



Thermowells are recommended for temperature instruments in process systems where pressure, velocity, or viscous, abrasive, and corrosive materials are present individually or in combination. A properly selected thermowell will protect the temperature instrument from damage resulting from these process variables. Additionally, a thermowell enables removal of the temperature instrument for replacement, repair, or testing without affecting the process system.

Texas Thermowell Industries (TTI) specializes in the design and manufacture of all types of thermowells. The 2100 Series thermowell designs shown in this guide are styles that are popular throughout industry. Special designs, as well as modifications of our standard offerings, are also available.

TTI is dedicated to unsurpassed quality, on-time delivery, and competitive pricing. This commitment has been recognized by the International Standards Organization (ISO) – our ISO 9001:2000 certification is additional assurance to our customers that their buying decisions can be made every day with a higher level of supplier confidence, and affirms our ongoing commitment to our quality policy –

“TTI will deliver products, services and information that meet or exceed customer requirements and expectations every time.”

This product guide is intended to provide technical data to deal with most applications. For severe applications not adequately covered here, please contact the factory for assistance.

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2100 Series – Thermowells

SPECIFICATIONS

Materials

TTI thermowells are available in virtually any material to fit your application. Contact the factory regarding availability of materials not listed in the “Ordering Information” guide on page 5.

Strength

The strength of a thermowell depends on several parameters that relate thermowell construction to the installation environment. For most industrial applications, standard TTI thermowells provide the necessary strength if the material, style, and length are correctly specified for the application parameters: fluid type, temperature, pressure, and fluid velocity. It is important to note that most thermowell failures are caused by vibration that is induced by fluid flow.

In addition to providing this selection guide, TTI offers assistance in correctly selecting thermowells, given the application parameters. This service is available for a nominal charge. Contact the factory for more information.

Construction

All 2100 Series thermowell bodies are machined from solid bar stock. Flange mounts are welded to the thermowell body. The serial number and material are etched on each thermowell. Additional tagging for specific customer requirements is available.

MANUFACTURING STANDARDS

Bar Stock

Mill Standard +0.000” / -1/32”

Shank O.D.

±0.010”

“U” Dimension

±0.050”

Overall Length

±0.050”

Tip Thickness

¼” ±0.050” (unless otherwise specified)

Shank Surface Finish

Polished to 16 RMS

Bore

±0.003”

THERMOWELL TERMINOLOGY

Process Connection	External means to connect thermowell to process system. Wells can be threaded, bolted (to matching flange), clamped, or welded in place.
Instrument Connection	Internal threads to connect temperature instrument to thermowell.
“U” Dimension	Length of thermowell immersed into process system. Measured from the base of the process connection to the end tip of the well.
“T” Dimension	Also called “lag length” or “lagging extension”. Extends length between the instrument and process connections to accommodate vessel or piping insulation.
“A” Dimension	Instrument insertion length into thermowell. Equal to bore length.
“D” Dimension	Also called “tip diameter”. Diameter of thermowell shank at the end tip of the thermowell. This dimension may vary with process connection and/or shank design.
“Q” Dimension	Also called “root diameter”. Diameter of thermowell shank below the process connection. This dimension may vary with process connection and/or shank design.
Bore Diameter	Dimension of internal bore to match the diameter of the instrument inserted into the thermowell.
Stepped Shank	Also called “reduced tip”. The shank O.D. is reduced over the last 2½” of the “U” dimension from the standard root diameter to ½” O.D. The stepped shank is available with a 0.260” bore diameter only.
Straight Shank	Shank O.D. is the same from the root diameter (“Q” dimension) to the tip diameter (“D” dimension). The straight shank is generally used with a 0.385” or larger bore diameter, but is also available with a 0.260” bore.
Tapered Shank	Shank O.D. is gradually reduced from the root diameter (“Q” dimension) to the tip diameter (“D” dimension). The tapered shank is recommended for heavy duty applications characterized by high vibration, pressure, temperature, and/or velocity.

SELECTION CONSIDERATIONS

Immersion Length (“U” Dimension)

For best temperature measurement accuracy, the “U” dimension should be long enough to permit the entire temperature-sensitive part of the measuring instrument to project into the medium being measured.

Liquid temperature measurement: A properly designed thermowell will extend into the fluid an amount equal to the length of the temperature-sensitive zone plus one inch or greater.

Gas temperature measurement: A properly designed thermowell will extend into the fluid an amount equal to the length of the temperature-sensitive zone plus three inches or greater.

The temperature-sensitive zone for thermocouples and thermistors is short (right at the tip of the device), enabling measurement accuracy with limited immersion into the process fluid.

Bi-metal thermometers, resistance temperature detectors (RTDs), and liquid-in-glass thermometers have bulbs with temperature-sensitive zones between one and two inches long.

Filled-system thermometer bulbs may have temperature-sensitive zones from one to several inches in length.

Bore Diameter

While TTI offers thermowells with bore diameters up to 0.718”, the most common are as follows:

0.260” bore:

- Bi-metal Thermometers (¼” stem)
- Thermocouples (¼” sheath)
- RTDs (¼” sheath)
- Liquid-in-glass Test Thermometers (unarmored)
- Other elements having 0.252” maximum diameter

0.385” bore:

- Bi-metal Thermometers (⅜” stem)
- Thermocouples (8 and 14 gage)
- Liquid-in-glass Test Thermometers (armored)
- Other elements having 0.377” maximum diameter

Shank Style

Tapered shank wells provide greater stiffness for the same sensitivity. The higher strength to weight ratio gives these wells higher natural frequency than for equivalent straight

shank wells, thus permitting operation at higher fluid velocities.

Velocity Ratings

In most cases, thermowell failures are not due to the effects of pressure and temperature. The calculations necessary to provide adequate strength under given conditions are familiar enough to permit proper choice of wall thickness and material.

Less familiar are the vibrational effects to which thermowells are subjected. Fluid flowing past the well forms a turbulent wake (the Von Karman Trail), which has a definite frequency based on the diameter of the well and the velocity of the fluid. The thermowell must have sufficient stiffness so that the wake frequency will never equal the natural frequency of the thermowell itself. If the natural frequency of the well were to coincide with the wake frequency, the well would vibrate to destruction and break off.

Table 1 provides recommended maximum velocity ratings for common well length and material combinations. To reduce the complexity of presenting this information, the ratings given are based on operating temperatures of 1000°F for carbon steel, 304 SST, and 316 SST wells. Ratings for brass wells are based on 350°F service. Ratings for Monel wells are based on 900°F service. Slightly higher velocity is possible at lower temperatures.

The velocity ratings provided are extremely conservative and intended primarily as a guide. Wells are safe from vibrational destruction if the resonant frequency is well below the wake frequency, or if the fluid velocity is constantly fluctuating through the critical velocity point. Nevertheless, if the installation is not hampered by a sufficiently stiff well, it is recommended that the values given not be exceeded.

