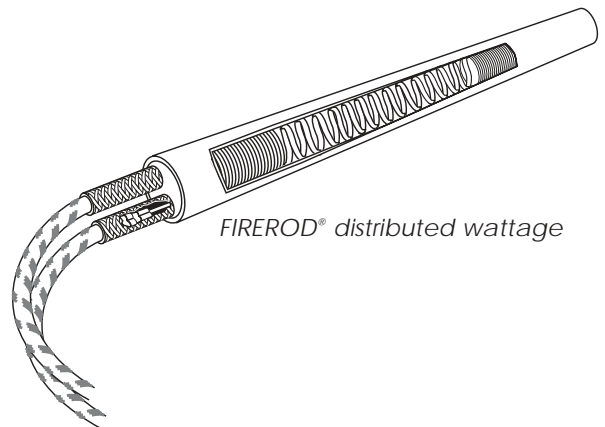


High Performance Metal Sheath Heaters

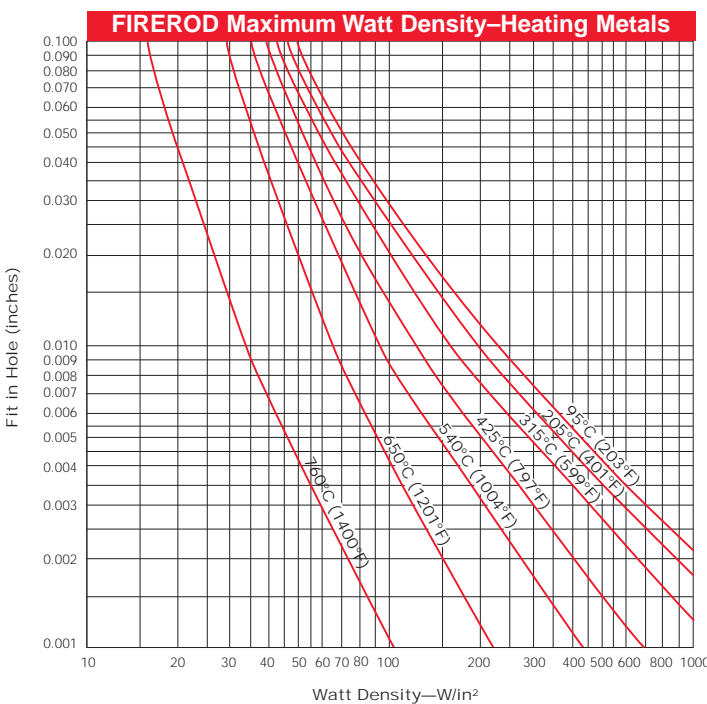


Maintaining uniform temperature in a vacuum chamber is critical for establishing consistent processes. High performance metal sheath heaters are the choice for many of the CVD and plasma etch vacuum chamber applications. Heaters are an integral component in the vacuum chamber's critical thermal subsystems. Watlow uses our application expertise to design special heaters that meet precision semiconductor specifications for heating external chamber walls and lids and in-situ wafer chucks. Electrical, thermal, mechanical and environmental specifications determine the best heater solution.



FIREROD® Cartridge Heaters

Watlow's FIREROD® cartridge heaters provide superior heat transfer, uniform temperature and resistance to oxidation and corrosion, even at high temperatures. FIREROD heaters can be cleanroom compatible using Teflon® insulated lead wires or mineral insulated leads which feature a stainless steel sheath.



Features and Benefits

Nickel-chromium resistance wire

- Precisely wound and centered in the unit, assures even, efficient distribution of heat to the sheath

Minimal spacing between the element wire and sheath

- Results in lower internal temperature, giving you the ability to design with fewer or smaller heaters that operate at higher watt densities

UL® and CSA approved flexible stranded wires

- With silicone fiberglass oversleeve, insulate the wire to temperatures of 250°C (480°F)

Incoloy® sheath

- Resists oxidation and corrosion from many chemicals, heat and atmospheres

Incoloy® is a registered trademark of Special Metals Corporation.

Teflon® is a registered trademark of E.I. du Pont de Nemours and Company.

High Performance Metal Sheath Heaters



Cable Heaters

The versatile Watlow cable heater can be formed to a variety of shapes for high-tech semiconductor applications. Cable heaters from Watlow are small diameter, high-performance units, fully annealed and readily bent to desired configurations.

Flat spiral cable heater configurations are the heart of many turnkey platen heater assemblies. Coil assemblies are used in wire bonding, while flat spiral assemblies are used in photolithography and chemical vapor deposition. Star wound cable heaters can be used for a variety of nitrogen, air and liquid applications.

