

Test Plan: Heater Cartridge

Overview:

The main objective of this test plan is to determine heating cartridge capabilities, comparing calculated power to experimental power, and determining any thermal expansion.

Testing Configuration:

In order to test heating cartridge, the following materials are required:

- Heating Cartridge
- Beaker (filled with water)
- Stopwatch
- Thermocouple (or other temperature measuring device)
- Calipers
- Power Supply
- Multimeter

Test Procedure:

Power: Find rate of power going to heat cartridge

1. Fill beaker with water
2. Power heating cartridge
3. Place heater and thermocouple in the beaker
4. Turn on power supply to a set voltage, begin timing
 - a. record actual voltage and current to obtain power using multimeter
5. Measure temperature over set time interval
6. Vary voltage and repeat steps 1-5.
7. Plot data (Power vs Voltage) with curve fit, compare to actual value calculated in step 4a.

Thermal Expansion Analysis: Determine if thermal expansion is negligible or needs to be considered

1. Measure heating cartridge dimensions using calipers
2. Allow heater to reach steady state temperature conditions
3. Measure heated cartridge dimensions and compare to ambient

Example of Data sheet:

