The promise of precision, every time.

MACWELD machining

www.mac-weld.com

THERMOWELLS

Flanged | Helical | Limited Space | Socket-Weld | Threaded | Tri-Clamp | Vanstone | Weld-In

MACWELD machining

At Mac-Weld we promise precision, every time. We're proud of our work, and we work closely with our customers. We design and develop products that perform best under the most challenging conditions. We don't crack under pressure. We don't melt under heat. We measure the flow, and we're measured in our response. We stand by our quality, our time, and our price. We're Mac-Weld, and our promise is, to be the best.

The promise of precision, every time.

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Mac-Weld reserves the right to update and/or change our product line at anytime without written notice. Drawings may differ slightly from final product. For the most up to date and accurate drawing, please contact your Mac-Weld Sales representative today at 1-877-622-9353. Revised August 2022.

Flanged Thermowells

Helical Thermowell

Limited Space Thermowells

Tri-Clamp Thermowell

Socket Weld Thermowells

Threaded Thermowells

Vanstone Thermowells

Weld-In Thermowell

Mac-Weld Thermowells

Over 40 years experience manufacturing thermowells

As a pioneer and global leader in manufacturing thermowells, we ensure the highest quality and precision in every piece we manufacture. Whether they are custom-made for highly specialized measurements or they are in a standard configuration, each and every thermowell is built to meet or exceed accepted standards.

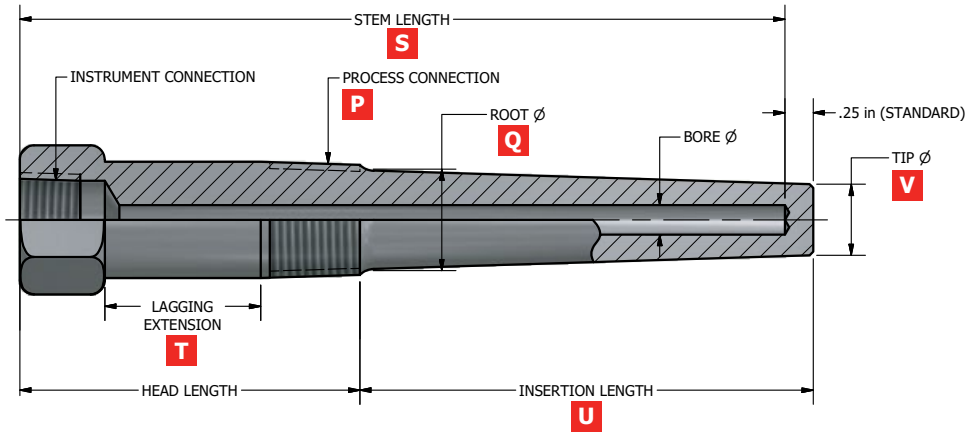
Precision | Quality | On-time Delivery

Our thermowells are designed and manufactured 100% in house, and are made to accept standard and custom made thermometers, thermocouples, bulbs and RTD's. Mac-Weld flange thermowells are also available in a large variety of sizes and configurations that include, but are not limited to, raised face, flat face, and ring type joint.

- Mac-Weld thermowells accept standard or custom-made thermometers, thermocouples, bulbs and RTD's.
- All are manufactured in house, quality checked and tested to code before being shipped.
- Mac-Weld custom software, V-MAC, utilized for thermowell wake calculations.
- Large variety of materials available
- CRN approved thermowells.
- Various NDT options
- NACE compliant
- Sanitary (Tri-Clamps) thermowells available, 8-12 Micro inch R/A finish

Thermowell Dimensions

Threaded Tapered Thermowell



U Insertion depth
This is how much of the thermowell will be inserted into the process.

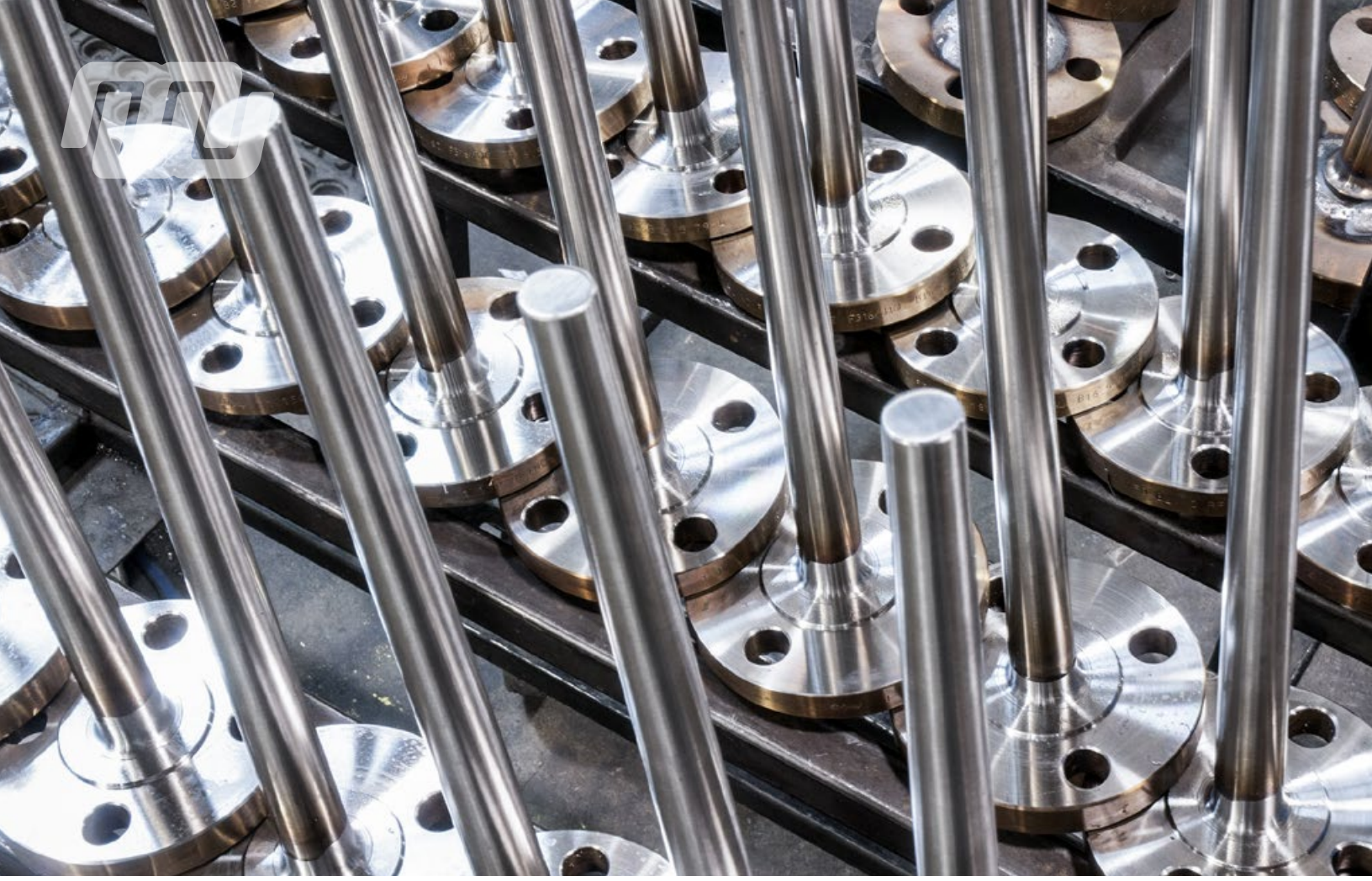
T Lag Length
This provides extra length between the process connection and the sensor connection.

P Process Connection
The pipe size of the thermowell.

Q Root Diameter
This is based on the process connection dimension.

V Tip Diameter
Based on thermowell design, with various sizes depending on style.

S Stem Length (Bored Depth)
Total length of the thermowell, minus the 1/4" .



Connections and Construction

We ensure the highest quality & precision in every piece we manufacture

Process Connection

Thermowells come in a variety of different process connections. The process connection is determined by how the Thermowell will be mounted in the field. The most common styles are threaded, flanged, socket weld, weld-in and Vanstone

Threaded thermowell process connections thread into a threaded fitting welded to the process pipe or vessel. This type of connection is popular because it allows for easy installation and removal when required. Threaded thermowells typically come with a hex head or two wrench flats at the top of the well.

Flanged thermowells are mated to an existing flange mounted to the process pipe using bolts. Flange connections are useful in high velocity, high temperature and/or high pressure conditions. Flanged connections also allow for easy installation and removal which makes them a popular solution.

Welded thermowell process connections, either socket weld or weld-ins; are a more permanent mounting solution. This type of connection is also common in high velocity, high temperature and/or high pressure conditions. Welded connections come with the benefit of proven reliability and leak resistance; however, removal is more difficult due to the fact that they must be cut out of the process.

Vanstone thermowells are installed by sandwiching it between the flange mounted to the process pipe and a lap joint flange. Because the lap joint flange and the thermowell are separate pieces, it allows for the possibility of using two dissimilar materials.

Flanged Well Construction

A flanged well is made up of three basic construction components: a blind, the stem and the weld that joins them together. Mac-Weld uses a full penetration weld as standard practice on almost all materials. Full penetration welding provides your flanged thermowell with complete joint penetration, and a stronger, more dependable weld.

There are a variety of flange facing options available. The most common are Raised Face (RF), Flat Face (FF), and Ring Type Joint (RTJ). The raised face and flat face versions come with a spiral serrated gasket surface as the standard finish. Concentric serrations are an alternative gasket finish on the RF and FF flanges, commonly used with low density process fluids to reduce the risk of leakage. Ring type joint flange facings have a groove cut into the surface and use a metal gasket to seal with the mating flange.

Mac-Weld has a large collection of TSSA approved weld procedures that we apply to a variety of materials. We perform all of our welding in accordance with the requirements stipulated in the ASME Boiler Pressure Vessel Code. All of our welds are performed by TSSA accredited welders to ensure the utmost strength, durability and integrity in every piece we make.

