

AE4-1135 R16

COOLING REQUIREMENTS FOR COPELAMETIC COMPRESSORS

July, 2004

Introduction

In response to customer inquiries, both domestic and international, Copeland has reviewed our application requirements for oil coolers and head fans applied on Discus compressors in the R404A/R507 low temperature applications. Product engineering has done extensive testing of various parameters including unloading, as well as, fully loaded. The results were the basis for the application envelope shown in **Figure 1**.

The latest testing has shown that as long as the suction return gas is maintained below 65° F, Discus compressors can be operated down to -25° F evaporating on R404A/R507A without the requirement of a head fan or oil coolers. Additionally, head fans can be eliminated at even lower evaporating temperatures if return gas temperatures can be maintained at the lower values. Copeland application engineering will approve these applications upon receipt of acceptable test data.

NOTE: If you remove the oil cooler, you must install the by-pass loop to maintain proper oil flow.

The cooling requirements for all other Copelametic motor-compressors and refrigerants are clearly defined below. Any deviation from these recommendations can result in failure of the compressor.

Air-Cooled Compressors

As the name implies, air-cooled compressors are totally dependent on heat transfer to the air to maintain proper temperatures.

Air-cooled compressors require constant airflow across the compressor for proper cooling. Merely drawing air through a compartment over the compressor is not adequate - direct impingement on the compressor from the fan discharge is necessary.

If the compressor is mounted in the fan discharge stream on a condensing unit, adequate cooling will be provided. When applied with a remote condenser, an auxiliary fan is required.

If compressor cooling is provided by the condenser fan, fan cycling for head pressure control is not acceptable unless auxiliary cooling is provided.

Water-Cooled Compressors

Some smaller Copelametic compressors are wrapped with water coils for application on water-cooled condensing units. If water is circulated through the coil wrapped around the compressor, adequate cooling will be provided.

Refrigerant-Cooled Compressors (Non Discus)

Refrigerant suction cooled compressors are adequately cooled by the refrigerant at evaporating temperatures above 0° F. If operated at evaporating temperatures below 0° F, auxiliary cooling is required.

At evaporating temperatures below 0° F, the compressor can be cooled adequately by the condenser fan discharge. Fan cycling for head pressure control is not acceptable unless auxiliary cooling is provided. Fan cycling for head pressure control for medium and high temperature applications is acceptable.

Vertical cooling fans are recommended for compressors 3 H.P. in size and larger when auxiliary cooling is required. A standard fan assembly developing 1000 CFM airflow is available, with interchangeable brackets to fit different model compressors.

Compressors designed for an oil cooler, (6RL, 6RT, 4RL) must be applied with an oil cooler and a vertical cooling fan.

Two Stage Compressors

All two stage compressors are provided with an interstage expansion valve, and adequate cooling is provided by the refrigerant. No auxiliary fan is required.

Table 1

Vertical Fan Assemblies
(To Be Mounted On Top Of Compressor)

Part Number	For Compressor Model	Description
998-0550-00	All	Fan assembly including 230-1-60/50 motor, fan blade, guard.
998-0550-01	All	Fan assembly including 440/380-1-60/50 motor, fan blade, guard.
998-0550-02	All	Fan assembly including 115-1-60/50 motor, fan blade, guard.
998-0574-00	L	Mounting kit including bracket, studs, spacers, connectors, conduit.
998-0574-01	M	Mounting kit including bracket, studs, spacers, connectors, conduit.
998-0574-02	N	Mounting kit including bracket, studs, spacers, connectors, conduit.
998-0574-03	4D-4R	Mounting kit including bracket, studs, spacers, connectors, conduit.
998-0574-04	6D-6R	Mounting kit including bracket, studs, spacers, connectors, conduit.
998-0574-05	6DL/T-6RL/T	Mounting kit including bracket, studs, spacers, connectors, conduit.
998-0574-06	9R Old Style Head	Mounting kit including bracket, studs, spacers, connectors, conduit.
998-0574-08	9D-9R New Style Head* 3D	Mounting kit including bracket, studs, spacers, connectors, conduit.
998-0574-11	2D	Mounting kit including bracket, studs, spacers, connectors, conduit.
998-0574-10	*3D Moduload	Mounting kit including bracket, studs, spacers, connectors, conduit.
998-0574-07	6DL/T-6RL/T	Mounting Kit and oil cooler assembly.
998-1123-00	6DL/T-6RL/T	Oil cooling assembly, including oil cooler, studs, spacers, and fittings.
998-1124-00	4DL/T-4RL/T	Oil cooling assembly, including oil cooler, studs, spacers, and fittings.

* Use 998-0574-08 for 3D models without unloading.
Use 998-0574-10 for 3D models with Moduload unloading.

Table 2
Vertical Cooling Fan
Space Requirement

Compressor Model	Add To Compressor Height, Inches
L	8.0
N	8.0
M	8.5
9	8.5
4	9.5
6	10.25

Table 3
Horizontal Fan Assemblies
(To Blow On Compressor Side)

COMP. HP	FAN AND MOTOR ASSEMBLY		MOTOR		FAN BLADE PART NUMBER	FAN SPACE REQUIREMENT			
	MINIMUM AIR FLOW CFM	PART NUMBER	VOLTS	SIZE		* GUARD PART NUMBER	ADD TO COMPRESSOR HEIGHT, IN.	WIDTH, IN.	
									COMPRESSOR
1	650	998-0050-001	230-1-60*50	9 Watt	350-0241-01	024-0163-00	083-0026-00	1.25	5.50
1-1/2	650	998-0050-00	230-1-60*50	9 Watt	350-0241-01	024-0163-03	083-0026-00	1.25	5.50
2	650	998-0050-02	230-1-60*50	9 Watt	350-0241-03	024-0163-03	083-0026-30	None	5.50
	650	998-0050-03	440-1-60*50	9 Watt	350-0241-04	024-0163-0C	083-0026-00	None	5.50

* Not included with fan and motor assembly.

Figure 1

Discus Head Fan Requirements
R-404A

