

Chromalox®

PRECISION HEAT AND CONTROL

Electric Heat and Control Products For the Marine Industry



MARINE PRODUCTS

CONTENTS

Duct Heaters	3
Convection Heaters	4
Blower Heaters	4
Circulation Heaters	5
Immersion Heaters	5
Steam Boilers	6
Control Panels	7

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CHROMALOX IS THE SOURCE FOR HEAT AND CONTROL SOLUTIONS FOR MARINE APPLICATIONS



Chromalox provides high-quality equipment designed and manufactured to meet the requirements of U.S. Navy and Coast Guard specifications. But that's just one reason to choose Chromalox.

Here are more:

Experience

Chromalox began designing and manufacturing heat and control products in 1915 . . . nearly 90 years ago. Today we make more kinds of heating elements, sensors, and controls for more industries than anyone in the world. Our products can be found in some of the most unusual and challenging applications, like engine preheaters on the space shuttle. Our depth of experience extends to marine applications, too, where Chromalox products can be found on a variety of military surface ships and submarines.

Innovation

Chromalox can custom-design, custom-engineer, and custom-manufacture innovative products to meet unique application needs. Our innovative spirit can be seen in the non-magnetic-design circulation heaters installed on MCM Avenger Class Minesweepers, and steam boilers small enough to pass through ship hatches for installation and removal. Innovation is what started this company in 1915 when we introduced the world's first metal-sheathed heating element.

Responsiveness

Chromalox will work hard to get you the best product solution quickly. We are responsive partners eager to help you select what you need from our existing product line, or we'll design and produce prototypes for new products and systems in the shortest possible turnaround time.



Chromalox also wants to keep you up and running. We maintain vast inventories of repair and replacement parts for immediate shipment and same-day or next-day delivery.



DUCT HEATERS

DUCT HEATERS

Duct Heaters

Chromalox offers electric duct heaters in a variety of sizes for preheating intake air on surface ships and reheating air in individual room compartments on board ships and submarines. They are a compact, safe, and light-weight heat source that does not leak on cargo or crew, or present after-damage problems that can occur with steam equipment.

Chromalox duct heaters feature heating elements constructed of nickel chromium resistance wire centered in densely compacted magnesium oxide insulation. This is enclosed in a corrosion-resistant MONEL* alloy sheath. Spiral MONEL alloy fins are continuously wound around and brazed to the sheath. Ceramic-to-metal hermetic seals are welded on the terminal ends of the heating element to prevent moisture from entering. Stainless steel fintube elements are also available.

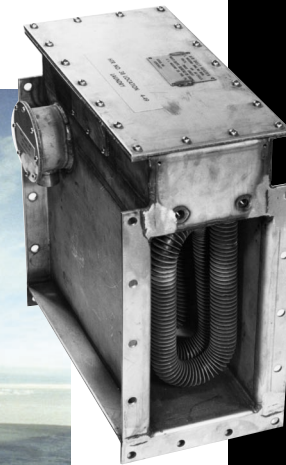
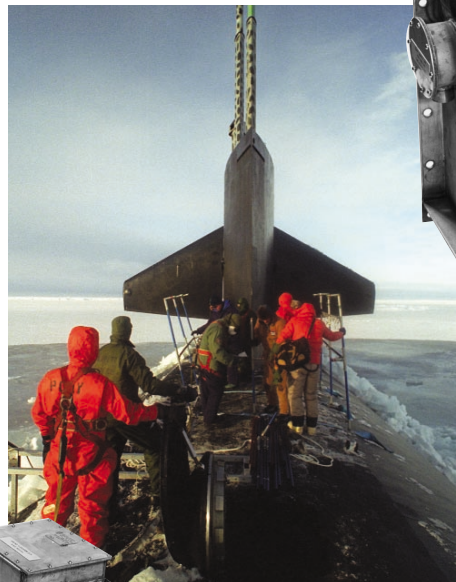
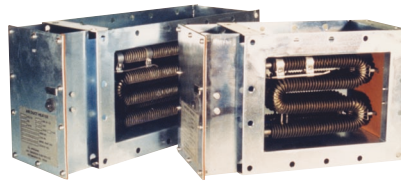
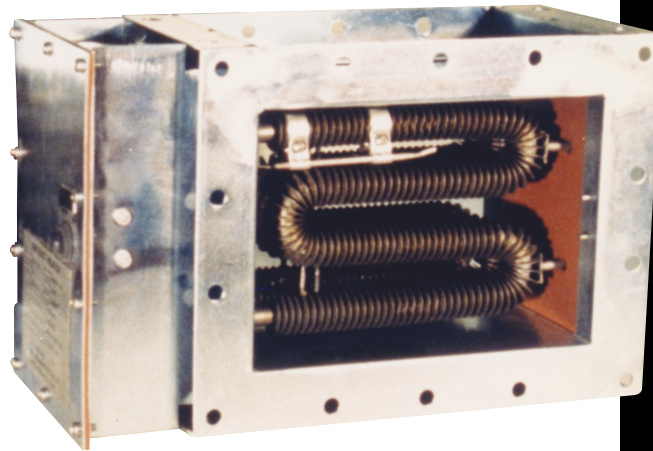
The terminal box is of spray-tight construction and fully gasketed to prevent moisture from entering the electrical connections. The cover-plate is removable for complete access to the power source terminals. A manual reset cutout switch located in the terminal box limits the surface temperature of the heating elements to 750°F. It can be reset from the exterior of the heater.

