Initial Set-Up

Required Supplies

1. Thermocouple with male connector
2. Data acquisition system including a TC module (Any Yokagowa main and sub unit)
3. Heat source (open flame, lighter, heat gun, etc)
4. If necessary, thermocouple extension wire with connectors

Start Up Procedures

Prior to the start of the first test in the series

1. The data acquisition unit shall be checked to confirm calibration.
2. Plug thermocouple into a TC module of data acquisition system.
    a. If TC extension wire is used, minimize the temperature gradient between the ends of the extension wire and any additional junctions.
3. Verify ambient temperature reading of thermocouple
4. Apply a heat source such as an open flame or heat gun to thermocouple junction and verify temperature rise.

Prior to each test in the series

1. Verify ambient temperature reading of thermocouple

Experiment Procedures

1. Record the thermocouple reading for the duration of the experiment.
    a. Exception- When the thermocouple must be removed prior to the end of the experiment due to experiment design or damage. The elapsed time at which the thermocouple was removed and the reason for removal shall be recorded.

Shut Down Procedures

1. After the experiment, the thermocouples in locations where they could have been damaged shall be examined for visible damage. Perform functional verification if necessary.
    a. If damage has occurred, the instrument shall be taken out of service at the time of the damage. The laboratory engineer shall review the data to determine if there is a noticeable event that marked the damage to the instrument. If not, the thermocouple shall be taken out of service for the entire test. After the thermocouple has been taken out of service, the calculations shall be redone.

Maintenance Procedures

1. Generally, there is no maintenance performed on a thermocouple. If a thermocouple becomes damaged or inoperable a replacement thermocouple is manufactured.

Calibration Procedures

Due to the disposable nature of thermocouples, they undergo a functional verification procedure, rather than a calibration. The process for functional verification of a thermocouple is noted below:

1. Verify ambient temperature reading of thermocouple
2. Apply a heat source such as an open flame or heat gun to thermocouple junction and verify temperature rise.

Best Practices

1. Make thermocouples no longer than 75 ft.
    a. Limit the length of thermocouple wire and extension wire to 100 ohms of resistance as recommended by Omega Engineering Inc.
    b. The resistance of 24 AWG thermocouple wire is approximately 0.75 Ohms/ft and 24 AWG extension wire at approximately 0.625 Ohms/ft.
    c. When using thermocouples longer than 75 ft., measure the resistance.
2. Be aware of radiative sources that could influence the accuracy oftemperature reading. Shield thermocouples when practical or critical to the test results.
3. Use small gauge wire and relatively long insertion lengths to minimize conduction error. Considering a 24 AWG wire with a diameter of 0.5 mm, the corresponding minimum insertion length is 2.5 cm.
4. Minimize the temperature gradient across any junctions
    a. Typically, run thermocouple wire outside of compartments before transitioning to extension wire.