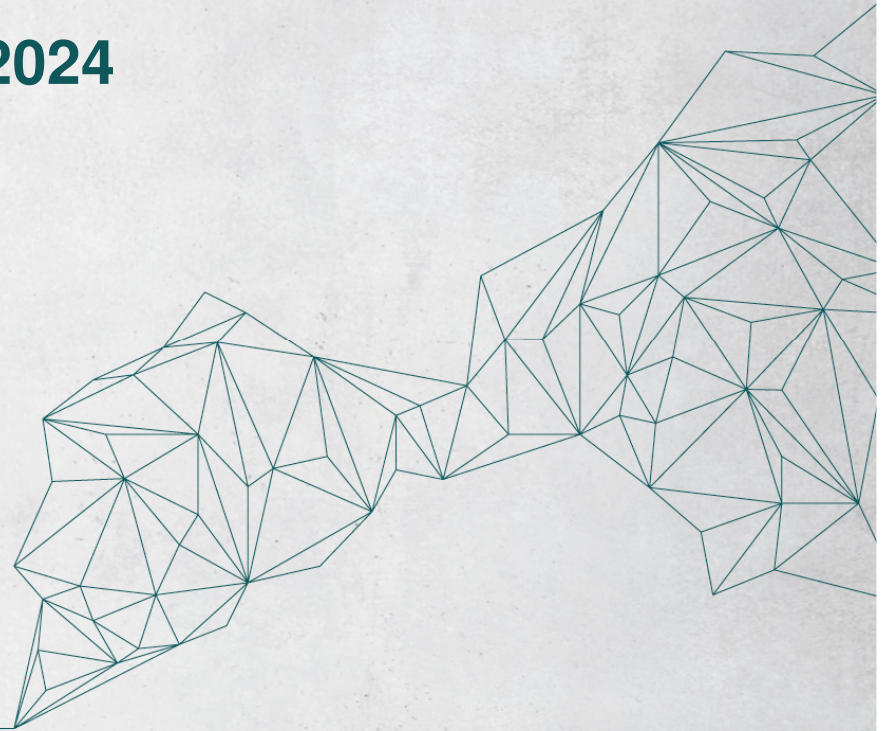


Hall 8

CHILLVENTA

Chillventa Specialist Forums 2024 Chillventa Fachforen 2024

**CONNECTING
EXPERTS.**



MARSTAIR

REFRIGERATION AND SPECIALIST AIR CONDITIONING

MARSTAIR

Hall 6
Stand 117

R-744 Air-conditioning

Presented By