The casing is 16-gauge steel to minimize noise and electro-galvanized to resist corrosion. Pre-drilled flanged connections are provided for installation to the ductwork.

Many similar heater designs are available, as specifications have varied for submarine use, different ship classes, or those following old designs.

Sizes range from 1/4 kW to several hundred kW. Also available are thermostatic or solid-state type controls that have passed required marine tests. Consult your Chromalox representative.

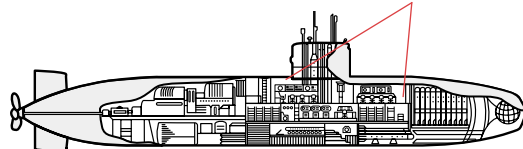
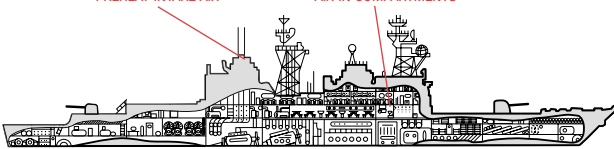
Approvals: MIL-H-22594A, MIL-S-901C (High Shock), MIL-STD-167-1 (Vibration)



DUCT HEATERS PREHEAT INTAKE AIR

DUCT HEATERS REHEAT AIR IN COMPARTMENTS

DUCT HEATERS REHEAT AIR IN COMPARTMENTS



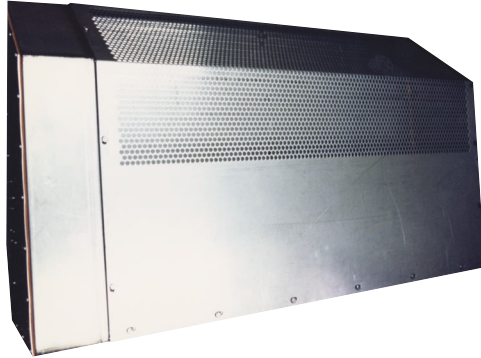
*MONEL is a registered trademark of Special Metals Corporation.

CONVECTION AND BLOWER HEATERS

CONVECTION AND BLOWER HEATERS

Convection Heaters

Chromalox Type CE electric convection heaters are rugged, reliable, and designed for easy installation in hard-use areas. Easily bulkhead mounted, these 21-inch high heaters are ideal for shower rooms, toilets, or any place where a small, highly moisture-resistant heater is required.



These units feature heating elements constructed of nickel chromium resistance wire centered in densely compacted magnesium oxide insulation. This is enclosed in a corrosion-resistant MONEL* alloy sheath. Spiral MONEL alloy fins are continuously wound around and brazed to the sheath. Ceramic-to-metal hermetic seals are welded on the terminal ends of the heating element to prevent moisture from entering.

