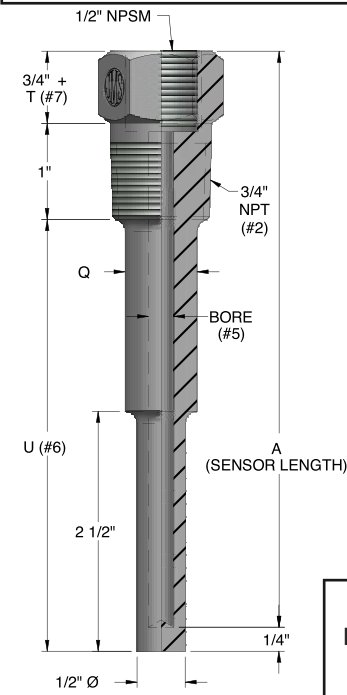


# THREADED, WELD-IN, & SOCKET WELD THERMOWELLS

#1	DESCRIPTION [See pages 20-24 for complete information on dimensions, velocity ratings, and pressure ratings]			
5	Thermowells - Add "W" here for a plug with a chain attached to well. (i.e. 5W)			
#2	THREADED WELLS / EXTERNAL THREAD	SOCKET WELL WELDOLET SIZE		WELD IN WELL SIZE
1	1/2" NPT	N/A		N/A
2	3/4" NPT (Standard)	3/4"	1.050"Ø (Standard)	.75"Ø
3	1" NPT	1"	1.315"Ø	1.0"Ø
4	1 1/2" NPT	1 1/2"	1.900"Ø	1.5"Ø (Standard)
X	Other, specify			
#3	SHANK STYLE [15]			
A	Step shank (Standard)			
S	Straight shank			
T	Tapered shank			
B	Built up (Recommended for over 22 1/2", see drawing on 5-2)			
X	Other, specify			
#4	THREADED OR SOCKET WELD WELLS			
T	Threaded well design			
S	Socket weld well design			
W	Weld-in (Tapered shank standard)			
X	Other, specify			
#5	BORE SIZE			
2	.260" ID used for .250" OD sensors (Standard)			
3	.385" ID used for .375" OD sensors (straight or tapered only)			
X	Other, specify			



**Looking for Sanitary Thermowells?**  
 3-A certified sanitary thermowells [4-4] and 3-A certified sanitary weld-in thermowells [4-5] can be found in section 4 of this catalog.



[ ] BRACKETS INDICATE PAGE NUMBERS IN TECHNICAL CATALOG AVAILABLE ONLINE AT [WWW.JMS-SE.COM/PDF/JMS\\_TECHNICAL\\_CATALOG.PDF](http://WWW.JMS-SE.COM/PDF/JMS_TECHNICAL_CATALOG.PDF)

#6	U (INSERTION) DEPTH [15]	STANDARD "T" DIMENSION	SENSOR LENGTH	
			NO LAG	WITH LAG
B	2 1/2" * <b>Note: JMS recommends the use of the "Built Up" design if longer than 22 1/2" See page 5-2 for drawing.</b>	2	4	6
C	4 1/2"	3	6	9
D	6"	3	7 1/2	10 1/2
E	7 1/2"	3	9 1/2	
F	10 1/2"	3	12	15
G	13 1/2"	3	15	18
H	16 1/2"	3	18	21
I*	22 1/2"	3	24	27
X	Other, specify			

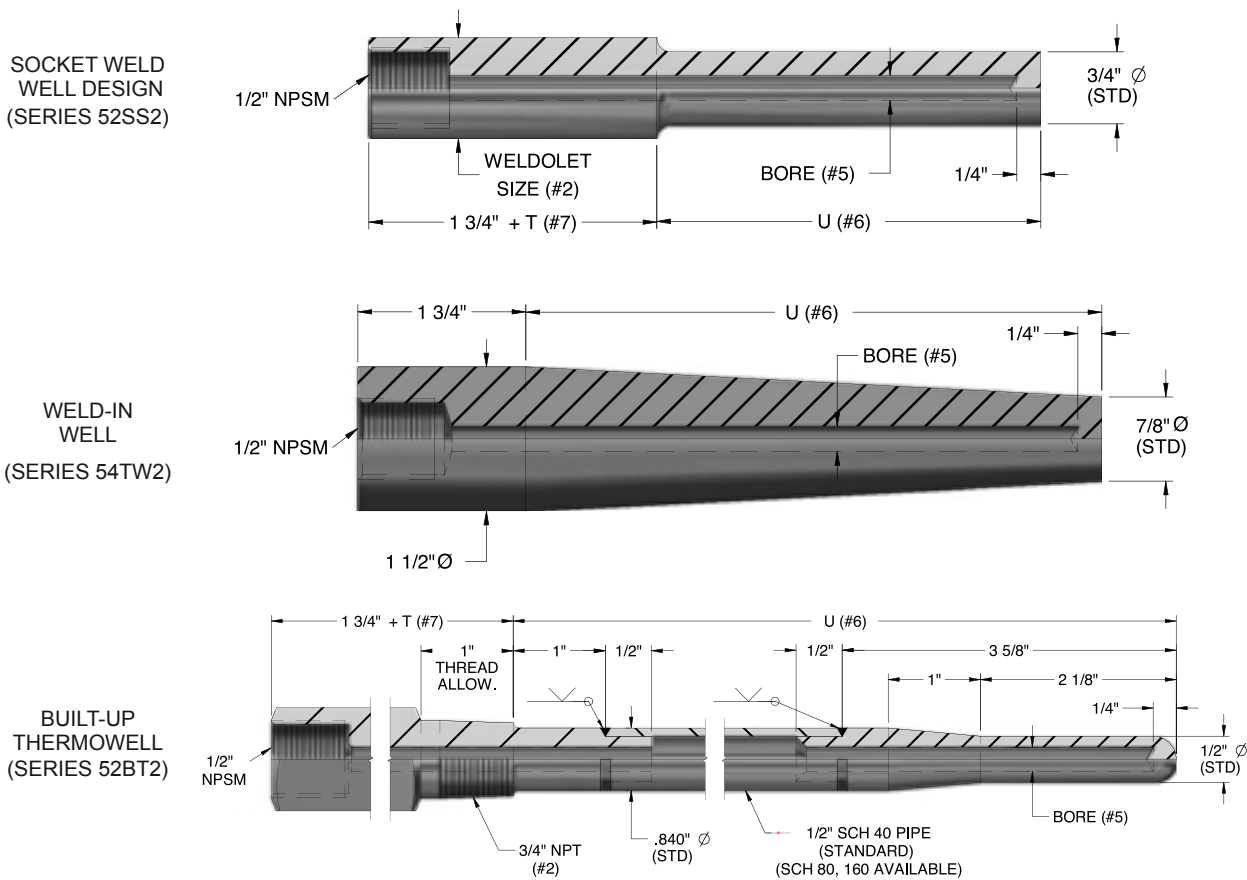
#7	T (LAG) EXTENSION [15]
T	Standard lag (For length see Table in Symbol #6)
Z	N/A (No lag)
X	Other, specify

#8	WELL MATERIAL [31-34]
E	F22
F	F11
G	Carbon steel
H	304 Stainless steel
I	Low Carbon 304 Stainless steel
J	310 Stainless steel
K	316 Stainless steel (Standard)
L	Low Carbon 316 Stainless steel
M	Inconel 600
N	Monel 400
Q	Hastelloy C-276
S	Titanium
X	Other, specify (i.e.: Teflon, PVC, Nickel, etc.)

#9	TAGGING OPTIONS
1	Stamped on well (Standard)
X	Other
Z	N/A <b>Note: You must always specify information required on tag.</b>

5	2	A	T	2	E	T	H	1
---	---	---	---	---	---	---	---	---

# THREADED, SOCKET & WELD-IN THERMOWELLS



# LIMITED SPACE THERMOWELLS

#1	DESCRIPTION										
5L	Limited Space Thermowells - Add "W" here for a plug with a chain attached to well. (i.e. 5L W)										
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;">#2</th> <th>WELL MATERIAL</th> </tr> </thead> <tbody> <tr> <td>H</td> <td>304 Stainless steel</td> </tr> <tr> <td>K</td> <td>316 Stainless steel</td> </tr> <tr> <td>M</td> <td>Inconel 600</td> </tr> <tr> <td>X</td> <td>Other, specify</td> </tr> </tbody> </table>	#2	WELL MATERIAL	H	304 Stainless steel	K	316 Stainless steel	M	Inconel 600	X	Other, specify
#2	WELL MATERIAL										
H	304 Stainless steel										
K	316 Stainless steel										
M	Inconel 600										
X	Other, specify										
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;">#3</th> <th>TAGGING OPTIONS</th> </tr> </thead> <tbody> <tr> <td>1</td> <td rowspan="3">                     Stamped on well (<b>Standard</b>)                      Other                      N/A <b>Note: You must always specify information required on tag</b> </td> </tr> <tr> <td>X</td> </tr> <tr> <td>Z</td> </tr> </tbody> </table>	#3	TAGGING OPTIONS	1	Stamped on well ( <b>Standard</b> ) Other N/A <b>Note: You must always specify information required on tag</b>	X	Z				
#3	TAGGING OPTIONS										
1	Stamped on well ( <b>Standard</b> ) Other N/A <b>Note: You must always specify information required on tag</b>										
X											
Z											
	<p><b>Note: Immersion length of a spring-loaded sensor to fit this well is 2 1/2".</b></p> <p style="text-align: right;"><b>LIMITED SPACE THERMOWELL</b></p>										
5L	M	1									

# FLANGED THERMOWELLS

#1	DESCRIPTION [See pages 25-27 for complete information on dimensions, velocity ratings, and pressure ratings]										
5T	Thermowells - Add "W" here for a plug with a chain attached to well. (i.e. 5TW)										
#2	CONFIGURATION										
A S T	Step shank ( <b>Standard</b> ) Straight shank Tapered shank			B X	Built-up Thermowell (Dwg. 5-2) Other, specify			Note: Over 22" use "Built Up" design. See page 5-2 for drawing.			
#3	BORE SIZE										
2 3 X	.260" ID used for .250" OD sensors ( <b>Standard</b> ) .385" ID used for .375" OD sensors (straight or tapered only) Other, specify										
#4	U (INSERTION) DEPTH [15]			"U" DIMENSION		SENSOR LENGTH					
A B C D E F G* X	2" 4" 7" 10" 13" 16" 22" Other, specify			2" 4" 7" 10" 13" 16" 22"		4" 6" 9" 12" 15" 18" 24"					
#5	T (LAG) EXTENSION [15]										
T= ___" Z	Length in inches N/A ( <b>Standard</b> )										
#6	WELL MATERIAL [31-34]										
G H I J K L M N	Carbon steel 304 Stainless steel Low Carbon 304 Stainless steel 310 Stainless steel 316 Stainless steel Low Carbon 316 Stainless steel Inconel 600 Monel 400			O Q R S X	Hastelloy B-3 Hastelloy C-276 Tantalum Titanium Other, specify			Note: Special jackets & coatings are avail. for thermowells. Call JMS for more info. See web.			
#7	SIZE OF FLANGE										
3 4	1" 1 1/2"			5 X	2" Other, specify						
#8	*FLANGE RATING										
A* B* C* D*	150 300 400 600			*lbs. rating per ASME B-16.5			E* F* X	900 1500 Other, specify			
#9	FACING (for opt. 3 a description must be provided)										
1 2 3	Raised ( <b>Standard</b> ) Flat 3 Ring Joint Type			4 5 X	Van Stone no flange Van Stone w/flange Other, specify						
#10	FLANGE MATERIAL [31-34]										
G H I J K L M	Carbon steel 304 SS Low Carbon 304 SS 310 SS 316 SS Low Carbon 316 SS Inconel 600			N* O* Q* R* S* X	Monel 400 Hastelloy B-3 Hastelloy C-276 Tantalum Titanium Other, specify			* Economical alternative avail. See web.			
#11	TAGGING OPTIONS										
1 X Z	STAMPING	Stamped on well ( <b>Standard</b> ) Other N/A								Note: You must always specify information required on tag	

