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GSTIN – 09FCTPS8613D1ZY

Solutions -

1. Temperature range - 0 to 1200 degree
2. Application - Pipe/Drum/Machine/Cylinder/Other
3. Application Material - Plastic/HDPE,MS, SS 304/316
4. Dimension - Dia/Height, LxW
5. Inside Material - Water/Chemical/Gas/Camphor/Ghee/Grease/Honey
6. Volt - Single Phase 230v, Three Phase 415v
7. Temperature Controller (Optional)
8. Heater Type (Band/Belt/Immersion/Cartage/Tubular/Tape

Product Category -

1. Mica Band Heater :





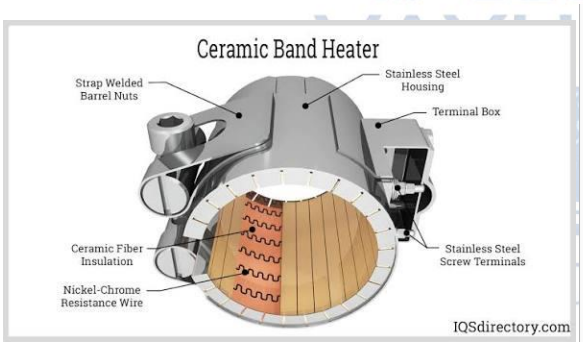
A mica band heater is an industrial heating element wrapped around cylindrical surfaces, like pipes or barrels, to provide uniform heat via **electrical conduction**. Made with a **nickel-chromium resistance wire** and **mica insulation** encased in a stainless steel sheath, they typically cost between **₹150 to ₹1,500** depending on the diameter and wattage.

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Operating Temperature: Generally up to 250°C to 300°C (though some models can reach up to 450°C).
Voltage & Power: Commonly operates on 110V, 220V, or 240V, with standard wattages ranging from 100W to 2kW.
Common Uses: Extensively used in the plastics processing industry (for injection molding and extrusion barrels), packaging machinery, and heated piping systems.
Advantages: Fast heat-up time, cost-effective design, and resistance to moisture and chemicals.

Mica band heaters are custom-tailored to the machinery they service. To ensure a precise fit and avoid damaging air gaps, you must specify the **inner diameter**, **width (band height)**, and **gap size**

2. Ceramic Band Heater :





Ceramic band heaters are mid-to-high-temperature industrial heating elements designed to wrap around cylindrical components like barrels, pipes, and nozzles to provide efficient, uniform heat. They primarily transfer energy through a combination of conduction and radiation, which ensures they do not require an absolutely perfect, ultra-tight fit to operate effectively

Heating Core: A helically wound Nickel-Chromium (Ni-Cr 80/20) resistance wire is threaded through these flexible ceramic tiles to create a durable heating mat.

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Insulation Blanket: A layer of ceramic fiber insulation (typically 4mm to 6mm thick) sits behind the tiles to prevent backward heat loss. This built-in barrier reduces electrical energy consumption by **20% to 30%**.

Outer Sheath: The entire setup is encased in a corrosion-resistant Stainless Steel (SS 304) or aluminised steel outer jacket with serrated edges, giving it the flexibility to easily open up and clamp onto machinery.

Parameter	Standard Range / Specification
Operating Temperature	Up to 600°C – 760°C (1100°F – 1400°F) maximum
Standard Diameters	Minimum 25 mm–38 mm up to 2000 mm
Standard Widths	Minimum 20 mm–25 mm upwards
Watt Density	Generally 3 to 7 Watts/cm² (up to 45 W/in²)
Voltage System	110V, 220V–240V, or 415V–480V; supports Single or Three-Phase
Termination Types	Post terminals (screw), lead wires, or heavy-duty terminal plug boxes

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3. Brass Band Heater :





Brass band heaters (often called sealed brass band heaters) are high-performance heating elements designed specifically for applications requiring **high watt densities, fast thermal response, and complete resistance to plastic leaks**. They consist of a brass tubular sheath enclosing a precision-wound nickel-chromium resistance wire, insulated by high-purity magnesium oxide (MgO) or mica.
Unlike standard mica or ceramic heaters, brass band heaters feature **completely sealed ends**. During plastic processing (like injection moulding), plastic drool or gases often leak onto the heater. Standard heaters absorb these contaminants, causing internal short circuits and premature failure. The sealed brass construction acts as a liquid-proof shield, completely protecting the internal heating elements from contamination

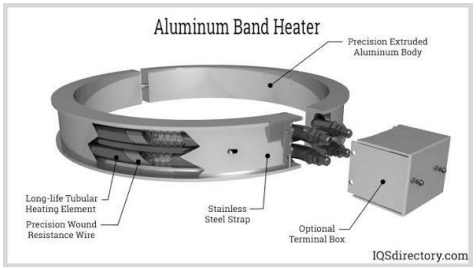
Parameter Standard Range / Specification
Operating Temperature Up to 350°C – 400°C (660°F – 750°F) maximum
Watt Density High, generally 5 to 8 Watts/cm² (up to 50 W/in²)
Material Sheath Heavy-duty Brass / Copper alloy
Standard Diameters Minimum 25 mm up to 100 mm (ideal for small spaces)
Standard Widths Minimum 20 mm upwards
Clamping Band Integrated stainless steel clamping straps with tightening screws
Termination Types Radial or axial lead wires (braided metal or fiberglass) with silicone boots

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- **100% Leak-Proof Protection:** The brass casing prevents liquid plastic, oil, and moisture ingress, significantly reducing downtime.
- **Fast Heat Transfer:** Brass has a much higher thermal conductivity than stainless steel or ceramic, allowing rapid heat-up times and tighter temperature control.
- **Space Efficiency:** They deliver high wattages despite having very narrow widths and small diameters, making them ideal for cramped spaces.
- **Internal Thermocouple Option:** Many brass heaters can be manufactured with a built-in Type J or Type K thermocouple for direct temperature monitoring at the exact point of heating.