The spray-tight terminal box houses a built-in, adjustable thermostat accessible by removing the electrical enclosure cover plate. A manual reset cutout switch is also located in the terminal box. It can be reset from the exterior of the heater at the electrical enclosure cover plate. The integral control circuit is 120 volts. On 440-volt heaters a unit-mounted transformer provides the 120-volt power.

The casing is corrosion-resistant 316 stainless steel. It has a removable grill with a sloped top.

Approvals: MIL-H-22663 Type T, MIL-S-901C (High Shock), MIL-STD-167 (Vibration), MIL-STD-461 (EMI)

Blower Heaters

One word describes Chromalox RSFM blower heaters used in living quarters: versatile. They can be surface or recess mounted. They can be concealed completely where duct connectors are desired, such as under or over windows for defrosting. The units can be mounted vertically in a wall, horizontally in a ceiling, or at any angle from vertical to horizontal in the same plane.

The air inlet is at the top; the air outlet is at the bottom. Symmetrical louvers can be changed from the front of the unit to the top and bottom. The pitch of the louvers allows upward or downward air deflection, or inward or outward air deflection if at the top of the heater.

Three toggle switches allow full heat or fan only at high or low airspeed. The centrifugal, sealed-bearing fan delivers 150 CFM on high and 76 CFM on low. A pilot light indicates when the unit is on. There is a thermostat for heat adjustment and automatic overheat protection, though the unit can be furnished without a thermostat, if desired. A separate switch and pilot light with a connection box are available for remote mounting.

The framework is rugged steel with a high-heat-baked enamel finish.

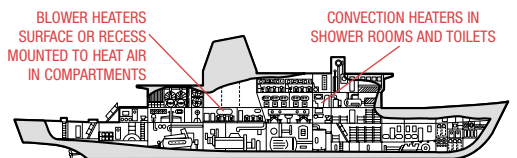
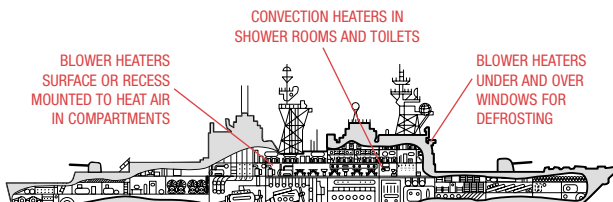
Power rating: 750, 1,000, 1,500, 2,000 and 3,000 W (2,000 W maximum recommended for ceiling mounting)

Voltage: 120V, 1-phase; 440 V, 1- or 3-phase using built-in transformer and relay

Frame dimensions: 15 in. wide x 20 in. high x 5 in. deep

Outside trim dimensions: 15 1/8 in. wide x 20 1/8 in. high (surface); 16 1/8 in. wide x 21 1/8 in. high (flush)

Weight: 28 lb.



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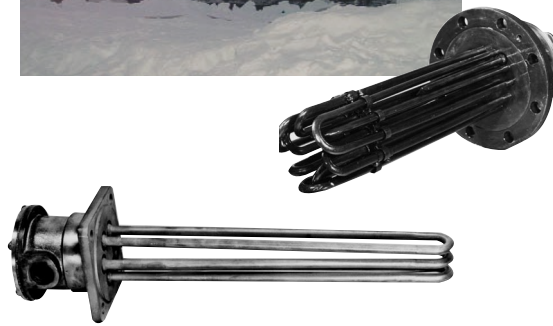
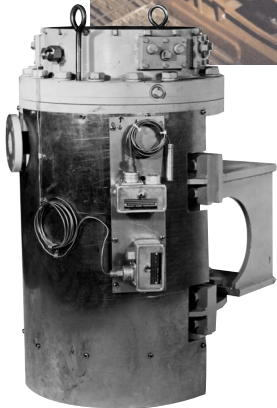
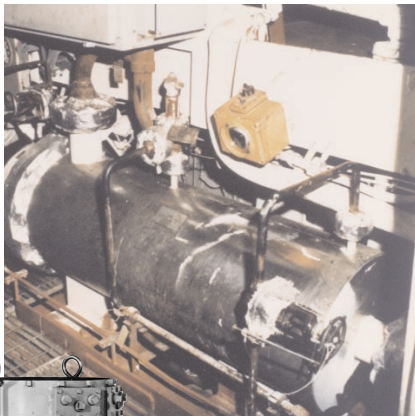
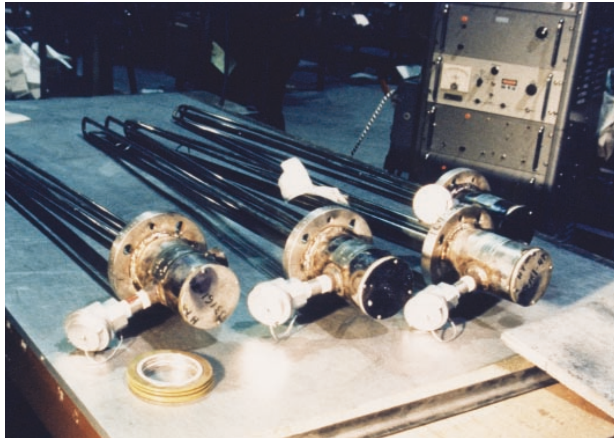
Circulation Heaters

