its Copenhagen and Vienna amendments have put HCFC-22 on a phase-out schedule.

Because of this, the Alternative Refrigerant Evaluation Program (AREP), an industry-backed international organization of major refrigerant suppliers and HVAC manufacturers, has identified several HCFC-22 substitutes. The four approved alternatives are HFC-407C, HFC-404A, HFC-134a, and HFC-410A.

As an AREP participant and a proponent of providing the best refrigerant choice for each particular application, YORK has optimized a line of direct expansion (DX) chillers for HFC-407C.

Picking the right DX refrigerant

In selecting a refrigerant to use in place of HCFC-22, YORK engineers found HFC-407C to be an ideal alternative for DX chillers. Its operating characteristics are so similar to HCFC-22 that it has been used as a drop-in alternative in machines originally designed for HCFC-22. This also allows the continued use of the proven design and components of YORK® Millennium® air-cooled chillers. Plus, a unique feature of HFC-407C — the property known as temperature glide — presents intriguing implications for DX chiller design.

Temperature glide explained

HFC-407C is a blend of three refrigerants, composed by weight of 23% HFC-32, 25% HFC-125, and 52% HFC-134a. This composition exhibits the characteristics of a zeotropic blend, meaning that the resulting mixture does not act as a single substance. At a given pressure, it evaporates over a range of temperatures, rather than at a single temperature. The expression "temperature glide" describes this phenomenon.

HFC-410A and 404A have temperature glides of 1°F (0.5°C) or less, small enough to have negligible effect. HFC-407C, however, has a temperature glide of approximately 8°F (4.4°C), which can be leveraged to give opportunities for greater operating efficiency.

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Temperature glide can help increase efficiency

Temperature glide, when fully understood, holds tremendous promise for designers and users of chillers as a means of improving efficiency. If the DX evaporator is designed as a counterflow heat exchanger, refrigerant and water enter at opposite ends as shown in Figure 1, and make a single pass through the heat exchanger. In this configuration, the leaving refrigerant temperature can be greater than the leaving chilled water temperature.

The higher leaving suction gas temperature of a counterflow evaporator with HFC-407C means the compressor does less work to raise the refrigerant to the condensing temperature. Less compressor works means lower energy consumption and reduced operating costs.

Thanks to temperature glide, HFC-407C is an outstanding HCFC-22 substitute when used in equipment designed to capitalize on the glide.

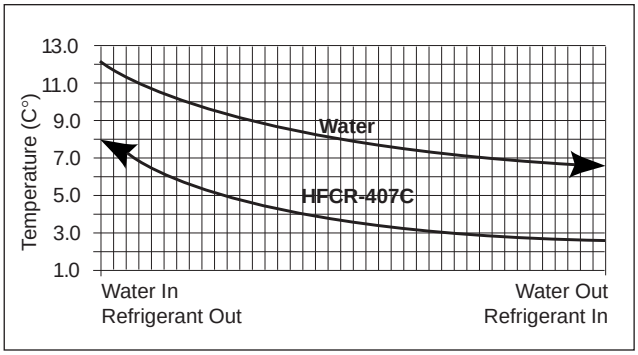


Figure 1: Water/R-407C Temperature Differentials

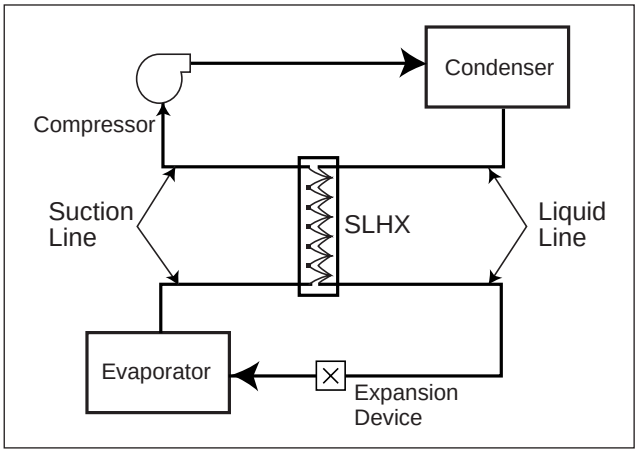


Figure 2: Counterflow heat transfer design with SLHX heat exchanger

HFC-407C in an optimized chiller

Using proven Millennium Air-Cooled Screw Chiller technology, YORK has developed an HFC-407C ***Optimized*** chiller. The counterflow heat transfer technology, coupled with the addition of a state-of-the-art Suction Line Heat Exchanger (SLHX), are simple hardware modifications that allow the chiller to fully exploit the temperature glide properties of HFC-407C, as shown in Figure 2.

Each refrigerant circuit of the YORK ***Optimized*** chiller utilizes a simple SLHX. This additional heat exchanger maximizes chiller capacity and efficiency by subcooling liquid refrigerant delivered to the evaporator and superheating suction gas delivered to the compressor.

