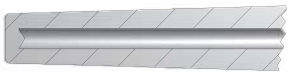
Thermowell Design and Selection Criteria

A thermowell is a pressure-tight receptacle that protects and extends the life of a temperature sensor in processing applications where the sensor is not mechanically or chemically compatible with the process environment. Installed directly into the piping systems, thermowells facilitate sensor replacement in high-pressure pipelines and eliminate the need to interrupt the process flow or drain the process system for sensor maintenance functions. The use of standardized thermowells permits simple relocation of sensors throughout a plant.

Strength versus accurate and fast temperature measurement is a balancing act. The factors which tend to produce high strength also tend to reduce the temperature sensor's accuracy and speed of response. A properly selected thermowell will balance these opposing factors to produce a design capable of functioning satisfactorily in the intended application. The listed factors are a general guide and are not all inclusive. Refer to ASME PTC 19.3 TW for a more authoritative dissertation on proper thermowell selection.



TAPERED STEM:
-BALANCE BETWEEN STRENGTH AND ACCURACY
-HEAVY DUTY APPLICATIONS
-HIGH RIGIDITY

STEPPED STEM:
-FASTER RESPONSE
-REDUCED STEM LOSS
-GOOD RIGIDIGY

STRAIGHT STEM:
-STANDARD CONSTRUCTION
-GOOD RIGIDITY

MATERIAL
SELECTION MUST PROVIDE:
-PROCESS TEMPERATURE RESISTANCE
-PROCESS FLUID CORROSION AND EROSION RESISTANCE
-MECHANICAL STRENGTH

WALL THICKNESS	
THIN	THICK
(BEST MEASUREMENT)	(BEST STRENGTH)
-REDUCES RESPONSE TIME -REDUCES STEM CONDUCTION LOSS	-HIGH STATIC PRESSURE -HIGH RIGIDITY & NATURAL FREQUENCY -INCREASED RESISTANCE TO BENDING & VIBRATIONAL STRESS -INCREASED CORROSION & EROSION LIFE

STEM GEOMETRY

THREADED

HEX OR WRENCH FLATS

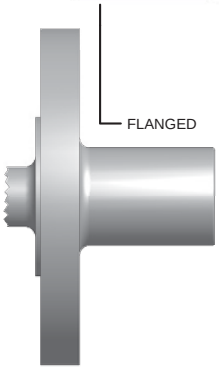
IMMERSION LENGTH	
LONGER	SHORTER
(BEST MEASUREMENT)	(BEST STRENGTH)
-PLACES ACTIVE PORTION OF SENSOR DEEPER INTO PROCESS STREAM -REDUCES STEM CONDUCTION	-INCREASES RIGIDITY & NATURAL FREQUENCY - INCREASES RESISTANCES TO BENDING & VIBRATIONAL STRESS

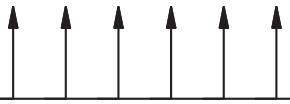
PROCESS CONNECTION
-MUST MATCH MATING CONNECTION
-MAINTAIN PRESSURE-TIGHT RIGID CONNECTION
-MEET ANY APPLICABLE CODES

LAG EXTENSION
(OPTIONAL)
- MOVES SENSOR CONNECTION PAST INSULATING WALL IF REQUIRED

WELDED

FLANGED

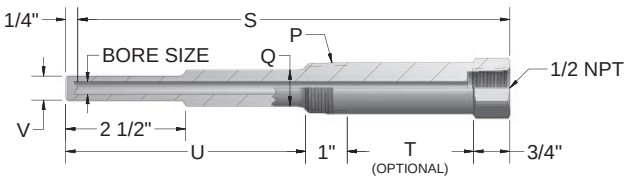




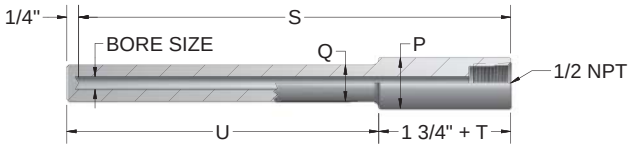
PROCESS FLUID VELOCITY	
FASTER (BEST MEASUREMENT)	SLOWER (BEST STRENGTH)
-INCREASES HEAT TRANSFER -REDUCES RESPONSE TIME	-REDUCES BENDING STRESS -REDUCES VIBRATIONAL FORCING FREQUENCY

The drilled thermowells listed below are those most commonly found in process applications. Other types and styles are listed later in this section. The thermowells listed below are available as separate component wells and can be ordered by the code numbers listed below. They can also be ordered as a part of a complete sensor assembly. Consult factory for wells with different mounting threads, lengths, and materials.

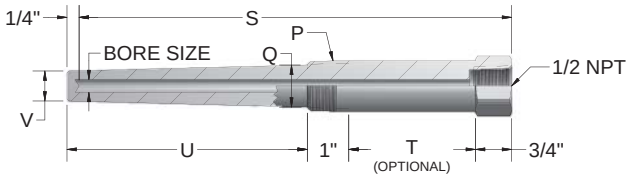
STANDARD-DUTY WELLS



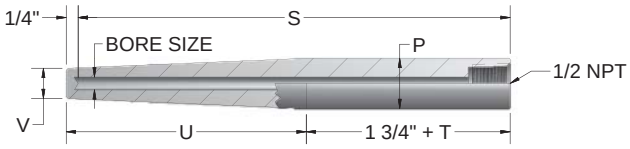
STRAIGHT-SHANK, SOCKET-WELD



HEAVY-DUTY WELLS



WELD-IN WELLS



ORDER CODES

Example Order Number:

1-0	1-1	1-2	1-3	1-4	1-5	1-6
S	4	D	06	08	T2	S

1-0 Well Type

CODE	DESCRIPTION
S	Standard-duty threaded (NPT)
H	Heavy-duty threaded (NPT)
SW	Straight-shank, socket-weld
WI	Weld-in

1-1 Bore Size

CODE	DESCRIPTION
4	0.260 Dia. Bore

1-2 Pipe Size "P"

CODE	DESCRIPTION
C	1/2" Pipe[1]
D	3/4" Pipe
E	1" Pipe
[1] Only available with well type S or H	

1-3 Length Dimensions (inches)

CODE	"S" DIMENSIONS	"U" DIMENSIONS	
		NO LAG	*WITH STANDARD LAG*
04	4	2(1/2)	N/A
06	6	4(1/2)	2(1/2)
09	9	7(1/2)	4(1/2)
12	12	10(1/2)	7(1/2)
15	15	13(1/2)	10(1/2)
18	18	16(1/2)	13(1/2)
24	24	22(1/2)	19(1/2)

1-4 Material

CODE	DESCRIPTION
8	316 stainless steel
9	304 stainless steel

1-5 Optional "T" Lag Dimension

CODE	DESCRIPTION
Leave blank if No Lag is required	
T2	2" Lag standard on 6" well
T3	3" Lag standard on 9, 12, 15, 18, 24" wells
T__	Special Lag specify "T" dimension in inches

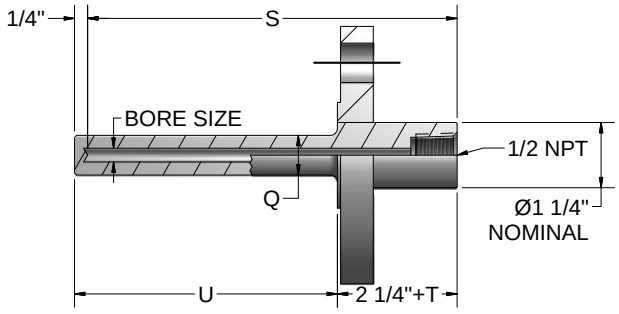
1-6 Well Options

CODE	DESCRIPTION
C8	316 stainless steel well cap and chain
C22	Brass well cap and chain
S	Customer specified part number marked on the thermowell - (10 digit maximum)

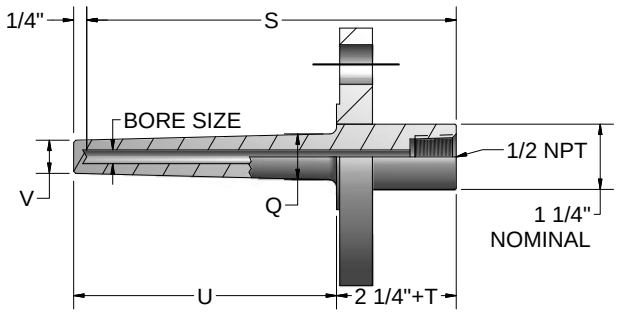
The flanged thermowells described on this page are those commonly found in most process applications. These wells are supplied as standard- or heavy-duty with raised-faced flanges. Other types and styles are listed later in this section. Consult factory for wells with different flange sides, lengths, and materials.

FLANGED THERMOWELLS

STANDARD-DUTY



HEAVY-DUTY



ORDER CODES

Example Order Number:

1-0	1-1	1-2	1-3	1-4	1-5	1-6	1-7	1-8
SF	4	15	R	3	12	08	T2	C8

1-0 Well Type

CODE	DESCRIPTION
SF	Standard-duty flanged
HF	Heavy-duty flanged

1-1 Bore Size

CODE	DESCRIPTION
4	0.260 Bore

1-2 Flange Size

CODE	DESCRIPTION
10	1"
15	1 1/2"
20	2"

1-3 Flange Type

CODE	DESCRIPTION
R	Raised face

1-4 Pressure Rating

CODE	DESCRIPTION
1	150 class
3	300 class

1-5 Well Length (inches)

CODE	DESCRIPTION	
	"S" DIMENSION	"U" DIMENSION
06	6	4
09	9	7
12	12	10
15	15	13
18	18	16
24	24	22

1-6 Well Material

CODE	DESCRIPTION
08	316 Stainless steel
09	304 Stainless steel

1-7 Optional "T" Lag Dimension

CODE	DESCRIPTION
Leave blank if no lag is required	
T__	Specify "T" dimension in inches

1-8 Well Options

CODE	DESCRIPTION
C8	316 stainless steel well cap and chain
C22	Brass well cap and chain
S	Customer specified part number marked on thermowell (10 digit maximum)

ORDER CODES

Built-Up Protection Wells are small diameter general-purpose wells for use in low temperature, low pressure, and low fluid velocity applications. Built-Up Protection Wells are constructed by welding or brazing bushings onto tubing. Built-Up Protection Wells of all stainless steel construction have welded-on bushings. Built-Up Protection Wells with brass bushings have brazed-on bushings.