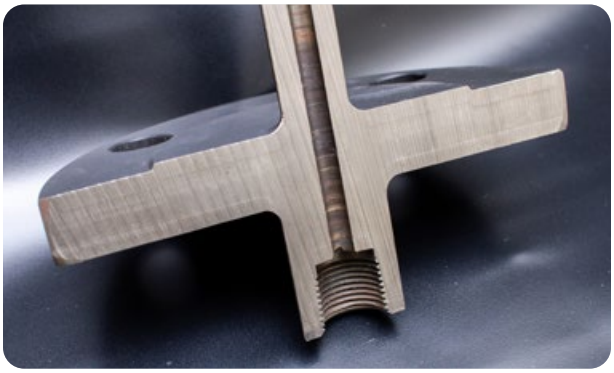

PRECISION ARC

Construction, Surface and Sheaths

We ensure the highest quality & precision in every piece we manufacture

Full Penetration Weld

There is no seam between the flange and the stem of the well. The entire connection has been welded to one mass. This is the highest quality thermowell construction.



Surface Finishes

All Mac-Weld thermowells have a standard surface finish of 16-32 µin Ra. This gives our thermowells a higher corrosion resistance than a rougher or less polished surface.

Our sanitary thermowells are commonly finished at a higher rating of 4-12 µin Ra., however all of our thermowells can be finished with a higher rating. Talk to a sales representative today for details.

Sheaths and Protection Tubes

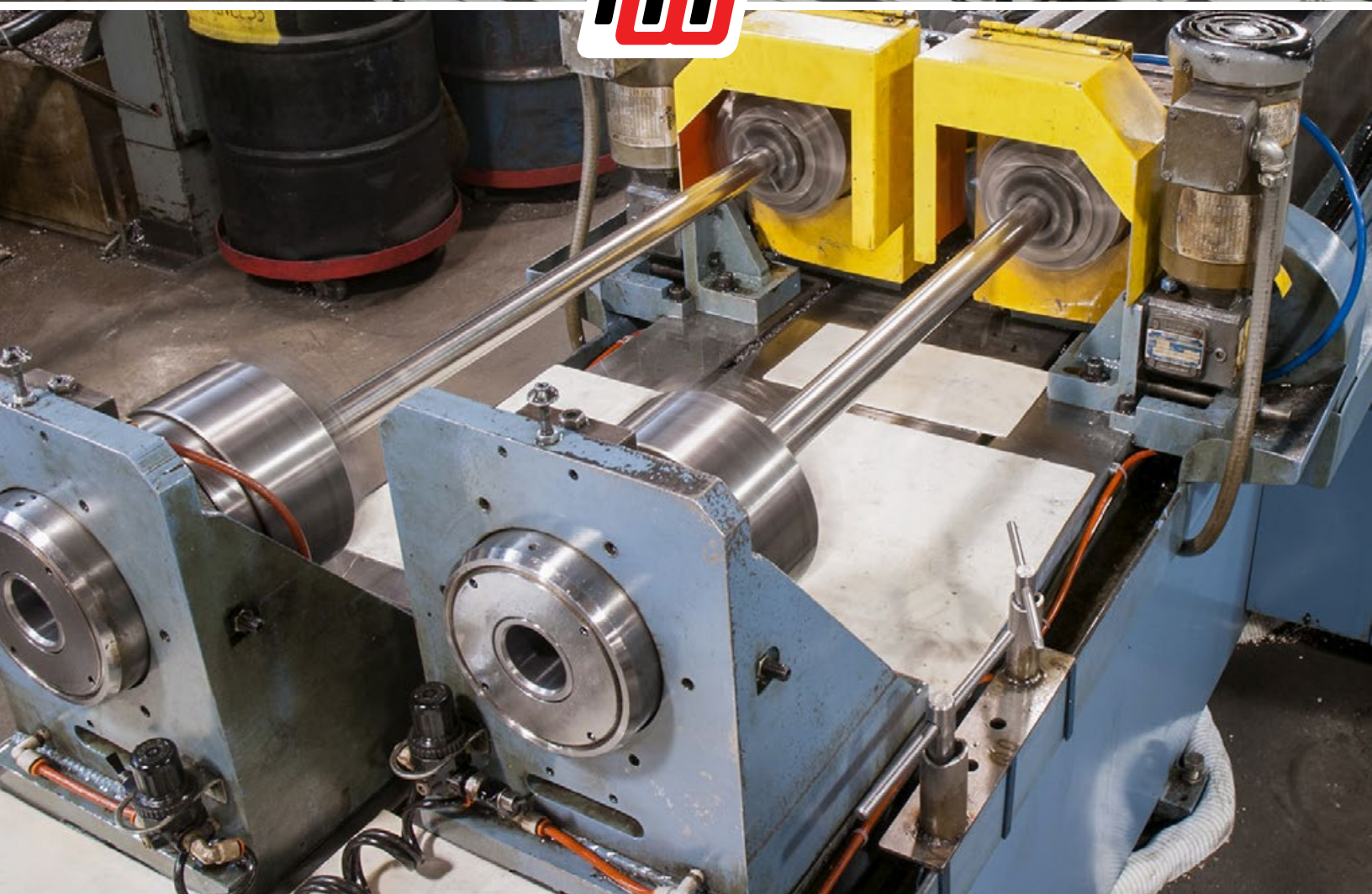
We offer a wide range of thermowell sheaths to help ensure they withstand the harshest conditions.

Our most common material for sheaths is Tantalum, which offers an exceptional level of protection with an upper temperature range of 5000°.

Tantalum also offers better resistance to highly corrosive chemicals or processes.

Mac-Weld protection tubes are available in a variety of materials and specifications to suit your job requirements.


MILLTRONICS
DANGER
DANGER
Z-AXIS



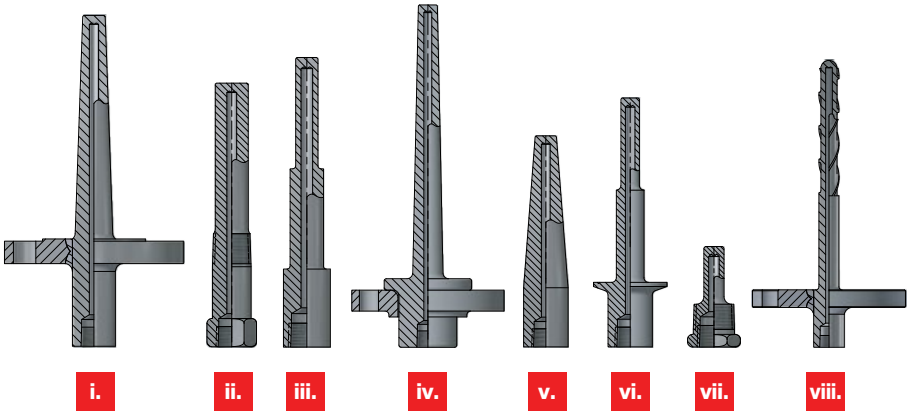
Thermowell Types and Styles

Mac-Weld offers a wide variety of various process connections and styles

Thermowell Connection Types

Mac-Weld thermowells are available in several different thermowell types, including the three most common; flanged, threaded and socket weld. All our thermowells are manufactured in house, which gives us the advantage of producing these various types with the exact specifications required by our clients.

With over 40 years of experience manufacturing thermowells, Mac-Weld has the ability to offer almost any type of thermowell with the quality and precision the industry requires.



i. **Flanged**
ii. **Threaded**
iii. **Socket Weld**
iv. **Vanstone**
v. **Weld-In**
vi. **Tri-Clamp**
vii. **Limited Space**
viii. **Helical**

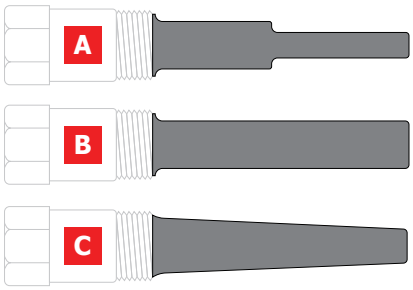
Thermowell Shank Styles

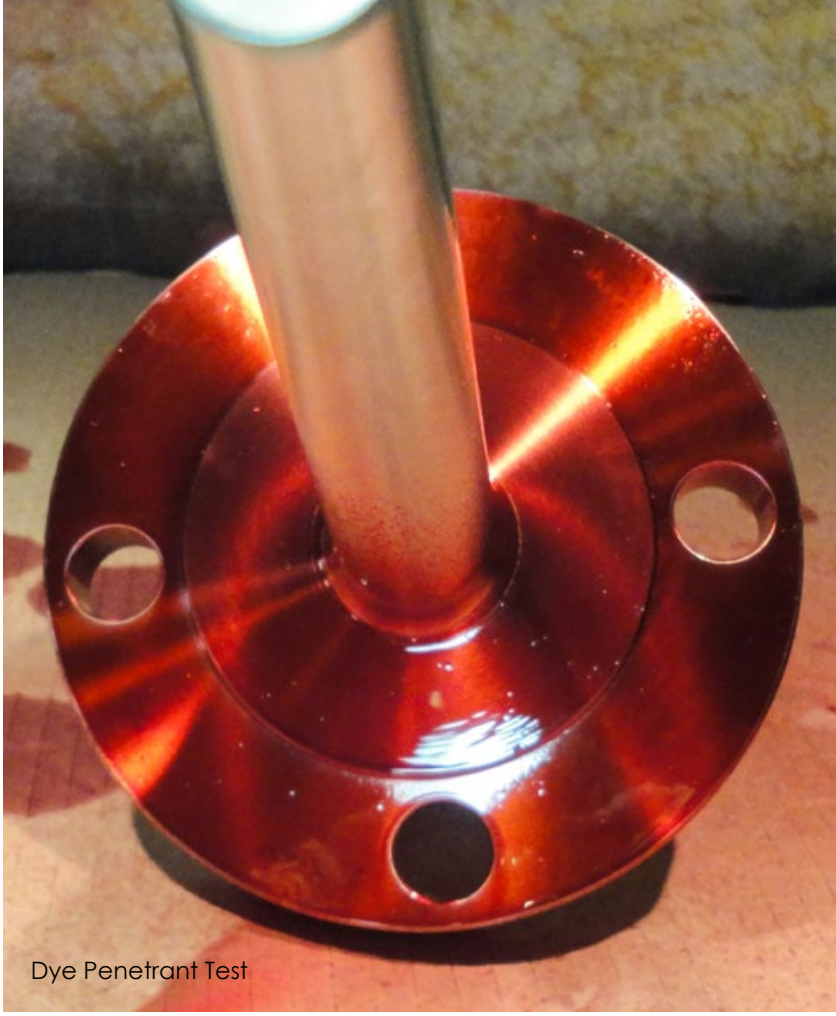
A thermowell shank can be straight, stepped or tapered. Mac-Weld offers almost any combination of thermowell shank styles in our various thermowell types, creating almost endless possibilities depending on your application requirements.

