

**Building Precision Electric Heat and Control Systems
for Process Industries Around the World**



PROCESS CAPABILITIES

A GLOBAL FORCE IN ELECTRIC HEAT

Since our first innovation nearly 100 years ago, Chromalox has become a global force in electric heat through our unceasing drive to meet customers' needs and requirements with the best possible solution—whatever the process and wherever in the world the need arises.

CHROMALOX IS DEDICATED TO PROVIDING YOU WITH THE BEST ELECTRIC HEAT AND CONTROL SOLUTION FOR YOUR PROCESS AND APPLICATION

A legacy of innovation and evolution, peerless design and engineering capabilities, vertically integrated manufacturing, and unmatched global third-party approvals—all come together at Chromalox to deliver the best electric heat and control solution for your process and application.

Innovation

In 1915, Chromalox introduced the world's first metal-sheathed heating element. The Chromalox sheathed heating element soon became the standard for making heating elements around the world because of its versatility and reliability.

Global Strength

Today Chromalox offers full design and engineering capabilities and is vertically integrated in manufacturing capabilities. This plus more global third-party approvals than any other company in our industry enables us to serve customers anywhere in the world.

Evolution

Chromalox initially applied its technology to domestic commercial and light industrial applications with heater designs of just a few kilowatts. Over the years, our heater design and construction techniques have evolved to meet the multi-megawatt, highly specialized heaters and controls required by customers for virtually any process and application.

Chromalox Solutions Are Value-Added Solutions

Some companies simply build heaters and controls. Chromalox does more. By designing equipment specifically for your needs, our solutions are value-added solutions by helping you maximize process efficiency, minimize downtime, and save time and money. That's the Chromalox difference.

NO OTHER MANUFACTURER OF HEAT AND CONTROL PRODUCTS SERVES MORE INDUSTRIES THAN CHROMALOX



Petrochemicals

- Fuel Gas Heaters
- Seal Gas Heaters
- TEG Reboilers
- Mole Sieve Regenerator Heaters
- Continuous Catalyst Chlorination Heaters
- Regeneration Heaters
- Air Heaters
- Reduction Heaters
- Penex Moliex Heaters
- Steam Superheaters
- Methanol Heaters
- Wellhead Fluid Separation Heaters
- Knock-Out Drum Vaporizers
- Heat Trace & Control



Chemicals

- Air Separation Heaters
- Defrost Heaters
- Bake-Out Heaters
- Thawing Heaters
- Hot Oil Recirculation Heaters
- Reactor Start-Up Heaters
- Catalyst Circulation Heaters
- Amine Reboilers
- Heat Trace & Control
- Steam Boilers & Superheaters



Power Generation

- Fuel Gas Heaters
- Combustion Air Heaters
- Turbine Pre-Heaters
- Lube Oil Console Heaters
- Anti-Condensation Heaters
- Energy Dissipation Units
- Heat Trace & Control
- Fuel Oil Pre-Heaters



Pharmaceutical

- Hot Oil Heat Transfer Systems
- Line Heaters
- Steam Boilers & Superheaters
- Heat Trace & Control



Marine

- Compartment Comfort Heaters
- Intake Air Duct Heaters
- Air Recirculation Duct Heaters
- Lubrication & Fuel Oil Heaters
- Water Heaters
- Lube Oil Purifier Heaters
- Fuel Oil Transfer System Heaters
- Lube Oil Settling & Sump Tank Heaters
- Defrost Heaters
- Galley Steam Boilers
- Laundry Steam Boilers



FPSO & Offshore Platforms

- TEG Reboilers
- Lube Oil Heaters
- Fuel Gas Heaters
- Crude Oil Heaters



Water & Wastewater Treatment

- Water Line Heaters
- Air Drying Heaters
- Heat Trace & Control
- Hazardous Area Heaters
- Wastewater Heaters



Solar Panel Manufacturing

- Heat Trace & Control
- Immersion Heaters
- Large-Tank Heaters
- Heat Transfer Systems
- Component Heaters
- Circulation Heaters
- Vaporizers



Food Processing

- Water Line Heaters
- Steam Generators
- Heat Trace & Control
- Tank Heaters

HEATING SOLUTIONS FOR DIVERSE INDUSTRIES
 Chromalox provides value-added heating solutions for diverse process industries by custom-designing equipment to specifically fit our customers' needs.
HEATING SOLUTIONS FOR DIVERSE INDUSTRIES

WHY ELECTRIC HEAT? BENEFITS & ADVANTAGES

As the drive to employ cleaner sources of energy gains momentum, electric heat offers a green choice for protecting the environment . . . along with a number of other significant benefits and advantages.

ELECTRIC HEAT OFFERS SIGNIFICANT BENEFITS AND ADVANTAGES OVER OIL- OR GAS-FIRED SYSTEMS

There are a lot more "green" reasons beyond environmental concerns to choose electric heat over oil- and gas-fired heat systems. Electric heat offers a number of advantages that can benefit manufacturers in saving or reducing manufacturing, installation, operating, maintenance, and capital costs. Improved safety and the ability to meet or exceed regulatory issues are important considerations, too.



Consistent Pricing

Electric utility prices have been very consistent, averaging only four percent yearly increases. This allows customers to accurately determine operating cost without gambling on the volatile prices of gas or oil. Gas and oil prices tend to be erratic, with prices surging every winter.

Clean-Running Operation

With electric heat there is no additional expense of installing exhaust piping, fuel or gas inlet lines, storage tanks for fuel oil, or air inlet lines—not to mention the factory space lost to accommodate such a system.

No Pollution

Electric converts 100 percent of the power input into heat energy with no pollutants generated. Fuel- and gas-fired systems produce pollutants that must be monitored and controlled in accordance with environmental regulations.

Quiet Operation

Electric heaters have no combustion noise and minimal moving parts. This greatly reduces concerns over meeting noise regulations.

Reduced Footprint and Envelope Size

Compared to some similar oil and gas heating systems of similar outputs, electric heaters are

typically one-quarter to one-half the size. This saves valuable plant floor space.

Minimal Maintenance

Due to the simpler operation of electric heaters (i.e., no combustion controls) very little maintenance is needed. In addition, electric elements can be easily replaced by service personnel.

Lower Operating Cost

Due to the complexity of controlling a fuel/air mixture in a fuel or gas system, a full-time, trained technician may be needed for its operation. In addition, without continual tuning, gas and oil units can have reduced efficiencies.

Safety Concerns

Electric heaters have no open flames. Flame-operated systems may require installation away from any potentially combustible areas.

Large Turndown / Precise Control

With multiple staging or an SCR power control, electric heaters can respond rapidly and precisely to varying process conditions for operating cost savings. The large turndown ratios possible with electric heat drop operating costs proportionally, while turndown ratios of other heat technologies, e.g. steam, deliver a diminishing return of operating cost reduction.

GLOBAL THIRD-PARTY APPROVALS

Chromalox heaters and controls meet the certifications, codes, and standards of process industries around the world. Our products have earned more global third-party approvals than any other company in our industry.