Example Order Number: 26 - 48 - 06 - 803 (1 - 2 - 3)

1 Well Size and Material

CODE	TUBE (inches) O.D.	I.D.	MATERIAL
48	0.250 x	0.194	316 SS
58	0.313 x	0.257	316 SS
88	0.500 x	0.260	316 SS
Z	Special (Consult factory)		

2 Well 'U' Dimensions

Insert (2) digit 'U' length in inches.
EXAMPLES: 06 = 6" U Dim. 02 (1/2) = 2(1/2") U Dim.

3 Mounting Bushing Material - Dimensions

CODE		BUSHING THREADS (inches)		BUSHING 'B' DIM. (inches)
BRASS	*316 SS*	*EXT.*	*INT.*	
2201[1]	801[1]	1/4	1/8	3/4
2202	802	3/8	1/8	3/4
2203	803	3/8	1/4	3/4
2204	804	1/2	1/8	15/16
2205	805	1/2	1/4	15/16
2206	806	1/2	3/8	15/16
2207	807	1/2	1/2	1 1/2
2208	808	3/4	1/8	1
2209	809	3/4	1/4	1
2210	810	3/4	3/8	1
2211	811	3/4	1/2	1

[1] Not available with 1/2" O.D. wells

Code	Description	UNS Number	Trade Names
03	Alloy 600	N06600	Inconel®
04	310 SS	S31000	
05	446 SS	S44600	
07	Alloy 601	N06601	Inconel®
08	316 SS/316 L	S31603	
09	304 SS/304 L	S30403	
22	Brass[1]		
27	Alloy 400	N04400	Monel®
28	Alloy B-3	N10675	Hastelloy®
29	Alloy C-276	N10276	Hastelloy®
31	Nickel 200	N02200	
35	321 SS	S32100	
36	347 SS	S34700	
37	Alloy 800	N08800	Incoloy®
38	Alloy 20	N08020	Carpenter
41	HR-160	N12160	Haynes®
50	Zirconium	R60702	
51	Alloy X		Hastelloy®
56	Fluoropolymer		Fluoropolymer
59	F22	K21590	
60	F11	K11572	
61	A105	K03504	
91	F91	K90901	
[1] Materials available in various alloys - Consult factory.			

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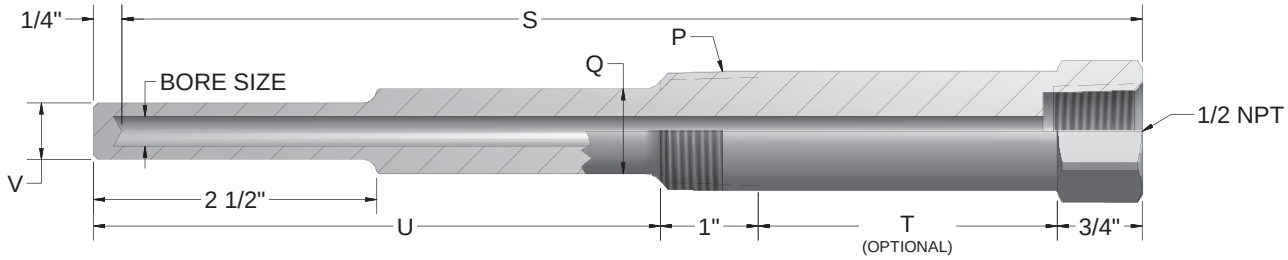
Thermowell Options and Specifications

The following options are available on Pyromation thermowells. Please contact our sales department for information and current pricing.

Documentation/Testing	
Certificate of Compliance	C of C
Hydrostatic Test (Internal or External)	ASTM E1003 Compliant
Liquid Dye Penetrant Test	ASTM E165 Compliant
Material Test Reports	MTR
NACE	NACE Certification available for applicable materials. (Barstock thermowells meet this specification. Flanged thermowells can be heat treated to comply.)
Positive Material Identification (PMI)	X-Ray Fluorescence Spectrometry
Surface Roughness Test	ASME B46.1
Wake Frequency Calculation	ASME PTC 19.3 TW
Weld X-Ray Inspection	Call for Pricing
Services	
Expedited Delivery	Call for Pricing
Oxygen cleaning	ASTM G93 Compliant (when specified)
Stamping	10 Characters Maximum
Full-Penetration Weld	Performed by welders certified to ASME Section IX, Boiler and Pressure Vessel Code
Components/Coatings	
Abrasive Coatings	Call for Pricing
Plug and Chain - Brass	Call for Pricing
Plug and Chain - Stainless Steel	Call for Pricing
Ring-Joint Flange	Call for Pricing
Tantalum Jacket	Call for Pricing
FEP Coating	Call for Pricing
Industry Specifications	
Canadian Registration Numbers (CRN)	ASME B31.3 Process Piping
Flanged Thermowells	ASME B16.5 prior to fabrication
Heat Treating	Stress relief, annealing, and custom heat treating available upon request.
Material	ASTM Compliance and other applicable National Standards
Pipe Threads	ASME B1.20.1
Sanitary Thermowells	3-A Sanitary Council Standard. Authorization Number: 487 32 µin R_a Food Grade Surface Finish
Manufacturing Tolerances and Maximums	
"S" Length Maximum	32" maximum for standard drilled thermowells. For over 32” or for multi-piece construction, consult factory.
Bore "Bottom" Shape	"W" (nominal)
Bore Concentricity	± 10% of minimum wall thickness
Bore Depth	±0.020" (through 32.00")
Bore Diameter	+0.005" / -0.003" (bore sizes 0.125" through 0.406" I.D.)
Insertion Length	Lengths up to 22.50" ± 0.0625". Lengths from 22.50" through 48" ±0.125". Lengths over 48" ±0.25".
Stem Outside Diameter	±0.010”
Tapered Allowance	Maximum tapered length is 16.00”. “U” dimensions greater than 16.00” in length are manufactured with a straight O.D. beginning below the process connection radius and following throughout with only the last 16.00” of “U” dimension tapered to minor O.D.
Surface Finish	32 µin R_a standard
Internal Threads	1/2"-14 - NPT per ANSI B1.20.1 (1 to 3 turns deep per UL 866 and CSA C22.2 No. 30-M1986)
Marking	Standard marking includes material grade, material traceability codes, and CRN when applicable on drilled barstock and flanged thermowells

Standard-Duty, Threaded Thermowells

Standard-Duty, Threaded Thermowells are available in a variety of materials, process connection sizes, lengths, and optional lagging extensions. Thermowell specifications should be determined based on process conditions which include strength, temperature, pressure and corrosion-resistance requirements. The stepped construction is used in standard-duty applications and increases the speed of response while maintaining mechanical strength. These thermowells are designed with standard 0.260" bore diameters to accommodate sensing elements with a 0.252" maximum diameter. These wells are available as separate components or as part of complete sensor assemblies.



Wells are made from round bar with milled wrench hex. 1 1/4" NPT and 1 1/2" NPT wells are supplied as round bar with milled wrench flats.

("U" length for non-lagging wells) = "S" -1 1/2"
("U" length for lagging wells) = "S" -1 1/2" -"T"
(To solve for "T"), "T" = "S" -"U" -1 1/2" (When "U" and "S" are specified)

Thermowell Dimensions

"P"	"Q"	"V"
1/2" NPT	5/8" Dia.	1/2" Dia.
3/4" NPT	3/4" Dia.	1/2" Dia.
1" NPT	7/8" Dia.	1/2" Dia.
1 1/4" NPT	1 1/4" Dia.	7/8" Dia.
1 1/2" NPT	1 1/2" Dia.	7/8" Dia.

ORDER CODES

Example Order Number:

1-0	1-1	1-2	1-3	1-4	1-5	1-6
S	4	D	06	08	T2	C8S

1-0 Well Type

CODE	DESCRIPTION
S	Standard-duty threaded

1-1 Bore Size

CODE	DESCRIPTION
4	0.260" Dia. bore

1-2 Pipe Size "P"

CODE	DESCRIPTION
C	1/2" NPT
D	3/4" NPT
E	1" NPT
F	1 1/4" NPT
G	1 1/2" NPT

1-3 "S" Length

CODE	DESCRIPTION
XX	Specify length in inches using two digits plus fractional length

1-4 Material

CODE	DESCRIPTION
XX	Specify two digit material code as stated in the Thermowell Material Table located earlier in section

1-5 Optional "T" Lag Dimension

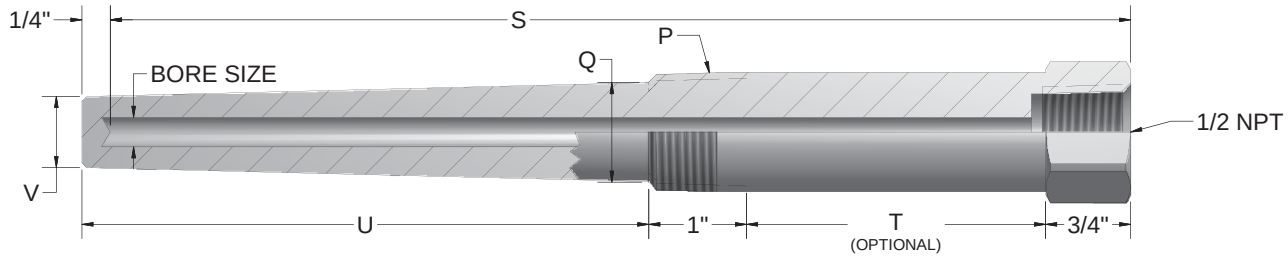
CODE	DESCRIPTION
Leave blank if no lag is required	
T__	Specify "T" dimension in inches

1-6 Options

CODE	DESCRIPTION
C8	316 stainless steel well cap and chain
C22	Brass well cap and chain
S	Well stamped with customer-specified part number

Heavy-Duty, Threaded Thermowells

Heavy-Duty, Threaded Thermowells are available in a variety of materials, process connection sizes, lengths and optional lagging extensions. Thermowell specifications should be determined based on process conditions which include strength, temperature, pressure and corrosion-resistance requirements. They are designed with a standard 0.260" or 0.385" bore diameter to accommodate sensing elements with either a 0.252" or 0.377" maximum diameter, respectively. The tapered design is suited for heavy-duty applications where greater rigidity is required for increased pressure and flow due to process conditions. These wells are available as separate components or as part of complete sensor assemblies.



