

Rosemount™ Twisted Square™ Thermowells



- Wide variety of industry standard process connections including flanged, threaded, socket weld, and Van Stone
- Large selection of thermowell materials to ensure proper process compatibility from stainless steel to exotic materials such as duplex and alloy C-276
- Additional thermowell options and certificates available

Notice

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Rosemount Twisted Square Thermowell

Product overview

Thermowells are closed-end metal tubes or barstock installed into process vessels or piping and become an integral pressure retaining part of the process vessel or pipe. Thermowells experience a variety of different pressures and forces acting on them from the flowing process. These forces, if not closely accounted for, can cause the thermowells to vibrate and fail. Failure can be a crack at the process connection weld, bending of the thermowell stem, or even a complete stem shearing.

Thermowells in flow are subjected to the dynamic and static forces that if not accounted for could lead to thermowell failure. The ASME PTC 19.3 TW is recognized as the global standard for designing safe and reliable thermowells. However, calculations done to avoid vortex-induced vibration issues (VIV) are very challenging and often require modifying the thermowell design with reduced lengths and increased diameters. In some cases, there are no possible thermowell design solutions, thus leaving designers with no thermowell options at all.

Rosemount Twisted Square Thermowell is a revolutionary design manufactured specifically to damp harmful VIV that can lead to thermowell stem failure. It damps the vibrations by over 90 percent, thus drastically reducing the dynamic stresses experienced by the thermowell. This allows the Twisted Square to operate in flow regions that a conventional thermowell cannot. The Twisted Square also doesn’t experience the frequency limitations that conventional thermowells are plagued with. Its unique design simplifies the thermowell design process and greatly reduces the risk of thermowell failures with its ability to handle applications with changing process conditions.

Twisted Square Thermowell calculations

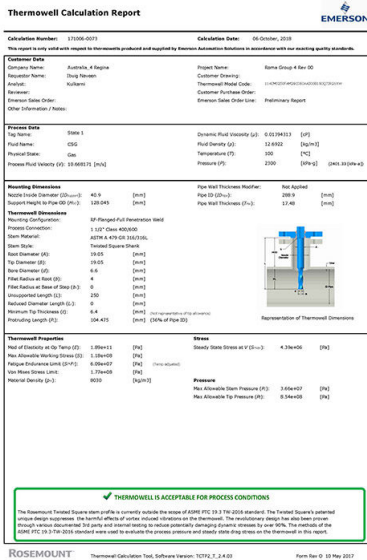
- The Twisted Square thermowell calculations are performed based on the static stress and pressure stress limit criteria of the ASME PTC 19.3 TW-2016 design standard.

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- Due to the revolutionary design of the Twisted Square, the dynamic and frequency limit criteria are not limiting factors. The design suppresses more than 90 percent of harmful vibrations that typically cause thermowell failure.
- The Twisted Square thermowell calculation report highlights process information, thermowell properties and calculation result (see Figure 1).

Figure 1: Thermowell Calculation Report (R21)



Wide range of thermowell options and certificates for any application

- Options for special testing requirements, such as External Hydrostatic Pressure Test (Q5) and Dye Penetration Test (Q73)
- Options to ensure material traceability or compatibility, including Positive Material Identification or PMI (Q76), Material Certification (Q8), Thermowell X-ray/Radiograph (Q81), and NACE® Approval (Q35)
- Options for special processing requirements such as Electropolishing (R20)

Experience global consistency and local support from numerous worldwide Emerson manufacturing sites



- World-class manufacturing provides globally consistent product from every factory and the capacity to fulfill the needs of any project, large or small.
- Experienced Instrumentation Consultants help select the right product for any temperature application and offer advice on best installation practices.

- An extensive global network of Emerson service and support personnel can be on-site when and where they are needed.

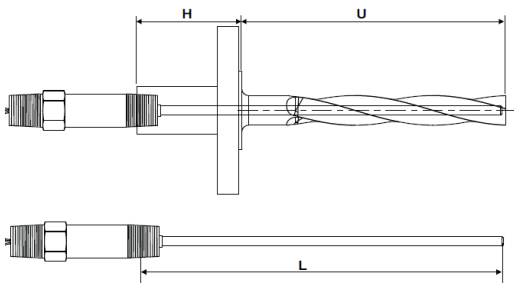
Explore the benefits of Complete Point Solutions™ from Emerson

- An “Assemble Sensor to Specific Transmitter” and “Assemble Sensor to Specific Thermowell” option enables Emerson to provide a Complete Point Solution for measuring temperature, delivering an installation-ready transmitter, sensor, and thermowell assembly.
- Emerson has a complete portfolio of Single Point and Multi-Input Temperature Measurement solutions, allowing effective measurement and process control with reliable Rosemount products.

Selection guide

Ensure the sensor fits the thermowell

Rosemount 114C Head length (H) + Immersion length (U) = Rosemount 214C Sensor insertion length (L).



Basic selection guide

Selecting the proper thermowell for an application is an important activity as it impacts plant safety and measurement efficiency. Thermowells are considered a wetted part; they physically become part of the pressure retaining system.

The three major factors to consider when selecting a thermowell for an application are described below:

Thermowell length

There is no standard formula to determine thermowell immersion length. However, there are a few common practices that the process industry follows along with good engineering judgment. Ideally, the thermowell tip should be located near the centerline in turbulent flow conditions because this represents the most accurate process temperature.

To ensure optimal performance, a general guideline for immersion length into a pipe is as follows:

- 10x the thermowell root diameter for air or gas
- 5x the thermowell root diameter for liquids

Another guideline is at least one-third the way into the pipe for any measurement. The American Petroleum Institute (API) has a specific recommendation of using an immersion length of the sensing element plus 50 mm (2-in.).

Mounting configuration

Consider how the thermowell is mounted on the pipe or tank. The process designer typically specifies what mating connection will be used and the thermowell selected should match that connection. Temperature, pressure, and material are usually taken into consideration to ensure the process connection will be adequate for the application. Socket Weld, Threaded, Flanged, and Van Stone are standard mounting configuration options.

Thermowell material

Rosemount Thermowells are supplied in most materials required for industrial applications. Standard materials are 316/316L Stainless Steel, 304/304L Stainless Steel, and A105 Carbon Steel. For corrosive environments, special materials such as Alloy C-276 and Alloy 600 are also available. See the ordering table for a complete listing of standard materials. Contact your local Emerson representative for additional material availability.

Specifications and options

The purchaser of the equipment must specify and select the product materials, options, or components.

Optimizing lead time

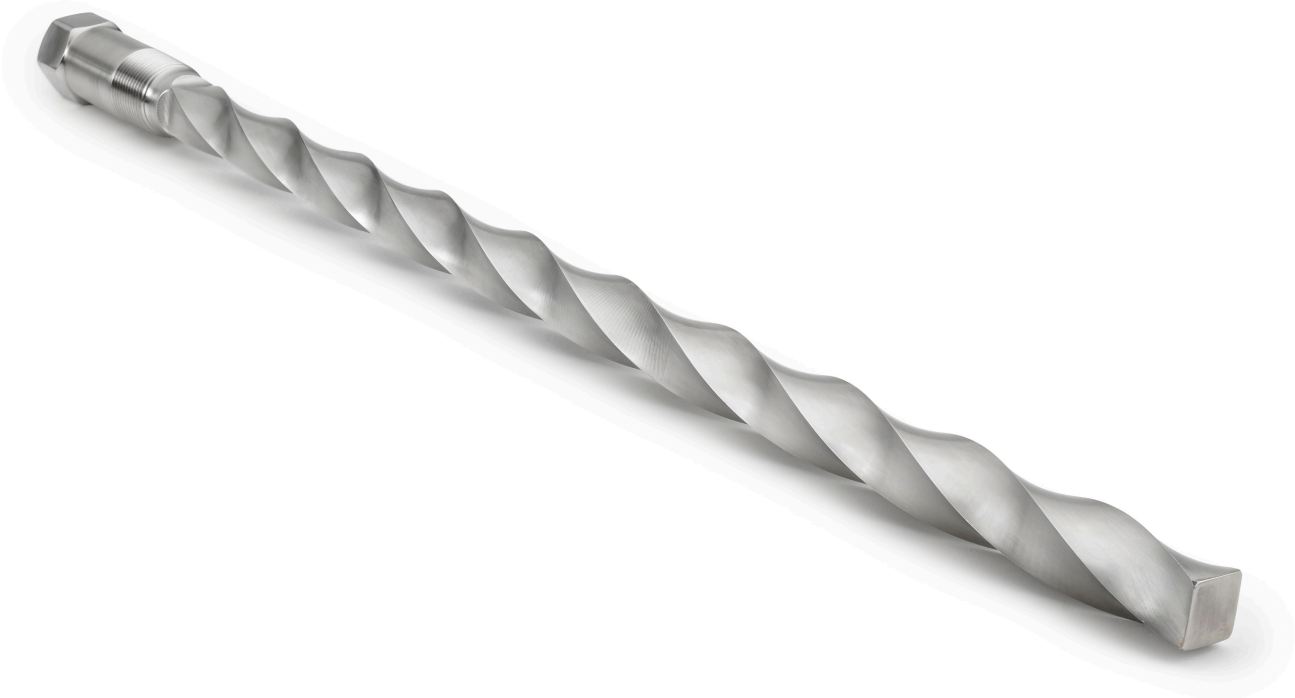
The starred offerings (★) represent the most common options and should be selected for the fastest delivery times. The non-starred offerings are subject to additional delivery lead time.

Online product configuration

Many products are configurable online using our Product Configurator. Select the **Configure** button or visit our [website](#) to start. With this tool's built-in logic and continuous validation, you can configure your products more quickly and accurately.



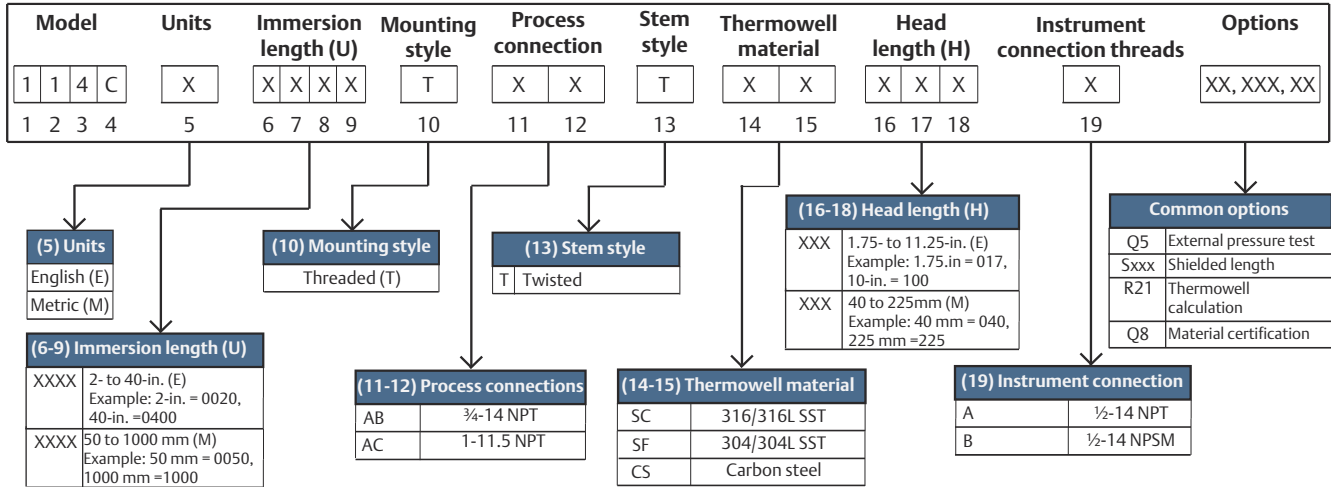
Rosemount Twisted Square Threaded Thermowells



Threaded thermowell overview

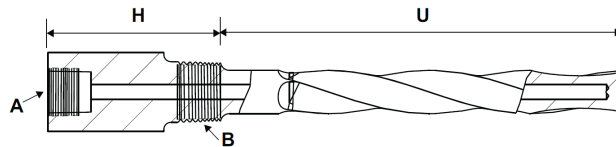
Threaded thermowells are threaded into a process pipe or tank, allowing for easy installation and removal when necessary. While this is a common mounting method, it has the lowest pressure rating of all mounting configuration options.

Figure 2: Standard Offering-Threaded



The common options shown in Figure 2 represent a partial offering; reference the [Threaded ordering information](#) for a full list of available options.

Figure 3: Threaded Thermowell Components



Tapered threads

- A Instrument connection
- B Process connection
- H Head length
- U Immersion length

Note

Wetted surface includes engaged threads and immersion length (U).

Threaded ordering information

Figure 4: Model Number Ordering Example

| Model | | | | Units | Immersion length (U) | | | | Mounting style | Process connection | | Stem style | Thermowell material | | Head length (H) | | | Instrument connection | Options |
|-------|---|---|---|-------|----------------------|---|---|---|----------------|--------------------|----|------------|---------------------|----|-----------------|----|----|-----------------------|-------------|
| 1 | 1 | 4 | C | E | 0 | 0 | 6 | 0 | T | A | A | T | S | C | 0 | 5 | 0 | A | WR5, Q76... |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | XXXXX |

Optimizing lead time

The starred offerings (★) represent the most common options and should be selected for the fastest delivery times. The non-starred offerings are subject to additional delivery lead time.

Required model components

Model

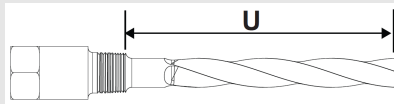
| Place #s 1-4 | | Description | Ref. page |
|--------------|------|---------------------------------|---|
| ★ | 114C | Barstock temperature thermowell | Made with a standard bore diameter of 0.26-in. (6.6 mm) and tip thickness of 0.25-in. (6.4 mm) N/A |

Dimension units

| Place # 5 | Description | Details | Ref. page |
|-----------|-------------|---------------------|---|
| ★ | E | English units (in.) | Specifies whether length units will be in inches (in) or millimeters (mm) |
| ★ | M | Metric units (mm) | |

Immersion length (U)

| Place #s 6-9 | Description | Ref. page |
|--------------|--|-----------|
| ★ | xxxx xxx.x-in., 2.00 to 40-in. in ¼-in. increments (when ordered with dimension units code E) Example of a 6.25-in. length where the second decimal is dropped off: 0062 | page 55 |
| ★ | xxxx mm, 50 to 1000 mm in 5 mm increments (when ordered with dimension units code M) Example of a 50 mm length: 0050 | |



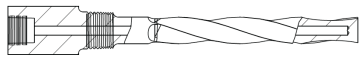
Mounting style

| Place # 10 | | Description | Ref. page |
|------------|---|-------------|-----------|
| ★ | T | Threaded | N/A |

Process connection

| Places # 11-12 | Description | Thread type | Ref. page |
|----------------|-------------|-----------------|-----------|
| ★ | AB | ¾-14 NPT | N/A |
| ★ | AC | 1-11.5 NPT | N/A |
| ★ | AD | 1½-11.5 NPT | N/A |
| ★ | AF | ¾-in. BSPT | N/A |
| ★ | AG | 1-in. BSPT | N/A |
| ★ | DB | M24 × 1.5p | N/A |
| ★ | DC | M27 × 2p | N/A |
| | DD | M33 × 2p | N/A |
| ★ | DF | ¾-in. BSPF (G¾) | N/A |
| ★ | DG | 1-in. BSPF (G1) | N/A |

Stem style

| Place # 13 | Description | Details | Image | Ref. page | |
|------------|-------------|---------|--|---|-----|
| ★ | T | Twisted | Minimum immersion length 2-in. (50 mm) |  | N/A |

