



When you want Quality, specify COLMAC!

# Installation, Operation, and Maintenance

## Ammonia Subcooler Assembly



ENG00020134

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## 1. SAFETY INSTRUCTIONS

Caution: Colmac Subcooler Assemblies by their very nature produce subcooled ammonia liquid. Like most liquids, ammonia liquid expands with a rise in temperature. If this expanding liquid is trapped between service valves, it can and will create pressures far beyond the design operating pressure of some components within the assembly. Hydrostatic safety relief valves are provided and installed.

Therefore – it is imperative that the closing of service valves be performed by an experienced ammonia operator. It is recommended that the heat exchanger side of the service valves be evacuated immediately after the service valves are closed.

Additionally – Subcooled liquid that has left (downstream of) the subcooler assembly should also be evacuated, or vented to the system to prevent excess hydraulic pressure upon warming.

## 2. MODEL NOMENCLATURE

- SC-100 - covers the range of 25- 100 system evaporator tons
- SC-300 - covers the range of 75- 300 system evaporator tons
- SC-700 - covers the range of 175 - 700 system evaporator tons

## 3. MODEL DATA

Model Number	System Cap., Tons	Max. System Flow, lb/hr	Subcooling Cap., Tons	Main Liq. Line, NPS	Suction Line, NPS	Ammonia Charge, lbs	Dry Weight, Pounds	Size, in H X W X D
SC-100	100	2400	12	1	1 1/2	6	275	38" X 39" X 46"
SC-300	300	7200	36	1 1/2	2 1/2	14	350	38" X 39" X 46"
SC-700	700	16000	84	2 1/2	2 1/2	44	470	38" X 39" X 46"

## 4. GENERAL DESCRIPTION

4.1 Colmac Subcooler Assemblies are designed to offer a “plug in” ammonia subcooling module in a DX ammonia system. They are engineered to reduce the temperature and pressure of high pressure liquid ammonia to the proper temperature and pressure for efficient and successful operation of a DX system. They are available in three sizes, spanning a capacity range of 25 to 700 evaporator tons.

4.2 These units are built around fusion welded compact plate heat exchangers for a minimum ammonia charge and optimum heat transfer efficiency. It will be pre-piped and mounted on a frame. The system liquid lines will be sized for a velocity of less than 4 ft/sec.

4.3 Included Items

4.3.1 Welded plate heat exchanger suitable for 400 Psig DWP at 300°F

- 4.3.2 System liquid inlet, outlet and bypass lines, each with seal cap service valves mounted
- 4.3.3 Hydrostatic safety relief valves provided on both sides of plate heat exchanger.
- 4.3.4 Liquid outlet pressure gage with service valve
- 4.3.5 Temperature probe in a well for controlling and monitoring subcooled ammonia temperature
- 4.3.6 Suction line with seal cap service valve
- 4.3.7 Liquid feed line with solenoid valve and seal cap service valve
- 4.3.8 Electronic expansion valve mounted and piped
- 4.3.9 Support stand for the stud mounted heat exchanger and piping support
- 4.3.10 Stainless steel drip tray

## 5. CONTROL PANEL

A UL Listed, control panel will be mounted, prewired and programmed by Colmac. It will be housed in a NEMA 4 enclosure with indicating lights. The following functions control will be controlled or monitored.

### 5.1. Included Items

- 5.1.1. Subcooler energized Light
- 5.1.2. Subcooled liquid temperature, Digital readout
- 5.1.3. Subcooler expansion valve % capacity, Digital readout

## 6. SKID ASSEMBLY AND PIPING

All of the above components will be mounted on a steel skid assembly with lifting eyes. All of the piping will be of 304 SS per IIAR-2 and ASME B31.5. All of the piping clearances will allow for a minimum of 2" of insulation where required. Once assembled, the entire assembly will be pressure tested to 330 Psig, evacuated and nitrogen charged. It will then be shrink wrapped for shipment.

## 7. INSTALLATION

### 7.1. DELIVERY

- 7.1.1. Upon delivery of the Subcooler Assembly, the package should be inspected for damage. The shrink wrap should be removed if there is suspected damage beneath. It should be resealed if the assembly is to remain outside until installation. There is a Schrader valve on the two upper connections of the assembly on the heat exchanger side of the service valves. They should both be "burped" to confirm that the nitrogen shipping charge is still intact. If there is damage or no pressure on either connection, then it should be noted and a claim filed with the trucker. Should the unit warrant a return to the factory, please contact your local Colmac representative or call Colmac at 1-800-845-6778 and ask for the shipping

department. Please have the shipping PRO number or Colmac Order number handy.

