Industrial Process and Sensor
2109 Holland Street
Alton, Illinois 62002

Phone 618-465-7623 **FAX 618-465-7623**

WE CAN TAKE THE *HEAT*!

Thermowell Data

This Section Contains

General Reference Data

Please  For Quote.

If you can't find what you need

Just  **CALL!!**

From Illinois 618-465-7623

From St. Louis 314-231-0752

Fax 618-465-7679

E-mail info@ipscustom.com

The thermowells shown in this catalog are standard lengths for bimetallic thermometers. We also manufacture wells for thermocouples and RTDs. IPS will be glad to quote your custom requirements and additionally provide our high standard of quality to the following specifications.

Bore Diameters	Extensive range of sizes
Calculations	ASME PTC 19.3
Coatings	Alumina Oxide, Colmonoy [1], Kynar [2], Stellite [3], Halar [4], Tantalum, PTFE, PFA (Fluoropolymers) and others
Exotic Materials	The largest inventory of Nickel Alloys, flanges and bar, in the industry
Heat Treating	NACE MR-01-75 certification, Stress Relief, annealing and custom
Oxygen Cleaning	In compliance with ASTM G93-88
Pipe Protection Tubes	Extensive inventory of pipe sizes & materials
Sanitary Wells	TTI is certified under the 3A Dairy Standard, Authorization #690
Sheaths	Tantalum, Titanium, Hastelloy Alloys, etc.
Testing Procedures:	
• Internal Hydrostatic Test	In compliance with ASTM E1003-84(1990)
• Liquid Dye Penetrant Test	In compliance with ASTM E1220-92
• PMI, X-ray, Radiograph, etc.	Additional information available
Welding (Standard & Full penetration)	Welding performed by welders certified under ASME Sec. IX, Boiler & Pressure Vessel Code

Our standard delivery policy is 2 weeks shipping after receipt of order. However, if you require a “rush” delivery, we will provide whatever service you may need. Because of our large and advanced equipment package and the largest inventory of bar and flanges in the industry, we are able to respond in a manner which cannot be matched by anyone in our industry.

(1) Trademark Wall Colmonoy
(2) Trademark Pennwalt Corp.
(3) Trademark Deloro Stellite
(4) Trademark Ausimont USA, Inc.

PRODUCT ENGINEERING SPECIFICATIONS

DRILLED BARSTOCK
OVERALL LENGTHS: THROUGH 31.25" ONLY

Barstock Outside Diameter	Mill Standard +.000"/-1/32" (Hex: Flat to flat measurement; Round: Outside diameter)
Bore "Bottom" Shape	"W" (Nominal)
Bore Concentricity	.0015" drift per inch, .035" Max. T.I.R.
Bore Depth	+.030"/-.000"
Bore Diameter	+.005"/-.003" Stem Only (Not Welded) +.007"/-.003" Welded Products
Chamfer	Nominal
Insertion Length	±.063"
Instrument Connection	1/2"-14 NPT. Entrance bevel: 60° (±1/2°); Drill .718"(±.005") I.D. x 1.00" (±.015") depth; 59° (Nom.) drill bottom. Tap (thread) .500" x .875" depth. Yield: 3 full turns (Min.) x 4 full turns (Max.) on plug gauge. In compliance with ANSI B1.20.1-92. *NOTE: Variances in standard dimensions occur in the TTI Series: 1/2"LS (Limited Space) threaded thermowell, request dimensions.
Material	In compliance with ASTM specifications (or other applicable National Standard such as ASME, AWS, etc.)
Overall Length	Nominal
Process Connection Flange	Reference Doc. No. TX-PFT
Process Connection Thread	In compliance with ANSI B1.20.1-92. Specifications vary depending upon the required process connection size, request dimensions.
Radius	Nominal
Stamping	3/32" minimum height characters indicating material grade & Manufacturer's internal traceability code(s).
Stem Finish	16-32 RMS over 85% of "U" dimension (Exception: *high carbon/low alloy content materials).
Stem Outside Diameter(s)	+/- .010"
Tapered Allowance	Maximum "U" length for a full length taper is 16.00". "U" dimensions greater than 16.00" in length are manufactured with a straight o.d. (Utilizing the Major "taper" diameter) beginning below the process connection radius & following through with only the last 16.00" (+.000"/-.500") of the "U" dimension tapered to the Minor o.d.
Tip Thickness	.250" ±.063"
Weld	Reference TTI Doc. No TX-PFT for flanged wells. (Multiple-piece construction weld joints: Reference TTI Dwg. No. TX-B)
Wrench Allowance	Nominal. Wrench allowance specifications vary with the process connection size ordered. Request dimensions.