Uses :
I**njection Moulding Nozzles:** This is their primary use case, where plastic drool from the nozzle tip is highly common.
Hot Runner Bushings: Used in complex plastic moulds where space is tightly constrained.
Blow Moulding Equipment: Applied to the die heads to maintain uniform flow temperatures.
Packaging Machinery: Used on small cylindrical sealing bars and heating heads

4. Aluminum Band Heater :





Aluminium band heaters (almost universally referred to as **cast-in aluminium band heaters**) represent the heavy-duty tier of industrial heating. They are engineered by bending a high-quality tubular heating element into a cylindrical shape and casting it directly into a solid aluminium alloy body

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Standard mica or ceramic heaters rely on clamping tension to press thin elements against a barrel, which can form tiny air pockets over time. Aluminium band heaters are heavy, rigid precision metal blocks machined on the inside to sit flush against the cylinder. Because aluminium is an exceptional thermal conductor, these heaters provide **near-perfect uniform heat distribution**, completely eliminating localized hot spots.

Parameter	Standard Range / Specification
Operating Temperature	Up to 350°C – 450°C (660°F – 840°F) maximum
Watt Density	Generally 2.5 to 5 Watts/cm² (up to 35 W/in²)
Wall Thickness	Typically thick and substantial, around 18mm to 22mm
Voltage Options	12V to 480V; single-phase or three-phase systems
Cooling Integrations	Can be cast with built-in internal liquid cooling tubes or external air fins
Termination Types	Threaded post terminals, terminal boxes, or high-temperature leads

Extremely Rugged Construction: The solid metal exterior shrugs off heavy physical impacts, vibrational wear, and plastic contaminants that would instantly destroy standard wrapped bands.

Virtually Infinite Lifespan: Because the internal resistance wire is sealed within a protective tubular rod before casting, it experiences minimal oxidation and thermal stress.

Tighter Process Control: Perfect contact with the machinery guarantees that thermocouple sensors register ultra-accurate temperature readouts

Plastic Extrusion Barrels: The primary application, particularly where high-speed polymer extrusion requires rapid liquid-cooling control.

Blow Moulding Dies: Used to maintain stable melt-flow index conditions across massive material volumes.

Rubber Machinery & Vulcanization: Chosen for processes requiring high pressure and structural resilience

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5. Water Immersion Heater :





Water immersion heaters are electric heating elements inserted directly into water tanks, cylinders, or industrial vessels to provide rapid, efficient heat transfer. Because the heating element is completely submerged, **100% of the generated electrical energy goes directly into the liquid**, making it one of the most efficient water heating methods available
Immersion heaters are classified based on how they attach to a water tank or vessel

Types :

- **Threaded / Screw Plug Heaters:** The heating element is brazed or welded onto a threaded pipe plug (typically 1”, 1.5”, or 2” BSP/NPT). These screw directly into a matching threaded opening in the side of a water tank.



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- **Flanged Heaters:** Designed for large-scale, high-pressure industrial applications. Multiple hairpin elements are welded onto a heavy-duty circular flange, which bolts onto a nozzle welded to the tank wall.



- **Over-the-Side Heaters:** Engineered for applications where drilling a hole into the side of the tank is impossible or unsafe. The elements slide directly over the top rim of the tank and sit completely submerged at the bottom.



Parameter Standard Range / Specification
Element Material Copper (for fresh water), Stainless Steel (SS304/SS316 for hard water), or Incoloy/Titanium (for highly corrosive water)
Wattage Options 1.5 kW to 3 kW (for homes); 5 kW to over 100 kW (for industrial systems)
Voltage System 220V–240V (Single-Phase) or 415V–480V (Three-Phase)
Temperature Control Built-in adjustable stem thermostat or a capillary-type safety cutout
Enclosure Rating IP44 up to IP65 moisture-proof or explosion-proof terminal boxes

Maximum Efficiency: Total immersion eliminates the ambient thermal radiation losses common to external blanket or strip heaters.

Fast Heat Recovery: The direct thermal contact allows cold water to reach target temperatures rapidly.

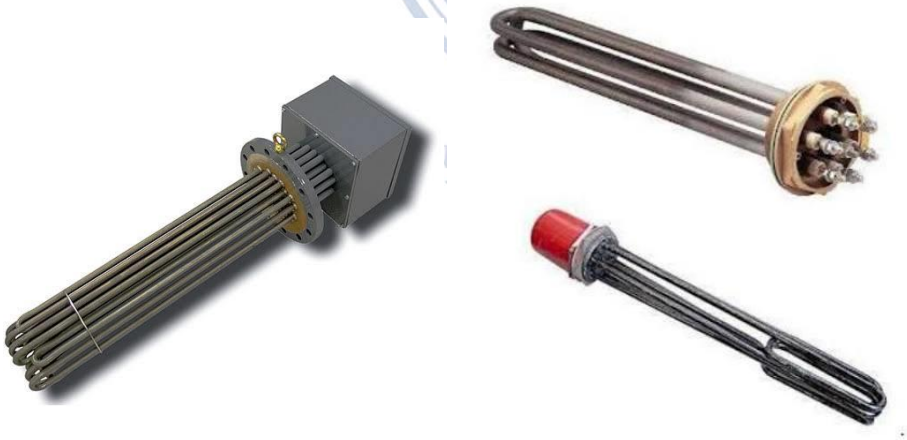
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Easy Maintenance: Screw-plug and flanged units can be unbolted and slid out for descaling or replacement without structurally altering the tank.

Precise Control: Integrated thermostat wells allow sensors to read internal water temperatures accurately, preventing dangerous overheating or boiling.

Domestic Geyser Elements (3kW, 230V): Standard copper screw-plug configurations for residential water heaters start between **₹350 and ₹750 per piece** depending on the built-in thermostat inclusion.
Industrial Flanged Immersion Heaters: Heavy-duty, high-kilowatt stainless steel assemblies designed for large industrial boilers and processing plants generally range from **₹3,000 to ₹12,000+ per unit**, depending on flange size, wattage, and material grade.

6. Oil Immersion Heater :



Oil immersion heaters are electric heating elements specifically engineered to heat viscous fluids like hydraulic oil, fuel oil, lubricating oil, and thermal fluids. While they look physically identical to water immersion heaters, **they are completely different internally**

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You cannot use a water immersion heater in oil. Oil has much lower thermal conductivity and a lower specific heat than water. If you use a high-wattage water heater in oil, the heat cannot dissipate quickly enough. The oil immediately surrounding the element will overheat, burn, and carbonize (create a thick black sludge layer). This destroys the fluid quality and causes the heating element to rapidly burn out.

Oil immersion heaters are designed with a **low watt density** (typically 1.5 to 3 Watts/cm²), spreading the heat over a much larger surface area to prevent scorching.

