NOTICE:

Prices and availability are subject to change without notice. Please contact Marlin Manufacturing before ordering for updated pricing.

PROTECTING TUBES
THERMOWELLS

CORRODENT	TEMP. °F.	CONC. %	RECOM. MATERIAL
Acetic Acid	212	ALL	Monel
Acetic Anhydride	300		Nickel
Acetone	212	ALL	304 SS
Acetylene	400		304 SS
Alcohols	212	ALL	304 SS
Alum. (Potassium or Sodium)	300	ALL	Hast. C
Aluminum Chloride	212	ALL	Hast. B
Aluminum Sulfate	212	ALL	316 SS
Ammonia, Dry	212	ALL	304, 316 SS
Ammonium Hydroxide (Ammonia, Aqua)	212	ALL	304, 316 SS
Ammonium Chloride	300	50%	Monel
Ammonium Nitrate	300	ALL	304 SS
Ammonium Sulfate	212	ALL	316 SS
Amyl Acetate	300	ALL	304 SS
Aniline	75		Monel
Asphalt	250		304 SS
Atmosphere, (Industrial and Marine)			304 SS
Barium Compounds	SEE CALCIUM		
Beer	70		304 SS
Benzene (Benzol)	212		Steel
Benzoic Acid	212	ALL	316 SS
Bleaching Powder	70	15%	Monel
Borax	212	ALL	Brass
Bordeaux Mixture	200		304 SS
Boric Acid	400	ALL	316 SS
Bromine	125	DRY	Monel
Butane	400	ALL	Steel
Butyl Alcohol	SEE ALCOHOLS		
Butyric Acid	212		Hast. C
Calcium Bisulphite	75	ALL	Hast. C
Calcium Chloride	212	ALL	Hast. C
Calcium Hydroxide	300	20%	Hast. C
Calcium Hypochlorite	SEE BLEACHING POWDER		
Carbolic Acid	SEE PHENOL		
Carbon Dioxide, Dry	800	ALL	Brass
Carbonated Water	212	ALL	304 SS
Carbonated Beverages	212		304 SS
Carbon Disulfide	200		304 SS
Carbon Tetrachloride	125	ALL	Monel
Chlorine, Dry	100		Monel
Chlorine, Moist	100	ALL	Monel
Chloracetic Acid	212	ALL	Monel
Chloroform, Dry	212		Monel
Chromic Acid	300	ALL	Hast. C
Cider	300	ALL	304 SS
Citric Acid	212	ALL	Hast. C
Copper (10) Chloride	212	ALL	Hast. C
Copper (10) Nitrate	300	ALL	316 SS
Copper (10) Sulfate	300	ALL	316 SS
Copper Plating Solution (Cyanide)	180		304 SS
Copper Plating Solution (Acid)	75		304 SS
Corn Oil	200		304 SS
Creosote	200	ALL	304 SS
Crude Oil	300		Monel
Ethyl Acetate	SEE LACQUER THINNER		
Ethyl Chloride, Dry	500		Steel
Ethanol	SEE ALCOHOLS		
Ethylene Glycol (Uninhibited)	212	ALL	304 SS
Ethylene Oxide	75		Steel
Fatty Acids	500	ALL	316 SS
Ferric Chloride	75	ALL	Hast. C
Ferric Sulfate	300	ALL	304 SS
Formaldehyde	212	40%	316 SS
Formic Acid	300	ALL	316 SS
Freon	300		Steel
Fluorine, Anhydrous	100		304 SS
Furfural	450		316 SS
Gasoline	300		Steel
Glucose	300		304 SS
Glue ph 6-8	300	ALL	304 SS
Glycerine	212	ALL	Brass
Hydrobromic Acid	212	ALL	Hast. C
Hydrochloric Acid (37-38%)	225	ALL	Hast. B
Hydrogen Chloride, Dry	500		304 SS
Hydrocyanic Acid	212	ALL	304 SS
Hydrofluoric Acid	212	60%	Monel
Hydrogen Fluoride, Dry	175		Steel
Hydrofluogilicic Acid	212	40%	Monel
Hydrogen Peroxide	125	10-100%	304 SS
Kerosene	300	ALL	Steel
Lacquers & Thinners	300	ALL	304 SS
Lactic Acid	300	ALL	316 SS
Lime	212	ALL	316 SS
Linseed Oil	75		Steel
Magnesium Chloride	212	50%	Nickel
Magnesium Hydroxide (or Oxide)	75	ALL	304 SS
Magnesium Sulfate	212	40%	304 SS
Mercuric Chloride	75	10%	Hast. C
Mercury	700	100%	Steel
Methylene Chloride	212	ALL	304 SS
Methyl Chloride, Dry	75		Steel
Milk, fresh or sour	180		304 SS
Molasses	SEE GLUCOSE		
Natural Gas	70		304 SS
Nitric Acid	75	ALL	304 SS
Nitric Acid	300	ALL	316 SS
Oxygen	75	ALL	Steel
Oleic Acid	SEE FATTY ACIDS		
Oxalic Acid	212	ALL	Monel
Photographic Bleaching	100	ALL	304 SS
Palmitic Acid	SEE FATTY ACIDS		
Phosphoric Acid	212	ALL	316 SS
Phenol	212	ALL	316 SS
Potassium Compounds	SEE SODIUM COMPOUNDS		
Propane	300		Steel
Rosin	700	100%	316 SS
Sea Water	75		Monel
Soap & Detergents	212	ALL	304 SS
Sodium Bicarbonate	212	20%	316 SS
Sodium Bisulphite	212	20%	304 SS
Sodium Bisulphate	212	20%	304 SS
Sodium Carbinate	212	40%	316 SS
Sodium Chloride	300	30%	Monel
Sodium Chromate	212	ALL	316 SS
Salt or Brine	SEE SODIUM CHLORIDE		
Sodium Cyanide	212	ALL	304 SS
Sodium Hydroxide	212	30%	316 SS
Sodium Hypochlorite	75	10%	Hast. C
Sodium Nitrate	212	40%	304 SS
Sodium Nitrite	75	20%	316 SS
Sodium Phosphate	212	10%	Steel
Sodium Silicate	212	10%	Steel
Sodium Sulfate	212	30%	316 SS
Sodium Sulfide	212	10%	316 SS
Sodium Sulfite	212	30%	304 SS
Sodium Thiosulfate	212	ALL	304 SS
Steam			304 SS
Stearic Acid	SEE FATTY ACIDS		
Sugar Solutions	SEE GLUCOSE		
Sulfur	500		304 SS
Sulfur Chloride	75	DRY	316 SS
Sulfur Dioxide	500	DRY	316 SS
Sulfur Trioxide	500	DRY	316 SS
Sulfuric Acid	212	10%	316 SS
Sulfuric Acid	212	10-90%	Hast. B
Sulfuric Acid, Fuming	175		Hast. C
Sulfurous Acid	75	20%	316 SS
Titanium Tetrachloride	75	ALL	316 SS
Tannic Acid	75	40%	Hast. B
Toluene	75		Steel
Trichloracetic Acid	75	ALL	Hast. B
Trichlorethylene	300	DRY	Monel
Turpentine	75		316 SS
Varnish	150		Steel
Zinc Chloride	212	ALL	Hast. B
Zinc Sulfate	212	ALL	316 SS