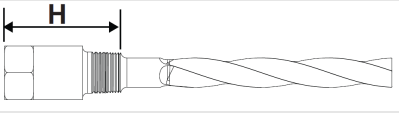
Thermowell material

| Place # 14-15 | Description | Ref. page | |
|---------------|-------------|----------------------|-------------------------|
| ★ | SC | 316/316L dual rated | page 56 |
| ★ | SF | 304/304L dual rated | page 56 |
| ★ | CS | Carbon steel (A-105) | page 56 |
| | SL | 310 SST | page 56 |
| | SM | 321 SST | page 56 |
| | AB | Alloy B3 | page 56 |
| | AC | Alloy C-276 | page 56 |


| Place # 14-15 | Description | Ref. page |
|---------------|---------------------------------------|-------------------------|
| AG | Alloy 20 | page 56 |
| AH | Alloy 400 | page 56 |
| AK | Alloy 600 | page 56 |
| CA | Chrome-Moly Grade B-11/F-11 Class II | page 56 |
| CB | Chrome-Moly Grade B-22/F-22 Class III | page 56 |
| CC | Chrome-Moly Grade F-91 | page 56 |
| NK | Nickel 200 | page 56 |
| TT | Titanium Grade 2 | page 56 |
| DS | Super duplex SST Grade F-53 | page 56 |
| DU | Duplex 2205 Grade F51 | page 56 |
| SG | 316Ti SST | page 56 |
| SN | 321H SST | page 56 |
| SP | 347 SST | page 56 |
| SR | 904L SST | page 56 |
| AU | Alloy C-20 | page 56 |
| AM | Alloy 601 | page 56 |
| AN | Alloy 625 | page 56 |
| AP | Alloy 800 | page 56 |
| AQ | Alloy 800H/HT | page 56 |
| AR | Alloy 825 | page 56 |
| AS | Alloy F44 Mo6 | page 56 |
| MO | Molybdenum | page 56 |
| SD | 316/316 SST NORSOK | page 56 |
| DT | Super duplex NORSOK | page 56 |

| Place # 14-15 | | Description | Ref. page |
|---------------|----|--------------------|-------------------------|
| | DV | Duplex 2205 NORSOK | page 56 |

Head length (H)

| Place #s 16-18 | | Description |  | Ref. page |
|----------------|-----|--|--|-------------------------|
| ★ | xxx | xx.x-in., 1.75 to 11.25-in. in ¼-in. increments (when ordered with dimension units code E) | | page 58 |
| | | Example of a 6.25-in. length where the second decimal is dropped off: 062 (default head length = 1.75-in.) | | |
| ★ | xxx | xxx mm, 40 to 225 mm in 5 mm increments (when ordered with dimension units code M) | | page 58 |
| | | Example of a 50 mm length: 050 (default head length = 45 mm) | | |

Instrument connection

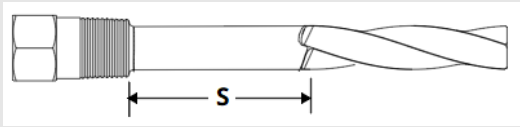
| Place # 19 | | Description | Details | Image | Ref. page |
|------------|---|----------------|----------------|---|-------------------------|
| ★ | A | ½-14 NPT | Female threads |  | page 60 |
| ★ | B | ½-14 NPSM | | | page 60 |
| | C | ¾-14 NPT | | | page 60 |
| | D | M18 × 1.5p | | | page 60 |
| | E | M20 × 1.5p | | | page 60 |
| | F | M24 × 1.5p | | | page 60 |
| | G | G ½-in. (BSPF) | | | page 60 |
| | H | G ¾-in. (BSPF) | | | page 60 |
| | J | M27 × 2p | | | page 60 |
| | K | M14 × 1.5p | | | page 60 |

Additional options

Sensor/thermowell assemble to options

| Code | | Description | Details | Ref. page |
|------|----|---|---|-------------------------|
| ★ | XT | Hand tight assembly of sensor and thermowell | Ensures sensor is threaded into thermowell but only hand tightened | page 60 |
| ★ | XW | Process-ready assembly of sensor and thermowell | Ensures sensor is threaded into thermowell and torqued for process-ready installation | page 60 |

Shielded length

| Code | | Description |  | Ref. page |
|------|------|---|--|-------------------------|
| ★ | Sxxx | xx.x-in., 0.5 to 40-in. in ¼-in. increments (when ordered with dimension units code E) Example of a 6.25-in. length where the second decimal is dropped off: 062 | | page 61 |
| ★ | Sxxx | xxx mm, 13 to 1000 mm in 1 mm increments (when ordered with dimension units code M) Example of a 50 mm length: 050 | | page 61 |

Extended product warranty

| Code | | Description | Details | Ref. pages |
|------|-----|-------------------------|--|-------------------------|
| ★ | WR3 | 3-year limited warranty | This warranty option extends manufacturer’s warranty to three or five years for manufacturer related defects | page 62 |
| ★ | WR5 | 5-year limited warranty | | page 62 |

Thermowell calculation

| Code | | Description | Details | Ref. page |
|------|-----|------------------------|--|-------------------------|
| ★ | R21 | Thermowell calculation | Set of calculations to ensure thermowells are safe in certain process conditions | page 62 |

NACE certification

| Code | | Description | Details | Ref. page |
|------|-----|---------------|--|-------------------------|
| ★ | Q35 | NACE approval | Meets MR0175/ISO 15156 and MR0103 requirements | page 62 |

PMI testing

| Code | | Description | Details | Ref. page |
|------|-----|-------------|---|-------------------------|
| | Q76 | PMI testing | Verifies chemical composition of material | page 63 |

Material certification

| Code | | Description | Details | Ref. page |
|------|----|------------------------|--|-------------------------|
| ★ | Q8 | Material certification | Certificate for material conformance and traceability in accordance with EN 10204 type 3.1 | page 63 |

Surface finish

| Code | | Description | Details | Ref. page |
|------|-----|---------------|--|-------------------------|
| | Q16 | Certification | Certificate showing measured surface finish values | page 63 |

Electropolish

| Code | | Description | Details | Ref. page |
|------|-----|---------------|--|-------------------------|
| | R20 | Electropolish | Improve smoothness and surface quality | page 64 |

Hydrostatic pressure test

| Code | | Description | Details | Ref. page |
|------|-----|------------------------|--|-------------------------|
| ★ | Q5 | External pressure test | Verifies structural quality and checks for leaks at thermowell process connection and stem | page 64 |
| ★ | Q85 | Internal pressure test | Verifies internal structural integrity of thermowell | page 64 |

Canadian registration number

| Code | | Description | Details | Ref. page |
|------|-----|------------------------------|--|-------------------------|
| | Q17 | Canadian Registration Number | Canadian approvals for all provinces (Approved materials in reference section) | page 65 |

Dye penetration test

| Code | | Description | Details | Ref. page |
|------|-----|----------------------|----------------------------|-------------------------|
| ★ | Q73 | Dye penetration test | Checks quality of material | page 66 |

Special cleaning

| Code | | Description | Details | Ref. page |
|------|----|------------------|---|-------------------------|
| | Q6 | Special cleaning | Oxygen enriched environment cleaning per ASTM G93 | page 66 |

Thermowell markings

| Code | | Description | Details | Ref. page |
|------|-----|-----------------------------|--|-------------------------|
| | R40 | Test markings on thermowell | External marking of the thermowell for specific tests (see reference page for list of tests) | page 66 |


Vent hole

| Code | | Description | Details | Ref. page |
|------|-----|-------------|---|-------------------------|
| | R11 | Vent hole | Allows for the venting of a thermowell and for indication that thermowell structural integrity has been compromised | page 67 |

Thermowells with wrench flats

| Code | | Description | Details | Ref. Page |
|------|-----|-------------------------------|---|-------------------------|
| | R37 | Thermowells with wrench flats | Converts the two wrench flats to hex wrench flats; only applies to exotic materials | page 69 |

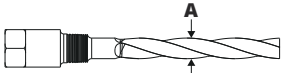
Non-standard bore diameter (d)

| Code | | Description | Details | Image | Ref. page |
|------|-----|------------------|-----------------------------|---|-----------|
| | D01 | 0.276-in./7.0 mm | Default = 0.26-in. (6.6 mm) |  | page 70 |
| | D05 | 0.354-in./9.0 mm | | | page 70 |
| | D07 | 0.256-in./6.5 mm | | | page 70 |
| | D08 | 0.315-in./8.0 mm | | | page 70 |
| | D09 | 0.335-in./8.5 mm | | | page 70 |

Note

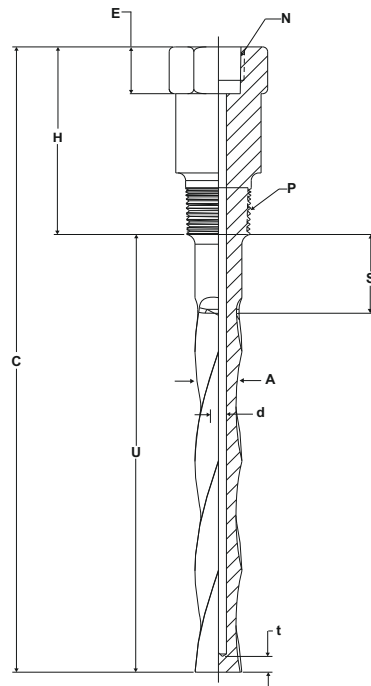
D01 and D07 are the only bore diameter codes compatible with the standard stem diameter (0.75-in./ 19.05 mm). D01, D05, D07, D08, and D09 are compatible with the larger root diameter (0.875-in./ 22.23 mm).

Root diameter (A)

| Code | | Description | Details | Image | Ref. Page |
|------|------|--|---------------------------------|--|-----------|
| | A087 | 0.875-in. if ordering in English units (E) | Standard root diameter 0.75-in. |  | N/A |
| | A220 | 22.23 mm if ordering in Metric units (M) | Standard root diameter 19.05 mm | | |

Threaded thermowell drawings

Figure 5: Thread Mount Thermowell Drawings



- A** Root diameter
- C** Total length (U + H)
- d** Bore diameter
- E** Wrench allowance
- N** Instrument connection
- P** Process connection
- S** Shielded length
- t** Tip thickness
- U** Immersion length

Table 1: Thread Mount Thermowells

| Code | Code T, threaded mounting style | Wrench flat size "G" | | Thread specification |
|------|---------------------------------|-----------------------|-------------------------------|---|
| | Process connection "P" | Metric units (code M) | U.S. customary units (code E) | |
| AB | ¾-14 NPT | 30 mm | 1 ⅛ in. | NPT per SAE -AS 71051 (reference PS-71) |
| AC | 1-11.5 NPT | 34 mm | 1 ¼ in. | |
| AD | 1 ½-11.5 NPT | 48 mm | 1 ¾ in. | |

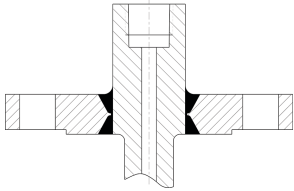
Rosemount Twisted Square Flanged Thermowells



Flanged thermowell overview

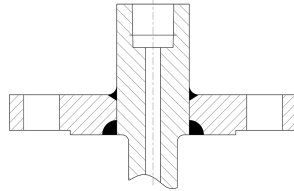
All Rosemount flanged thermowells are manufactured in accordance with ANSI B16.5. The flange to stem weld is in accordance to ASME Section IX. There is also full traceability with material certifications available on request. Rosemount flanged thermowells are available in two manufacturing configurations: full and partial penetration welds.

Full penetration weld (F)



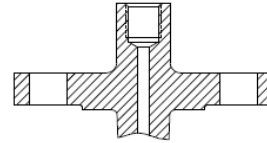
- Stronger weld joint per ASME PTC 19.3 TW-2016
- Used for heavy duty applications
- Emerson recommended option

Partial penetration weld (P)



- Adequate for most process applications
- Weld withstands same pressure and temperature rating as flange
- Lower cost than full penetration weld

Forged, no welds (G)



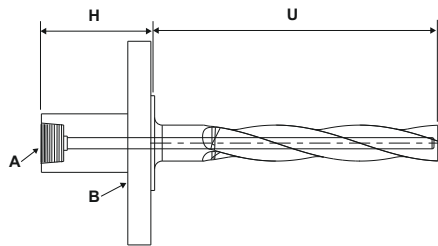
- Highest fatigue resistance per ASME PTC 19.3 TW
- Eliminates weld qualifications and failures
- Used in extreme process applications

Figure 6: Standard Offering–Flanged

| Model | Units | Immersion length (U) | Mounting style | Process connection | Stem style | Thermowell material | Head length (H) | Instrument connection threads | Options |
|--|-------|--|----------------|---|------------|---|-----------------|--|-------------|
| 1 1 4 C | X | X X X X | X | X X | T | X X | X X X | X | XX, XXX, XX |
| 1 2 3 4 | 5 | 6 7 8 9 | 10 | 11 12 | 13 | 14 15 | 16 17 18 | 19 | |
| (5) Units | | (10) Mounting style | | (13) Stem style | | (16-18) Head length (H) | | Common options | |
| English (E) Metric (M) | | F Full penetration weld P Partial penetration weld G Forged, no welds | | T Twisted | | XXX 2.25- to 11.25-in. (E) Example: 2.25-in. = 022, 10-in. = 100 XXX 40 to 225 mm (M) Example: 40 mm = 040, 225 mm = 225 | | Q5 External pressure test Sxxx Shielded length R21 Thermowell calculation Q8 Material certification Q73 Dye penetration test | |
| (6-9) Immersion length (U) | | (11-12) Process connections | | (14-15) Thermowell material | | (19) Instrument connection | | | |
| XXXX 2- to 40-in. (E) Example: 2-in. = 0020, 40-in. = 0400 XXXX 50 to 1000 mm (M) Example: 50 mm = 0050, 1000 mm = 1000 | | AA 1-in. Class 150 AB 1½-in. Class 150 AC 2-in. Class 150 AH 1-in. Class 300 AJ 1½-in. Class 300 AK 2-in. Class 300 | | SC 316/316L SST SF 304/304L SST CS Carbon steel | | A ½-14 NPT B ½-14 NPSM | | | |

The common options shown in Figure 6 represent a partial offering; reference the [Flanged ordering information](#) for a full list of available options.

Figure 7: Flanged Thermowell Components



- A Instrument connection
- B Process connection
- H Head length
- U Immersion length

Note

Wetted surface includes flange face and immersion length (U).

Flanged ordering information

Figure 8: Model Number Ordering Example

| Model | Units | Immersion length (U) | Mounting style | Process connection | Stem style | Thermowell material | Head length (H) | Instrument connection | Options |
|---------|-------|----------------------|----------------|--------------------|------------|---------------------|-----------------|-----------------------|-------------|
| 1 1 4 C | E | 0 1 5 0 | F | A C | T | S C | 0 5 0 | A | WR5, Q76... |
| 1 2 3 4 | 5 | 6 7 8 9 | 10 | 11 12 | 13 | 14 15 | 16 17 18 | 19 | XXXXX |

The numbers below the model number ordering example correlate to the character place numbers in the second column of the ordering table.

Optimizing lead time

The starred offerings (★) represent the most common options and should be selected for the fastest delivery times. The non-starred offerings are subject to additional delivery lead time.