- 7.1.2. Upon successful receipt of the assembly, lift it with the lifting eyes and locate it in its final installation location. This location should be level and able to support the dry weight plus the ammonia charge listed in the Model Data table above. Once situated it should be securely bolted to the floor or welded, if to a steel structure.

## 8. PIPE FITTING

- 8.1. There are three field connections to the assembly as shown on the drawing; warm liquid in, cold liquid out, and cold vapor (suction) out. All three connections are factory sealed with welded pipe caps having Schrader type valves. NOTE: Listen for nitrogen gas escaping as the valves are depressed. If there is no nitrogen hiss, read the delivery instructions above. The three pipe caps will be cut away prior to installation. Prior to welding, open the service valves in the proximity of the weld to lift the Teflon seal off from the seat to avoid heat damage. Weld directly to the system side of the service valves with a wet rag on the valve body to absorb the welding heat.
- 8.2. Pipe bracing is mandatory! Even though the subcooler assembly piping is supported from the factory, it is designed for the shock loads due to shipping. All field pipes to the unit should be independently supported from the floor or building structure so that no stresses are imposed on the Subcooler Assembly piping.

## 9. PRESSURE TESTING

Prior to system is pressure testing; all of the service valves are to be opened.

## 10. EVACUATION

- 10.1. Unlike recirculated systems, all DX ammonia systems are compromised by the presence of water in the ammonia. Please refer to the Colmac DX Ammonia Piping Handbook for a complete explanation why.
- 10.2. One potential source for water is the residual water liquid and vapor left behind from component testing and fabrication. THEREFORE IT IS IMPERATIVE that the entire system be double evacuated to a 5.16mm Hg absolute vacuum. Please refer to the Colmac DX Ammonia Piping Handbook for a complete description of the double evacuation technique. This publication is available online at [www.colmaccoil.com](http://www.colmaccoil.com)

## 11. ELECTRICAL INSTALLATION

Within the control panel is a terminal strip for the hot, neutral & ground power supply. The source should be 20 amps of 120 Volt single phase power with a proper ground. The remainder of the wiring is factory completed. Briefly energize the circuit breaker to confirm power and left in the off position until system commissioning.

## 12. COMISSIONING

- 12.1. After the system has been charged with refrigeration grade (99.95% pure) anhydrous ammonia, the following steps should be followed:
  - Ensure that all service valves are opened, back seated and their seal caps installed
  - Close tight the bypass valve (tagged NC) and replace the seal cap
  - Energize the control panel by switching the circuit breaker on

- The liquid outlet temperature should be set to 40°F or 10°F below saturated intermediate for low temp subcooling.
- With the panel energized the controller is factory adjusted to stroke the electronic expansion valve to maintained the desired liquid temperature
- Open the gage service valve and adjust the regulator for a 75 Psig outlet pressure once liquid flow is established
- Clean the strainer safe maintenance procedures after the first 100 hours of operation and annually after that.

### 13. MAINTENANCE

13.1. Clean the strainer using safe maintenance procedures annually.

13.2. There is only one cycling part in the assembly, the EEV. Other than normal wear and tear or dirt contamination, minimal maintenance is required. Please refer to the appropriate valve manufacturers' IOM for valve maintenance. The EEV as well as the heat exchanger IOM, are included as an appendix to this manual.

### 14. TROUBLESHOOTING

14.1. With a minimum of cycling parts, this assembly is very robust. In the event the leaving liquid temperature is high, please check the following items:

- That there is a sufficient liquid level in the receiver or feed vessel to ensure pure liquid flow
- The liquid strainer is clean
- The liquid line solenoid coil is not burned out and the solenoid is opening properly
- The EEV actuator powered and is modulating properly
- That there are valid electrical signals to both
- The main liquid bypass valve has been inadvertently opened
- Evacuate and warm up the cold side of the heat exchanger and drain any oil present.

14.2. If the liquid outlet pressure is high or unstable, exercise the manual opening stem and change to a higher set point and back to the 75 Psig. If the control is still erratic, either the liquid flow rate is less than 25% of the system rating or the valve needs to be rebuilt or replaced.



Colmac reserves the right to change product design and specifications without notice.

For more information on Colmac products call us at 1-800-845-6778 or visit us online at:

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