Approval or Standard by Country

Country	Approval	Type
United States	ASME	Pressure Vessel
	NATO	Military
	UL/Listed	Electrical Compliance
	UL/Recog.	Electrical Compliance
	FM	Performance Safety and Quality
Canada	CSA	Electrical Compliance
	cUL	Electrical Compliance
	CRN	Pressure Vessel
Europe	ATEX	Hazardous Area Compliance
	AD MERKBLATT	Pressure Vessel
	BKI (ExVA)	Hazardous Area Compliance
	CE	Electrical Compliance
	CENELEC	Electrical Compliance
	CODAP	Pressure Vessel
	CSTB	Military
	DCN	Military
	DEMKO	Electrical Compliance
	EVPU	Hazardous Area Compliance
	ISSep	Hazardous Area Compliance
	NATO	Military
	PED	Pressure Vessel
	PTB	Hazardous Area Compliance
	SPVC	Pressure Vessel
	STOOMWEZEN	Pressure Vessel
Russia	GOSTR	Construction Standards
	GOST ex	Hazardous Area Compliance
Kazakstan	GOSTK	Hazardous Area Compliance
India	CCOE	Hazardous Area Compliance
China	CQST	Hazardous Area Compliance
	SQL/CBPVI/SELO	Pressure Vessel
Korea	KOSHA	Hazardous Area Compliance
Malaysia	DOSH	Pressure Vessel
Australia	AS1210	Pressure Vessel
	IECEX	Hazardous Area Compliance
International	ISO 9001 2000	Manufacturing Processes
Worldwide	IECEX	Hazardous Area Compliance



WORLD-CLASS COMPLIANCE

Decades of providing electric heating solutions for more process industries around the world than anyone is the basis for meeting international codes and standards.

THIRD-PARTY APPROVALS

DESIGN & ENGINEERING

BENCHMARKS OF THE INDUSTRY'S DESIGN AND ENGINEERING LEADER

UNRIVALED DESIGN, ENGINEERING, AND MANUFACTURING CAPABILITIES FOCUSED ON YOUR COMPLETE HEAT AND CONTROL SOLUTION

Front-End Engineering Design Assistance

Chromalox has more experience in process design than anyone else in the industry. Prior to construction, let us put that experience to work for you.

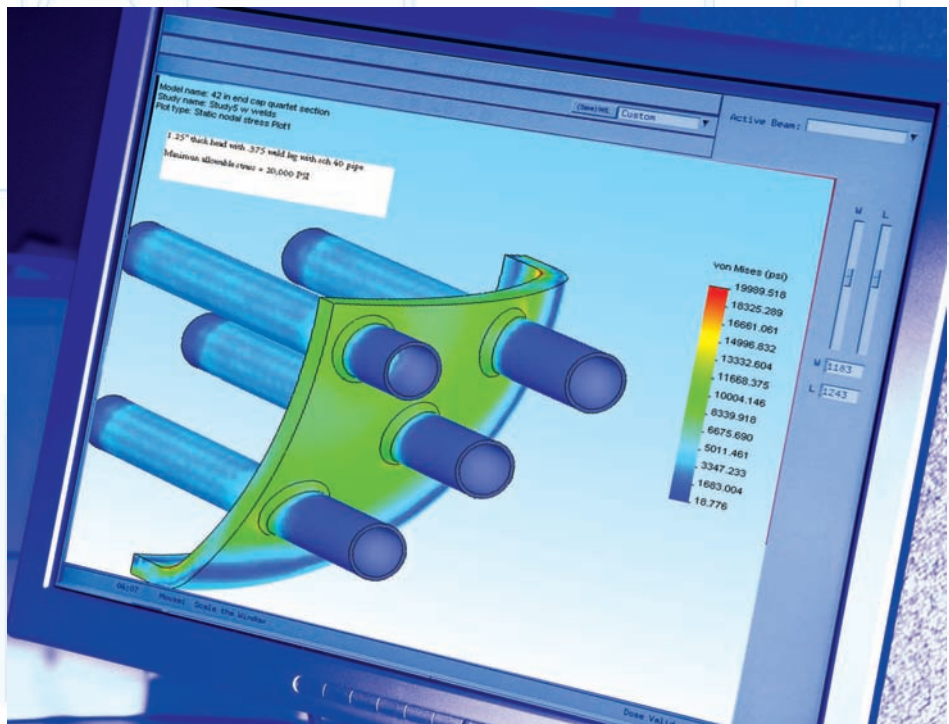
Accurate planning and sound engineering are keys to any process. Our engineering support staff can help to properly specify equipment that will get the job done right the first time so when you enter the construction phase, you can be sure that the specified equipment will operate as desired.



Comprehensive Engineering Capabilities

From heater assemblies and skid fabrication to integration with controls and sensors, our complete engineered systems reduce installation labor, reduce start-up time, and ensure proper operation to specification. Chromalox provides engineering assistance with integrating our products into your application, offering a full range of engineering capabilities.

Our in-house engineering and software capabilities allow us to design simple operator interfaces. These advanced designs can reduce your business' training time and expense, as well as increase repeatable operation. In addition, Chromalox has training tools and resources to assist you with installation, start-up, and operation.



102" MIN.
REMOVAL
DISTANCE
FOR HEATER
BUNDLE



Custom Design and Manufacturing for Unique Requirements

If an element, sensor, control, or packaged system that we carry in stock doesn't exactly fit your needs, we'll custom-build it—either by expertly adapting an existing product or by designing and manufacturing a completely new one. Our design engineers have won industry awards for innovation and rapid turnaround of custom designs. They bring expert knowledge in process engineering design together with a flair for innovation to help you produce prototypes of new products and systems, developing an innovative design in the shortest possible turnaround time.



Manufacturing That Leads the Industry

Chromalox maintains four state-of-the-art manufacturing plants throughout the United States, Mexico, and Europe. In the U.S., Chromalox has more than 325,000 square feet (30,000 square meters) of manufacturing and warehousing space in Utah and Tennessee. Our Soissons, France facility is 73,000 square feet (7,000 square meters).

Our manufacturing capability features computer-controlled, automated machinery to help quality. With ASME welding capability in-house since 1953, Chromalox has gained more in-plant experience than any other electric heater manufacturer for high-quality welding. Our large-volume ASME production of high-pressure systems gives Chromalox the experience base to perform ASME welding at a level of excellence unsurpassed in our industry. ASME U-, R-, S-, and M-stamps are standard, with KOSHA, SQL, GOST, PED, AS1210, MIGAS, and many other vessel codes readily available.

BENCHMARKS OF THE INDUSTRY'S MANUFACTURING LEADER

- Chromalox produces 3,383 miles of tubular elements in North America alone . . . nearly the diameter of the moon
- Chromalox makes enough heating cable each year to stretch from Northern Italy to the tip of Sicily
- Chromalox employs more than 1,000 production personnel at four manufacturing plants on two continents
- Chromalox produces more than 3 million stand-alone items each year