Features and Benefits

High ductility

- Allows the heater to be cold-formed into almost any shape

Low mass

- Allows for quick response to both heating and cooling

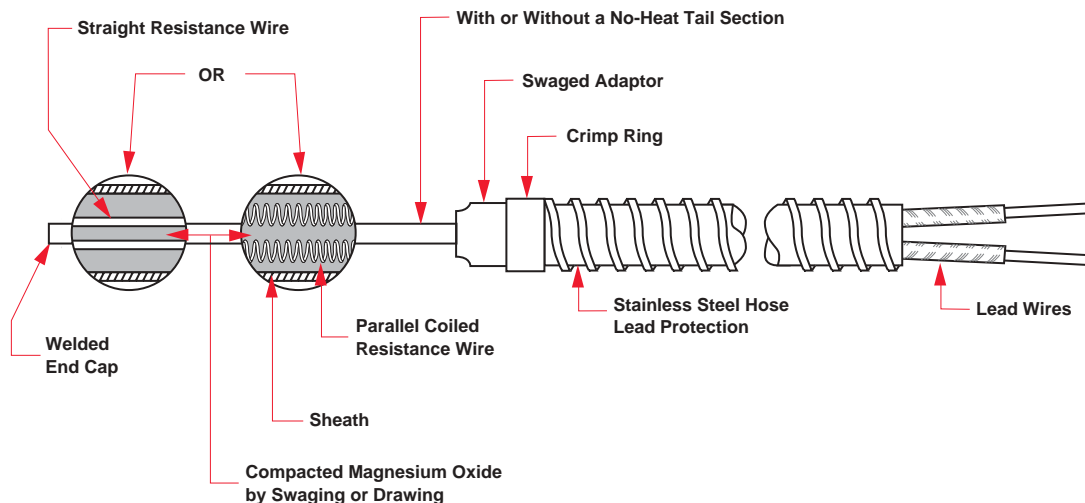
Heater sheath can be brazed

- Allows the permanent attachment of mounted fittings to the heater

Standard 304 stainless steel or optional 316L stainless steel or Inconel® 600

- Provide high temperature corrosion and oxidation resistance along with ideal thermal expansion properties

Cable Heater Construction

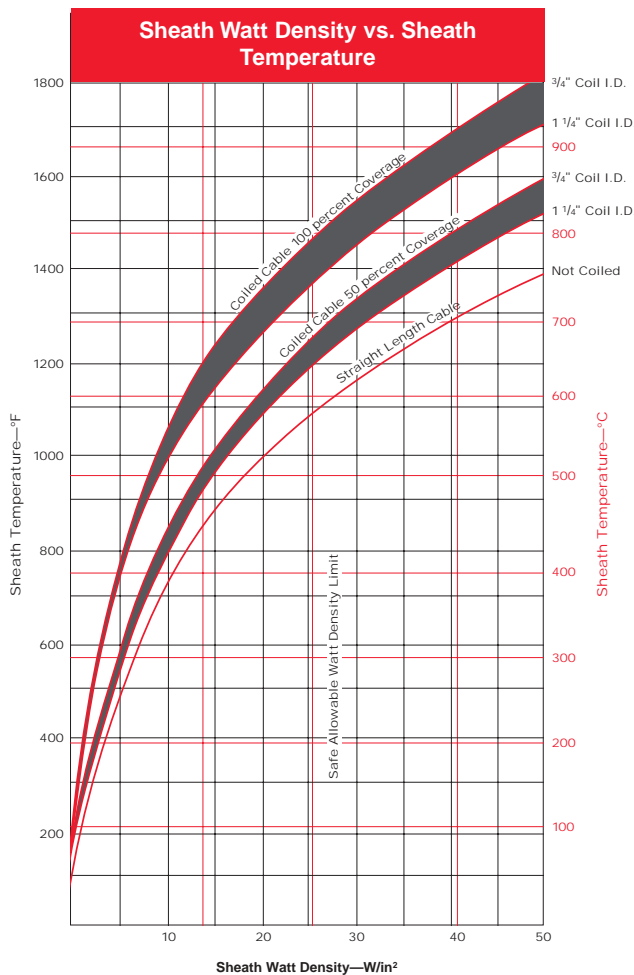


High Performance Metal Sheath Heaters



Round and Flat Tubular Heating Elements

High performance tubular heaters are used in both radiant and convection modes to provide uniform temperature profiles in core wafer process applications. Tubular elements and assemblies from Watlow generate all the heat necessary in these processes; and are virtually 100 percent energy efficient.



Features and Benefits

Precision bending with intricate formations

- Enables heating element to be designed around available space to maximize heating efficiency

High temperature moisture-resistant seals

- Protect against moisture contamination and are rated to 400°C (752°F)

MgO insulation filled sheath

- Maximizes dielectric strength, heat transfer and life

Stainless steel studs

- Fusion-welded to terminal pins for mechanical strength with ceramic insulators