

Thermowells

Included in our thermowell series are standardized wells of threaded, ANSI flanged, Van Stone and Weld-in types.

Threaded wells are made in readily welded or brazed materials for installations requiring seal welding or brazing. The pipe thread provides the mechanical strength, the weld merely seals.

ANSI flanged wells consist of a bar-stock well which is permanently welded to a top quality flange. Standard construction uses primary "J" groove weld and a bevel groove secondary weld. Both welds are machined to produce a clean fillet. This double welded construction eliminates possibility of crevice corrosion since no open joints are exposed from either inside or outside the installation.

Socket weld types of wells can be installed easily by merely welding into place to form a clean and tight connection.

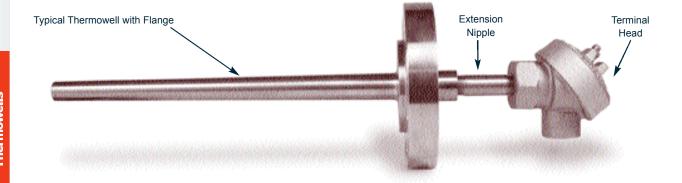
The insertion length "rule of thumb" of ten diameters is not always practical when installing thermowells. Care should be exercised to make certain that the sensitive tip is totally immersed into the medium being measured. Above all, be sure that the dead length — i.e. the length required to pass through walls, pipe fittings, etc. — is taken into account when choosing the necessary insertion length.

Our tapered thermowells provide greater rigidity than straight shank styles. They are well-suited to applications of high fluid velocity.

The thermowells shown on the following pages are available in standard bore diameters of .260" for thermocouple elements to 14 gauge wire and .385" for thermocouple elements to 8 gauge wire. Both are suitable for use with metal sheathed elements of compatible diameters.







Material - The Longevity Factor

In general, the thermowell material chosen for the installation is governed mainly by the corrosion conditions to which the well is exposed. Recommended materials for various services are given in the corrosion table on pages 67 to 69. The high mirror polish given to all stainless and monel wells provides maximum corrosion resistance.

Sometimes the major consideration is strength rather than corrosionresistance. For example, a high pressure water service may require a stainless steel well, while from a corrosion standpoint, a brass well would be satisfactory.

Connection - The Installation Factor

In these pages you will find standardized wells of threaded, flanged (A.N.S.I. and Van Stone), and socket welded types with standard bore sizes.

Threaded wells are all made in readily welded or brazed materials for installations requiring seal welding or brazing. The pipe thread provides the mechanical strength, the weld merely seals.

Flanged wells other than Van Stone type) consist of a bar-stock well which is permanently welded to a top quality flange. Standard construction uses a primary "J" groove weld and a bevel groove secondary weld. Both welds are machined to produce a clean fillet. this double welded construction eliminates possibility of crevice corrosion since no open joints exposed from either inside or outside the installation.

Socket welding types of wells are simple to install - merely welded into place. These wells fit A.N.S.I. standard socket weld coupling of flanges. The resulting installation is clean and tight.

Insertion Length - The Accuracy Factor
The distance from the end of the well to the underside of the thread, or other connection means, (designated as "U") is the insertion length. For best accuracy, this length should be long enough to permit the entire temperature sensitive part of the well to project into the temperature medium being measured. A properly installed thermowell will project into the liquid and amount equal to its sensitive length plus at least one inch. In air or gas, the bulb should be immersed into the sensitive length plus at least three inches.

Thermocouples and thermistors have short sensitive lengths and therefore can use the smallest insertion lengths.

Bi-metal thermometers, resistance thermometers, and liquid-in-glass thermometers have bulbs with sensitive portions between one and two inches long. Therefore, the minimum standard insertion length of 2-1/2" must be entirely immersed in liquid for proper accuracy.

Filled system thermometer bulbs may have sensitive portions from one to several inches in length. Determine the sensitive length of bulb before choosing an insertion length.

Above all - be sure that dead length i.e. - that required to pass thru wall, pipe fittings, etc. is taken into account when choosing the necessary well insertion length.

B o re Size - The Interchange ability Factory

Several types of temperature measuring instruments are used in most installations. The selection of a standard bore diameter provides extreme flexibility; the same well can accommodate thermocouple resistance thermometer, bi-metal thermometer, or test thermometer.

