

# CERAMIC PROTECTION TUBES

Alumina, Mullite and Hexoloy protection tubes are used at high temperatures that have a small slope of temperature change. Any thermocouple type can be used in these ceramic tubes; however, platinum-rhodium and chromel-alumel are used most often due to their high operating temperature range. "Alumina" is an alumina oxide ceramic (99.7% Al<sub>2</sub>O<sub>3</sub>). "Mullite" is a compound of alumina and silica. "Hexoloy" is a sintered alpha silicon carbide. Alumina tubes can be used at 3400°F (1870°C), Mullite tubes can be used at 3100°F (1700°C) and Hexoloy will not slump at 3000°F (1648°C) even under load. These tubes are somewhat gas tight, sensitive to thermal shock, and can crack if one end of the tube is heated at a different rate than the other. If the tubes are exposed to a significant sharp decline or rise in temperature, they may crack. Hexoloy has excellent thermal shock resistance, universal corrosion resistance and exceptional wear with high strength and extreme hardness for severe environment applications.

Platinum-Rhodium thermocouples should always be protected in a ceramic protection tube. Alumina should be used rather than mullite for all atmospheres except oxidizing, where mullite can be used. The silicon from the mullite can contaminate the platinum-rhodium thermocouple.

We recommend that the user preheat the entire tube to ≈ 900°F before installing it into a hot process environment.

#1	DESCRIPTION			
5D	Ceramic Protection Tubes - Add "W" here for a cap and chain to fit over open end. (i.e. 5DW)			
#2	MATERIAL			
A	Alumina	WG	Mullite/Alumina w/cap and chain	
M	Mullite	X	Other, specify	
H	Hexoloy SE Sic			
G	Alumina/Mullite 60/40			
WA	Alumina w/cap and chain			
WM	Mullite w/cap and chain			
WH	Hexoloy w/cap and chain			
#3	ATTACHING DEVICE			
O	No mounting fitting			
P	Open both ends, no mounting fitting			
C*	Collar (See chart below for dimensions)			
B	Mounting bushing (Standard)			
S	Carbon steel mounting sleeve - (4" standard)			
X	Other, specify			
#4	TUBE SIZE I.D. x O.D. / COLLAR OD FOR APPROPRIATE TUBE SIZE			
14	1/4" x 3/8"	5/8"	<p><b>Note:</b> Do not use spring-loaded sensors in ceramic protection tubes.</p> <p><b>ATTACHING DEVICE STYLE "S"</b></p> <p><b>ATTACHING DEVICE STYLE "B"</b></p>	
38	3/8" x 1/2"	3/4"		
76	7/16" x 11/16"	1"		
12	1/2" x 3/4" (Standard)	1-1/8"		
34	3/4" x 1"	1-3/8"		
10	1" x 1-1/4"	1-3/4"		
X	Other, specify			
#5	LENGTH (L)			
A	6"			
B	12" (Standard)			
C	18" (Standard)			
D	24" (Standard)			
E	30"			
F	36"			
X	Other, specify			
#6	TAGGING OPTIONS			
1	Tag # stamped (Standard) (on attaching device or permanently written on well)			
X	Other			
M	MTR			

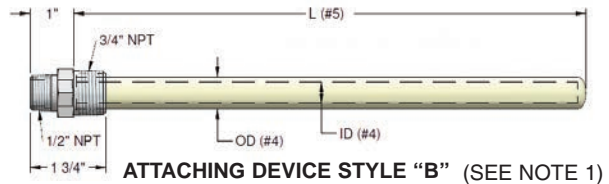
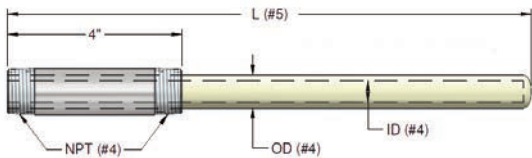
**NOTE 1:**

Standard hex bushings are 1/2" NPT head connection, and 3/4" NPT process connection.

Hex bushings are not standard for 3/4" x 1" or 1" x 1-1/4" ceramic tubes.

For tubes smaller than 11/16" OD, the "L" length will equal the total length including the entire hex bushing.

**ATTACHING DEVICE STYLE "S"**



CS sleeve for tube NPT will equal tube OD (Ex. 1" OD will use 1" NPT threads). It can be used to attach adjustable flanges and bushings. Use "X" in symbol number 3 and describe.