**Series 5TS**

SPECIFY FLANGE SIZE, RATING, & MATERIAL (#7 - #10)

**VAN STONE SERIES 5TS**

SPECIFY OPTIONAL VAN STONE BACKING FLANGE SIZE, RATING, & MATERIAL (#7 - #10) IF NEEDED (OPTIONAL BACKING FLANGE IS NOT ATTACHED TO TW)

Van Stone Dimensions Chart			
	P (stem diameter)	R (sealing face diameter)	Flange Bore
1"	1.315"	2"	1.375"
1 1/2"	1.900"	2.875"	1.970"
2"	2.375"	3.625"	2.46"

5T	A	2	C	Z	H	4	A	1	H	1
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# METAL PROTECTION TUBES

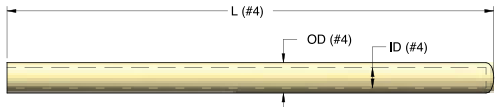
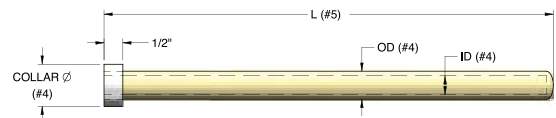
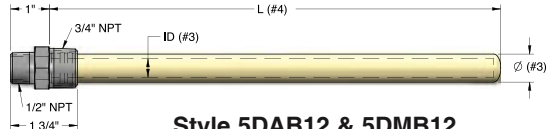
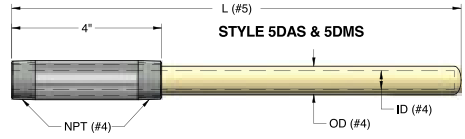
#1	DESCRIPTION						
5P	Metal protection tube - Add "W" here for a cap and chain to fit over open end. (i.e. 5PW)						
#2	RESPONSE TYPE						
1	Fast response tip						
2	Standard response tip						
#3	ATTACHING DEVICES						
B	Carbon steel bushing						
K	Stainless steel bushing						
J	Cast iron floor flange						
Z	N/A						
X	Other, specify (i.e.: 3" 150 lb raised face.)						
#4	**NOMINAL SIZE	I.D.	O.D.	N.P.T. [30]	STANDARD BUSHING PROCESS CONNECTION	STANDARD FLOOR FLANGE SIZE	
18	1/8"	.269	.405	1/8"	1/4" NPT	3"	
14	1/4"	.364	.540	1/4"	1/2" NPT	3"	
12	<b>Standard</b> 1/2"	.622	.840	1/2"	3/4" NPT	3"	
34	3/4"	.824	1.050	3/4"	1" NPT	4"	
10	1"	1.049	1.315	1"	1 1/4" NPT	4"	
X	Other, specify						
<b>**Refers to schedule 40 pipe. For other pipe schedules, use "X" in the above symbol and specify the pipe schedule in description. Ex. 5P1BX1210G X=1/2" Schedule 80 pipe.</b>							
#5	OVERALL LENGTH (P)						
A	12"		E		36"		
B	18"		F		48"		
C	24"		G		60"		
D	30"		X		Other, specify		
<b>Note: Bends and elbows are available. Call your salesperson for drawing(s).</b>							
#6	FIXED OR ADJUSTABLE MOUNTING METHOD						
—	Insert "U" dimension. (Only if using a permanently fixed attaching device. See drawing below)						
Z	N/A (Bushing if specified will be adjustable)						
#7	PROTECTION TUBE MATERIAL [31-34]						
G	Carbon steel				M	Inconel 600	
H	304 Stainless steel				T	446 Stainless steel	
J	310 Stainless steel				X	Other, specify	
K	316 Stainless steel - ( <b>Standard</b> )						
#8	TAGGING OPTIONS						
1	Stamped on well ( <b>Standard</b> )						
X	Other						
Z	N/A						
<b>Note: You must always specify information required on tag</b>							
<b>Style 5P2Z</b>							
<b>Style 5P1</b>							
<b>Style 5P2</b>							
5P	2	B	12	A	9"	K	1