A. **Stepped Thermowells**
Stepped thermowells have two straight sections with the smaller diameter section at the tip. The stepped thermowell is more responsive to changes, since the tip diameter is reduced to improve heat transfer to the sensor. This does however, also reduce the overall strength and durability.

B. **Straight Thermowells**
Straight thermowells have the same diameter along the entire immersion length. The straight thermowell is very durable, especially for low pressure/velocity applications.

C. **Tapered Thermowells**
Tapered thermowells have an outside diameter that decreases uniformly from root to tip. The tapered thermowell is the perfect combination of strength and vibration resistance, making it a popular selection for a majority of applications.





Dye Penetrant Test

Thermowell Options

- Dye Penetrant Test
- Dye Penetrant - Root & Cap
- Brass Plug & Chain
- Stainless Plug & Chain
- Teflon Coating
- Stellite Overlay
- Kynar Coating
- Internal Hydrostatic Testing
- External Hydrostatic Testing
- Material Test Report (MTR)
- Nace MR0175
- PMI
- Tantalum Sheath (Straight only)
- Velocity Calculation per ASME PTC 19.3 TW 2016
- X-Ray
- O2 Cleaning
- Post Weld Heat Treatment
- UT bore concentricity
- UT phased array
- CofC (Certificate of compliance)
- COO (Certificate of origin)
- Traceability Index
- ITP (Inspection test plan)
- Stamping
- SS tags
- Visual dimensional report
- Electro polish
- Pickle and Passivation

Our Warranty

All Mac-Weld Machining products are warranted free of defects in materials or workmanship for one full year from the date of the original factory shipment.

If returned within the warranty period, and upon factory inspection of the product, the cause of the malfunction is determined to be defective material or workmanship, then Mac-Weld Machining will repair or replace the product at no cost to the purchaser (or owner) other than transportation.

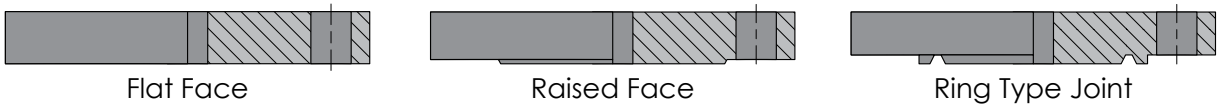
Mac-Weld Machining shall not be liable for misapplication, labor claims, direct or consequential damage or expense arising from the installation or use of the equipment. There are no other warranties expressed or implied at this time.

Faces, welds and benefits

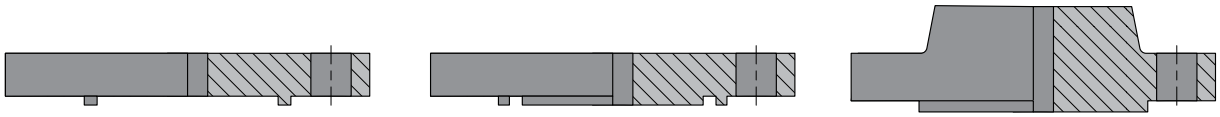
With over 40 years experience, Mac-Weld can help with any project

Flange Faces

The flange face is the surface used to hold the gasket. The various styles require different gaskets depending on the type of face to create a leak proof seal in the connection.



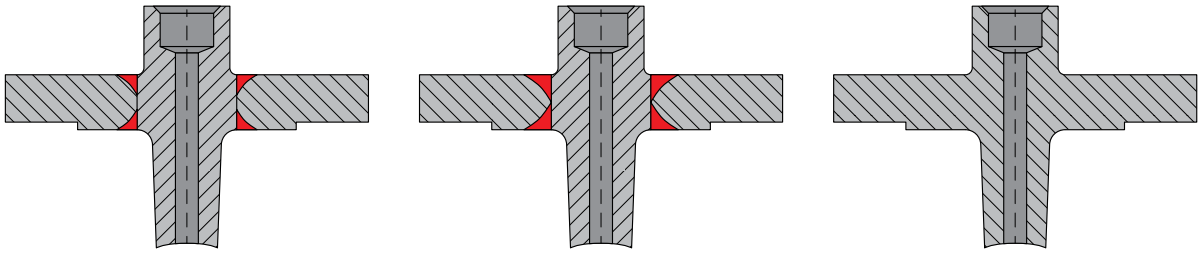
Flat Face | Raised Face | Ring Type Joint



Tongue Face | Groove Face | High Hub

Flange Weld Type

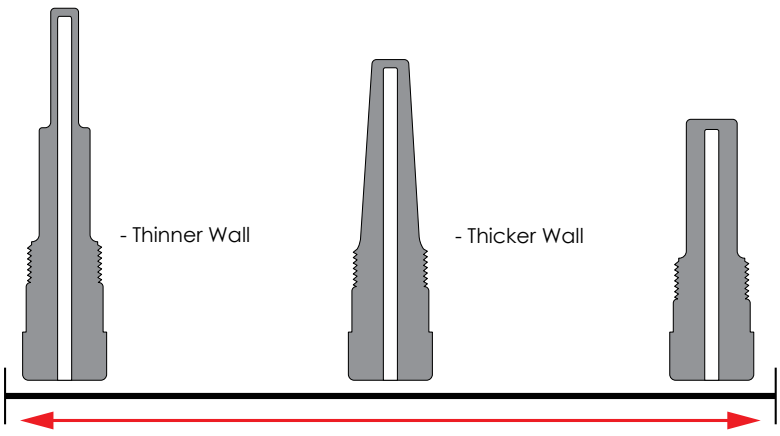
Most Mac-Weld flanged thermowells are fabricated using a full penetration weld. This is one of the strongest weld connections available, while also keeping budget in mind.



Seal Weld, Partial Penetration | Full Penetration Weld | Forging, No Weld

Thermowell Style Benefits

There are three main thermowell styles available, stepped, tapered and straight. Each style has its own advantage based on its strength and temperature accuracy.



Measurement
- Quicker response time
- Less stem conduction

Strength
- Increased resistance to vibrations
- Higher resistance to corrosion
- Difficult to bend and less likely to break due to vibration stress

FLANGED THERMOWELLS

TW33	–	A	–	DA	–	B	–	L2	–	L2	–	AA	–	010000	–	02250	–	1060	–	0625	–	I
1		2		3		4		5		6		7		8		9		10		11		12

1	Thermowell Stem Style
2	Bore Size
3	Flange Size & Rolling
4	Flange Facing
5	Stem Material
6	Flange Material

7	Instrumental Connection
8	Insertion Length
9	Head Length
10	Root Diameter
11	Tip Diameter
12	Unit of Measurement

Please see our product part breakdowns online at mac-weld.com featuring a complete list of available part options specific to each type and style of thermowell.

See page 32 for a complete list of available sizes, materials and measurements. Visit www.mac-weld.com for more information.

Flanged Thermowells

Our flanged thermowells are designed and manufactured 100% in house

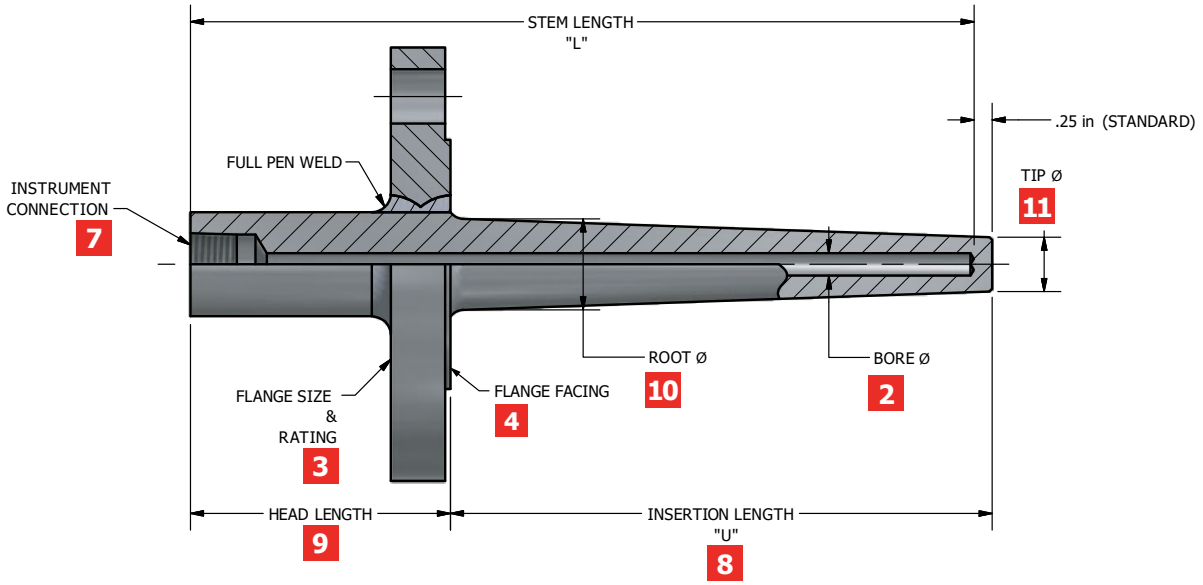
Our thermowells are used in demanding conditions of intense pressure and temperature, across a wide variety of industries.

As a pioneer and global leader in manufacturing thermowells, we ensure the highest quality and precision in every piece we manufacture. Whether they are custom-made for highly specialized measurements or they are standard configuration, each and every thermowell is built to meet or exceed accepted standards. Since all our thermowells are made to order and manufactured on site, our clients have the ability to mix various material types between the flange and thermowell.

Our flanged thermowells are designed and manufactured 100% in house, and are made to accept standard and custom made thermometers, thermocouples, bulbs and RTD's.