Wells are made from round bar with milled wrench hex. 1 1/4" NPT and 1 1/2" NPT wells are supplied as round bar with milled wrench flats.

("U" length for non-lagging wells) = "S" -1 1/2"
("U" length for lagging wells) = "S" -1 1/2" -"T"
(To solve for "T"), "T" = "S" -"U" -1 1/2" (When "U" and "S" are specified)
Maximum tapered length is 16"

Thermowell Dimensions

"P"	"Q"	"V" (0.260")	"V" (0.385")
1/2" NPT	11/16" Dia.	5/8" Dia.	N/A
3/4" NPT	7/8" Dia.	5/8" Dia.	49/64" Dia.
1" NPT	1 1/16" Dia.	5/8" Dia.	49/64" Dia.
1 1/4" NPT	1 3/8" Dia.	7/8" Dia.	7/8" Dia.
1 1/2" NPT	1 5/8" Dia.	1" Dia.	1" Dia.

ORDER CODES

Example Order Number:

1-0	1-1	1-2	1-3	1-4	1-5	1-6
H	4	D	06	08	T2	C8S

1-0 Well Type

CODE	DESCRIPTION
H	Heavy-duty threaded

1-1 Bore Size

CODE	DESCRIPTION
4	0.260" Dia. bore
6	0.385" Dia. bore

1-2 Pipe Size "P"

CODE	DESCRIPTION
C [1]	1/2" NPT
D	3/4" NPT
E	1" NPT
F	1 1/4" NPT
G	1 1/2" NPT

[1] Not available with 0.385" Dia. Bore

1-3 "S" Length

CODE	DESCRIPTION
XX	Specify length in inches using two digits plus fractional length

1-4 Material

CODE	DESCRIPTION
XX	Specify two digit material code as stated in the Thermowell Material Table located earlier in section

1-5 Optional "T" Lag Dimension

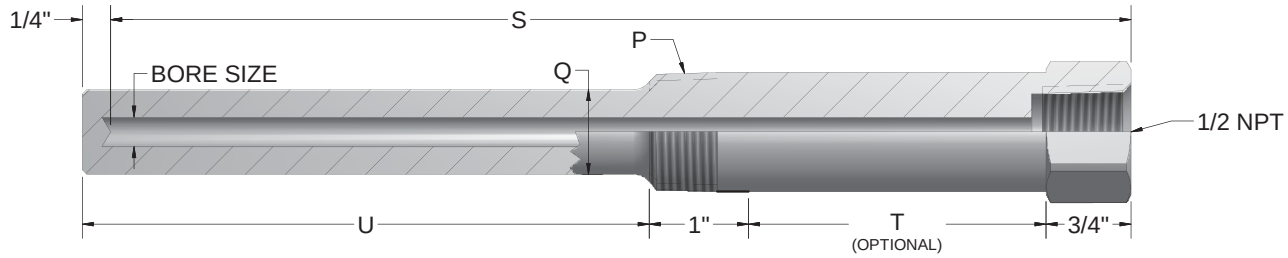
CODE	DESCRIPTION
Leave blank if no lag is required	
T__	Specify "T" dimension in inches

1-6 Options

CODE	DESCRIPTION
C8	316 stainless steel well cap and chain
C22	Brass well cap and chain
S	Well stamped with customer-specified part number

Straight-Shank, Threaded Thermowells

Straight-Shank, Threaded Thermowells are available in a variety of materials, process connection sizes, lengths, and optional lagging extensions. Thermowell specifications should be determined based on process conditions which include strength, temperature, pressure and corrosion-resistance requirements. They are designed with a standard 0.260" or 0.385" bore diameter to accommodate sensing elements with either a 0.252" or 0.377" maximum diameter, respectively. These wells are available as separate components or as part of complete sensor assemblies.



Wells are made from round bar with milled wrench hex. 1 1/4" NPT and 1 1/2" NPT wells are supplied as round bar with milled wrench flats.

("U" length for non-lagging wells) = "S" -1 1/2"
("U" length for lagging wells) = "S" -1 1/2" -"T"
(To solve for "T"), "T" = "S" -"U" -1 1/2" (When "U" and "S" are specified)

Thermowell Dimensions

"P"	"Q"
1/2" NPT	5/8" Dia.
3/4" NPT	3/4" Dia.
1" NPT	7/8" Dia.
1 1/4" NPT	1 1/4" Dia.
1 1/2" NPT	1 1/2" Dia.

ORDER CODES

Example Order Number:

1-0	1-1	1-2	1-3	1-4	1-5	1-6
ST	4	D	09	08	T2	C8S

1-0 Well Type

CODE	DESCRIPTION
ST	Straight-shank threaded

1-1 Bore Size

CODE	DESCRIPTION
4	0.260 Dia. bore
6	0.385" Dia. bore

1-2 Pipe Size "P"

CODE	DESCRIPTION
C	1/2" NPT
D	3/4" NPT
E	1" NPT
F	1 1/4" NPT
G	1 1/2" NPT

1-3 "S" Length

CODE	DESCRIPTION
XX	Specify length in inches using two digits plus fractional length

1-4 Material

CODE	DESCRIPTION
XX	Specify two digit material code as stated in the Thermowell Material Table located earlier in section

1-5 Optional "T" Lag Dimension

CODE	DESCRIPTION
Leave blank if no lag is required	
T__	Specify "T" dimension in inches

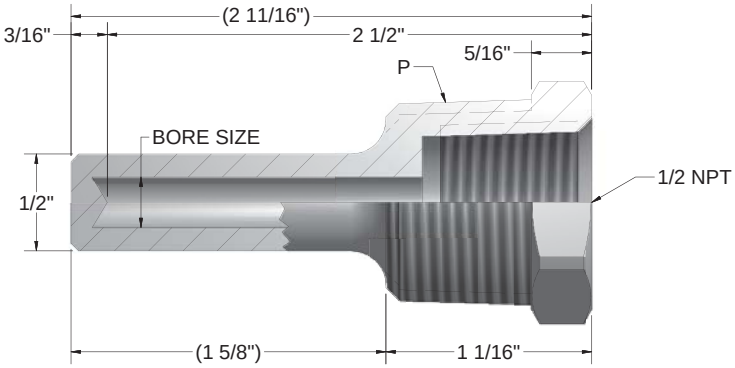
1-6 Options

CODE	DESCRIPTION
C8	316 stainless steel well cap and chain
C22	Brass well cap and chain
S	Well stamped with customer-specified part number

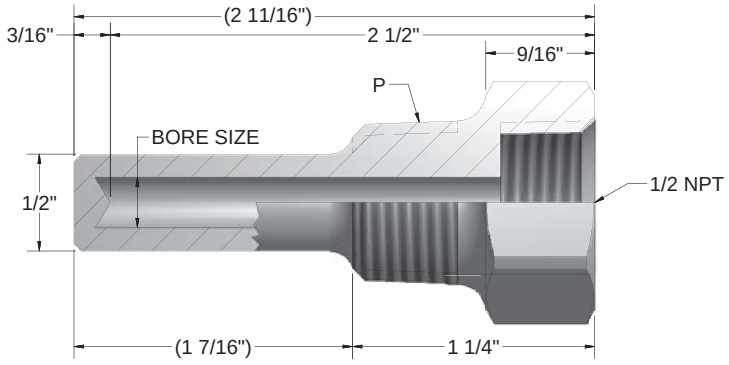
Limited-Space Thermowells

Limited-Space Thermowells are available in a variety of materials and process connection sizes. Thermowell specifications should be determined based on process conditions which include strength, temperature, pressure and corrosion-resistance requirements. They are intended for use in piping systems where space is limited. They are designed with a standard 0.260" bore diameter to accommodate sensing elements with a 0.252" maximum diameter. These wells are available as separate components or as part of complete sensor assemblies.

3/4" and 1" NPT



1/2" NPT



ORDER CODES

Example Order Number:

1-0	1-1	1-2		1-3	1-4
LS	4	D	2.5	08	C8

1-0 Well Type

CODE	DESCRIPTION
LS	Limited-space threaded

1-1 Bore Size

CODE	DESCRIPTION
4	0.260" Dia. bore

1-2 Pipe Size "P"

CODE	DESCRIPTION
C	1/2" NPT
D	3/4" NPT
E	1" NPT

1-3 Material

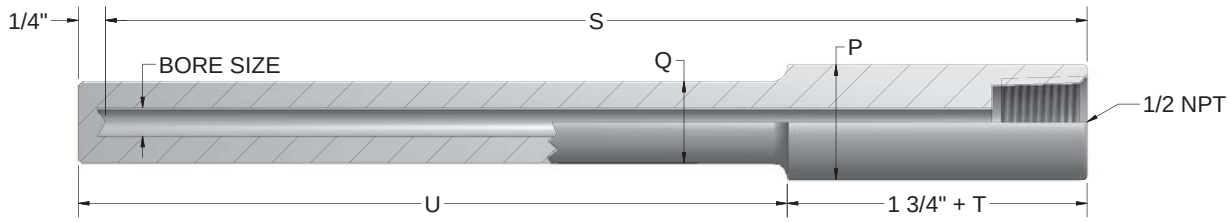
CODE	DESCRIPTION
XX	Specify two digit material code as stated in the Thermowell Material Table located earlier in section

1-4 Options

CODE	DESCRIPTION
C8	316 stainless steel well cap and chain
C22	Brass well cap and chain
S	Well stamped with customer-specified part number

Straight-Shank, Socket-Weld Thermowells

Straight-Shank, Socket-Weld Thermowells are available in a variety of materials, process connection sizes, lengths, and optional lagging extensions. Thermowell specifications should be determined based on process conditions which include strength, temperature, pressure and corrosion-resistance requirements. The Straight-Shank Socket-Weld is designed to be used with a 3000 class weld-o-let which allows the thermowell to be welded permanently into the process. They are designed with a standard 0.260" or 0.385" bore diameter to accommodate sensing elements with either a 0.252" or 0.377" maximum diameter, respectively. These wells are available as separate components or as part of complete sensor assemblies.