In recommending the above materials, consideration has been given to providing good service life without undue cost. Where two or more materials are satisfactory, the least expensive is listed. Consult the factory for information on materials or services not given. Other factors which will influence corrosion rates include: degree and frequency of temperature fluctuation, concentration, ...rations of fluids, high velocities or abrasives in the fluid stream, flashing or cavitating conditions, etc. Therefore the data presented should be interpreted as one basis for material selection and not as a complete recommendation.

Since 1952 Marlin
MANUFACTURING CORPORATION 12404 TRISKETT ROAD CLEVELAND, OHIO 44111 (216) 941-6200 FAX: (216) 941-6207

Thermowells

Thermowells provide maximum protection for thermal sensors from corrosion, pressure and flow induced stresses. When selecting thermowells these parameters determine the type and material that should be used. In general, thermowells are machined from solid bar stock for "A" dimensions to 24" but for longer lengths a built-up design is used.

General Application Considerations

Select sensor location for representative temperature measurement.

Provide sufficient depth of immersion so that heat transfer along the instrument does not influence temperature measurement.

Select materials that are compatible with corrosive media elements.

Select thermowell with sufficient stiffness to resist destruction from flow induced stresses.

Thermowell Materials

Strength at operating temperature and resistance to corrosion are the primary considerations in material selection. A corrosion guide is supplied in the general Data Section.

General Material Considerations

Carbon Steels can be used to 1300° F (700° C) usually in oxidizing atmospheres.

Austenitic Stainless Steels (300 series) can be used to 1600° F (870° C) mostly in oxidizing atmospheres although type 316 can be used in some reducing environments.

Ferritic Stainless Steels (400 series) can be used to the 1800° F (982° C) — 2100° F (1149° C) range in both oxidizing and reducing atmospheres.

High Nickel Alloys can be used to 2100° F (1149° C) in oxidizing atmospheres.