Table 1. Maximum Fluid Velocity Ratings (ft/sec)

Shank Style	Root Dia. "Q" Dim.	Material	Process Fluid	Immersion Length – "U" Dimension							
				2½"	4½"	7½"	10½"	13½"	16½"	19½"	22½"
Stepped	¾"	Brass	Liquid	59.3	39.8	23.9	16.4	9.9	6.6	4.8	3.6
			Gas	207	89.1	32.3					
		Carbon Steel	Liquid	106	71.2	42.7	22.8	13.8	9.3	6.7	4.9
			Gas	290	123	44.9					
	304, 316 SST	Liquid	148	99.3	46.4	23.6	14.3	9.6	6.9	5.1	
		Gas	300	128							
	Monel	Liquid	118	79.8	40.6	20.7	12.4	8.3	6.1	4.5	
		Gas	261	112							
7/8"	Brass	Liquid	59.3	47.6	37.0	18.8	11.4	7.6	5.5	4.1	
		Gas	207	102	28.0						
	Carbon Steel	Liquid	106	84.3	51.6	26.2	15.9	10.6	7.6	5.7	
		Gas	290	143	50.6						
304, 316 SST	Liquid	148	117	53.5	27.2	16.5	11.0	7.9	5.9		
	Gas	300	148								
Monel	Liquid	118	93.3	46.7	23.7	14.4	9.5	6.9	5.1		
	Gas	261	128								
Straight	Any	Brass	Liquid	145	80	48.0	27.6	16.7	11.1	8.0	6.0
			Gas	290	150	54.1					
		Carbon Steel	Liquid	260	144	69.5	35.4	20.5	14.3	10.3	7.7
			Gas	326	192						
304, 316 SST	Liquid	360	199	71.9	36.6	21.2	14.8	10.7	8.0		
	Gas	349									
Monel	Liquid	316	178	68.1	34.8	20.8	14.0	10.0	7.5		
	Gas	320	189								
Tapered	Any	Carbon Steel	Liquid	270	150	90.3	45.6	27.8	18.5	13.2	9.8
			Gas	410	249						
		304, 316 SST	Liquid	350	208	97.3	49.7	30.4	20.3	14.5	10.7
Gas	483		272								
Monel	Liquid	300	167	77.5	39.2	23.8	16.0	10.3	7.7		
	Gas	396	214								

ORDERING INFORMATION

Example Model Number	Series	Material	Immersion Length	Style	Bore Diameter	Lag Length	Instrument Connection	Root Diameter	Tip Diameter	Options
			"U" Dim.			"T" Dim.		"Q" Dim.	"D" Dim.	
	2100	A	105	F43	A	030	A	R	E	-04 -07 -11

Written as: 2100A105F43A030ARE-04-07-11

Material

Material	Code
304 SST	A
310 SST	C
316 SST	D
321 SST	F
Alloy 20	G

Material	Code
Carbon Steel	H
Hastelloy C	J
Hastelloy B	K
Inconel 600	M
Monel	P

Material	Code
Nickel 200	T
Titanium	W
Brass	Y
Other (please specify)	X

Immersion Length ("U" Dimension)

Length ("U") in inches	Code
1.625	016
2.0	020
2.5	025
3.0	030
3.5	035
4.0	040
4.5	045
5.0	050
5.5	055
6.0	060
6.5	065
7.0	070
7.5	075
8.0	080
8.5	085
9.0	090
9.5	095
10.0	100
10.5	105
11.0	110
11.5	115
12.0	120
12.5	125

Length ("U") in inches	Code
13.0	130
13.5	135
14.0	140
14.5	145
15.0	150
15.5	155
16.0	160
16.5	165
17.0	170
17.5	175
18.0	180
18.5	185
19.0	190
19.5	195
20.0	200
20.5	205
21.0	210
21.5	215
22.0	220
22.5	225
23.0	230
24.0	240
25.0	250

Length ("U") in inches	Code
26.0	260
27.0	270
28.0	280
29.0	290
30.0	300
31.0	310
32.0	320
33.0	330
34.0	340
35.0	350
36.0	360
37.0	370
38.0	380
39.0	390
40.0	400
41.0	410
42.0	420
43.0	430
44.0	440
45.0	450
46.0	460
47.0	470
48.0	480

Style

Mounting Style	Shank Style	Process Connection	Code
Threaded	Stepped	1/2" NPT	T21
		3/4" NPT	T22
		1" NPT	T23
		1 1/2" NPT	T24
	Straight	1/2" NPT	T31
		3/4" NPT	T32
		1" NPT	T33
		1 1/2" NPT	T34
	Tapered	1/2" NPT	T41
		3/4" NPT	T42
		1" NPT	T43
		1 1/2" NPT	T44
Flanged	Stepped	1", Class 150	F21
		1 1/2", Class 150	F22
		2", Class 150	F23
		1", Class 300	F24
		1 1/2", Class 300	F25
		2", Class 300	F26
		1", Class 600	F27
		1 1/2", Class 600	F28
		2", Class 600	F29

Mounting Style	Shank Style	Process Connection	Code
Flanged	Straight	1", Class 150	F31
		1 1/2", Class 150	F32
		2", Class 150	F33
		1", Class 300	F34
		1 1/2", Class 300	F35
		2", Class 300	F36
		1", Class 600	F37
		1 1/2", Class 600	F38
		2", Class 600	F39
		Tapered	1", Class 150
	1 1/2", Class 150		F42
	2", Class 150		F43
	1", Class 300		F44
	1 1/2", Class 300		F45
	2", Class 300		F46
	1", Class 600		F47
	1 1/2", Class 600		F48
	2", Class 600		F49
	1", Class 900/1500		F51
	1 1/2", Class 900/1500	F52	
2", Class 900/1500	F53		
1", Class 2500	F54		
1 1/2", Class 2500	F55		
2", Class 2500	F56		

**2100 Series
Thermowells**



Mounting Style	Shank Style	Process Connection	Code
Van Stone	Stepped	1"	V21
		1½"	V22
		2"	V23
	Straight	1"	V31
		1½"	V32
		2"	V33
	Tapered	1"	V41
		1½"	V42
		2"	V43
Socket Weld	Stepped	¾" pipe	K21
		1" pipe	K22
	Straight	¾" pipe	K31
		1" pipe	K32
	Tapered	¾" pipe	K41
		1" pipe	K42
		1½" pipe	K43

Mounting Style	Shank Style	Process Connection	Code	
Weld-In	Tapered	¾" pipe (1.05" O.D.)	W41	
		1" pipe (1.32" O.D.)	W42	
		1½" pipe (1.9" O.D.)	W43	
Sanitary	Stepped	1½" Tri-Clamp	S21	
		2" Tri-Clamp	S22	
		2½" Tri-Clamp	S23	
		3" Tri-Clamp	S24	
		Straight	1½" Tri-Clamp	S31
			2" Tri-Clamp	S32
	2½" Tri-Clamp		S33	
	3" Tri-Clamp		S34	
	Tapered		1½" Tri-Clamp	S41
			2" Tri-Clamp	S42
		2½" Tri-Clamp	S43	
		3" Tri-Clamp	S44	
Other	(please specify)	(please specify)	XXX	

Bore Diameter

Bore Diameter	Code
0.260"	A
0.385"	B
0.437"	C
0.515"	D

Bore Diameter	Code
0.656"	E
0.718"	F
Other (please specify)	X

Lag Length ("T" Dimension)

