



COMPONENT HEATING SOLUTIONS



A CENTURY OF INNOVATION.

THE CHROMALOX DIFFERENCE

When it comes to temperature management solutions, some companies are suppliers who just sell equipment. Our approach is to be a partner dedicated to providing you with the best electric heat and control solution for your process and application, solving even the most demanding and complex heating challenges: a partner who can meet your high expectations with solutions designed to exceed specifications, mitigates risk, operate within a defined budget; a partner who can provide sustainable solutions that can be installed efficiently, and require minimal design iterations.

PIONEERS IN ELECTRIC HEAT & CONTROL

We invented electric heating technology with the introduction of the first metal-sheathed heating element 100 years ago. Since that first innovation, we've created an industry and evolved from technologies of just a few kilowatts to those that meet the highly specialized requirements of virtually any industrial process and application.

It is our mission to find elegant solutions to the most demanding and complex challenges. These solutions help our customers improve their operating processes and enhance productivity. This mission, and our investment in research and development in new technologies, will shape the future of industrial process heating as we continue to pioneer a new century of innovation.

YOUR TRUSTED PARTNER

Our approach is to be a partner dedicated to providing you with the best electric heat and control solution for your process or application.

We are responsive, with a sense of urgency and a bias for action. From the moment a customer need is identified, Chromalox acts quickly to deliver the best solution while giving thorough, thoughtful, careful attention to detail. By limiting design iterations, meeting project timelines, and automating our manufacturing process, we deliver a satisfying customer experience and an efficient heating solution.

UNCOMPROMISING QUALITY

Our constant focus on quality improvement provides our customers with a competitive advantage. Implemented statistical process control, investment in manufacturing automation, ISO 9001:2011 certification, and compliance to stringent third-party approvals demonstrate our world-class commitment.



ADVANCED COMPONENT HEATING SOLUTIONS FOR EVERY APPLICATION

With over 100 years experience in thermal heating solutions and our vast product offering, Chromalox Component Heating Solutions are designed to address even the most challenging applications. Our fully integrated engineering resource combined with our industry leading technologies provide safe and reliable solutions to countless industries worldwide. No matter how extreme, corrosive, or hazardous the process or environmental conditions, we have a solution tailored to exceed your performance specifications, meet your budget expectations, and minimize risk to your operations. Our engineering, manufacturing, and site service personnel stand ready to deliver complete Component Technology Solutions for the worlds growing markets including Food and Beverage, Plastics, Transportation, Packaging, Chemical, Medical and Laboratory, and more.



1 SILICONE LAMINATE HEATERS

Flexible silicone laminate heaters can be used for battery and engine block warming, but are the most versatile of any of our component heaters. They are made for lower temperature applications up to 392°F (200°C) for a number of industrial applications. While stock sizes are available, they can be custom made in a wide variety of sizes and can be manufactured to virtually any shape required.

2 ENCLOSURE HEATERS

Enclosure heaters are used for freeze and condensate control in electrical enclosures. These heaters are economical and easy to install. Both safe area and hazardous area rated models are available and can be outfitted with a number of control options.

3 BAND HEATERS

Chromalox offers band heaters for pipeline or barrel heating in a number of materials, styles, and ratings. With designs capable of temperatures up to 1600°F, Chromalox band heaters are a rugged solution for any cylindrical heating applicaton.

4 TUBULAR HEATING

Chromalox tubular heaters are a versatile product used in a number of conductive, radiant, and convective heating applications. Available in many different materials, sizes, ratings, and terminations, Chromalox tubular elements provide exceptional heat transfer for today's commercial and industrial markets.

5 KAPTON HEATERS

Kapton® Heaters are very thin, light weight, etched foil heating elements. They have a temperature range of up to 392°F (200°C), and with their low profile design have exceptional thermal response. Kapton® is commonly used in a wide variety of applications such as medical, analytical instrumentation, semiconductor and aerospace.

6 SENSORS & CONTROLS

Chromalox provides a wide array of temperature sensors for industrial and commercial applications to assure precise temperature measurement of critical processes. Along with Chromalox's extended line of temperature and power controls, reliable monitoring, diagnostics and control is available for any application where heat is required.