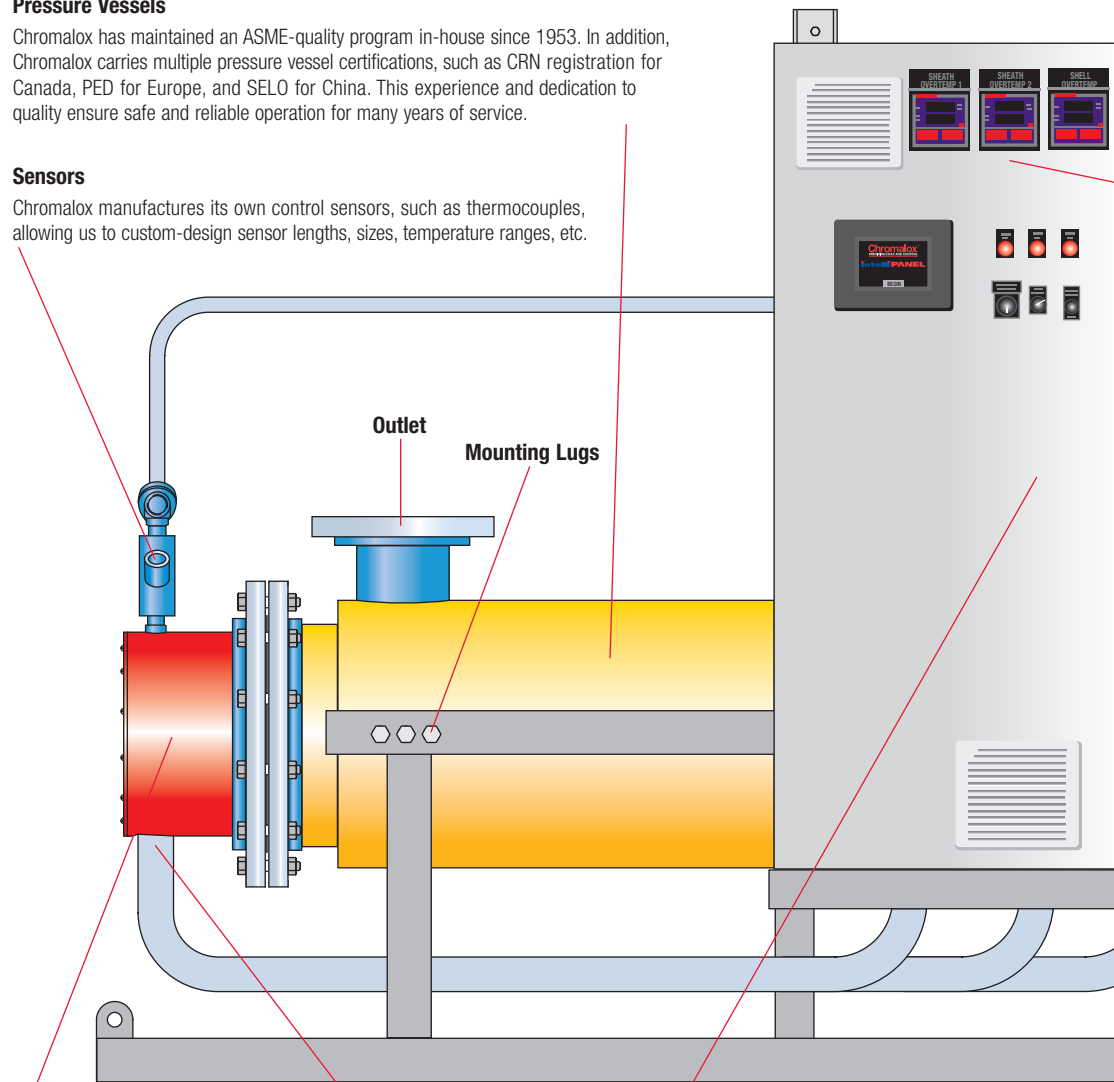
Beyond custom product engineering, **Chromalox remains a leader in designed systems** because we control the manufacturing process from the first component to the finished product. While some companies simply assemble purchased parts, our **vertical integration** of product manufacturing allows tight control of all procedures. Because Chromalox manufactures the component parts, we can adjust to meet customers' critical requirements.

Pressure Vessels

Chromalox has maintained an ASME-quality program in-house since 1953. In addition, Chromalox carries multiple pressure vessel certifications, such as CRN registration for Canada, PED for Europe, and SELO for China. This experience and dedication to quality ensure safe and reliable operation for many years of service.

Sensors

Chromalox manufactures its own control sensors, such as thermocouples, allowing us to custom-design sensor lengths, sizes, temperature ranges, etc.



Terminal Enclosure

Terminal enclosures are available for general-purpose, moisture-resistant, and explosion-resistant applications.

Power Controls

Chromalox can design power control components needed to meet the process demands. Options can include contactor control for a cost-effective design all the way through full SCR control of a temperature-critical process.

Final Assembly

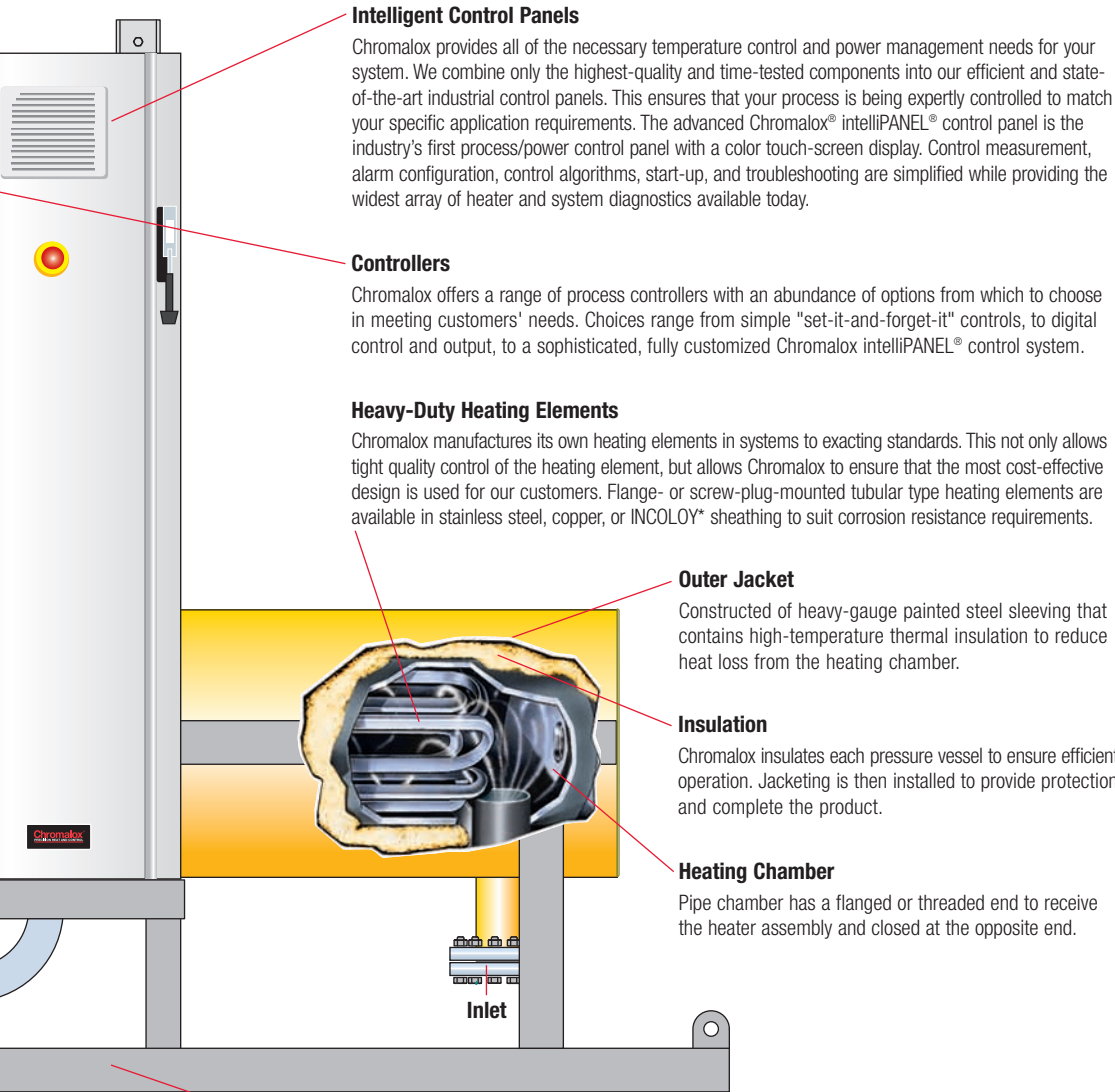
Chromalox brings all of the manufactured components together to complete the final system. This includes electrical wiring to NEC/IEC standards, mechanical fit-ups, and even a customized paint scheme, if desired.