Length ("T") in inches	Code
0.0	000
0.5	005
1.0	010
1.5	015
2.0	020
2.5	025
3.0	030

Length ("T") in inches	Code
3.5	035
4.0	040
4.5	045
5.0	050
5.5	055
6.0	060
6.5	065

Length ("T") in inches	Code
7.0	070
7.5	075
8.0	080
8.5	085
9.0	090
9.5	095
Other (please specify)	XXX

Instrument Connection

Instrument Connection Thread	Code
½" NPT	A
½" NPSM	B
¾" NPT	C
¾" NPT	D
¾" NPSM	E

Instrument Connection Thread	Code
1" NPT	F
1" NPSM	G
Other (please specify)	X

Root Diameter ("Q" Dimension)

Diameter ("Q") in inches	Code
0.375	A
0.400	B
0.500	C
0.562	D
0.625	E
0.680	F
0.735	G
0.750	H

Diameter ("Q") in inches	Code
0.766	J
0.781	K
0.860	L
0.875	M
0.900	N
1.000	P
1.050	Q
1.063	R

Diameter ("Q") in inches	Code
1.125	S
1.250	T
1.315	U
1.375	V
1.500	W
1.625	Y
1.900	Z
Other	X

Tip Diameter ("D" Dimension)

Diameter ("D") in inches	Code
0.375	A
0.400	B
0.500	C
0.562	D
0.625	E
0.680	F
0.735	G
0.750	H

Diameter ("D") in inches	Code
0.766	J
0.781	K
0.860	L
0.875	M
0.900	N
1.000	P
1.050	Q
1.063	R

Diameter ("D") in inches	Code
1.125	S
1.250	T
1.315	U
1.375	V
1.500	W
1.625	Y
1.900	Z
Other	X

Options

Option	Code
Thermowell material certificate	-01
Thermowell Wake Frequency Calculation (Configuration Data Sheet Required)	-02
Thermowell special internal pressure testing	-03
Thermowell special external pressure testing	-04 ⁽¹⁾
Thermowell dye penetration testing	-05
Special cleaning for oxygen service	-06
NACE MR-01-75 approval	-07
Electropolishing	-08
Stellite overlay	-09
Chrome plating	-10
Full penetration weld	-11 ⁽¹⁾
Concentric serrations of thermowell flange face	-12 ⁽¹⁾
Flat face flange	-13 ⁽¹⁾
Ring Joint flange	-14 ⁽¹⁾
Thermowell special surface finish (12Ra Max)	-15
Special stamping	-17
Plug and chain – stainless steel	-18
Plug and chain – brass	-19
Teflon coating	-20
Weldment X-Ray	-21
Tantalum sheath	-22 ⁽¹⁾
Titanium sheath	-23 ⁽¹⁾
Positive Material Identification (PMI) test	-24

(1) Available on flanged thermowells only. Only one flange face option allowed.

Example Model Number

Series	Material	Immersion Length	Style	Bore Diameter	Lag Length	Instrument Connection	Root Diameter	Tip Diameter	Options
		"U" Dim.			"T" Dim.		"Q" Dim.	"D" Dim.	
2100	A	105	F43	A	030	A	R	E	-04 -07 -11

