Heat Transfer Systems

Application Data

Heat Transfer Systems can be categorized (grouped) by the type of fluid used in transferring the heat to the process. Water and Water/Glycol systems can be used for temperatures up to 300°F. Special heat transfer fluids and oils can operate up to 750°F and the fluid vaporizer systems utilize vapor phase heat energy to give a higher heat of 750°F with lower operating pressures (150 psig).

The Reference Guidelines and General Specifications give more information to help your selection. Detailed product information appears in the following pages.

Heat Transfer Systems — Reference Guidelines

Heat Transfer Fluid	Operating Pressure (psig)	Operating Temp. (°F)	Maximum kW[1]	Model	Page
Water	Atmospheric Atmospheric Atmospheric	300 300 300	48 800 800	CMX MWS MWSS	D-5 D-6 D-9
Oil	Atmospheric Atmospheric	550 650	24 500	CMXO MOS	D-14 D-15
Oil/Pressurized	200	750	600	Note 2	D-22
System Options					D-24
Vapor	50	750	300	Note 2	D-28

1. Higher kW ratings available. Contact your Local Chromalox Sales office.
2. Custom Premium Solution Capability. Contact your Local Chromalox Sales office.

Benefits & Advantages

Reliable and Proven Designs — Backed by 100 years of engineering and manufacturing of electric heating equipment, Chromalox electric fluid heat transfer systems are safe, versatile and easy to use, pre-engineered heating or heating and cooling systems which operate at existing distribution voltages (208 - 600 Volts).

Safe and Reliable Electrical Wiring — All wiring complies with the National Electrical Code.

Heater Burnout Protection — Every heating chamber has an overtemperature cutout which will de-energize the heater in case of an overtemperature condition.

Matched Components — All Chromalox standard and special systems are pre-engineered with correctly sized and matched components such as pumping rate versus pipe line size, amperage draw versus electrical parts to ensure total system performance.

Optional Controls — All Chromalox heat transfer systems are available with the latest state-of-the-art solid state controls. These include microprocessor-based, recording and SCR power controllers that can control fluid temperatures to ± 1°F. For a complete selection of optional controls refer to the Controls section.

HEAT TRANSFER

Heat Transfer Systems — General Specifications

Model	System Type	Application	Operating Temp. (°F)	kW[2]	Mbh[4]	Max. Operating Pressure	ASME	Pressure Rating & Construction	Connection Type
CMX	Mold Temperature Controller	Water/Glycol	50 - 250[1]	4.5 - 48	15.3 - 81.8	Atmospheric	N/A[3]	125 Lb. Threaded	NPT
MWS	Heat Transfer Non-Pressurized	Water/Glycol	50 - 300	50 - 800	171 - 2,730	Atmospheric	Optional	150 Lb. Welded	Flanged
MWSS[5]	Heat Transfer Non-Pressurized	Water/Glycol	50 - 300	50 - 800	171 - 2,730	Atmospheric	Optional	150 Lb. Welded	Flanged
CMXO	Heat Transfer Non-Pressurized	Heat Transfer Fluid/Oil	50 - 550	6 - 24	20.4 - 81.9	Atmospheric	N/A[3]	125 Lb. Welded	NPT
MOS	Heat Transfer Non-Pressurized	Heat Transfer Fluid/Oi	50 - 650	50 - 500	171-1710	Atmospheric	Optional	150 Lb. Welded	150 Lb. Flanged
Note 6	Heat Transfer Pressurized	Syltherm® 800	100 - 750	9 - 600	30.7 - 2,047	200 psig	Standard	300 Lb. Welded	300 Lb. Flanged
Note 6	Heat Transfer Vaporizer	Dowtherm® Therminol®	-20 - 750	15 - 300	51.2 - 1,024	150 psig	Standard	300 Lb. Welded	300 Lb. Flanged

1. Indicates standard models. Models available in other configurations.
2. Indicates standard design kW. Higher kW ratings available.
3. N/A indicates not available or not applicable.
4. Mbh is the ASME & ANSI standard for one thousand British Thermal Units per hour.
5. Similar to MWS, but all stainless steel contruction
6. Custom Premium Solution Capability.