The evaporator used in the ***Optimized*** chiller is also state-of-the-art. Its "counter-flow" design takes advantage of the "Glide" characteristics of HFC-407C. This new evaporator employs technologically advanced (patent pending) high-efficiency tube assemblies which make possible a single pass DX evaporator that is capable of delivering refrigerant suction gas warmer than the leaving chilled water at full load. DX evaporators are preferred over flooded evaporators on air-cooled chillers for better refrigerant and oil management across the broad range of ambient conditions to bring greater application flexibility and system reliability. These chillers are ideal for a wide variety of applications, from the colder climates of North America to the hotter ambients of the Middle East.

A YORK HFC-407C ***Optimized*** chiller selection is a superior choice due to the efficiency, safety, and environmental acceptability inherent with this refrigerant.

In terms of personal and plant safety, ASHRAE endorses HFC-407C with its highest refrigerant rating—an "A-1" refrigerant—meaning it has the lowest toxicity and is non-flammable.

And in terms of environmental acceptability, HFC-407C has zero ozone depletion potential (ODP) because it contains no chlorine to damage the ozone layer. Leaks, if they occur, can be corrected, and the unit "topped-off" with additional HFC-407C.

It also achieves low total global warming impact. The better efficiency of the ***Optimized*** chiller with HFC-407C leads to lower energy consumption. The reduced energy consumption eases the demand on and emissions of fossil-fueled generating plants—a contributor to the green house effect.

More Advantages of YORK HFC-407C Optimized Chillers

YORK HFC-407C *Optimized* chillers are a superb selection because of three customer advantages, namely Ease of Installation, Ease of Operation, and Ease of Maintenance.

1) Easy to install

Installation and special application requirements account for a significant portion of total chiller cost. That's why YORK Millennium DX units are engineered to minimize on-site preparation and to adapt to your exact installation needs by offering these features and benefits:

- Factory charged with refrigerant and oil—eliminates field charging time and costs.
- Rugged, strong, light steel-truss frame—withstands the rigors of situating unit on site.
- Small footprint—reduces pad size requirements and allows more space for other equipment.
- Compact design and light weight—reduces shipping costs.
- Low circuit ampacity requirement—reduces wiring and related costs.
- Meets NEC, ASHRAE/ANSI, and ASME codes for safety requirements, as well as UL and CUL codes—ensures code compliance.
- Designed to withstand the rigors of cold, heat, rain, snow, humidity, or dust—worry-free performance in practically every outdoor installation.
- Quiet operation—allows units to be installed virtually anywhere.
- Factory wiring—reduces field wiring costs.

2) Easy to operate

Day-to-day operation of YORK DX chillers is simple and foolproof, thanks to many standard built-in features.

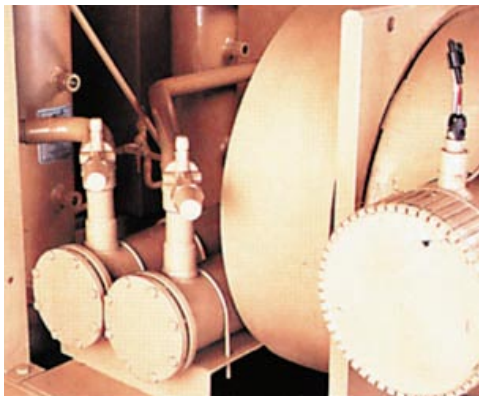
- Millennium Control Center—provides all performance information on one easy-to-read display (no codes to interpret).
- Fuzzy Logic water temperature control—provides accuracy and reduces energy costs.
- Daily/holiday scheduling—eliminates unnecessary unit operation and personal attention. Routine service can be scheduled in advance, when it's convenient.
- Informative display readouts available in English, Spanish, French, or German—minimizes operator training.
- Data logging accessible directly from the display screen—saves operator time.
- Printed log available automatically—no need to involve operator.

Access vital information with a finger's touch

3) Easy to maintain

YORK Millennium series chillers are designed to minimize required maintenance.

- Manual override/off-hours service mode — allows maintenance personnel to operate the chiller independently.
- All maintenance-related data can be read from the control panel or via a printed log — facilitates convenient analysis and troubleshooting.
- Easy availability of shutdown fault data — speeds troubleshooting and reduces downtime.
- Balanced compressor runtime — assures maximum compressor life.
- No scheduled maintenance is required on the hermetic refrigerant circuits — reduces maintenance costs.
- Filters, compressors, motors, suction screens, sight glasses, and filter driers are fully accessible — allows quick diagnosis and servicing.



Easy access to major service components

Latest refrigerant in a leading DX design

YORK is the leader in engineering advanced chiller technology. That's because we offer a range of product and technology choices that put the customer first. With YORK HFC-407C ***Optimized*** chillers, you get a combination of economy, reliability, safety, and environmental acceptability second to none. Plus, you get all the valuable installation, operation, and maintenance advantages engineered into the YORK DX chiller design.

Step up to the best engineered solution for DX chillers. For more details on Millennium HFC-407C Optimized DX chillers, call your local YORK office at 1-800-861-1001, visit www.york.com, or write P.O. Box 1592-361P, York, PA 17405.

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