("U" length for non-lagging wells) = "S" -1 1/2"
("U" length for lagging wells) = "S" -1 1/2" -"T"
(To solve for "T"), "T" = "S" -"U" -1 1/2" (When "U" and "S" are specified)

Thermowell Dimensions

"P" PIPE SIZE		"Q"
NOM.	DIA.	
3/4"	1.050"	3/4" Dia.
1"	1.315"	7/8" Dia.
1 1/4"	1.660"	1 1/4" Dia.
1 1/2"	1.900"	1 1/2" Dia.

ORDER CODES

Example Order Number:

1-0	1-1	1-2	1-3	1-4	1-5	1-6
SW	4	D	09	08	T2	C8S

1-0 Well Type

CODE	DESCRIPTION
SW	Straight- shank socket-weld

1-1 Bore Size

CODE	DESCRIPTION
4	0.260" Dia. bore
6	0.385" Dia. bore

1-2 Pipe Size "P"

CODE	DESCRIPTION
D	3/4" NPS
E	1" NPS
F	1 1/4" NPS
G	1 1/2" NPS

1-3 "S" Length

CODE	DESCRIPTION
XX	Specify length in inches using two digits plus fractional length

1-4 Material

CODE	DESCRIPTION
XX	Specify two digit material code as stated in the Thermowell Material Table located earlier in section

1-5 Optional "T" Lag Dimension

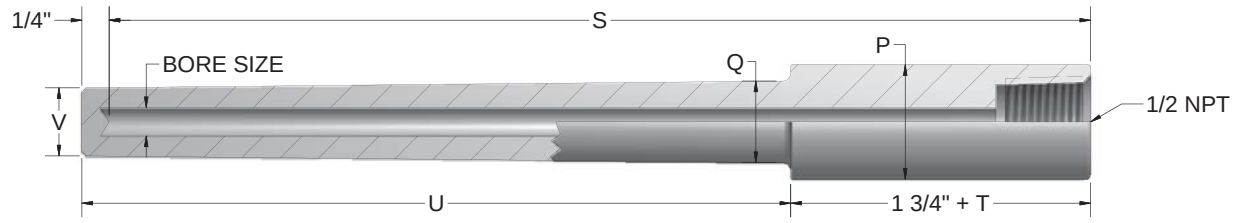
CODE	DESCRIPTION
Leave blank if no lag is required	
T__	Specify "T" dimension in inches

1-6 Options

CODE	DESCRIPTION
C8	316 stainless steel well cap and chain
C22	Brass well cap and chain
S	Well stamped with customer-specified part number

Heavy-Duty, Socket-Weld Thermowells

Heavy-Duty, Socket-Weld Thermowells are available in a variety of materials, process connection sizes, lengths and optional lagging extensions. Thermowell specifications should be determined based on process conditions which include strength, temperature, pressure and corrosion-resistance requirements. The Heavy-Duty Socket-Weld is designed to be used with a 3000 class weld-o-let which allows the thermowell to be welded permanently into the process. They are designed with a standard 0.260" or 0.385" bore diameter to accommodate sensing elements with a 0.252" or 0.377" maximum diameter, respectively. The tapered design is suited for heavy-duty applications where greater rigidity is required due to process conditions. These wells are available as separate components or as part of complete sensor assemblies.



Thermowell Dimensions

"P" PIPE SIZE		"Q"	"V" 0.260	"V" 0.385
NOM.	DIA.			
3/4"	1.050"	3/4" Dia.	5/8" Dia.	5/8" Dia.
1"	1.315"	7/8" Dia.	5/8" Dia.	49/64" Dia.
1 1/4"	1.660"	1 1/4" Dia.	7/8" Dia.	7/8" Dia.
1 1/2"	1.900"	1 1/2" Dia.	7/8" Dia.	7/8" Dia.

("U" length for non-lagging wells) = "S" -1 1/2"
("U" length for lagging wells) = "S" -1 1/2" -"T"
(To solve for "T"), "T" = "S" -"U" -1 1/2" (When "U" and "S" are specified)

ORDER CODES

Example Order Number:

1-0	1-1	1-2	1-3	1-4	1-5	1-6
HW	4	D	09	08	T2	C8S

1-0 Well Type

CODE	DESCRIPTION
HW	Heavy-duty socket-weld

1-1 Bore Size

CODE	DESCRIPTION
4	0.260" Dia. bore
6	0.385" Dia. bore

1-2 Pipe Size "P"

CODE	DESCRIPTION
D	3/4" NPS
E	1" NPS
F	1 1/4" NPS
G	1 1/2" NPS

1-3 "S" Length

CODE	DESCRIPTION
XX	Specify length in inches using two digits plus fractional length

1-4 Material

CODE	DESCRIPTION
XX	Specify two digit material code as stated in the Thermowell Material Table located earlier in section

1-5 Optional "T" Lag Dimension

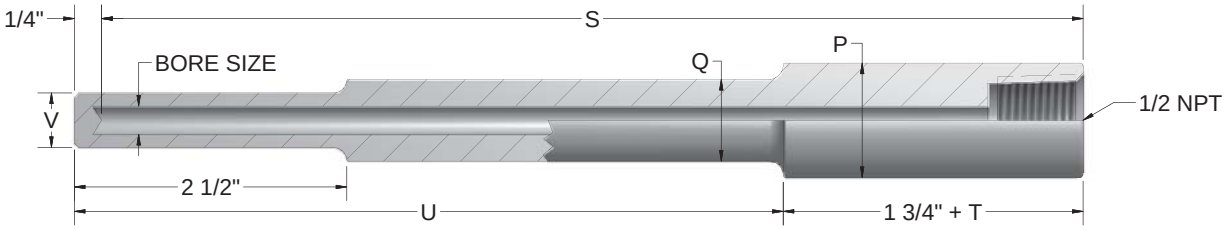
CODE	DESCRIPTION
Leave blank if no lag is required	
T__	Specify "T" dimension in inches

1-6 Options

CODE	DESCRIPTION
C8	316 stainless steel well cap and chain
C22	Brass well cap and chain
S	Well stamped with customer-specified part number

Reduced-Tip, Socket-Weld Thermowells

Reduced-Tip, Socket-Weld Thermowells are available in a variety of materials, process connection sizes, lengths, and optional lagging extensions. Thermowell specifications should be determined based on process conditions which include strength, temperature, pressure and corrosion-resistance requirements. The Reduced-Tip Socket-Weld is designed to be used with a class 3000 weld-o-let which allows the thermowell to be welded permanently into the process. The stepped construction is used in standard-duty applications and increases the speed of response while maintaining mechanical strength.They are designed with standard 0.260" bore diameters to accommodate sensing elements with a 0.252" maximum diameter. These wells are available as separate components or as part of complete sensor assemblies.



("U" length for non-lagging wells) = "S" -1 1/2"
("U" length for lagging wells) = "S" -1 1/2" -"T"
(To solve for "T"), "T" = "S" -"U" -1 1/2" (When "U" and "S" are specified)

Thermowell Dimensions

"P" PIPE SIZE		"Q"	"V"
NOM.	DIA.		
3/4"	1.050"	3/4" Dia.	1/2" Dia.
1"	1.315"	7/8" Dia.	1/2" Dia.
1 1/4"	1.660"	1 1/4" Dia.	7/8" Dia.
1 1/2"	1.900"	1 1/2" Dia.	7/8" Dia.

ORDER CODES

Example Order Number:

1-0	1-1	1-2	1-3	1-4	1-5	1-6
RW	4	D	09	08	T2	C8S

1-0 Well Type

CODE	DESCRIPTION
RW	Reduced-tip socket-weld

1-1 Bore Size

CODE	DESCRIPTION
4	0.260" Dia. bore

1-2 Pipe Size "P"

CODE	DESCRIPTION
D	3/4" NPS
E	1" NPS
F	1 1/4" NPS
G	1 1/2" NPS

1-3 "S" Length

CODE	DESCRIPTION
XX	Specify length in inches using two digits plus fractional length

1-4 Material

CODE	DESCRIPTION
XX	Specify two digit material code as stated in the Thermowell Material Table located earlier in section

1-5 Optional "T" Lag Dimension

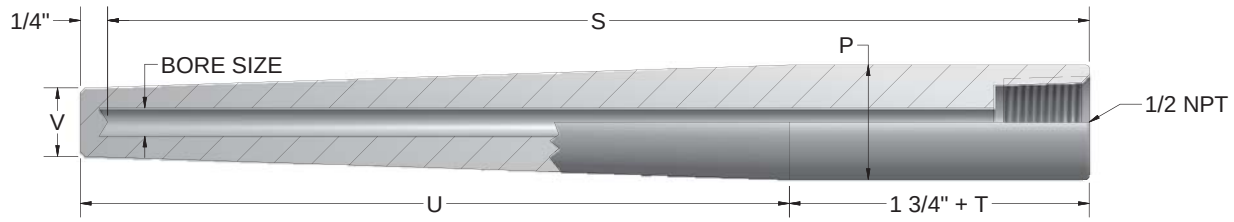
CODE	DESCRIPTION
Leave blank if no lag is required	
T__	Specify "T" dimension in inches

1-6 Options

CODE	DESCRIPTION
C8	316 stainless steel well cap and chain
C22	Brass well cap and chain
S	Well stamped with customer-specified part number

Weld-In Thermowells

Weld-In Thermowells are available in a variety of materials, process connection sizes, lengths and optional lagging extensions. Thermowell specifications should be based on process conditions which include strength, temperature, pressure and corrosion-resistance requirements. Weld-In thermowells are welded directly into the process apparatus. They are designed with a standard 0.260" or 0.385" bore diameter to accommodate sensing elements with a 0.252" or 0.377" maximum diameter, respectively. The tapered design is suited for heavy-duty applications where greater rigidity is required due to process conditions. These wells are available as separate components or as part of complete sensor assemblies.