Parameter	Standard Range / Specification
Element Material	Steel (for light oils), Stainless Steel (SS304/SS316 for chemical/synthetic oils), or Incoloy
Watt Density	**Strictly low:** 1.5 to 3 Watts/cm² (10 to 20 W/in²)
Wattage Options	1 kW to 5 kW (standard tanks); Up to 50+ kW (large industrial reservoirs)
Voltage System	220V–240V (Single-Phase) or 415V–480V (Three-Phase)
Mounting Style	Threaded Screw Plug (1.25", 1.5", 2" BSP/NPT) or heavy Flanged assemblies
Enclosure Rating	IP65 moisture-proof, dust-proof, or Flameproof/Explosion-proof (for fuel tanks)

No Fluid Carbonization: Low watt densities ensure the oil remains chemically stable without burning or degrading.

Excellent Viscosity Control: Essential for thinning heavy oils (like crude or fuel oils) so they can flow smoothly through pumps and filtration systems.

Corrosion Resilience: Steel and stainless steel elements handle the unique chemical structures of synthetic and petroleum oils without breaking down.

Removable Core Options: Some industrial models allow you to replace the heating element core without draining the massive oil tank, saving heavy maintenance costs

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Common Industrial Applications :

Hydraulic Reservoirs: Keeps hydraulic fluids at optimal operating viscosity in cold weather climates.
Lube Oil Systems: Used in massive gearboxes, turbines, and heavy machinery to prevent cold-start damage.
Fuel Oil Preheating: Heaters are installed in tanks carrying heavy diesel or furnace oil to thin the fuel before atomization and combustion.
Heat Transfer Systems: Keeps closed-loop thermal oil fluid flowing consistently.

Standard Screw-Plug Oil Heaters (2kW to 3kW): Basic steel or stainless steel models with built-in thermostats generally range from **₹1,200 to ₹3,500 per unit**.
 Flameproof / Heavy Industrial Flanged Heaters: Units destined for fuel oil tanks or chemical processing requiring flameproof terminal boxes scale up from **₹6,000 to ₹25,000+** depending on scale.

7. Cartridge Heater (High/Low Density) :



Cartridge heaters are tube-shaped, heavy-duty industrial heating elements inserted into drilled holes to provide highly localized, precision contact heating. Because they fit completely inside a solid metal block, they offer exceptional heat transfer and can reach incredibly high temperatures within a very compact footprint.

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How They Work and Construction

A cartridge heater is built from the inside out to withstand intense thermal stress and physical vibration

- **The Core:** A high-grade Nickel-Chromium (Ni-Cr 80/20) resistance wire is wound around a high-purity magnesium oxide (MgO) ceramic core.
- **Insulation:** The core is placed inside a metal tube and packed tightly with fine MgO powder, which acts as an excellent electrical insulator but a brilliant thermal conductor.
- **Swaging Process:** The entire cartridge undergoes a process called "swaging," where the tube is mechanically compressed. This tightens the internal components, maximizing heat transfer efficiency and boosting the heater's lifespan.
- **The Sheath:** The outer casing is typically made of Stainless Steel (SS304 or SS316) or Incoloy to resist oxidation and high-temperature scaling

Parameter	Standard Range / Specification
Operating Temperature	Up to 750°C – 800°C (1400°F) maximum
Watt Density	Very high; up to 30 to 50 Watts/cm² (up to 300+ W/in²)
Standard Diameters	Metric: 3mm to 25mm+
Standard Lengths	From 20mm up to 1000mm+
Voltage System	12V, 24V, 110V, 220V–240V, or 415V
Internal Sensors	Available with built-in Type J or Type K thermocouples at the tip or center

Lead Wire Termination Options

Because these heaters are often installed in moving machinery, how the electrical wires connect to the cartridge is critical

- **Crimped-On Leads:** External wires are crimped to solid terminal pins outside the cartridge. Ideal for general applications with minimal movement.
- **Swaged-In (Internal) Leads:** The flexible lead wires run directly inside the heater core. This is mandatory for applications where the wires must flex or bend sharply right at the exit point.

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- **Right-Angle Leads:** The wires exit the metal cartridge at a 90-degree angle, which saves space in tight machine layouts.
- **Braided Metal Sleeves:** The leads are encased in a flexible stainless steel mesh to protect them from physical abrasion, sharp edges, or moving mechanical parts.

Common Industrial Applications

- **Plastic Processing:** Installed inside injection moulding manifolds, hot runner nozzles, and extrusion dies.
- **Packaging Machinery:** Inserted directly into cutting jaws, hot-melt glue guns, and plastic bag sealing bars.
- **Medical Equipment:** Used in lab testing devices, fluid warming setups, and surgical tools requiring precise micro-heating.
- **3D Printers:** High-power miniature cartridge heaters serve as the thermal engine inside desktop and industrial 3D printer hotends

Standard Replacements (e.g., 10mm x 100mm, 230V, 300W): Basic stainless steel cartridge heaters for general industrial machinery range from **₹150 to ₹450 per piece**. [1]

High-Watt Density / Thermocouple Integrated Heaters: Advanced units featuring internal swaged-in leads and built-in J/K type temperature sensors generally cost between **₹600 and ₹1,800+ per piece**.

8. Coil Heater :





Coil heaters (also known as cable heaters or hot runner heaters) are high-performance, miniature heating elements designed to deliver high thermal outputs in extremely confined spaces. They are essentially highly flexible, linear heating cables that can be tightly wrapped or coiled around cylindrical components to provide intense, localized heat.

How They Work and Construction

A coil heater is built using advanced manufacturing techniques to pack high power into a micro-sized cross-section

- **The Core:** A premium Nickel-Chromium (Ni-Cr 80/20) resistance wire is centered inside a small metal tube.
- **Insulation:** The wire is surrounded by high-purity magnesium oxide (MgO) powder, which is heavily compacted (swaged) to ensure rapid heat conduction and high electrical isolation.
- **The Sheath:** The outer casing is typically made of Stainless Steel or Incoloy, allowing the heater to withstand high temperatures and oxidation.
- **Flattened Cross-Sections:** While standard cable heaters are round, coil heaters are frequently pressed into **flat or rectangular profiles**. A flat profile increases the contact surface area against the nozzle, significantly improving heat transfer efficiency.