Written as: 2100A105F43A030ARE-04-07-11

Figure 1. Threaded Thermowells

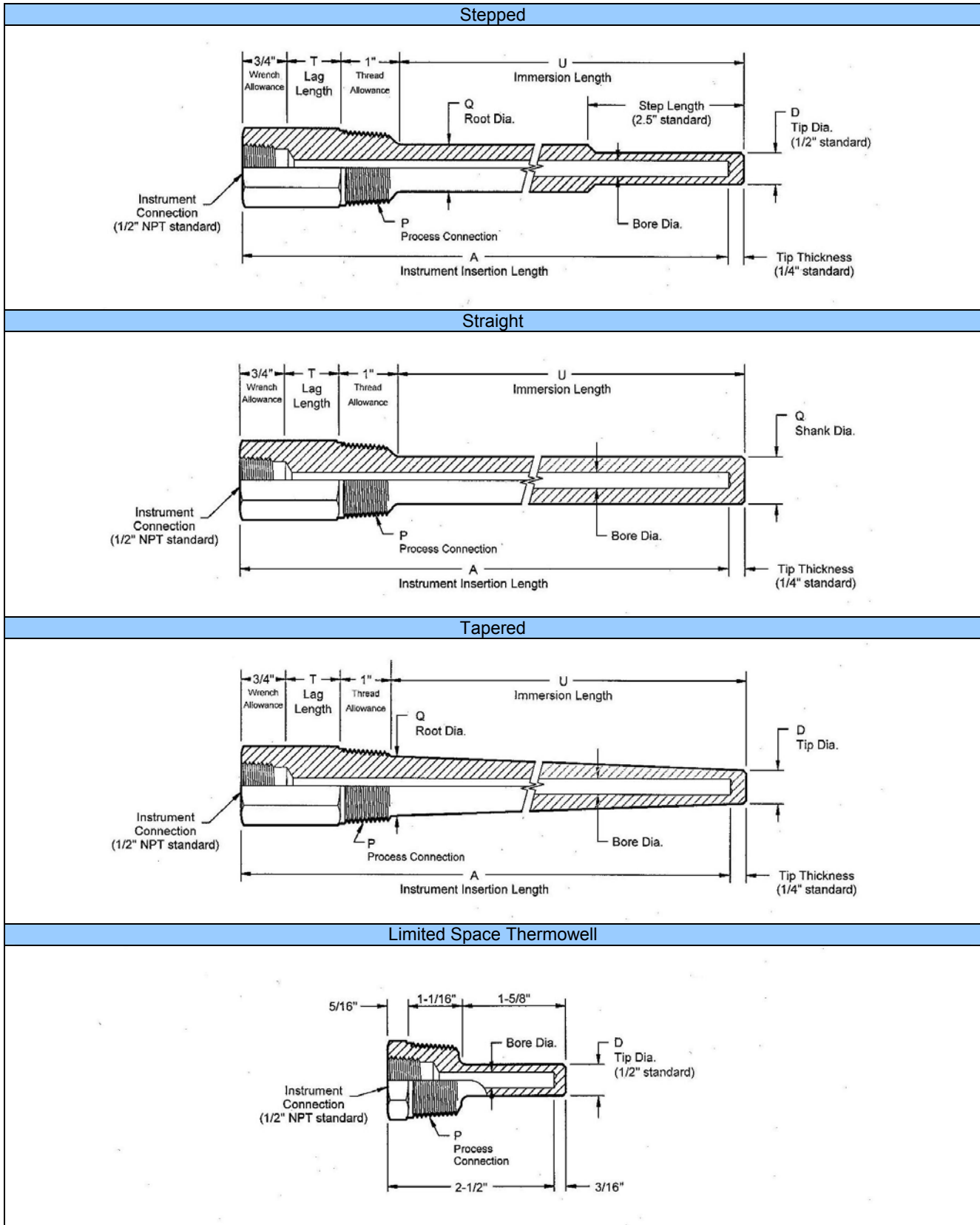


Figure 2. Flanged Thermowells

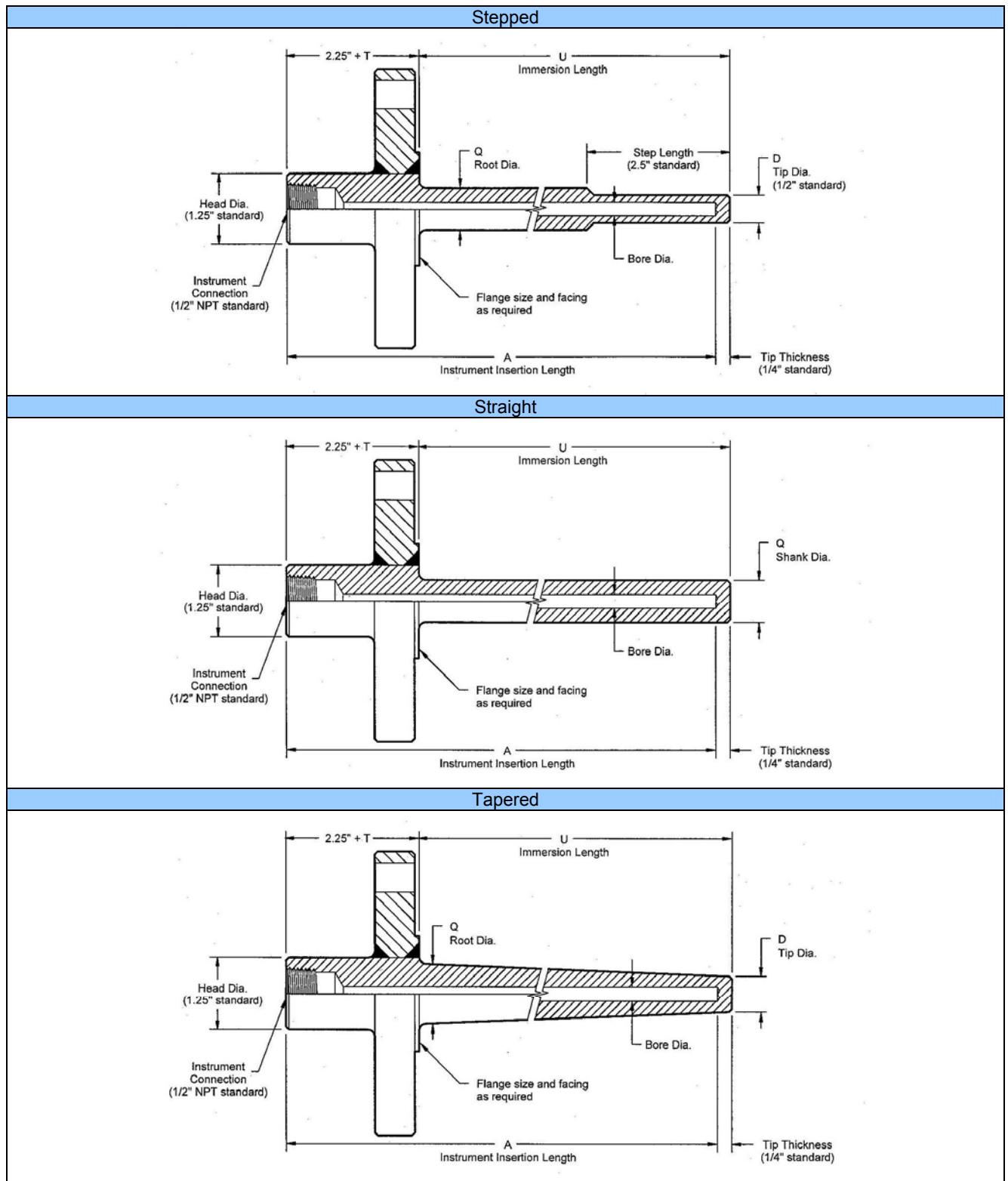


Figure 3. Van Stone Thermowells

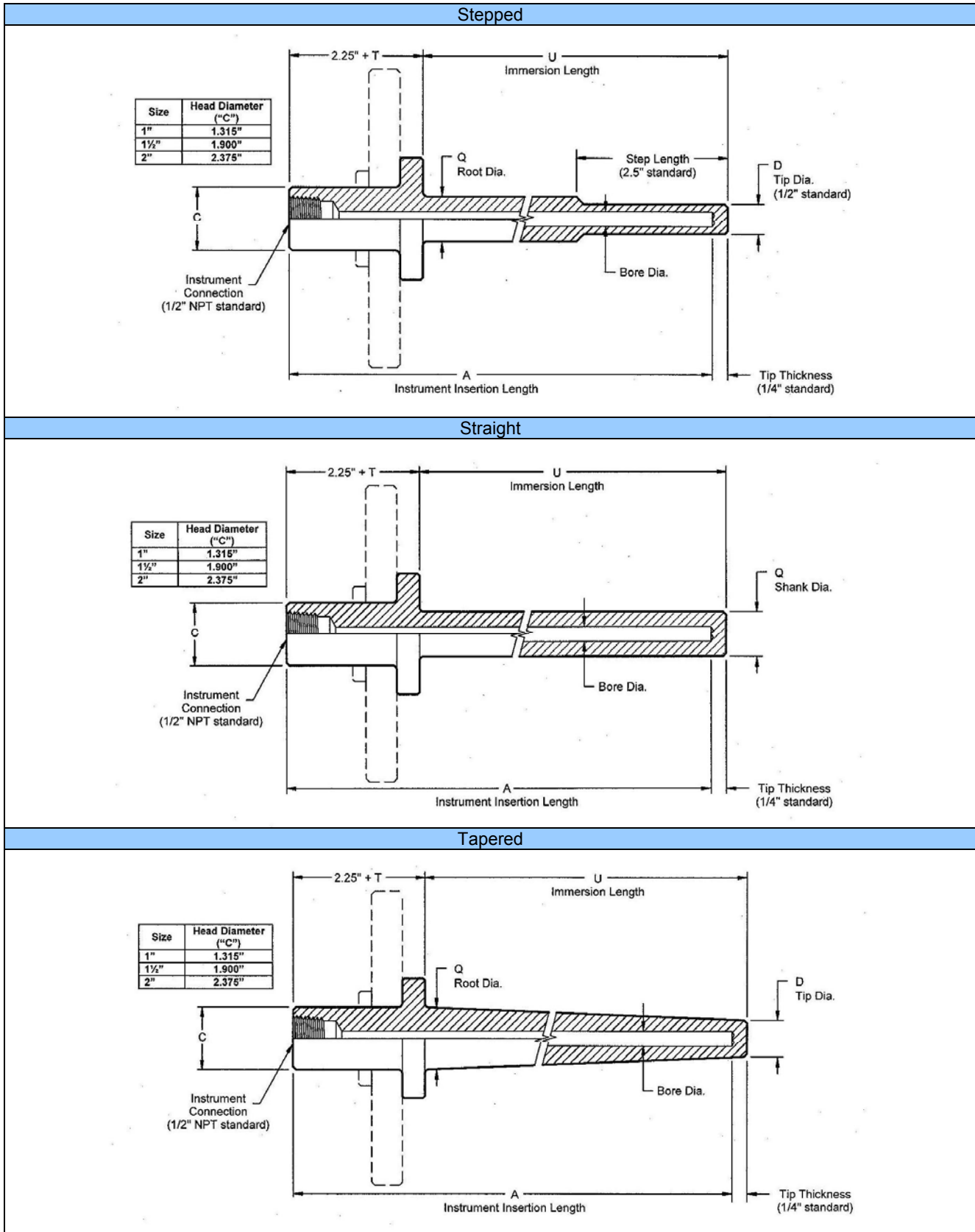


Figure 4. Socket Weld Thermowells

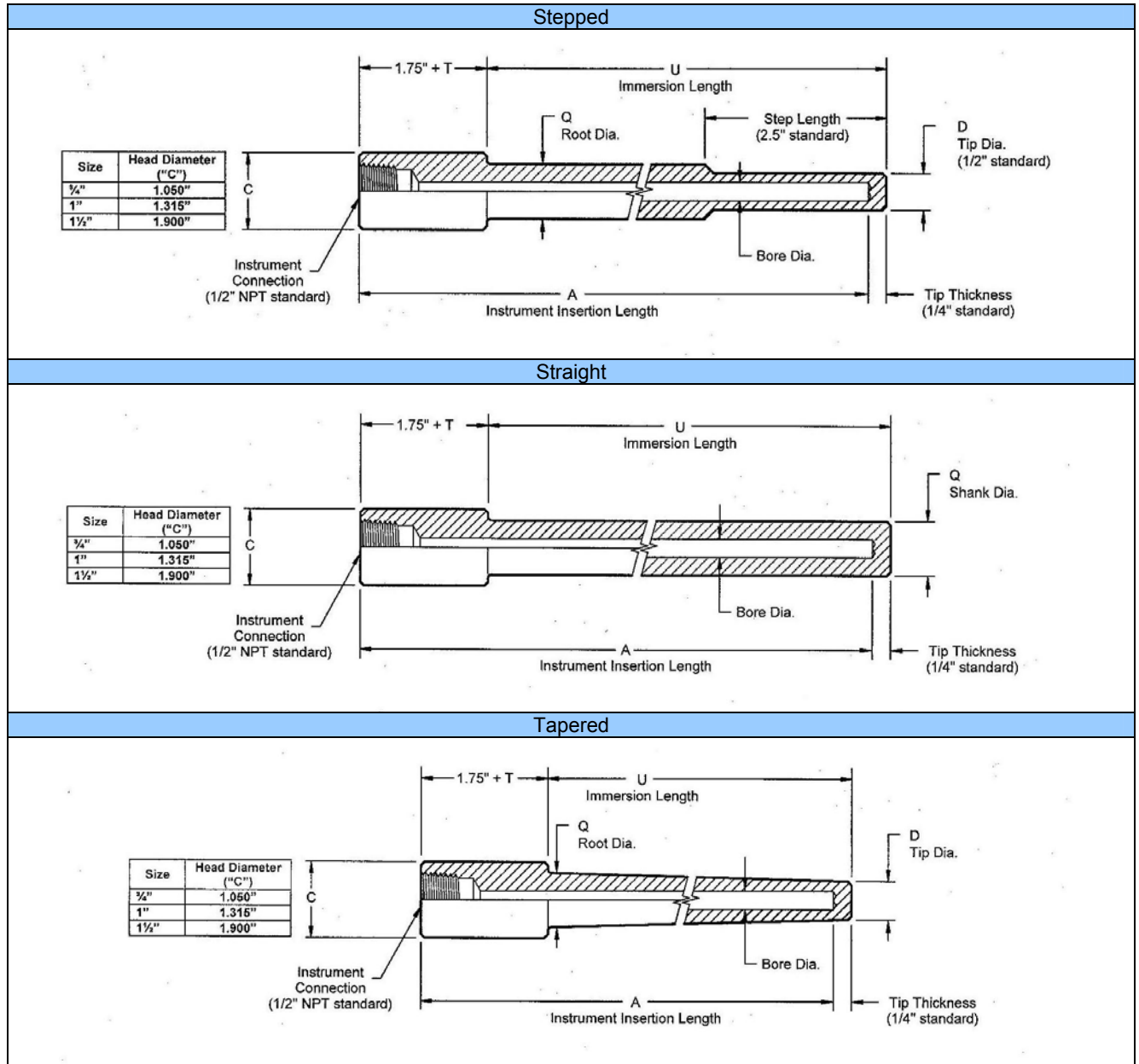


Figure 5. Sanitary Thermowells

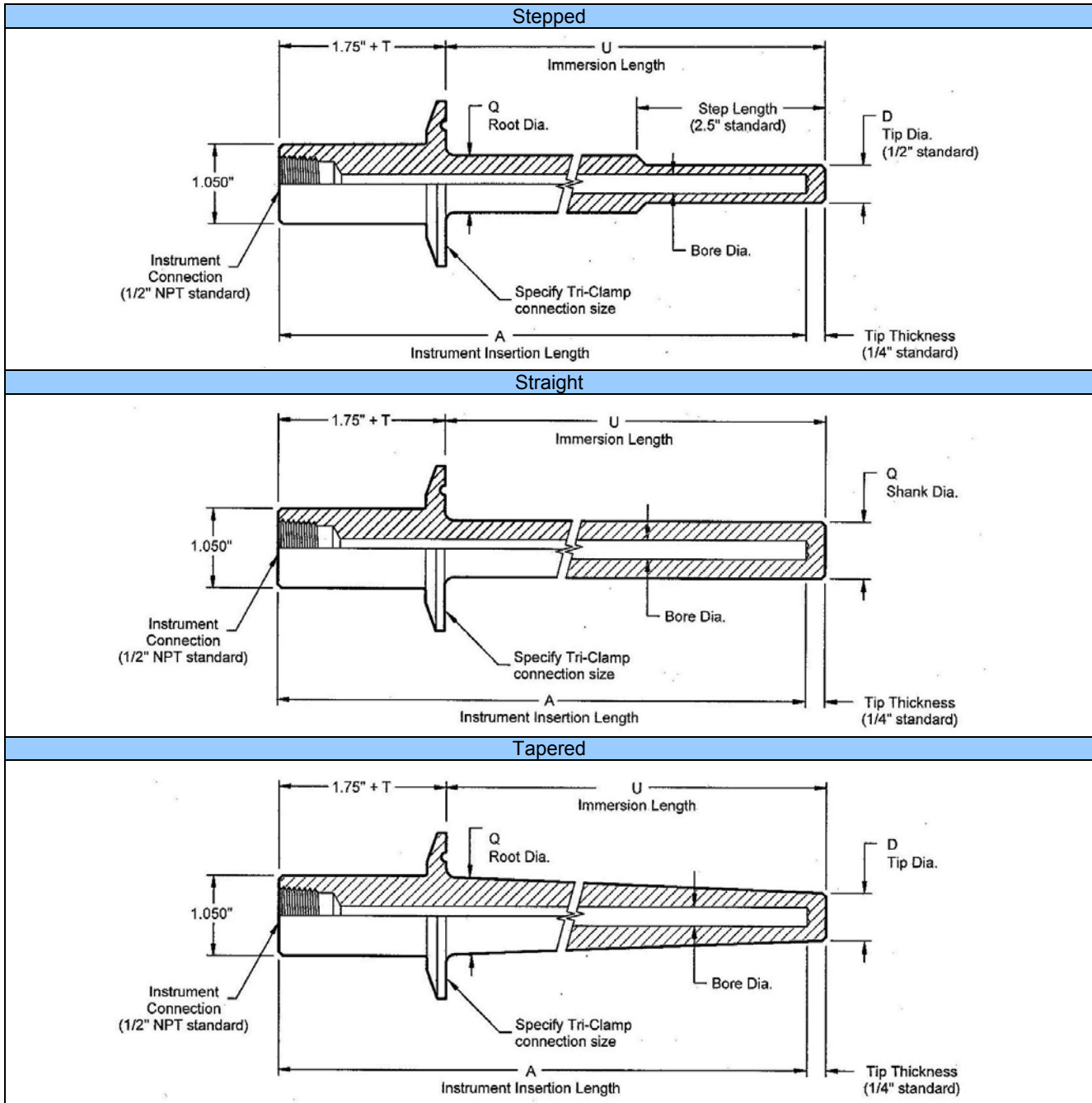
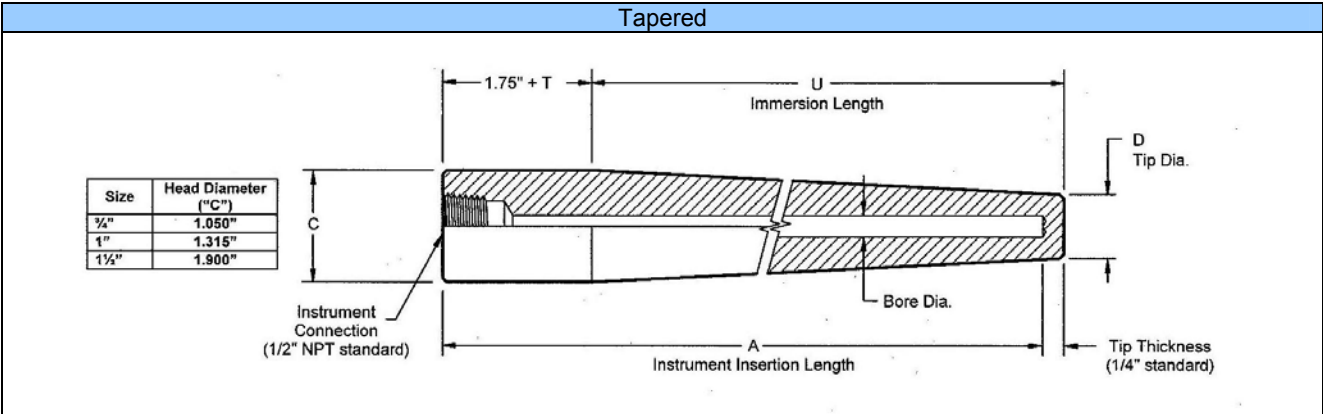


Figure 6. Weld-In Thermowells



2200 Series – Protection Tubes

MANUFACTURING STANDARDS

Material

In compliance with ASTM specifications or other applicable national standard (i.e., ASME, AWS, etc.)

Process Connection

- Flange: In compliance with ANSI B16.5 prior to fabrication
- Bushing: Welded in place
- Welded: Bare tube

Instrument Connection

Male pipe thread in compliance with ANSI B1.20.1-92

“U” Dimension

±0.50” for immersion lengths <60”
±0.75” for immersion lengths 60” to 96”
±1.00” for immersion lengths >96”

Tip Thickness

1/4” ±0.050” (unless otherwise specified)

Welding

Flange to Base Metal: per TTI Dwg. TX-A1
 Bushing to Base Metal: Fillet weld
 Barstock for Closed-end: per TTI dwg no. TX-FP-TIP⁽¹⁾
 Pipe Cap for Closed-end: per TTI dwg no. TX-B⁽¹⁾