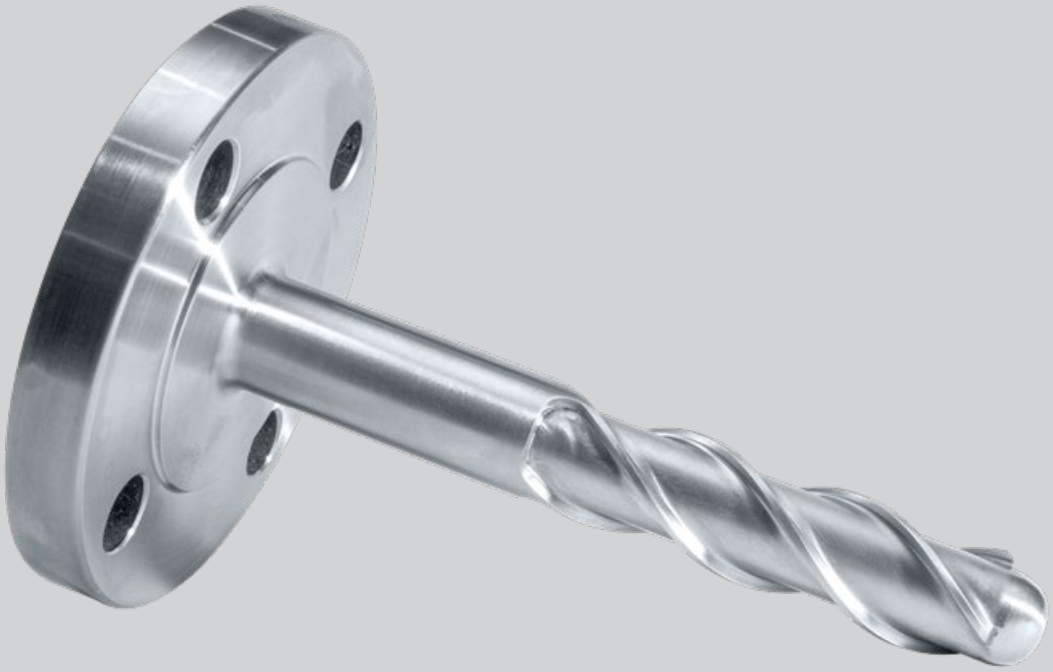
Available in a large variety of flange sizes, and configurations that include, but are not limited to, raised face, flat face, and ring type joint. making the Mac-Weld flange thermowell the perfect solution for the job.

- Our thermowells are made to order with expedited lead times available.
- Raised face, flat face and ring type joint versions.
- Available in various shank styles; stepped, straight and tapered.
- Full penetration welds on flanged thermowell.
- CRN approved thermowells.
- Custom software for thermowell design calculations.
- Various NDT options.
- NACE compliant.



Material Options: 316 Stainless Steel, 304 Stainless Steel, Carbon Steel, 310 Stainless Steel, 321 Stainless Steel, 347 Stainless Steel, Alloy 20, C-276, Duplex, Alloy 800, Alloy 600, Alloy 625, Alloy 825, Alloy 400, and Titanium (For a complete list, talk to a Mac-Weld sales representative today).

Industries: All Industries that measures process temperature.



HELICAL THERMOWELL

Utilizing VE Technology

TW34	–	A	–	DA	–	B	–	L2	–	L2	–	AA	–	010000	–	02250	–	1060	–	0625	–	I
1		2		3		4		5		6		7		8		9		10		11		12

1	Thermowell Stem Style
2	Bore Size
3	Flange Size & Rolling
4	Flange Facing
5	Stem Material
6	Flange Material

7	Instrumental Connection
8	Insertion Length
9	Head Length
10	Root Diameter
11	Tip Diameter
12	Unit of Measurement

Please see our product part breakdowns online at mac-weld.com featuring a complete list of available part options specific to each type and style of thermowell.

See page 32 for a complete list of available sizes, materials and measurements. Visit www.mac-weld.com for more information.

Helical Thermowell

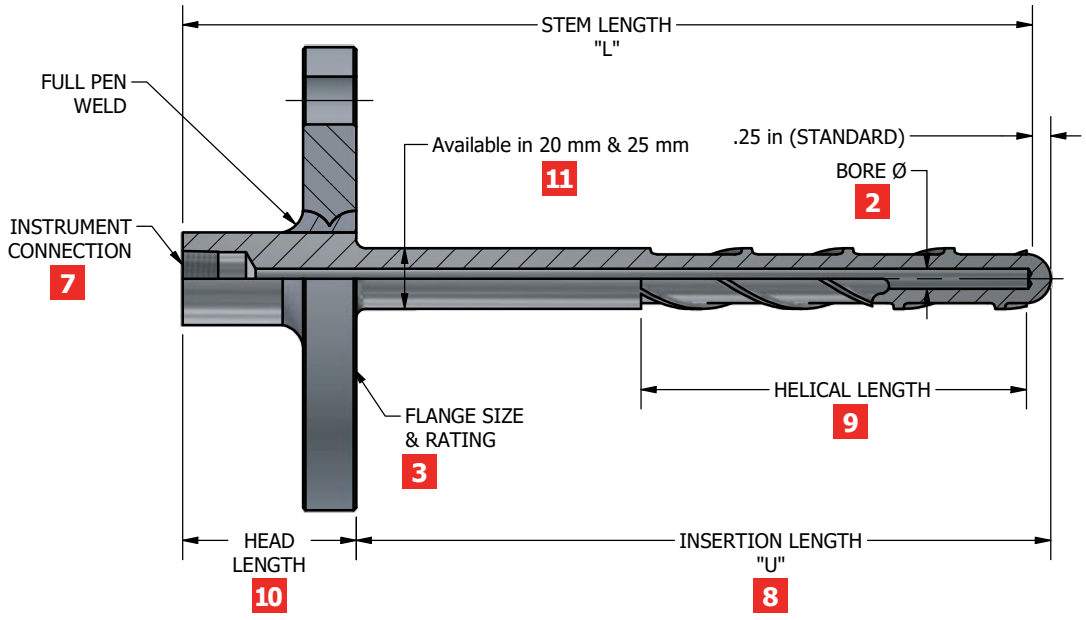
Designed for high velocity applications

Our helical thermowells are designed to withstand high velocity flow applications, where standard thermowells would often fail.

As a pioneer and global leader in manufacturing thermowells, we ensure the highest quality and precision in every piece we manufacture. Our helical thermowell improves accuracy and response time of temperature measurement, compared to a standard thermowell with greatly increased root-tip diameters and shortened immersion length.

Our helical thermowell features VE Technology, utilizing a design that helps eliminate vortex-induced vibration. VE Technology combines both the helical strakes along with a rounded tip, which break up vortices caused by the flow around the thermowell.

- Reduces amplitude of oscillation by more than 90% compared to standard round bar design.
- Wake frequency calculations are no longer required for helical thermowell. Steady state stress and pressure calculations are sufficient.
- Fewer limitations due to immersion length.
- Standard installation allows for quick install or replacement.
- The small root and tip diameters allow for fast response to temperature variations.
- Perfect for nozzles with small ID and high standoff length.



Material Options: 316 Stainless Steel, 304 Stainless Steel, Carbon Steel, 310 Stainless Steel, 321 Stainless Steel, 347 Stainless Steel, Alloy 20, C-276, Duplex, Alloy 800, Alloy 600, Alloy 625, Alloy 825, Alloy 400, and Titanium (For a complete list, talk to a Mac-Weld sales representative today).

Industries: All Industries that measure high velocity processes.

LIMITED SPACE THERMOWELLS

TW41	–	A	–	AB	–	L2	–	AA	–	004500	–	01750	–	0750	–	0625	–	I
1		2		3		4		5		6		7		8		9		10

1	Thermowell Stem Style
2	Bore Size
3	Process Connection
4	Material
5	Instrument Connection

6	Insertion Length
7	Head Length
8	Root Diameter
9	Tip Diameter
10	Unit of Measurement

Please see our product part breakdowns online at mac-weld.com featuring a complete list of available part options specific to each type and style of thermowell.

See page 32 for a complete list of available sizes, materials and measurements. Visit www.mac-weld.com for more information.

Limited Space Thermowells

Compact design, with the same protection and quality

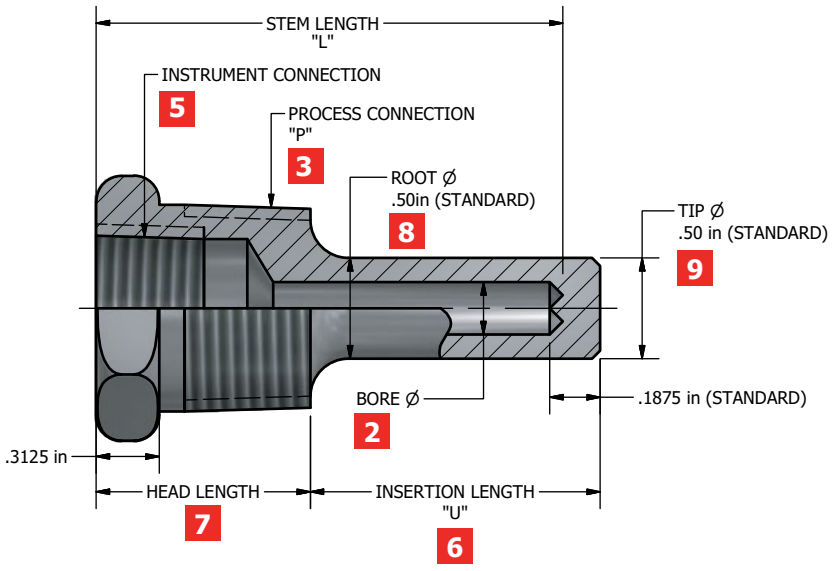
Mac-Weld thermowells are a critical component of any temperature or pressure measurement point, available in a large variety of designs and materials.

Mac-Weld thermowells are used in demanding conditions of intense pressure and temperature, across a wide variety of industries. We know what it takes to design and build thermowells that function as specified to every job, everywhere in the world.

Our limited space thermowells are designed and manufactured 100% in house, are made to client specifications and they accept standard or custom-made thermometers, thermocouples, bulbs and RTD's.

Available in a wide variety of process thread sizes and configurations which include, but are not limited to, NPT, NPS, and BSPT., making the Mac-Weld limited space thermowell the perfect fit for your project.

- Large variety of materials available.
- CRN approved thermowells.
- Various NDT options.
- NACE compliant.
- One piece bar stock construction.



Material Options: 316 Stainless Steel, 304 Stainless Steel, Carbon Steel, 310 Stainless Steel, 321 Stainless Steel, 347 Stainless Steel, Alloy 20, C-276, Duplex, Alloy 800, Alloy 600, Alloy 625, Alloy 825, Alloy 400, and Titanium (For a complete list, talk to a Mac-Weld sales representative today).

Industries: All Industries that measures process temperature, which require a small profile.

SOCKET WELD THERMOWELLS

TW22	–	A	–	AB	–	L2	–	AA	–	004500	–	01750	–	0750	–	0625	–	I
1		2		3		4		5		6		7		8		9		10

1	Thermowell Stem Style
2	Bore Size
3	Process Connection
4	Material
5	Instrument Connection

6	Insertion Length
7	Head Length
8	Root Diameter
9	Tip Diameter
10	Unit of Measurement

Please see our product part breakdowns online at mac-weld.com featuring a complete list of available part options specific to each type and style of thermowell.