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VERTICAL INTEGRATION

We control the manufacturing process from the first component to the finished product, enabling us to adjust to meet customers' critical requirements.

VERTICAL INTEGRATION



Intelligent Control Panels

Chromalox provides all of the necessary temperature control and power management needs for your system. We combine only the highest-quality and time-tested components into our efficient and state-of-the-art industrial control panels. This ensures that your process is being expertly controlled to match your specific application requirements. The advanced Chromalox® intelliPANEL® control panel is the industry's first process/power control panel with a color touch-screen display. Control measurement, alarm configuration, control algorithms, start-up, and troubleshooting are simplified while providing the widest array of heater and system diagnostics available today.

Controllers

Chromalox offers a range of process controllers with an abundance of options from which to choose in meeting customers' needs. Choices range from simple "set-it-and-forget-it" controls, to digital control and output, to a sophisticated, fully customized Chromalox intelliPANEL® control system.

Heavy-Duty Heating Elements

Chromalox manufactures its own heating elements in systems to exacting standards. This not only allows tight quality control of the heating element, but allows Chromalox to ensure that the most cost-effective design is used for our customers. Flange- or screw-plug-mounted tubular type heating elements are available in stainless steel, copper, or INCOLOY* sheathing to suit corrosion resistance requirements.

Outer Jacket

Constructed of heavy-gauge painted steel sleeving that contains high-temperature thermal insulation to reduce heat loss from the heating chamber.

Insulation

Chromalox insulates each pressure vessel to ensure efficient operation. Jacketing is then installed to provide protection and complete the product.

Heating Chamber

Pipe chamber has a flanged or threaded end to receive the heater assembly and closed at the opposite end.

Skid Frame Construction

Each frame is designed to handle rough shipping conditions and relocations during installation. Chromalox in-house design software can also ensure that framing is constructed to meet any other design conditions a customer may need such as wind or seismic loading.

Having control from the very beginning of every step of the process, Chromalox can ensure that the highest quality is designed and manufactured into each product and allows us to produce **systems that are tailored to our customers' needs and requirements.**

VERTICAL INTEGRATION

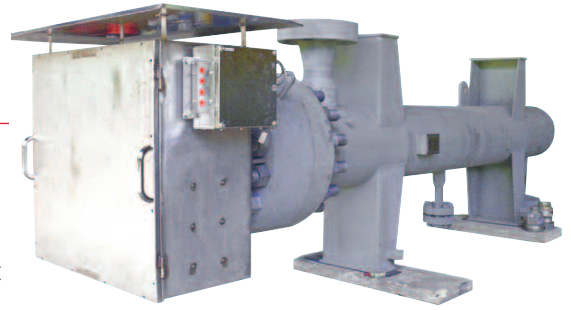
Vertical integration helps ensure that the highest quality is designed and manufactured into each product.

VERTICAL INTEGRATION

CIRCULATION HEATERS

CIRCULATION HEATERS

Circulation heaters are designed to heat a flowing gas or liquid using in-line or side-arm piping configurations. Complete units consist of built-in heating elements, a heating chamber, thermostat and sensors, insulation, insulation jacket, and inlet and outlet connections. Circulation heaters offer high efficiency since all heat is generated within the fluid or gas, which is directed past the heating elements, giving fast response and even heat distribution.

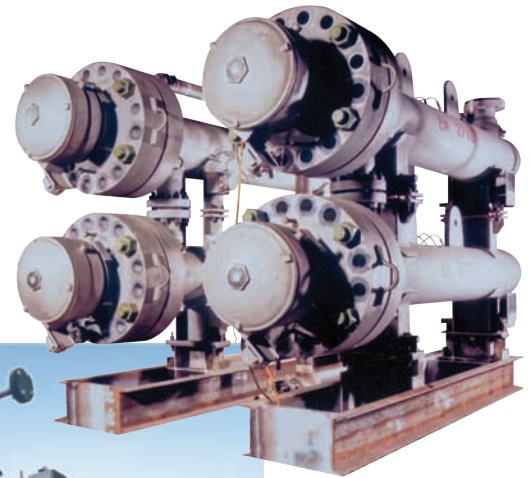


Applications

- Fuel gas heating to increase temperature of the gas to prevent freezing during pressure reduction and dew point control to ensure liquid droplets do not form in the feed pipe to the gas turbines, which would damage the turbine blades.
- Oil heaters primarily used to reduce the viscosity of the oil for pumping purposes in pipelines and other equipment.
- Heating medium heaters used to increase the temperature of the heating medium (normally a water-glycol mixture or heat transfer fluids). These can be used as the primary heat source or as a "top-up" heater to the existing waste heat recovery system.
- High-temperature gas heaters used for regeneration or catalyst systems. Temperatures up to 1,000°F/550°C can be achieved using standard materials and higher temperatures can be achieved using special element materials. High-temperature and low-pressure drop heaters are specially designed for these applications.
- Mole sieve regeneration heaters used in air separation plants to dry out the molecular sieve bed. Typical outlet temperatures are 465°F/240°C, but require very low pressure drops.
- Vaporizers for liquid vaporization of butane, LNG, and other gases.
- Other applications include natural gas, hydrogen, high H₂S gas, nitrogen, hydrocarbon gas mixtures, hydrocarbon liquids, crude oils, fuel oils, bunker oils.

Electrical Certification

Heaters are fully certified.



*INCOLOY and INCONEL are the registered trademarks of Huntington Alloys Corporation.

