SHARE DETAILS & QUOTE

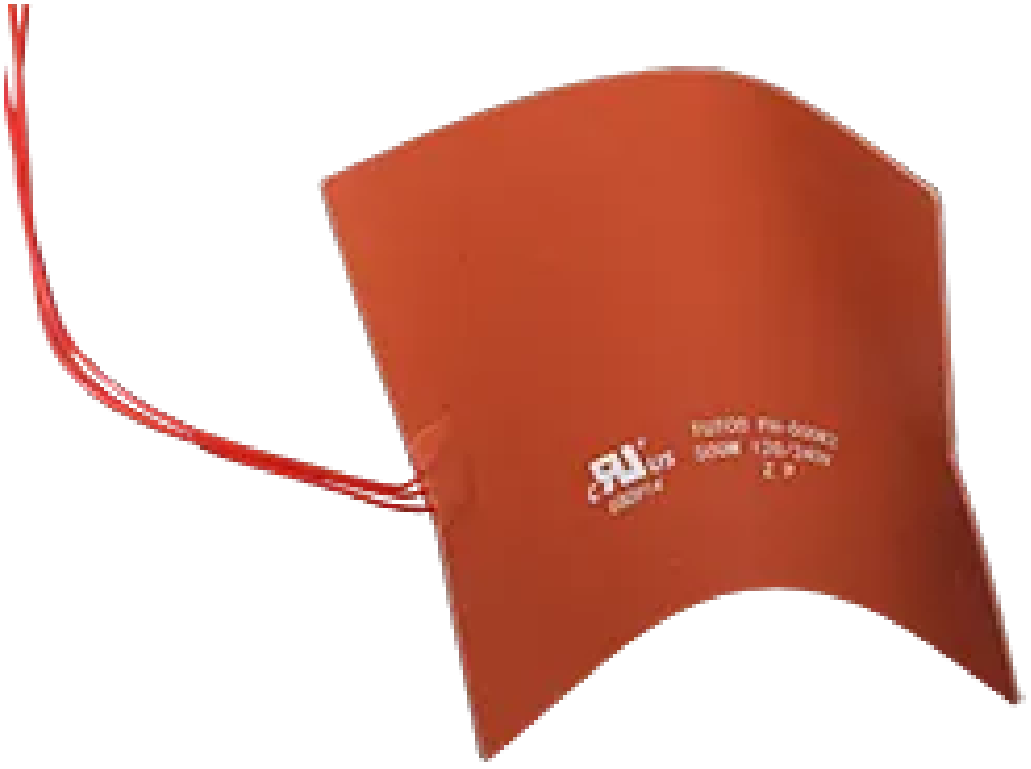
Flexible Heaters

Silicon Rubber, Polyimide, and Mica Surface Heaters

TUTCO Farnam highly customizable OEM Flexible Heaters are ideal for applications with a wide range of thermal and environmental requirements. Our UL Listed flexible products are commonly used for adverse conditions and irregular shaped conductive heating applications. All TUTCO flexible heaters are durable, offer quick temperature ramp rates, and high temperatures.

A flexible heater is a device designed to generate heat in various applications while having the ability to conform to different shapes and surfaces. Unlike traditional rigid heaters, these are made from materials that allow them to bend, curve, or fit onto irregular surfaces, making them versatile for different uses. Typical flexible materials include polyimide, silicone rubber or mica each with their own temperature range and flexibility characteristics. TUTCO Farnam's flexible heaters typically consist of heating elements embedded within flexible materials like silicone, polyimide, or mica. We can provide custom-designed solutions to fit specific shapes, sizes, and applications, such as in automotive systems, medical devices, electronics, aerospace, food industry equipment, and more. The flexibility of our heaters gives them a versatility including allowing them to be wrapped around pipes, adhered to surfaces, or molded onto different objects, providing heat where rigid heaters can't be easily applied. And since they can operate efficiently in various environments our flexible heaters are valuable in many industries where traditional heaters would not be suitable.

Types of flexible heaters:



Silicone Etched-Foil Flexible Heaters

A specific type of flexible heater that stands out due to its construction and properties:

Construction: This heater consists of a flexible silicone rubber material with an etched-foil element inside. The etched-foil technique involves chemically etching a resistive foil (often made of materials like nickel or copper) to create a fine and intricate heating pattern. This allows for precise control of

heat distribution across the surface of the heater.