Thermowell Dimensions

"P" PIPE SIZE		"V" (0.260")	"V" (0.385")
NOM.	DIA.		
3/4"	1.050"	5/8" Dia.	49/64" Dia.
1"	1.315"	49/64" Dia.	49/64" Dia.
1 1/4"	1.660"	1" Dia.	1" Dia.
1 1/2"	1.900"	1 1/8" Dia.	1 1/8" Dia.

("U" length for non-lagging wells) = "S" -1 1/2"
("U" length for lagging wells) = "S" -1 1/2" -"T"
(To solve for "T"), "T" = "S" -"U" -1 1/2" (When "U" and "S" are specified)

ORDER CODES

Example Order Number:

1-0	1-1	1-2	1-3	1-4	1-5	1-6
WI	4	D	09	08	T2	C8S

1-0 Well Type

CODE	DESCRIPTION
WI	Weld-In

1-1 Bore Size

CODE	DESCRIPTION
4	0.260" Dia. bore
6	0.385" Dia. bore

1-2 Pipe Size "P"

CODE	DESCRIPTION
D	3/4" NPS
E	1" NPS
F	1 1/4" NPS
G	1 1/2" NPS

1-3 "S" Length

CODE	DESCRIPTION
XX	Specify length in inches using two digits plus fractional length

1-4 Material

CODE	DESCRIPTION
XX	Specify two digit material code as stated in the Thermowell Material Table located earlier in section

1-5 "T" Lag Dimension

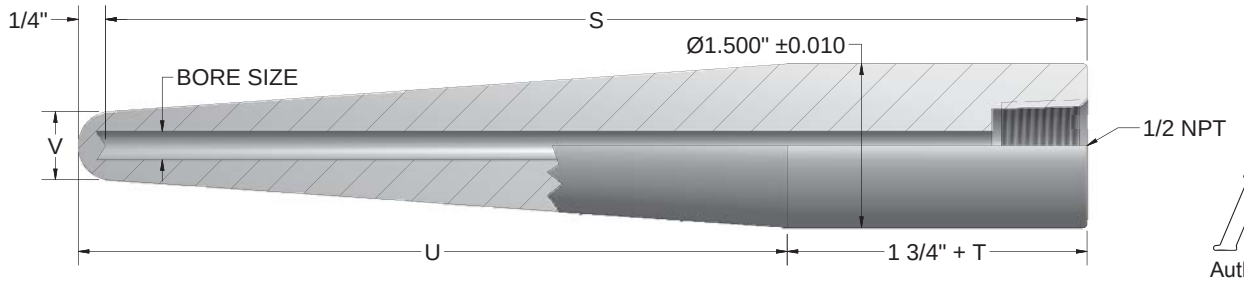
CODE	DESCRIPTION
Leave blank if no lag is required	
T__	Specify "T" dimension in inches

1-6 Options

CODE	DESCRIPTION
C8	316 stainless steel well cap and chain
C22	Brass well cap and chain
S	Well stamped with customer-specified part number

Sanitary, Weld-In Thermowells

Sanitary, Weld-In Thermowells are offered in 304 and 316 stainless steel. They are available in a variety of lengths, process connection sizes, and optional lagging extensions. This type of thermowell is designed to be welded into a tank or vat with a full crevice-free fillet-weld to prevent corrosion, bacteria growth, and product contamination. Thermowells are supplied with a surface finish that meets or exceeds 32µin R_a. Surface finishes of 15µin R_a or better are available upon request. These thermowells are designed with standard 0.260" or 0.385" bore diameter to accommodate sensing elements with a 0.252" or 0.377" maximum diameter, respectively. These wells are available as separate components or as part of complete sensor assemblies.



Authorized 74-

("U" length for non-lagging wells) = "S" -1 1/2"
("U" length for lagging wells) = "S" -1 1/2" -"T"
(To solve for "T"), "T" = "S" -"U" -1 1/2" (When "U" and "S" are specified)

Thermowell Dimensions

BORE SIZE	"V"
0.260" Dia.	5/8" Dia.
0.385" Dia.	49/64" Dia.

ORDER CODES

Example Order Number:

1-0	1-1	1-2	1-3	1-4	1-5	1-6
WS	4	09	08	T2	C8S	

1-0 Well Type

CODE	DESCRIPTION
WS	Sanitary weld-in

1-1 Bore Size

CODE	DESCRIPTION
4	0.260 Dia. bore
6	0.385 Dia. bore

1-2 "S" Length

CODE	DESCRIPTION
XX	Specify length in inches using two digits plus fractional length

1-5 Options

CODE	DESCRIPTION
C8	316 stainless steel well cap and chain
C22	Brass well cap and chain
S	Well stamped with customer-specified part number

1-4 Optional "T" Lag Dimension

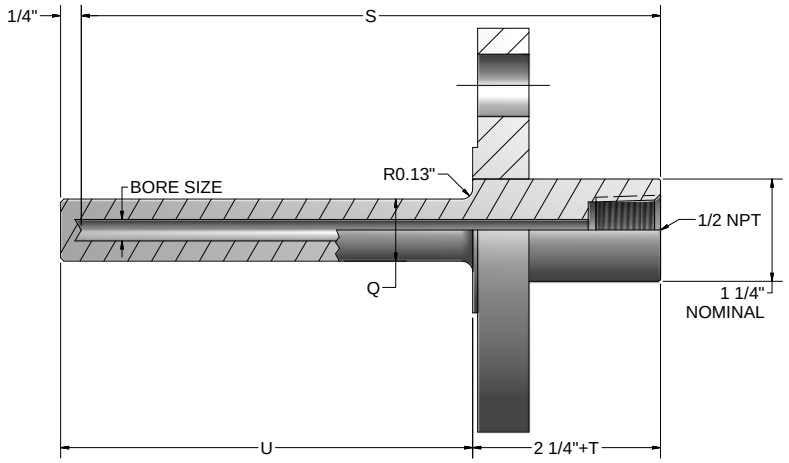
CODE	DESCRIPTION
Leave blank if no lag is required	
T__	Specify "T" dimension in inches

1-3 Material

CODE	DESCRIPTION
08	316 stainless steel
09	304 stainless steel

Standard Flanged Thermowells

Standard Flanged Thermowells are available in a variety of materials, flange types, flange sizes, and pressure ratings. They are also available in various lengths and with optional lagging extensions. Thermowell specifications should be determined based on process conditions which include strength, temperature, pressure and corrosion-resistance requirements. Standard flanged thermowells are supplied with a straight shank and are designed with a 0.260" or 0.385" bore diameter to accommodate sensing elements with a 0.252" or 0.377 maximum diameter, respectively. These wells are available as separate components or as part of complete sensor assemblies.



("U" length for non-lagging wells) = "S" - 2"
("U" length for lagging wells) = "S" - 2" - "T"
(To solve for "T"), "T" = "S" - "U" - 2" (When "U" and "S" are specified)

Thermowell Dimensions

BORE	"Q" Dim.
0.260	3/4"
0.385	7/8"

ORDER CODES

Example Order Number:

1-0	1-1	1-2	1-3	1-4	1-5	1-6	1-7	1-8
SF	4	15	R	1	09	08	T2	C8S

1-0 Well Type

CODE	DESCRIPTION
SF	Standard flanged

1-1 Bore Size

CODE	DESCRIPTION
4	0.260" Dia. bore
6	0.385" Dia. bore

1-2 Flange Size

CODE	DESCRIPTION
10	1" (DN 25)
13	1 1/4" (DN 32)
15	1 1/2" (DN 40)
20	2" (DN 50)
30	3" (DN 80)

1-3 Flange Type

CODE	DESCRIPTION
F	Flat face
J	Ring joint
R	Raised face

1-4 Pressure Rating

CODE	DESCRIPTION
1	150 Class
3	300 Class
6	600 Class
9	900 Class
15	1500 Class

1-8 Options

CODE	DESCRIPTION
C8	316 stainless steel well cap and chain
C22	Brass well cap and chain
F	Full penetration weld
S	Well stamped with customer-specified part number

1-7 Optional "T" Lag Dimension

CODE	DESCRIPTION
Leave blank if no lag is required	
T__	Specify "T" dimension in inches using two digits plus any fractional length

1-6 Material

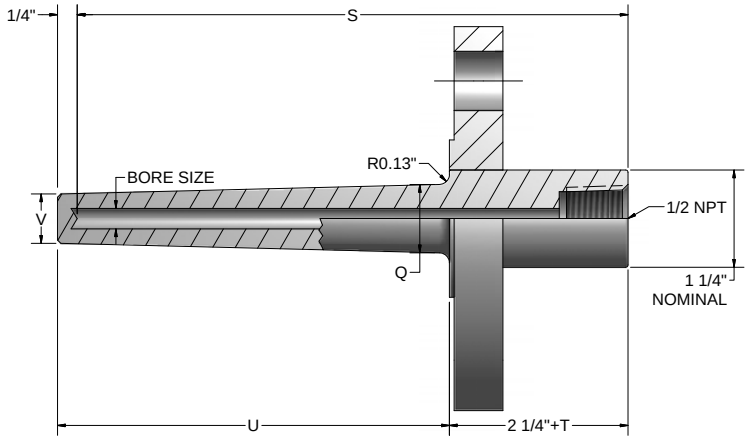
CODE	DESCRIPTION
XX	Specify two digit material code as stated in the Thermowell Material Table located earlier in section

1-5 "S" Length

CODE	DESCRIPTION
XX	Specify length in inches using two digits plus fractional length

Heavy-Duty, Flanged Thermowells

Heavy-Duty, Flanged Thermowells are available in a variety of materials, flange types, flange sizes, and pressure ratings. They are also available in various lengths and with optional lagging extensions. Thermowell specifications should be determined based on process conditions which include strength, temperature, pressure and corrosion-resistance requirements. Heavy-duty flanged thermowells are supplied with a 0.260" or 0.385" bore diameter to accommodate sensing elements with a 0.252" or 0.377" maximum diameter, respectively. The tapered design is suited for heavy-duty applications where greater rigidity is required for increased pressure and flow due to process conditions. These wells are available as separate components or as part of complete sensor assemblies.