Required model components

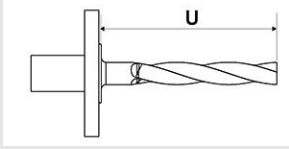
Model

| Place #s 1-4 | Description | Ref. page |
|--------------|--|-----------|
| ★ 114C | Barstock temperature thermowell | N/A |
| | Made with a standard bore diameter of 0.26-in. (6.6 mm) and tip wall thickness of 0.25-in. (6.4 mm). Default ASME flange facing is raised face with spiral serrations. | |

Dimension units

| Place # 5 | | Description | Details | Ref. page |
|-----------|---|---------------------|---|-----------|
| ★ | E | English units (in.) | Specifies whether length units will be in inches (in) or millimeters (mm) | page 55 |
| ★ | M | Metric units (mm) | | page 55 |

Immersion length (U)

| Place #s 6-9 | | Description |  | Ref. page |
|--------------|------|--|--|-----------|
| ★ | xxxx | xx.x-in., 2 to 40-in. in ¼-in. increments (when ordered with dimension units code E) Example of a 6.25-in. length where the second decimal is dropped off: 0062 | | page 55 |
| ★ | xxxx | xxxx mm, 50 to 1000 mm in 5 mm increments (when ordered with dimension units code M) Example of a 50 mm length: 0050 | | page 55 |

Mounting style

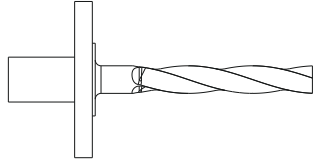
| Place # 10 | | Description | Details | Ref. page |
|------------|---|----------------------------------|---|-----------|
| ★ | P | Flange, partial penetration weld | Weld refers to welding of the flange to thermowell stem | N/A |
| ★ | F | Flange, full penetration weld | | N/A |
| ★ | G | Flange, forged | Single piece forging, no welds | N/A |

Process connection

| Place # 11-12 | | Partial weld (P) | Full penetration weld (F) | Ref. page |
|---------------|----|----------------------|---------------------------|-----------|
| ★ | AA | 1-in. Class 150 | 1-in. Class 150 | N/A |
| ★ | AB | 1½-in. Class 150 | 1½-in. Class 150 | N/A |
| ★ | AC | 2-in. Class 150 | 2-in. Class 150 | N/A |
| ★ | AD | 3-in. Class 150 | 3-in. Class 150 | N/A |
| ★ | AE | 4-in. Class 150 | 4-in. Class 150 | N/A |
| ★ | AF | 6-in. Class 150 | 6-in. Class 150 | N/A |
| ★ | AG | ¾-in. Class 300 | ¾-in. Class 300 | N/A |
| ★ | AH | 1-in. Class 300 | 1-in. Class 300 | N/A |
| ★ | AJ | 1½-in. Class 300 | 1½-in. Class 300 | N/A |
| ★ | AK | 2-in. Class 300 | 2-in. Class 300 | N/A |
| | AL | 1-in. Class 400/600 | 1-in. Class 400/600 | N/A |
| | AM | 1½-in. Class 400/600 | 1½-in. Class 400/600 | N/A |

| Place # 11-12 | | Partial weld (P) | Full penetration weld (F) | Ref. page |
|---------------|----|---------------------|---------------------------|-----------|
| | AN | 2-in. Class 400/600 | 2-in. Class 400/600 | N/A |
| | AP | N/A | 1-in. Class 900/1500 | N/A |
| | AQ | N/A | 1½-in. Class 900/1500 | N/A |
| | AR | N/A | 2-in. Class 900/1500 | N/A |
| | AT | N/A | 1½-in. Class 2500 | N/A |
| | AU | N/A | 2-in. Class 2500 | N/A |
| | AV | 3-in. Class 300 | 3-in. Class 300 | N/A |

Stem style

| Place # 13 | | Description | Details | Image | Ref. page |
|------------|---|-------------|--|--|-----------|
| ★ | T | Twisted | Minimum immersion length = 2-in. (50 mm) |  | N/A |

Thermowell material

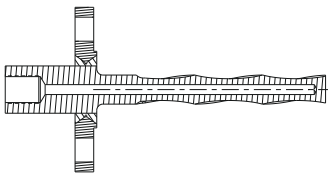
| Place # 14-15 | | Description | Ref. page |
|---------------|----|--------------------------------------|-------------------------|
| ★ | SC | 316/316L dual rated | page 56 |
| ★ | SF | 304/304L dual rated | page 56 |
| ★ | CS | Carbon steel (A-105) | page 56 |
| | SL | 310 SST | page 56 |
| | SM | 321 SST | page 56 |
| | AB | Alloy B3 | page 56 |
| | AC | Alloy C-276 | page 56 |
| | AG | Alloy 20 | page 56 |
| | AH | Alloy 400 | page 56 |
| | AK | Alloy 600 | page 56 |
| | CA | Chrome-Moly Grade B-11/F-11 Class II | page 56 |

| Place # 14-15 | Description | Ref. page |
|---------------|---------------------------------------|-------------------------|
| CB | Chrome-Moly Grade B-22/F-22 Class III | page 56 |
| CC | Chrome-Moly Grade F-91 | page 56 |
| NK | Nickel 200 | page 56 |
| TT | Titanium Grade 2 | page 56 |
| DS | Super duplex SST Grade F-53 | page 56 |
| DU | Duplex 2205 Grade F51 | page 56 |
| SG | 316Ti SST | page 56 |
| SN | 321H SST | page 56 |
| SP | 347 SST | page 56 |
| SR | 904L SST | page 56 |
| AD | Alloy C4 (with 304/304L SST flange) | page 56 |
| AE | Alloy C-22 (with 304/304L SST flange) | page 56 |
| AF | Alloy C-22 (with 316/316L SST flange) | page 56 |
| AU | Alloy C-20 | page 56 |
| AJ | Alloy 400 (with 304/304L SST flange) | page 56 |
| AL | Alloy 600 (with 304/304L SST flange) | page 56 |
| AM | Alloy 601 | page 56 |
| AN | Alloy 625 | page 56 |
| AP | Alloy 800 | page 56 |
| AQ | Alloy 800H/HT | page 56 |
| AR | Alloy 825 | page 56 |
| AS | Alloy F44 Mo6 | page 56 |
| MO | Molybdenum | page 56 |

Head length (H)

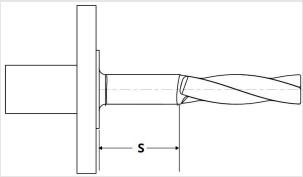
| Place #s 16-18 | | Description | Ref. page |
|----------------|-----|--|-----------|
| ★ | xxx | xx.x-in., 2.25 to 11.25-in. in ¼-in. increments (when ordered with dimension units code E) | page 58 |
| | | Example of a 6.25-in. length where the second decimal is dropped off: 062 (default head length = 2.25-in. for flanges under Class 900) | |
| ★ | xxx | xxx mm, 45 to 225 mm in 5 mm increments (when ordered with dimension units code M) | page 58 |
| | | Example of a 50 mm length: 050 (default head length = 60 mm for flanges under Class 900) | |

Instrument connection

| Place # 19 | Description | Details | Image | Ref. page |
|------------|-------------|----------------|---|-----------|
| ★ | A | ½-14 NPT |  | page 60 |
| ★ | B | ½-14 NPSM | | page 60 |
| | D | M18 × 1.5p | | page 60 |
| | E | M20 × 1.5p | | page 60 |
| | G | G ½-in. (BSPF) | | page 60 |

Additional options

Shielded length

| Code | Description | Image | Ref. page | |
|---|-------------|--|---|--|
| ★ | Sxxx |  | page 61 | |
| | | | | xx.x-in., 1 to 40-in. in ¼-in. increments (when ordered with dimension units code E) |
| Example of a 6.25-in. length where the second decimal is dropped off: 062 | | | | |
| ★ | Sxxx | | xxx mm, 25 to 1000 mm in 1 mm increments (when ordered with dimension units code M) | page 61 |
| | | | Example of a 50 mm length: 050 | |

Sensor/thermowell assemble to options

| Code | Description | Details | Ref. page |
|------|-------------|---|-----------|
| ★ | XT | Hand tight assembly of sensor and thermowell | page 60 |
| ★ | XW | Process-ready assembly of sensor and thermowell | page 60 |

Extended product warranty

| Code | | Description | Details | Ref. pages |
|------|-----|-------------------------|--|-------------------------|
| ★ | WR3 | 3-year limited warranty | This warranty option extends manufacturer's warranty to three or five years for manufacturer related defects | page 62 |
| ★ | WR5 | 5-year limited warranty | | page 62 |

Thermowell calculation

| Code | | Description | Details | Ref. page |
|------|-----|------------------------|--|-------------------------|
| ★ | R21 | Thermowell calculation | Set of calculations to ensure thermowells are safe in certain process conditions | page 62 |

NACE certification

| Code | | Description | Details | Ref. page |
|------|-----|---------------|--|-------------------------|
| ★ | Q35 | NACE approval | Meets MR0175/ISO 15156 and MR0103 requirements | page 62 |

PMI testing

| Code | | Description | Details | Ref. page |
|------|-----|-------------|---|-------------------------|
| | Q76 | PMI testing | Verifies chemical composition of material | page 63 |

Material certification

| Code | | Description | Details | Ref. page |
|------|----|------------------------|--|-------------------------|
| ★ | Q8 | Material certification | Certificate for material conformance and traceability in accordance with EN 10204 type 3.1 | page 63 |

Surface finish

| Code | | Description | Details | Ref. page |
|------|-----|---------------|--|-------------------------|
| | Q16 | Certification | Certificate showing measured surface finish values | page 63 |

Electropolish

| Code | | Description | Details | Ref. page |
|------|-----|---------------|--|-------------------------|
| | R20 | Electropolish | Improve smoothness and surface quality | page 64 |

Hydrostatic pressure test

| Code | | Description | Details | Ref. page |
|------|-----|------------------------|--|-------------------------|
| ★ | Q5 | External pressure test | Verifies structural quality and checks for leaks at thermowell process connection and stem | page 64 |
| ★ | Q85 | Internal pressure test | Verifies internal structural integrity of thermowell | page 64 |

Canadian registration number

| Code | | Description | Details | Ref. page |
|------|-----|------------------------------|--|-------------------------|
| | Q17 | Canadian Registration Number | Canadian approvals for all provinces (Approved materials in reference section) | page 65 |

Dye penetration test

| Code | | Description | Details | Ref. page |
|------|-----|----------------------|----------------------------|-------------------------|
| ★ | Q73 | Dye penetration test | Checks quality of material | page 66 |

Special cleaning

| Code | | Description | Details | Ref. page |
|------|----|------------------|---|-------------------------|
| | Q6 | Special cleaning | Oxygen enriched environment cleaning per ASTM G93 | page 66 |

Thermowell markings

| Code | | Description | Details | Ref. page |
|------|-----|-----------------------------|--|-------------------------|
| | R40 | Test markings on thermowell | External marking of the thermowell for specific tests (see reference page for list of tests) | page 66 |

X-ray/radiograph test

| Code | | Description | Details | Ref. page |
|------|-----|------------------|---|-------------------------|
| | Q81 | X-ray/radiograph | Verifies quality of full penetration flange welds | page 66 |

Plug and chain

| Code | | Description | Details | Ref. page |
|------|-----|-----------------|--|-------------------------|
| | R06 | Stainless steel | Protects thermowell threads when sensor is not installed | page 67 |
| | R23 | Brass | Protects thermowell threads when sensor is not installed | page 67 |

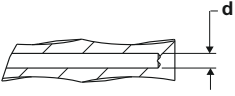
Vent hole

| Code | | Description | Details | Ref. page |
|------|-----|-------------|--|-------------------------|
| | R11 | Vent hole | Allows for the venting of a thermowell | page 67 |

Flange face

| Code | | Description | Details | Ref. page |
|------|-----|-----------------------|--|-------------------------|
| | R09 | Concentric serrations | Concentric serrations on the flange face per ASME B16.5 | page 68 |
| | R10 | Flat | Flat flange face per ASME B16.5 or EN 1092-1 facing Type A | page 68 |
| | R16 | RTJ | Ring type joint flange face per ASME B16.5 | page 69 |


Non-standard bore diameter (d)

| Code | Description | Details | Image | Ref. page |
|------|------------------|-----------------------------|---|-----------|
| D01 | 0.276-in./7.0 mm | Default = 0.26-in. (6.6 mm) |  | page 70 |
| D05 | 0.354-in./9.0 mm | | | page 70 |
| D07 | 0.256-in./6.5 mm | | | page 70 |
| D08 | 0.315-in./8.0 mm | | | page 70 |
| D09 | 0.335-in./8.5 mm | | | page 70 |

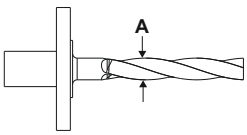
Note

D01 and D07 are the only bore diameter codes compatible with the standard stem diameter (0.75-in./ 19.05 mm). D01, D05, D07, D08, and D09 are compatible with the larger root diameter (0.875-in./ 22.23 mm).

Non-standard tip thickness (t)

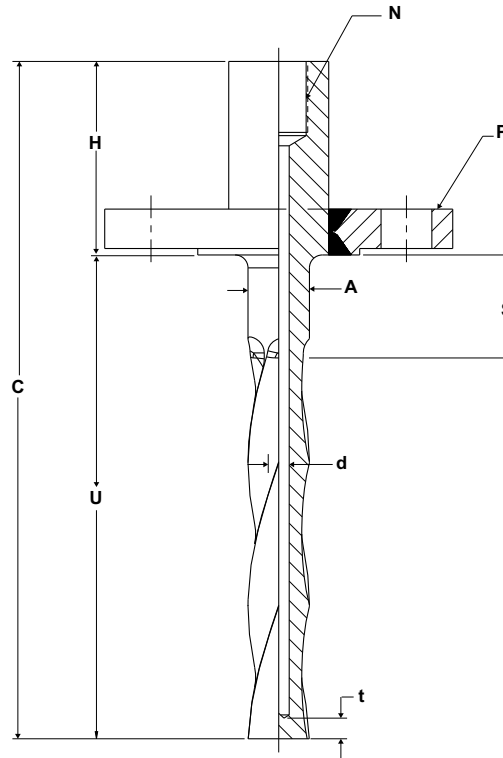
| Code | Description | Details | Image | Ref. page |
|------|------------------|------------------------------|---|-----------|
| T01 | 0.197-in./5.0 mm | Standard = 0.25-in. (6.4 mm) |  | page 70 |
| T02 | 0.236-in./6.0 mm | | | page 70 |

Root diameter (A)

| Code | Description | Details | Image | Ref. Page |
|------|--|---------------------------------|---|-----------|
| A087 | 0.875-in. if ordering in English units (E) | Standard root diameter 0.75-in. |  | N/A |
| A220 | 22.23 mm if ordering in Metric units (M) | Standard root diameter 19.05 mm | | |

Flanged thermowell drawings

Figure 9: Flanged Mount Thermowells



- A** Root diameter
- C** Total length (U + H)
- d** Bore diameter
- H** Head length
- N** Instrument connection
- P** Process connection
- S** Shielded length
- t** Tip thickness
- U** Immersion length

Note

Dimensions are in inches (millimeters).

Table 2: Flange Mounted Thermowells

| Code | Process connection | | | Root diameter stepped stem | Root diameter tapered stem | Tip diameter tapered stem | Tip diameter straight stem | Flanges per specification |
|------|---|--|----------------------------------|----------------------------|----------------------------|---------------------------|----------------------------|---------------------------|
| | Code P, flanged, partial penetration weld | Code F, flanged, full penetration weld | Code G, flanged, forged/no welds | | | | | |
| AA | 1-in. Class 150 | 1-in. Class 150 | 1-in. Class 150 | .748 (19) | .886 (22.5) | .630 (16) | .748 (19) | ASME B16.5 |
| AB | 1½-in. Class 150 | 1½-in. Class 150 | 1½-in. Class 150 | .846 (21.5) | 1.043 (26.5) | .709 (18) | .846 (21.5) | |

Table 2: Flange Mounted Thermowells (continued)

| Code | Process connection | | | Root diameter stepped stem | Root diameter tapered stem | Tip diameter tapered stem | Tip diameter straight stem | Flanges per specification |
|------|---|--|----------------------------------|----------------------------|----------------------------|---------------------------|----------------------------|---------------------------|
| | Code P, flanged, partial penetration weld | Code F, flanged, full penetration weld | Code G, flanged, forged/no welds | | | | | |
| AC | 2-in. Class 150 | 2-in. Class 150 | 2-in. Class 150 | .846 (21.5) | 1.043 (26.5) | .709 (18) | .846 (21.5) | ASME B16.5 |
| AD | 3-in. Class 150 | 3-in. Class 150 | 3-in. Class 150 | .846 (21.5) | 1.043 (26.5) | .709 (18) | .846 (21.5) | |
| AE | 4-in. Class 150 | 4-in. Class 150 | 4-in. Class 150 | .846 (21.5) | 1.043 (26.5) | .709 (18) | .846 (21.5) | |
| AF | 6-in. Class 150 | 6-in. Class 150 | 6-in. Class 150 | .846 (21.5) | 1.043 (26.5) | .709 (18) | .846 (21.5) | |
| AG | ¾-in. Class 150 | ¾-in. Class 150 | ¾-in. Class 150 | .669 (17) | .669 (17) | .496 (12.5) | .669 (17) | |
| AH | 1-in. Class 300 | 1-in. Class 300 | 1-in. Class 300 | .748 (19) | .886 (22.5) | .630 (16) | .748 (19) | |
| AJ | 1½-in. Class 300 | 1½-in. Class 300 | 1½-in. Class 300 | .846 (21.5) | 1.043 (26.5) | .709 (18) | .846 (21.5) | |
| AK | 2-in. Class 300 | 2-in. Class 300 | 2-in. Class 300 | .846 (21.5) | 1.043 (26.5) | .709 (18) | .846 (21.5) | |
| AL | 1-in. Class 400/600 | 1-in. Class 400/600 | 1-in. Class 400/600 | .748 (19) | .886 (22.5) | .630 (16) | .748 (19) | |
| AM | 1½-in. Class 400/600 | 1½-in. Class 400/600 | 1½-in. Class 400/600 | .846 (21.5) | 1.043 (26.5) | .709 (18) | .846 (21.5) | |
| AN | 2-in. Class 400/600 | 2-in. Class 400/600 | 2-in. Class 400/600 | .846 (21.5) | 1.043 (26.5) | .709 (18) | .846 (21.5) | |
| AP | N/A | 1½-in. Class 900/1500 | 1½-in. Class 900/1500 | .748 (19) | .886 (22.5) | .630 (16) | .748 (19) | |
| AQ | N/A | 1½-in. Class 900/1500 | 1½-in. Class 900/1500 | .846 (21.5) | 1.043 (26.5) | .709 (18) | .846 (21.5) | |
| AR | N/A | 2-in. Class 900/1500 | 2-in. Class 900/1500 | .846 (21.5) | 1.043 (26.5) | .709 (18) | .846 (21.5) | |
| AT | N/A | 1½-in. Class 2500 | 1½-in. Class 2500 | .846 (21.5) | 1.043 (26.5) | .709 (18) | .846 (21.5) | |
| AU | N/A | 2-in. Class 2500 | 2-in. Class 2500 | .846 (21.5) | 1.043 (26.5) | .709 (18) | .846 (21.5) | |
| AV | 3-in. Class 300 | 3-in. Class 300 | 3-in. Class 300 | .846 (21.5) | 1.043 (26.5) | .709 (18) | .846 (21.5) | |
| AX | N/A | 3-in. Class 900 | N/A | .846 (21.5) | 1.043 (26.5) | .709 (18) | .846 (21.5) | |
| AY | N/A | 3-in. Class 1500 | N/A | .846 (21.5) | 1.043 (26.5) | .709 (18) | .846 (21.5) | |
| AZ | N/A | 3-in. Class 2500 | N/A | .846 (21.5) | 1.043 (26.5) | .709 (18) | .846 (21.5) | |
| FA | DN 20/PN 2.5/6 | DN 20/PN 2.5/6 | .669 (17) | .669 (17) | .669 (17) | .669 (17) | .669 (17) | EN 1092-1 |