Material Code	MATERIAL	Melting Point	Recommended Operating Atmosphere	Maximum Operating Temp. in Atmosphere
	STAINLESS STEELS			
304	304	2560	ORNV	1650
310	310	2560	ORNV	2100
316	316	2500	ORNV	1700
321	321	2550	ORNV	1600
347	347	2600	ORNV	1600
446	446	2700	ORNV	2000
CS	Carbon Steel	2500	ON	1300
INC	Inconel™	2550	ONV	2100
INX	Inconel X™	2620	ONV	1500
INY	Incoloy™	2500	ON	1600
HTX	Hastelloy X™	2300	O	2200
HTC	Hastelloy C™	2310	O	1800
HTB	Hastelloy B™	2375	OR	1400
MON	Monel™	2460	OR	1000
BR	Brass	1850	O	650
AL	Aluminum	1220	O	700
NCK	Nickel	2647	O	1400
TRN	Tantalum	5425	V	5000
TIT	Titanium	3035	VN	2000

O = Oxidizing R = Reducing N = Neutral V = Vacuum

Velocity Rating

Once the selection of material is made attention should be given to the parameter of flow induced stresses. Fluids flowing by a well form a turbulent wake called the Von Karman Trail. This wake has a definite frequency based on the diameter of the well and the fluid velocity. It is important to provide a well with sufficient stiffness so that the wake frequency will never exceed the natural frequency of the well itself. Should the natural frequency of the well coincide with the wake frequency the well would vibrate to destruction. Tapered shank wells provide greater stiffness for the same sensitivity than a straight shank well. The higher strength to weight ratio gives these wells a higher natural frequency and therefore are able to operate at higher fluid velocities. Recommended maximum velocity rating can be found for every standard well length and material catalogued. Ratings are based on operating temperatures as shown in the table below.

Material	Velocity Rating Operating Temperature
Carbon Steel (C1018) 304 SS 316 SS	1000° F (538° C)
Monel	900° F (482° C)
Brass	350° F (177° C)

Single values that appear in the velocity tables may be considered safe for water, steam, air or gas. Double values distinguish between water (parenthesized) and steam, air and gases. These values are intended as general guides to selection. If you have operating conditions requiring special well designs our engineering staff is available to assist you.

Pressure Rating

The limit pressure versus temperature ratings are tabulated for various materials for each thermowell series.

Here is a typical table.

LIMIT PRESSURE vs TEMPERATURE
(lbs/in²) (°F)

MATERIAL	CODE	TEMPERATURE – °F						
		70°	200°	400°	600°	800°	1000°	1200°
Brass	BR	5000	4200	1000	—	—	—	—
Carbon Steel	CS	5200	5000	4800	4600	3500	1500	—
A.I.S.I. 304	304	7000	6200	5600	5400	5200	4500	1650
A.I.S.I. 316	316	7000	7000	6400	6200	6100	5100	2500
Monel	MON	6500	6000	5400	5300	5200	1500	—

Selection of material and/or equipment is at the sole risk of the user of this publication. The data presented does not and should not preclude professional engineering design and consulting for your particular application. Marlin Manufacturing Corporation, its distributors, representatives, and the contributors to this publication specifically deny any warranty expressed or implied.

THERMOWELLS
MECHANICAL APPLICATION CONSIDERATION

Process Connection supports and/or seals the thermowell into the process system.

Types:

Threaded	one piece well with NPT threads (may require welding or brazing for seal).
Flanged Welded	a primary J groove weld and a bevel groove secondary weld join the flange to the well. Flanges are made to specification.
Lap Joint	flanges are made to specification.
Socket Weld	fits A.S.A. standard socket weld couplings for field installation.

Bore Size is the inside diameter of the thermowell in which the temperature sensor will be located. Standard sizes are .260" or .385" with a ± .002" tolerance.

Instrument Connection supports and/or seals the temperature sensor into the thermowell bore. Standard connection is a ½" NPS thread. An optional brass or stainless steel captive cap is available for keeping the well bore clean when not in use.