The bore size of wells shown in this catalog cover the most commonly used temperature sensing elements as follows:

.260 Diameter Bore: Bi-metal Thermometers (1/4" stem) Thermocouples - (#20 Gauge) Liquid-in-glass Test thermometers (Unarmored) Other elements having .252" maximum diameter.

.385 Diameter Bore: Bi-metal Thermometers (3.8" Stem) Thermocouples - (#14 Gauge) Liquid-in-glass Test thermometers (Armored) Other elements having .377" maximum diameter.

Tap e red or Straight Shank - The Velocity Rating Factor

Tapered shank wells provide greater rigidity for the same sensitivity. The higher strength to weight ratio gave these wells higher natural frequency than for equivalent length straight shank wells, thus permitting operation at higher fluid velocity.



INTRODUCTION TO THERMOWELLS

Thermowell Materia	al Selection Guide	
Application	Material	
Heat Treating		
Annealing Up to 704°C (1300°F) Over 704°C (1300°F)	Black Steel Inconel 600, ^a Type 446 SS	
Carburizing Hardening Up to 816°C (1500°F) 1093°C (1500 to 2000°F) Over 1093°C (200°F) Nitriding salt baths Cyanide	Black Steel Inconel 600, ^a Type 446 SS Ceramic ^b Type 446 SS Nickel (CP)	
Neutral	Type 446 SS	
High Speed	Ceramic ^b	
Iron and Steel		
Basic oxygen furnace	Quartz	
Blast furnaces Downcomer Stove dome Hot blast main Stove trunk Stove outlet flue	Inconel 600, Type 446 SS Silicon carbide Inconel 600 Inconel 600 Black steel	
Open hearth Flues and stack Checkers Waste heat boiler	Inconel 600, Type 446 SS Inconel 600, Cermets Inconel 600, Type 446 SS	
Billet heating slab heating and butt welding Up to 1093°C (2000°F) Over 1093°C (2000°F)	Inconel 600, Type 446 SS Silicon ceramic carbide ^b	
Bright annealing batch Top work temperature Bottom work temperature	Not required (use bare Type J thermocouple) Type 446 SS	
Continuous furnace section forging	Inconel 600, ceramic ^b	
Soaking pits Up to 1093°C (2000°F) Over1093°C (2000°F)	Inconel 600 Silicon ceramic carbide ⁶	
Nonferrous Metals		
Aluminum Melting Heat treating	Cast iron (white-washed) Black steel	
Brass or bronze	Not required (use dip-type thermocouple)	
Lead	Type 446 SS, black steel	
Magnesium	Black steel, cast iron	
Tin	Extra heavy carbon steel	
Zinc	Extra heavy carbon steel	
Pickling tanks	Chemical Lead	
Cement Exit flues	In	
EVII TILIOC	Inconel 600, Type 446 SS	
Kilns, heating zone	Inconel 600	

^b Due to susceptibility to cracking, sudden thermal shocks should be avoided.

^c Due to susceptibility to cracking, sudden thermal shocks should be avoided.