Certifications and Approvals

Certifications	Approvals
<ul style="list-style-type: none"> • EEx'd' or EEx'e' for use in Zone 1 and 2 Hazardous Areas • NEMA 7 and NEMA 4X for use in Class 1 Div 1 & 2 • Temperature Class T6 to T1 • Ambient Temperature -76°F/-60°C to 140°F/60°C 	<ul style="list-style-type: none"> • ATEX / CCOE • IECEx • NEC / CSA • GOST • KOSHA

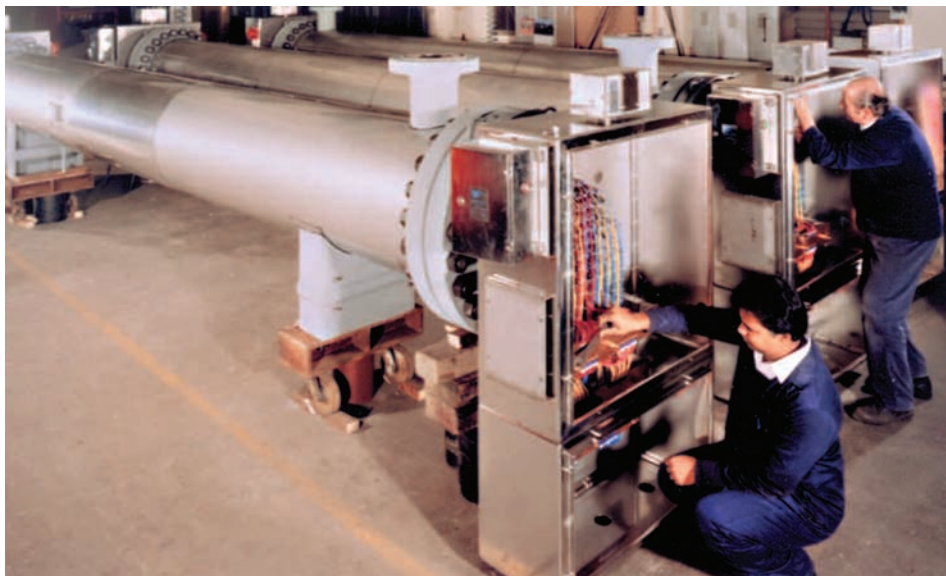
Mechanical Design & Certification

Pressure vessels can be designed and certified to most national standards including:

- ASME V111 Div 1 & 2 plus U-Stamp as required
- PD 5500 and PED compliant
- AS1210
- NACE as required

Materials of Construction

Vessel	Elements
<ul style="list-style-type: none"> • Carbon Steel • Stainless Steel 304L, 321, and 316L • Duplex and Super Duplex • INCOLOY* 800 / 825 • INCONEL* 600 / 625 • Titanium • Plus many other exotic materials to suit the process 	<ul style="list-style-type: none"> • Stainless Steel 304L, 321, and 316L • INCOLOY* 800 / 825 • INCONEL* 600 / 625 • Titanium • Plus many other exotic materials to suit the process



CIRCULATION HEATERS

IMMERSION HEATERS

IMMERSION HEATERS



Immersion heaters are designed for direct contact heating of water, oils, viscous materials, solvents, process solutions, and gases. Since all heat is generated within the liquid or process, virtually 100 percent energy efficiency is achieved. Chromalox manufactures a large selection of designs for heating any fluid, from plain water to corrosive solutions, highly viscous oils, and for many specialized applications such as high-pressure and hazardous locations.

Applications

- MEG and TEG regeneration heaters used in gas drying applications, both onshore and offshore. Heaters can be supplied up to 2,500 kW in one heater bundle and multiple heater bundles can be supplied to meet any load and layout in the vessel. Special care must be taken when selecting the correct heat flux to ensure that no degradation of the liquid occurs.
- Oil heaters used in large storage tanks to reduce the viscosity of fluids and make it easier for pumping. Among typical oils are bunker oil, fuel oil, diesel oil, and crude oil.
- Tank heaters used in flare knockout drums and drain vessels to heat hydrocarbon liquids for easy pumping and vaporization.
- Water heaters for various applications such as potable water for shower systems, sea water heaters, and heaters for heating media (water-glycol mix).
- Vaporizers used for liquid vaporization of butane, LNG, etc.
- Withdrawable-type heaters for large liquid storage tanks where it is not practical to drain the tank to replace individual elements.

Electrical Certification

Heaters are fully certified.

Certifications and Approvals

Certifications

- EEx'd' or EEx'e' for use in Zone 1 and 2 Hazardous Areas
- NEMA 7 and NEMA 4X for use in Class 1 Div 1 & 2
- Temperature Class T6 to T1
- Ambient Temperature -76°F/-60°C to 140°F/60°C

Approvals

- ATEX / CCQE
- IECEx
- NEC / CSA
- GOST
- KOSHA



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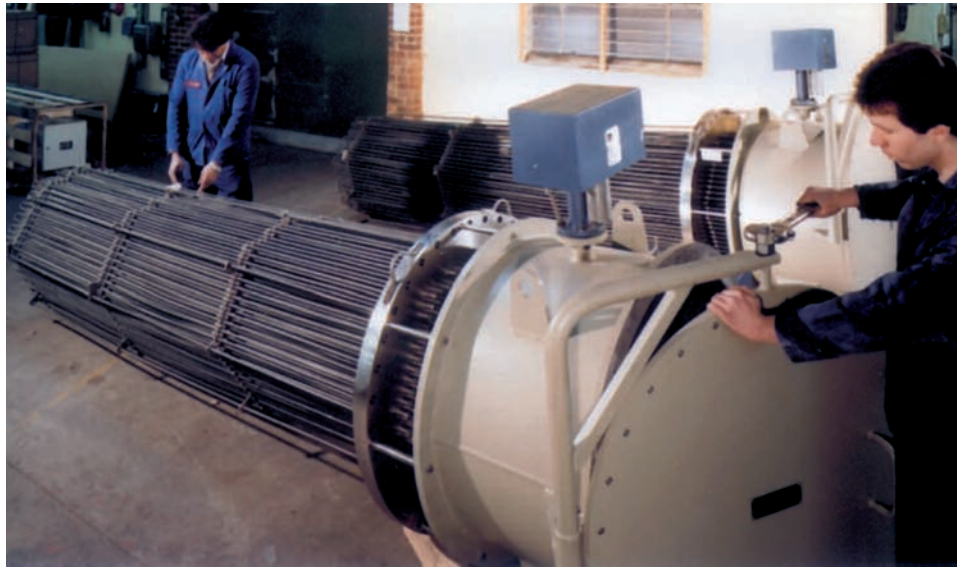
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Materials of Construction

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• Carbon Steel	• Stainless Steel 304L, 321, and 316L
• Stainless Steel 304L, 321, and 316L	• INCOLOY* 800 / 825
• Duplex and Super Duplex	• INCONEL* 600 / 625
• INCOLOY* 800 / 825	• Titanium
• INCONEL* 600 / 625	• Plus many other exotic materials to suit the process
• Titanium	
• Plus many other exotic materials to suit the process	



IMMERSION HEATERS

HEAT TRACE AND CONTROL

Heat Trace Cable

Chromalox heat trace cable includes cables for most process maintenance and pipe and vessel freeze protection, including:

- Self-regulating cable for ordinary and hazardous environments to prevent pipe freezing and maintain process temperatures up to 302°F/150°C, with maximum exposure temperature up to 420°F/215°C.
- Constant-wattage cable for freeze protection and process temperature maintenance up to 350°F/175°C, with maximum exposure temperature up to 392°F/200°C.
- Mineral-insulated cable for the most demanding heat trace applications, with temperature maintenance up to 900°F/480°C and maximum exposure temperature to 1,100°F/593°C.



Applications

- Maintain petroleum and by-products at process temperatures.
- Prevent the precipitation of NaOH from solutions in wastewater treatment facilities.
- Maintain viscosity of food processing products such as chocolate, oils, and tallow.
- Instrument lines.
- Storage tanks.
- Freeze protection of steam cleaned lines.
- Steam condensate lines and other chemical additive lines in power generation plants.
- Asphalt lines.