Chris Chisman BEng, MInstR, Technical Director, TEV / Marstair



In partnership with

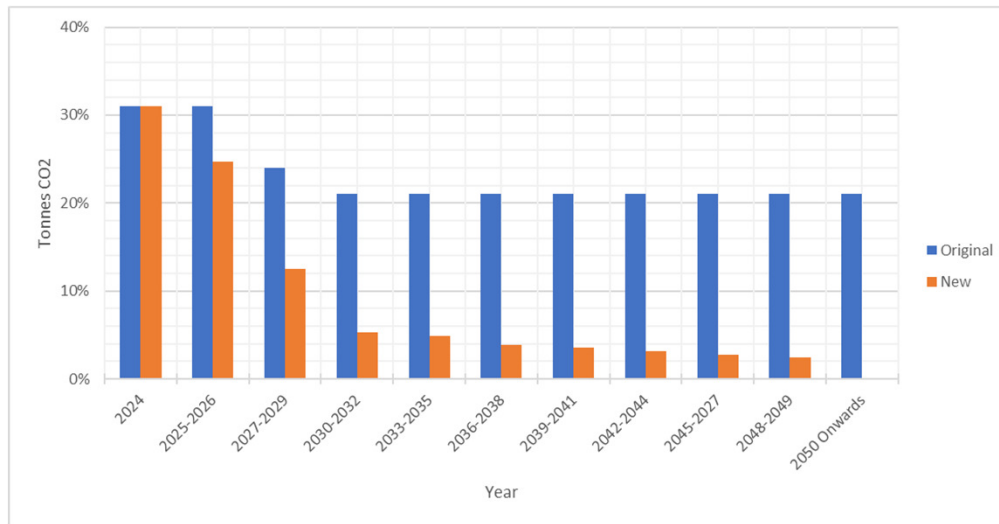
QUARTZ
FAN COILS AND HVAC

WWW.MARSTAIR.COM

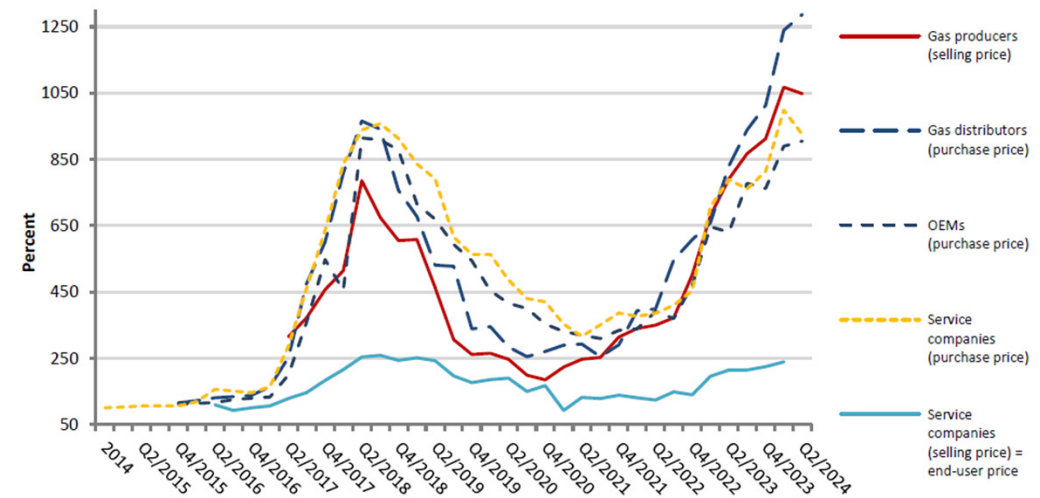
Content:

- ✓ F-Gas Regulation
- ✓ Product Application
- ✓ Cassettes
- ✓ DXD – Ducted Fan coils
- ✓ Wall Mounted