Notice: Customer supplied specifications will be accepted as an alternative. Manufacturability of such specifications will be determined by IPS.

PRODUCT ENGINEERING SPECIFICATIONS

DRILLED BARSTOCK

OVERALL LENGTHS: >31.25" THROUGH 61.25" ONLY

Barstock Outside Diameter	Mill Standard +.000"/-1/32" (Hex: Flat to flat measurement; Round: Outside diameter)
Bore “Bottom” Shape	“W” (Nominal)
Bore Concentricity	.002" drift per inch, .035" Max. T.I.R.
Bore Depth	+.063"/-.000"
Bore Diameter	+.007"/-.003"
Chamfer	Nominal
Insertion Length	±.125"
Instrument Connection	1/2"-14 NPT. Entrance bevel: 60° (±1/2°); Drill 718"(±.005") I.D. x 1.00" (±.015") depth; 59° (Nom.) drill bottom. Tap (thread) .500" x .875" depth. Yield: 3 full turns (Min.) x 4 full turns (Max.) on plug gauge. In compliance with ANSI B1.20.1-92.
Material	In compliance with ASTM specifications (or other applicable National Standard such as ASME, AWS, etc.)
Overall Length	Nominal
Process Connection Flange	Reference Doc. No. TX-PFT
Process Connection Thread	In compliance with ANSI B1.20.1-92. Specifications vary depending upon the required process connection size, request dimensions.
Radius	Nominal
Stamping	3/32" minimum height characters indicating material grade & Manufacturer’s internal traceability code(s).
Stem Finish	16-32 RMS over 85% of “U” dimension (Exception: *high carbon/low alloy content materials).
Stem Outside Diameter(s)	+/- .015"
Tapered Allowance	Maximum “U” length for a full length taper is 16.00". “U” dimensions greater than 16.00" in length are manufactured with a straight o.d. (Utilizing the Major “taper” diameter) beginning below the process connection radius & following through with only the last 16.00" (+.000"/-.500") of the “U” dimension tapered to the Minor o.d.
Tip Thickness	.250" ±.063"
Weld	Reference TTI Doc. No TX-PFT for flanged wells. Multiple-piece construction weld joints: Reference TTI Dwg. No. TX-B. Drilled-through tip with full pen. weld to close: Reference TTI Dwg. No. TX-FP TIP
Wrench Allowance	Nominal. Wrench allowance specifications vary with the process connection size ordered. Request dimensions.

Notice: Customer supplied specifications will be accepted as an alternative. Manufacturability of such specifications will be determined by IPS.

PRODUCT ENGINEERING SPECIFICATIONS

DRILLED BARSTOCK

OVERALL LENGTHS: GREATER THAN 61.25"

Barstock Outside Diameter	Mill Standard +.000"/-1/32" (Hex: Flat to flat measurement; Round: Outside diameter)
Bore “Bottom” Shape	“W” (Nominal)
Bore Concentricity	.002" drift per inch, .035" Max. T.I.R.
Bore Depth	+.500"/-.000"
Bore Diameter	+.007"/-.003"
Chamfer	Nominal
Insertion Length	±.500"
Instrument Connection	1/2"-14 NPT. Entrance bevel: 60° (±1/2°); Drill .718"(±.005") I.D. x 1.00" (±.015") depth; 59° (Nom.) drill bottom. Tap (thread) .500" x .875" depth. Yield: 3 full turns (Min.) x 4 full turns (Max.) on plug gauge. In compliance with ANSI B1.20.1-92.
Material	In compliance with ASTM specifications (or other applicable National Standard such as ASME, AWS, etc.)
Overall Length	Nominal
Process Connection Flange	Reference Doc. No. TX-PFT
Process Connection Thread	In compliance with ANSI B1.20.1-92. Specifications vary depending upon the required process connection size, request dimensions.
Radius	Nominal
Stamping	3/32" minimum height characters indicating material grade & Manufacturer’s internal traceability code(s).
Stem Finish	16-32 RMS over 85% of “U” dimension (Exception: *high carbon/low alloy content materials).
Stem Outside Diameter(s)	+/- .015"
Tapered Allowance	Maximum “U” length for a full length taper is 16.00". “U” dimensions greater than 16.00" in length are manufactured with a straight o.d. (Utilizing the Major “taper” diameter) beginning below the process connection radius & following through with only the last 16.00" (+.000"/-.500") of the “U” dimension tapered to the Minor o.d.
Tip Thickness	.250" ±.063"
Weld	Reference TTI Doc. No TX-PFT for flanged wells. Multiple-piece construction weld joints: Reference TTI Dwg. No. TX-B. Drilled-through tip with full pen. weld to close: Reference TTI Dwg. No. TX-FP TIP
Wrench Allowance	Nominal. Wrench allowance specifications vary with the process connection size ordered. Request dimensions.