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Parameter	Standard Range / Specification
Operating Temperature	Up to 650°C – 700°C (1200°F – 1300°F) maximum
Watt Density	Extremely high; up to 15 to 30 Watts/cm²
Cross-Section Shapes	Round (e.g., Ø3.3mm), Flat (e.g., 2.2x4.2mm), or Square (e.g., 3x3mm)
Inside Diameter (ID)	Standard sizes range from 8mm up to 50mm+
Voltage System	12V, 24V (miniature setups); 110V, 220V–240V (industrial standard)
Internal Sensor	Can be manufactured with a built-in Type J or Type K thermocouple

Key Advantages

- **Ultra-Compact Profile:** Their small cross-section allows them to fit into complex multi-cavity moulds where standard band heaters are too bulky.
- **360-Degree Uniform Heating:** Coiling the linear cable around a nozzle provides continuous, even heat distribution along the entire length of the component.
- **Distributed Wattage:** Manufacturers can vary the pitch (tightness) of the coils. Coils can be wound tighter at the ends to compensate for edge heat loss, ensuring a perfectly uniform temperature profile.
- **Moisture Resistance:** Sealed exit configurations protect the internal MgO insulation from humidity and liquid polymer ingress.

S**tandard Hot Runner Coil Heaters (220V, 250W–500W):** Basic round or flat profile replacement coil heaters for standard injection moulding nozzles typically cost between **₹450 and ₹1,200 per piece**.

Thermocouple-Integrated & Enclosed Models: Premium coil heaters featuring an internal Type J thermocouple, stainless steel braided lead wires, or a reflective outer metal axial sleeve generally range from **₹1,500 to ₹3,500+ per unit**.

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9. Tubular Heater :



Tubular heaters are the most versatile, durable, and widely used electric heating elements in the world. They consist of a metal tube containing a precision resistance wire, which can be straight or bent into custom shapes (like U-shapes, hairpins, or complex coils) to heat air, liquids, gases, or solid surfaces.

How They Work and Construction

A tubular heater is built to be rugged and highly adaptable

- **The Core:** A high-grade Nickel-Chromium (Ni-Cr 80/20) resistance wire generates heat when an electrical current passes through it.
- **Insulation:** The wire is centered inside a metal tube and packed with high-purity magnesium oxide (MgO) powder. The assembly is then mechanically compressed (swaged) to ensure dense electrical insulation and fast heat transfer.
- **The Sheath:** The outer metal casing is selected based on the operating environment. Common choices include Copper (for water), Stainless Steel (SS304/SS316 for general use), Incoloy (for high-temperature air or chemicals), and Titanium (for highly corrosive acids)

Parameter Standard Range / Specification
Operating Temperature Up to 850°C (1560°F) maximum on the sheath
Standard Diameters 6.5mm, 8mm, 11mm, 14mm, and 16mm are industrial standards

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Length Options From 200mm up to 3000mm+
Watt Density Highly variable; from 2 W/cm² (for oils) up to 20 W/cm² (for air/solids)
Voltage System 12V to 480V; single-phase or three-phase configurations
Form Factors Straight rods, U-shaped, W-shaped, double-loop, or custom blueprints

Key Variations

Because the basic tubular rod is so adaptable, it serves as the foundation for several other major heater categories

- **Finned Tubular Heaters:** Rectangular or continuous spiral fins are wrapped around the sheath. This massively increases the surface area, making them ideal for rapid forced-air heating in ducts and industrial ovens.



- **Immersion Heaters:** Multiple tubular elements are welded onto a screw plug or a large flange to submerge directly into water, oil, or chemical tanks.
- **Cast-In Heaters:** The tubular element is bent into shape and cast inside a solid block of aluminium or bronze (like the aluminium band heaters discussed earlier).

Common Industrial Applications

- **Industrial Ovens & Furnaces:** Used for curing, drying, and paint-baking systems.
- **Load Banks & Duct Heating:** Installed in HVAC systems and load testing setups to heat moving air currents.
- **Defrosting Elements:** Specially sealed, low-temperature tubular heaters are used in commercial refrigeration units to prevent ice buildup.
- **Kitchen Appliances:** They function as the core heating element in domestic ovens, grills, deep fryers, and electric kettles.

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Standard Straight / U-Shape Elements (1kW–3kW): Basic stainless steel replacement elements for ovens or standard commercial equipment range from **₹250 to ₹750 per piece**.
Finned / Heavy-Duty Industrial Elements: Air duct elements or heavy-gauge Incoloy processing rods generally cost between **₹800 and ₹2,500+**, depending on the length and fin configuration.

10. Hot Air Gun Heater :





Hot air gun heating elements (commonly known as heat gun replacement cores) are lightweight, high-output heating assemblies designed to instantly warm a high-velocity stream of air. They are mounted directly in the barrel of hand-held heat guns or electronic SMD rework stations.

How They Work and Construction

Because a hot air gun relies on a fan pushing air over a minimal surface area at high speeds, the heating element must reach glowing red temperatures instantly without burning out or collapsing.

- **The Ceramic Skeleton:** The backbone of the element is a stepped, cross-shaped ceramic body. Ceramic is selected for its extreme resistance to thermal shock and ability to remain rigid under intense heat.
- **The Resistance Alloy:** High-grade **Nickel-Chromium (Ni-Cr)** or **Kanthal** resistance wires are wound in tight coils and threaded carefully along the ceramic skeleton.
- **The Mica Wrapper:** The entire ceramic-and-coil assembly is wrapped in a layer of heat-resistant **mica sheet**. This prevents the electric current running

through the coils from contacting the outer metal barrel of the gun, shielding the user from shocks.

Parameter Standard Range / Specification
Operating Temperature Peak air outputs ranging from 300°C up to 650°C (570°F – 1200°F)
Wattage Range SMD Rework: 250W – 700W |
Industrial/DIY Guns: 1500W – 2200W
Voltage System Standard 220V–240V AC operation
Wiring Form 2-wire setups (basic heating) or 3 to 4-wire setups (integrated thermal sensors)
Internal Sensor Premium units feature an integrated thermocouple bead for digital LCD readouts

Key Failure Causes

Hot air gun elements are consumables that experience immense thermal wear. The most common causes of failure include

- **Immediate Post-Use Shutoff:** Switching off a heat gun directly from a high temperature traps extreme residual heat in the barrel, instantly melting the internal coils. (Pro Tip: Always run your gun on its "Cool Air" mode for 30 seconds before completely powering down to protect the element).
- **Physical Impact:** Dropping a hot air gun while the element is red hot causes the brittle ceramic skeleton to fracture instantly.

