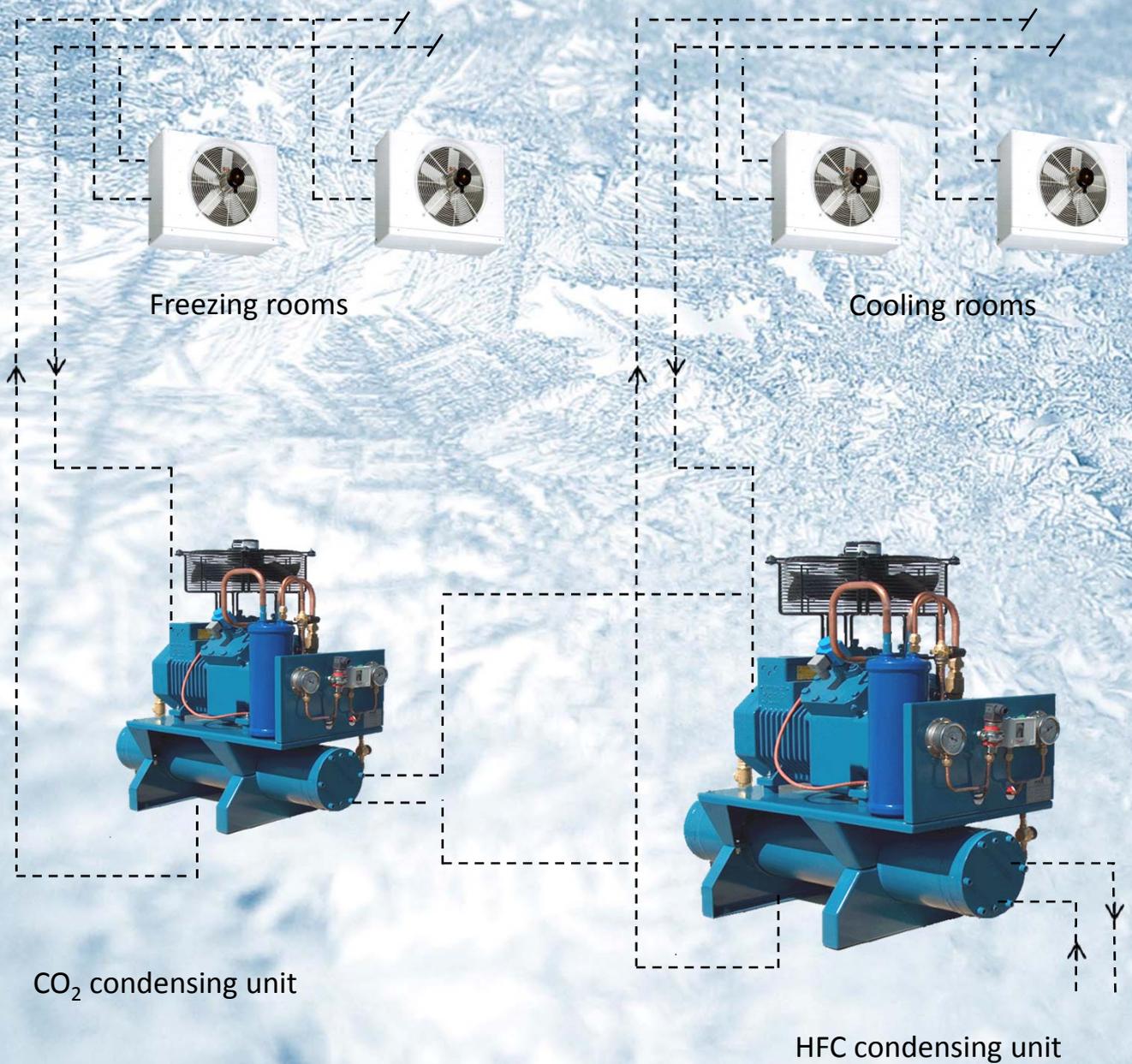




TEKNOTHERM

MARINE

Provision Room Refrigeration CO₂ – HFC Cascade System



CO₂ as a refrigerant

Within refrigeration technology, carbon dioxide (CO₂) is recognized by the name R-744 and has a long history. It is a colourless gas which liquefies under pressure, and has a slightly acidic smell and taste. Carbon dioxide has no ozone depletion potential (ODP=0) and a negligible direct effect on global warming (GWP=1) when used as a refrigerant in closed systems. It is not combustible, is chemically inactive and heavier than air.

Carbon dioxide is available naturally in large quantities.

CO₂ in a provision refrigeration plant

CO₂ is also known for high pressures and low critical point which requires special measures when used onboard a ship as well as for general installations.

For a typical provision plant, the refrigeration system will be designed as a so-called 2-stage cascade system. A cascade system will include minimum one compressor for the freezing (low temp.) rooms using CO₂ as refrigerant, while the cooling (high temp.) rooms need minimum one designated compressor which may use an ordinary HFC refrigerant, typical R-134a.

The CO₂ low temperature compressor will be cooled by high temperature compressor via a so-called cascade heat exchanger. This arrangement will give an improved plant efficiency (COP) compared with a traditional single stage arrangement.

The complete plant will operate with positive (over) pressures for both low- and high temperature side while the highest environmental standards of the classification societies will be achieved.

CO₂ is preferably to be used in larger provision systems, typical for cruise- and ferry vessels.

Features for CO₂/HFC cascade plant

- Reduced power consumption
- Reduced overall global warming impact
- Environmentally friendly installation
- Reduced components dimensions
- Low temperature capacities from 10 kW and up

COP – Coefficient Of Performance comparison with some typical refrigerants

CO ₂ /R-134a, cascade	$T_E/T_M/T_C$: -35/-8/45°C	semi. recip. compressor	COP : 1,5
R-134a, single stage	T_E/T_C	: -35/45°C	semi. recip. compressor	COP : 0,8
R-134a, single stage	T_E/T_C	: -35/45°C	open screw compressor, eco	COP : 1,25
R-404A, single stage	T_E/T_C	: -35/45°C	semi. recip. compressor	COP : 1,0
R-404A, single stage	T_E/T_C	: -35/45°C	open screw compressor, eco	COP : 1,2

We reserve the rights to change specification without notice.

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