Table 2: Flange Mounted Thermowells (continued)

| Code | Process connection | | | Root diameter stepped stem | Root diameter tapered stem | Tip diameter tapered stem | Tip diameter straight stem | Flanges per specification |
|------|---|--|----------------------------------|----------------------------|----------------------------|---------------------------|----------------------------|---------------------------|
| | Code P, flanged, partial penetration weld | Code F, flanged, full penetration weld | Code G, flanged, forged/no welds | | | | | |
| FE | DN 20/PN 10/16/25/40 | DN 20/PN 10/16/25/40 | DN 20/PN 10/16/25/40 | .669 (17) | .669 (17) | .669 (17) | .669 (17) | EN 1092-1 |
| FG | DN 20/PN 63/100 | DN 20/PN 63/100 | DN 20/PN 63/100 | .669 (17) | .669 (17) | .669 (17) | .669 (17) | |
| GA | DN 2.5 PN 2.5/6 | DN 2.5 PN 2.5/6 | DN 2.5 PN 2.5/6 | .748 (19) | .748 (19) | .500 (12.7) | .748 (19) | |
| GE | DN 2.5 PN 10/16/25/40 | DN 2.5 PN 10/16/25/40 | DN 2.5 PN 10/16/25/40 | .748 (19) | .748 (19) | .500 (12.7) | .748 (19) | |
| GG | DN 2.5 PN63/100 | DN 2.5 PN63/100 | DN 2.5 PN63/100 | .748 (19) | .748 (19) | .500 (12.7) | .748 (19) | |
| JA | DN 40 / PN 2.5/6 | DN 40 / PN 2.5/6 | DN 40 / PN 2.5/6 | .846 (21.5) | 1.043 (26.5) | .709 (18) | .846 (21.5) | |
| JE | DN 40 / PN 10/16/25/40 | DN 40 / PN 10/16/25/40 | DN 40 / PN 10/16/25/40 | .846 (21.5) | 1.043 (26.5) | .709 (18) | .846 (21.5) | |
| JG | DN 40 / PN 63/100 | DN 40 / PN 63/100 | DN 40 / PN 63/100 | .846 (21.5) | 1.043 (26.5) | .709 (18) | .846 (21.5) | |
| JH | DN 40 / PN 160 | DN 40 / PN 160 | DN 40 / PN 160 | .846 (21.5) | 1.043 (26.5) | .709 (18) | .846 (21.5) | |
| JJ | DN 50/PN 250 | DN 50/PN 250 | DN 50/PN 250 | .846 (21.5) | 1.043 (26.5) | .709 (18) | .846 (21.5) | |
| JK | DN 50/PN 320 | DN 50/PN 320 | DN 50/PN 320 | .846 (21.5) | 1.043 (26.5) | .709 (18) | .846 (21.5) | |
| JL | DN 50/PN 400 | DN 50/PN 400 | DN 50/PN 400 | .846 (21.5) | 1.043 (26.5) | .709 (18) | .846 (21.5) | |
| KA | DN 50/PN 2.5/6 | DN 50/PN 2.5/6 | DN 50/PN 2.5/6 | .846 (21.5) | 1.043 (26.5) | .709 (18) | .846 (21.5) | |
| KC | DN 50/PN 10/16 | DN 50/PN 10/16 | DN 50/PN 10/16 | .846 (21.5) | 1.043 (26.5) | .709 (18) | .846 (21.5) | |
| KE | DN 50/PN 25/40 | DN 50/PN 25/40 | DN 50/PN 25/40 | .846 (21.5) | 1.043 (26.5) | .709 (18) | .846 (21.5) | |
| KF | DN 50/PN 63 | DN 50/PN 63 | DN 50/PN 63 | .846 (21.5) | 1.043 (26.5) | .709 (18) | .846 (21.5) | |
| KG | DN 50/PN 100 | DN 50/PN 100 | DN 50/PN 100 | .846 (21.5) | 1.043 (26.5) | .709 (18) | .846 (21.5) | |
| LA | DN 65 / PN 2.5/6 | DN 65 / PN 2.5/6 | DN 65 / PN 2.5/6 | .846 (21.5) | 1.043 (26.5) | .709 (18) | .846 (21.5) | |
| LC | DN 65 / PN 10/16 | DN 65 / PN 10/16 | DN 65 / PN 10/16 | .846 (21.5) | 1.043 (26.5) | .709 (18) | .846 (21.5) | |
| LE | DN 65 / PN 24/40 | DN 65 / PN 24/40 | DN 65 / PN 24/40 | .846 (21.5) | 1.043 (26.5) | .709 (18) | .846 (21.5) | |
| LF | DN 65 / PN 63 | DN 65 / PN 63 | DN 65 / PN 63 | .846 (21.5) | 1.043 (26.5) | .709 (18) | .846 (21.5) | |
| LG | DN 65 / PN 100 | DN 65 / PN 100 | DN 65 / PN 100 | .846 (21.5) | 1.043 (26.5) | .709 (18) | .846 (21.5) | |

Table 2: Flange Mounted Thermowells (continued)

| Code | Process connection | | | Root diameter stepped stem | Root diameter tapered stem | Tip diameter tapered stem | Tip diameter straight stem | Flanges per specification |
|------|---|--|----------------------------------|----------------------------|----------------------------|---------------------------|----------------------------|---------------------------|
| | Code P, flanged, partial penetration weld | Code F, flanged, full penetration weld | Code G, flanged, forged/no welds | | | | | |
| MA | DN 80/ PN 2.5/6 | DN 80/ PN 2.5/6 | DN 80/ PN 2.5/6 | .846 (21.5) | 1.043 (26.5) | .709 (18) | .846 (21.5) | EN 1092-1 |
| MC | DN 80/ PN 10/16 | DN 80/ PN 10/16 | DN 80/ PN 10/16 | .846 (21.5) | 1.043 (26.5) | .709 (18) | .846 (21.5) | |
| ME | DN 80/ PN 25/40 | DN 80/ PN 25/40 | DN 80/ PN 25/40 | .846 (21.5) | 1.043 (26.5) | .709 (18) | .846 (21.5) | |
| MF | DN 80/ PN 63 | DN 80/ PN 63 | DN 80/ PN 63 | .846 (21.5) | 1.043 (26.5) | .709 (18) | .846 (21.5) | |
| MG | DN 80/ PN 100 | DN 80/ PN 100 | DN 80/ PN 100 | .846 (21.5) | 1.043 (26.5) | .709 (18) | .846 (21.5) | |
| NA | DN 100/ PN 2.5/6 | DN 100/ PN 2.5/6 | DN 100/ PN 2.5/6 | .846 (21.5) | 1.043 (26.5) | .709 (18) | .846 (21.5) | |
| NC | DN 100/ PN 10/16 | DN 100/ PN 10/16 | DN 100/ PN 10/16 | .846 (21.5) | 1.043 (26.5) | .709 (18) | .846 (21.5) | |
| NE | DN 100 / PN 63 | DN 100 / PN 63 | DN 100 / PN 63 | .846 (21.5) | 1.043 (26.5) | .709 (18) | .846 (21.5) | |
| NF | DN 100/PN 63 | DN 100/PN 63 | DN 100/PN 63 | .846 (21.5) | 1.043 (26.5) | .709 (18) | .846 (21.5) | |
| NG | DN 100/PN 100 | DN 100/PN 100 | DN 100/PN 100 | .846 (21.5) | 1.043 (26.5) | .709 (18) | .846 (21.5) | |

Rosemount Twisted Square Van Stone Thermowells

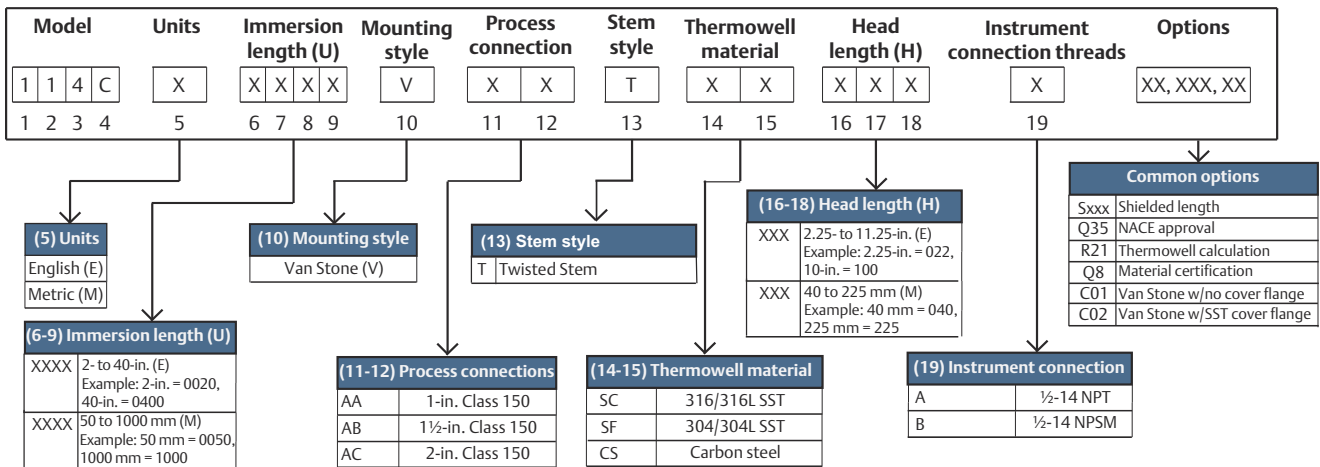


Van Stone thermowell overview

Van Stone/lap Joint thermowells are mounted between the mating flange and lap joint flange. This unique design enables thermowell designers to specify thermowell flange materials different than the thermowell stem material; flanges are easily replaceable. These thermowells allow use of different thermowell materials for the flange contacting the process and overlaying flange which can save material and manufacturing costs. They are a good choice for corrosive applications, because there are no welds so weld-joint corrosion is eliminated. The Emerson standard for the Van Stone thermowell is a raised face style made of carbon steel. Other styles and flange materials are also available.

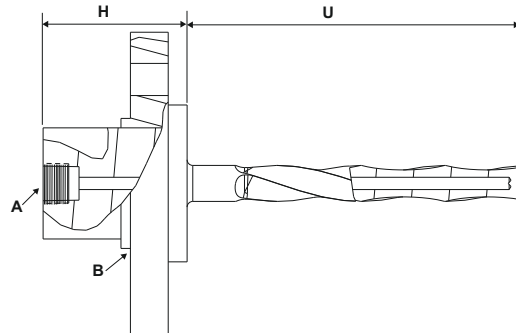
The standard offering in [Figure 10](#) shows the thermowell configurations that can typically be shipped in two weeks or less.

Figure 10: Standard Offering-Van Stone



The common options shown in [Figure 10](#) represent a partial offering; reference the [Van Stone ordering information](#) for a full list of available options.

Figure 11: Van Stone Thermowell Components



- A** Instrument connection
- B** Process connection
- H** Head length
- U** Immersion length

Note

Wetted surface includes flange face and immersion length (U).

Van Stone ordering information

Figure 12: Model Number Ordering Example

| Model | | | | Units | Immersion length (U) | | | | Mounting style | Process connection | | Stem style | Thermowell material | | Head length (H) | | | Instrument connection | Options |
|-------|---|---|---|-------|----------------------|---|---|---|----------------|--------------------|----|------------|---------------------|----|-----------------|----|----|-----------------------|-------------|
| 1 | 1 | 4 | C | M | 0 | 1 | 5 | 0 | V | A | B | T | S | C | 0 | 5 | 0 | A | WR5, Q76... |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | XXXXX |

The numbers below the model number ordering example correlate to the character place numbers in the second column of the ordering table.

Optimizing lead time

The starred offerings (★) represent the most common options and should be selected for the fastest delivery times. The non-starred offerings are subject to additional delivery lead time.

Required model components

Model

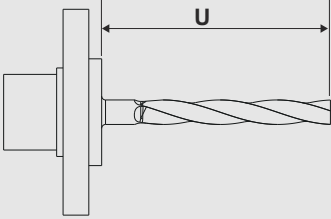
| Place #s 1-4 | | Description | Ref. page |
|--------------|------|---------------------------------|--|
| ★ | 114C | Barstock temperature thermowell | Made with a standard bore diameter of 0.26-in. (6.6 mm) and tip wall thickness of 0.25-in. (6.4 mm) N/A |

Dimension units

| Place # 5 | | Description | Details | Ref. page |
|-----------|---|---------------------|---|-----------|
| ★ | E | English units (in.) | Specifies whether length units will be in inches (in) or millimeters (mm) | page 55 |
| ★ | M | Metric units (mm) | | page 55 |

Immersion length (U)

| Place #s 6-9 | | Description | Ref. page |
|--------------|------|--|-----------|
| | | | |
| ★ | xxxx | xx.x-in., 2 to 40-in. in ¼-in. increments (when ordered with dimension units code E) Example of a 6.25-in. length where the second decimal is dropped off: 0062 | page 55 |
| ★ | xxxx | xxxx mm, 50 to 1000 mm in 5 mm increments (when ordered with dimension units code M) | page 55 |

| Place #s 6-9 | Description |  | Ref. page |
|--------------|---------------------------------|--|-----------|
| | Example of a 50 mm length: 0050 | | |

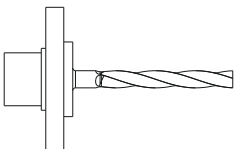
Mounting style

| Place # 10 | Description | Details | Ref. page |
|------------|-----------------------|---|-----------|
| ★ V | Van Stone, lap flange | Default cover flange material is carbon steel | N/A |

Process connection

| Place # 11-12 | Description | Ref. page |
|---------------|--------------------------|-----------|
| ★ AA | 1-in. Class 150 | N/A |
| ★ AB | 1½-in. Class 150 | N/A |
| ★ AC | 2-in. Class 150 | N/A |
| ★ AH | 1-in. Class 300 | N/A |
| ★ AJ | 1½-in. Class 300 | N/A |
| ★ AK | 2-in. Class 300 | N/A |
| ★ AL | 1-in. Class 400/600 | N/A |
| ★ AM | 1½-in. Class 400/600 | N/A |
| ★ AN | 2-in. Class 400/600 | N/A |
| | AP 1-in. Class 900/1500 | N/A |
| | AQ 1½-in. Class 900/1500 | N/A |
| | AR 2-in. Class 900/1500 | N/A |
| | AS 1-in. Class 2500 | N/A |
| | AT 1½-in. Class 2500 | N/A |
| | AU 2-in. Class 2500 | N/A |

Stem style

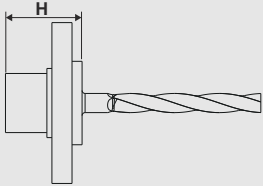
| Place # 13 | Description | Details | Image | Ref. page |
|------------|-------------|--|---|-----------|
| ★ T | Twisted | Minimum immersion length = 2-in. (50 mm) |  | N/A |