- **SMD Rework Station Cores (250W - 700W):** Replacements for electronic repair stations (like the 850 or 852D series) are highly affordable, ranging between **₹150 and ₹500**

- **Heavy-Duty Industrial Elements (1800W - 2000W):** Replacement elements for brands like Bosch or Weldy generally retail from **₹400 to ₹1,500** depending on the specific model compatibility.

11. Manifold Heater :



Manifold heaters (most commonly called **hot runner manifold heaters**) are specialized, highly malleable heating elements designed to lay directly inside machined grooves of a distribution manifold block. Their primary purpose is to keep fluids or materials—such as molten polymers in plastic injection moulding—at an ultra-stable, uniform temperature while being split into multiple channels.
(Note: In completely separate contexts, a "manifold heater" can refer to an automotive intake grid heater for cold-starting diesel engines, or a hydronic plumbing manifold assembly for radiant underfloor heating. This guide covers the industrial electric element)

How They Work and Construction

A manifold heater starts its life as a straight, annealed tubular element. Annealing removes internal stresses, rendering the metal soft and malleable enough to be bent into complex 2D or 3D geometry right on the production floor.

- **The Core:** A premium Nickel-Chromium (Ni-Cr 80/20) element wire is wound helically through the center.
- **The Insulation:** High-purity, high-temperature magnesium oxide (MgO) powder is tightly compressed around the wire.
- **The Cross-Section:** While standard tubular heaters are round, manifold heaters are often drawn into **square or rectangular cross-sections** (e.g., 6x6mm, 8x8mm)

- **The Installation:** Technicians place the heater into a square groove on the manifold block and physically hammer or press it into place. The flat sides achieve maximum contact with the groove walls, eliminating insulating air pockets and promoting rapid heat conduction.

Parameter Standard Range / Specification
Operating Temperature Up to 700°C – 750°C (1300°F) maximum on the sheath
Common Cross-Sections 6mm x 6mm, 8mm x 8mm, 6.5mm x 6.5mm, or Ø8.5mm round
Sheath Material High-grade Stainless Steel (typically AISI 321 or SS304)
Watt Density Highly concentrated, typically 4 to 10 Watts/cm²
Voltage Parameters 220V–240V AC (Standard single-phase configuration)
Lead Protection Teflon leads, fiberglass sleeving, or stainless steel braiding
Core Structural Profiles

Depending on the machine complexity and manufacturing workflow, you will encounter three main profiles:

- **Flexible Tubular Heaters:** Supplied as straight, fully annealed rods. These offer total flexibility because the technician can bend them by hand or with simple tools directly into custom channels on-site.
- **Pre-Formed Factory Heaters:** Bent at the factory using specialized precision CNC jigs to match an exact architectural CAD drawing. This profile is optimal for high-volume manufacturing assembly lines because they serve as an instant, drop-in replacement part.
- **Cast-In Manifold Blocks:** The tubular element is completely cast inside a solid block of aluminum or bronze. This is chosen for extreme heavy-duty environments that require completely automated, indirect radiant heat profiles.

Common Industrial Applications

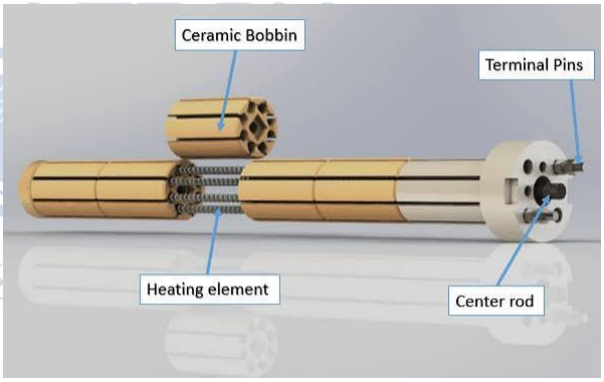
- **Hot Runner Injection Moulds:** The single most common application. They line the manifold block to keep molten plastics flowing smoothly through multiple nozzle cavities without forming premature "cold slugs".
- **Multi-Lane Packaging Systems:** Used to warm complex multi-point sealing bars and heat-shrunk film apparatuses.

- **Chemical Handling Instrumentation:** Warms manifold blocks used to distribute or mix multiple corrosive gases or fluids at precise temperatures.
- Stainless Steel 6.5x6.5mm Manifold Heaters via Elmec Speciality Heaters: Premium square profile engineered for high watt density distribution. **Price:** ~₹1,400 / piece.
- 250W Flexible Manifold Heaters via Bion Heaters: Built out of SS304 with standard Teflon leads for easy manual routing. **Price:** ~₹750 / piece.
- Basic standard flexible element material can also be bought linearly, starting around **₹30 to ₹95 per inch** depending on order volumes.

12. **Screw Heater :** Same as immersion heater

13. Bobbin Heater :





Bobbin heaters (often called **ceramic bobbin heaters**) are semi-flexible, cylindrical industrial heating elements designed primarily for **indirect fluid heating** or **dry air systems**. They consist of multiple interlocking cylindrical ceramic blocks (or "bobbins") held together by a central metal tie rod, with a continuous heating wire threaded through holes along the perimeter of the bobbins.

The Core Advantage: "Zero-Draining" Maintenance

The defining feature of a bobbin heater is how it operates inside fluid tanks. Instead of touching the liquid directly, the ceramic bobbin assembly slides

inside a permanently welded protective metal pipe (a pocket or thermowell) within the tank.

When the heating element eventually burns out, technicians can unbolt the terminal cover and **slide the old heater core straight out to replace it without draining thousands of litres of chemical, oil, or water processing fluid**. This completely eliminates expensive fluid disposal, refilling costs, and heavy operational downtime.

Parameter Standard Range / Specification
Operating Temperature Up to 600°C – 850°C maximum inside the core
Watt Density Low-to-medium: 1 to 10 Watts/cm²
Standard Diameters 25mm, 32mm, 38mm, 45mm, 57mm up to 100mm
Length Profiles Highly customizable; from 150mm up to 3000mm
Insulation Core High-temperature **Steatite** or Alumina refractory ceramic blocks
Resistance Wire Nickel-Chromium (NiCr 80/20) or Ferritic Iron-Chromium-Aluminium (Kanthal/FeCrAl)
Voltage Layout 12V up to 440V AC; supports single, dual, or three-phase wiring

Key System Configurations

- **Open Ceramic Elements:** Sold as raw, exposed ceramic blocks with threaded wires running along the exterior edges. These are pushed directly into air ducts, radiant tubes, or pre-existing pockets where the fluid-facing shield is already built into the machinery
- **Sheathed Immersion Assemblies:** Sold as a complete kit where the ceramic bobbin core is factory-fitted inside a stainless steel (SS304/SS316), Incoloy, or Mild Steel pipe casing. The assembly terminates at a standard threaded screw plug or flange with a moisture-proof connection box.