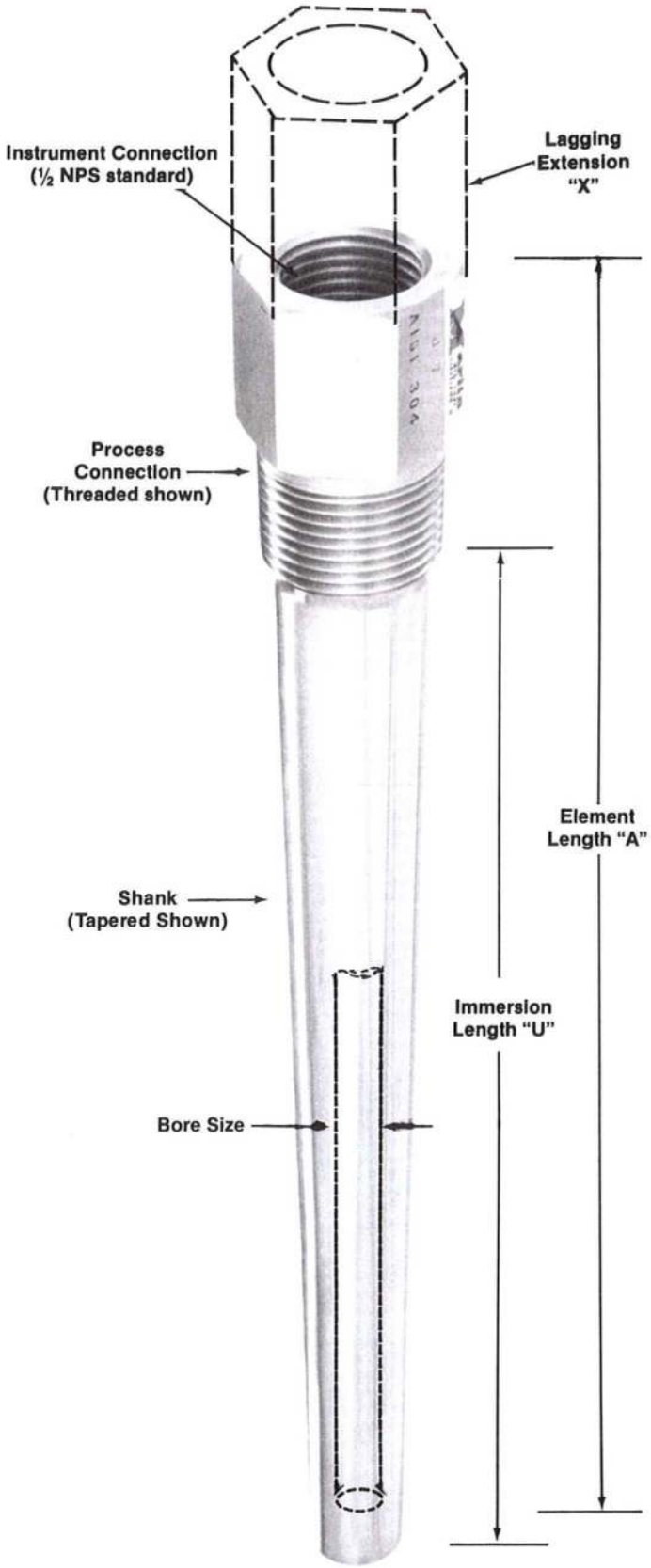
Shank Constructions

Straight	the outside diameter of the well is consistent over its immersion length.
Reduced Diameter	the outside diameter at the end of well is reduced for greater sensor sensitivity.
Tapered	the outside diameter of the well decreases along the immersion length for greater stiffness. (see Velocity Ratings)

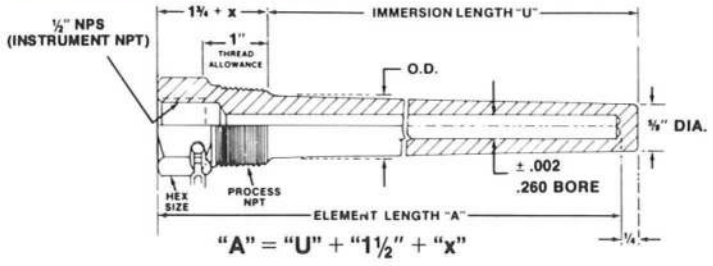
Immersion Length is the distance along the shank from the end of the well to the underside of the process connection. Immersion length implies that this is the portion of the well that sees the fluid or gas that is being monitored. Care must be taken so that dead lengths (required lengths to pass through walls, pipe fittings, etc.) and proper sensitivity lengths (lengths required for proper temperature measurement of the sensor) are taken into account.

Lagging Extension Length is the distance along the shank from the top side of the process connection to the termination connection of the well. If needed dead lengths (i.e.-that required to pass through walls, pipe fittings etc.) should be taken into account.

Note: For special thermowells please send your prints and/or specifications — Marlin will promptly quote price and delivery.



THERMOWELLS
0.260" BORE, THREADED



"A" = "U" + "1½" + "x"

260 TT - ___ - ___ - ___ - ___ - ___

"U" | "X" (if req.) | Mat'l. Code

Bore Size .260"
Threaded Thermowell (T)
Tapered Shank (T)
Process Sizes 3/4" or 1" NPT
Instrument Size 1/2" NPS (Standard)
Cap and Chain (if req.) Brass "BC" add $4.00 extra
SSTL. "SC" add $8.50 extra

Process Size	¾" NPT	1" NPT
Shank OD	⅞"	1 1/16"
Hex Size	1⅛"	1⅜"

STANDARD LENGTHS (inches)

Without Extension X

U	2½	4½	7½	10½	13½	16½	22½
A	4	6	9	12	15	18	24

With Extension X

Ux		2½	4½	7½	10½	13½	19½
X		2	3	3	3	3	3
Ax		6	9	12	15	18	24

Process Size	Price $/Thermowell 304 SS						
3/4" NPT	33.00	38.00	56.00	70.00	93.00	114.00	158.00
1" NPT	37.00	47.00	62.00	76.00	105.00	122.00	164.00

To price other materials see multiplier table.