Thermowell Mater	rial Selection Guide
Application	Material
Ceramic	
Kilns	Ceramic ^b and silicon carbide ^c
Dryers	Silicon carbide, black steel
Vitreous enameling*	Inconel 600, Type 446 SS
Glass	
Fore hearths and feeders	Platinum thimble
Lehrs	Black steel
Tanks	
Roof and wall	Ceramica
Flues and checkers	Inconel 600, Type 446 SS
Paper	
Digesters	Type 316 SS, Type 446 SS
Petroleum	
Dewaxing	Type 304, 310, 316, 321, 347 SS carbon steel
	Type 304, 310, 316, 321, 347
Towers	SS carbon steel
Tranfer lines	Type 304, 310, 316, 321, 347
	SS carbon steel
Factioning column	Type 304, 310, 316, 321, 347 SS carbon steel
B.: I	Type 304, 310, 316, 321, 347
Bridgewall	SS carbon steel
Power	
Coal-air mixtures	304SS
Flue gases	Black steel, Type 446 SS
Preheaters	Black steel, Type 446 SS
Steel lines	Type 347 or 316 SS
Water Lines	Low carbon steels
Boiler tubes	Types 304, 309 or 310 SS
Gas Producers	- 440.00
Producers gas	Type 446 SS
Water gas Carburetor	Inconel 600, Type 446 SS
Superheater	Inconel 600, Type 446 SS
Tar stills	Low carbon steels
Incinerators	
Up to 1093°C (2000°F)	Inconel 600, Type 446 SS
O 4000°O (0000°E)	Ceramic (primary) silicon
Over 1093°C (2000°F)	carbide (secondary) ^a
Food	
Baking ovens	Black steel
Charretort, sugar	Black steel
Vegetables and fruit	Type 304 SS
Chemical	
Acetic acid 10 to 50% 21°C (70°F)	
50% 100°C (212°F)	Type 304, Hastelloy C, ^d Mone
99% 21 to 100°C	Type 316, Hastelloy C, ^d Mone Type 430, Hastelloy C, ^d Mone
(70 to 212°F)	Type 430, Flastelloy C, World
Alcohol, ethyl, methyl	Type 304
21 to 100°C (70 to 212°F)	
Ammonia	
` ,	Type 304, 316 SS

^d Trademark of the Cabot Corp.

^e Trademark of the Driver-Harris Co.

¹ Trademark of the Driver-Harris Co.



INTRODUCTION TO THERMOWELLS

Chemical (continued) Ammonium nitrate All concentration 21°C to 100°C (70 to 212°F) Type 316 SS Ammonium sulphate, 10% to saturated	terial
Ammonium nitrate All concentration 21°C to 100°C (70 to 212°F) Type 316 SS Ammonium sulphate, 10% to saturated	
All concentration 21°C to 100°C (70 to 212°F) Type 316 SS Ammonium sulphate, 10% to saturated	
Ammonium sulphate, 10% to saturated	
10% to saturated	
100°C (212°F) Type 316 SS	
Barium chloride, all concentrations, 21°C (70°F) Monel, Hastell	oy C
Barium hydroxide, all concentrations, 21°C (70°F) Low carbon st	eels
Barium sulphite Nichrome,º Has	stelloy C
Brines Monel	
Bromine Tantalum Mone	el
Butadiene Type 304 SS	
Butane Type 304 SS	
Butylacetate Monel	
Butyl alcohol Copper, Type 3	304 SS
Calcium, Chlorate, dilute Type 304 SS	
Calcium hydroxide 10% to 20% 100°C (212°F) Type 304 SS, 1 50% 100°C (212°F) Type 316 SS, 1	Hastelloy C Hastelloy C
Carbolic acid, all, 100°C (212°F) Type 316 SS	
Carbon dioxide, wet or dry 2017-T4 aluming	um, Monel, nickel
Chlorine gas Dry, 21°C (70°F) Moist, -7 to 100°C (20 to 212°F) Type 316 SS, Hastelloy C	Monel
Chromic acid, 10% to 20% 100°C (212°F) Type 316 SS, (all concentrati	
Citric acid 15% 21°C (70°F) Type 304 SS, (all concen 15% 100°C (212°F) Type 316 SS, (all concen	ntrations) Hastelloy C ntrations)
Concentrated,100°C(212°F) Type 316 SS, (all concentrated)	ntrations)
Copper nitrate Types 304 SS,	
Copper sulphate Types 304 SS,	, 316 SS
Cresols Types 304 SS	
Cyanogen gas Type 304 SS	
Dow therm ¹ Low carbon sto	eels
Ether Type 304 SS	
Ethyl acetate Monel, Type 30	
	low carbon steel
Ethyl sulphate, 21°C (70°F) Monel Ferric chloride, 5% 21°C (70°F) Tentalum Hace	tallay C
to boiling	telloy C
Ferric sulphate, 5% 21°C (70°F) Type 304 SS	
Ferrous sulphate, dilute, 21°C (70°F) Type 304 SS	
Formaldehyde Types 304 SS,	, 316 SS
Formic acid, 5% 21°C to 66°C Type 316 SS	
(70° to 150°F)	