Common Industrial Applications

- **Corrosive Chemical Tanks:** Used heavily in electroplating tanks, acid baths, and metal finishing lines. The ceramic bobbin is inserted into a chemical-resistant Titanium or Teflon-coated steel pocket, ensuring the electrical core never contacts corrosive materials.
- **Viscous Bitumen and Oil Reservoirs:** Used to heat thick heavy fuel oils, grease, tar, fats, and wax. A low watt density spreads out the thermal energy gently,

preventing the surrounding oil from carbonizing or scorching onto the outer tube.

- **Electric Industrial Boilers:** Serves as the primary heating engine inside central water heating units and laundry machinery washing lines
- **Hot Air Furnaces:** Used as stationary radiant heaters suspended inside commercial baking ovens, paint curing rooms, and material heat treatment chambers.

Industrial Ceramic Bobbin Heater (2kW, 230V) from suppliers like Vijay Heat Industries: Consists of high-temp steatite blocks with a 45mm diameter and 600mm length profile. **Price:** ~₹950 / piece.

Electric Ceramic Bobbin Replacement Core (1000W, 230V) via Sai Heater And Meter: Compact 150mm length basic replacement core designed for quick drop-in placement. **Price:** ~₹250 / unit.

Heavy-duty multi-phase Ceramic Silica Bobbin Heaters (7kW to 12kW, 415V) sourced via manufacturers like Astha Heat Tech usually range between **₹1,100 and ₹4,500+** depending on length and terminal boxes.

14. Heating Tape/ Roof Snow De Icing Heat Cable :



Heating tapes and **roof snow de-icing cables** (commonly called heat tapes or heat trace cables) are flexible electrical elements designed to freeze-protect pipes or melt dangerous snow and ice build-ups on roof edges, gutters, and downspouts. [

While they serve a similar purpose, they utilize two completely different technologies depending on how they regulate temperature.

Core Technology Types

- **Self-Regulating Cables (Smart Cables):** These feature a conductive polymer core between two parallel bus wires. As the ambient temperature drops, the core microscopically contracts, creating more electrical paths and **automatically increasing heat output**. When the temperature rises, it expands and throttles back power. They are incredibly safe because they will not overheat or burn out even if the cable overlaps itself
- **Constant Wattage Cables (Traditional):** These deliver a fixed, unvarying amount of heat (e.g., 5 or 8 watts per foot) regardless of the surrounding temperature. They require an external thermostat to turn on and off. **Warning:** They must never overlap or touch themselves, as the trapped thermal energy will cause the cable to melt and short circuit.

Parameter Standard Range / Specification
Output Rating Typically 5 to 8 Watts per foot (15 to 26 Watts per meter) at 0°C (32°F)
Voltage System 110V–120V AC (Standard household plugs) or 208V–277V AC (Industrial/Commercial)
Outer Jacket Material UV-Stabilized Polyolefin or Fluoropolymer (highly chemical and weather-resistant)
Ground Protection Continuous tinned copper metallic braid for mandatory electrical grounding
Operating Limit Maintain roof gutter paths open down to -40°C (-40°F)
Roof and Gutter Installation Mechanics

To effectively prevent ice dams (which cause water to back up under roof shingles and leak into homes), the cable is installed in specific patterns

- **The Roof Edge:** Laid out in a continuous **"Zig-Zag" (or sawtooth) pattern** along the roof overhang. It must extend at least 30 cm (12 inches) up past the exterior wall line.
- **The Gutters:** Run straight through the bottom of the gutter to maintain an open channel for melted water to flow away

- **The Downspouts:** Dropped completely down inside the downspout pipe—and looped back up slightly at the exit—to ensure water doesn't freeze and burst the pipe at the ground level.
    - **Residential Pre-Cut Kits (120V):** Standard retail kits (ranging from 30 feet to 100 feet in length) with roof clips and spacers included generally cost between **$35 and $120 (₹3,000 to ₹10,000)** depending on the length and whether it is a self-regulating or constant-wattage cable.
    - **Industrial Bulk Heat Trace Spools:** Self-regulating industrial-grade cable bought by the spool typically ranges from **$2 to $5 (₹170 to ₹420) per foot**, requiring separate waterproof power connection and end-seal termination kits.

15. Silicone Heating Belt :



Silicone heating belts (also commonly called **silicone drum heaters**, barrel heaters, or silicone heating bands) are flexible, wrap-around electric heating elements designed to change the viscosity of materials stored in drums, barrels, pails, or gas cylinders.

Because they are thin and flexible, they wrap tightly around cylindrical surfaces to deliver fast, even heat directly into the storage container

How They Work and Construction

Silicone heating belts are engineered to combine rugged durability with high flexibility

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- **The Heating Matrix:** A precision-etched foil circuit or a multi-strand nickel-chromium resistance wire is laid out symmetrically across a glass-fiber carrier mesh.
- **Silicone Insulation:** The heating matrix is laminated between two layers of heavy-duty, fiberglass-reinforced silicone rubber. Silicone is chosen because it withstands moisture, industrial chemicals, and physical tearing, while remaining completely flexible.
- **The Clamping System:** Most belts feature built-in heavy-duty **tension springs** attached to metal eyelets. This allows the user to stretch and hook the belt around a drum, ensuring perfect contact even if the drum expands or contracts due to temperature changes.

Parameter	Standard Range / Specification
Operating Temperature	Up to 150°C – 200°C (300°F – 392°F) maximum
Material Shell	Fiberglass-reinforced silicone rubber (Moisture & Chemical resistant)
Standard Widths	125 mm to 250 mm (5 to 10 inches) are industrial standards
Voltage Layout	110V–120V AC or 220V–240V AC (Standard single-phase wall plugs)
Temperature Control	Built-in adjustable dial thermostat (typically 30°C to 150°C) or a digital controller
Power Output	1000W to 2000W+ for standard 200-litre (55-gallon) drum

Key Advantages

- **Viscosity Control:** They quickly melt or thin out thick materials like honey, wax, resin, oil, grease, paint, and chemicals so they can be easily pumped or poured.
- **Uniform Surface Contact:** Because the belt is highly flexible and spring-loaded, it eliminates insulating air gaps, preventing localized hot spots that could scorch sensitive contents.
- **Freeze Protection:** Used in cold climates to prevent water-based industrial products, chemicals, or diesel exhaust fluid (DEF) from freezing inside storage yards.