LIMIT PRESSURE (lbs/in²) **vs TEMPERATURE** (°F)

MATERIAL	CODE	TEMPERATURE – °F						
		70°	200°	400°	600°	800°	1000°	1200°
Brass	BR	5300	4750	1100	—	—	—	—
Carbon Steel	CS	5900	5750	5450	5250	4000	1750	—
A.I.S.I. 304	304	7800	7050	6400	6150	6000	5190	1875
A.I.S.I. 316	316	7800	7800	7250	7100	6950	5200	2720
Monel	MON	7450	6850	6150	6100	5940	1750	—

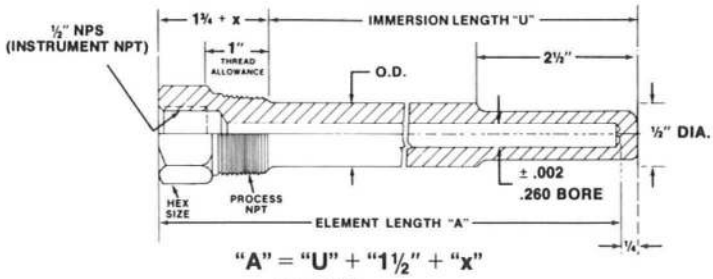
LIMIT FLUID VELOCITY (ft/sec) **vs LENGTH** (inches)

PROCESS SIZE	MATERIAL	CODE	IMMERSION LENGTH "L"							
			2½	4½	7½	10½	13½	16½	19½	22½
¾ NPT	Brass	BR	305 (97.5)	93.8 (54.1)	33.9	17.1	10.5	7.0	5.0	3.7
	Carbon Steel	CS	386 (175)	180 (97.2)	65.3 (58.3)	33.0	20.1	13.4	9.6	7.1
	A.I.S.I.-304 & 316	304 316	440 (243)	197 (135)	71.2	36.0	22.0	14.7	10.5	7.8
	Monel	MON	354 (195)	155 (108)	56.1	28.4	17.3	11.6	7.5	5.6
1 NPT	Brass	BR	354 (161)	108 (89.5)	39.4	19.8	12.2	8.1	5.8	4.3
	Carbon Steel	CS	448 (289)	209 (161)	75.7	38.4	23.3	15.5	11.1	8.2
	A.I.S.I.-304 & 316	304 316	490 (403)	228 (225)	82.5	41.8	25.5	17.1	12.2	9.1
	Monel	MON	410 (322)	179 (178)	65.1	33.0	20.1	13.5	8.7	6.5

Total Quantity	Discount Factor
1 - 9*	Net
10 - 24	.95
25 - 49	.90
50 - 99	.85
100 - 199	.80
200+	.75

*1 to 4 pcs add $24.00 set up

Material	X 304SS Price Multiplier
C-1018, Brass	0.85
304 ECL (Low carbon)	1.15
316 SS, 347 SS, 321 SS	1.35
316 ELC (Low carbon)	1.45
309 SS, s10 SS	3.0
Carp 20, Incoloy 800	3.5
Inc 600, Nickel, Monel	3.75
Titanium, Hast C	8.0
Hast B	10.0



"A" = "U" + "1½" + "x"

260 TR - ___ - ___ - ___ - ___ - ___

"U" | "X" (if req.) | Mat'l. Code

Bore Size .260"
Threaded Thermowell (T)
Reduced Diameter (R)
Process Sizes 1/2", 3/4" or 1" NPT
Instrument Size 1/2" NPS (Standard)
Cap and Chain (if req.) Brass "BC" add $4.00 extra
SSTL. "SC" add $8.50 extra

Process Size	½" NPT	¾" NPT	1" NPT
Shank OD	⅝"	¾"	⅞"
Hex Size	1⅛"	1⅛"	1⅜"

STANDARD LENGTHS (inches)

Without Extension X

U	2½	4½	7½	10½	13½	16½	22½
A	4	6	9	12	15	18	24

With Extension X

Ux		2½	4½	7½	10½	13½	19½
X		2	3	3	3	3	3
Ax		6	9	12	15	18	24

Process Size	Price $/Thermowell 304 SS						
1/2" NPT	25.00	30.00	42.00	52.00	75.00	90.00	116.00
3/4" NPT	27.00	33.00	44.00	54.00	77.00	92.00	120.00
1" NPT	32.00	42.00	54.00	66.00	91.00	106.00	146.00

To price other materials see multiplier table.

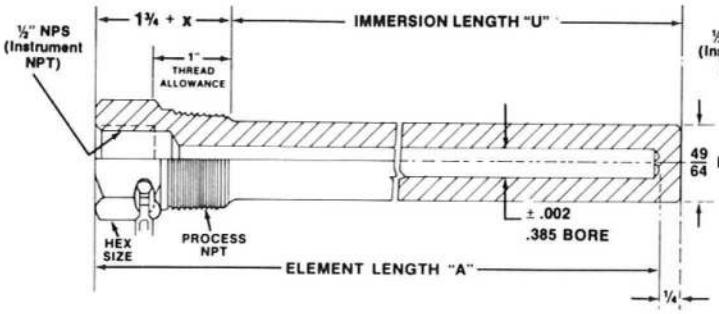
LIMIT PRESSURE (lbs/in²) **vs TEMPERATURE** (°F)