Electrical Certification

Chromalox trace heating cables are tested to IEEE-515 and other worldwide standards, including the 32-week service life benchmark test. Chromalox self-regulating heat trace cables are also subjected to age testing to ensure their thermal stability (retention of power output within the permissible limit) when used in accordance with IEEE standards. Chromalox has highest manufacturing standards with check/analysis of all the raw materials at various stages to produce heating cable used for long service life. Chromalox self-regulating and mineral insulated heating cables are rated for voltage supply of 120 VAC to 277 VAC; constant wattage cables are suitable for voltage up to 480 VAC.

Materials of Construction

Cable	Materials
SRL – Self-Regulating, Low Temperature	<ul style="list-style-type: none"> • Twin 16 AWG copper buss wires • Semiconductive polymer core matrix • Polyolefin jacket • Tinned copper braid • High-temperature fluoropolymer or TPR overjacket (optional)
SRM/E – Self-Regulating, Medium Temperature Enhanced	<ul style="list-style-type: none"> • Twin 16 AWG copper buss wires • Semiconductive polymer core matrix • High-temperature fluoropolymer jacket • Metallic braid • High-temperature fluoropolymer overjacket (optional)
SRP – Self-Regulating, Process Temperature	<ul style="list-style-type: none"> • Twin 16 AWG copper buss wires • Semiconductive polymer core matrix • High-temperature fluoropolymer jacket • Metallic braid • High-temperature fluoropolymer overjacket (optional)
CWM – Constant Wattage, Medium Temperature	<ul style="list-style-type: none"> • Twin 16 AWG copper buss wires • FEP insulation jacket • Pairing jacket • Nickel chromium wire • FEP insulation • Tinned copper braid • FEP overjacket (optional)
MI – Mineral Insulation, High Temperature	<ul style="list-style-type: none"> • Resistance wire construction • Magnesium oxide (MgO) dielectric insulation • High nickel alloy sheath

Approvals

	SRL	SRM	SRP	CWM	MI	DL Kits	U Kits	DTS Control
UL	•	•				•		•
FM	•	•	•	•	•	•	•	
CSA	•	•	•	•	•	•	•	
ABS	•	•	•			•	•	
ATEX	•	•		•			•	
IECEX	•	•					•	
GOST (Russia)	•	•					•	
CQST (China)	•	•				•	•	
KOSHA (Korea)	•	•				•	•	
CCOE (India)	•	•				•	•	

Heat Trace Controls

Typical heat trace temperature control for freeze protection and maintenance applications employs an ambient air or pipe wall sensing thermostat to control the process temperature within a moderate or narrow band. These thermostats switch individual heat trace circuits on and off at a preset temperature. Central control panels are used to provide electronic control of multiple heat trace circuits.

Digital Temperature Sensor

The Chromalox DTS-HAZ digital temperature sensor is a microprocessor-based temperature control and monitoring unit for freeze protection or process maintenance of pipes or tanks protected by heat tracing products. Housed in a NEMA 4X enclosure, it includes terminals for connecting instrument power, heating cable, and RTD (remote temperature detector). It can be used with constant-wattage, mineral-insulated, or self-regulating heating cable in ordinary or Div 2 hazardous area locations.



Additional Features

- Integral 100 ohm platinum RTD
- Integral pipe stand
- LED indication for setpoint, process temperature, high temperature alarm, low temperature alarm, RTD failure
- Soft start
- 30-amp solid state relay output
- On/off control, 1- to 10-degree selectable dead-band
- Programmable deadband in one-degree increments
- Programmable high and low temperature alarms
- 100 to 240 VAC operation
- Common alarm contact for remote indication of alarm status



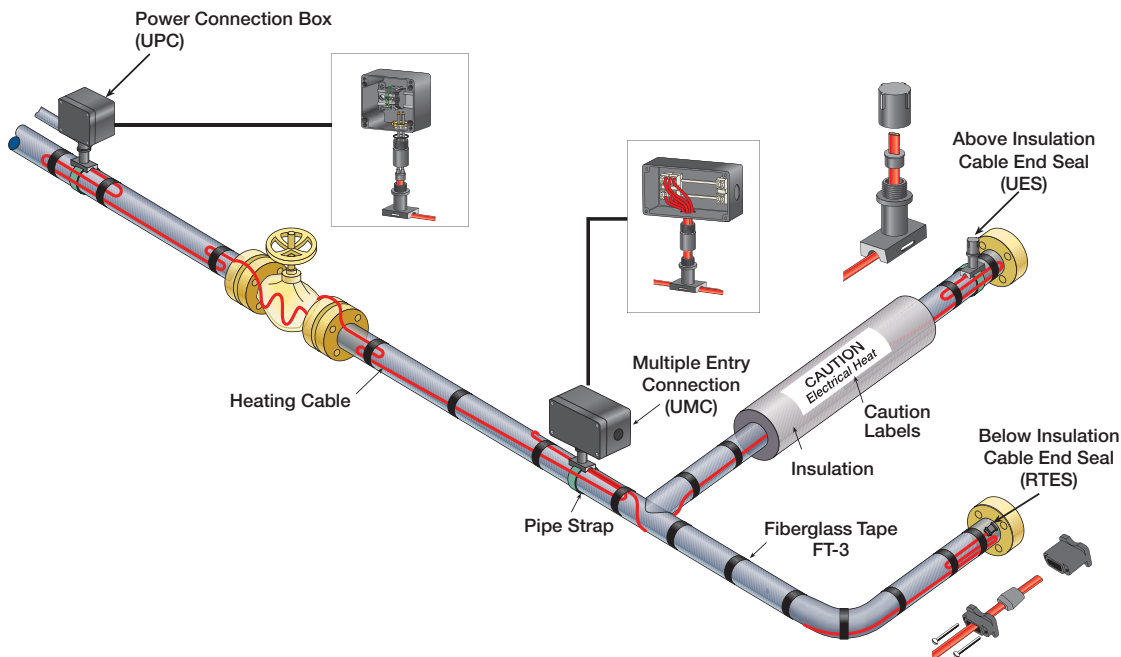
ITLS and ITAS IntelliTRACE Control Panels

The IntelliTRACE® ITLS (line sensing) and ITAS (ambient sensing) control panels are microprocessor-based control/monitoring and power management and distribution systems for heat trace applications. They feature a 10-inch touch-screen computer operator interface that provides real-time display of alarms for high/low temperatures, high/low current, ground fault leakage, and sensor faults.



Additional Features

- SCR control
- Soft start
- 40 amp/loop at 100 to 480 VAC
- 6 to 36 loops, expandable to 72 loops
- Full communications, wired and wireless
- Enhanced data logging
- NEMA 4 enclosure
- Integral circuit panel with breaker



HEAT TRACE & CONTROL

Skin-Effect Heat Trace System

Chromalox skin-effect trace heating is ideal for the freeze protection, temperature maintenance, and heat-up of materials transported by long-distance pipelines (up to 15 miles/25 kilometers). Pipes can be above or below ground, submerged, and across all types of terrains. Skin-effect trace heating employs a single circuit, eliminating the need for an extensive power distribution system. This makes it an extremely cost-effective alternative to conventional trace heating, particularly in remote areas where installation and maintenance can be costly.

Applications

- The movement of materials in tank farms.
- The movement of materials in storage terminals.
- Piping between distant processing facilities in the chemical, petrochemical, oil, and natural/refined gas industries.

Electrical Certification

Rated for voltages up to 3,000 V.