Flexibility: Silicone rubber is highly flexible and can withstand a wide range of temperatures, making it suitable for applications that require both flexibility and durability. This flexibility allows the heater to conform to irregular surfaces and shapes.

Uniform Heating: The etched-foil design enables uniform heat distribution across the entire surface of the heater. This even heating is crucial for applications where consistent temperatures are required, such as in medical devices, aerospace equipment, or food industry machinery.

Customization: Silicone Etched-Foil Flexible Heaters can be tailored to fit specific shapes and sizes, making them versatile for various applications. Manufacturers can customize these heaters to meet the exact requirements of different industries and devices.

Temperature Control: These heaters often come with options for precise temperature control and regulation. This is important in applications where maintaining specific temperature ranges is critical.

Rapid Heating: They generally have quick response times, reaching operational temperatures relatively fast compared to some other heating technologies. Overall, the combination of the etched-foil design within a flexible silicone rubber material makes Silicone Etched-Foil Flexible Heaters unique due to their durability, adaptability, precise heating capabilities, and suitability for diverse applications.

Learn More Here - Silicone Etched-Foil Flexible Heaters

Polyimide (Kapton) Flexible Heaters

Often referred to as Kapton heaters due to the brand name of the polyimide film produced by DuPont, have distinctive features that set them apart:

High Temperature Resistance: Polyimide films can withstand a broad temperature range, from extremely low to very high temperatures (typically from -269°C to over 260°C). This high-temperature resistance makes them suitable for applications where other materials might degrade or fail.

Chemical Resistance: Kapton heaters exhibit excellent resistance to chemicals, solvents, and most oils, making them suitable for use in harsh or corrosive environments without compromising performance.

Thin and Lightweight: Polyimide films are exceptionally thin and lightweight, making the heaters low profile. This characteristic is beneficial in applications where space is limited or weight is a concern.

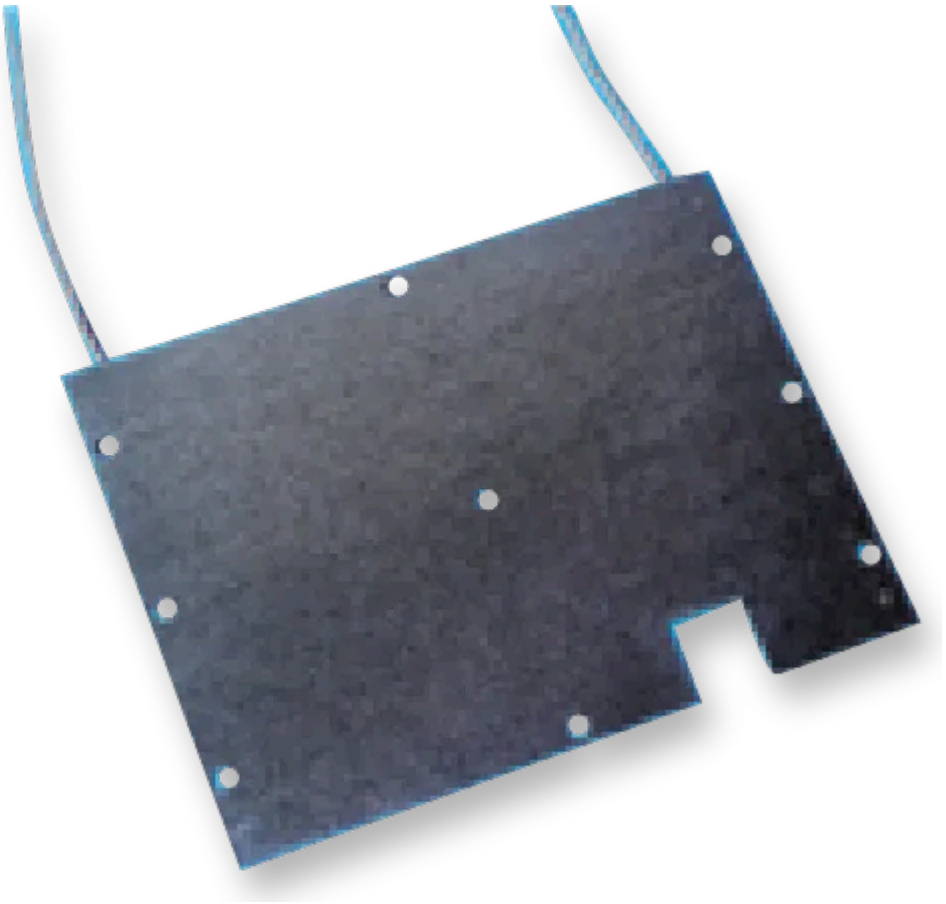
Flexibility and Durability: Similar to silicone-based flexible heaters, polyimide heaters are also highly flexible and durable. They can conform to various shapes and contours, making them adaptable to different surfaces.