Notice: Customer supplied specifications will be accepted as an alternative. Manufacturability of such specifications will be determined by IPS.

POST-FABRICATED
FLANGE DIMENSIONAL TOLERANCES

Post-fabricated flange dimensional tolerances are provided below. These dimensional tolerances include those of the ANSI B16.5 National Standard, where applicable. Customer requested specifications will be reviewed for manufacturability upon request.

Flange Overall Thickness	
RF, FF, RTJ	+.12"/-.000" (18" NPS and smaller). See "Exceptions Notice" following.
All others	±.062" (10" NPS and smaller). See "Exceptions Notice" following.
Exceptions Notice:	All post -fabricated "High Carbon/Low Alloy" content material grade flanges are provided per ANSI B16.5 maximum thickness. However, the ANSI B16.5 minimum thickness may be provided undersized[1] by as much as .063".
Gasket Surface	
Standard Flanges	125-200 Microinch. Serrated-spiral (phonographic) grooves.
RTJ (Ring Type)	125-200 AARH. Smooth machined surface.
Vanstone Series	125-200 AARH. Smooth machined surface.
Flanged w/ Sheath	32-64 RMS (thermowell flange gasket surface)
Inside Diameter	
Drilled by TTI	Non-welded: +.005"/-.000" Welded: Request TTI standard welding drawing "TX-A1" (or optional full penetration welding drawing "TX-A2")
Radius	Nominal
Stamping	In compliance with ANSI B16.5 with additional 3/32" minimum height characters indicating TTI internal traceability code(s).
Thermowell Stem	Reference applicable TTI Doc. No. PES 31, PES 61, or PES G61.
Threaded	To standard gauge limits (when threads are applicable). Reference TTI Series "Threaded-On & Seal-Welded" detail drawings. Note: Standard ANSI B16.5 thread specifications are **not** fabricated to mate with a threaded thermowell stem.
TTI Welding Qualifications	
Welders	Welding is performed by welders certified under the ASME Sec. IX, Boiler & Pressure Vessel Code-1992.
WPS/PQR	Request welding documents prior to fabrication.
TTI Welding Specifications	
Standard Weld	Reference TTI Dwg. No. TX-A1
Full Penetration	Reference TTI Dwg. No. TX-A2
Non-Standard	Specifications provided upon request

FLANGED THERMOWELL DISCLOSURE:
Flanged thermowells are considered proprietary products which are not governed by ANSI B16.5. Post-fabricated thermowell flange components do no carry an automatic ANSI B16.5 rating[2] and are not considered in compliance with the standard[3].

ANSI B16.5 PATTERNED FLANGES:
Certain material grades are not included in the ANSI B16.5 National Standard and are offered as "ANSI B16.5 Patterned" flanges. Patterned flanges are **dimensionally** compliant to ANSI B16.5. Prevalent material grades for patterned flanges include: Alloy C22 (Trade name: Hastelloy C22), Alloy 601 (Trade name: Inconel 601), HR 160, Tantalum, Titanium (all grades), and Zirconium (all grades), etc. Reference ANSI B16.5, TABLE 1A - LIST OF MATERIAL SPECIFICATIONS.

---

[1]Price and availability for "high carbon/low alloy" content material grade flanges to meet ANSI B16.5 minimum flange thickness after fabrication is available upon request. TTI Doc. No. TX-CSL provides a listing of applicable materials.

[2]Reference ANSI B16.5-1988 (1992); Interpretation: 1-1, Subject: Modification to Flanges; Reply number (1) and number (2).

[3]Reference ANSI B16.5-1988 (1992); Interpretation: 1-4, Subject: Proprietary Products; Reply number (1) and number (3).

