

“HOW TO”

DO A BOILING POINT FIELD CHECK ON TEMPERATURE SENSORS

WHAT IS A BOILING POINT?

A Boiling Point is the equilibrium temperature between a liquid and its vapour. It is commonly associated with water at 100°C, and 1 standard atmosphere. This is harder to do in the field as elevation and barometric pressure come into play. If you have a glass thermometer, you can get a better reading, unless you are below sea level all errors will be on the low side of 100°C. The nice thing about using water is it will not go over that temperature no matter what heat source you use.

HOW DO YOU DO A BOILING POINT FIELD CHECK?

Apparatus Required:

- DVM – 4 ½ digit or better
- Dewar Flask or insulated container with 6” minimum height (18” would be the best)
- Digital multimeter with an accuracy of +/- 0.01%
 - 10X Diameter of the probe must be in the water (ex: ¼” the absolute minimum depth 2.5”)
- Distilled water or Tap water
- Burner (heat source)

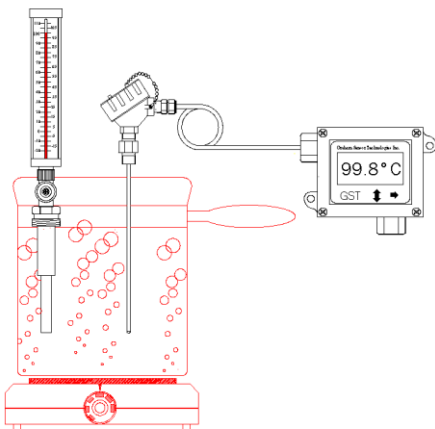
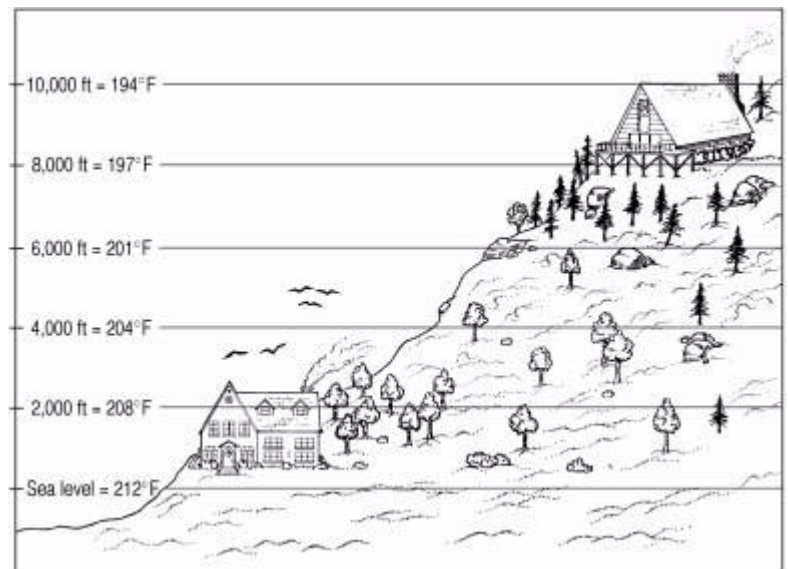
Procedure:

In a Dewar flask or suitable container place distilled water. The bath should have enough water to provide a good thermal contact with the RTD. Place the container on to a burner or heat source and stir every few minutes.

Measure the Boiling Point of Water resistance of the sensor.

At this point, you have left the sensor in the Dewar flask for a reasonable length of time and you have stirred the bath. You should be going for and make sure you are not touching the bottom of the container. A heat source suitable for the environment in which you will be doing the test. Remember that elevation and atmospheric condition will affect the true boiling point of water.

Altitude in Feet	Boiling Point
-511	213°F
-261	212.5°F
0	212°F
512	211°F
1025	210°F
1539	209°F
2063	208°F
2589	207°F
3115	206°F
3642	205°F
4169	204°F



HOW DO YOU MEASURE THE BOILING POINT RESISTANT OF THE SENSOR?

If measuring a 3 wire RTD, it must be done in two stages. There is no standard colour coding for RTD's, sometimes we use 2 whites and 1 red wire, and other times we use 2 reds and 1 white (this is done interchangeably). The 2 wires are always connected together at the RTD bulb so you can tell what lead wire resistance is and what the bulb's resistance is.

1. Set the DVM to the lowest resistance range.
2. Connect one red wire and one white wire to the meter and log the resistance value, depending how long the leads are the resistance value will be above 100Ω. **NOTE:** you can tell if the RTD has reached equilibrium by looking at the readings and noting if the value keeps rising.
3. Connect one white wire and the other white wire to the meter. Log this value. Depending on how long the sensor is and how long the wire is the value can be anywhere from 0.01Ω to 20 or 30Ω for really long runs of wire.
4. Subtract the second reading from the first will give you the RTD resistance value at the said temperature looking at the table below.

BELOW THE BOILING POINT OF WATER

Temp C	+0	+0.1	+0.2	+0.3	+0.4	+0.5	+0.6	+0.7	+0.8	+0.9
96	136.987	137.025	137.063	137.101	137.139	137.177	137.215	137.253	137.291	137.329
97	137.367	137.405	137.443	137.481	137.519	137.557	137.595	137.633	137.651	137.709
98	137.747	137.785	137.823	137.861	137.899	137.936	137.974	138.012	138.050	138.088
99	138.126	138.164	138.202	138.240	138.278	138.316	138.354	138.392	138.430	138.468
100	138.505	138.543	138.581	138.619	138.657	138.695	138.733	138.771	138.809	138.847

ABOVE THE BOILING POINT OF WATER

Temp C										
101	138.885	138.923	138.961	138.998	139.036	139.074	139.112	139.150	139.188	139.226
102	139.264	139.302	139.340	139.378	139.415	139.453	139.491	139.529	139.567	139.605