Material
Monel
Type 304 SS, low carbon steel
Type 304 SS
Type 304 SS Type 304 SS
Type 304 33
Hastelloy B
Hastelloy C
Hastelloy B
Hastelloy B
Hastelloy C, Monel
Types 316SS, 304 SS
Types 316SS
Tantalum
Type 304 SS
Type 316 SS Tantalum
Tantalum
Monel
Tantalum
Type 304 SS
71
Type 304 SS, 316 SS
Type 304 SS, 316 SS
Type 304 SS, 316 SS
Type 316 SS
Type 304 SS, 316 SS
Tantalum
Type 304 SS
Type 316 SS
Type 316 SS
Type 304 SS
Monel
01 1
Steel
SS
SS
Tune 240 CC
Type 316 SS Type 340 SS

- Trademark of the international violet Co.
 Due to susceptibility to cracking, sudden thermal shocks should be avoided.
 Due to susceptibility to cracking, sudden thermal shocks should be avoided.
 Trademark of the Cabot Corp.
 Trademark of the Driver-Harris Co.

- ¹ Trademark of the Driver-Harris Co.



INTRODUCTION TO THERMOWELLS

A 11 11	al Selection Guide	
Application	Material	
Chemical (continued)		
Phosphoric acid	T 204 00	
1%, 5% 21°C (70°F)	Type 304 SS Type 316 SS	
10% 21°C (70°F) 10% 100°C (212°F)	Hastelloy C	
30% 21 to 100°C	Tradiciley 6	
(70 to 212°F)	Hastelloy B	
85% 21 to 100°C		
(70 to 212°F)	Hastelloy B	
Picric acid, 21°C (70°F)	Type 304 SS	
Potassium bromide, 21°C (70°F)	Type 316 SS	
Potassium carbonate, 1% 21°C (70°F)	Type 304 SS, Type 316 SS	
Potassium chlorate, 21°C (70°F)	Type 304 SS	
Potassium hydroxide		
5% 21°C (70°F)	Type 304 SS	
25% 100°C (212°F) 60% 100°C (212°F)	Type 304 SS Type 316 SS	
Potassium nitrate	1 ypc 0 10 00	
5% 21°C (70°F)	Type 304 SS	
5% 100°C (212°F)	Type 304 SS	
Potassium permanganate,	T::::- 204 00	
5% 21°C (70°F) Potassium sulphate,	Type 304 SS	
5% 21°C (70°F)	Type 304 SS, Type 316 SS	
Potassium sulphide,	J/ Jp	
5% 21°C (70°F)	Type 304 SS, Type 316 SS	
Propane	Type 304 SS, low carbon steel	
Pyrogallic acid	Type 304 SS	
Quinine bisulphate, dry	Type 316 SS	
Quinine sulphate, dry	Types 304 SS	
Seawater	Monel or Hastelloy C	
Salicylic acid	Nickel	
Sodium bicarbonate All concentrations,	Types 304 SS	
21°C (70°F)	Types 304 SS	
5% 66°C (150°F)	Types 304 SS, 316 SS	
Sodium carbonate,	•	
5% 21°C to 66°C	Types 304 SS, 316 SS	
(70° to 150°F) Sodium chloride,		
5% 21°C to 66°C	Types 316 SS	
(70° to 150°F)	•	
Saturated 21 to 100°C	Types 316 SS, Monel	
(70 to 212°F) Sodium fluoride, 5% 21°C (70°F)	Monel	
Sodium hydroxide	Types 304 SS, 316 SS, Hastelloy C	
Sodium hypochlorite, 5% still	Types 316 SS, Hastelloy C	
Sodium nitrate, fused	Type 316 SS	
Sodium peroxide	Type 304 SS	
Sodium sulphate, 21°C (70°F)	Types 304 SS, 316 SS	
	Type 316 SS	
Sodium sulphide 21°C (70°F)	1,500 010 00	
Sodium sulphide, 21°C (70°F)		
Sodium sulphide, 21°C (70°F) Sodium sulphite, 30% 66°C (150°F)	Type 304 SS	
Sodium sulphite, 30% 66°C	Type 304 SS	
Sodium sulphite, 30% 66°C (150°F) Sodium dioxide Moist gas, 21°C (70°F)	Type 316 SS	
Sodium sulphite, 30% 66°C (150°F) Sodium dioxide	, , , , , , , , , , , , , , , , , , ,	
Sodium sulphite, 30% 66°C (150°F) Sodium dioxide Moist gas, 21°C (70°F)	Type 316 SS	