See page 32 for a complete list of available sizes, materials and measurements. Visit www.mac-weld.com for more information.

Socket Weld Thermowells

Designed for high pressure and/or high flow process applications

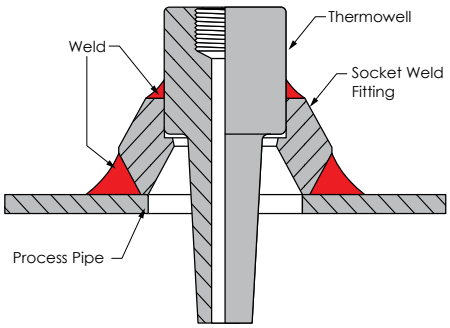
Our use of high quality materials and design ensure our thermowells are the first choice for use in the chemical and petrochemical industries.

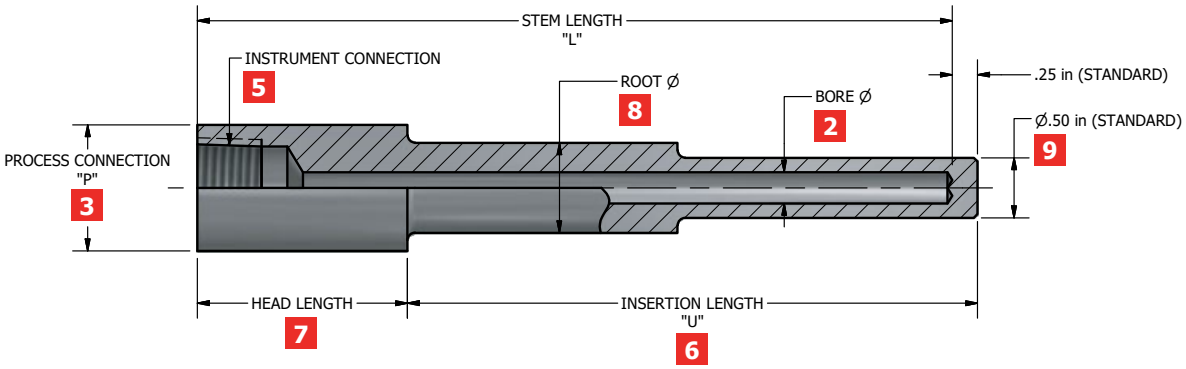
At Mac-Weld we work with our clients to select the thermowell requirements based on the job specifications. This ensures optimal protection of the sensor to get precise measurements.

Our socket weld thermowells are designed and manufactured 100% in house, and are made to accept standard and custom made thermometers, thermocouples, bulbs and RTD's. Socket weld thermowells are typically used when contaminants could collect in exposed threads, such as pharmaceutical or food processing production.

Available in a wide variety of process pipe sizes and configurations, the Mac-Weld socket weld thermowell is the perfect fit for your project.

- Custom software for thermowell design calculations.
- Available in various shank styles; stepped, straight and tapered.
- CRN approved thermowells.
- Various NDT options.
- NACE compliant.
- Standard or customized shank dimensions and styles.
- Large selection of materials available.





Material Options: 316 Stainless Steel, 304 Stainless Steel, Carbon Steel, 310 Stainless Steel, 321 Stainless Steel, 347 Stainless Steel, Alloy 20, C-276, Duplex, Alloy 800, Alloy 600, Alloy 625, Alloy 825, Alloy 400, and Titanium (For a complete list, talk to a Mac-Weld sales representative today).

Industries: All Industries that measures process temperature.

THREADED THERMOWELLS

TW02	–	A	–	AB	–	L2	–	AA	–	004500	–	01750	–	0750	–	0625	–	I
1		2		3		4		5		6		7		8		9		10

1	Thermowell Stem Style
2	Bore Size
3	Process Connection
4	Material
5	Instrument Connection

6	Insertion Length
7	Head Length
8	Root Diameter
9	Tip Diameter
10	Unit of Measurement

Please see our product part breakdowns online at mac-weld.com featuring a complete list of available part options specific to each type and style of thermowell.

See page 32 for a complete list of available sizes, materials and measurements. Visit www.mac-weld.com for more information.

Threaded Thermowells

Our threaded thermowells are designed and manufactured 100% in-house

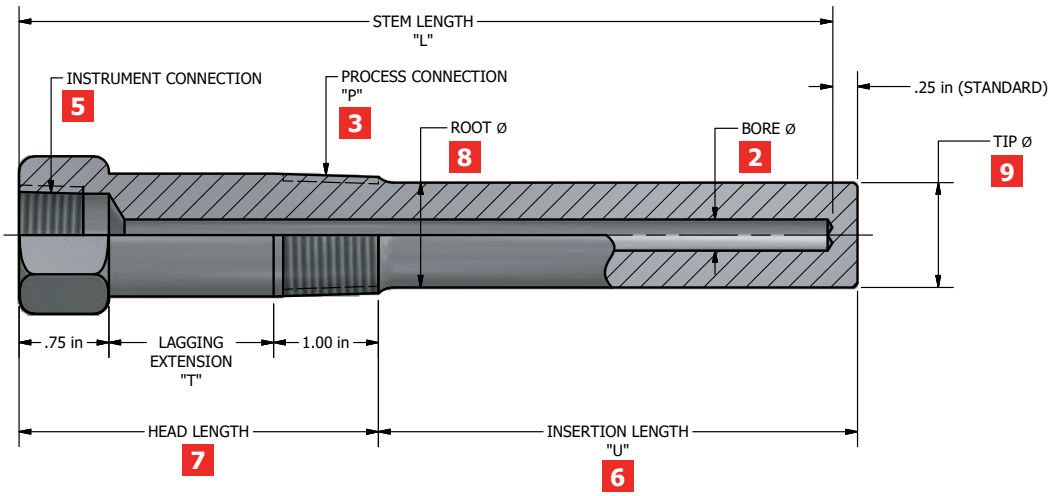
Mac-Weld thermowells are a critical component of any temperature or pressure measurement point, available in a large variety of designs and materials.

Mac-Weld manufactures threaded thermowells in a wide variety of process thread sizes and configurations which include, but are not limited to, NPT, NPS, and BSPT.

Our threaded thermowells are designed and manufactured 100% in-house, and are made to accept standard and custom made thermometers, thermocouples, bulbs and RTD's.

Mac-Weld is a pioneer and global leader in the manufacturing of thermowells, and have consistently offered the highest quality and precision in every piece that has left our facility. Whether made to order, or standard configurations, all our products meet or exceed accepted standards.

- Custom software for thermowell design calculations.
- Available in various shank styles; stepped, straight and tapered.
- CRN approved thermowells.
- Various NDT options.
- NACE compliant.
- Standard or customized shank dimensions and styles.
- Large selection of materials available.



Material Options: 316 Stainless Steel, 304 Stainless Steel, Carbon Steel, 310 Stainless Steel, 321 Stainless Steel, 347 Stainless Steel, Alloy 20, C-276, Duplex, Alloy 800, Alloy 600, Alloy 625, Alloy 825, Alloy 400, and Titanium (For a complete list, talk to a Mac-Weld sales representative today).

Industries: All Industries that measures process temperature.

TRI-CLAMP (SANITARY) THERMOWELLS

TW91	–	A	–	2000	–	L3	–	AA	–	004500	–	01750	–	0750	–	0625	–	I
1		2		3		4		5		6		7		8		9		10

1	Thermowell Stem Style
2	Bore Size
3	Tri-Clamp Size
4	Material
5	Instrument Connection

6	Insertion Length
7	Head Length
8	Root Diameter
9	Tip Diameter
10	Unit of Measurement

Please see our product part breakdowns online at mac-weld.com featuring a complete list of available part options specific to each type and style of thermowell.

See page 32 for a complete list of available sizes, materials and measurements. Visit www.mac-weld.com for more information.

Tri-Clamp (Sanitary) Thermowells

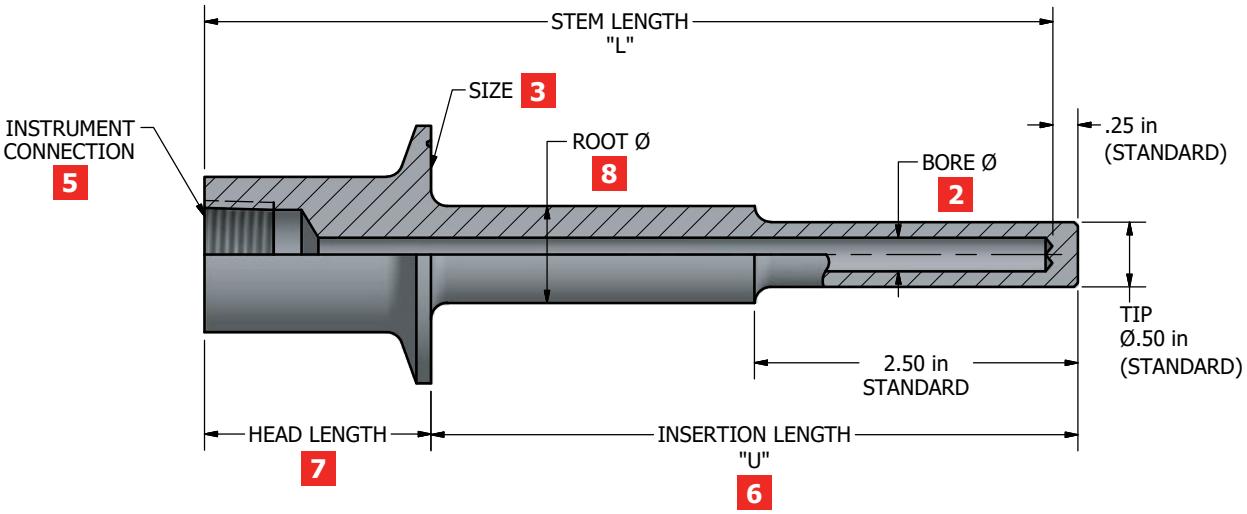
Designed for food processing or pharmaceutical production

Our thermowells have limitless application possibilities and they come in a variety of designs and materials.

Sanitary thermowells are typically used when contaminants could collect in exposed threads, such as pharmaceutical or food processing production. The polish and large radius between the stem and face help support easy cleaning.