7 DRUM & TANK HEATERS

Silicone rubber drum heaters are available in a variety of sizes to fit 5, 15, 30, and 55 gallon plastic and metal drum heaters. They are chemical and moisture resistant and extremely rugged. Installation onto standard drum heaters is quick and easy. They are available with or without integral temperature control.



OUR BUSINESS IS INNOVATION.

Chromalox is more than just a product manufacturer. Our suite of technologies enables new solutions to our customers' ever-increasing challenges. We don't just manufacture—we create. Here are the latest technological innovations from Chromalox.



XTREMEDUTY™

XtremeDuty™ technology is a suite of custom-engineered thermal solutions that feature engineering, material, and proprietary control technologies designed for the most extreme environmental and process conditions.

Products design, engineered, and manufactured with Chromalox® XtremeDuty™ technology carry the safety and security of stringent third-party certifications, and are subjected to intense performance and endurance testing through our in-house and partner test labs.

The benefits of XtremeDuty thermal solutions include:

- ▶ Low maintenance
- ▶ Superior performance
- ▶ Safe operation
- ▶ Corrosion resistance
- ▶ Faster startup
- ▶ Moisture resistance
- ▶ Hazardous area approved

POWER^V™

Power^V™ technology is an innovative Chromalox technology that leverages the benefits of higher voltage to provide increased efficiency and cost savings, while providing the benefits of zero emissions.

Power^V technology is available for Chromalox heat trace cable, industrial heaters and systems, and temperature and power control products.

Benefits of Chromalox® Power^V™ technology include:

- ▶ Decreased installation costs with fewer connection points and components. Increases efficiency by reducing energy losses I²R.
- ▶ Reduced infrastructure requirements with condensed product footprint and weight.
- ▶ Simplified, time-saving maintenance inspections.
- ▶ Clean operation with no regulatory compliance issues.

DRIMEG™

DriMeg™ technology encompasses a suite of advanced moisture control barriers, scientifically proven materials, proprietary manufacturing processes, and innovative control schemes that prevent, reduce, and eliminate moisture from electric heating elements. DriMeg technology enables end users problem-free startups and safe, worry-free operation while eliminating costly maintenance and downtime.

C2I™

C2i™ technology is an integrated intelligent network of advanced control technologies, component products, and systems from Chromalox that delivers superior system process integrity by utilizing exclusive control algorithms and engineered . C2i technology reduces both installation and operation costs while mitigating system risk and supporting process optimization.

Among the benefits of C2i technology are:

- ▶ Reduced operating costs with advanced, continuous condition monitoring.
- ▶ Lowered risk with proprietary control algorithms and engineered technologies.
- ▶ Decreased installation costs by minimizing material and labor content.
- ▶ Process optimization with developed control systems.

REDSAGE™

Drawing on more than 100 years of institutional learning, hundreds of thousands of designs on file, and leveraging industry-leading proprietary design software, Chromalox is able to provide best-in-class products with the most value and the shortest lead times.

We call this knowledge base RedSage™ Application Engineering Collective Intelligence System. It provides:

- ▶ Design modeling and simulation for research and development.
- ▶ Process and application design systems for estimating and quoting.
- ▶ Product life cycle management. Product design systems to speed engineering to production handoffs.



**UNRIVALED DESIGN. PRECISE ENGINEERING.
QUICK PROCUREMENT AND INSTALL.**

FRONT-END ENGINEERING DESIGN ASSISTANCE

With more experience than anyone else in the industry, our engineering support staff can help to properly specify equipment that will get the job done right the first time.

COMPREHENSIVE ENGINEERING CAPABILITIES

Our complete engineered systems reduce installation labor, reduce startup time, and ensure proper operation to specification. Chromalox provides engineering assistance by integrating our products into your application, offering a full range of engineering capabilities.

FAST RESPONSE SAMPLES

The Chromalox sample program takes your ideas and expedites them into products for a fast evaluation. Our engineering services and application teams guide your samples through from start to finish for one seamless process that ensures our product meets your needs.