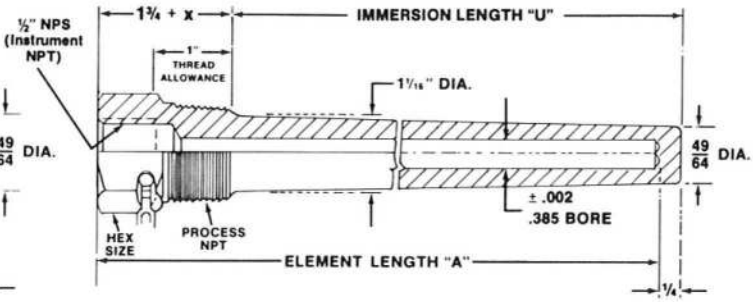
MATERIAL	CODE	TEMPERATURE – °F						
		70°	200°	400°	600°	800°	1000°	1200°
Brass	BR	5000	4200	1000	—	—	—	—
Carbon Steel	CS	5200	5000	4800	4600	3500	1500	—
A.I.S.I. 304	304	7000	6200	5600	5400	5200	4500	1650
A.I.S.I. 316	316	7000	7000	6400	6200	6100	5100	2500
Monel	MON	6500	6000	5400	5300	5200	1500	—

LIMIT FLUID VELOCITY (ft/sec) **vs LENGTH** (inches)

PROCESS SIZE	MATERIAL	CODE	IMMERSION LENGTH "L"							
			2½	4½	7½	10½	13½	16½	19½	22½
½ NPT	Brass	BR	207 (59.3)	75.5 (32.2)	27.3 (19.7)	13.9	8.4	5.6	4.1	3.0
	Carbon Steel	CS	290 (106)	105 (59)	38.2 (36.3)	19.4	11.8	7.8	5.7	4.2
	A.I.S.I.-304 & 316	304 316	300 (148)	109 (82.2)	39.5	20.1	12.2	8.1	5.9	4.4
	Monel	MON	261 (118)	95 (65.5)	24.4	17.5	10.5	7.1	5.2	3.8
¾ NPT	Brass	BR	207 (59.3)	89.1 (39.8)	32.2 (23.9)	16.4	9.9	6.6	4.8	3.6
	Carbon Steel	CS	290 (106)	123 (71.2)	44.9 (42.7)	2.84	13.8	9.3	6.7	4.9
	A.I.S.I.-304 & 316	304 316	300 (148)	128 (99.3)	46.4	23.6	14.3	9.6	6.9	5.1
	Monel	MON	261 (118)	112 79.88)	40.6	20.7	12.4	8.3	6.1	4.5
1 NPT	Brass	BR	207 (59.3)	102 (47.6)	37.0 (28)	18.8	11.4	7.6	5.5	4.1
	Carbon Steel	CS	290 (106)	143 (84.3)	51.6 (50.6)	26.2	15.9	10.6	7.6	5.7
	A.I.S.I.-304 & 316	304 316	300 (148)	148 (117)	53.5	27.2	16.5	11.0	7.9	5.9
	Monel	MON	216 (118)	128 (93.3)	46.7	23.7	14.4	9.5	6.9	5.1

THERMOWELLS
0.385" BORE, THREADED





385 TS - ___ - ___ - ___ - ___ - ___ - ___

"U" | "X" (if req.) | Mat'l. Code

Bore Size 0.385
Threaded Thermowell (T)
Straight Shank (S)
Process Sizes 3/4" or 1" NPT
Instrument Size 1/2" NPS (Standard)
Cap and Chain (if req.) Brass "BC" add $4.00 extra
SSTL. "SC" add $8.50 extra

"A" = "U" + "1½" + "x"

Process NPT	¾"	1"
Hex Size	1⅛"	1⅜"

STANDARD LENGTHS (inches)

Without Extension X

U	2½	4½	7½	10½	13½	16½	22½
A	4	6	9	12	15	18	24

With Extension X

Ux		2½	4½	7½	10½	13½	19½
X		2	3	3	3	3	3
Ax		6	9	12	15	18	24

Process Size	Price $/Thermowell 304 SS						
3/4" NPT	27.00	33.00	44.00	54.00	77.00	92.00	120.00
1" NPT	32.00	42.00	54.00	66.00	91.00	106.00	146.00

To price other materials see multiplier table

LIMIT PRESSURE vs TEMPERATURE
(lbs/in²) (°F)

MATERIAL	CODE	TEMPERATURE – °F						
		70°	200°	400°	600°	800°	1000°	1200°
Brass	BR	5000	4200	1000	—	—	—	—
Carbon Steel	CS	5200	5000	4800	4600	3500	1500	—
A.I.S.I. 304	304	7000	6200	5600	5400	5200	4500	1650
A.I.S.I. 316	316	7000	7000	6400	6200	6100	5100	2500
Monel	MON	6500	6000	5400	5300	5200	1500	—