Other Notes — Use these selection guidelines as a reference to the availability of Chromalox Packaged Heat Transfer Systems If you cannot find a system with all of the features required for your application, contact your Local Chromalox Sales office.

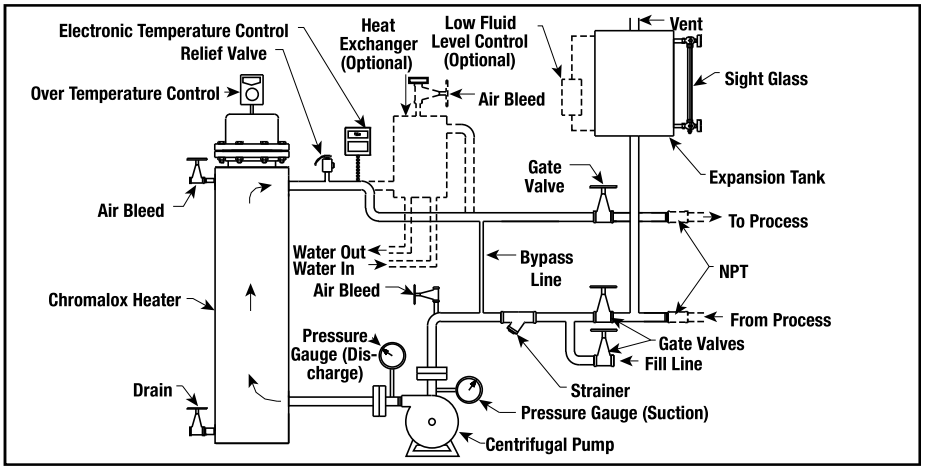
Water Systems

Technical & Application Data

- Water and Water/Glycol Solutions to 250°F
- 4.5 - 800 kW (15 - 2,047 Mbh)
- 120 - 600 V, Three Phase
- Heavy Duty 0.475 Copper Elements
- Cast Iron Bronze or Stainless Fitted Centrifugal Pumps
- Electronic Digital Temperature and Process Controls
- NEMA 1 Electrical Enclosure (STD) - NEMA 4 and 12 Explosion Resistant
- Integral Power Panels with Mechanical Contactors or SCR Power Control
- Optional Pressure Relief Valve
- ASME Section VIII Certification Available
- Optional Open or Closed-Loop Cooling Modules
- Optional Expansion Tank

Note — Mbh is ASME & ANSI standard for one thousand British Thermal Units per hour.

Typical Water Heat Transfer Piping Schematic



Applications

Chromalox Water Heat Transfer Systems are used in process heating applications requiring closely controlled process temperatures. Systems are furnished complete with heaters, controls, pumps, valves, safety devices and necessary plumbing. They are used with injection molding machines and equipment, jacketed vessels, pipelines, heat tracing and other industrial or commercial processes. Water heat transfer systems can be used for special comfort heating applications.

Advantages

The primary advantage of using water as the heat transfer fluid is its low cost and availability. Water has a high specific heat and is an excellent heat transfer medium. In addition, water usually requires no special handling or disposal procedures.

Heating & Cooling Simplicity

Heating water is relatively simple and straight forward. Cooling can be incorporated into most water heat transfer applications by the simple addition of either open-loop or closed-loop cooling.

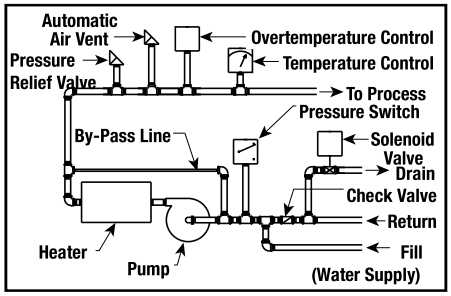
Open-Loop Cooling is the least expensive and the easiest to install. It requires makeup water during the cooling cycle which may be a disadvantage in locations with a limited water supply, or hard water.

Closed-Loop Cooling is usually more expensive initially than open-loop cooling, but has the advantage of reusing and conserving water. A cooling tower or refrigerated system is recommended.