LEADING THE INDUSTRY

Chromalox maintains six state-of-the-art manufacturing plants throughout the world with more than 634,000 square feet (30,000 square meters) of manufacturing space. Our plants use automated machinery to ensure tightly controlled, repeatable quality standards. Our facilities are vertically integrated and also provide final assembly and functional testing. Chromalox maintains numerous global product and plant certifications.

GLOBAL THIRD-PARTY APPROVALS

Decades of providing electric heating solutions for more process industries around the world than anyone else is the basis for meeting international certifications, codes, and standards. Our products have earned more global third-party approvals than any other company in our industry.



VERSATILE & RELIABLE: CARTRIDGE AND TUBULAR HEATERS

Subtitle: Chromalox offers a wide variety of insertion and tubular style heaters customized to many sizes, ratings, materials, and features for numerous industries and applications.



APPLICATIONS

- ▶ Platen heating
- ▶ Oven heating
- ▶ Injection heads for plastics
- ▶ Direct clamp on heating
- ▶ Extruder Dies
- ▶ Stamping and packaging
- ▶ Medical Applications/ Sterilizers

SIZES AND DIMENSIONS

Cartridge Heaters

- ▶ 0.125" - 1.25" Diameters
- ▶ Standard lengths up to 60" (150 cm)
- ▶ Up to 480V Designs
- ▶ Maximum Sheath Temperature 1500°F (815C)

Tubular Heaters

- ▶ 0.20" - 0.475" Diameters
- ▶ Up to 480" (12192 mm) finished lengths
- ▶ Voltages to 690V (1500V for metric designs)
- ▶ Maximum Sheath Temperature 1600°F (870C)

MATERIALS OF CONSTRUCTION

Cartridge

- ▶ Stainless Steel 304/316
- ▶ Incoloy 800
- ▶ Brass

Tubular

- ▶ Carbon Steel
- ▶ Stainless Steel 304L/321/316L
- ▶ Incoloy 800/825/840
- ▶ Titanium
- ▶ Hastelloy C276
- ▶ Copper

Custom Features

- ▶ Lead Wires or Terminals
- ▶ Metal Braid Lead Protection
- ▶ Electro-Polishing And Passivation
- ▶ Straight and Right Angle Threaded Fittings
- ▶ RTV, Epoxy, and Hermetic Seals
- ▶ Numerous Bending Options
- ▶ Distributed Wattage
- ▶ Flat Pressed Or Heart Shaped Sheath

COST EFFECTIVE & DURABLE: STRIP, RING AND BAND HEATERS

Chromalox strip, ring, and band heaters are designed to the highest quality with the capability to provide temperatures to 1600°F (870C) for many conduction and convection type applications.



APPLICATIONS

- ▶ Oven Heating
- ▶ Blow Molding
- ▶ Die Heads
- ▶ Extruders
- ▶ Heating Pipes
- ▶ Injection Molding
- ▶ Barrel and Tank Heating
- ▶ Platens

SIZES AND DIMENSIONS

Strip, Ring and Disc Heaters

- ▶ Strip: Up to 72" (180 cm) finished lengths
- ▶ Ring: 2.5" - 11.0" (6—28cm) outside diameters
- ▶ Disc: 2.75" and 3.25" (7—8.3cm) outside diameters
- ▶ Up To 480V

MATERIALS OF CONSTRUCTION

Strip

- ▶ Rust Resisting Iron
- ▶ Chrome Steel
- ▶ 304 Stainless Steel
- ▶ Incoloy
- ▶ Monel

Band

- ▶ Mica
- ▶ Mineral Insulated
- ▶ Ceramic
- ▶ Aluminum Extrusion
- ▶ Stainless Steel Sheath
- ▶ Chrome Steel Sheath

Ring and Disc

- ▶ Rust Resisting Iron
- ▶ Chrome Steel

Custom Features

- ▶ Lead wires or terminals
- ▶ Metal braid lead protection
- ▶ Multi-piece and split sheath designs
- ▶ Terminal boxes
- ▶ Thermocouples and cutouts (Band)
- ▶ Cross sectional and lengthwise bending (Strip)