Maximum tapered length is 16"
("U" length for non-lagging wells) = "S" - 2"
("U" length for lagging wells) = "S" - 2" - "T"
(To solve for "T"), "T" = "S" - "U" - 2" (When "U" and "S" are specified)

Thermowell Dimensions

FLANGE	"Q" (0.260")	"V"(0.260")	"V"(0.385")
1"	7/8" Dia.	5/8" Dia.	49/64" Dia.
1 1/4" thru 3"	1 1/16" Dia.	5/8" Dia.	49/64" Dia.

ORDER CODES

Example Order Number:

1-0	1-1	1-2	1-3	1-4	1-5	1-6	1-7	1-8
HF	4	15	R	1	09	08	T2	C8S

1-0 Well Type

CODE	DESCRIPTION
HF	Heavy-duty flanged

1-1 Bore Size

CODE	DESCRIPTION
4	0.260" Dia. bore
6	0.385" Dia. bore

1-2 Flange Size

CODE	DESCRIPTION
10	1" (DN 25)
13	1 1/4" (DN 32)
15	1 1/2" (DN 40)
20	2" (DN 50)
30	3" (DN 80)

1-3 Flange Type

CODE	DESCRIPTION
F	Flat face
J	Ring joint
R	Raised face

1-4 Pressure Rating

CODE	DESCRIPTION
1	150 Class
3	300 Class
6	600 Class
9	900 Class
15	1500 Class

1-5 "S" Length

CODE	DESCRIPTION
XX	Specify length in inches using two digits plus fractional length

1-6 Material

CODE	DESCRIPTION
XX	Specify two digit material code as stated in the Thermowell Material Table located earlier in section

1-7 Optional "T" Lag Dimension

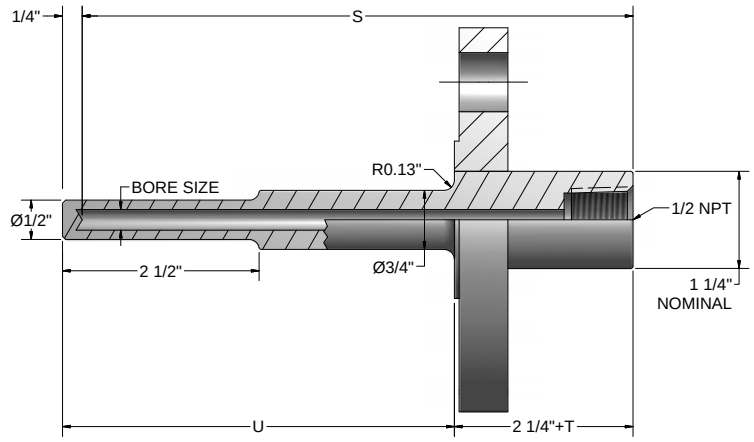
CODE	DESCRIPTION
Leave blank if no lag is required	
T__	Specify "T" dimension in inches

1-8 Options

CODE	DESCRIPTION
C8	316 stainless steel well cap and chain
C22	Brass well cap and chain
F	Full penetration weld
S	Well stamped with customer specified part number

Reduced-Tip Flanged Thermowells

Reduced-Tip, Flanged Thermowells are available in a variety of materials, flange types, flange sizes, and pressure ratings. They are also available in various lengths and with optional lagging extensions. Thermowell specifications should be determined based on process conditions which include strength, temperature, pressure and corrosion-resistance requirements. The stepped construction is normally used in standard-duty applications, and increases the speed of response while maintaining mechanical strength. They are designed with standard 0.260" bore diameters to accommodate sensing elements with a 0.252" maximum diameter. These wells are available as separate components or as part of complete sensor assemblies.



("U" length for non-lagging wells) = "S" - 2"
("U" length for lagging wells) = "S" - 2" - "T"
(To solve for "T"), "T" = "S" - "U" - 2" (When "U" and "S" are specified)

ORDER CODES

Example Order Number:

1-0	1-1	1-2	1-3	1-4	1-5	1-6	1-7	1-8
RF	4	15	R	1	09	08	T2	C8S

1-0 Well Type

CODE	DESCRIPTION
RF	Reduced-tip flanged

1-1 Bore Size

CODE	DESCRIPTION
4	0.260" Dia. bore

1-2 Flange Size

CODE	DESCRIPTION
10	1" (DN 25)
13	1 1/4" (DN 32)
15	1 1/2" (DN 40)
20	2" (DN 50)
30	3" (DN 80)

1-3 Flange Type

CODE	DESCRIPTION
F	Flat face
J	Ring joint
R	Raised face

1-4 Pressure Rating

CODE	DESCRIPTION
1	150 Class
3	300 Class
6	600 Class
9	900 Class
15	1500 Class

1-5 "S" Length

CODE	DESCRIPTION
XX	Specify length in inches using two digits plus fractional length

1-6 Material

CODE	DESCRIPTION
XX	Specify two digit material code as stated in the Thermowell Material Table located earlier in section

1-7 Optional "T" Lag Dimension

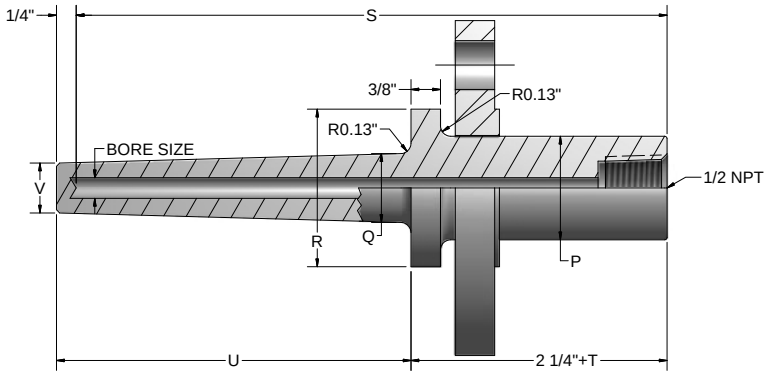
CODE	DESCRIPTION
Leave blank if no lag is required	
T__	Specify "T" dimension in inches

1-8 Options

CODE	DESCRIPTION
C8	316 stainless steel well cap and chain
C22	Brass well cap and chain
F	Full penetration weld
S	Well stamped with customer specified part number

Heavy-Duty Van Stone Thermowells

Heavy-Duty Van Stone Thermowells are available in a variety of materials, flange sizes, and pressure ratings. They are also available in various lengths and with optional lagging extensions. Thermowell specifications should be determined based on process conditions which include strength, temperature, pressure and corrosion-resistance requirements. Heavy-duty Van Stone thermowells are supplied with a 0.260" or 0.385" bore diameter to accommodate sensing elements with 0.252" or 0.377" maximum diameter, respectively. Van Stone thermowells are connected using a separate and reusable backing flange, eliminating the need for expensive flange materials. The tapered design is suited for heavy-duty applications where greater rigidity is required for increased pressure and flow due to process conditions. These wells are available as separate components or as part of complete sensor assemblies.



Maximum tapered length is 16"
("U" length for non-lagging wells) = "S" - 2"
("U" length for lagging wells) = "S" - 2" -"T"
(To solve for "T"), "T" = "S" -"U" - 2" (When "U" and "S" are specified)

Thermowell Dimensions					
"P" PIPE SIZE		"R" DIA.	"Q" DIA.	"V" 0.260" DIA.	"V" 0.385" DIA.
NOM.	DIA.				
1"	1.315"	2"	7/8"	5/8"	49/64"
1 1/2"	1.900"	2 7/8"	1 1/16"	5/8"	49/64"

ORDER CODES

Example Order Number:

1-0	1-1	1-2	1-3	1-4	1-5	1-6	1-7	1-8
HF	4	15	V	1	09	08	T2	C8S

1-0 Well Type

CODE	DESCRIPTION
HF	Heavy-Duty Van Stone

1-1 Bore Size

CODE	DESCRIPTION
4	0.260" Dia. bore
6	0.385" Dia. bore

1-2 Flange Size

CODE	DESCRIPTION
10	1" (DN 25)
15	1 1/2" (DN 40)

1-3 Flange Type

CODE	DESCRIPTION
V	Van Stone (lap joint)

1-4 Pressure Rating

CODE	DESCRIPTION
0	No backing flange
1	150 Class
3	300 Class
6	600 Class
9	900 Class
15	1500 Class
Carbon steel lap joint flange standard	

1-5 "S" Length

CODE	DESCRIPTION
XX	Specify length in inches using two digits plus fractional length

1-6 Material

CODE	DESCRIPTION
XX	Specify two digit material code as stated in the Thermowell Material Table located earlier in section

1-7 "T" Lag Dimension

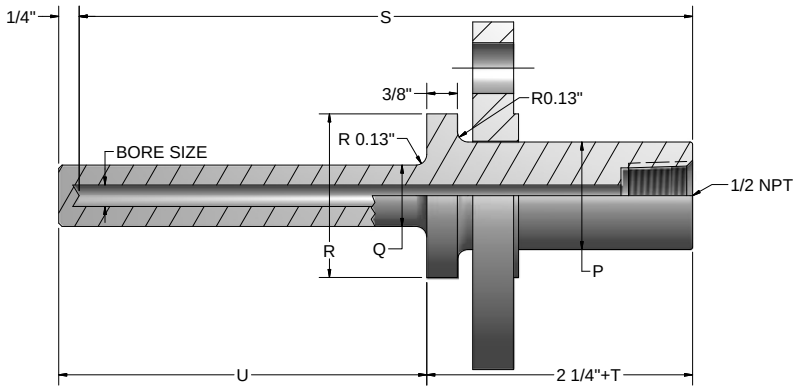
CODE	DESCRIPTION
Leave blank if no lag is required	
T__	Specify "T" dimension in inches using two digits plus any fractional length

1-8 Options

CODE	DESCRIPTION
C8	316 stainless steel well cap and chain
C22	Brass well cap and chain
S	Well stamped with customer-specified part number

Straight Van Stone Thermowells

Straight Van Stone Thermowells are available in a variety of materials, flange sizes, and pressure ratings. They are also available in various lengths and with optional lagging extensions. Thermowell specifications should be determined based on process conditions which include strength, temperature, pressure and corrosion-resistance requirements. Straight Van Stone thermowells are supplied with a 0.260" or 0.385" bore diameter to accommodate sensing elements with a 0.252" or 0.377" maximum diameter, respectively. Van Stone thermowells are connected using a separate and reusable backing flange, eliminating the need for expensive flange materials. These wells are available as separate components or as part of complete sensor assemblies.