(1) Full penetration weld locations are subject to minor distortion and internal filler metal slag.

TERMINOLOGY

Process Connection	External means to connect protection tube to process system. Tubes can be threaded, bolted (to matching flange), or welded in place.
Instrument Connection	Means to connect temperature instrument to protection tube. Typically male pipe threaded.
“U” Dimension	Length of protection tube immersed into process system. Measured from the base of the process connection to the end tip of the tube.
“H” Dimension	Also called “head length”. Measured from the base of the process connection to the face of the instrument connection.
“A” Dimension	Instrument insertion length into protection tube.

ORDERING INFORMATION

Example Model Number	Series	Material	Immersion Length	Tube Style	Process Connection	Bore Diameter	Head Length	Instrument Connection	Options
			"U" Dim.				"H" Dim.		
	2200	A	240	E	09	A	030	A	-01 -07 -11

Written as: 2200A240E09A030A-01-07-11

Material

Material	Code
304 SST	A
310 SST	C
316 SST	D
321 SST	F
Alloy 20	G

Material	Code
Carbon Steel	H
Hastelloy C	J
Hastelloy B	K
Inconel 600	M
Monel	P

Material	Code
Nickel 200	T
Titanium	W
Brass	Y
Other (please specify)	X

Immersion Length ("U" Dimension)

Length ("U") in inches	Code