Also referred to as tri-clamp thermowells, they isolate and protect internal temperature sensors from high velocity and corrosive media applications. Thermowells ensuring accurate readings and increased longevity from the internal instruments, while also allow much easier maintenance when a sensor does malfunction since it can me accessed without shutting down the entire process.

- Available in various shank styles; stepped, straight and tapered.
- Stamped with material and heat number mill.
- Standard or customized shank dimensions and styles.
- Large selection of materials available.
- Various NDT options.
- NACE compliant.



Material Options: 316 Stainless Steel, 304 Stainless Steel, Carbon Steel, 310 Stainless Steel, 321 Stainless Steel, 347 Stainless Steel, Alloy 20, C-276, Duplex, Alloy 800, Alloy 600, Alloy 625, Alloy 825, Alloy 400, and Titanium (For a complete list, talk to a Mac-Weld sales representative today).

Industries: pharmaceutical, biotech, along with food and beverage industries

VANSTONE THERMOWELLS

TW63	–	A	–	VE	–	L2	–	AA	–	004500	–	01750	–	0750	–	0625	–	I
1		2		3		4		5		6		7		8		9		10

1	Thermowell Stem Style
2	Bore Size
3	Process Connection
4	Material
5	Instrument Connection

6	Insertion Length
7	Head Length
8	Root Diameter
9	Tip Diameter
10	Unit of Measurement

Please see our product part breakdowns online at mac-weld.com featuring a complete list of available part options specific to each type and style of thermowell.

See page 32 for a complete list of available sizes, materials and measurements. Visit www.mac-weld.com for more information.

Vanstone Thermowells

Designed to operate between two flanges within the process

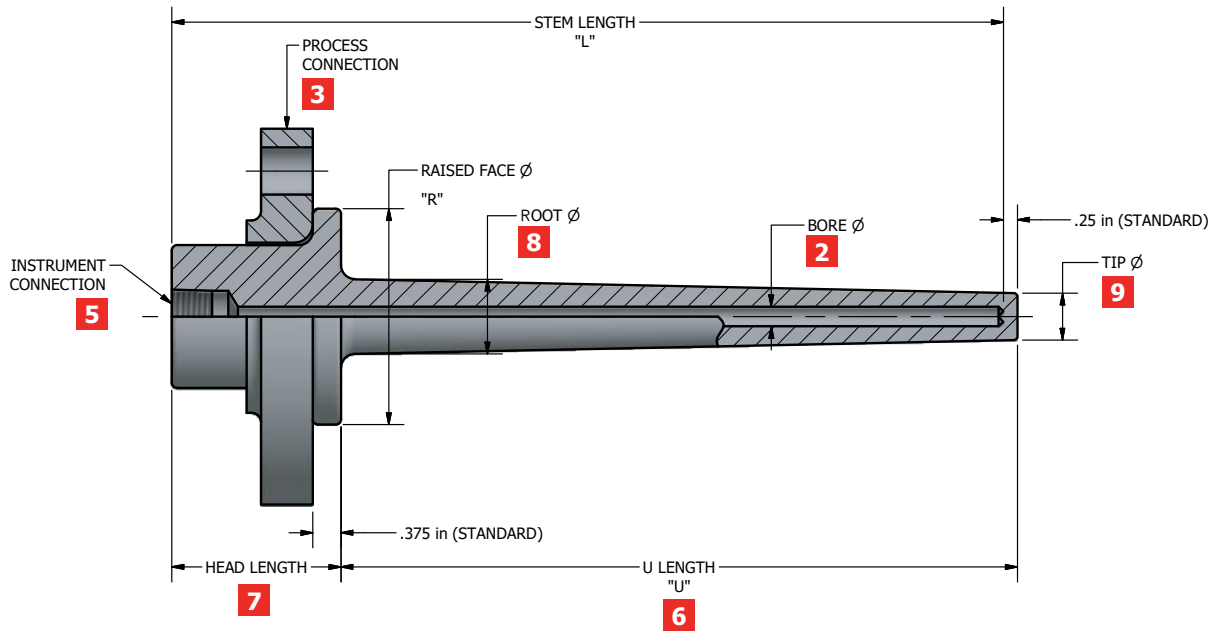
Our thermowells work to protect the surroundings and operating personnel by keeping the high pressure and flow rates contained within the process boundaries.

Mac-Weld thermowells are of heavy duty design to withstand the challenging environments they have to operate in. Designed to be installed between two flanges, and can be offered with the required lap joint flanges in a variety of materials.

Our vanstone thermowells are designed and manufactured 100% in-house, and are made to accept standard and custom made thermometers, thermocouples, bulbs and RTD's.

Available in a wide variety of process pipe sizes and configurations, the Mac-Weld vanstone thermowell is the perfect fit for your project.

- Lap joint flanges are available.
- Available in various shank styles; stepped, straight and tapered.
- Custom software for thermowell design calculations.
- CRN approved thermowells.
- Various NDT options.
- NACE compliant.
- Standard or customized shank dimensions and styles.
- Large selection of materials available.



Material Options: 316 Stainless Steel, 304 Stainless Steel, Carbon Steel, 310 Stainless Steel, 321 Stainless Steel, 347 Stainless Steel, Alloy 20, C-276, Duplex, Alloy 800, Alloy 600, Alloy 625, Alloy 825, Alloy 400, and Titanium (For a complete list, talk to a Mac-Weld sales representative today).

Industries: All Industries that measures process temperature.

WELD-IN THERMOWELLS

TW27	–	A	–	BJ	–	L2	–	AA	–	004500	–	01750	–	0750	–	0625	–	I
1		2		3		4		5		6		7		8		9		10

1	Thermowell Stem Style
2	Bore Size
3	Process Connection
4	Material
5	Instrument Connection

6	Insertion Length
7	Head Length
8	Root Diameter
9	Tip Diameter
10	Unit of Measurement

Please see our product part breakdowns online at mac-weld.com featuring a complete list of available part options specific to each type and style of thermowell.

See page 32 for a complete list of available sizes, materials and measurements. Visit www.mac-weld.com for more information.

Weld-In Thermowells

Designed for high pressure and/or high flow process applications

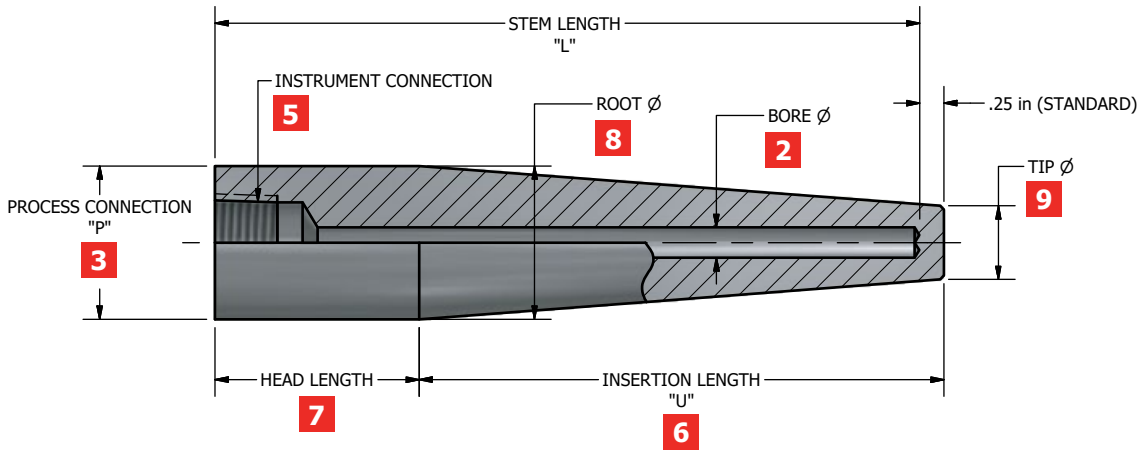
Mac-Weld thermowells are a critical component of any temperature or pressure measurement point, available in a large variety of designs and materials.

Weld-in thermowells are highly recommended in applications that produce a high rate of flow or pressure, since the thermowell is welded directly to the process pipe without the need for threads or flanges. This type of thermowell is also recommended when contaminants could collect in exposed threads, such as pharmaceutical or food processing production.

Our weld-in thermowells are designed and manufactured 100% in house, and are made to accept standard and custom made thermometers, thermocouples, bulbs and RTD's.

Available in a wide variety of process pipe sizes and configurations, the Mac-Weld weld-in thermowell is the perfect fit for your project.

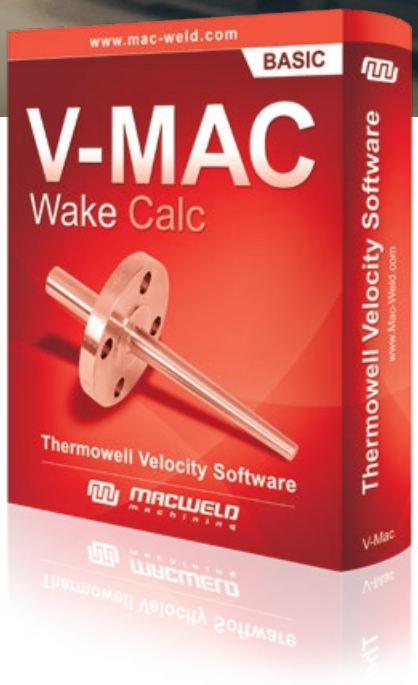
- Designed for high pressure and/or high flow process applications.
- CRN approved thermowells.
- Various NDT options.
- NACE compliant.
- Standard or customized shank dimensions and styles.
- Large selection of materials available.



Material Options: 316 Stainless Steel, 304 Stainless Steel, Carbon Steel, 310 Stainless Steel, 321 Stainless Steel, 347 Stainless Steel, Alloy 20, C-276, Duplex, Alloy 800, Alloy 600, Alloy 625, Alloy 825, Alloy 400, and Titanium (For a complete list, talk to a Mac-Weld sales representative today).

Industries: All Industries that measures process temperature with higher pressure and/or flow.

V-MAC comes with many features to ensure you have everything you need right at your finger tips.



V-MAC
Basic

Call for Price

USD (1 License)

V-MAC
Advanced

Call for Price

USD (1 License)

Thermowell Wake Frequency Analysis

V-MAC software designed by Mac-Weld Machining Ltd.