LIMIT FLUID VELOCITY vs LENGTH
(ft/sec) (inches)

MATERIAL	CODE	IMMERSION LENGTH "L"							
		2½	4½	7½	10½	13½	16½	19½	22½
Brass	BR	290 (145)	150 (80)	54.1 (48)	27.6	16.7	11.1	8.0	6.0
Carbon Steel	CS	326 (260)	192 (144)	69.5	35.4	20.5	14.3	10.3	7.7
A.I.S.I.-304 & 316	304 316	349 (360)	199	71.9	36.6	21.2	14.8	10.7	8.0
Monel	MON	316 (320)	189 (178)	68.1	34.8	20.8	14.0	10.0	7.5

385 TT - ___ - ___ - ___ - ___ - ___ - ___

"U" | "X" (if req.) | Mat'l. Code

Bore Size 0.385
Threaded Thermowell (T)
Tapered Shank (T)
Process Sizes 1" NPT
Instrument Size 1/2" NPS (Standard)
Cap and Chain (if req.) Brass "BC" add $4.00 extra
SSTL. "SC" add $8.50 extra

"A" = "U" + "1½" + "x"

Process NPT	1"
Hex Size	1⅜"

STANDARD LENGTHS (inches)

Without Extension X

U	2½	4½	7½	10½	13½	16½	22½
A	4	6	9	12	15	18	24

With Extension X

Ux		2½	4½	7½	10½	13½	19½
X		2	3	3	3	3	3
Ax		6	9	12	15	18	24

Process Size	Price $/Thermowell 304 SS						
1" NPT	37.00	46.00	62.00	76.00	104.00	122.00	164.00

To price other materials see multiplier table

LIMIT PRESSURE vs TEMPERATURE
(lbs/in²) (°F)

MATERIAL	CODE	TEMPERATURE – °F						
		70°	200°	400°	600°	800°	1000°	1200°
Brass	BR	5000	4200	1000	—	—	—	—
Carbon Steel	CS	5200	5000	4800	4600	3500	1500	—
A.I.S.I. 304	304	7000	6200	5600	5400	5200	4500	1650
A.I.S.I. 316	316	7000	7000	6400	6200	6100	5100	2500
Monel	MON	6500	6000	5400	5300	5200	1500	—

LIMIT FLUID VELOCITY vs LENGTH
(ft/sec) (inches)

MATERIAL	CODE	IMMERSION LENGTH "L"							
		2½	4½	7½	10½	13½	16½	19½	22½
Brass	BR	321 (150)	129 (83.5)	46.8	23.6	14.5	9.6	6.9	5.1
Carbon Steel	CS	410 (270)	249 (150)	90.3	45.6	27.8	18.5	13.2	9.8
A.I.S.I.-304 & 316	304 316	483 (350)	272 (208)	97.3	49.7	30.4	20.3	14.5	10.7
Monel	MON	396 (300)	214 (167)	77.5	39.2	23.8	16.0	10.3	7.7

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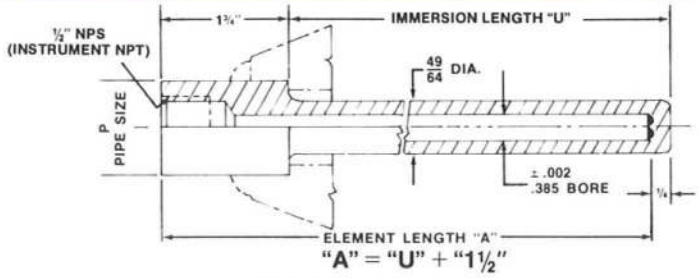
THERMOWELLS
SOCKET WELD, FLANGED

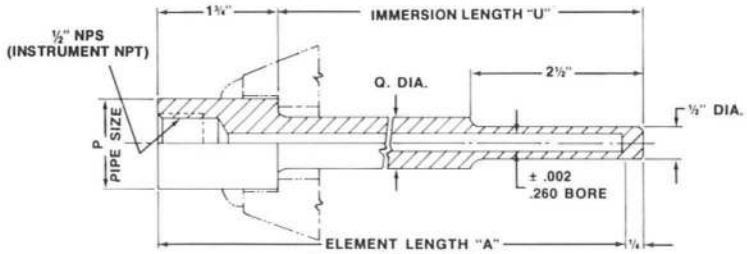


"A" = "U" + "1½"

385 WS - ___ - ___ - ___ - ___ - ___

"U" | "X" (if req.) | Mat'l. Code

Bore Size 0.385
Socket Weld Thermowell (W)
Straight Shank (S)
Process Sizes 3/4" or 1" Pipe
Instrument Size 1/2" NPT (Standard)
Cap and Chain (if req.) Brass "BC" add $4.00 extra
SSTL. "SC" add $8.50 extra



"A" = "U" + "1½"

