

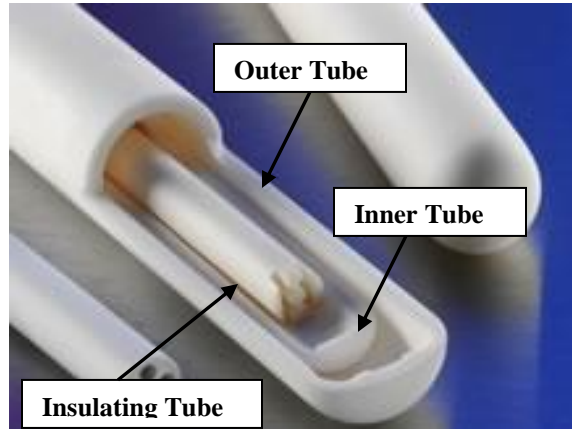
► High Performance Protection Tubes for Thermocouple

Tempsens white paper

► Tempsens Instruments Pvt. Ltd.

In the furnace where the temperature is more than 1000° C, high alumina tubes are used as protection tubes for a thermocouple. With the vision of continues development by adopting the latest technique, Tempsens introduce use of HWT specially designed tubes with heavy wall thickness for some critical areas like furnace crown and bottom of a glass furnace.

HWT (Heavy Wall Thickness) Protection Tubes



Typical arrangement of tubes for a thermocouple

In furnace Crown the thermocouple may come in direct contact with the flames, the temperature also may exceed 1300-1400 Deg C, so it is very difficult for thermocouple to withstand for long service period. The outer protection here becomes very important as it is responsible for the life of the thermocouple, high alumina tubes having 99.7 % alumina are widely used for this application. However, double protection tubes may be used to increase the life of the thermocouple but sometimes the thickness of the outer tube is not enough and it leads to the damage of the thermocouple in very short service time. The Heavy wall thickness tubes (HWT) are introduced as an outer protection which may increase the service life of the thermocouple by 25-30%.

We can take an example of a thermocouple with a double protection tube to understand the above point

With Normal Tube

Outer Tube Dimension

OD = 24mm, ID = 18mm, Wall thickness = 3mm

Inner Tube Dimension

OD = 15 mm, ID = 10 mm, Wall thickness = 2.5mm

Total wall thickness for thermocouple using above tubes is calculated as $3+2.5 = \underline{\underline{5.5\text{mm}}}$

Now, we will consider HWT tubes as outer Protection,

Outer Tube Dimension (HWT)

OD = 24mm, ID = 12mm, Wall thickness = 6mm

Inner Tube Dimension

OD = 10mm, ID = 6mm, Wall Thickness = 2mm

Total Wall thickness for thermocouple using above tubes is calculated as $6 + 2 = \underline{\underline{8\text{mm}}}$.

Here we can observe the increase in wall thickness by 2.5 mm i.e. 45% of overall thickness. There is no major difference in price, but one can observe the enhanced service life of a thermocouple.