("U" length for non-lagging wells) = "S" - 2"
("U" length for lagging wells) = "S" - 2" - "T"
(To solve for "T"), "T" = "S" - "U" - 2"
(When "U" and "S" are specified)

Thermowell Dimensions

"P" PIPE SIZE		"R" DIA.	"Q" 0.260" DIA.	"Q" 0.385" DIA.
NOM.	DIA.			
1"	1.315"	2"	3/4"	7/8"
1 1/2"	1.900"	2 7/8"	3/4"	7/8"

ORDER CODES

Example Order Number:

1-0	1-1	1-2	1-3	1-4	1-5	1-6	1-7	1-8
SF	4	15	V	1	09	08	T2	C8S

1-0 Well Type

CODE	DESCRIPTION
SF	Straight Van Stone

1-1 Bore Size

CODE	DESCRIPTION
4	0.260" Dia. bore
6	0.385" Dia. bore

1-2 Flange Size

CODE	DESCRIPTION
10	1" (DN25)
15	1 1/2" (DN40)

1-3 Flange Type

CODE	DESCRIPTION
V	Van Stone (lap joint)

1-4 Pressure Rating

CODE	DESCRIPTION
0	No backing flange
1	150 Class
3	300 Class
6	600 Class
9	900 Class
15	1500 Class
Carbon steel lap joint flange standard	

1-5 "S" Length

CODE	DESCRIPTION
XX	Specify length in inches using two digits plus fractional length

1-6 Material

CODE	DESCRIPTION
XX	Specify two digit material code as stated in the Thermowell Material Table located earlier in section

1-7 Optional "T" Lag Dimension

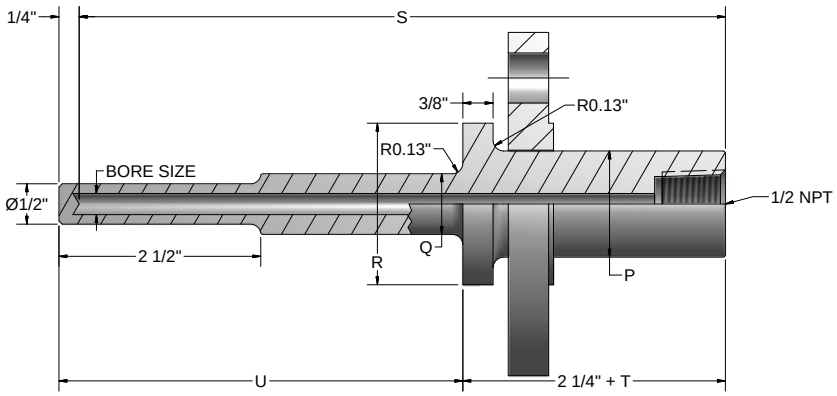
CODE	DESCRIPTION
Leave blank if no lag is required	
T__	Specify "T" dimension in inches

1-8 Options

CODE	DESCRIPTION
C8	316 stainless steel well cap and chain
C22	Brass well cap and chain
S	Well stamped with customer specified part number

Reduced-Tip Van Stone Thermowells

Reduced-Tip Van Stone Thermowells are available in a variety of materials, flange sizes, and pressure ratings. They are also offered in various lengths and with optional lagging extensions. Thermowell specifications should be determined based on process conditions which include strength, temperature, pressure and corrosion-resistance requirements. The Reduced Tip Van Stone thermowell is supplied with a 0.260" bore diameter to accommodate sensing elements with a 0.252" maximum diameter. The stepped construction is normally used in standard-duty applications and increases the speed of response while maintaining mechanical strength. Van Stone thermowells are connected using a separate and reusable backing flange, eliminating the need for expensive flange materials. These wells are available as separate components or as part of complete sensor assemblies.



("U" length for non-lagging wells) = "S" - 2"
("U" length for lagging wells) = "S" - 2" -"T"
(To solve for "T"), "T" = "S" -"U" - 2" (When "U" and "S" are specified)

Thermowell Dimensions

"P" PIPE SIZE NOM.	"P" DIA.	"R" DIA.	"Q" DIA.
1"	1.315"	2"	3/4"
1 1/2"	1.900"	2 7/8"	7/8"

ORDER CODES

Example Order Number:

1-0	1-1	1-2	1-3	1-4	1-5	1-6	1-7	1-8
RF	4	15	V	1	09	08	T2	C8S

1-0 Well Type

CODE	DESCRIPTION
RF	Reduced-Tip Van Stone

1-1 Bore Size

CODE	DESCRIPTION
4	0.260" Dia. bore

1-2 Flange Size

CODE	DESCRIPTION
10	1" (DN25)
15	1 1/2" (DN40)

1-3 Flange Type

CODE	DESCRIPTION
V	Van Stone (lap joint)

1-4 Pressure Rating

CODE	DESCRIPTION
0	No backing flange
1	150 Class
3	300 Class
6	600 Class
9	900 Class
15	1500 Class
Carbon steel backing flange standard	

1-5 "S" Length

CODE	DESCRIPTION
XX	Specify length in inches using two digits plus fractional length

1-6 Material

CODE	DESCRIPTION
XX	Specify two digit material code as stated in the Thermowell Material Table located earlier in section

1-7 Optional "T" Lag Dimension

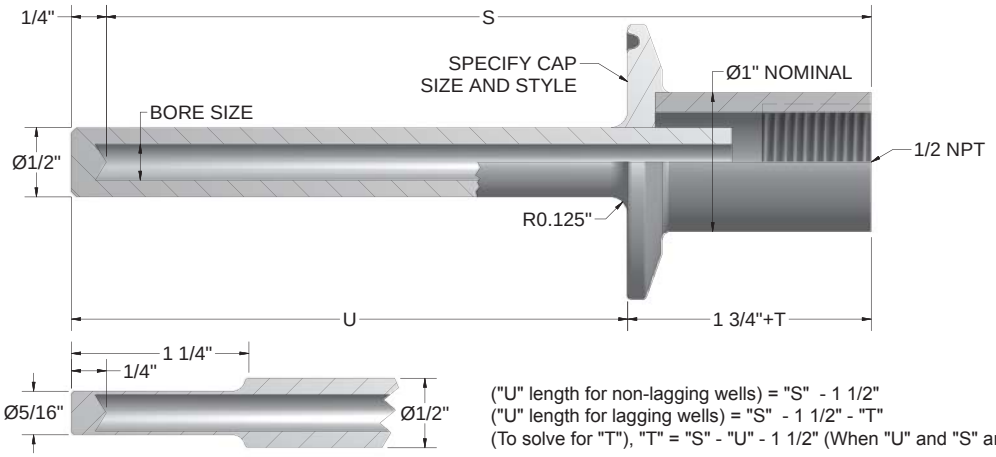
CODE	DESCRIPTION
Leave blank if no lag is required	
T__	Specify "T" dimension in inches

1-8 Options

CODE	DESCRIPTION
C8	316 stainless steel well cap and chain
C22	Brass well cap and chain
S	Well stamped with customer-specified part number

Sanitary-Connected Thermowells

Sanitary-Connected Thermowells are offered in 316 stainless steel. The DW and DR series are welded constructions, and they are available in a variety of lengths, cap styles, cap sizes, and optional lagging extensions. Thermowells are supplied with a surface finish that meets or exceeds 32µin R_a. Surface finishes of 15µin R_a or better are available upon request. They are designed with standard 0.260" bore diameters to accommodate sensing elements with a 0.252" maximum diameter. These wells are available as separate components or as part of complete sensor assemblies.



("U" length for non-lagging wells) = "S" - 1 1/2"
("U" length for lagging wells) = "S" - 1 1/2" - "T"
(To solve for "T"), "T" = "S" - "U" - 1 1/2" (When "U" and "S" are specified)

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ORDER CODES

Example Order Number:

1-0	1-1	1-2	1-3	1-4	1-5	1-6
DW	4	25	09	08	T2	C8S

1-0 Well Type

CODE	DESCRIPTION
DW	Sanitary well
DR	Reduced-tip sanitary well

1-1 Bore Size

CODE	DESCRIPTION
4	0.260" Dia. bore

1-2 Cap Size & Style

CODE	DESCRIPTION
15	1", 1 1/2" Tri-clamp® 16 AMP
25	2" Tri-clamp® 16 AMP
35	2 1/2" Tri-clamp® 16 AMP
45	3" Tri-clamp® 16 AMP
Other styles - sizes available. Consult factory.	

1-3 "S" Length

CODE	DESCRIPTION
XX	Specify length in inches using two digits plus fractional length

1-4 Material

CODE	DESCRIPTION
08	316 stainless steel

1-5 Optional "T" Lag Dimension

CODE	DESCRIPTION
Leave blank if no lag is required	
T__	Specify "T" dimension in inches

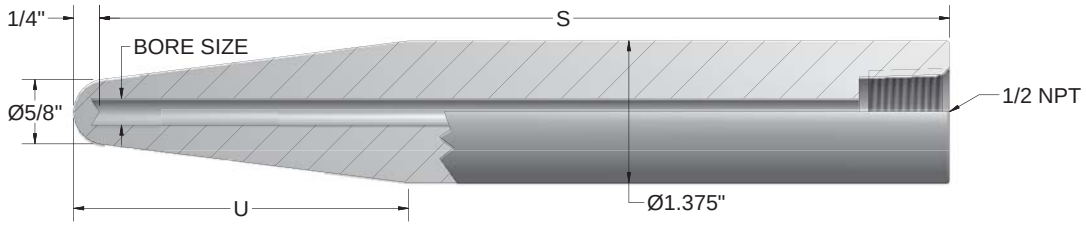
1-6 Options

CODE	DESCRIPTION
C8	316 stainless steel well cap and chain
S	Well stamped with customer-specified part number

Tri-clamp® is a registered trademark of Alfa Laval, Inc.