BAND HEATER	STD DIAMETER	OPERATING TEMP	COMMENT
Mica	1-20" / 3-51cm	600°F / 315°C	Fast response, Wider widths
Ceramic	3-12" / 8-30cm	1600°F / 870°C	Higher temperatures
Mighty Tuff	1-14" / 3-36cm	1200°F / 650°C	Fast response, Wider widths
Aluma-Flex	3-14" / 8-36cm	650°F / 340°C	Rugged, Large diameters
HD Strip	5-12.5" / 13-32cm	800°F / 426°C	Rugged, Proprietary design
HBT-Tubular	3-60"+ / 8-150cm+	1200°F / 650°C	Very large diameters

HARSH ENVIRONMENT SOLUTIONS: ENCLOSURE & FLEXIBLE HEATERS

Chromalox enclosure and flexible heaters are used in many harsh environments for anti-condensation and freeze protection, as well as precision applications where minimal space is available.



APPLICATIONS

- ▶ Medical
- ▶ Semiconductor
- ▶ Electrical Enclosures
- ▶ Power Systems/Motors
- ▶ Communications
- ▶ Food Service
- ▶ Vending
- ▶ Transportation and Aerospace
- ▶ Manufacturing
- ▶ Military

MATERIALS AND TYPES

Enclosure Heaters

- ▶ TEH
- ▶ SLB
- ▶ AEPS
- ▶ XPMC

Flexible Heaters

- ▶ Silicone Laminate—Wire Wound
- ▶ Silicone Laminate—Etched Foil
- ▶ Kapton

SIZES AND DIMENSIONS

Strip

- ▶ Enclosure Heaters
- ▶ From 25 Watts to 1,100 Watts
- ▶ 120V to 600V Supply Requirements
- ▶ Built In Temperature Control Options
- ▶ Ordinary and Hazardous Area Approvals
- ▶ UL/CSA Certified to Class 1, Div. 1/2, Groups B,C,D
- ▶ T2, T3, and T3C Temperature Ratings
- ▶ Significant Stock Product Available

Flexible Heaters

- ▶ Low To Medium Temperature Applications
- ▶ Up To 390°F (200C)
- ▶ Up To 600V
- ▶ Ideal For Drum, Tank, and Enclosure Applications

Special Features

- ▶ Multiple T/C and Thermostat Control Options
- ▶ Adhesive, Spring, and Clamp Mounting Methods
- ▶ Custom Shapes and Sizes For Precise Heat Placement

CUSTOM & COMPREHENSIVE: CONTROL SYSTEMS

Chromalox is the only manufacturer of electric heaters and heating systems that also offers a complete line of electric heat and process controls.



CHROMALOX ELECTRIC HEAT & PROCESS CONTROL CAPABILITIES

Heater	Elements
Temperature and Process Control	<ul style="list-style-type: none"> ▶ Choose from 1/32, 1/16, 1/8, and 1/4 DIN to DIN Rail solutions for temperature, over-temperature, valve motor drive, and heater break control. Software and communication options include ModBus RTU/RS485, TCP/Ethernet, and many other popular fieldbus protocols.
Sensors	<ul style="list-style-type: none"> ▶ RTD ▶ J & K thermocouples ▶ Bayonet thermocouples ▶ Special-purpose sensors ▶ Custom sensors
Power Control	<ul style="list-style-type: none"> ▶ From simple mechanical contactors to advanced SCRs with full parameter diagnostics and safety features, zero cross and phase angle firing modes, electronic resettable fuses, a full complement of communication protocols, and powerful configuration software, Chromalox has the right design for your power control needs.
Power Panel Systems	<ul style="list-style-type: none"> ▶ Chromalox is a UL508 panel shop that offers contactor based, SCR based or a hybrid design of both types as standard catalog panel designs ranging from 30 to 1200 amps. Our custom panel solutions, including PLC and multiple circuit designs, set us apart from the competition.

CERTIFICATIONS AND APPROVALS

- Certifications**
- ▶ NEC
 - ▶ IEC
-
- Approvals**
- ▶ UL
 - ▶ cUL
 - ▶ CE
 - ▶ CSA
 - ▶ FM



COMPREHENSIVE SERVICE & SUPPORT.