Chromalox electric circulation heaters can be found in a variety of lubrication and fuel oil applications on submarines and surface vessels alike. High-kW, compact-design Chromalox circulation heaters are installed on submarines to preheat 2190 TEP lubricating oil prior to purification processing. The fuel oil service system heaters on Spruance Class Destroyers are Chromalox circulation heaters. And on MCM Avenger Class Minesweepers, non-magnetic-design Chromalox circulation heaters are hard at work, providing reliable, efficient heat as lubrication oil preheaters.

Chromalox circulation heaters are packaged units consisting of a screwplug or flanged immersion heater mounted in a thermally insulated heating chamber. Thermocouples provide process temperature control and overheat protection.

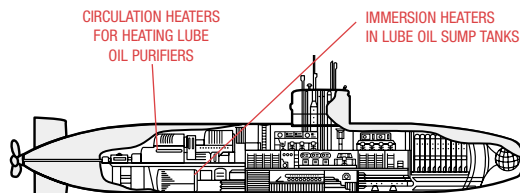
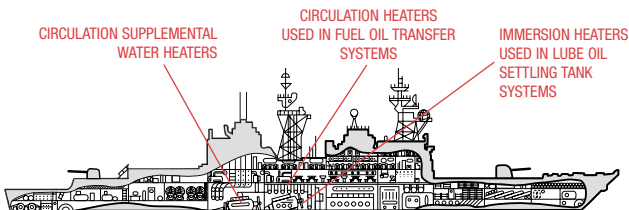
Immersion Heaters

Chromalox immersion heaters can apply heat to water and oil at virtually 100 percent efficiency. They are constructed of hairpin-bent tubular elements, made of copper or carbon or stainless steel, that are hermetically sealed and brazed or welded to a flange or threaded plug. The units have a thermowell for the temperature control sensor, and the terminals are inside a liquid-tight electrical enclosure.



CIRCULATION AND IMMERSION HEATERS

CIRCULATION AND IMMERSION HEATERS



STEAM BOILERS

STEAM BOILERS



Steam Boilers

Electric steam boilers are an efficient means of providing steam aboard ship for galley and laundry use. On FFG-7 class frigates, Chromalox single steam boilers are used to supply steam at 100 psi for the laundry. The boiler shell is steel. Copper elements provide the heat transfer. Pressure switches regulate circuits at 90, 95, and 100 psi to maintain steam pressure supplying washing, drying, and pressing machines.

Two boilers are installed on the DD-964 Spruance Class Destroyer to supply both the galley and laundry. The boilers are interconnected so that either unit can supply both areas or each area individually. Pressure switches regulate the circuits to maintain steam availability.

The boilers on the destroyer are unique in that the complete boiler shell is made of INCOLOY* steel. INCOLOY steel is used to provide improved service life in a corrosive environment. The boilers are also small enough to pass through hatches for installation and removal.