12	120
15	150
18	180
21	210
24	240
27	270
30	300
32	320
34	340
36	360
38	380
40	400
42	420
44	440

Length ("U") in inches	Code
46	460
48	480
50	500
52	520
54	540
56	560
58	580
60	600
62	620
64	640
66	660
68	680
70	700
72	720

Length ("U") in inches	Code
74	740
76	760
78	780
80	800
82	820
84	840
86	860
88	880
90	900
92	920
94	940
96	960
98	980
Other (please specify)	XXX

Tube Style

Style	Size	Code
Drilled Barstock	½" O.D.	A
	⅝" O.D.	B
	¾" O.D.	C
	⅞" O.D.	D
	1" O.D.	E
	1 ⅛" O.D.	F
	1 ¼" O.D.	G

Style	Size	Schedule	Code
Pipe	¼"	40	H
		80	J
		160	K
		XX Heavy	L
	½"	40	M
		80	N
		160	P
		XX Heavy	Q
	¾"	40	R
		80	T
		160	U
		XX Heavy	V
1"	40	W	
	80	X	
	160	Y	
	XX Heavy	Z	

Process Connection

Process Connection	Code
¾" NPT	01
1" NPT	02
1½" NPT	03
2" NPT	04
Welded	05
1", Class 150	06
1½", Class 150	07

Process Connection	Code
2", Class 150	08
3", Class 150	09
4", Class 150	10
1", Class 300	11
1½", Class 300	12
2", Class 300	13
3", Class 300	14

Process Connection	Code
4", Class 300	15
1", Class 600	16
1½", Class 600	17
2", Class 600	18
3", Class 600	19
4", Class 600	20
Other (please specify)	XX

Bore Diameter

Bore Diameter	Code
0.260"	A
0.385"	B
N/A (Pipe construction)	P
Other (please specify)	X

Head Length ("H" Dimension)

