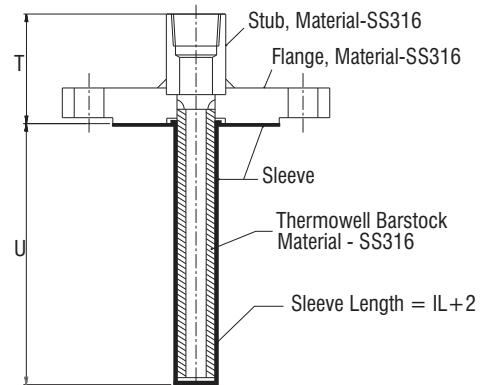


Sleeved (Lined) Thermowell

One of the most economical solutions to protect the thermowells from chemically aggressive fluids is to provide a bar-stock flanged thermowell made out of conventional stainless steel (SS316) with loose lining in the form of a sleeve on the entire wetted portion. This will provide strength from stainless steel & corrosion resistance from the lining.

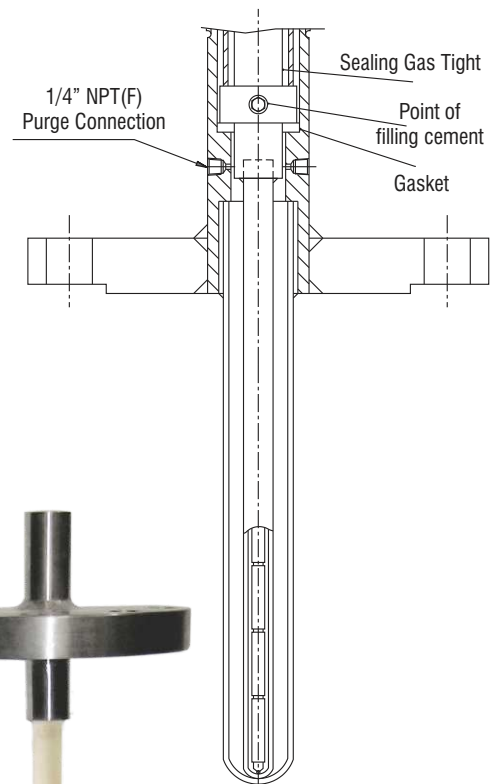


Thermowells for use in high temperature applications

For high temperature applications, generally, Ceramic protecting tubes are used in different industries such as Iron & Steel, glass, cement etc. It has high resistance to thermal shocks. It is inert to most chemicals and has a high dielectric strength. These are primarily used to protect noble metal thermocouples (like R, S & B type) They are available in variety of sizes. Normally it is cemented (by high temperature withstanding cement) to metal tubes (which are termed as holding tubes). The process connection slides or is welded to this metallic portion of the tube. For double protection, inner ceramic tube is also used. Mainly two grades of ceramic are used. Ceramic 610 (also termed as Mullite) & Ceramic 710 (recrystallised Alumina-99.5% purity) can withstand up to 1500°C & 1800°C respectively. It should be remembered that it has poor mechanical shock resistance. It is impervious to gases at high temperatures.

Silicon Carbide protecting tubes are also used generally as a secondary protection for applications such as Kilns, Furnaces, Stove Dome etc. Recrystallised silicon carbide has a very high abrasion resistance. Also used for flue gas application or incinerators in waste management system. It can withstand 1600°C & direct flame impingement. It is extremely hard & chemically inert. It resists most of the acids, molten salts. Generally used in conjunction with ceramic tube.

Cermet (LT-1) which is metal ceramic composite (combination of chromium & aluminium oxide) is stable in oxidising atmospheres upto 1300°C. Cermet tubes are stronger & more resistant to thermal & mechanical shocks than ceramic protecting tubes. Main area of usage is in molten copper, open hearth furnace, blast furnace. Ceramic primary tube is recommended when Cermet is used.



Special Thermowells

One of the most difficult problems in temperature measurement of process parameters has been the rapid wearing out of Thermowells made out of conventional stainless steel. Various factors could cause the failure of the thermowells, the most difficult, have been the erosion due to severe particle impingement. The corrosion due to chemically aggressive fluids; the combination of high temperature, high velocity fluids & the thermal shock faced by the sensor protective sheaths in the glass & metallurgical industries.

With an experience of over three decades, *General* is in a position to offer some solutions to most of these problems. Some of the standard designs are described and illustrated in this literature.

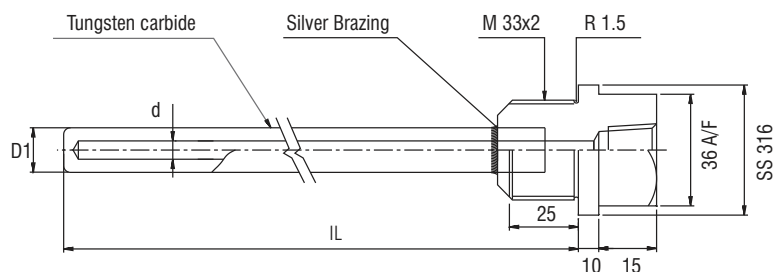


Solid Sintered Tungsten Carbide Thermowell

These thermowells are ideally suited for use in very abrasive environment such as in air preheaters & coal mills of coal based power plants (mill classifier or pulveriser outlet) or steam generation units, for temperature measurement of coal and air mixture.

Typical Specifications

- Type** : Built-up threaded
- Material** : Solid Sintered Tungsten Carbide brazed to 316 SS threaded bushing.
- Process connection** : M33 x 2 or as required
- Bore** : 7 mm, 10.5 mm
- Outer diameter** : 16 mm, 20 mm as standard or else to be specified
- Immersion length** : IL - 160, 200, 250, 320, 400
- Extension length** : EL - 100, 160 in the form of ½" schedule 80 nipple generally
- Note** : When the length are longer, it is recommended to use tungsten carbide only for the tail portion of say 200 to 250 mm.



Sensor & Bulb dia (mm)	d	D1	IL
MI TC 6 mm dia	6.5	16	160, 200, 250, 320, 350
MI RTD 6 mm dia	6.5	16	160, 200, 250, 320, 350
Temp Gauge or Switch 10 mm dia	10.5	20	160, 200, 250, 320, 350