Rapid Heat Transfer: Polyimide flexible heaters have good thermal conductivity, allowing for efficient heat transfer. They can achieve rapid heating and uniform temperature distribution across the surface.

Customization: These heaters can be custom-designed to fit specific shapes and sizes. They can also incorporate different wattages, voltages, and heating element configurations to meet precise application requirements.

Electrical Insulation: Kapton film provides excellent electrical insulation properties, ensuring safety and reliability in electrical applications. Polyimide flexible heaters find applications in industries such as aerospace, electronics, medical devices, food processing, and automotive sectors, where their unique combination of high-temperature resistance, flexibility, durability, and chemical resistance is advantageous.

Learn More Here - Polyimide (Kapton) Flexible Heaters



Mica Conductive Surface Heaters

unique due to their construction and specific properties:

Mica Insulation: These heaters use mica as an insulating material. Mica is a naturally occurring mineral known for its excellent dielectric strength and thermal properties. It provides good electrical insulation while also being able to handle high temperatures.

Conductive Elements: Typically, these heaters consist of resistance wire or foil sandwiched between layers of mica. This construction allows for uniform heat distribution across the surface of the heater.

High-Temperature Capability: Mica heaters can withstand very high operating temperatures, making them suitable for applications requiring intense heat, such as in plastics processing, semiconductor manufacturing, and certain industrial processes.

Rapid Heat Transfer: The combination of conductive elements and mica's thermal conductivity enables these heaters to transfer heat quickly and efficiently to the target surface.

Thin and Lightweight: Mica heaters tend to be relatively thin and lightweight, which can be beneficial in applications where space or weight considerations are crucial.

Customization: Manufacturers can customize these heaters to fit specific shapes and sizes. They can also tailor the wattage, voltage, and heating element configurations to meet the precise needs

of various industries and applications.

Chemical Resistance: Mica has good resistance to many chemicals, oils, and solvents, making these heaters suitable for use in certain industrial environments.

Due to their ability to reach high temperatures, uniform heat distribution, and flexibility in customization, mica conductive surface heaters find applications in industries requiring high-temperature processes and where consistent, controlled heating is essential.

Learn More Here - Mica Conductive Surface Heaters

CHARACTERISTICS	TYPICAL POLYIMIDE PARAMETERS	TYPICAL SILICONE RUBBER PARAMETERS
Size Range	< 1/2" sq. to 27.5" x 19.625" (700mm x 500mm)	< 1/2" sq. to 18" x 24"
Temperature Range	300°F - 390°F (150°C - 200°C)	Up to 428°F(220°C)