Cooling Options

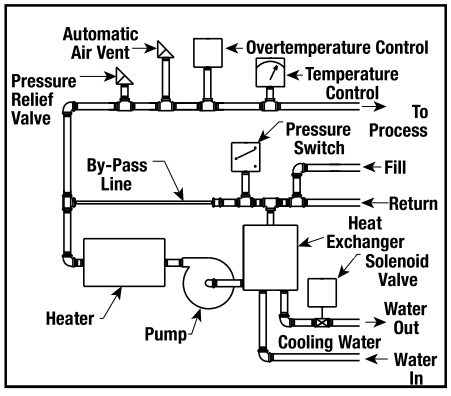
In open-loop cooling, hot water is circulated normally in the closed loop of the process piping. When the temperature of the fluid rises over the controller setpoint, an automatic solenoid valve opens allowing cool water to be injected into the process loop from the primary water supply. Excess hot water is discharged to the drain.

Open-Loop Cooling System



Closed-loop cooling uses a heat exchanger with water from a cooling tower or refrigerated system. Water is recirculated and conserved. No water is discharged down the drain.

Closed-Loop Cooling System



Oil Systems

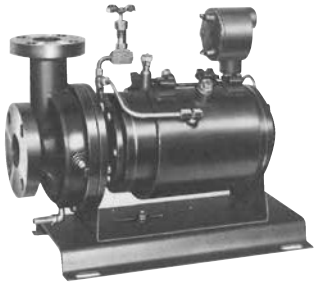
Technical & Application Data

- Heat Transfer Fluids and Oils to 750°F
- 4 - 600 kW (14 - 2,047 Mbh) Multiple Zone and Special System Designs to 1,200 kW or More
- 208 - 575V, 3 Phase, 60Hz
- Non-Pressurized (Atmospheric) and Pressurized Systems
- 150 Lb and 300 Lb Carbon Steel Construction - All Primary Loop Hydraulic Piping Welded Schedule 40 Steel Pipe
- Long Life 0.475" Dia. Steel Sheath Elements Welded to Flanges for Easy Service
- Positive Displacement and Centrifugal Pumps — Wide Selection of Pump Manufacturers Available
- NEMA 1, 4 and 12 Electrical Enclosures - Explosion Resistant Class I, Group D, Div. 1 Available
- Integral Power Panels with Mechanical Contactors or Optional Electronic SCR Controls and Sequencers
- Broad Selection of Mechanical and Electronic Process Controls
- ASME Section VIII Certification
- Complete Line of Expansion Tanks, Cooling Modules, Accessories and Options

Options & Features

Special Pumps — Chromalox heat transfer systems can be built with an installed spare pump. The pump can be the same manufacturer as the standard or Chromalox will build the system using a pump from your preferred pump manufacturer. The types of pumps available include centrifugal (AVS type which conforms to ANSI standard B73.1), positive displacement, sealess (canned or magnetic drive) or turbine. Pump manufacturers include Allis-Chalmers, Aurora, Blackmer, Brown & Sharp, Burkes, Carver, Crane, Dean, Deming, Dickow, Dunham-Bush Fairbanks-Morris, Goulds, Haight, Ingersoll Rand, Kontro KSB, Peerless, Roper, SiHi, Sundyne, Vican, Viking, Weinman, Worthington.

Special Crane Chempump® can be operated at 750˚F, one of many optional types of pumps available.

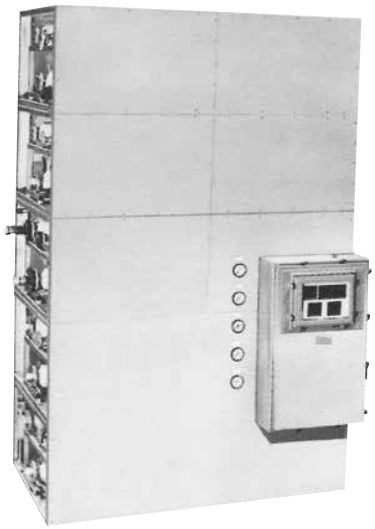


Standard and Special Heating and Cooling Systems — Many processes require cooling as well as heating. Examples are:

- The rapid cool down at the end of the process cycle for product handling
- Controlled cooling or tempering to maintain temperature due to an exothermic reaction.

