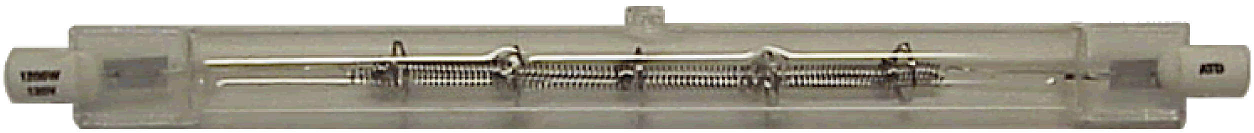
(800) 720-5256

Quartz Infrared Lamp **Product Data Sheet**



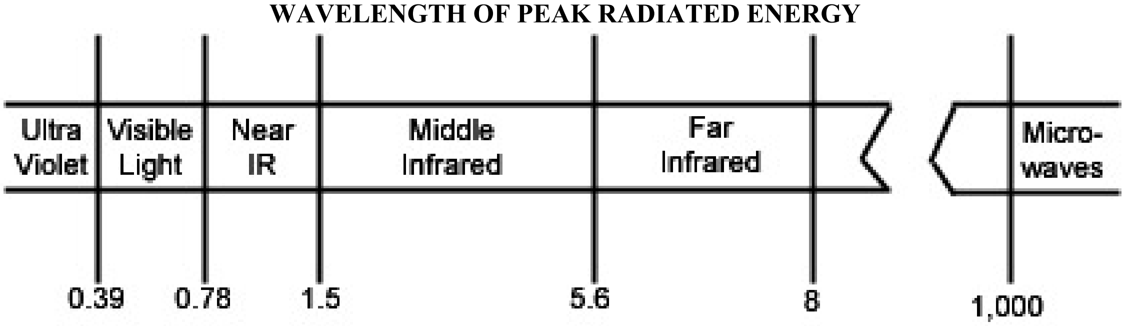
Description:

Anderson Thermal Devices, Inc. specifies tungsten filament Infrared halogen lamps in most of its heaters. The Halogen Cycle increases the life of the lamp. Halogen gas is added to the inert gas in the lamp. As the heater operates, tungsten slowly evaporates from the filament and combines with the halogen to create a tungsten halide. As the tungsten halide touches the filament, the heat separates the halide into tungsten and halogen gas and re-deposits the tungsten back on the filament. The freed halogen gas then repeats the process.

Rapid Response:

The lamps heat up and cool down instantly in response to changes in applied voltage. They radiate 90 percent of the available radiant energy in less than one second after being turned on. By comparison, long-wavelength infrared emitters must be energized for several minutes before they reach the same relative output. Similarly, the short-wavelength infrared emitter in the lamps cools down much faster than a long-wavelength infrared emitter. This is in part due to the greater thermal mass of long-wavelength emitters.

WAVELENGTH OF PEAK RADIATED ENERGY



WAVELENGH-MICRONS (10^{-6} METERS)

Tungsten Wire Filament

The high-density infrared energy is produced by a tungsten wire filament in the lamp. The filament is supported by tungsten wire ring anchors, tantalum disks, or through deflection winding of the filament to create the support from the filament itself. The supports prevent the filament from coming into contact with the quartz lamp envelope and causing the lamp to fail.

Atmosphere

The inert atmosphere in the quartz glass envelope protects the tungsten wire filament from oxidation.

Quartz Glass Envelope

All T3 lamps have a diameter of 3/8 inch, while T4 lamps have a diameter of ½ inch. Lamps are available in various lengths and wattages, and in clear or translucent quartz glass envelopes. Translucent lamps are used for reduced glare requirements.
The exterior of the quartz glass envelope must be cleaned before voltage is applied to the lamp. Any residue or salty deposit (perspiration) on the envelope will absorb energy or react with the quartz and cause premature lamp failure.

Ceramic Coating

Applying a special ceramic coating to the envelope improves radiation at required wavelengths and raises energy efficiency.
Black Coating (High-efficiency far-infrared radiation). This coating enables a lamp to radiate nearly 100% of its energy in the visible spectrum, or convert between 70% and 80% of its energy from the near-infrared region to the far-infrared region. This far-infrared output is two to three times that of conventional halogen heater.
White Reflective Coating (Stronger radiation in a fixed direction). By applying a white coating to half the lamp envelope, energy is radiated in a highly efficient manner in a specific direction. This type of

Lamp Orientation

Some lamps are intended to be operated in a horizontal position so that the filament is supported equally along its length. Shorter lamps can be operated in a vertical position because the filament will not sag and stress its upper section with its weight. Special vertical-burn lamps are available in longer lengths that have indentations in the quartz envelope that support individual filament spacers and prevent the filament from sagging when the lamps are operated vertically.