W81 Series Sanitary Weld-In Thermowells

Sanitary Weld-In Thermowells are offered in 316 stainless steel. The thermowell is designed to be welded into a tank or vat with a full crevice-free fillet-weld to prevent corrosion, bacteria growth, and product contamination. Thermowells are supplied with a surface finish that meets or exceeds 32µin R_a. Surface finishes of 15µin R_a or better are available upon request. They are designed with a standard 0.260" bore diameter to accommodate sensing elements with a 0.252" maximum diameter. These wells are available as separate components or as part of complete sensor assemblies.



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ORDER CODES

Example Order Number: W81 - 1 8 S

(1-0) (1-1) (1-2) (1-3)

1-0 Well Type

CODE	DESCRIPTION
W81	Sanitary weld-in

1-3 Options

CODE	DESCRIPTION
C8	316 stainless steel well cap and chain
S	Well stamped with customer-specified part number

1-1 Length

CODE	"S" LENGTH	"U" LENGTH
1	8 1/4"	3 1/4"
2	9 7/8"	3 1/4"
3	11 5/8"	5"
4	12 7/8"	3 3/4"

1-2 Material

CODE	DESCRIPTION
8	316 stainless steel

www.Pyromation.com/TechInfo/WakeFreq.aspx

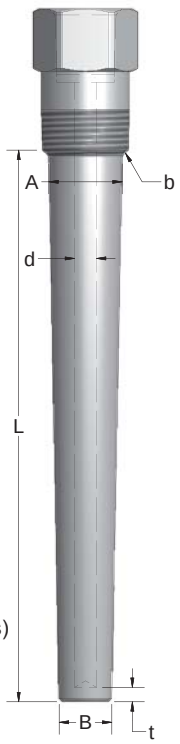
Based on calculations in accordance with ASME PTC 19.3 TW

ASME PTC 19.3 TW, the U.S. standard for evaluating the mechanical design of a thermowell used in a broad range of applications, was updated in 2010 to include a greater number of thermowell and process variables. Sometimes referred to as "Wake Frequency Calculation", the revision incorporates new elements for evaluating thermowell constructions that will reduce the chance of vibration and stress damage to the vessel, as well as avoid vibration damage to the temperature sensor it protects.

Please input data regarding your thermowell dimensions, thermowell properties and material/media/process properties in the designated spaces below. We will review the data, process the calculations and contact you with the results. Feel free to contact one of our Product Engineers to go through the process calculations.

Unit of Measure:	English Units	
Mounting Type:	Threaded	
Shank Profile:	Tapered	
Material:	316SS	
Process Connection:	1" NPT	
Unsupported Length (L):	6	in
Bore Diameter (d):	0.260	in
Root Diameter (A):	1.0625	in
Tip Diameter (B):	0.625	in
Minimum Tip Thickness (t):	0.188	in
? Fillet Radius at Support Plane (b):	0.178	in
? Fillet Radius at Base of Step (b_s):		in
Reduced-Diameter Shank Length (L_s):		in
? Damping Factor (ζ):	0.0005	
? Shielded Length of T-Well (L_o):	0	in
Max. Fluid Velocity (V):	15.5	ft/s
Fluid Density (ρ)	4.3	lb/ft^3
Max. Operating Temperature (T):	450	F
Max. Operating Pressure (P):	150	psig
Dynamic Viscosity (μ):		cP (1 centipoise = mPa*s)
Tag/Reference #:	TW-100	

1. Input your data online
2. We review and process the calculations
3. We will contact you with results
4. (***Optional***) Contact one of our Product Engineers to go through process calculation questions



Find this page at: www.Pyromation.com/TechInfo/WakeFreq.aspx

THIS IS A RESPONSE EXAMPLE ONLY - DO NOT USE DATA FOR ANY OTHER PURPOSE

pyromation inc.
beyond measure

5211 Industrial Road, Fort Wayne, IN 46825

Straight or Tapered Thermowell
Wake Frequency Evaluation Results

per PTC 19.3-TW 2010

Date:	8/3/2011
Customer Name:	Dave Myers
Company/Org. Name:	Pyromation, Inc
E-mail Address:	dmyers@pyromation.com
Tag Number:	TW-100

OUTPUTS

Frequency Condition	**PASS**
Frequency Ratio	**0.073**
Steady State Stress Limit	**PASS**
Dynamic Stress Limit	**PASS**
Pressure Limit	**PASS**

INPUTS

Mounting Type: Threaded
Material type: 316SS

Dimensions:

Length	L=	6.000	in	0.152 m
Root diameter	A=	1.063	in	0.027 m
Tip diameter	B=	0.625	in	0.016 m
Bore diameter	d=	0.260	in	0.007 m
Tip thickness	t=	0.188	in	0.005 m
Fillet radius at base	b=	0.178	in	0.005 m
Damping Factor	ζ=	0.0005		
Shielded length	L_0=	0.000	in	0.000 m
Sensor density	ρ_s=	2700	kg/m^3	

T-Well Material Properties

Allowable stress	S=	18000	psi	1.24E+08 Pa
Fatigue limit	S_f=	5400	psi	3.72E+07 Pa
Modulus at temperature	E=	25900000	lbf/in^2	1.79E+11 Pa
Density of t-well material	ρ_m=	0.290	lbf/in^3	8026.9 kg/m^3

Fluid Properties:

Fluid velocity	V=	15.50	ft/s	4.72 m/s
Fluid density	ρ=	4.300	lb/ft^3	68.9 kg/m^3
Fluid temperature	T=	450.0	°F	232.2 °C
Gauge pressure	P=	150.0	psig	1034214.0 Pa
Viscosity	μ=	0.019	cp	

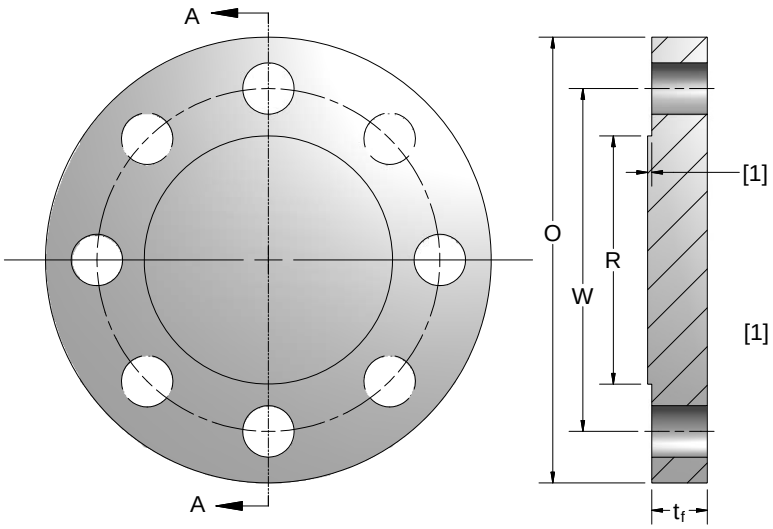
Summary/ Suggestions:

*Pyromation makes no claims regarding performance or safety based on the calculations provided. The results communicated are based on the ASME PTC 19.3 TW-2010 design standard for reliable service of tapered, straight and stepped-shank thermowells in a broad range of applications. The user assumes full responsibility for installation, application and operation of the product.

ANSI Flanged Thermowell Data Sheet

Flanges comply with ASME B16.5 and are welded in accordance with the Boiler Code ASME Section IX. Certified welders use ASME Section II Compliant materials. Gaskets are not supplied with flanged thermowells and assemblies.

Nominal Pipe Size (inches)	Nominal Diameter DN	Flange Class	"O" Outside Diameter of Flange	"R" Outside Diameter Raised Face Large Male and Large Tongue	"W" Diameter of Bolt Circle	Number of Bolts	"t_f" Thickness of Flange Min.
1/2	15	150	3.50	1.38	2.38	4	0.38
3/4	20	150	3.88	1.69	2.75	4	0.44
1	25	150	4.25	2.00	3.12	4	0.50
1 1/4	32	150	4.62	2.50	3.50	4	0.56
1 1/2	40	150	5.00	2.88	3.88	4	0.62
2	50	150	6.00	3.62	4.75	4	0.69
2 1/2	65	150	7.00	4.12	5.50	4	0.81
3	80	150	7.50	5.00	6.00	4	0.88
3 1/2	90	150	8.50	5.50	7.00	8	0.88
4	100	150	9.00	6.19	7.50	8	0.88
1/2	15	300	3.75	1.38	2.62	4	0.50
3/4	20	300	4.62	1.69	3.25	4	0.56
1	25	300	4.88	2.00	3.50	4	0.62
1 1/4	32	300	5.25	2.50	3.88	4	0.69
1 1/2	40	300	6.12	2.88	4.50	4	0.75
2	50	300	6.50	3.62	5.00	8	0.81
2 1/2	65	300	7.50	4.12	5.88	8	0.94
3	80	300	8.25	5.00	6.62	8	1.06
3 1/2	90	300	9.00	5.50	7.25	8	1.12
4	100	300	10.00	6.19	7.88	8	1.19
1/2	15	600	3.75	1.38	2.62	4	0.56
3/4	20	600	4.62	1.69	3.25	4	0.62
1	25	600	4.88	2.00	3.50	4	0.69
1 1/4	32	600	5.25	2.50	3.88	4	0.81
1 1/2	40	600	6.12	2.88	4.50	4	0.88
2	50	600	6.50	3.62	5.00	8	1.00
2 1/2	65	600	7.50	4.12	5.88	8	1.12
3	80	600	8.25	5.00	6.62	8	1.25
3.50	90	600	9.00	5.50	7.25	8	1.38
4.00	100	600	10.75	6.19	8.50	8	1.50



SECTION A-A

[1] HEIGHT OF RAISED FACE
0.06" FOR 150 & 300 CLASS
0.25" FOR ALL OTHER CLASSES