
**EMISSION MEASUREMENT CENTER
GUIDELINE DOCUMENT**

**TEMPERATURE MEASUREMENTS AND CALIBRATION OF
TYPE K THERMOCOUPLES IN HIGH TEMPERATURE STACKS**

INTRODUCTION

A common type of thermocouple material is the K-type. There are some limitations for the application of any thermocouple type but the discussion here will be limited to the application of the K-type. The manufacturer's specifications are a starting point for assurance of accuracy for temperature measurement with the thermocouple. The manufacturer usually specifies the accuracy, and temperature range for the give application.

DISCUSSION

Once the thermocouple has been placed in a stack (with the assumption that it is placed in a protective sheath and loosely insulated for protection from the harsh stack gases) the manufacturer's calibration data has been altered. Manufacturer's specifications are from data obtained under ideal laboratory conditions. It would be impractical to remove the thermocouple from the stack routinely to calibrate it against a reference thermocouple in the laboratory for QA purposes because of the obvious environmental differences. One important difference is the temperature profile of the thermocouple in the stack than in the lab. One possible alternative way of calibrating the thermocouple would be to compare results of a reference thermometer or other temperature measurement device placed in the stack near the thermocouple. Another alternative would be to slide either an R or S type thermocouple that have been calibrated in a thermology lab into the protective sheath, along side the one in question, for making reference comparisons for accuracy.

Drift under ideal conditions for a typical type K thermocouple is around .25 to .5 percent for every 1000 operating hours. Therefore, to ensure that the usual manufacturers "out of the box" initial accuracy (0.75 percent) plus about 1.25 percent drift (Total CD = 2.0 percent) is not exceeded, the thermocouple calibration should be verified every 3 months or replaced.

Type K thermocouples, even with large wire gauge sizes, will eventually fail if subjected to sustained temperatures above 2000 degrees Fahrenheit. Even short excursions will shorten the useful life of the thermocouple. Other types of thermocouples should be considered for sustained temperatures above 2000 degrees Fahrenheit.

The National Institute of Standards and Technology (NIST) was the reference for this information and the expert contact at NIST is Mr. George Burns, Electrical Engineer for the Thermocouple Group. His number is (301)975-4817.