TECHNICAL INFORMATION

Operating Voltage

Each lamp has a rated voltage. Filament temperature, color temperature, peak wavelength, and total energy emissions can be controlled by adjusting the applied voltage above or below this rated value. Lamp power, which is measured in watts, is also a function of the applied voltage. Operating lamps at voltage levels in excess of the rated voltage will significantly reduce lamp life.

Lamp Life

The rated life for most lamps is 5,000 hours. High color-temperature lamps have a shorter rated life. Average lamp life is based upon an open-rack burning test, where the lamps are allowed to radiate out to free space. The actual life in a heater will be different than the results of the open-rack burning test. The life is dependent upon several variables:

- *Filament Temperature*

The lamp design and physical properties of the tungsten determine the evaporation rate and re-deposition of the tungsten during lamp operation, which is a function of filament temperature. Increasing the tungsten temperature increases the heat output and shortens life. Conversely, reducing the applied voltage to the lamp, coating eliminates the need for reflective mirrors and other optical devices, making it a space-saving, low-cost alternative.

Electrical Connections

In most cases, connections to supply electricity to the tungsten wire filament are made through flexible pigtail leads. Button contacts and screw bases are also used on some lamps to make this connection.
Lamps with end leads should be installed so the leads have a small amount of slack to allow for thermal expansion during operation. This will eliminate lamp failure caused by rigid leads transferring this expansion to the quartz glass envelope.

End Seals

Standard end seals are limited to a temperature of approximately 662°F (350°C). Operating lamps at temperatures above this level leads to oxidation, overheating, and eventual burnout. Cooling for lamp end seals is provided on some heaters to increase the times and temperatures at which they can be operated, and to extend lamp life.

End seals are available in metallic and ceramic versions. The metallic end seals have un-insulated leads, while the ceramic end seals have insulated leads. The ceramic end seal serves to protect the joint of each lamp lead to the lamp emitter filament and the insulated leads are electrically isolated.

and the resulting filament temperature, lengthens the lamp life.

- End Seal Temperature

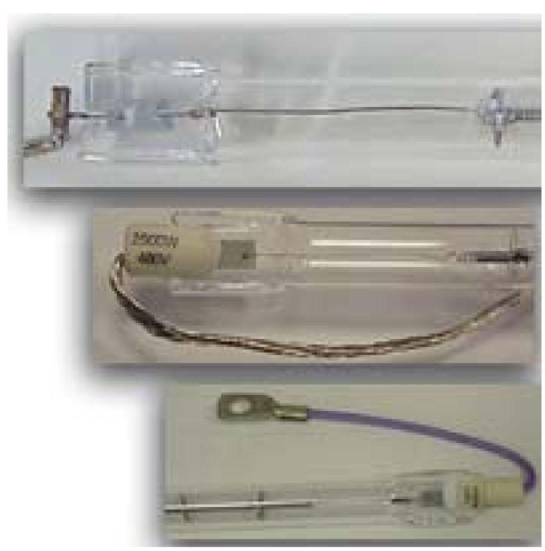
Molybdenum foil is used as the conductor through the end-seal area for lamps with metallic end seals. The foil is not completely airtight. As the foil is heated, it oxidizes. The oxidation rate is a function of temperature. At Anderson Thermal Devices, our design goal is to cool the end seals to less than 350°C in most heaters, which maximizes the seal life of the lamps.

- Quartz Temperature

The quartz must be maintained at a temperature of less than 800ºC, to keep the quartz from softening. If a lamp fails from improper quartz temperature, it will either be dark (if overcooled), or softened and warped (if overheated).

-Voltage Control

Tungsten has a very low resistance at room temperatures (as compared to operating temperatures). The in-rush current may be ten times that of the operating current.
Thus, at startup, it is imperative to run with a reduced voltage for a short period of time (less than 1 second).



Anderson Thermal Devices, Inc. supplies Quartz Infrared Lamps to a number of large and small companies for a number of varied uses. Pictured below in Figure A is one side of an ***Electric Infrared Curing Tunnel*** used for drying and curing featuring our short wave length T3 lamps; 0.7 to 2.0 microns. Figure B shows an all electric ***Air and Infrared Batch Oven*** for curing powder coated parts with T3 Quartz Infrared Lamps.

Figure A

Figure B

We welcome your calls and or visits to:

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