Thermowell Material Selection Guide			
Application	Material		
Chemical (continued)			
Sulphuric acid 5% 21 to 100°C (70 to 212°F) 10% 21 to 100°C (70 to 212°F) 50% 21 to 100°C (70 to 212°F) 90% 21°C (70°F) 90% 100°C (212°F)	Hastelloy B, Type 316 SS Hastelloy B Hastelloy B Hastelloy B Hastelloy D		
Tannic acid, 21°C (70°F)	Type 304 SS, Hastelloy B		
Tartaric acid, 21°C (70°F) 66°C (150°F)	Type 304 SS Type 316 SS		
Toluene	2017-T4 aluminum, low carbon steel		
Turpentine	Types 304 SS, 316 SS		
Whiskey and wine	Types 304 SS, nickel		
Xylene	Copper		
Zinc chloride	Monel		
Zinc sulphate 5% 21°C (70°F) Saturated, 21°C (70°F) 25% 100°C (212°F)	Types 304 SS, 316 SS Types 304 SS, 316 SS Types 304 SS, 316 SS		



Reference Charts and Tables on pages 67-69 are courtesy of the American Society for Testing and Materials. Taken from publication STP 47OB, "Manual on the Use of Thermocouples in Temperature Measurement."

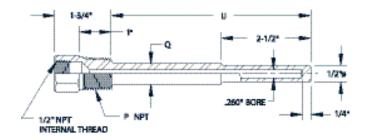
- ^a Trademark of the International Nickel Co.
- ^b Due to susceptibility to cracking, sudden thermal shocks should be avoided.
- ° Due to susceptibility to cracking, sudden thermal shocks should be avoided.
- ^d Trademark of the Cabot Corp.
- ^e Trademark of the Driver-Harris Co.
- ¹ Trademark of the Driver-Harris Co.



STANDARD THERMOWELLS

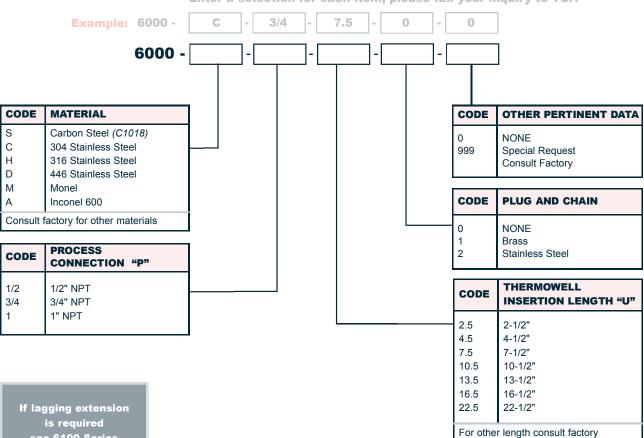
Series 6000

- · Standard Bore Size: .260"
- Reduced Tip for Faster Heat Response
- Brass Plug and Chain Optional



Process Connection "P"	1/2"	3/4"	1"
Diameter "Q"	5/8"	3/4"	7/8"

Enter a selection for each item, please fax your inquiry to TCP.



see 6100 Series

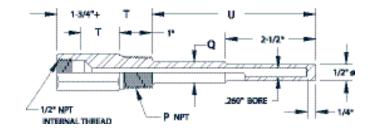




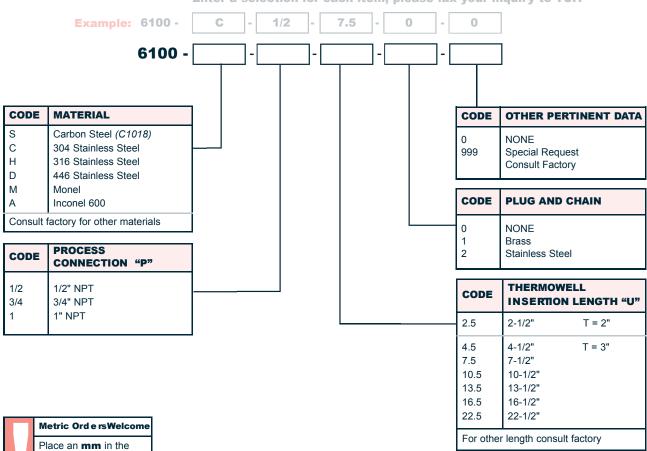
STANDARD LAG THERMOWELLS

Series 6100

- Standard Bore Size: .260
- Reduced Tip for Faster Heat Response
- Brass Plug and Chain Optional