Length ("H") in inches ⁽¹⁾	Code
2.0	020
2.5	025
3.0	030
3.5	035
4.0	040
4.5	045

Length ("H") in inches ⁽¹⁾	Code
5.0	050
5.5	055
6.0	060
6.5	065
7.0	070
7.5	075

Length ("H") in inches ⁽¹⁾	Code
8.0	080
8.5	085
9.0	090
9.5	095
Other (please specify)	XXX

Instrument Connection

Instrument Connection Thread	Code
½-14 ANPT	A
½-14 NPSM	B
Other (please specify)	X

Options

Option	Code
Material certificate	-01
Wake Frequency Calculation (Configuration Data Sheet Required)	-02
Special internal pressure testing	-03
Special external pressure testing	-04 ⁽¹⁾
Dye penetration testing	-05
Special cleaning for oxygen service	-06
NACE MR-01-75 approval	-07
Electropolishing	-08
Stellite overlay	-09
Chrome plating	-10
Full penetration weld	-11 ⁽¹⁾
Concentric serrations of flange face	-12 ⁽¹⁾
Flat faced flange	-13 ⁽¹⁾
Ring Joint Flange	-14 ⁽¹⁾
Special surface finish (12Ra Max)	-15
Special stamping	-17
Plug and chain – stainless steel	-18
Plug and chain – brass	-19
Weldment X-Ray	-21
Positive Material Identification (PMI) test	-24

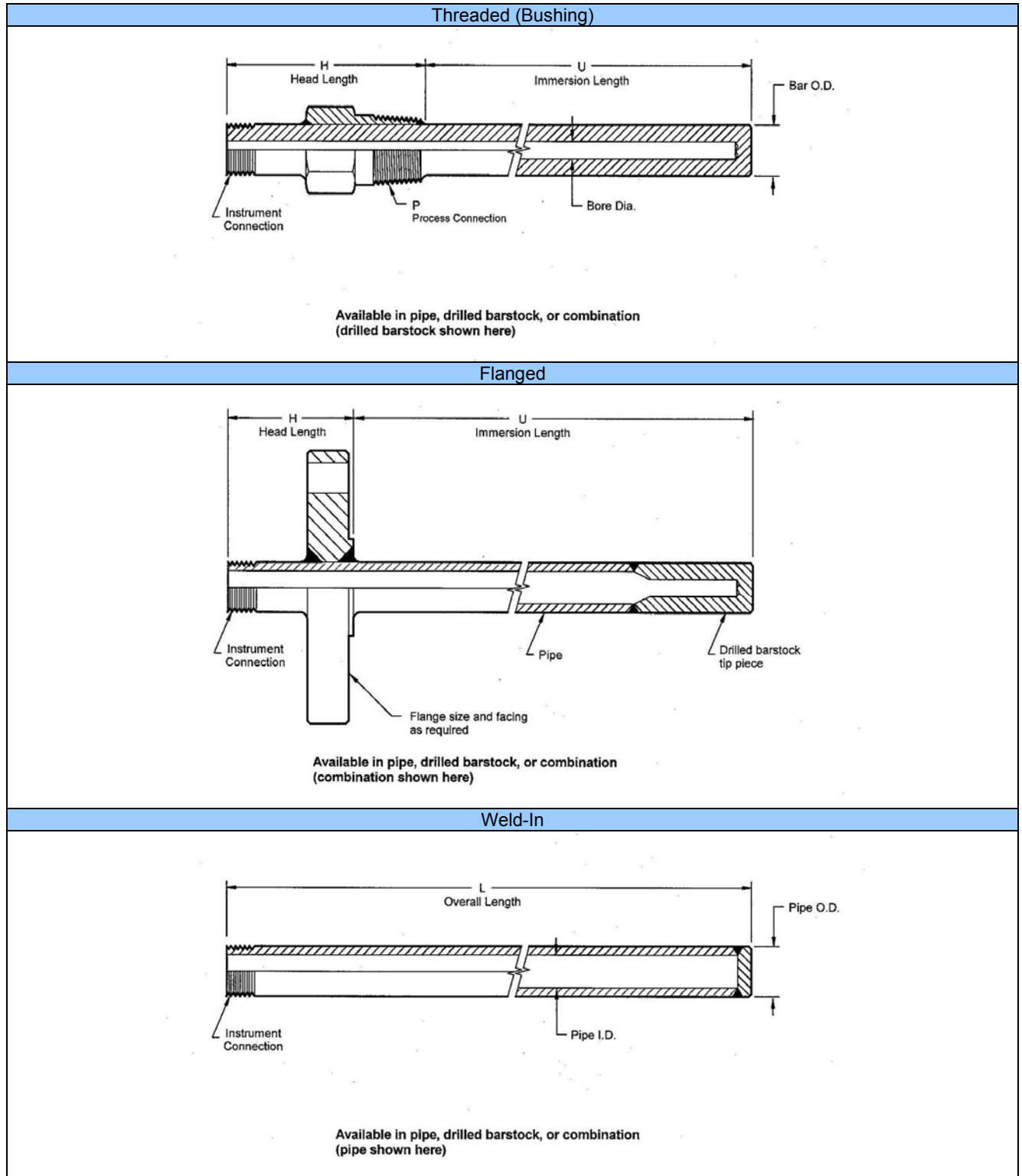
(1) Available on flanged thermowells only. Only one flange face option allowed.

Example Model Number

Series	Material	Immersion Length	Tube Style	Process Connection	Bore Diameter	Head Length	Instrument Connection	Options
		"U" Dim.				"H" Dim.		
2200	A	240	E	09	A	030	A	-01 -07 -11

Written as: 2200A240E09A030A-01-07-11

Figure 7. Drilled Barstock Protection Tubes



2300 Series – Sample Probes

MANUFACTURING STANDARDS

Bar Stock

Mill Standard +0.000" / -1/32"

Overall Length

±0.050"

Shank O.D.

±0.010"

Shank Surface Finish

Polished to 16 RMS

"U" Dimension

±0.050"

Bore

±0.003"

ORDERING INFORMATION

Example Model Number

Series	Material	Immersion Length "U" Dim.	Process Connection	Bore Diameter	Lag Length "T" Dim.	Sampler Connection	Shank Diameter "D" Dim.	Options
2300	A	070	T21	A	000	A	H	-01 -08

Written as: 2300A070T21A000AH-01-08

Material

Material	Code
304 SST	A
310 SST	C
316 SST	D
321 SST	F
Alloy 20	G

Material	Code
Carbon Steel	H
Hastelloy C	J
Hastelloy B	K
Inconel 600	M
Monel	P

Material	Code
Nickel 200	T
Titanium	W
Brass	Y
Other (please specify)	X

Immersion Length ("U" Dimension)

Length ("U") in inches	Code
1.5	015
2.0	020
2.5	025
3.0	030
3.5	035
4.0	040
4.5	045
5.0	050
5.5	055
6.0	060
6.5	065
7.0	070
7.5	075
8.0	080
8.5	085
9.0	090
9.5	095
10.0	100
10.5	105
11.0	110
11.5	115
12.0	120
12.5	125