Chromalox electric fluid heat transfer systems can be designed with a standard or special cooling cycle using the same heat transfer fluid. This can be accomplished either in an open (water system) or closed-loop cooling cycle by adding either a water-cooled, air- cooled or refrigerated heat exchanger in the piping loop. A system with mechanical refrigeration can be designed to operate between -20 and 750°F (-28 and 398°C).

Switching between the heating and cooling cycles can be set up for manual, semi-automatic or fully automatic operation. The method of switching can be as simple as manually turning valves or as sophisticated as a programmable controller linked to a computer or distributed process system (DPS).



Five zone ASME certified hot oil heat transfer system with remote controls emphasizes the expertise and capabilities of the Chromalox organization to meet the requirements of virtually any heat transfer application. The system has independent zones with a separate pump, motor, heater, heat exchanger and cooling module for each.

Lower Cost Construction — The major advantage of using heat transfer fluids instead of hot water or steam is the operating pressure at process temperature. Hot oil systems are preferred over hot water or steam for temperatures above 250°F to avoid the hazards and risks of the dangerously high pressures required to use high-temperature steam. There are many heat transfer fluids that operate to 650°F at atmospheric pressure. Other fluids operate to 750°F at less than 150 psig system pressures. Compare this to steam pressures and process temperatures in the following table.

Steam Temperature Vs. Pressure

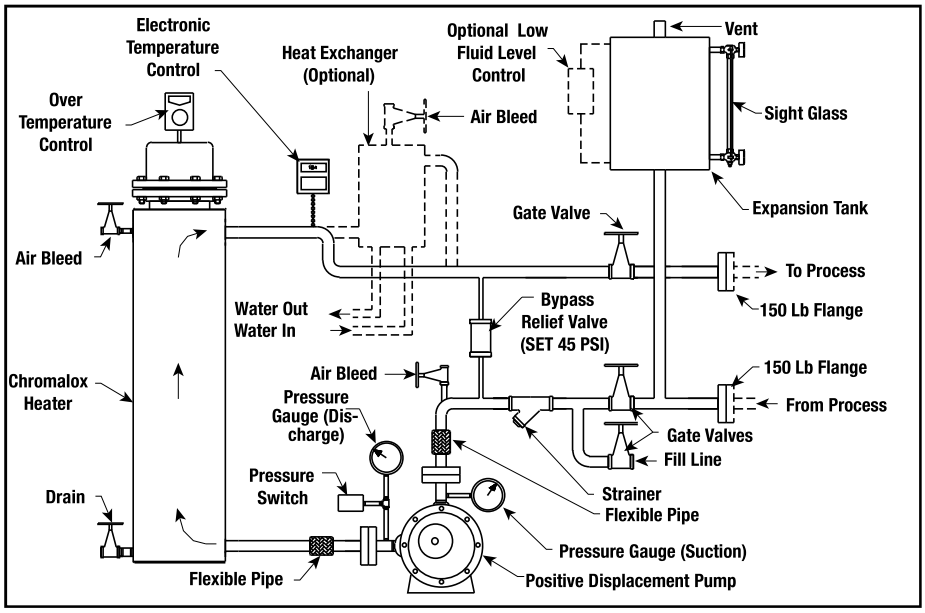
Process Temperature (°F)	Steam Pressure (Psia)
406	250
467	500
510	750
545	1,000
572	1,250
596	1,500
635	2,000
652	2,250
695	3,000
707	3,250

Note — High system pressure means costly pressure retaining components. The low vapor pressures of heat transfer fluids simplify piping and vessel design and allow lower cost construction.

Oil Systems

Technical & Application Data (Cont.)

Typical Piping Schematic for Non-Pressurized (Atmospheric) Hot Oil Systems



Typical Piping Schematic for Pressurized Hot Oil Systems