Process Connection "P"	1/2"	3/4"	1"
Diameter "Q"	5/8"	3/4"	7/8"

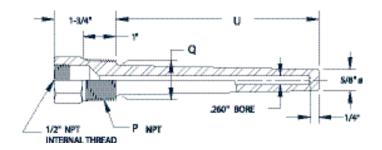




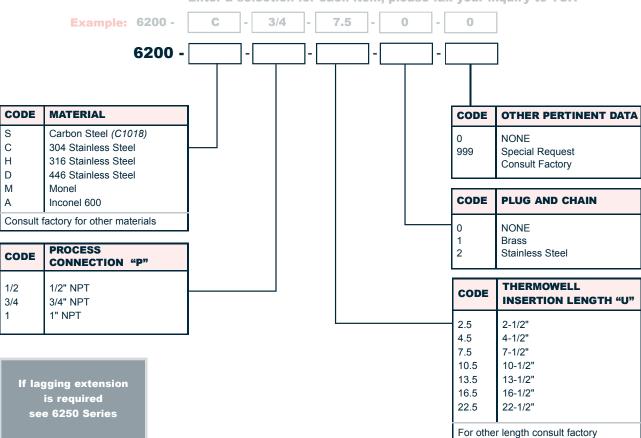
HEAVY DUTY WELL

Series 6200

- · Standard Bore Size: .260"
- Tapered Design to Provide Greater Rigidity
- Brass Plug and Chain Optional



Process Connection "P"	1/2"	3/4"	1"
Diameter "Q"	5/8"	7/8"	1-1/16"



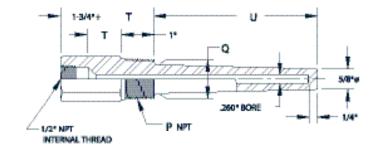




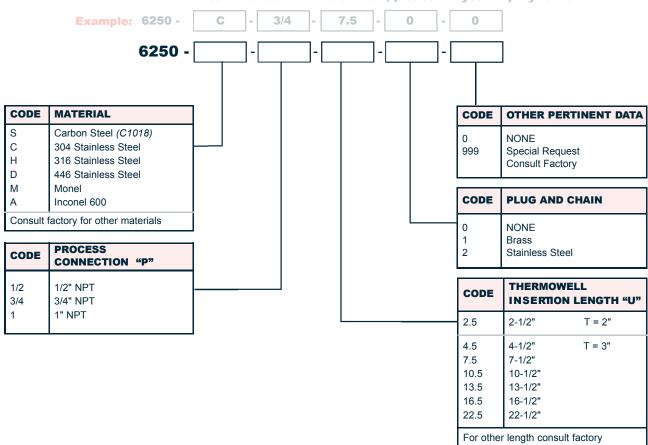
HEAVY DUTY WELL

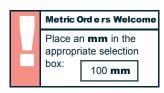
Series 6250

- · Standard Bore Size: .260"
- Tapered Design to Provide Greater Rigidity
- Brass Plug and Chain Optional



Process Connection "P"	1/2"	3/4"	1"
Diameter "Q"	5/8"	7/8"	1-1/16"