Thermowell material

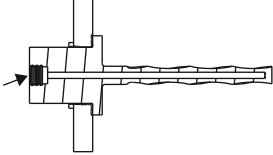
| Place # 14-15 | | Description | Ref. page |
|---------------|----|---------------------------------------|-----------|
| ★ | SC | 316/316L dual rated | page 56 |
| ★ | SF | 304/304L dual rated | page 56 |
| ★ | CS | Carbon steel (A-105) | page 56 |
| | SL | 310 SST | page 56 |
| | SM | 321 SST | page 56 |
| | AB | Alloy B3 | page 56 |
| | AC | Alloy C-276 | page 56 |
| | AG | Alloy 20 | page 56 |
| | AH | Alloy 400 | page 56 |
| | AK | Alloy 600 | page 56 |
| | CA | Chrome-Moly Grade B-11/F-11 Class II | page 56 |
| | CB | Chrome-Moly Grade B-22/F-22 Class III | page 56 |
| | CC | Chrome-Moly Grade F-91 | page 56 |
| | NK | Nickel 200 | page 56 |
| | TT | Titanium Grade 2 | page 56 |
| | DS | Super duplex SST Grade F-53 | page 56 |
| | DU | Duplex 2205 Grade F51 | page 56 |
| | SG | 316Ti SST | page 56 |
| | SN | 321H SST | page 56 |
| | SP | 347 SST | page 56 |
| | SR | 904L SST | page 56 |
| | AD | Alloy C4 (with 304/304L SST flange) | page 56 |
| | AE | Alloy C-22 (with 304/304L SST flange) | page 56 |

| Place # 14-15 | Description | Ref. page |
|---------------|---------------------------------------|-----------|
| AF | Alloy C-22 (with 316/316L SST flange) | page 56 |
| AU | Alloy C-20 | page 56 |
| AJ | Alloy 400 (with 304/304L SST flange) | page 56 |
| AL | Alloy 600 (with 304/304L SST flange) | page 56 |
| AM | Alloy 601 | page 56 |
| AN | Alloy 625 | page 56 |
| AP | Alloy 800 | page 56 |
| AQ | Alloy 800H/HT | page 56 |
| AR | Alloy 825 | page 56 |
| AS | Alloy F44 Mo6 | page 56 |
| MO | Molybdenum | page 56 |
| SD | 316/316 SST NORSOK | page 56 |
| DT | Super duplex NORSOK | page 56 |
| DV | Duplex 2205 NORSOK | page 56 |

Head length (H)

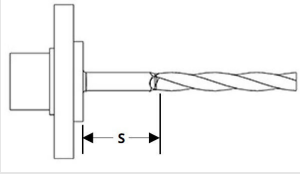
| Place #s 16-18 | Description |  | Ref. page |
|----------------|-------------|--|-----------|
| ★ | xxx | xx.x-in., 1.75 to 11.25-in. in ¼-in. increments (when ordered with dimension units code E) Example of a 6.25-in. length where the second decimal is dropped off: 062 (default head length = 2.25-in. for flanges under Class 900) | page 58 |
| ★ | xxx | xxx mm, 40 to 225 mm in 5 mm increments (when ordered with dimension units code M) Example of a 50 mm length: 050 (default head length = 60 mm for flanges under Class 900) | page 58 |

Instrument connection

| Place # 19 | | Description | Details | Image | Ref. page |
|------------|---|----------------|----------------|---|-----------|
| ★ | A | ½-14 NPT | Female threads |  | page 60 |
| ★ | B | ½-14 NPSM | | | page 60 |
| | D | M18 × 1.5p | | | page 60 |
| | E | M20 × 1.5p | | | page 60 |
| | G | G ½-in. (BSPF) | | | page 60 |

Additional options

Shielded length

| Code | Description |  | Ref. page |
|------|-------------|---|-----------|
| ★ | Sxxx | xx.x-in., 1 to 40-in. in ¼-in. increments (when ordered with dimension units code E) Example of a 6.25-in. length where the second decimal is dropped off: 062 | page 61 |
| ★ | Sxxx | xxx mm, 25 to 999 mm in 1 mm increments (when ordered with dimension units code M) Example of a 50 mm length: 050 | page 61 |

Sensor/thermowell assemble to options

| Code | Description | Details | Ref. page | |
|------|-------------|---|---|---------|
| ★ | XT | Hand tight assembly of sensor and thermowell | Ensures sensor is threaded into thermowell but only hand tightened | page 60 |
| ★ | XW | Process-ready assembly of sensor and thermowell | Ensures sensor is threaded into thermowell and torqued for process-ready installation | page 60 |

Extended product warranty

| Code | Description | Details | Ref. pages | |
|------|-------------|-------------------------|--|---------|
| ★ | WR3 | 3-year limited warranty | This warranty option extends manufacturer's warranty to three or five years for manufacturer related defects | page 62 |
| ★ | WR5 | 5-year limited warranty | | page 62 |

Thermowell calculation

| Code | | Description | Details | Ref. page |
|------|-----|------------------------|--|-------------------------|
| ★ | R21 | Thermowell calculation | Set of calculations to ensure thermowells are safe in certain process conditions | page 62 |

NACE certification

| Code | | Description | Details | Ref. page |
|------|-----|---------------|--|-------------------------|
| ★ | Q35 | NACE approval | Meets MR0175/ISO 15156 and MR0103 requirements | page 62 |

PMI testing

| Code | | Description | Details | Ref. page |
|------|-----|-------------|---|-------------------------|
| | Q76 | PMI testing | Verifies chemical composition of material | page 63 |

Material certification

| Code | | Description | Details | Ref. page |
|------|----|------------------------|--|-------------------------|
| ★ | Q8 | Material certification | Certificate for material conformance and traceability in accordance with EN 10204 type 3.1 | page 63 |

Surface finish

| Code | | Description | Details | Ref. page |
|------|-----|---------------|--|-------------------------|
| | Q16 | Certification | Certificate showing measured surface finish values | page 63 |

Electropolish

| Code | | Description | Details | Ref. page |
|------|-----|---------------|--|-------------------------|
| | R20 | Electropolish | Improve smoothness and surface quality | page 64 |

Hydrostatic pressure test

| Code | | Description | Details | Ref. page |
|------|----|------------------------|--|-------------------------|
| ★ | Q5 | External pressure test | Verifies structural quality and checks for leaks at thermowell process connection and stem | page 64 |

| Code | | Description | Details | Ref. page |
|------|-----|------------------------|--|-------------------------|
| ★ | Q85 | Internal pressure test | Verifies internal structural integrity of thermowell | page 64 |

Canadian registration number

| Code | | Description | Details | Ref. page |
|------|-----|------------------------------|--|-------------------------|
| | Q17 | Canadian Registration Number | Canadian approvals for all provinces (Approved materials in reference section) | page 65 |

Dye penetration test

| Code | | Description | Details | Ref. page |
|------|-----|----------------------|----------------------------|-------------------------|
| ★ | Q73 | Dye penetration test | Checks quality of material | page 66 |

Special cleaning

| Code | | Description | Details | Ref. page |
|------|----|------------------|---|-------------------------|
| | Q6 | Special cleaning | Oxygen enriched environment cleaning per ASTM G93 | page 66 |

Thermowell markings

| Code | | Description | Details | Ref. page |
|------|-----|-----------------------------|--|-------------------------|
| | R40 | Test markings on thermowell | External marking of the thermowell for specific tests (see reference page for list of tests) | page 66 |

Plug and chain

| Code | | Description | Details | Ref. page |
|------|-----|-----------------|--|-------------------------|
| | R06 | Stainless steel | Protects thermowell threads when sensor is not installed | page 67 |
| | R23 | Brass | Protects thermowell threads when sensor is not installed | page 67 |

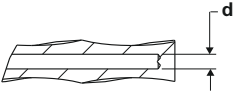
Vent hole

| Code | | Description | Details | Ref. page |
|------|-----|-------------|--|-------------------------|
| | R11 | Vent hole | Allows for the venting of a thermowell | page 67 |

Flange face

| Code | Description | Details | Ref. page |
|------|-----------------------|---|-----------|
| R09 | Concentric serrations | Concentric serrations on the flange face per ASME B16.5 | page 68 |
| R16 | RTJ | Ring type joint flange face per ASME B16.5 | page 69 |


Non-standard bore diameter (d)

| Code | Description | Details | Image | Ref. page |
|------|------------------|-----------------------------|---|-----------|
| D01 | 0.276-in./7.0 mm | Default = 0.26-in. (6.6 mm) |  | page 70 |
| D05 | 0.354-in./9.0 mm | | | page 70 |
| D07 | 0.256-in./6.5 mm | | | page 70 |
| D08 | 0.315-in./8.0 mm | | | page 70 |
| D09 | 0.335-in./8.5 mm | | | page 70 |

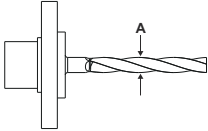
Note

D01 and D07 are the only bore diameter codes compatible with the standard stem diameter (0.75-in./ 19.05 mm). D01, D05, D07, D08, and D09 are compatible with the larger root diameter (0.875-in./ 22.23 mm).

Non-standard tip thickness (t)

| Code | Description | Details | Image | Ref. page |
|------|------------------|------------------------------|---|-----------|
| T01 | 0.197-in./5.0 mm | Standard = 0.25-in. (6.4 mm) |  | page 70 |
| T02 | 0.236-in./6.0 mm | | | page 70 |

Root diameter (A)

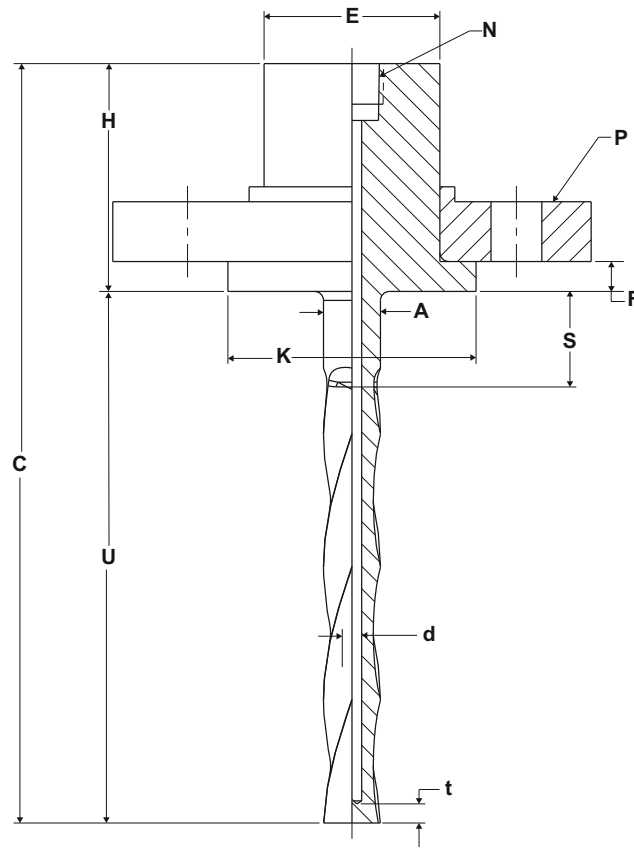
| Code | Description | Details | Image | Ref. Page |
|------|--|---------------------------------|---|-----------|
| A087 | 0.875-in. if ordering in English units (E) | Standard root diameter 0.75-in. |  | N/A |
| A220 | 22.23 mm if ordering in Metric units (M) | Standard root diameter 19.05 mm | | |

Lap flange material for Van Stone design

| Code | Description | Details | Ref. page |
|------|--------------------------|--|-----------|
| C01 | No flange | Provides a Van Stone stem without a lap flange. | page 70 |
| C02 | 316/316L SST flange | Provides a Van Stone stem with a 316/316L SST lap flange. | page 70 |
| C03 | Flange per stem material | Provides a Van Stone stem with a matching lap flange per stem material. Coatings do not apply to lap flange. | page 70 |

Van Stone thermowell drawings

Figure 13: Van Stone Thermowells



- A Root diameter
- C Total length (U + H)
- d Bore diameter
- E Socket size
- F Stub thickness
- H Head length
- N Instrument connection
- P Process connection
- S Shielded length
- t Tip thickness
- U Immersion length

Table 3: Van Stone Mount Thermowells

| Code | Code V, Van Stone mounting style LAP flange | Lagging diameter C ⁽¹⁾ | Stub diameter K standard raised face ⁽¹⁾ | Stub diameter K ring type joint option R16 ⁽¹⁾ | Stub thickness F standard raised face ⁽¹⁾ | Stub thickness F ring type joint option R16 ⁽¹⁾ |
|------|---|-----------------------------------|---|---|--|--|
| | Process connection | | | | | |
| AA | 1-in. Class 150 | 1.31 (33.4) | 1.99 (50.8) | 2.50 (63.5) | .394 (10) | .644 (16.35) |
| AB | 1 ½-in. Class 150 | 1.90 (48.3) | 2.87 (73) | 3.25 (82.5) | | .644 (16.35) |
| AC | 2-in. Class 150 | 2.37 (60.3) | 3.62 (92.1) | 4 (102) | | .644 (16.35) |
| AH | 1-in. Class 300 | 1.31 (33.4) | 1.99 (50.8) | 2.75 (70) | | .644 (16.35) |
| AJ | 1 ½-in. Class 300 | 1.90 (48.3) | 2.87 (73) | 3.56 (90.5) | | .644 (16.35) |
| AK | 2-in. Class 300 | 2.37 (60.3) | 3.62 (92.1) | 4.25 (108) | | .707 (17.92) |
| AL | 1-in. Class 400/600 | 1.31 (33.4) | 1.99 (50.8) | 2.75 (70) | | .644 (16.35) |
| AM | 1 ½-in. Class 400/600 | 1.90 (48.3) | 2.87 (73) | 3.56 (90.5) | | .644 (16.35) |
| AN | 2-in. Class 400/600 | 2.37 (60.3) | 3.62 (92.1) | 4.25 (108) | | .707 (17.92) |
| AP | 1-in. Class 900/1500 | 1.31 (33.4) | 1.99 (50.8) | 2.81 (71.5) | | .644 (16.35) |
| AQ | 1 ½-in. Class 900/1500 | 1.90 (48.3) | 2.87 (73) | 3.62 (92) | | .644 (16.35) |
| AR | 2-in. Class 900/1500 | 2.37 (60.3) | 3.62 (92.1) | 4.88 (124) | | .707 (17.92) |
| AS | 1-in. Class 2500 | 1.31 (33.4) | 1.99 (50.8) | 3.25 (82.5) | | .644 (16.35) |
| AT | 1 ½-in. Class 2500 | 1.90 (48.3) | 2.87 (73) | 4.50 (114) | | .707 (17.92) |
| AU | 2-in. Class 2500 | 2.37 (60.3) | 3.62 (92.1) | 5.25 (133) | | .707 (17.92) |

(1) Dimensions are in inches (millimeters).

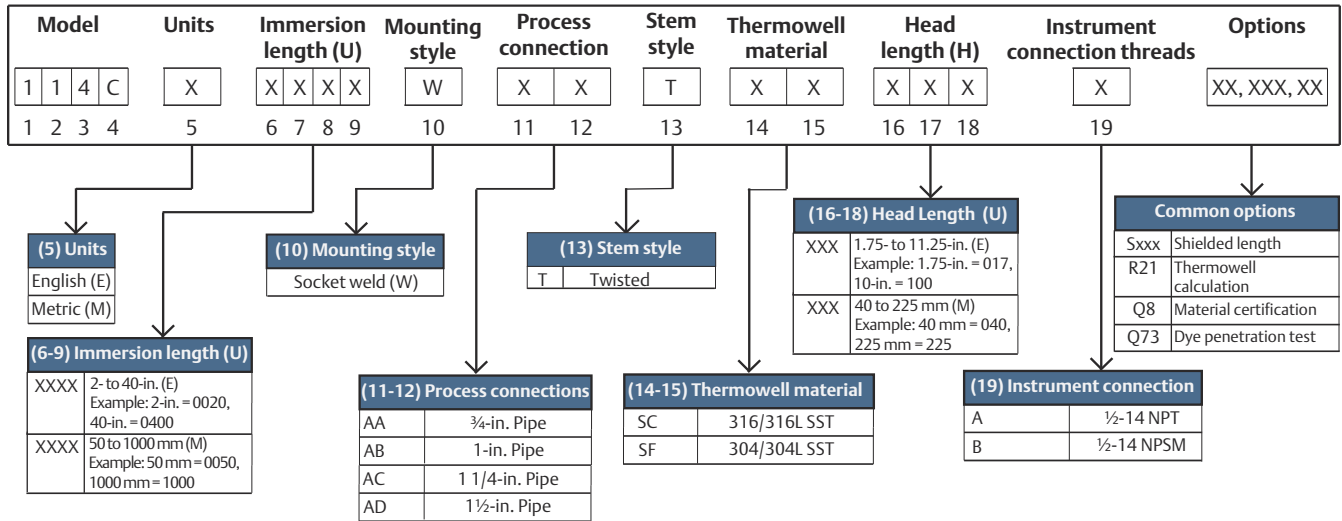
Rosemount Twisted Square Socket Weld Thermowells



Socket weld thermowell overview

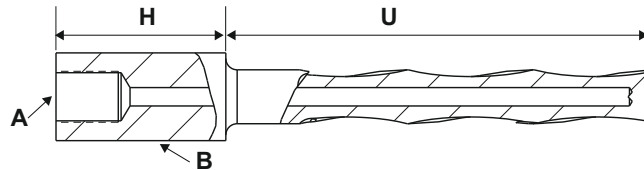
Socket weld thermowells are permanently welded to process pipes or tanks. Socket weld thermowells have the highest pressure rating and are generally used in applications with high velocity flow, high temperature, or extremely high pressure. They are necessary where a leak-proof seal is required. The standard offering in Figure 14 shows the thermowell configurations that can typically be shipped in two weeks or less.