Approvals

- ATEX
- GOST

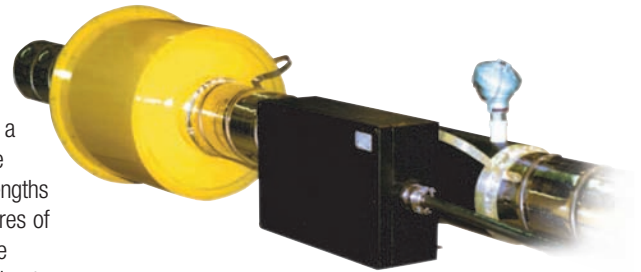


Impedance Heating Systems

Impedance-style heating employs the "Joule Effect," using the pipe itself as the heating source to uniformly transfer heat to a process stream. No piping modifications are required. Impedance heaters can heat pipe lengths up to several miles/kilometers to temperatures of 1,800°F/980°C. Higher watt densities can be used—up to 190 W/in.² or 29.5 W/cm²—due to increased velocities and lower pressure drops.

Applications

- Raising or maintaining the temperature of a process stream, including fluids that are thermally sensitive or highly viscous, or fluids that may solidify in piping and need liquefied prior to pumping.
- Freeze protection.
- Heating corrosive materials when direct immersion heating is not desired or impractical.



LARGE-TANK HEATERS



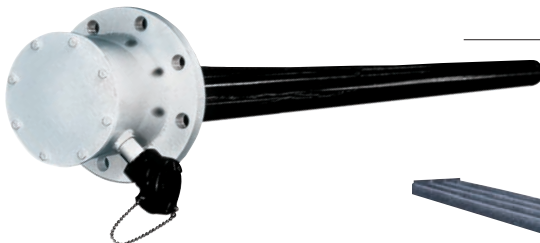
Chromalox offers uniquely designed, cost-effective solutions to the challenge of heating materials in large storage tanks. They can be installed in above- or below-ground tanks made of steel, concrete, or Fibreglas*.

Applications

- Open-coil-element and flange heaters for low watt density heating over a large surface area in above-ground storage of fire water, asphalt, diesel, lube oils, ethanol, biodiesel, glycerin, animal fats, vegetable oils, fuel oils, or similar types of liquids.
- Flexible tank immersion heaters installed through manhole openings for low watt density heating of asphalt, fuel oil, pitch and tar, liquid sugar, molasses, lube oils, linseed oil, and other viscous, heat-sensitive materials in above- or below-ground steel, concrete, and Fibreglas* tanks, or in open-top process tanks.
- Unitary electric immersion heaters with metal sheath elements or open coil heating elements for applications in cramped locations for precise, low watt density heating over a large heated surface for asphalt, fuel oil, pitch and tar, liquid sugar, molasses, lube oils, linseed oil, and other viscous, heat-sensitive fluids.

Electrical Certification

Heaters are fully certified.



*Fibreglas is the registered trademark of Owens-Corning Fibreglas Corporation.

Certifications and Approvals

Certifications	Approvals	
• Moisture-resistant housings	NEMA 4	CSA
	IP65	CE
• Moisture/explosion-resistant housings	Class I, Div 1, Groups B, C & D	CSA
	Class II, Div 1, Groups E, F & G	
	Class I, Zone 1, AEx d, IIB + H2 T1 to T6	
	Class I, Zone 1 Ex d, IIB + H2 T1 to T6	ATEX
	Ex d IIB + H2 T1 to T6	IECEx

Mechanical Design & Certification

Large Tank Flange Heater: ASME design and certification available.

Materials of Construction

Heater	Elements
Open Coil Element Heaters	Insulating Support: <ul style="list-style-type: none"> • High-density electrical ceramic
Large Tank Flange Heaters	Tube and flange: <ul style="list-style-type: none"> • Carbon steel • 304 stainless steel • Other materials available

LARGE-TANK HEATERS

PROCESS AIR AND RADIANT HEATERS

Process Air Heaters

Chromalox high-temperature process air heaters provide process temperatures up to 1,200°F/650°C for many oven and forced air applications. In addition to ambient air, Chromalox electric process air heaters can also be designed to heat special atmospheres such as argon or nitrogen. Our process air heaters employ sheathed tubular, finned tubular, and finned strip heating elements.



Applications

- Recirculating ovens.
- Drying ovens.
- Curing ovens.
- Core drying.
- Heat treating.
- Seal gas heating.
- Annealing.
- Dehumidification.
- Heating cryogenic exhaust gases.
- Air intake freeze protection for turbines.

Electrical Certification

Heaters are fully certified. UL, CSA, and ATEX certifications are available.



Process Radiant Heaters

Because radiant energy directly heats the product with no heat transfer medium, radiant heating offers a number of advantages over other heating methods. Heat losses can be eliminated. Heating can be more rapid. Heating cycles can be shorter. Radiant heaters may be installed and operated in any position and mounted to form banks, tunnels, or oven sections. Chromalox process radiant heaters include a large selection of elements, fixtures, and panels for the best solution where heated process air or direct contact is impossible, impractical, or undesirable.



Applications

- Paint drying.
- Vacuum forming.
- Thermoforming.
- Rubber pre-heating or vulcanizing.
- Laminating.
- Plastic welding.
- Pre-heating welding seams.
- Resin curing.
- Shrink packaging.
- Heat setting synthetic fibers and fabric.
- Print drying.
- Heat staking.
- Semiconductor wafer pre-heating and drying.
- Drying of glazing on ceramic tiles.
- Water and solvent evaporation.
- Tempering layered glass.
- Leather production.
- Paper pulp drying.
- Thermography.

Materials of Construction

Element Radiant Heaters

Heating element	INCOLOY* metal sheath
Housing	Rigid extruded aluminum
Reflectors	Highly polished aluminum

Infrared Oven Sections

Heating element	INCOLOY* metal sheath
Housing	Extruded aluminium
Reflectors	Highly polished aluminium

Ceramic Radiant Heaters

Heating element	Nickel-chromium resistance wire; enamel-coated ceramic face
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Wide Area Radiant Heaters

Heating element	Precision iron-based resistance wire
Emission surface	Woven refractory cloth with black ceramic coating Aluminum emission surfaces also available
Frame	Heavy-gauge, heat-resistant aluminized steel

High-Intensity Quartz-Faced Radiant Heaters

Heating element	Precision iron-based resistance wire
Emission surface	Grooved fused quartz faceplate Aluminum emission surfaces also available
Frame	Heavy-gauge, heat-resistant aluminized steel

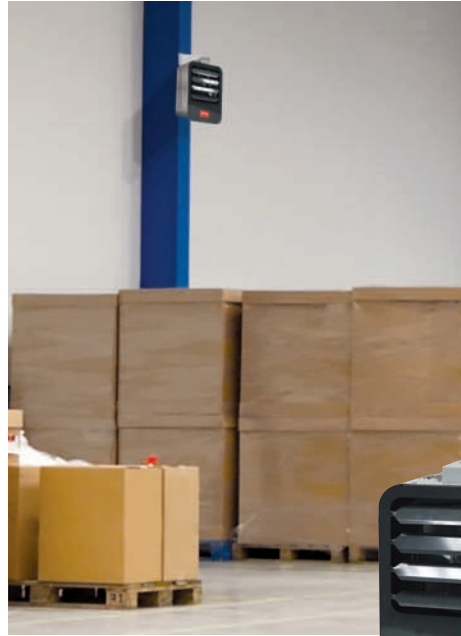


PROCESS AIR & RADIANT HEAT

*INCOLOY is the registered trademark of Huntington Alloys Corporation.