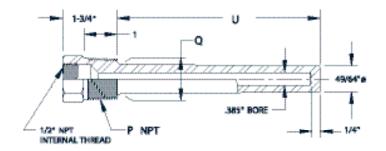


For other length consult factory

HEAVY DUTY WELL

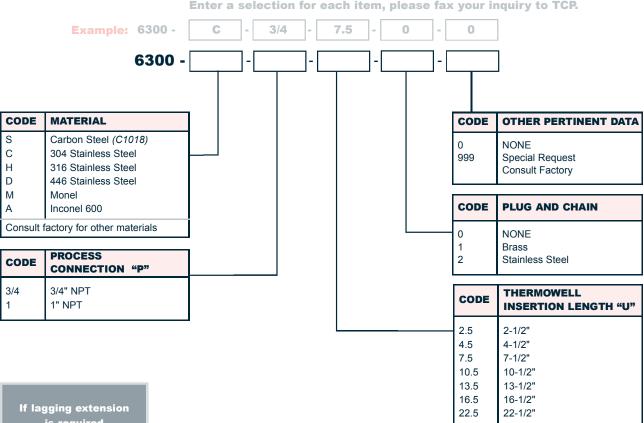
Series 6300

- Standard Bore Size: .385"
- Tapered Design to Provide Greater Rigidity
- Brass Plug and Chain Optional



Process Connection "P"	3/4"	1"
Diameter "Q"	7/8"	1-1/16"

Enter a selection for each item, please fax your inquiry to TCP.



see 6350 Series

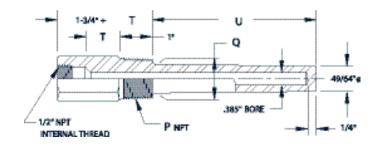




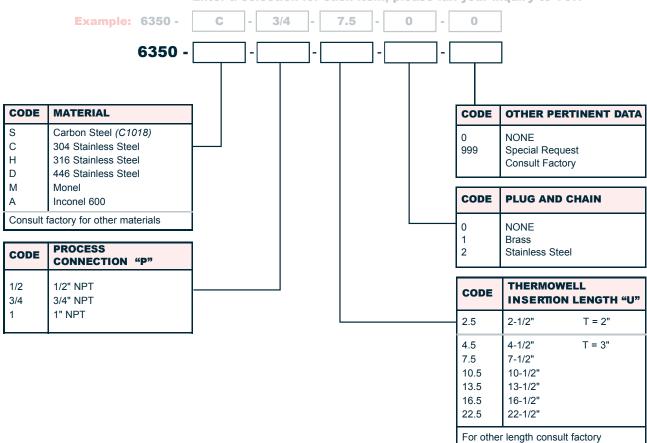
HEAVY DUTY WELL

Series 6350

- Standard Bore Size: .385"
- Supplied with a Standard Lag Length
- Brass Plug and Chain Optional



Process Connection "P"	3/4"	1"
Diameter "Q"	7/8"	1-1/16"







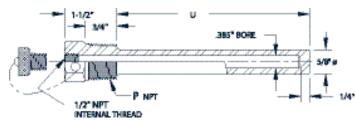
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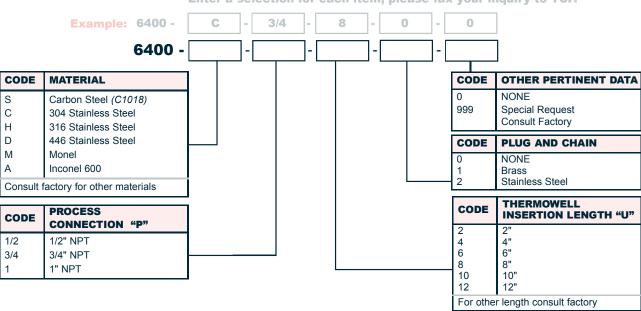
TEST WELL

Series 6400

- Standard Bore Size: .385"
- Brass Plug and Chain Standard



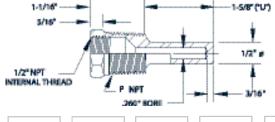
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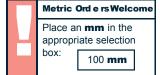




Series 6500

- Standard Bore Size: .260
- Brass Plug and Chain Optional







CODE	MATERIAL	
S	Carbon Steel (C1018)	
С	304 Stainless Steel	
Н	316 Stainless Steel	
D	446 Stainless Steel	
M	Monel	
Α	Inconel 600	
Consult factory for other materials		

CODE	PROCESS CONNECTION "P"	
3/4	3/4" NPT	
1	1" NPT	
For special requirements contact factory. 1/2" NPT - Not available		