Figure 14: Standard Offering- Socket Weld



The common options shown in Figure 14 represent a partial offering; reference the [Socket Weld ordering information](#) for a full list of available options.

Figure 15: Socket Weld Thermowell Components



- A Instrument connection
- B Process connection (dependent on weld point)
- U Immersion length
- H Head length

Note

Actual wetted surface varies; it is measured from the weld point to the thermowell tip.

Socket Weld ordering information

Figure 16: Model Number Ordering Example

| Model | | | | Units | Immersion length (U) | | | | Mounting style | Process connection | | Stem style | Thermowell material | | Head length (H) | | | Instrument connection | Options |
|-------|---|---|---|-------|----------------------|---|---|---|----------------|--------------------|----|------------|---------------------|----|-----------------|----|----|-----------------------|-------------|
| 1 | 1 | 4 | C | E | 0 | 0 | 6 | 0 | W | A | B | T | S | C | 0 | 5 | 0 | A | WR5, Q76... |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | XXXXX |

The numbers below the model number ordering example correlate to the character place numbers in the second column of the ordering table.

Optimizing lead time

The starred offerings (★) represent the most common options and should be selected for the fastest delivery times. The non-starred offerings are subject to additional delivery lead time.

Required model components

Model

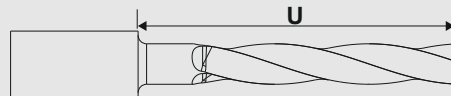
| Place #s 1-4 | | Description | Ref. page |
|--------------|------|---------------------------------|--|
| ★ | 114C | Barstock temperature thermowell | Made with a standard bore diameter of 0.26-in. (6.6 mm) and tip wall thickness of 0.25-in. (6.4 mm) N/A |

Dimension units

| Place # 5 | | Description | Details | Ref. page |
|-----------|---|---------------------|---|-------------------------|
| ★ | E | English units (in.) | Specifies whether length units will be in inches (in) or millimeters (mm) | page 55 |
| ★ | M | Metric units (mm) | | page 55 |

Immersion length (U)

| Place #s 6-9 | | Description | Ref. page |
|--------------|------|--|-------------------------|
| ★ | xxxx | xxx-in., 2 to 40-in. in ¼-in. increments (when ordered with dimension units code E) | page 55 |
| | | Example of a 6.25-in. length where the second decimal is dropped off: 0062 | |
| ★ | xxxx | xxxx mm, 50 to 1000 mm in 5 mm increments (when ordered with dimension units code M) | page 55 |
| | | Example of a 50 mm length: 0050 | |



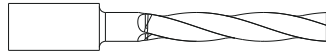
Mounting style

| Place # 10 | | Description | Ref. page |
|------------|---|--------------------|-----------|
| ★ | W | Welded-socket weld | N/A |

Process connection

| Place # 11-12 | | Welded-socket weld (W) | Ref. page |
|---------------|----|------------------------|-----------|
| ★ | AA | ¾-in. pipe | N/A |
| ★ | AB | 1-in. pipe | N/A |
| ★ | AC | 1¼-in. pipe | N/A |
| ★ | AD | 1½-in. pipe | N/A |

Stem style

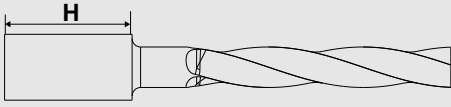
| Place # 13 | | Description | Details | Image | Ref. page |
|------------|---|-------------|--|--|-----------|
| ★ | T | Twisted | Minimum immersion length = 2-in. (25 mm) |  | N/A |

Thermowell material


| Place # 14-15 | | Description | Ref. page |
|---------------|----|----------------------|-------------------------|
| ★ | SC | 316/316L dual rated | page 56 |
| ★ | SF | 304/304L dual rated | page 56 |
| ★ | CS | Carbon steel (A-105) | page 56 |
| | SL | 310 SST | page 56 |
| | SM | 321 SST | page 56 |
| | AB | Alloy B3 | page 56 |
| | AC | Alloy C-276 | page 56 |
| | AG | Alloy 20 | page 56 |
| | AH | Alloy 400 | page 56 |
| | AK | Alloy 600 | page 56 |

| Place # 14-15 | Description | Ref. page |
|---------------|---------------------------------------|-----------|
| CA | Chrome-Moly Grade B-11/F-11 Class II | page 56 |
| CB | Chrome-Moly Grade B-22/F-22 Class III | page 56 |
| CC | Chrome-Moly Grade F-91 | page 56 |
| NK | Nickel 200 | page 56 |
| TT | Titanium Grade 2 | page 56 |
| DS | Super duplex SST Grade F-53 | page 56 |
| DU | Duplex 2205 Grade F51 | page 56 |
| SN | 321H SST | page 56 |
| SP | 347 SST | page 56 |
| SR | 904L SST | page 56 |
| AU | Alloy C-20 | page 56 |
| AM | Alloy 601 | page 56 |
| AN | Alloy 625 | page 56 |
| AP | Alloy 800 | page 56 |
| AQ | Alloy 800H/HT | page 56 |
| AR | Alloy 825 | page 56 |
| AS | Alloy F44 Mo6 | page 56 |
| MO | Molybdenum | page 56 |
| SD | 316/316 SST NORSOK | page 56 |
| DT | Super duplex NORSOK | page 56 |
| DV | Duplex 2205 NORSOK | page 56 |

Head length (H)

| Place #s 16-18 | | Description |  | Ref. page |
|----------------|-----|--|--|-----------|
| ★ | xxx | xx.x-in., 1.75 to 11.25-in. in ¼-in. increments (when ordered with dimension units code E) | | page 58 |
| | | Example of a 6.25-in. length where the second decimal is dropped off: 062 (default head length = 1.75-in.) | | |
| ★ | xxx | xxx mm, 40 to 225 mm in 5 mm increments (when ordered with dimension units code M) | | page 58 |
| | | Example of a 50 mm length: 050 (default head length = 45 mm) | | |

Instrument connection

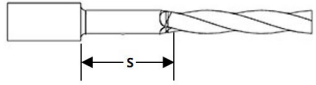
| Place # 19 | | Description | Details | Image | Ref. page |
|------------|---|----------------|----------------|--|-----------|
| ★ | A | ½-14 NPT | Female threads |  | page 60 |
| ★ | B | ½-14 NPSM | | | page 60 |
| | D | M18 × 1.5p | | | page 60 |
| | E | M20 × 1.5p | | | page 60 |
| | G | G ½-in. (BSPF) | | | page 60 |

Additional options

Sensor/thermowell assemble to options

| Code | | Description | Details | Ref. page |
|------|----|--|--|-----------|
| ★ | XT | Hand tight assembly of sensor and thermowell | Ensures sensor is threaded into thermowell but only hand tightened | page 60 |

Shielded length

| Code | | Description |  | Ref. page |
|------|------|--|--|-----------|
| ★ | Sxxx | xx.x-in., 0.5 to 40-in. in ¼-in. increments (when ordered with dimension units code E) | | page 61 |
| | | Example of a 6.25-in. length where the second decimal is dropped off: 062 | | |
| ★ | Sxxx | xxx mm, 13 to 1000 mm in 1 mm increments (when ordered with dimension units code M) | | page 61 |
| | | Example of a 50 mm length: 050 | | |

Extended product warranty

| Code | | Description | Details | Ref. pages |
|------|-----|-------------------------|--|-------------------------|
| ★ | WR3 | 3-year limited warranty | This warranty option extends manufacturer's warranty to three or five years for manufacturer related defects | page 62 |
| ★ | WR5 | 5-year limited warranty | | page 62 |

Thermowell calculation

| Code | | Description | Details | Ref. page |
|------|-----|------------------------|--|-------------------------|
| ★ | R21 | Thermowell calculation | Set of calculations to ensure thermowells are safe in certain process conditions | page 62 |

NACE certification

| Code | | Description | Details | Ref. page |
|------|-----|---------------|--|-------------------------|
| ★ | Q35 | NACE approval | Meets MR0175/ISO 15156 and MR0103 requirements | page 62 |

PMI testing

| Code | | Description | Details | Ref. page |
|------|-----|-------------|---|-------------------------|
| | Q76 | PMI testing | Verifies chemical composition of material | page 63 |

Material certification

| Code | | Description | Details | Ref. page |
|------|----|------------------------|--|-------------------------|
| ★ | Q8 | Material certification | Certificate for material conformance and traceability in accordance with EN 10204 type 3.1 | page 63 |

Surface finish

| Code | | Description | Details | Ref. page |
|------|-----|---------------|--|-------------------------|
| | Q16 | Certification | Certificate showing measured surface finish values | page 63 |

Electropolish

| Code | | Description | Details | Ref. page |
|------|-----|---------------|--|-------------------------|
| | R20 | Electropolish | Improve smoothness and surface quality | page 64 |

Hydrostatic pressure test

| Code | | Description | Details | Ref. page |
|------|-----|------------------------|--|-------------------------|
| ★ | Q85 | Internal pressure test | Verifies internal structural integrity of thermowell | page 64 |

Canadian registration number

| Code | | Description | Details | Ref. page |
|------|-----|------------------------------|--|-------------------------|
| | Q17 | Canadian Registration Number | Canadian approvals for all provinces (Approved materials in reference section) | page 65 |

Thermowell markings

| Code | | Description | Details | Ref. page |
|------|-----|-----------------------------|--|-------------------------|
| | R40 | Test markings on thermowell | External marking of the thermowell for specific tests (see reference page for list of tests) | page 66 |

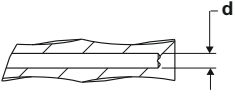
Plug and chain

| Code | | Description | Details | Ref. page |
|------|-----|-----------------|--|-------------------------|
| | R06 | Stainless steel | Protects thermowell threads when sensor is not installed | page 67 |
| | R23 | Brass | Protects thermowell threads when sensor is not installed | page 67 |

Vent hole

| Code | | Description | Details | Ref. page |
|------|-----|-------------|--|-------------------------|
| | R11 | Vent hole | Allows for the venting of a thermowell | page 67 |


Non-standard bore diameter (d)

| Code | Description | Details | Image | Ref. page |
|------|------------------|-----------------------------|---|-----------|
| D01 | 0.276-in./7.0 mm | Default = 0.26-in. (6.6 mm) |  | page 70 |
| D05 | 0.354-in./9.0 mm | | | page 70 |
| D07 | 0.256-in./6.5 mm | | | page 70 |
| D08 | 0.315-in./8.0 mm | | | page 70 |
| D09 | 0.335-in./8.5 mm | | | page 70 |

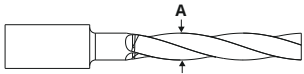
Note

D01 and D07 are the only bore diameter codes compatible with the standard stem diameter (0.75-in./ 19.05 mm). D01, D05, D07, D08, and D09 are compatible with the larger root diameter (0.875-in./ 22.23 mm).

Non-standard tip thickness (t)

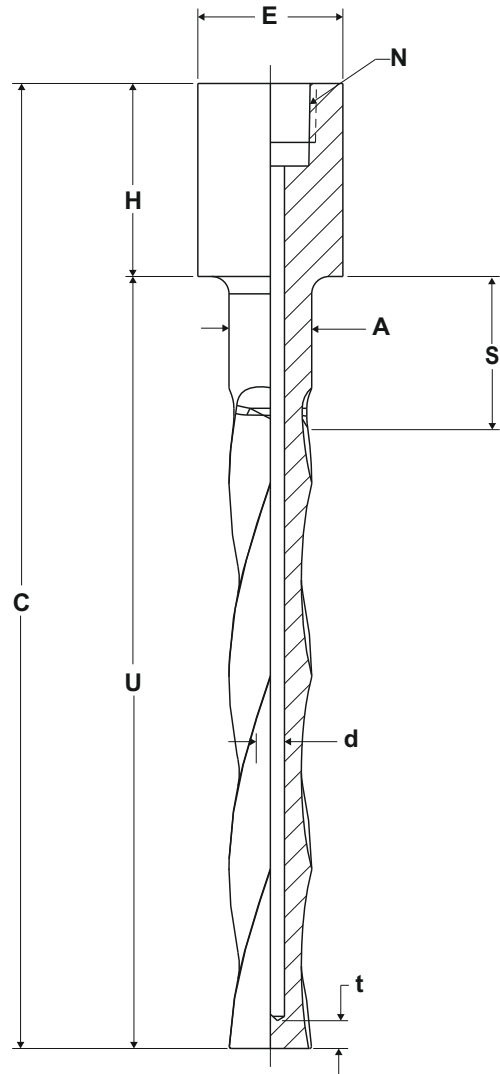
| Code | Description | Details | Image | Ref. page |
|------|------------------|------------------------------|---|-----------|
| T01 | 0.197-in./5.0 mm | Standard = 0.25-in. (6.4 mm) |  | page 70 |
| T02 | 0.236-in./6.0 mm | | | page 70 |

Root diameter (A)

| Code | Description | Details | Image | Ref. Page |
|------|--|---------------------------------|---|-----------|
| A087 | 0.875-in. if ordering in English units (E) | Standard root diameter 0.75-in. |  | N/A |
| A220 | 22.23 mm if ordering in Metric units (M) | Standard root diameter 19.05 mm | | |

Socket weld thermowell drawings

Figure 17: Socket Weld Thermowells



- | | |
|-------------------------------|--------------------------------|
| A Root diameter | N Instrument connection |
| C Total length (U + H) | P Process connection |
| d Bore diameter | S Shielded length |
| E Socket size | t Tip thickness |
| F Stub thickness | U Immersion length |
| H Head length | |

Table 4: Socket Weld Mount Thermowell

| Code | Code W, socket weld mounting style | Socket size ⁽¹⁾ | Stem diameter ⁽¹⁾ |
|------|------------------------------------|----------------------------|------------------------------|
| | Process connection | | |
| AA | ¾-in. pipe | 1.05 (26.67) | .75 (19.05) |
| AB | 1-in. pipe | 1.32 (33.40) | .75 (19.05) |
| AC | 1 ¼-in. pipe | 1.66 (42.16) | .75 (19.05) |
| AD | 1 ½-in. pipe | 1.90 (48.26) | .75 (19.05) |

(1) Dimensions are in inches (millimeters).

Ordering information detail

Dimension units

Back to [Threaded ordering information](#)

Back to [Flanged ordering information](#)

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Back to [Socket Weld ordering information](#)

The Rosemount 114C Thermowell has the flexibility to be specified in either inches (E) or millimeters (M).

English units (inches)

If English is selected, all lengths will be in inches.

Metric

If metric is selected, all lengths will be in millimeters.

Immersion length (U)

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Back to [Van Stone ordering information](#)

Back to [Socket Weld ordering information](#)

The immersion length normally refers to the length of the thermowell stem beginning underneath the process connection to the tip of the thermowell. This length is typically specified by the process designer but the general rule is at least one-third or one-half the pipe diameter. Thermowells longer than 42-in. will be required to have an internal pressure test (Q85) performed to ensure the internal cavity integrity has not been compromised. Parallel thread thermowells have a U length that actually includes the process threads thus requiring an extra 1-in. (25 mm) for min. U length.