PLANT SPACE HEATING

For heating areas large or small—from open plant floor spaces and warehouses to control booths and lunch and locker rooms—Chromalox offers a wide selection of forced air, convection, and radiant heaters from which to choose the best solution for your application. We have heaters that combat cold air inrush in pedestrian entryways and loading docks. We also have corrosion-resistant and explosion-proof heaters for harsh and special environments. Stainless steel explosion-proof blower-heaters are available for off-shore and corrosive environments. All of our plant space heaters provide safe, clean, fast heat. Their heavy-duty construction affords long, dependable service.



Applications

- Shipping and receiving areas.
- Factories.
- Warehouses.
- Garages.
- Machinery freeze protection.
- Entry air-curtain heating.
- Sewage treatment plants.
- Petrochemical facilities.
- Oil rigs.
- Coal preparation plants.
- Areas containing metal dusts.
- Gasoline storage and dispensing areas.
- Natural gas plants.
- Solvent extraction plants.
- Oil refineries.
- Chemical storage and handling facilities.



*INCOLOY and MONEL are the registered trademarks of Huntington Alloys Corporation.

Materials of Construction

Blower Heaters	
Cabinet and louvers	Die-formed heavy-gauge steel
Heating elements	INCOLOY® sheathing with corrosion-resistant steel fins
Hose Down Corrosion-Resistant Heaters	
Cabinet and louvers	20-gauge corrosion-resistant type 304 stainless steel
Control enclosure	NEMA-4X
Heating elements	Type 316 stainless steel fintube
Fins	Aluminum
Explosion-Proof Blower Heaters	
Cabinet and louvers	14-gauge steel
Heating elements	Copper
Heat exchanger	Steel tubes with aluminum fins
Fins	Aluminum
Air Duct Heaters	
Frame	Heavy-gauge aluminized, painted, or stainless steel
Heating elements	Aluminum-painted MONEL® or stainless steel sheath and fin
Convection Heaters	
Cabinet	Heavy-gauge steel
Heating elements	Steel with steel fins
Explosion-Proof Convection Heaters	
Cabinet	Heavy-gauge steel
Heating elements	Metal sheath in copper tube with aluminum fins
Architectural Convection Heaters	
Cabinet	14-gauge aluminum and steel
Heating elements	Stainless steel sheath with aluminum fins

Certifications and Approvals

Certifications	Approvals
Explosion-Proof Blower-Heaters	
• Class I, Div 1 & 2, Groups C & D	• UL
• Class II, Div 1 & 2, Groups E, F, G	• UL
• II 2G EX'd IIB T3	• ATEX
Explosion-Proof Convection Heaters	
• Class I, Div 1 or 2, Groups B, C, & D	• UL
	• CSA
• II 2G EX'd IIB T2 to T3	• KOSHA



CONTROL SYSTEMS

Chromalox can design the right control system for the proper performance, efficiency, reliability, and safety of your equipment, products, and processes. We are the only manufacturer of electric heaters and heating systems that also offers a complete line of electric heat and process controls.

Backed by nearly 100 years of Chromalox experience and expertise in precision electric heat and control, our technical sales engineers are well-prepared to assist you in conquering the challenges of even your most specialized application requirements.

Chromalox Electric Heat and Process Control Capabilities

Temperature Control	Range from simple "set-it-and-forget-it" to digital control and output
Monitor and Overtemperature Control	Options run from 1/16 DIN and board-level models to microprocessor-driven alarm monitor/high limit controller with digital communications
Sensors	<ul style="list-style-type: none"> • RTD • J & K thermocouples • Bayonet thermocouples • Special-purpose sensors • Custom sensors
Power Control	Options run from contactor controls for cost-effective design to full SCR controls for a temperature-critical process
Finished Panels	Controllers and control components fully assembled into a finished product that best accommodates layout as well as environmental and safety considerations

Codes and Approvals

Codes	Approvals
NEC	UL
IEC	cUL
	CE
	CSA
	FM



CHROMALOX SERVICE SOLUTIONS ENSURE OPTIMUM PERFORMANCE AND EXTEND PRODUCT LIFE



From start-up and training to ongoing maintenance diagnostics and emergency response, we offer customized service solutions to ensure the quality and continued success of your process.

Start-Up and Commissioning

New equipment start-ups can often delay project timelines. Minimize any chance for costly setbacks by having a Chromalox qualified engineer for on-site start-up and commissioning the mechanical, electrical, instrumentation, and control equipment for any system we have built, anywhere in the world. They will assist with initial equipment start-up and perform a complete review of the installed system to ensure optimized integration into your facility, increasing overall efficiency. You will save time and know that your product was installed correctly.

Chromalox Cold Weather Contracts

Cold weather can be a strain on much of your system's equipment. To help you avoid unplanned downtimes that can occur due to cold weather Chromalox offers a package of pre-season planning and preventive maintenance services to ensure proper equipment operation before the cold weather strikes. This added degree of security provides confidence that the heat will flow when you need it.

Chromalox Service Contracts

Chromalox Service Contracts deliver efficient emergency response and preventive maintenance, helping to eliminate problems before they arise. Chromalox field service personnel are experts at maximizing the performance of your process heat and control systems with a variety of on-site services including multi-point inspections, guaranteed emergency response times, site reports, and replacement parts availability.



**Serving you is our number one priority!
Call your local sales office.**

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Chromalox Value-Added Products and Services Are Available Worldwide



Chromalox®

PRECISION HEAT AND CONTROL

103 Gamma Drive
Pittsburgh, PA 15238
USA

Phone: (412) 967-3800
Fax: (412) 967-5148
Toll-Free: 1-800-443-2640

email: sales@chromalox.com
www.chromalox.com

Chromalox-UK
Unit 122, Lombard House
2 Purley Way
Croydon, Surrey, CR0 3JP, UK

Tel: +44 (0)20 8665 8900
Fax: +44 (0)20 8689 0571

email: uksales@chromalox.com
www.chromalox.co.uk

Chromalox-France
Route de Château-Thierry
Noyant et Aconin
F-02203 SOISSONS Cedex, France

Tel: +33 (0)3 23 74 39 39
Fax: +33(0)3 23 74 39 00

email: ventes@chromalox.fr
www.chromalox.fr

Chromalox-India
1st Floor, 6 UNICOM House
A-3 Commercial Complex
Janakpuri
New Delhi-10058
India

Tel: +91-11-25623134
Fax: +91-11-25623480

email: indiasales@chromalox.com
www.chromalox.in

Chromalox-China
Chromalox (Shanghai) Precision Heat
and Control Co., Ltd.
Suite A2, 4th Floor, Fenggu Building
88 Taigu Road
Waigaoqiao Free Trade Zone
Shanghai 200131
People's Republic of China

Tel: +86-(0)21-5866-8802
Fax: +86-(0)21-5866-8803

email: shanghai.office@chromalox.com
www.chromalox.cn

Chromalox-Thailand
75/57, 75/237-240, Moo 10
Sukhumvit Road
Thung Sukala
Sriracha
Chon Buri, 20230
Thailand

Tel: +66 (0) 38 492944/5
Fax: +66 (0) 38 492946

email: asiasales@chromalox.com
www.chromalox.com