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- **Space-Saving Storage:** When not in use, the belts can be unhooked, rolled up loosely, and stored flat on a shelf, occupying virtually no space

Common Configurations

- **Plastic Drum Heaters:** Engineered with a lower watt density (lower power output) to prevent melting or warping plastic/polyethylene barrels.
- **Metal Drum Heaters:** Configured with higher wattages to rapidly transfer heat through heavy steel or iron walls.
- **Gas Cylinder Warmers:** Narrower, specialized belts wrapped around propane, butane, or oxygen tanks to maintain stable internal pressure in freezing weather.

Standard 200-Litre (55 Gallon) Steel Drum Heater (2000W, 230V): Features an integrated dial thermostat and spring clamps. Prices generally range between **₹2,500 and ₹6,000 per unit** ($30 to $75 USD) depending on the quality of the silicone reinforcement.
Smaller 20-Litre (5 Gallon) Pail Heaters: Low-wattage configurations for smaller buckets usually retail from **₹1,200 to ₹2,500 per piece**.

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16. Heated Hose :



Heated hoses (or electrically heated transfer hoses) are flexible pipelines equipped with integrated thermal elements. They transport liquids, gases, or highly viscous materials while **maintaining precise target temperatures** or preventing fluids from freezing.
Because they compensate for ambient temperature drops, they eliminate cold spots, condensation, and crystallization along the line.
Core Structural Anatomy

An industrial-grade heated hose is built in a complex multi-layer matrix to maintain flexibility while handling heavy internal pressure and heat

- **The Inner Liner (Core):** Smooth-bore **PTFE (Teflon)** or stainless steel braids handle high temperatures and chemicals. Heavy-duty polyurethane or food-grade silicone is used for water and beverages.
- **The Heating element:** Precision-wound **Nickel-Chromium resistance wires** or smart self-regulating heat cables spiral around the core tube to guarantee uniform heat footprint distribution.
- **Thermal Insulation:** Multiple wraps of Nomex felt, silicone foam, or fiberglass trapping layers prevent external heat loss.
- **Outer Jacket:** Wrapped in an abrasion-resistant polyamide/polyester braid or a corrugated waterproof rubber skin to defend against mechanical crushing and weather elements.

Parameter	Standard Range / Specification
Operating Temperature	Standard options up to 200°C–250°C; High-temp variants up to 600°C
Working Pressure	Low pressure up to high-pressure configurations over 500 Bar

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Nominal Widths	From micro 4 mm bores up to massive 100 mm+ industrial pipelines
Sensors Integrated	Built-in PT100 RTDs, Type J, or Type K thermocouples for real-time monitoring
Voltage Layout	12V, 24V (mobile rigs); Standard 110V/230V AC, up to 400V 3-phase

Key Application Spheres

- **Hot Melt Glue & Adhesive Dispensing:** Found extensively in packaging, automated automotive assembly (such as headlamp bonding), and mattress manufacturing to prevent adhesives from hardening mid-line.
- **Polyurethane & Foam Spraying:** Dual-feed heated hoses feed chemical parts (like resin and hardeners) simultaneously to spray heads while matching exact mixing viscosity rules.
- **Emissions & Gas Analysis:** Used in eco-testing laboratories and factory smokestacks to transport hot exhaust sample gases to analyzers without condensation skewing the results.
- **RV & Winter Water Supply:** Standard low-temperature anti-freeze variants (like the Camco TastePURE Heated Hose) keep residential or livestock water flowing down to -20°F (-29°C).

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Residential Freeze-Proof Hoses (e.g., 25–50 ft): Plug-and-play drinking water hoses for campers and livestock generally retail between **₹12,000 and ₹18,000** ($130 to $200 USD).

Industrial Hot Melt / Teflon Hoses: Heavy-duty, high-pressure processing lines (approx. 1/2" to 3/4" size) range between **₹5,000 and ₹10,000 per meter**, depending on thermal and pressure ratings.

Specialized Double-Heated Mixer Lines: Ultra-precise configurations for chemical or complex multi-component blending can reach **₹25,000+ per meter**.

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17. Heat Tracing Cable :





Heat tracing cables (also known as trace heating cables or electric heat trace) are flexible, insulated electrical cables attached along pipelines, valves, pumps, and storage tanks. Their primary function is to **provide continuous thermal management to prevent freezing, control viscosity, or maintain precise process fluid temperatures**.

The Core Technology Types

Choosing the right cable depends entirely on the layout layout length, target temperature parameters, and chemical environments

- **Self-Regulating Cables:** These feature a semi-conductive polymer matrix core between two copper bus wires. As the ambient pipe temperature drops, the core microscopically contracts, opening electrical paths to generate more heat. If the temperature rises, it expands and throttles power. **They can safely overlap** without causing a catastrophic burnout hotspot.
- **Constant Wattage Cables:** These utilize a traditional resistive heating zone wrapped around bus wires. They output a fixed, unvarying power level (e.g., 25W/m) along the entire run regardless of ambient pipe heat. They always require external thermostats, and **must never cross or overlap** or they will fuse and short-circuit.
- **Mineral Insulated (MI) Cables:** Built out of a solid resistance wire encased in magnesium oxide insulation with an outer seamless metal sheath (like stainless steel or Inconoy). They are the heavy-duty tier capable of enduring extreme industrial process temperatures up to 600°C–800°C

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Key System Components

A functioning heat trace loop requires more than just raw cable; it requires a comprehensive, multi-part assembly

1. **Power Connection Box:** Connects the heating cable to the facility's electrical distribution supply lines.
2. **Splice & Tee Kits:** Allows the cable to split cleanly at structural pipe junctions or line branches.
3. **End Seals:** Crucial termination boots placed at the final tip of a cable run to completely shield the electrical bus elements from outside moisture ingress.
4. **Thermostat/Controller:** Directly monitors temperature levels using RTD or thermocouple sensors to regulate circuit power.
5. **Thermal Insulation & Caution Labels:** The pipe must be fully wrapped in glass wool or foam insulation to lock in the generated heat,

Parameter Standard Range / Specificatio
Maintain Temperatures Low-temp freeze prevention (50°C) to high-temp processing (200°C+ via MI)
Power Output Levels Standard 10 W/m, 15 W/m, 25 W/m, up to 50+ W/m options
Outer Insulation Jackets Polyolefin (general), Fluoropolymer / PTFE (high chemical/acid exposure)
Safety Certifications ATEX, IECEx, or FLP (Flameproof) ratings for oil/gas hazardous zones
Standard Voltage 110V–120V AC, 220V–240V AC, or 3-Phase high voltage limits

Basic Constant Wattage Cable: Simple setups utilizing PVC or low-grade insulation jackets generally range from **₹120 to ₹180 per meter**.