EU F-Gas Phase Down



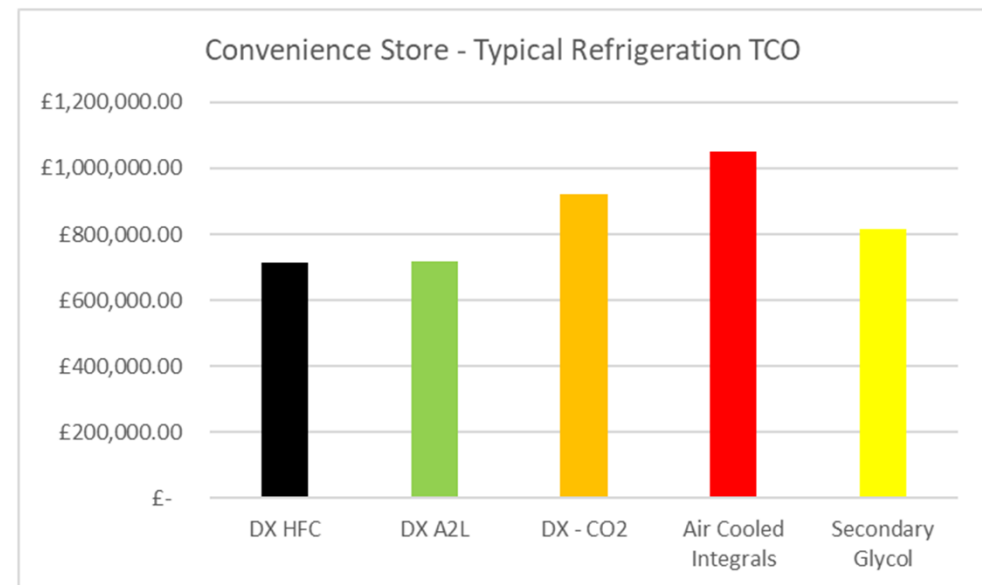
Refrigerant Price Trend



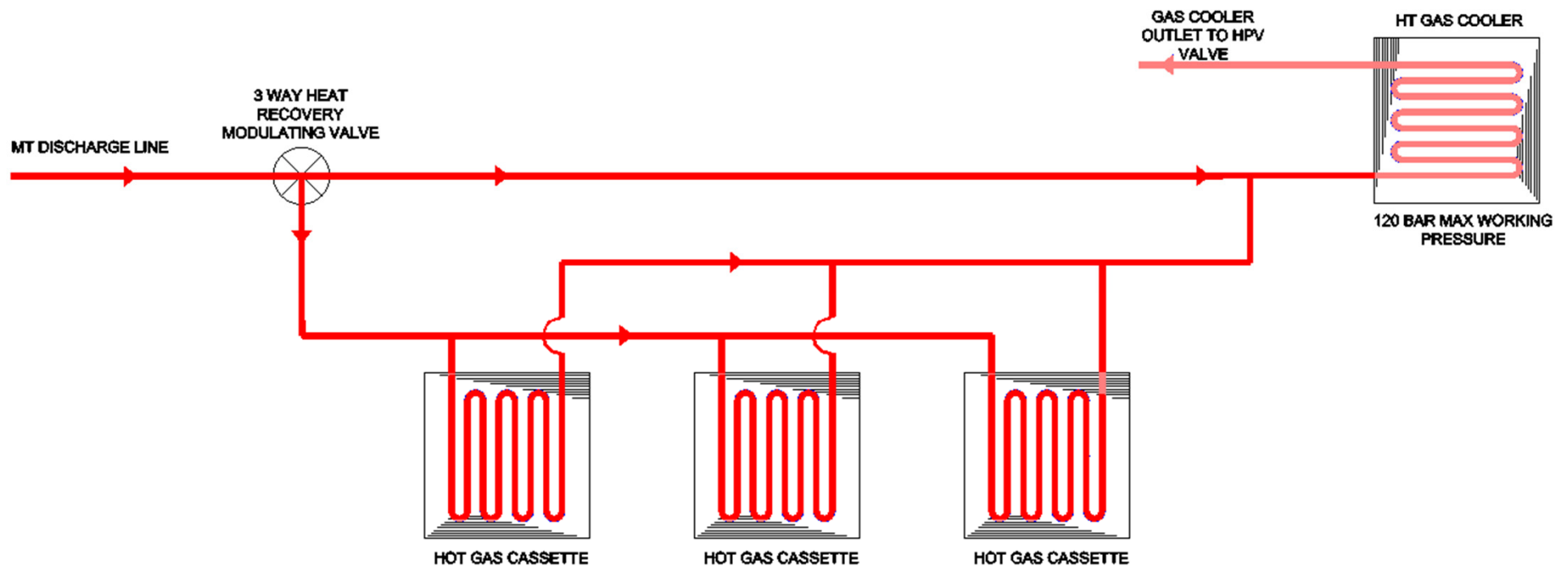
Air-Conditioning and Heat Recovery

- CO2 is more expensive to purchase and run compared to A1 and A2L systems on a like for like basis.
- CO2 gives excellent heat recovery due to its high discharge temperatures.
- Save cost through heating and cooling the store using heat recovered from a CO2 refrigeration pack.
- Future proof with the whole store refrigeration and air-conditioning on CO2 refrigerant.