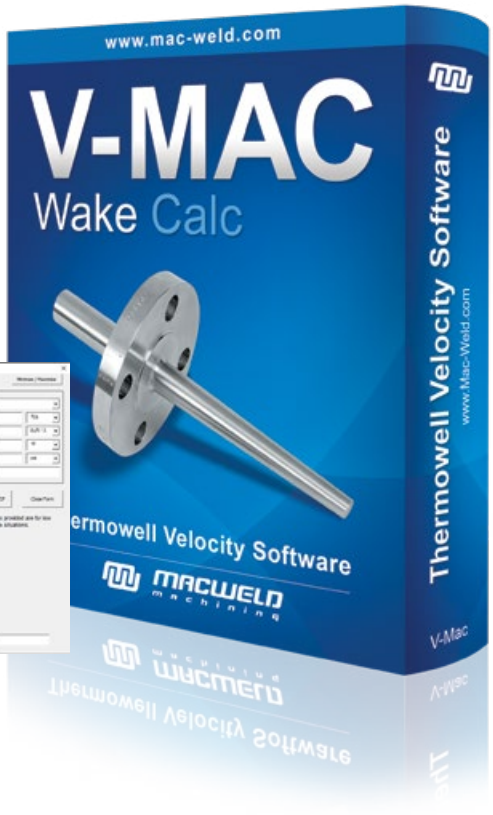
Thermowell velocity design software that's easy to use and ensures you meet the ASME PTC 19.3 TW 2016 code.

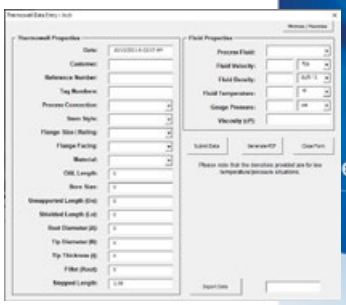
The ASME PTC 19.3 TW-2016 is the latest standard that establishes the practical design considerations for thermowell installations in power and process piping. The current standard evaluates a combination of static and dynamic forces, resulting from fluid impingement as well as external pressure acting on the thermowell stem. It includes complex formulas for the calculation of natural frequency, Strouhal frequency, in-line resonance and stress evaluation.

With each edition, the calculations became more and more complex. It is a great time to invest in the software that makes performing these complex calculations fast, easy and efficient.

Our system comes with many built in features to ensure you have everything you need right at your fingertips. Whether it be our 50+ preloaded materials, our convenient unit conversion tool, or simply our customizable print sheet. Our system ensures your customers get the information they need, in an easy-to-follow print sheet.

For a web demonstration, or more details contact us today.





Key features standard with the V-MAC System:

- Our system comes preloaded with 50+ Materials
- Built in Unit conversion tool that handles temperature, pressure, velocity, and density.
- Ability to run calculations for flanged, threaded, socket weld, weld-in, and vanstone thermowells.
- Run 100 plus calculations with the click of a single button.

System Requirements

Operating System (Windows)	10 & 11
Microsoft Excel (32 bit)	Required
Support Concurrent users *	Yes

* Requires a V-MAC Server License

Features

	Basic	Adv.
1 Year Free Support	✓	✓
50+ Preloaded Materials	✓	✓
Multiple Thermowell Configurations	✓	✓
Enter Data in Imperial or Metric	✓	✓
Unit Conversion Tool	✓	✓
1 Click PDF Generator	✓	✓
Large Project Capability	✓	✓
Customized Print Sheet	✓	✓
Custom Material Add-on		✓

Thermowell Codes and Variables

For individual thermowell part breakdowns visit www.mac-weld.com

Thermowell Stem Style	
Code	Description
TW01	Threaded Stepped Stem
TW02	Threaded Straight Stem
TW03	Threaded Tapered Stem
TW04	Threaded Helical
TW21	Socket Weld Stepped Stem
TW22	Socket Weld Straight Stem
TW23	Socket Weld Tapered Stem
TW24	Socket Weld Helical
TW27	Weld-in
TW31	Flanged Stepped Stem
TW32	Flanged Straight Stem
TW33	Flanged Tapered Stem
TW34	Flanged Helical
TW41	Limited Space Threaded
TW61	Vanstone Stepped Stem
TW62	Vanstone Straight Stem
TW63	Vanstone Tapered Stem
TW64	Vanstone Helical
TW91	Tri-Clamp Stepped Stem
TW92	Tri-Clamp Straight Stem
TW93	Tri-Clamp Tapered Stem

Bore Size	
Code	Description
A	0.260
B	0.385
C	0.515
D	0.203
E	0.375
F	0.390
G	0.343
M	0.406
N	0.280
O	0.302
P	0.312
R	0.275
U	0.394
V	0.354
X	0.437

Flange Size & Rating	
Code	Description
CK	1" 150#
CL	1" 300#
CM	1" 600#
CN	1" 900#-1500#
CO	1" 2500#
CU	1-1/2" 150#
CV	1-1/2" 300#
CW	1-1/2" 600#
CX	1-1/2" 900#-1500#
CY	1-1/2" 2500#
CZ	2" 150#
DA	2" 300#
DB	2" 600#
DC	2" 900#-1500#
DD	2" 2500#
DD	2" 2500#
DJ	3" 150#
DK	3" 300#
DL	3" 600#
DM	3" 900#
DN	3" 1500#
DO	3" 2500#
DP	4" 150#
DQ	4" 300#
DR	4" 600#
DS	4" 900#
DT	4" 1500#
DU	4" 2500#
DV	5" 150#
DW	5" 300#
DX	5" 600#
DY	5" 900#
EB	6" 150#
EC	6" 300#
ED	6" 600#
EE	6" 900#
EH	8" 150#
EI	8" 300#
EN	10" 150#
EQ	10" 900#
ET	12" 150#
EV	12" 600#

Flange Facing	
Code	Description
A	FF (flat face)
B	RF (raised face)
C	RTJ (ring type joint)
D	RTF (RTJ no groove)
E	HH (High Hub)
F	DBRF (Double Raised Face)

Material	
Code	Description
L2	316/316L
H2	304/304L
H3	304H
K1	310
K2	310H
L3	316H
J1	317
J3	317L
M2	321/H
M3	RA330
N2	347/H
N3	410
N4	446
N5	HR160
S3	904L
S4	AL-6XN
S2	Alloy 20
S1	Alloy 200
R1	Alloy 400
P1	Alloy 600
P3	Alloy 601
P2	Alloy 625
Q3	Alloy 800/H/HT
Q1	Alloy 825
U2	Alloy B2

Custom sizes, connections and materials may not be listed, contact Mac-Weld today to find out more.

Material *(Continued)*	
Code	**Description**
U3	Alloy B3
U4	Alloy C-22
U1	Alloy C-276
R2	Alloy K500
U5	Alloy X
C1	Aluminum 6061
A1	Brass
E4	Carbon Steel 1018
E3	Carbon Steel 12L14
E1	Carbon Steel ASTM A105
D2	Carbon Steel W44
D4	Carbon Steel A516Gr70
D6	Carbon Steel A53
D3	Carbon Steel A572
D5	Carbon Steel Smls
G1	Chrome-M-Moly F22
F1	Chrome-Moly-F11
F6	Chrome-Moly-F5
F7	Chrome-Moly-F9
F8	Chrome-Moly-F91
Y2	CPVC
F2	Duplex F51/2205
E2	LF2
B1	Naval Brass
Y1	PVC
F4	Stainless F44/254 SMO
F3	Super Duplex F53/2507
F5	Super Duplex F55
W1	Teflon
T1	Tit Gr2
T2	Tit Gr5
T3	Tit Gr7
Z1	Zirc 702

Instrument Connection	
Code	**Description**
AA	1/2" NPT
AB	3/4" NPT
AC	1" NPT
AD	1-1/4" NPT
AE	1-1/2" NPT
AF	1/2" NPSM
AG	G ½ male
AH	G ¾ B male
AI	G ¾ male
AJ	M14 x 1.5 female
AK	M18 x 1.5 female
AL	M20 x 1.5 female
AM	M20 x 1.5 male
AN	M24 x 1.5 female
AO	M24 x 1.5 male
AP	M27 x 2.0 female
AQ	M27 x 2.0 male
BA	3/4" Pipe (1.05" Dia)
BB	1" Pipe (1.315" Dia)
BC	1-1/4" OD
BD	1-1/2" OD
BE	1-3/4" OD
AV	5/8" - 18 UNF
AW	3/4" - 16 UNF
AX	7/8" - 14 UNF
AY	1" - 14 UNF
AZ	3/8" NPT
BA	3/4" Pipe (1.05" Dia.)
BB	1" Pipe (1.315" Dia)
BC	1-1/4" OD
BD	1-1/2" OD
BE	1-3/4" OD
BF	1-1/4" Pipe (1.660" Dia.)
BG	1-1/2" Pipe (1.900" Dia.)
BH	1/2" Pipe (0.840" Dia.)

Insertion Length	
Code	**Description**
xxxxxx	Imperial: 6.500" = 006500 110.500" = 110500 Metric: 165.1 mm = 001651 1200.5 mm = 012005

Head Length	
Code	**Description**
xxxxx	Imperial: 2.25" = 02250 Metric: 57.2 mm = 00572

Root Diameter	
Code	**Description**
xxxx	Imperial: 0.875" = 0875 Metric: 22.2 mm = 0222

Tip Diameter	
Code	**Description**
xxxx	Imperial: 0.500" = 0500 Metric: 12.7 mm = 0127

Unit of Measurement	
Code	**Description**
I	Imperial
M	Metric

Notes:

1. 316/304 thermowells with 1/2", 3/4", and 1" NPT process connections are manufactured from round bar with milled wrench hex. Exotic material thermowells ¾" NPT and under include a wrench hex, exotics 1" NPT are finished with 2 wrench flats.
   All thermowells with 1-1/4" and 1-1/2" NPT process connections are manufactured from round bar with 2 wrench flats.
2. Tapered length of 16 inches is standard
3. Thermowells with 1/2" NPT process connections have a hex length of 1" and external threaded area length of 3/4"

MACWELD machining

Recognized globally for our quality, service and the ability to deliver!