As the world's most comprehensive manufacturer of electric heat and control products, Chromalox offers customized service solutions ranging from startup and training, to ongoing maintenance diagnostics, to emergency response. No one can maximize your investment with proper maintenance and assessment strategies better than Chromalox.

STARTUP AND COMMISSIONING

Minimize any chance for costly setbacks by having Chromalox qualified engineering on-site to startup and commission any system we have built, anywhere in the world. They will perform a complete review of the installed system to ensure optimized integration into your facility. You will save time and know your product was installed correctly.

EMERGENCY SERVICE

Emergency on-site service is also available when the situation demands it. That's why our service technicians are available 24x7 and will come to you anywhere in the world.

CHROMALOX COLD WEATHER CONTRACTS

To help you avoid unplanned downtimes that can occur due to cold weather, Chromalox offers a package of preseason planning and preventive maintenance services to ensure proper equipment operation before that cold weather strikes.

CHROMALOX SERVICE CONTRACTS

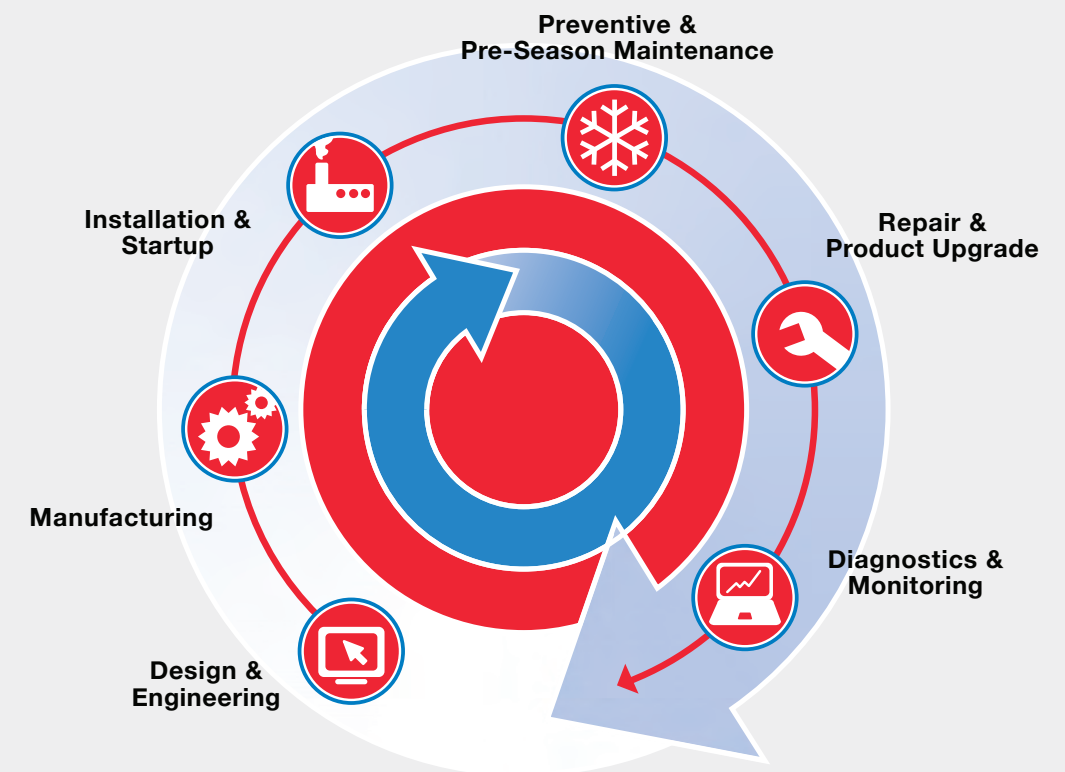
Chromalox Service Contracts deliver efficient emergency response and preventive maintenance, helping to eliminate problems before they arise.

PROFESSIONAL SERVICES

Chromalox comprehensive service solutions also include a selection of professional services to help integrate, operate, and service Chromalox heating and control equipment for your application.

- ▶ FEED Study and Process Evaluation services
- ▶ Training
- ▶ Diagnostics and Troubleshooting

PRODUCT LIFE CYCLE



CHROMALOX WORLDWIDE LOCATIONS



• Sales Offices
■ Manufacturing Facilities

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