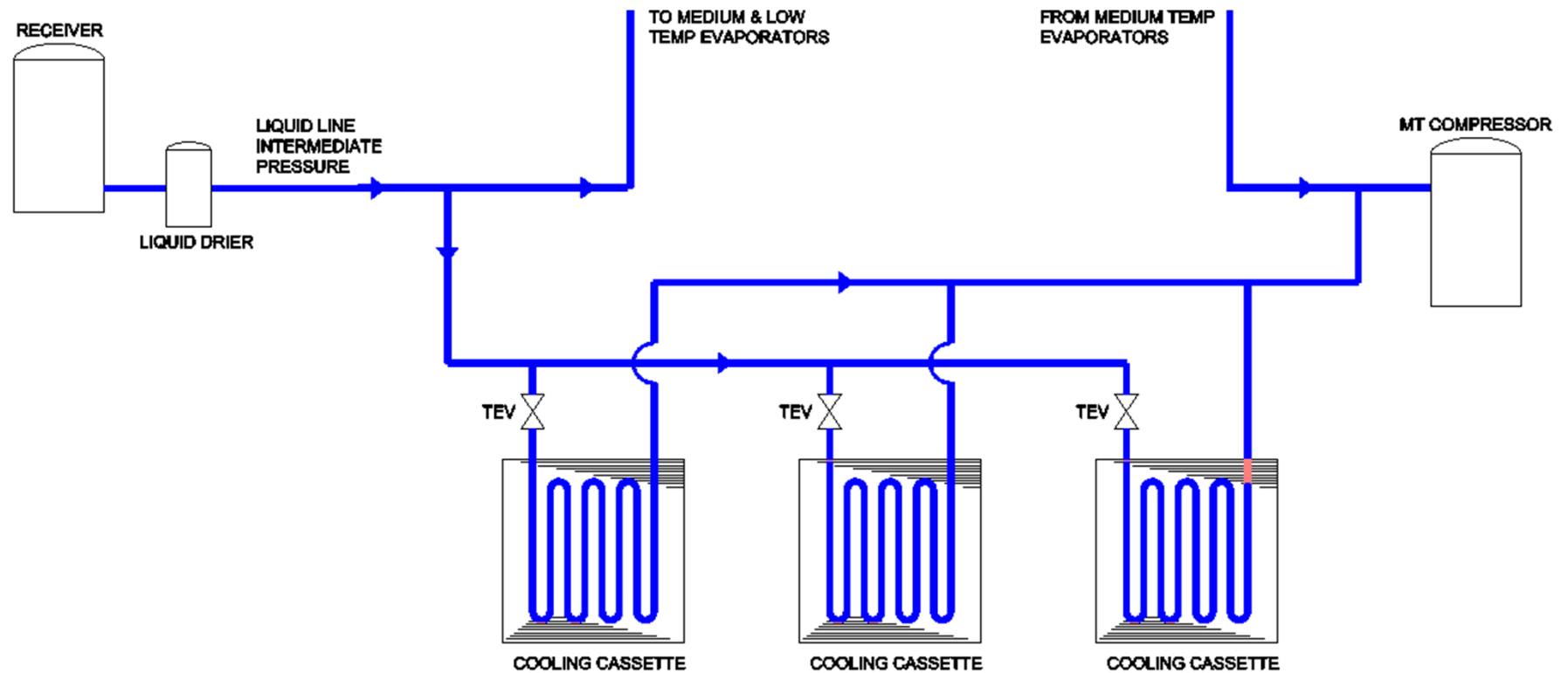
TOTAL COST OF OWNERSHIP LIKE FOR LIKE BASIS



CO2 Hot Gas Heat Recovery



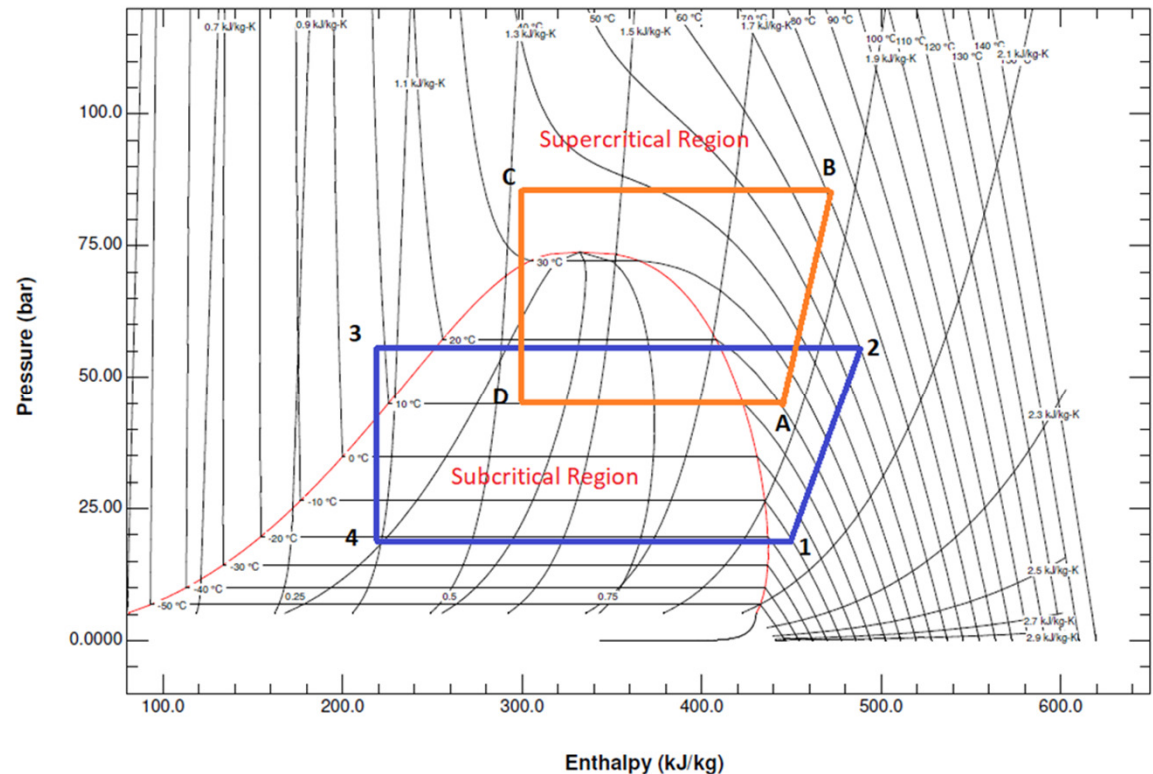
CO2 A/C Cooling



Cooling

- The Critical Point of CO₂ is **73.8Bar & 31°C**. Above this temperature and pressure, CO₂ becomes a supercritical fluid.
- A/C cooling evaporation always happens below the critical point so behaves in a similar way to HFC refrigerants with no glide.
- Cooling capacity of CO₂ evaporators are sized in the same way to standard evaporators
 - Airflow
 - Evaporating temperature
 - Air on temperature