MACWELD
machining

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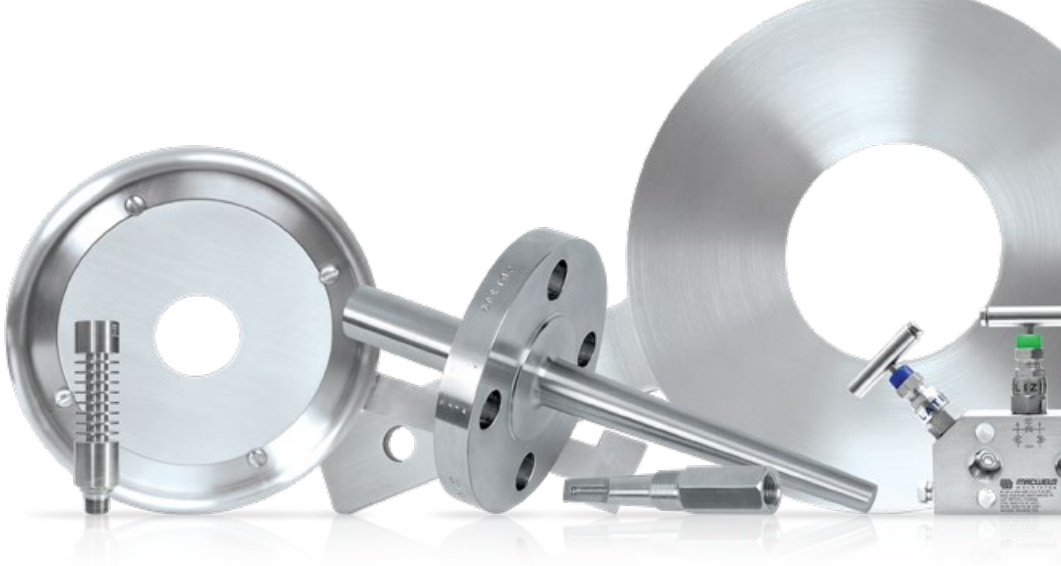

North America's Largest Thermowell & Instrumentation Hardware Manufacturers

Thermowells

- Flanged Thermowell
- Threaded Thermowell
- Socket Weld Thermowell
- Limited Space Thermowell
- Helical Thermowell
- Vanstone Thermowell
- Tri-Clamp Thermowell
- Weld-in Thermowell

Orifice Plates

- Paddle Orifice Plate
- Universal Orifice Plate
- Custom Orifice Plate
- RTJ Orifice Plate

Orifice Assemblies

- Orifice Wafer Assembly
- Integral Orifice Assembly
- Multi-Stage Restriction Orifice
- Restriction Orifice Union
- Orifice Flange Union

Bleed & Flush Rings

- Bleed Ring
- Flush Ring
- Bleed Ring Assembly
- Flush Ring Assembly

Pressure Vessels

- Level Chamber
- Seal Pot

Valves

- Needle Valves
- Manifold Valves
- Flange x Flange Manifold
- Low Profile Instrument Manifold
- Double Block and Bleed

Specialty Products

- Wake Frequency Software
- Spacer/Spectacle Blind
- Stilling Well
- Spool Piece

Gauge Siphons

- Finned Gauge Siphon
- Compact Gauge Siphon

Specialty Machining & Welding Services

TSSA Certified shop for CRN related parts & repairs for all provinces

- ✓ CRN Registration & Project Management
- ✓ Dissimilar Metal Welding
- ✓ Exotic Metals Welding and Fabrication
- ✓ PMI, Dye Penetrant Exam, Hydrostatic Testing, Phased Array, X-Ray, CMM Reporting and more.

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Corrosive Service Guide to Materials

for Thermowells and Sheaths

Chemical	Condition	Material
Acetic Acid	to 50% to 212 F	316 Stainless Steel
	to 75% to 300 F	Titanium
	to 99% to 250 F	Hastelloy C
Acetic Anhydride	All conc. to B.P.	Monel 400
Acetone	All conc. to B.P.	304 SS, Aluminum
Acetylene		304 SS, Aluminum
Alcohol, Ethyl	70 F-212 F	304 Stainless Steel
Aluminum Sulphate	to 25% and 212 F	304 Stainless Steel
	to 50% and 212 F	316 Stainless Steel
Ammonia gas or liquid	All concentrations	304 Stainless Steel
Ammonium Hydroxide		1100-1114 Alurrinum
Anvnonium Phosphate	to 25% and 212 F	304 Stainless Steel
Ammonium Nitrate	All conc. to 212 F	316 Stainless Steel
Ammonium Sulphate	All conc. to B.P.	316 Stainless Steel
	to 45% and 212 F	Monel 400
Amylacetate		304 Stainless Steel
Aniline	All concentrations	
Barium Chloride	25% to B.P.	Hastelloy C
Barium Hydroxide	to 50% 212 F	C1018 Steel
Black Liquor		Alloy 556
Boracic Acid	All conc. to B.P.	Hastelloy C
Brines		Monel 400, Hastelloy C
Bromine Dry	to 212 F	Monel 400
Butane	to 250 F	316 Stainless Steel
Butylacetate	to 212 F	Monel 400
Butyl Alcohol		Copper, Aluminum
Calcium Chlorate	to 30% and 212 F	304 Stainless Steel
Calcium Hydroxide	to 50% and 212 F	Hastelloy C or Titanium
Carbonic Acid	All conc. to 300 F	316 Stainless Steel
Carbon Dioxide	to 1300 F	304 Stainless Steel
Chlorine Gas	Moist to 212 F	Hastelloy C or Titanium
Chromic Acid	10% at 150F	Hastelloy C
Citric Acid	to 50% 212 F	316 Stainless Steel
	All conc. to B.P.	Hastelloy C
Copper Nitrate	All cone. to 212 F	304 Stainless Steel
Copper Sulphate	All cone. to B.P.	316 Stainless Steel
Cyanogen Gas	to 212 F	304 Stainless Steel
Dowtherm		C1018 Steel
Ether		304 Stainless Steel
Ethyl Acetate	to 150 F	Monel 400
Ferric Chloride	to 50% & B.P.	Tantalum
Ferric Sulphate	to 30% & B.P.	Hastelloy C
Ferrous Sulphate	All conc. to B.P.	Hastelloy C
Formaldehyde	All conc. to 150 F	304 Stainless Steel
Formic Acid	All conc. to 212 F	304 Stainless Steel
Freon		316 Stainless Steel
Gallic Acid	to 212 F	Monel 400
Gasoline or Petroleum		304 Stainless Steel
Glucose	70 F	304 Stainless Steel
Glycerine		304 Stainless Steel
Glycerol		304 Stainless Steel
Hydrobromic Acid	40% to 65 F	Titanium
	48% to 212 F	Hastelloy B
Hydrochloric Acid	to 37% and 150 F	Hastelloy B
Hydrofluoric Acid	All conc. to B.P.	Hastelloy C
Hydrogen Peroxide	to 212 F	316 Stainless Steel
Hydrogen Sulphide	Dry to 1000 F	316 Stainless Steel
Iodine	to 70 F	Tantalum
Ketones	to B.P.	Aluminum, 316 SS
Kerosene		304 Stainless Steel
Lactic Acid	to 212 F	Tantalum
Magnesium Chloride	to 40% of 212 F	Monel 400

Chemical	Condition	Material
Magnesium Sulphate	to 50% 212 F	Monel 400
Muriatic Acid	to 37% and 150 F	Hastelloy B
Naphtha	70 F	304 Stainless Steel
Natural Gas	to 800 F	304 Stainless Steel
Nickel Chloride	to 80% and 200 F	Hastelloy C
Nickel Sulphate	25% and 125 F	304 Stainless Steel
Nitric Acid	to 40% and 180 F	304 Stainless Steel
	All conc. to 370 F	Tantalum
Nitrobenzene	to 212 F	Carpenter 20 CB-3
Oleic Acid	to 212 F	316 Stainless Steel
Oleum	to 70 F	316 Stainless Steel
Oxalic Acid	All conc. to 212 F	Monel 400
Oxygen	70 F	C1018 Steel
	Liquid Oxygen	304 Stainless Steel
	Elevated Temps.	304 Stainless Steel
Palmitic Acid	100% at 439 F	316 Stainless Steel
Pentane		304 Stainless Steel
Phenol	to 700 F	316 Stainless Steel
Phosphoric Acid	10% & 70 F	316 Stainless Steel
	to 90% and 215 F	Hastelloy B
Picric Acid	to 212 F	316 Stainless Steel
Potassium Bromide	75% to 180 F	Hastelloy C
Potassium Carbonate	to 50% and 212 F	304 Stainless Steel
	All conc. to B.P.	Hastelloy C
Potassium Chlorate	to 25% and 212 F	316 Stainless Steel
Potassium Hydroxide	to 50% and B.P.	316 Stainless Steel
Potassium Nitrate	to 80% and 212 F	304 Stainless Steel
Potassium Permanganate	to 50% and 75 F	Hastelloy C or Titanium
Potassium Sulphate	to 20% and 212 F	304 Stainless Steel
Pyrogallic Acid	All conc. to B.P.	304 Stainless Steel
Quinine Bisulphate	Dry	316 Stainless Steel
Quinine Sulphate	Dry	316 Stainless Steel
Sea Water		Monel 400
Salicylic Acid	to 250 F	Nickel
Sodium Bicarbonate	to 20% and 212 F	304 Stainless Steel
Sodium Carbonate	to 25% and 212 F	304 Stainless Steel
Sodium Chloride	Saturated to 212 F	316 Stainless Steel
		Alloy 556
Sodium Fluoride	10% - 70F	Monel 400
Sodium Hydroxide		304 Stainless Steel
Sodium Nitrate	Fused	316 Stainless Steel
Sodium Peroxide		304 Stainless Steel
Sodium Sulphate	to 25% and 212 F	304 Stainless Steel
Sodium Sulphide	to 25% and 212 F	304 Stainless Steel
Sodium Sulphite	5% to 212F	304 Stainless Steel
Sulphur Dioxide	to 800 F	316 Stainless Steel
Sulphur	to 850 F	316 Stainless Steel
	to 1600 F	Alloy 556
Sulphuric Acid	1-60%, 75-100%,	Carpenter 20 CB-3
	176F	
	to 60% & B.P.	Hastelloy B
	All conc. to 370 F	Tantalum
Tannic Acid	to 212 F	304 Stainless Steel
Tartaric Acid	All conc. to 212 F	304 Stainless Steel
Toluene	to 250 F	304 Stainless Steel
Turpentine		304 Stainless Steel
Whiskey and Wine		316 Stainless Steel
Xylene		Copper
Zinc Chloride	to 25% and 130 F	Carpenter 20 CB3
	All conc. to B.P.	Monel 400
Zinc Sulphate	to 25% to 212 F	316 Stainless Steel
	to 40% to B. P.	Hastelloy C

Hot Condition 310SS up to 2000°F Inconel and 446SS up to 2150°F

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.

MACWELD
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