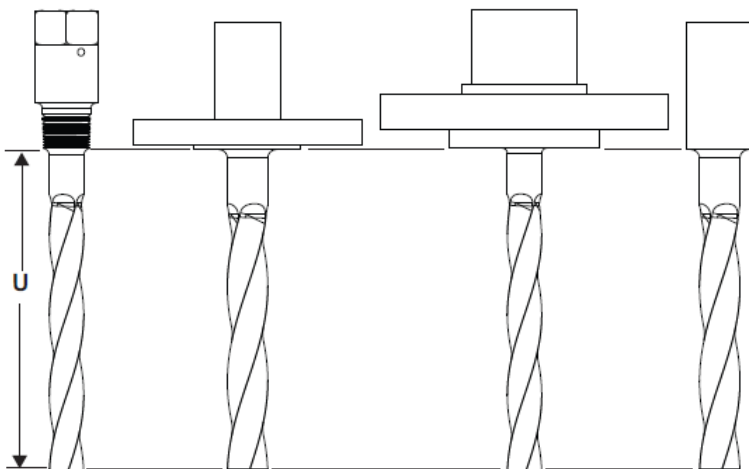


Table 5: Minimum Immersion Length by Profile Style

| Profile | Minimum length |
|---------|----------------|
| Twisted | 2-in. (50 mm) |

Thermowell material

Back to [Threaded ordering information](#)

Back to [Flanged ordering information](#)

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Back to [Socket Weld ordering information](#)

The material of construction is typically the first consideration in choosing a thermowell for any given application. Three factors affect the choice of material:

1. Chemical compatibility with the process media to which the thermowell will be exposed.
2. Temperature limits of the material.
3. Compatibility with the process piping material to ensure solid, non-corroding welds and junctions.

It is important the thermowell conforms to the design specs of the pipe or vessel it will be inserted into to ensure structural and material compatibility. The original process design most likely included temperature, pressure, and corrosive considerations as well as cleaning procedures, agency approvals required, and conformance with codes or standards. Since an installed thermowell essentially becomes part of the process, these original design considerations also apply to the thermowell and will drive the thermowell material of construction and mounting type selection. International pressure vessel codes are explicit about the types of materials and methods of construction allowed.

Table 6: Thermowell Materials

| Code | Thermowell material | Flange material | Code | Thermowell material | Flange material |
|-------------------|--|--|------|---|--|
| SC | 316/316L SST UNS S31600/S31603 ASTM A479 DIN 1.4401/1.4404 EN 10272 | 316/316L SST UNS S31600/S31603 ASTM A182 or A240 DIN 1.4401/1.4404 EN 10222-5 | DS | Super duplex UNS S32750 ASTM A479 DIN 1.4410 EN 10272 | Super duplex UNS S32750 ASTM A182 GR F53 or A240 DIN 1.4410 EN 10222-5 |
| SD ⁽¹⁾ | 316/316L SST dual rated (NORSOK) UNS S31600/S31603 ASTM A479 NORSOK M-630 MDS S01 | 316/316L SST dual rated (NORSOK) ⁽¹⁾ UNS S31600/S31603 ASTM A182 NORSOK M-630 MDS S01 | SP | 347 SST UNS S34700 ASTM A479 DIN 1.4550 | 347 SST UNS S34700 ASTM A182 or A240 DIN 1.4550 |
| SF | 304/304L SST UNS S30400/S30403 ASTM A479 DIN 1.4301/1.4306 EN 10272 | 304/304L SST UNS S30400/S30403 ASTM A182 or A240 DIN 1.4301/1.4306 EN 10222-5 | AB | Alloy B3 UNS N10675 ASTM B335 DIN 2.4600 | Alloy B3 UNS N10675 ASTM B333 or ASTM B462 DIN 2.4600 |
| SG | 316Ti SST UNS S31635 ASTM A479 DIN 1.4571 EN 10272 | 316Ti SST UNS S31635 ASTM A182 DIN 1.4571 EN 10222-5 | AC | Alloy C-276 UNS N10276 ASTM B574 DIN 2.4600 | Alloy C-276 UNS N10276 ASTM B462 or B575 DIN 2.4600 |
| SH ⁽²⁾ | 316/316L SST with TANTALUM sheath UNS S31600/S31603 ASTM A479 DIN 1.4401/1.4404 EN 10272 | 316/316L SST with TANTALUM sheath UNS S31600/S31603 ASTM A182 or A240 DIN 1.4401/1.4404 EN 10222-5 | AD | Alloy C-4 UNS N06455 ASTM B574 DIN 2.4819 | 304/304L SST UNS S30400/S30403 ASTM A182 or A240 DIN 1.4301/1.4306 |
| | Tantalum sheath UNS R05252 | | AE | Alloy C-22 UNS N06022 ASTM B574 DIN 2.4602 | 304/304L SST UNS S30400/S30403 ASTM A182 or A240 DIN 1.4301/1.4306 |

Table 6: Thermowell Materials (continued)

| Code | Thermowell material | Flange material | Code | Thermowell material | Flange material |
|------|--|--|------|---|---|
| SJ | 316/316L SST with PFA coating UNS S31600/S31603 ASTM A479 DIN 1.4401/1.4404 EN 10272 | 316/ 316L SST with PFA coating UNS S31600/S31603 ASTM A182 or A240 DIN 1.4401/1.4404 EN 10222-5 | AF | Alloy C-22 UNS N06022 ASTM B574 DIN 2.4602 | 316/316L SST UNS S31600/S31603 ASTM A182 or A240 DIN 1.4401/1.4404 |
| SK | 304/304L SST with PTFE coating UNS S30400/S30403 ASTM A479 DIN 1.4301/1.4306 EN 10272 | 304/304L SST with PTFE coating UNS S30400/S30403 ASTM A182 or A240 DIN 1.4301/1.4306 EN 10222-5 | AG | Alloy 20 UNS N08020 ASTM B473 DIN 2.4660 | Alloy 20 UNS N08020 ASTM B462 or B463 DIN 2.4660 |
| SL | 310 SST UNS S31008 ASTM A479 DIN 1.4845 | 310 SST UNS S31008 ASTM A182 or A240 DIN 1.4845 | AH | Alloy 400 UNS N04400 ASTM B164 DIN 2.4360 | Alloy 400 UNS N04400 ASTM B564 or B127 DIN 2.4360 |
| SM | 321 SST UNS S32100 ASTM A479 DIN 1.4541 EN 10272 | 321 SST UNS S32100 ASTM A182 or A240 DIN 1.4541 EN 10222-5 | AJ | Alloy 400 UNS N04400 ASTM B164 DIN 2.4360 | 304/304L SST UNS S30400/S30403 ASTM A182 or A240 DIN 1.4301/1.4306 |
| SN | 321H SST UNS S32109 ASTM A479 DIN 1.4878 | 321H SST UNS S32109 ASTM A182 or A240 DIN 1.4878 | AK | Alloy 600 UNS N06600 ASTM B166 DIN 2.4816 | Alloy 600 UNS N06600 ASTM B564 or B168 DIN 2.4816 |
| SR | 904L SST UNS N08904 ASTM A479 DIN 1.4539 | 904L SST UNS N08904 ASTM A240 DIN 1.4539 | AL | Alloy 600 UNS N06600 ASTM B166 DIN 2.4816 | 304/304L SST UNS S30400/S30403 ASTM A182 or A240 DIN 1.4301/ 1.4306 |
| AN | Alloy 625 UNS N06625 ASTM B446 DIN 2.4856 | Alloy 625 UNS N06625 ASTM B443 or B564 DIN 2.4856 | AM | Alloy 601 UNS N06601 ASTM B166 DIN 2.4851 | Alloy 601 UNS N06601 ASTM B168 or B564 DIN 2.4851 |
| AP | Alloy 800 UNS N08800 ASTM B408 DIN 1.4876 | Alloy 800 UNS N08800 ASTM B409 or B564 DIN 1.4876 | DU | Duplex 2205 UNS S31803 ASTM A479 DIN 1.4462 EN 10272 | Duplex 2205 UNS S31803 ASTM A182 GR F51 or A240 DIN 1.4462 EN 10222-5 |
| MO | Molybdenum 16 MO 3 DIN 1.5415 EN 10273 | Molybdenum 16 MO 3 DIN 1.5415 EN 10273 | CC | Chrome-Moly Grade F-91 UNS K90901 ASTM A182 DIN 1.4903 | Chrome-Moly Grade F-91 UNS K90901 ASTM A182 GR F-9, A217 GR C12A, or A387 GR 91 CL2 DIN 1.4903 EN 10222-2 |
| AQ | Alloy 800H/HT UNS N08810/N08811 ASTM B408 DIN 1.4959 | Alloy 800H/HT UNS N08810/N08811 ASTM B409 or B564 DIN 1.4959 | NK | Nickel 200 UNS N02200 ASTM B160 DIN 2.4066 | Nickel 200 UNS N02200 ASTM B162 or B564 DIN 2.4066 |

Table 6: Thermowell Materials (continued)

| Code | Thermowell material | Flange material | Code | Thermowell material | Flange material |
|------|--|--|-------------------|---|--|
| AR | Alloy 825 UNS N08825 ASTM B425 DIN 2.4858 | Alloy 825 UNS N08825 ASTM B424 or B564 DIN 2.4858 | CA | Chrome-Moly Grade B-11 UNS K11797 ASTM A739 GR B-11 DIN 1.7335 EN 10273 | Chrome-Moly Grade F-11 UNS K11572 ASTM A182 GR F-11 CL2 or A387 GR11 CL2 DIN 1.7335 EN 10222-2 |
| AU | Alloy C-22 UNS N06022 ASTM B574 DIN 2.4602 | Alloy C-22 UNS N06022 ASTM B567 or B575 DIN 2.4602 | CB | Chrome-Moly Grade B-22 UNS K21390 ASTM A739 GR B-22 DIN 1.7380 EN 10273 | Chrome-Moly Grade F-22 UNS K21590 ASTM A182 GR F-22 CL3, A217 GR WC9, or A387 GR22 CL2 DIN 1.7380 |
| AS | Alloy F44 Mo6 UNS S31254 ASTM A479 DIN 1.4547 | Alloy F44 Mo6 UNS S31254 ASTM A182 or A240 DIN 1.4547 | DT ⁽¹⁾ | Super duplex (NORSOK) UNS S32750 ASTM A479 NORSOK M-630 MDS D57 | Super duplex (NORSOK) UNS S32750 ASTM A182 GR F53 NORSOK M-630 MDS D54 |
| CS | Carbon steel UNS K03504 ASTM A105 DIN 1.0402 | Carbon steel UNS K03504 ASTM A105, A216 GR WCB, or A515 GR 70 DIN 1.0402 | DV ⁽¹⁾ | Duplex 2205 (NORSOK) UNS S31803 ASTM A479 NORSOK M-630 MDS D47 | Duplex 2205 (NORSOK) UNS S31803 ASTM A182 GR F51 NORSOK M-630 MDS D44 |
| TT | Titanium grade 2 UNS R50400 ASTM B348 GR 2 DIN 3.7035 | Titanium grade 2 UNS R50400 ASTM B381 GR 2 DIN 3.7035 | | | |

(1) Material supplier qualified per NORSOK M-650; material qualified per NORSOK M-630.

(2) Sheath thickness = 0.01-in. (0.38 mm).

Head length (H)

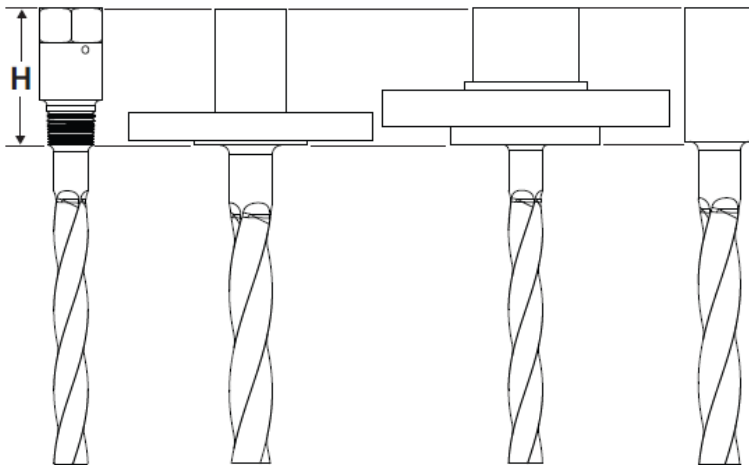
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Head length is the distance from the bottom of the process connection to the top of the thermowell. Each style has a minimum head length; the length specified must meet or exceed that minimum. It is shown below for all process connection styles.



Note

The industry standard minimum head length for flanged and Van Stone thermowells with connections under Class 900 (ASME B16.5) is 2.25-in. (60 mm).

Table 7: Recommended Minimum Head Length

Dimensions are in inches (millimeters).

| Process connection | Minimum head length (H) |
|--------------------|-------------------------|
| Threaded | 1.75 (45) |
| Socket Weld | |

Table 8: Recommended Minimum Head Length by Connection Class for ASME B16.5

Dimensions are in inches (millimeters).

| Connection size | Connection class | | | | |
|-------------------------|------------------|-----------|-----------|-----------|-----------|
| | 150 | 300 | 400/600 | 900/1500 | 2500 |
| Flanged | | | | | |
| ¾ | N/A | 1.75 (45) | N/A | N/A | N/A |
| 1 | 1.75 (45) | 2.00 (50) | 2.00 (50) | 2.50 (65) | N/A |
| 1 ½ | 1.75 (45) | 2.00 (50) | 2.00 (50) | 2.50 (65) | 3.00 (75) |
| 2 | 1.75 (45) | 2.00 (50) | 2.00 (50) | 2.75 (70) | 3.25 (80) |
| 3 | 2.00 (50) | N/A | N/A | N/A | N/A |
| 4 | 2.00 (50) | N/A | N/A | N/A | N/A |
| 6 | 2.00 (50) | N/A | N/A | N/A | N/A |
| Flanged with RTJ | | | | | |
| ¾ | N/A | 2.00 (50) | N/A | N/A | N/A |
| 1 | 1.75 (45) | 2.00 (50) | 2.00 (50) | 2.50 (65) | N/A |
| 1 ½ | 2.00 (50) | 2.00 (50) | 2.00 (50) | 2.50 (65) | 3.25 (80) |
| 2 | 2.00 (50) | 2.00 (50) | 2.00 (50) | 2.75 (70) | 3.50 (85) |
| 3 | 2.25 (60) | N/A | N/A | N/A | N/A |
| 4 | 2.25 (60) | N/A | N/A | N/A | N/A |
| 6 | 2.25 (60) | N/A | N/A | N/A | N/A |

Table 8: Recommended Minimum Head Length by Connection Class for ASME B16.5
(continued)

| Connection size | Connection class | | | | |
|---------------------------|------------------|------------|----------------|-----------------|-------------|
| | 150 | 300 | 400/600 | 900/1500 | 2500 |
| Van Stone | | | | | |
| 1 | 1.75 (45) | 1.75 (45) | 1.75 (45) | 2.00 (50) | 2.25 (60) |
| 1 ½ | 1.75 (45) | 1.75 (45) | 1.75 (45) | 2.25 (60) | 2.75 (70) |
| 2 | 1.75 (45) | 1.75 (45) | 2.00 (50) | 2.75 (70) | 3.25 (80) |
| Van Stone with RTJ | 150 | 300 | 400/600 | 900/1500 | 2500 |
| 1 | 1.75 (45) | 1.75 (45) | 2.25 (60) | 2.25 (60) | 2.50 (65) |
| 1 ½ | 1.75 (45) | 2.00 (50) | 2.00 (50) | 2.50 (65) | 3.00 (75) |
| 2 | 1.75 (45) | 2.00 (50) | 2.25 (60) | 3.00 (75) | 3.50 (90) |

Instrument connection

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| Thread | Specification |
|----------------|---------------------------------|
| ½-14 NPT | SAE-AS 71082 |
| ½-14 NPSM | ASME B1.20.1, 8 threads minimum |
| M18 x 1.5p | BS 3643 |
| M20 x 1.5p | |
| G ½ in. (BSPF) | ISO 228/1 (BS 2779) |

Sensor/thermowell assemble to options (XT, XW)

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XT

This option is selected when a Rosemount 214C Sensor is ordered with the Rosemount 114C Thermowell. This ensures the sensor is threaded into the thermowell, but only hand tightened.

XW

This option is selected when a Rosemount 214C Sensor is ordered with the Rosemount 114C Thermowell. This ensures the sensor is threaded into the thermowell and torqued for a process-ready installation.

Shielded length (Sxxx)

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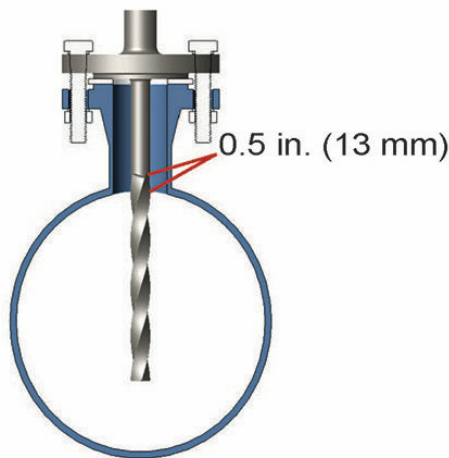
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This option refers to the length of the untwisted part of the thermowell. Only the immersed portion of the thermowell needs to be twisted. For installation best practices, it is recommended that the twisted portion extends 0.5 in. (13 mm) into nozzle or standoff as shown in the [Figure 18](#). If the Sxxx option is not selected the following default lengths in the table below will be used.