260 WR - ___ - ___ - ___ - ___

"U" | Mat'l. Code

Bore Size 0.260
Socket Weld Thermowell (W)
Reduced Diameter (R)
Process Size 3/4" or 1" Pipe
Instrument Size 1/2" NPT (Standard)
Cap and Chain (if req.) Brass "BC"
SSTL. "SC"

Pipe Size	¾"	1"
"P" O.D.	1.050	1.315
"Q" 260WR	¾"	⅞"

STANDARD LENGTHS (inches)							
U	2½	4½	7½	10½	13½	16½	22½
A	4	6	9	12	15	18	24
Process Size	**Price $/Thermowell 304 SS**						
3/4" Pipe	27.00	33.00	44.00	54.00	77.00	92.00	120.00
1" Pipe	32.00	42.00	54.00	66.00	91.00	106.00	146.00

To price other materials see multiplier table.

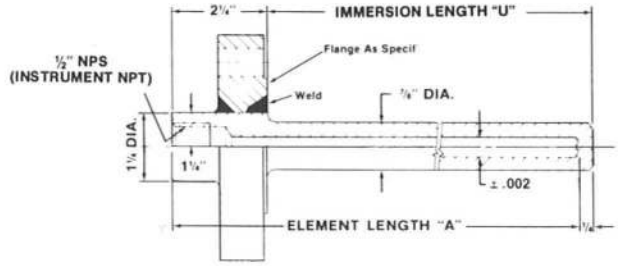
LIMIT PRESSURE vs TEMPERATURE
(lbs/in²) (°F)

MATERIAL	CODE	TEMPERATURE – °F						
		70°	200°	400°	600°	800°	1000°	1200°
Brass	BR	5000	4200	1000	—	—	—	—
Carbon Steel	CS	5200	5000	4800	4600	3500	1500	—
A.I.S.I. 304	304	7000	6200	5600	5400	5200	4500	1650
A.I.S.I. 316	316	7000	7000	6400	6200	6100	5100	2500
Monel	MON	6500	6000	5400	5300	5200	1500	—

LIMIT FLUID VELOCITY vs LENGTH (385WS)*
(ft/sec) (inches)

MATERIAL	CODE	IMMERSION LENGTH "L"						
		2½	4½	7½	10½	13½	16½	22½
Carbon Steel	CS	426 (260)	192 (144)	35.4	20.5	14.3	7.7	
A.I.S.I.-304&316	304 360	449	199	71.9	36.6	21.2	14.8	8.0

*FOR 260WR REDUCE LIMIT FLUID VELOCITY BY 35%.



"A" = "U" + "2"

385 or 260 FS - ___ - ___ - ___ - ___ - ___

"U" | Mat'l Code | Flange Size | Flange Mat'l. Code

Bore Size
Welded Flanged Thermowell (F)
Straight Shank (S)
(For tapered shank use code T add 15% to thermowell price)
Instrument Size 1/2" NPT (Standard)
Cap and Chain (if req.) Brass "BC" add $4.00 extra
SSTL. "SC" add $8.50 extra

STANDARD LENGTHS (inches)							
U	2	4	7	10	13	16	22
A	4	6	9	12	15	18	24
Price $/Thermowell 304 SS							
Add 15% for Tapered Shank	27.00	33.00	44.00	54.00	77.00	92.00	120.00

*Add Thermowell price to flange price for total price.
To price other materials see multiplier table.

Flange Rating	Flange Size	Price* 304SS $/Flange
150# RF or FF	1"	74.00
	1½	90.00
	2"	120.00
150# RTJ	1"	120.00
	1½"	144.00
	2"	178.00
300# RF or FF	1"	120.00
	1½"	132.00
	2"	160.00
300# RTJ	1"	166.00
	1½"	208.00
	2"	260.00

To price other materials see multiplier table.

LIMIT PRESSURE vs TEMPERATURE
(lbs/in²) (°F)

MATERIAL	CODE	TEMPERATURE – °F						
		0°	200°	400°	600°	800°	1000°	1125°
Carbon Steel	CS	___	___	- TO -	___	2500#		
A.I.S.I. 304	304	___	___	- TO -	___	___	2500#	
A.I.S.I. 316	316	___	___	- TO -	___	___	___	2500#
Monel	MON	___	___	- TO -	___	2500#		

LIMIT FLUID VELOCITY vs LENGTH (385FS)*
(ft/sec) (inches)

MATERIAL	CODE	IMMERSION LENGTH "L"						
		2	4	7	10	13	16	22
Carbon Steel	CS	410 (152)	248 (84.3)	91.3 (50.6)	45.7	27.6	18.5	10.0
A.I.S.I. 304 & 316	304 316	444 (117)	258 (70.3)	95.2	47.6	28.8	19.3	10.4
Monel	MON	338 (168)	226 (93.3)	83.3 (56.0)	41.6	25.2	16.9	9.1

*FOR 260FS REDUCE LIMIT FLUID VELOCITY BY 25%.