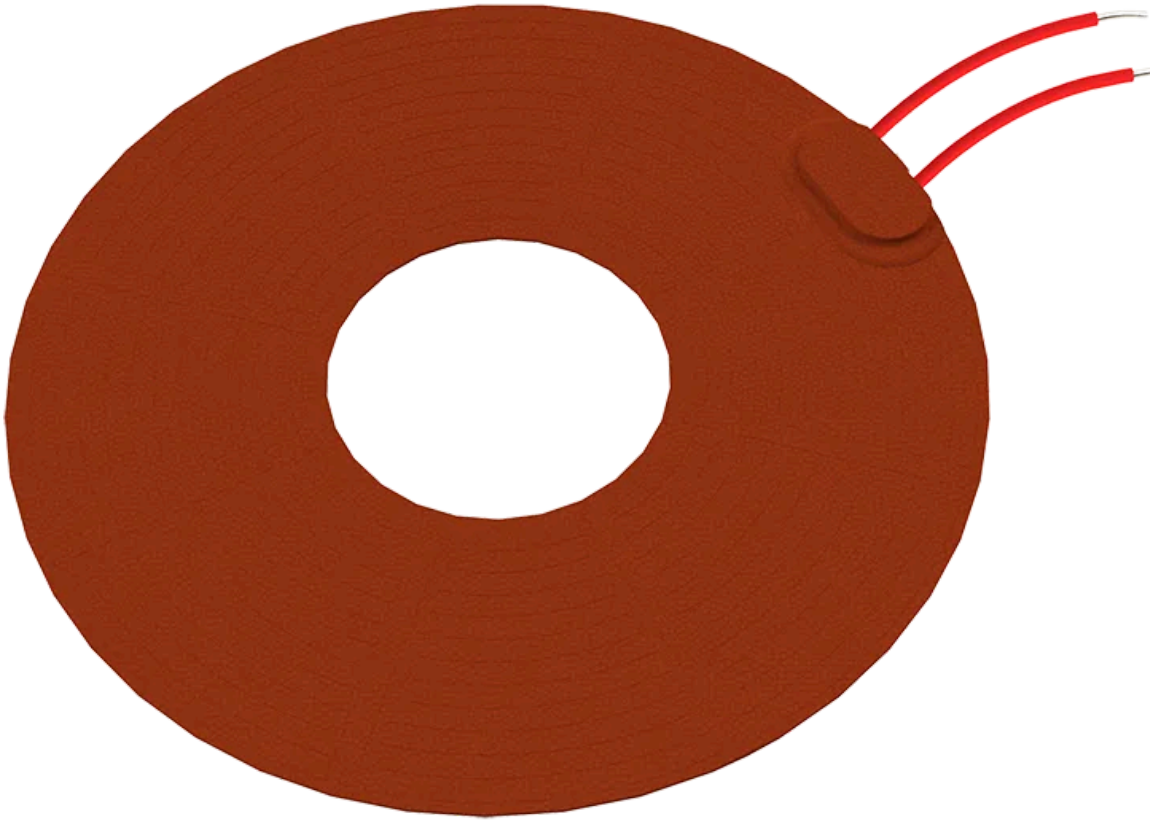
TUTCO® | FLEX SPECS

Design & spec your flexible heater online in 5 easy steps. Save and revise your configurations and submit them for quoting. Check our Flex Specs Tool to view and configure your heater.

Polyimide Heaters

Thin, highly precise heaters with excellent dielectric strength. Rapid heat up followed by constant temperature and excellent heat transfer. Ideal anywhere there are space or weight restrictions. Custom Shapes available.