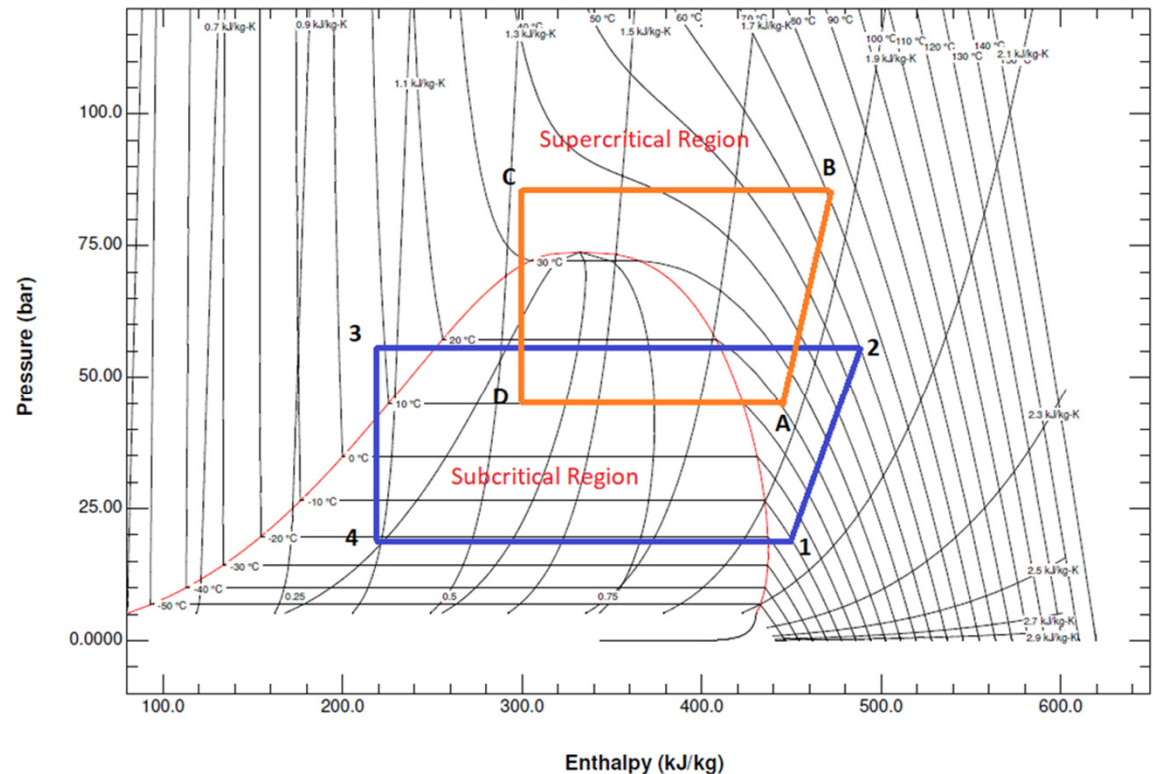
CO₂ Refrigeration Cycle



Heating

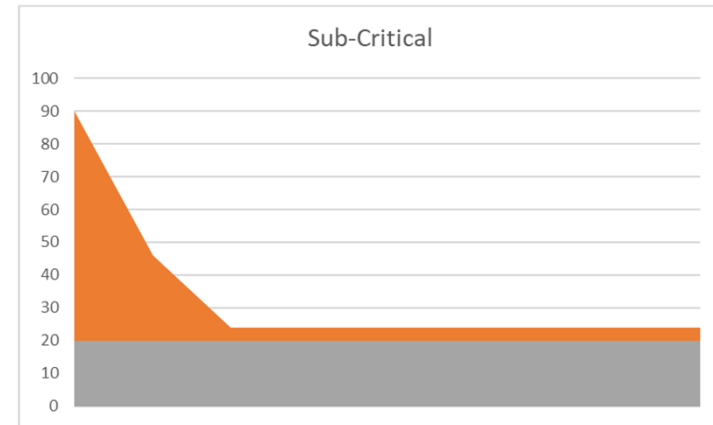
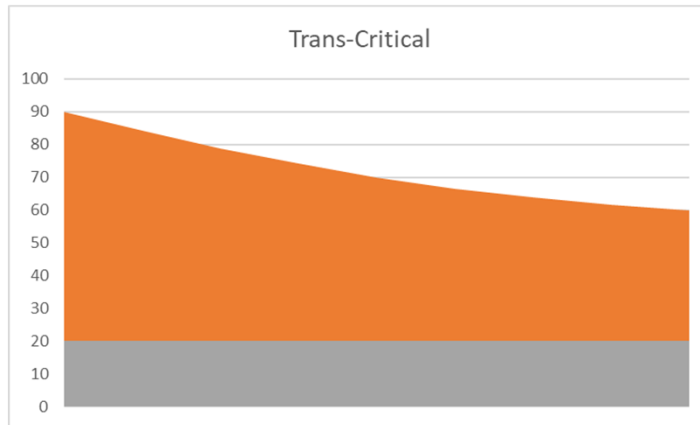
- CO2 Heat rejection will often occur above the critical point, so behave differently to HFC refrigerants.
- CO2 heat recovery units in a trans-critical system require the following inputs
 - Airflow
 - Pressure
 - Inlet temperature
 - Outlet temperature
 - Air inlet
- If the CO2 system is subcritical the heat recovery unit will behave like a traditional condenser. And require the following inputs
 - Airflow
 - Condensing temperature
 - Air inlet

CO2 Refrigeration Cycle



Unit sizing requirements

- Running a CO2 system with sub-critical heat rejection gives excellent energy efficiency improvements on the CO2 plant
- However, this gives a large reduction the heating capacity of the CO2 heat recovery units.