# CERAMIC PROTECTION TUBES

Alumina and mullite 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>) and "mullite" is a compound of alumina and silica. Alumina tubes can be used at 3400°F (1870°C) and mullite tubes can be used at 3100°F (1700°C). They 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 tube is exposed to a significant sharp decline or rise in temperature, the tube may crack.

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
	M	Mullite
	H	Hexoloy SE Sic
	G	Alumina/Mullite 80/20
	WA	Alumina w/cap and chain
	WM	Mullite w/cap and chain
	WH	Hexoloy w/cap and chain
		WG Mullite/Alumina w/cap and chain
		X Other, specify
		<b>Style 5DAO &amp; 5DMO</b>
		
	#3	ATTACHING DEVICE
	O	No mounting fitting
	P	Open both ends, no mounting fitting
	C*	Collar (See chart below for collar dimensions)
	B	Mounting bushing (Standard)
	S	Carbon steel mounting sleeve - (4" standard)
	X	Other, specify
		<b>Style 5DAC &amp; 5DMC</b>
		
	#4	TUBE SIZE I.D. x O.D. COLLAR OD FOR APPROPRIATE TUBE SIZE
	14	1/4" x 3/8" 5/8"
	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" (Standard)
	B	12" (Standard)
	C	18" (Standard)
	D	24" (Standard)
	E	30"
	F	36"
	X	Other, specify
		<b>Style 5DAB12 &amp; 5DMB12</b>
		
		(SEE NOTE)
	#6	TAGGING OPTIONS
	1	Stamped on well (Standard)
	X	Other
	Z	N/A <b>Note: You must always specify information required on tag.</b>
		<b>Style 5DAS &amp; 5DMS</b>
		

**NOTE:**

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.

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.

5D A B 12 B 1

# BONDED SILICON CARBIDE PROTECTION TUBES

Silicon carbide protection tubes provide excellent thermal conductivity for quick response to temperature changes. They can be used to replace cast iron tubes, eliminating the possibility of iron pick-up. Spread surface treatment assures adequate protection of the thermocouple.

JMS Southeast offers two types of silicon carbide protection tubes. Type A and B are dense silica bonded silicon carbide and are manufactured with a flange or a plain end as the following drawings indicate.

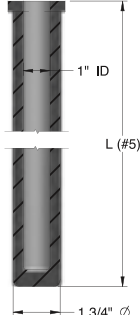
Type C and D are carbon bonded silicon carbide and graphite. They are manufactured with a black steel pipe located down the center. They have a 1/2" or 3/4" NPT connection to thread into place instead of a flange for mounting as Type A.

#1	DESCRIPTION			
5B	Protection Tube - Add "W" here for a cap and chain to fit over open end. (i.e. 5BW)			
	#2	MATERIAL		
	SC	Silicon carbide		
	#3	MOUNTING		
	F	Flange silicon carbide tube (1" I.D. x 1 3/4" O.D.)		
	P	Plain end silicon carbide tube (1" I.D. x 1 3/4" O.D.)		
	C	1/2" NPT threaded silicon carbide tube with reinforced pipe		
	D	3/4" NPT threaded silicon carbide tube with reinforced pipe		
	#4	SIZE		
	2	1/2" I.D. x 2" O.D.		
	3	3/4" I.D x 2" O.D. (for symbols		
	4	1" I.D. x 1 3/4" O.D. ← F & P)		
	#5	LENGTH (L)		
	A	18"		
	B	24"		
	X	Other, specify		