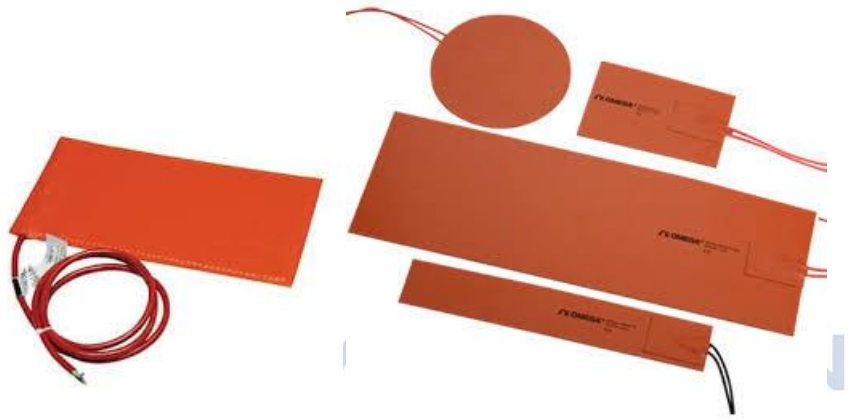
Self-Regulating PTFE / Stainless Steel Braided Cable: Built to resist acids, chemical wear, and structural friction (such as the PTS Heating Wire Series from Power Tech Solution) typically retails between **₹250 and ₹450 per meter**.

Heavy-Duty High-Temp Industrial Cable: Specialty elements rated for maintaining fluids past 150°C climb to **₹500 to ₹1,300+ per meter**.

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Pre-Kitted Freeze Protection Bundles: All-in-one residential or commercial kits (like RS India's Self-Regulating Trace Heating Kits) include 20–30 meters of cable alongside factory end-seals and attachment accessories starting around **₹15,000 to ₹65,000+** depending on length and certification levels.

18. Silicone Rubber Heater :



Silicone rubber heaters (often called silicone heat pads or blankets) are thin, flexible, and lightweight electric heating elements. They can be custom-moulded to almost any shape, geometric profile, or curvature.

Because they are highly flexible, they can be vulcanised, glued, or strapped directly onto flat, curved, or complex metal surfaces. This achieves **maximum surface contact**, enabling rapid heat transfer and exceptional thermal response times

How They Work and Construction

A silicone rubber heater uses a laminated matrix to maximize durability while maintaining a micro-thin profile

- **The Heating Matrix:** Two primary internal styles generate the thermal footprint:

- *Wire-Wound:* Strands of nickel-chromium resistance wire are laid out in a precise, repeating pattern. This is ideal for large surfaces or custom round shapes.
- *Etched Foil:* Micro-thin chemical resistance circuits are etched into flat metal alloy sheets. This delivers superior thermal uniformity and allows for much higher watt densities in complex layouts
- **Silicone Insulation:** The heating element is layered between two sheets of fiberglass-reinforced silicone rubber. The silicone provides excellent resistance to moisture, oils, and industrial chemicals, while remaining completely flexible.
- **Mounting Profiles:** They are installed using pressure-sensitive adhesive (PSA) backings, high-temperature RTV silicone glues, or built-in mechanical straps, hooks, and springs

Parameter Standard Range / Specification
Operating Temperature Continuous limits from -60°C up to 200°C (392°F); short peaks up to 230°C
Thickness Limits Extremely thin, typically between 1.5 mm and 2.5 mm
Watt Density Up to 0.6 W/cm² to 1.2 W/cm² (depending on mounting style)
Voltage Layout 5V to 24V DC (portable equipment); 110V to 240V AC (industrial standard)
Sensors Integrated Can be factory-fitted with internal Type J/K thermocouples, PT100 RTDs, or bimetallic thermostats

Common Industrial Applications

- **Medical Equipment:** Used in laboratory blood analyzers, respiratory therapy humidifiers, and surgical fluid warmers to maintain exact body-temperature fluids.
- **Aerospace & Defence:** Installed inside cockpit controls, optical lenses, and radar domes to prevent high-altitude icing and condensation.
- **3D Printers:** Highly popular as the primary heating engine beneath heated aluminum printing beds, ensuring stable adhesion for complex polymer filaments.
- **Catering & Food Service:** Used to heat buffet warming trays, commercial food delivery bags, and liquid condiment dispensers

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Standard 3D Printer Heat Pads (e.g., 300mm x 300mm, 220V, 500W): Basic square replacement pads with integrated thermistors and adhesive backings range from **₹800 to ₹1,800 per piece**.

Industrial Custom Shapes / Higher Voltages: Larger, specialized industrial blankets with built-in dial thermostats or spring-clamping systems generally cost between **₹2,500 and ₹7,500+**, depending on surface area and custom layout requirements.

19. Coil Heater Cooking Use (Ceramic Cooking Heater) :



20. Room Heater :



21. Fan Room Heater :



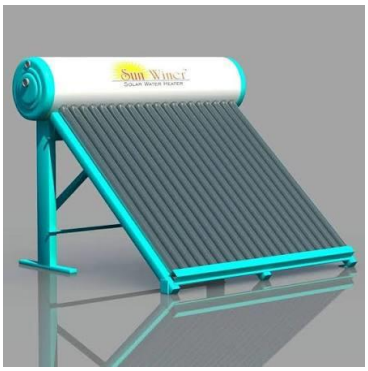
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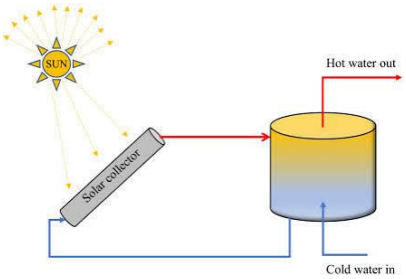
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22. Solar Water Heater :





23. Water Heating Rode For Home :



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