Heat recovery capacity is reduced significantly for sub critical systems. The refrigerant temperature quickly drops to the condensing temperature within the heat exchanger. It then stays there whilst the gas condenses into a liquid, greatly reducing the average temperature difference between the air and the refrigerant

Unit Types

- Cassettes 600 & 875 sizes
- Wall mounted units
- Ducted fan coils

Heat Exchanger Types

- CO2 Cooling Only – (2-pipe)
- CO2 Heating only – (2-pipe)
- CO2 Cooling with CO2 Heating – (4-pipe)
- CO2 Cooling with LPHW Heating – (4-pipe)

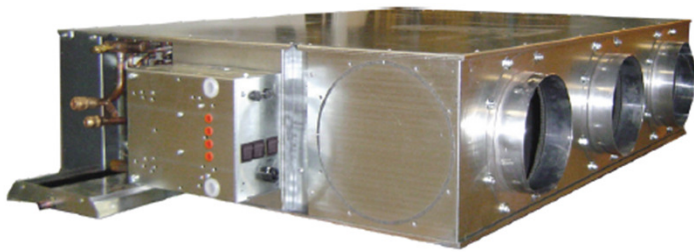
Applications

- Comfort cooling – Air conditioning
- Comfort heating – Heat recovery
- Low temperature Air conditioning 10°C

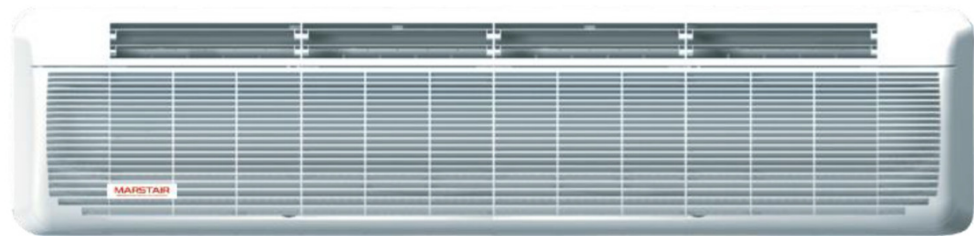
CASSETTES



DXD



WM



Unit Performance

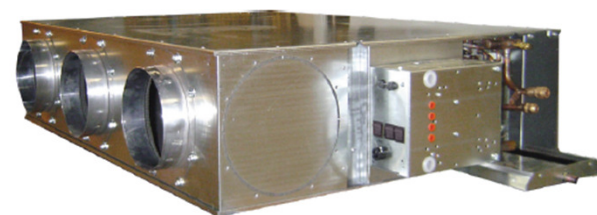
- CO2 Cooling and direct CO2 or LPHW Heating available within the one cassette.
- Available with 2 Fascia options
- Electric Heating available (When Refrigeration Requirement is too low to generate enough heating)
- Cooling Circuit 90 Bar MWP & Heating Circuit 120Bar MWP
- Can be supplied pre-fitted with electronic valve and driver



Model				Heating Duty Air 20°C				Cooling Duty Air 23°C		CO2 Heating duty 90Bar, 120°C Inlet, 35°C Outlet 20°C Return air
				Water Temperatures				Evaporating temperature		
Cassette	CO2 Cool	CO2 Heat	LPHW	60 - 30	60 - 40	65 - 40	50 - 30	7	5	
600 - 20 Cool + LPHW	Y	-	Y	1.2	3.0	3.5	1.0	2.4	2.9	-
600 - 20 Cool + Heat	Y	Y	-	-	-	-	-	2.4	2.9	2.7
600 - 25 LPHW only	-	-	Y	1.2	3	3.5	1	-	-	-
600 - 45 LPHW only	-	-	Y	2.3	5	5.5	2	-	-	-
600 - 65 LPHW only	-	-	Y	3	6.5	7	2.8	-	-	-
600 - 75 LPHW only	-	-	Y	4	8	8.5	3.5	-	-	-
875 - 80 Cool + LPHW	Y	-	Y	7.5	12.0	13.0	6.0	5.5	7.0	-
875 - 80 Cool & Heat	Y	Y	-	-	-	-	-	5.5	7.0	10.0
875 - 110 Heat Only	-	Y	-	-	-	-	-	-	-	13.0
875 - 140 Cool only	Y	-	-	-	-	-	-	6.8	8.2	-
875 - 95 LPHW only	-	-	Y	7.5	11	13	6.5	-	-	-
875 - 135 LPHW only	-	-	Y	10.5	14	17	9	-	-	-
875- 155 LPHW only	-	-	Y	13	17	20	11	-	-	-