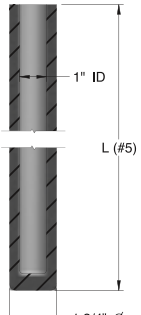
  

5B	SC	F	4	18"
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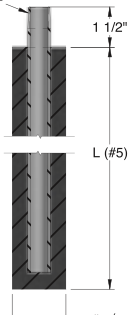
  



**TYPE F**



**TYPE P**



**TYPE C/D**

# SILICON NITRIDE PROTECTION TUBES

#1	DESCRIPTION			
5E	Silicon Nitride Protection Tube (Sialon)			
	#2	TUBE SIZES	BUSHING	THREAD SIZE
	1	28mm OD x 16mm ID (1.1" OD x .630" ID)	1 1/4"	1 1/4"
	2	22mm OD x 12mm ID (.866" OD x .472" ID)	1"	1"
	3	16mm OD x 9mm ID (.630" OD x .354" ID)	3/4"	3/4"
	4	12.5mm OD x 6.5mm ID (.492" OD x .256" ID)	1/2"	1/2"
	X	Other, specify		
	#3	TOTAL TUBE LENGTH		
	A	5.91" (150mm)	D	17.72" (450mm)
	B	11.81" (300mm)	E	23.62" (600mm)
	C	15.75" (400mm)	X	Other, specify
	#4	TUBE STYLE		
	B	Mounting bushing		
	S	Carbon steel mounting sleeve - (4" long sleeve is standard)		
	X	Other, specify		
	Z	No fitting		

5E	1	A	S
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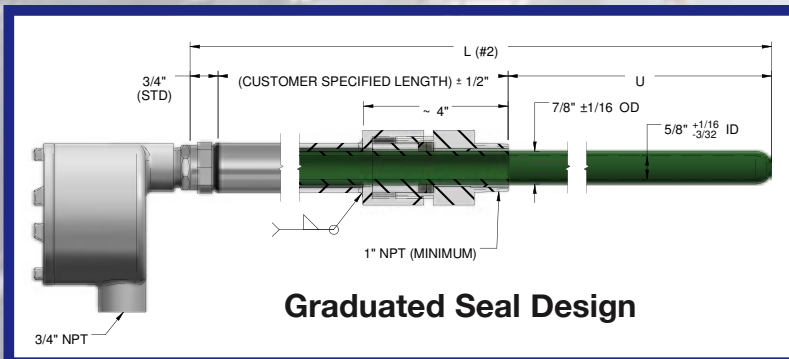
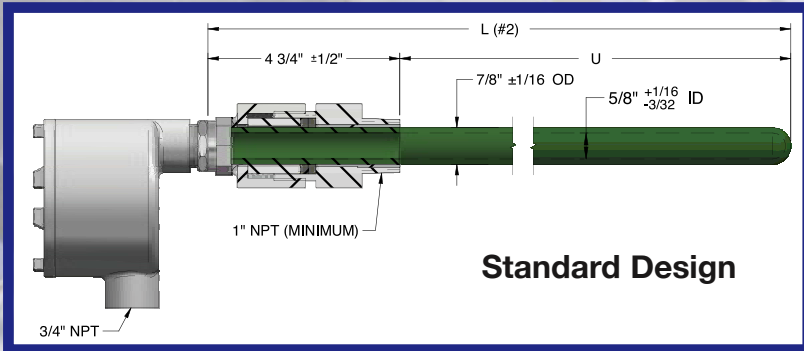
  

This material is the perfect choice for Aluminum melting processes!

# SULFUR PROTECTION TUBE



## DESIGN ASPECTS



- ❖ Excellent corrosion resistance capable of resisting even the punishing temperatures and corrosion of a sulfur burner.
- ❖ Graduated seals in fitting designed to provide consistent monitoring and to prevent leakage of sulfur burner contents.
- ❖ Maximize lifespan of wells and sensors.