Table 9: Shielded Length

| Code | Description | Default /min S Length |
|----------------------|--------------------------|-----------------------|
| TAB | Threaded ¾-14 ANPT | 0.5 in. (12.7 mm) |
| TAC | Threaded 1-11.5 ANPT | |
| TAF | ¾-in. BSPT | |
| TAG | 1-in. BSPT | |
| WAA | Socket Weld ¾-in. pipe | |
| WAB | Socket Weld 1-in. pipe | |
| TDB | M24 x 1.5 | 1.3 in. (33 mm) |
| TDC | M27 x 2 | |
| TDD | M33 x 2 | |
| TDF | ¾-in. BSPF (G ¾) | |
| TDG | 1-in. BSPF (G 1) | |
| TAD | Threaded 1 ½ - 11.5 ANPT | 1 in. (25.4 mm) |
| WAC | Socket Weld 1 ¼-in. pipe | |
| WAD | Socket Weld 1 ½-in. pipe | |
| Flanged or Van Stone | | 2.5 in. (63.5 mm) |

Figure 18: Recommended Installation



Extended product warranty (WR3, WR5)

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The extended product warranty options are available in three or five-year coverage plans. In the model string, order option codes WR3 for a three-year extended warranty or WR5 for a five-year warranty. This coverage is an extension of the manufacturer's limited warranty and states that the goods manufactured or services provided by seller will be free from defects in materials or workmanship under normal use and care until the expiration of the applicable warranty period.

Thermowell calculation (R21)

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Thermowell calculations for the Twisted Square only consists of the Static Stress and Pressure Limit criteria as it is called out by the ASME PTC 19.3 TW. In addition, the suitability of the thermowell material for the process environment must be considered. This means the designer must evaluate how corrosion and erosion affects the thermowell as well as how exposure to the process conditions affects material properties.

For detailed information about this standard, refer to the Twisted Square White Paper. Emerson advises that all thermowells should have a thermowell calculation performed to ensure they are suitable for the process conditions in their application. Emerson assumes that the customer has either done their own calculations or understands the risks of not having calculations done if this option is not requested.

NACE certification (Q35)

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This option certifies that thermowell materials used are compliant to NACE MR0175/ISO 15156 and NACE MR0103. The material certification provided will list compliance to the referenced standard.

| Material code | Certified material |
|---------------|--------------------------------|
| SC | 316/316L Dual rated SST |
| SD | 316/316L Dual rated SST NORSOK |
| SF | 304/304L Dual rated SST |
| SL | 310 SST |
| SM | 321 SST |
| AB | Alloy B3 |
| AC | Alloy C-276 |
| AG | Alloy 20 |

| Material code | Certified material |
|---------------|---------------------------------------|
| AH | Alloy 400 |
| AK | Alloy 600 |
| CA | Chrome-Moly Grade B-11/F-11 Class II |
| CB | Chrome-Moly Grade B-22/F-22 Class III |
| DT | Super Duplex NORSOK |
| DV | Duplex 2205 NORSOK |

PMI testing (Q76)

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Positive Material Identification (PMI) is a test that verifies the thermowell material is as specified by the Rosemount 114C model code. X-ray/radiograph fluorescence (XRF) is used to provide elemental analysis in a nondestructive manner. The certificate will provide PMI results in comparison with the applicable material standards for each individual thermowell and state the reference standard. Two points are provided on flanges. All other thermowell components (including welds) will have a single point. XRF will not detect carbon in steels. PMI can be marked on the thermowell by choosing option R40. Due to type of technology used, carbon steel material is exempt from this testing.

Material certification (Q8)

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Material certificate and traceability in accordance with EN 10204 Type 3.1 Inspection Certificate. The certificate provided will document the heat code, chemical analysis, and testing required by material standards.

| Material | Material codes | Charpy temperature | Acceptance impact value |
|----------------|--|--------------------|--|
| Duplex | DS – Super duplex DU – Duplex | -58 °F (-50 °C) | Average: 45 J (33 ft-lb) Minimum: 35 J (26 ft-lb) |
| 300 Series SST | SC – 316/316L SST SF – 304/304L SM – 321 SST | -321 °F (-196 °C) | Average: 60 J (44 ft-lb) Minimum: 55 J (41 ft-lb) |

Surface finish certification (Q16)

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Thermowell surface finish is typically done to remove all the burrs and sharp edges which smooths the thermowell stem surface. The Rosemount 114C comes with a standard surface finish of T32 μ in. CLA N6 (0.8 μm Ra) or better. This option provides a certificate that documents the maximum surface finish reading for stem and flange (when applicable) and a pass/fail statement. Improved surface finish options are also available for the Rosemount 114C (see option R20).

Electropolish (R20)

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The electropolish process uses a combination of electrical current and chemicals to improve the surface finish. The surface will appear shiny and polished. It can have an advantage over mechanical polishing because there is no cold work involved that can lead to scratches, strains, metal debris, and embedded abrasives on the surface. An improved surface finish will increase corrosion resistance and make the thermowell easier to clean. This is common in sanitary applications.

External hydrostatic pressure test (Q5)

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Thermowells are tested at room temperature for 10 minutes. Water is certified to have a chlorine content of less than 30 ppm. The certificate will document the chlorine content, hydrostatic test pressure level, duration, and test results. The pressure rating (in psi) for the different thermowell mounting styles is given below.

Flanged and Van Stone

Hydrostatic pressure test levels are in accordance with ASME B16.5. When the table below and the standard conflict, the standard shall govern.

| Flange class (lb.) | Thermowell material (psi) | | | | |
|--------------------|---------------------------|------|-----------------------------------|------|------------------------------------|
| | NK | AH | SA through SM, AD, AE, AF, AJ, AL | CS | AG, AK, CA, AB, AC, CB, CC, DU, DS |
| 150 | 300 | 350 | 425 | 450 | 450 |
| 300 | 725 | 900 | 1100 | 1125 | 1125 |
| 600 | 1450 | 1800 | 2175 | 2225 | 2250 |
| 1500 (900) | 3600 | 4500 | 5400 | 5575 | 5625 |
| 2500 | 6000 | 7500 | 9000 | 9275 | 9375 |

Threaded thermowells

1500 psi

Internal hydrostatic pressure test (Q85)

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This test is performed at room temperature for a minimum of 10 minutes to 3000 PSI. The water used here is certified to ensure a chloride content of less than 30 PPM. The certificate provided will document the chloride content, hydrostatic test level, duration, and results. Thermowells longer than 42-in. will be required to have an internal pressure test (Q85) performed to ensure the internal cavity integrity has not been compromised.

Canadian registration number (Q17)

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Any pressure vessel, piping system, or fitting used in Canada is required by law to have a CRN (Canadian Registration Number). This ensures all pressure vessels, piping systems, and fittings are built under appropriate quality control programs. This CRN is for all Canadian provinces but the end destination province still needs to be known during the order process.

| Material code | CRN approved material |
|---------------|---------------------------------------|
| SC | 316/316L Dual rated |
| SF | 304/304L Dual rated |
| SL | 310 SST |
| SM | 321 SST |
| SN | 321H SST |
| SP | 347 SST |
| SR | 904L SST |
| AB | Alloy B3 |
| AC | Alloy C-276 |
| AG | Alloy 20 |
| AH | Alloy 400 |
| AJ | Alloy 400 (with 304/304L SST flange) |
| AK | Alloy 600 |
| AL | Alloy 600 (with 304 SST flange) |
| AM | Alloy 601 |
| AN | Alloy 625 |
| AP | Alloy 800 |
| AQ | Alloy 800H/HT |
| AR | Alloy 825 |
| AS | Alloy F44 Mo6 |
| AU | Alloy C-20 |
| CA | Chrome-Moly Grade B-11/F-11 Class II |
| CB | Chrome-Moly Grade B-22/F-22 Class III |
| CC | Chrome-Moly Grade F-91 |

| Material code | CRN approved material |
|---------------|-----------------------|
| CS | Carbon Steel (A-105) |
| TT | Titanium Grade 2 |
| DU | Duplex 2205 |

Dye penetration test (Q73)

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Dye or liquid penetration testings are performed by ASME Level II or III trained inspectors. These tests are all done in accordance to ASME Section V, Article 6 with an acceptance criteria per ASME Section III, Div 1 NB-2546. The certificate will document the inspectors name, dye penetration acceptance criteria, and test result.

Special cleaning (Q6)

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Special cleaning for oxygen/special service to be performed in accordance to ASTM G93. The procedure to be qualified using ASTM G93 Type II quantitative tests. The documentation provided for this test will have a compliance statement to ASTM G93. All cleaned thermowells will come in a sealed plastic bag to prevent contamination. Not available with carbon steel or any coated material.

Thermowell markings (R40)

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This option provides the ability to have certain test markings on the thermowell. Below are the tests available for this option.

- Q5 — external pressure tests the values and units
- Q76 — PMI will be marked on the head length portion of the thermowell and on the top of the flange if applicable

X-ray/radiograph test (Q81)

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This test involves performing an X-ray/radiograph on the weld joints to examine for any internal imperfections and is only available on full penetration flanged thermowells. Testing is done in accordance to ASME Section VIII Div 1 per UW51 and conducted by a Level 2 Inspector. The certificate provided with this option will document the results.

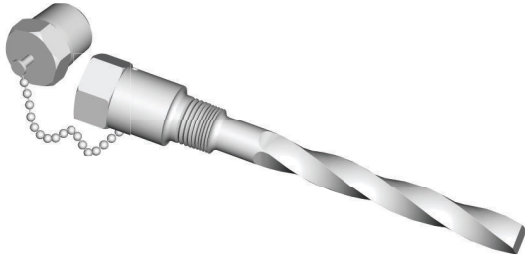
Stainless steel plug and chain (R06)

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The plug and chain are made from stainless steel. This plug is used to protect the thermowell threads when a sensor isn't installed. It also keeps elements such as rain, dust, and dirt out of the thermowell.



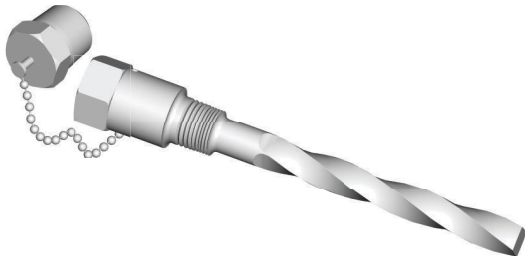
Brass plug and chain (R23)

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The plug and chain are made from brass. This plug is used to protect the thermowell threads when a sensor isn't installed. It also keeps elements such as rain, dust, and dirt out of the thermowell.



Vent hole (R11)

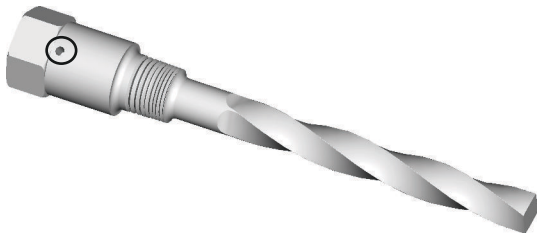
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The vent hole allows for the venting of a thermowell. Vent or weep holes are often used to prevent gas buildup in certain applications. This option is useful in applications where gas build up is a concern. Process fluid leakage from the vent hole is an indicator of thermowell failure.

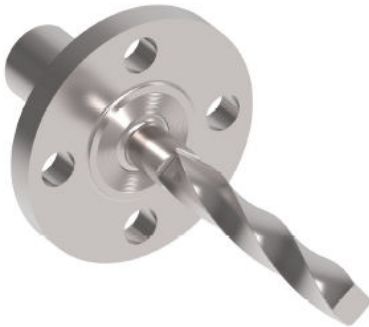


Flange face – concentric serrations (R09)

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This option changes the flange face so it has concentric serrations covering the wetted portion of the flange raised face. It is installed with an inside bolt circle (IBC) gasket/ring gasket, which extends to and is centered by the bolts. This flange face is designed per the ASME B16.5 standard.



Flange face – flat (R10)

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This option changes the flange face so it has no raised section on the wetted portion of the flange face. The flat face is finished with spiral serrations. This style is frequently used where the mating flange is made from a casting or fragile material. It can be installed with ring gaskets or full face gaskets that extend past the bolt holes. This flange face is designed per the ASME B16.5 standard.

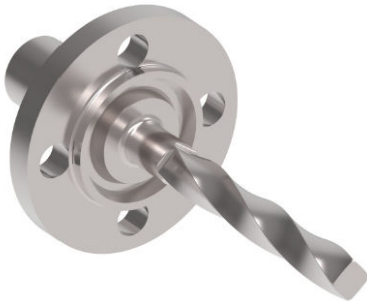


Flange face – RTJ (R16)

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This option changes the flange face so it has a ring type joint (RTJ). The RTJ flange face is common for high pressure applications using Class 600 flanges or higher. Both mating flanges have grooves that can accept a RTJ gasket which is usually made of solid metal. This flange face is designed per the ASME B16.5 standard.

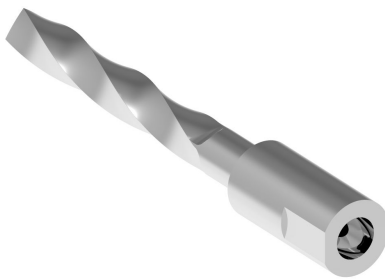


Thermowells with wrench flats (R37)

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This option only applies to threaded thermowells made from exotic materials. By default, these thermowells are made with two wrench flats; this option must be selected to get hex (6) wrench flats.

Standard



Option R37



Table 10: Exotic Materials

| Code | Material | Code | Material | Code | Material |
|------|-------------|------|---------------------------------------|------|-----------------------------|
| AB | Alloy B3 | AK | Alloy 600 | NK | Nickel 200 |
| AC | Alloy C-276 | CA | Chrome-Moly Grade B-11/F-11 Class II | TT | Titanium Grade 2 |
| AG | Alloy 20 | CB | Chrome-Moly Grade B-22/F-22 Class III | DS | Super duplex SST Grade F-53 |
| AH | Alloy 400 | CC | Chrome-Moly Grade F-91 | DU | Duplex 2205 Grade F-51 |

Bore diameter (d0X)

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Bore diameter (d) can be selected to accommodate different temperature sensor sizes. Time response is improved when the sensor and thermowells have a tighter fit.

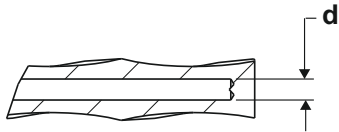


Table 11: Available Bore Diameters

| Code | Dimension |
|------|------------------|
| D01 | 0.276-in./7.0 mm |
| D05 | 0.354-in./9.0 mm |
| D07 | 0.256-in./6.5 mm |
| D08 | 0.315-in./8.0 mm |
| D09 | 0.335-in./8.5 mm |

Tip thickness (T0X)

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Tip thickness (t) is specified as the minimum thickness and measured from the top of the gun drill web as shown in the figure below:

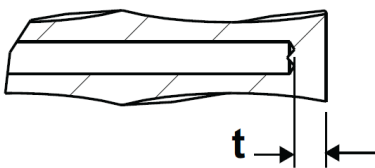


Table 12: Available Tip Thicknesses

| Code | Dimension |
|------|------------------|
| T01 | 0.197-in./5.0 mm |
| T02 | 0.236-in./6.0 mm |
| T03 | 0.252-in./6.4 mm |

Lap flange material for Van Stone design (C0X)

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This option is only available when the Van Stone (V) mounting configuration is selected. By default, a Van Stone thermowell comes with a carbon steel A105 lap flange. These options give the choice of having the thermowell ordered without a flange, with a 316/316L SST flange, or with a flange of similar material as the thermowell stem. Below are some model string examples of the standard offering and options for reference:

Example model: 114CE0030VAATSC032A – carbon steel A105 lap flange with 316/316L SST thermowell stem provided (standard)



Example model: 114CE0030VAATSC032AC01 – no lap flange, only thermowell stem provided



Example model: 114CE0030VAATSC032AC02 – changes default carbon steel A105 lap cover flange to 316/316L SST flange



Example model: 114CE0030VAATSC032AC03 – changes default cover flange to match thermowell stem material



Note

Coatings do not apply to lap flange.

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