CODE	OTHER PERTINENT DATA
0	NONE
999	Special Request Consult Factory
	Consult Factory

CODE	PLUG AND CHAIN
0	NONE
1	Brass
2	Stainless Steel
	THEDMOWELL

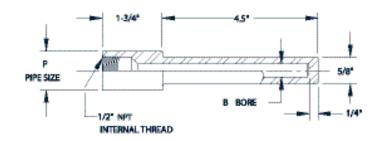
	CODE	INSERTION LENGTH "U"	
_	1.625	Only available in 1-5/8" ("U")	
	For other length consult factory		



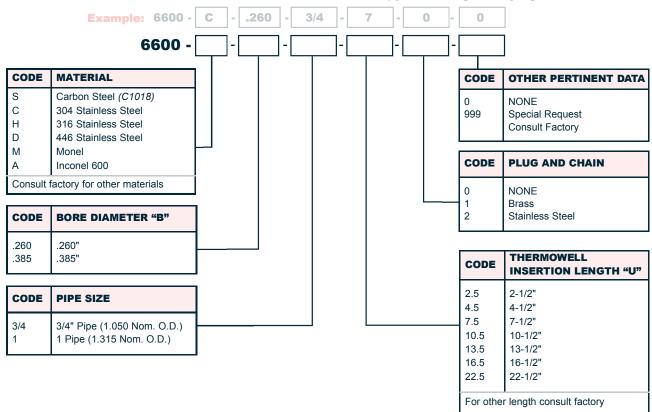
SOCKET - WELD WELL

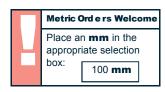
Series 6600

- Standard Bore Size: .260" or .385"
- Used in Seal Welded Applications for Maximum Vessel Integrity
- · Brass Plug and Chain Optional



Pipe Size "P"	В	Q
3/4"	.260" .385"	3/4" 49/64"
1"	.260" .385"	7/8" 7/8"



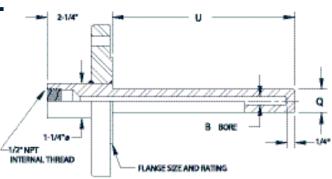




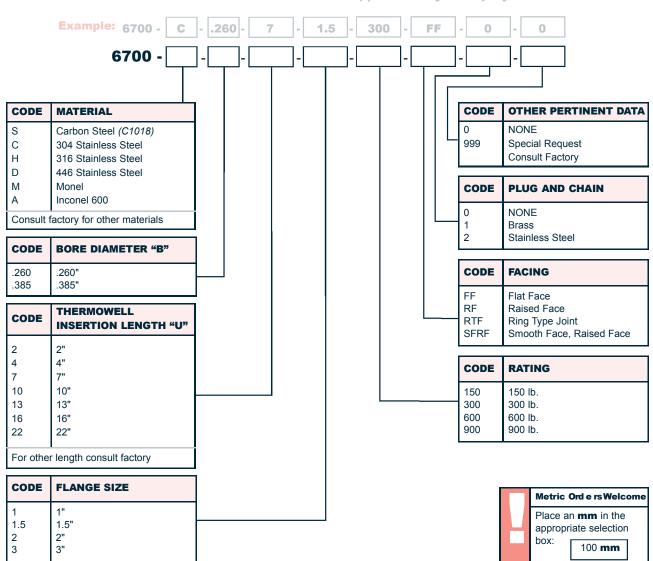
FLANGE THERMOWELL

Series 6700

- · Standard Bore Size: .260" or .385"
- Flange is Fully Welded to Thermowell
- Brass Plug and Chain Optional



Bore "B"	.260"	.385"
Diameter "Q"	3/4"	7/8"

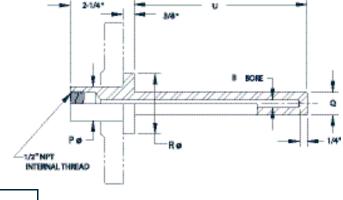




VAN STONE THERMOWELL

Series 6800

- Standard Bore Size: .260" or .385"
- Can be Supplied with a Lap Joint Flange
- Brass Plug and Chain Optional



Diameter "Q"	3/4"	7/8"
Bore "B"	.260"	.385"