PROTECTION TUBE ENGINEERING SPECIFICATIONS

Pipe Outside Diameter	Mill Standard +/-.032"
Pipe Inside Diameter	Mill Standard: Pre-Fabrication *Post-Fabrication: Pipe I.D. is subject to distortion at each welded area. Pipe I.D. is not drilled or reamed after fabrication.
Closed-End Bottom Shape	Nominal. Ref. "TX FP TIP" for TTI standard closed-end tip specifications. (Pipe caps are available as an option to close the tip. Pipe cap specifications are available upon request.)
"Bore" Depth	+/- .500" for Depths </= 60" +/- .750" for Depths > 60" - 96" +/- 1.00" for Depths > 96"
Chamfer	Nominal
Insertion Length	+/- .500" for Insertion Lengths </= 60" +/- .750" for Insertion Lengths > 60" - 96" +/- 1.00" for Insertion Lengths > 96"
Material	In compliance with ASTM specifications (or other applicable National Standard such as ASME, AWS, etc.)
Overall Length	Nominal
Process Connection Bushing	Standard bushing dimensions are per "TX-PTB".
Process Connection Flange	Flange dimensions are compliant to ANSI B16.5 prior to fabrication. Flange facing finish: 125-200 Microinch
Male Pipe Thread	In compliance with ANSI B1.20.1-92. The thread specifications vary with the pipe size ordered, request dimensions.
Radius	Nominal
Stamping	3/32" Minimum height characters indicating material grade & Manufacturer's internal traceability code(s).
Stem Surface Finish	RA 50 over 55% of "U" length
Tip Thickness	1/4" (+/- 1/16"). Valid for closed-end tip thickness per "TX-FP TIP"
Welding	a) Flange to Base Metal Weld: TTI Dwg. No. TX-A1 (Standard weld) b) Bushing to Base Metal: Fillet weld c) Barstock for Closed-end: TTI Dwg. No. "TX-FP TIP". Full penetration weld locations are subject to distortion and internal filler metal slag. d) Pipe Cap for Closed-end: TTI Dwg. No. "TX-B". Full penetration weld locations are subject to distortion and internal filler metal slag.

* Post-fabricated internal pipe diameters are affected by interdependent factors such as welding requirements, overall length and material grade. Internal pipe diameter tolerances are available on an "as needed" basis.

Notice: Customer supplied specifications will be accepted as an alternative. Manufacturability of such specifications will be determined by IPS.

MANUFACTURER'S STANDARD PACKAGING PROCEDURES

Standard packaging procedures were devised to insure delivery of our product undamaged as well as minimize the cost of transit charges. *Price & availability for non-standard packaging procedures are available upon request.

INDIVIDUAL PRODUCT PACKAGING

All wells are enclosed in protective packaging prior to accumulation into the transit container(s).

Standard Wells

Enclosed in plastic protective webbing then wrapped in brown paper and taped closed.

Coated Wells & Special Surface Finishes

Enclosed in bubble wrap and cardboard sleeves

High Carbon/Low Alloy Content Materials (Carbon Steel, Chrome/Moly & similar materials)

Coated with Rust inhibitor (WD-40 or similar), enclosed in Vapor Wrap then wrapped in brown paper and taped closed.

TRANSIT CONTAINERS

All transit containers have packing material to absorb shock & separate product.

Standard Transit Container

Corrugated cardboard box rated at 200 lb. Test

WEIGHT LIMITATIONS:

Threaded wells: 30 lbs. Maximum per cardboard box
Flanged wells: 25 lbs. Maximum per cardboard box (See quantity limitations below)

QUANTITY PER BOX LIMITATIONS:

Flanged wells :(All other wells are subject to weight limitations rather than quantity limitations)

150# - 600# Rating flanges
Maximum of two (2) flanged wells per cardboard box (or less to avoid exceeding the standard weight limit)

900# or greater Rating flanges
Maximum of one (1) flanged well per cardboard box

Pallet

Cardboard boxes are stacked onto a pallet & wrapped with plastic wrap for transit. $30.00 per pallet (Not included in net each prices) The estimated number of pallets required for large jobs are available through the TTI Sales Department. Palletization limits freight carrier choices. Generally palletizing does not require a forklift for unloading at the destination.

Crate

Crating limits freight carrier options. Generally, crating will require a forklift for unloading at the destination.

*IPS will not absorb any charges for product, freight charges or otherwise should requested non-standard packaging exceed the Manufacturer's standard limitations for weight or quantity per container herein.