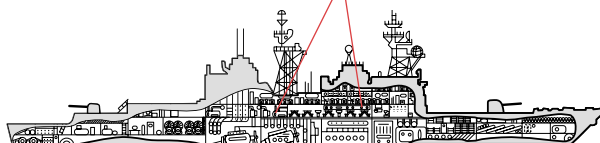
Power rating: 300 kW

Voltage: 440 V, 3-phase

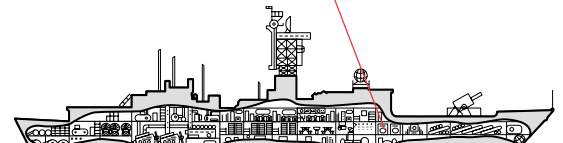
Approvals: MIL-S-901C (High Shock)



STEAM BOILERS USED TO SUPPLY GALLEY AND LAUNDRY



STEAM BOILERS FOR STEAM-OPERATED WASHING, DRYING, AND PRESSING LAUNDRY MACHINES



*INCOLOY is a registered trademark of Special Metals Corporation.

Control Panels

From multi-loop electronic controls to stock and custom control panels, Chromalox can design the right controls for marine applications. Following are a couple of examples of Chromalox controls and control panels installed aboard ships.

Fuel Oil Transfer System

Chromalox provides control panels for fuel oil transfer circulation heaters on a variety of ships. The panels include up to six contactors and may include SCR or staging controls, and electronic process and overheat protection controllers. The units are complete with transformer, fusing, and relays.

Power rating: 180 and 300 kW

Voltage: 440 V, 3-phase

Approvals: MIL-S-901C (High Shock), MIL-STD-167 (Vibration), First Article Test, MIL-STD-461 (EMI)

Lube Oil Settling Tank System

Chromalox control panels are used for lube oil settling tank immersion heaters on MCM Avenger Class Minesweepers and LPD 17 San Antonio Class Amphibious Ships. These panels include an electronic process temperature controller, an electronic high limit temperature controller to shut down the system if the heating element gets too hot, a power contactor, and necessary fusing and terminal blocks.

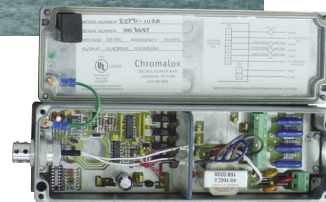
Power Rating: 20 kW

Voltage: 440 V, 3-phase

Duct Heating

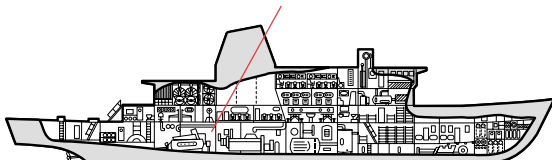
Chromalox supplies E2PD controls for space heating and cooling on LPD 17 amphibious ships and aircraft carriers. The units drive remote contactors and cooling coils for a wide variety of summer cooling and winter heating requirements.

Approvals: MIL-S-901C (High Shock), MIL-STD-167 (Vibration), MIL-STD-461 (EMI)

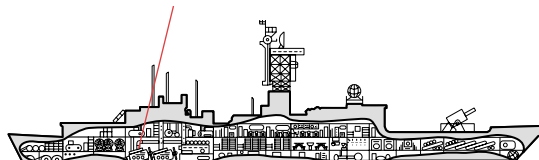


CONTROL PANELS

SOLID STATE CONTROL PANEL
PROVIDES ACCURATE OUTLET
TEMPERATURES OF CIRCULATION LUBE
OIL PURIFIER HEATER



CONTROL PANEL FOR LUBE OIL SETTLING TANK
IMMERSION HEATERS, INCLUDING ELECTRONIC
HIGH LIMIT TEMPERATURE CONTROLLER AND
FUSING AND TERMINAL BLOCKS



Chromalox Value-Added Products and Services Are Available Worldwide

Worldwide Customer Service

Argentina	Ecuador	Iran	Puerto Rico
Australia	Egypt	Israel	R.O.C. (Taiwan)
Austria	El Salvador	Japan	Russia
Belgium	England	Korea	Saudi Arabia
Bolivia	France	Kuwait	Singapore
Brazil	Germany	Lebanon	Sweden
Canada	Greece	Malaysia	Switzerland
Chile	Guatemala	Mexico	Thailand
China	Honduras	Netherlands	Turkey
Colombia	Hong Kong	Nicaragua	United Arab Emirates
Costa Rica	Iceland	Norway	United States
Dominican Republic	India	Pakistan	Venezuela
	Indonesia	Peru	

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