

Knowledge Domain: Electrical Simple
Unit: Heating Element
Skill: Replacement of Heating Elements

Tools and Parts Required:

- 1) Continuity Tester
- 2) Screwdriver (as needed)
- 3) Wrench (as needed)
- 4) Appliances or Machines with Heating Elements (hot pots, hot water baths, sterilizers, hairdryers, toasters, etc)

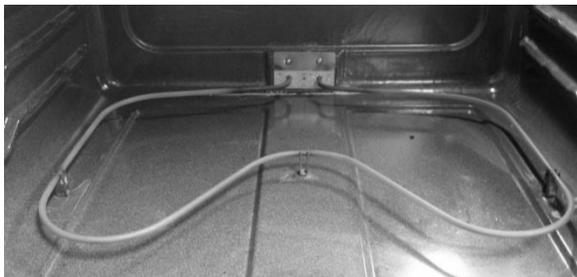
Introduction

Heating elements are used within devices to create heat. Heating elements are designed to have a low resistance. A low resistance causes electrical current flowing through the heating element to be converted to heat.

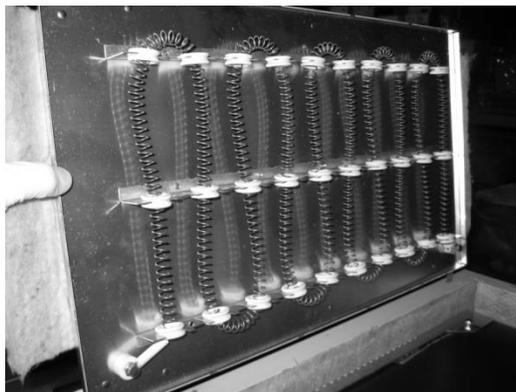
Medical and non-medical equipment often contain heating elements. You may be most familiar with the heating element in a hot water pot or hot plate. Hot water and heat for sterilization are essential to good healthcare.

Example

Below is an image of a heating element in an oven.



This hot water bath contains a coiled heating element directly below the water reservoir.



Identification and Diagnosis

The heating element on a machine is the component that becomes warm or hot when the machine is turned on. The two most common reasons for non-functioning heating elements are 1) an open/non-functioning thermostat or 2) a non-functioning heating element.

Turn on the machine and place your hand near the heating element. This is the easiest way to determine if the heating element is functioning. If the heating element does not become warm within 10 minutes, measure the voltage being applied to the heating element. If there is no voltage to the heating element, there is a problem with the thermostat and this skill will not help you. If there is voltage applied to the heating element but no heat is generated, you need to replace the heating element.

You can also test the resistance of the heating element. Most heating elements have a resistance between 15 ohms and 30 ohms. A functioning heating element will still conduct electricity. A continuity tester or multimeter will tell you whether the heating element is conducting electricity. Heating elements that are not conducting electricity should be replaced. If a heating element is not conducting electricity, the resistance will read as “infinite” or “open.”

The insulation of the heating element may have been broken. Test for a short to the ground or chassis. Touch one lead of your multimeter to the ground wire or chassis and one lead to the heating element (try both ends). The multimeter should read “infinite” resistance. If there is a low resistance (<1 ohm), you need to replace the heating element.

The most common heating elements are made of a material called Nichrome (Ni-Chrome, or Nickel-Chromium). Nichrome is a combination of 80% nickel and 20% chromium. The heating element may be straight, coiled, wire, or ribbon. The most important aspect to consider when replacing a heating element is the resistance and power rating.

Procedure

Heating elements are made in a wide variety of shapes and styles. It is important that the replacement heating element has the same resistance as the original heating element. Resistance is measured in ohms (Ω). Try to find the resistance of the original heating element. Check the equipment manual for a schematic. Check on the heating element for a label. If you can find an identical heating element, check the resistance with an ohmmeter.

When replacing a heating element, you do not need to use the exact same shape. You should be able to find different heating elements in hardware stores in large cities.

Before removing the old heating element, ensure that the electricity is disconnected. Remove the old heating element.

Install the new heating element. Follow manufacturer's instructions if instructions are provided. The heating element will usually be installed using screw terminals. Install *new* washers whenever a new heating element is attached. Heating elements do not solder well.

Verify that the heating element is installed correctly by turning on the machine. Look and feel for heat.

Exercise

Obtain a hot water pot, hot plate, or small appliance with a heating element. If you cannot see the heating element, open the casing until you can see the heating element. Turn on the heating element to verify that it is functioning. Allow the heating element to cool.

Remove the heating element. Use your continuity tester to verify conductivity. If your instructor has a multimeter, use the multimeter to check the resistance (in Ohms).

Return the heating element. Verify that the heating element still functions.

Your instructor must verify your work before you continue.

During your hospital visits, you may have the opportunity to see a heating element on a sterilizer or other piece of medical equipment. Your instructor may help you replace a faulty heating element.

Preventative Maintenance and Calibration

Heating elements should be checked regularly. Heating elements may burn out over time. Burnt out elements should be replaced.

Remind staff and users to keep equipment clean. Heating elements that are dirty are more likely to function inadequately. Burn out may occur more quickly when a heating element is dirty.