- ❖ Tightly bonded layer of chromium oxide which, together with the naturally inert nature of alumina, provides protection tubing with a remarkable resistance to oxidizing and corrosive atmospheres over 2200°F.
- ❖ High thermal conductivity and sensitivity to temperature changes makes it an excellent choice for thermocouples used to monitor or control in high temperature environments.
- ❖ Great strength at temperatures where many high temperature metals melt. Above 2800°F it begins to soften and becomes plastic.
- ❖ Less porous than most compacts. No significant passage of gas through the body at high temperatures, except under high vacuum. Sufficiently impermeable for most industrial applications.
- ❖ Superior to “straight” ceramics in resisting thermal shock, mechanical shock and impact.
- ❖ Sturdy UL, FM and CSA approved explosion proof head.
- ❖ Not recommended in boiling sulfuric acid -- 10%. For more information regarding its suitability to your application, **Call JMS Today!!!**

# SULFUR PROTECTION TUBE



## PROCESS BENEFITS

- ❖ JMS provides experienced engineering capable of designing to suit your specification needs.
- ❖ Increased life span of JMS Super Sulfur Tube increases the lifespan of your sensors
- ❖ Increases reliable temperature measurement in sulfur burners on an ongoing basis.
- ❖ Reduces risk of sulfuric acid leaking into uncontained areas.
- ❖ Reduces shut downs due to sensor replacement.
- ❖ Avoids the high cost of repetitive replacements.

## APPLICATIONS

Sulfuric Acid Plants

Corrosive SO<sub>2</sub> and SO<sub>3</sub> gas to 2500° F at tip

Corrosive SO<sub>3</sub> and HF gas to 2000° F

Boiling sulfuric acid – 97%

Many additional applications.

*Call JMS today for prompt and friendly assistance with your specification needs.*



# MCPT - METAL CERAMIC PROTECTION TUBES

The MCPT consists of a hard abrasion-resistant chromium and alumina oxide material. It has good strength at temperatures where many high-temperature metals melt. It is more susceptible to thermal shock than a metal protection tube, however, more resistant to shock than a ceramic protection tube.

The MCPT exhibits good wear resistance and abrasion resistance. It has a hardness of Rockwell C37, which indicates the crushing strength of the material rather than the true hardness of the entire body.

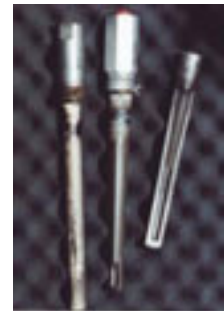
JMS Southeast, Inc. offers the special optional fitting pictured below for mounting the metal ceramic protection tube in high temperature sealed environments. The minimum "U" length available is 2.35".

#1	DESCRIPTION	
5G	Metal Ceramic Protection Tube 5/8" ID x 7/8" OD, 3/4" NPT Conduit Connector	
	#2	FITTING SELECTION (See 5-7 through 5-8 for details)
	Z J G X	No fitting Standard Design fitting Graduated seal design fitting Other, specify
	#3	LENGTH
	1 2 3 4 5 6 X	9" 12" 18" (Standard) 30" (Standard) 36" 48" (Standard) Other, specify
5G	J	3

# COAL PULVERIZING THERMOWELL

This well is ideal for coal pulverizers, fluidized beds and any place where contact instrumentation might be subjected to small particle erosion (SPE). JMS found that in many SPE applications its customers were using OEM supplied hard faced thermowells with a variety of coatings. These thermowells were expensive to replace and could not withstand the harsh erosive environment of pulverized coal. The wear to these OEM supplied wells resulted in loss of reliability, change in response time and significant energy costs.

In response to these concerns, JMS developed a pressure sealed dependable alternative and has had some wells in place for more than 6 years without appreciable wear. A side by side comparison of durability is pictured on the right.



#1	DESCRIPTION		
5V	Coal Pulverizing Thermowell		
	#2	Immersion Length (U)	
	—"	Immersion Length	
	#3	Process Connection	
	A B C X	3/4" Process Connection 1" Process Connection 1 1/4" Process Connection (Standard) Other, specify	
	#4	Lag Length (T)	
	Z —"	No Lag Specify Lag (length in inches)	
5V	3	A	Z