Unit Performance

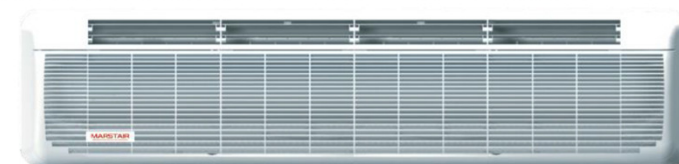
- CO2 Cooling and LPHW Heating available within the one ducted unit.
- Electric Heating available (When Refrigeration Requirement is too low to generate enough heating)
- Cooling Circuit 90 Bar MWP
- Can be supplied pre-fitted with electronic valve and driver.
- Return air plenum options



Model			Heating Duty Air 20°C				Cooling Duty Air 23°C	
			Water Temperatures				Evaporating temperature	
Concealed Ducted Unit	CO2 Cool	LPHW	60 - 30	60 - 40	65 - 40	50 - 30	7	5
DXD50 CO2 Only	Y	-	-	-	-	-	4.6	5.5
DXD60 CO2 Only	Y	-	-	-	-	-	5.4	6.4
DXD90 CO2 Only	Y	-	-	-	-	-	9.2	10.8
DXD130 CO2 Only	Y	-	-	-	-	-	10.8	12.5
DXD150 CO2 Only	Y	-	-	-	-	-	12	14.8
DXD50 CO2 +LPHW	Y	Y	1.31	2.19	2.3	1.21	4.6	5.5
DXD60 CO2+LPHW	Y	Y	1.84	2.8	3.33	1.63	5.4	6.4
DXD90 CO2+LPHW	Y	Y	2.7	4.7	5.64	2.56	9.2	10.8
DXD130 CO2+LPHW	Y	Y	3.7	5.79	6.94	3.35	10.8	12.5
DXD150 CO2+LPHW	Y	Y	4.94	6.78	7.5	4.3	12	14.8

Unit Performance

- CO2 Cooling and LPHW Heating available within the one wall mounted unit.
- Electric Heating available (When Refrigeration Requirement is too low to generate enough heating)
- Cooling Circuit 90 Bar MWP
- Can be supplied pre-fitted with electronic valve and driver



Model			Heating Duty Air 20°C				Cooling Duty Air 23°C	
			Water Temperatures				Evaporating temperature	
Wall Mounted	CO2 Cool	LPHW	60 - 30	60 - 40	65 - 40	50 - 30	7	5
WM 60 CO2 Only	Y	-	-	-	-	-	4	5
CWM 55 LPHW Only	-	Y	3.1	5.6	5.8	2.6	-	-
CWM 75 LPHW Only	-	Y	4.1	8	8.1	3.4	-	-
CWM 105 LPHW Only	-	Y	4.9	10	10.4	4.1	-	-



WINNER



WINNER



**ACR NEWS
AWARDS**



**ACR NEWS
AWARDS**

Thank You | Q&A:

For more information find us at Hall 6 Stand 117

Export Key Account Manager - OmarSoliman@tevlimited.com | +44 7812 771931

UK Key Account Manager – JT@tevlimited.com | +44 7912 390136

Technical Director - ChrisChisman@tevlimited.com | +44 7957 843831

WWW.MARSTAIR.COM

WWW.TEVLIMITED.COM



Chillventa Specialist Forums 2024
Chillventa Fachforen 2024

**CONNECTING
EXPERTS.**