Length ("U") in inches	Code
13.0	130
13.5	135
14.0	140
14.5	145
15.0	150
15.5	155
16.0	160
16.5	165
17.0	170
17.5	175
18.0	180
18.5	185
19.0	190
19.5	195
20.0	200
20.5	205
21.0	210
21.5	215
22.0	220
22.5	225
23.0	230
24.0	240
25.0	250

Length ("U") in inches	Code
26.0	260
27.0	270
28.0	280
29.0	290
30.0	300
31.0	310
32.0	320
33.0	330
34.0	340
35.0	350
36.0	360
37.0	370
38.0	380
39.0	390
40.0	400
41.0	410
42.0	420
43.0	430
44.0	440
45.0	450
46.0	460
47.0	470
48.0	480

Process Connection

Mounting Style	Process Connection	Code
Threaded	½" NPT	T31
	¾" NPT	T32
	1" NPT	T33
Flanged	1", Class 150	F31
	1½", Class 150	F32
	2", Class 150	F33
	1", Class 300	F34
	1½", Class 300	F35
	2", Class 300	F36
	1", Class 600	F37
	1½", Class 600	F38
Other	(please specify)	XXX

Bore Diameter

Bore Diameter	Code
0.260"	A
0.385"	B
Other (please specify)	X

Lag Length ("T" Dimension)

Length ("T") in inches	Code
0.0	000
0.5	005
1.0	010
1.5	015
2.0	020
2.5	025
3.0	030

Length ("T") in inches	Code
3.5	035
4.0	040
4.5	045
5.0	050
5.5	055
6.0	060
6.5	065

Length ("T") in inches	Code
7.0	070
7.5	075
8.0	080
8.5	085
9.0	090
9.5	095
Other (please specify)	XXX

Sampler Connection

Instrument Connection Thread	Code
½-14 ANPT	A
½-14 NPSM	B
Other (please specify)	X

Shank Diameter ("D" Dimension)

Diameter ("D") in inches	Code
0.375	A
0.400	B
0.500	C
0.562	D
0.625	E
0.680	F
0.735	G
0.750	H

Diameter ("D") in inches	Code
0.766	J
0.781	K
0.860	L
0.875	M
0.900	N
1.000	P
1.050	Q
1.063	R

Diameter ("D") in inches	Code
1.125	S
1.250	T
1.315	U
1.375	V
1.500	W
1.625	Y
1.900	Z
Other	X

Options

Option	Code
Material certificate	-01
Wake Frequency Calculation (Configuration Data Sheet Required)	-02
NACE MR-01-75 approval	-07
Electropolishing	-08
Full penetration weld	-11 ⁽¹⁾
Concentric serrations of thermowell flange face	-12 ⁽¹⁾
Flat face flange	-13 ⁽¹⁾
Ring Joint flange	-14 ⁽¹⁾
Special surface finish (12Ra Max)	-15
Special stamping	-17
Weldment X-Ray	-21
Positive Material Identification (PMI) test	-24

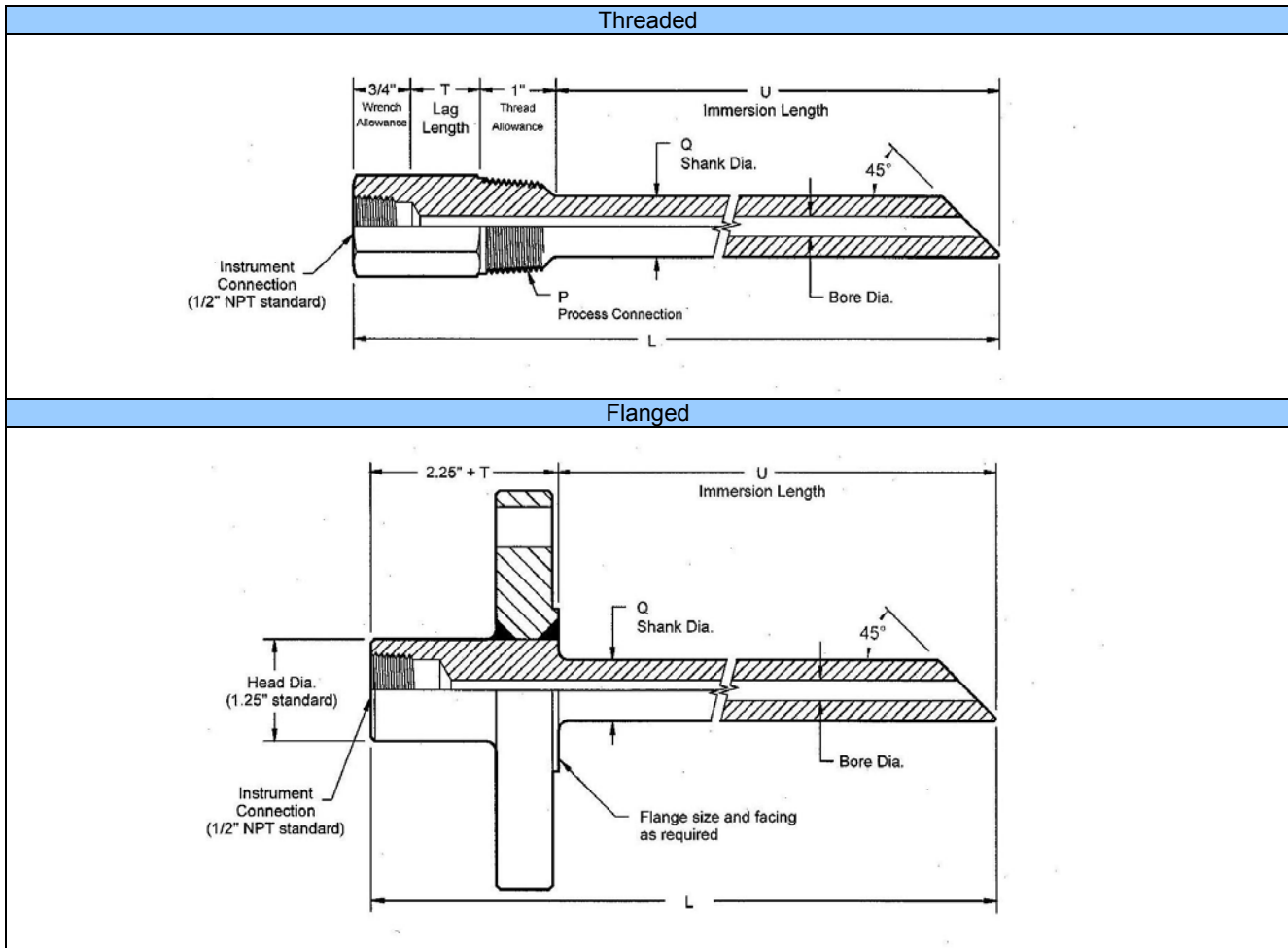
(1) Available on flanged thermowells only. Only one flange face option allowed.

Example Model Number

Series	Material	Immersion Length "U" Dim.	Process Connection	Bore Diameter	Lag Length "T" Dim.	Sampler Connection	Shank Diameter "D" Dim.	Options
2300	A	070	T21	A	000	A	H	-01 -08

Written as: 2300A070T21A000AH-01-08

Figure 8. Sample Probe





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