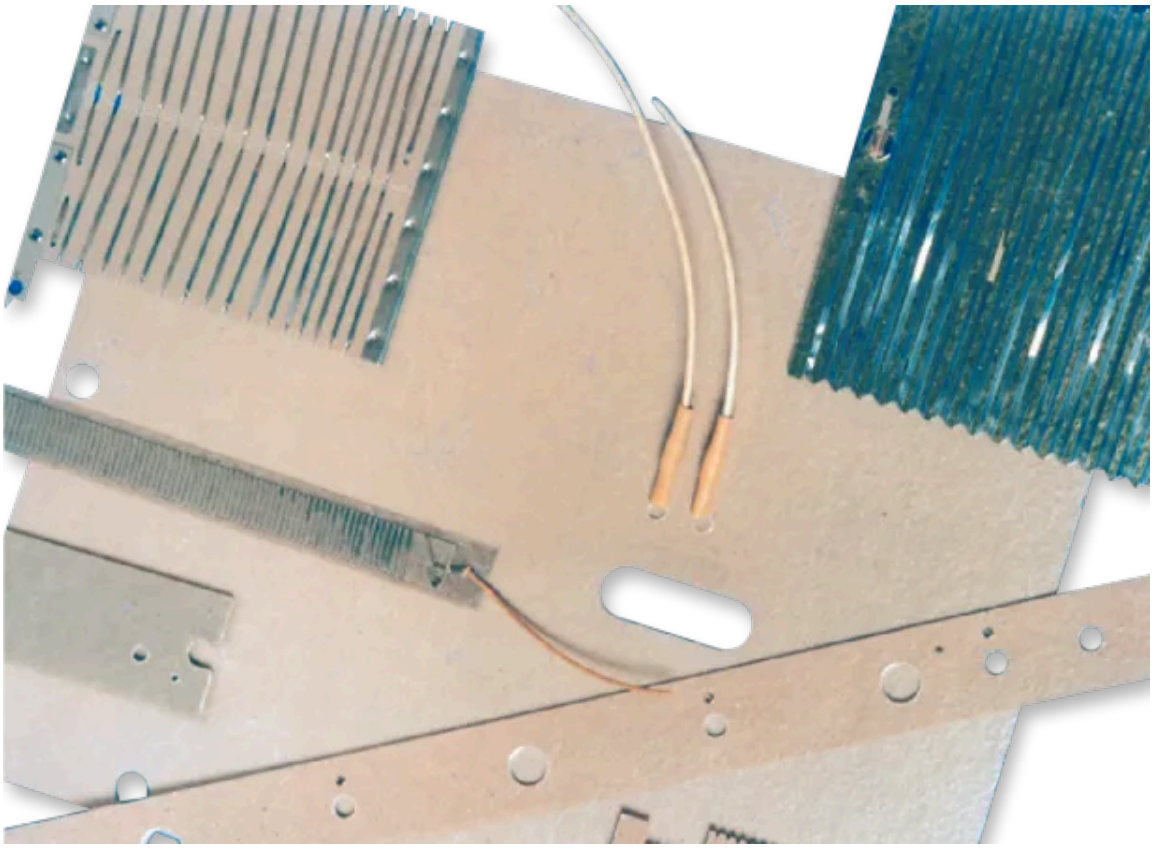
VIEW PRODUCT



Silicone Rubber Heaters

Silicone rubber heaters are durable industrial products with amazing properties. They are flexible, resistant to many chemicals, heat up quickly and are able to maintain precise temperatures.

VIEW PRODUCT



Mica Surface Heaters

Mica Surface Heaters heat by conduction and are great for temperatures up to 1200ºF. They are custom heaters designed to give most any desired temperature distribution.

VIEW PRODUCT

SILICONE RUBBER HEATERS

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Learn More Here

MICA SURFACE HEATERS

TUTCO Farnam Mica Surface Heaters combine rigid durability in a sleek, thin design.

Temperatures up to 1200º F - Rapid heat up and cool down while delivering even heat distribution across surfaces.

Rugged Construction - Built for rugged performance, mica surface heaters can be custom-engineered to meet a wide range of application needs.

Cost-effective - Improve product performance and reliability.

TUTCO Farnam's engineering and support team can provide you with a competitive advantage by creating a custom surface heater for your unique application.

Learn more here

APPLICATIONS AND USES

Manufacturers employ flexible heaters in various industries and applications due to their adaptability, efficiency, and versatility. Here are some examples:

Medical Devices: Flexible heaters are used in medical equipment such as IV fluid warmers, blood analyzers, diagnostic equipment, and patient warmers. They ensure precise and controlled heating in medical settings without hot spots that could cause discomfort or harm.

Aerospace and Aviation: These heaters are utilized in aircraft for de-icing systems, cabin heaters, fuel heating to prevent freezing, and instrumentation heating in avionics to maintain optimal performance in extreme conditions.

Automotive Industry: Flexible heaters find application in vehicles for heating fuel lines, keeping batteries at optimal operating temperatures in electric vehicles, preheating engine components in cold climates, and de-fogging or de-icing windows and mirrors.

Food Industry: In food processing and equipment, these heaters are used for maintaining specific temperatures in cooking appliances, warming trays, food dispensers, and preventing liquids from solidifying in pipes or containers.

Electronics Manufacturing: Flexible heaters assist in maintaining consistent temperatures during electronic assembly processes, controlling the temperature of sensitive components, and ensuring uniform heating in devices like 3D printers.

Industrial Applications: They're used for various industrial processes, such as curing adhesives, preheating parts for molding, maintaining consistent temperatures in pipes or tanks, and preventing condensation in control panels.

Consumer Goods: Applications in consumer goods include heated clothing, heated seats in vehicles, warming pads for pet enclosures, and heated grips for recreational vehicles.

Renewable Energy: Flexible heaters play a role in renewable energy by preventing freezing in wind turbine blades, keeping batteries at optimal temperatures in solar-powered devices, and maintaining efficiency in various renewable energy systems.

These examples illustrate the diverse applications of flexible heaters across industries, highlighting their adaptability and efficiency in providing controlled heating solutions for different purposes.

Case Studies & Sample Uses

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