

Rosemount™ 114C Thermowells



- Wide variety of industry standard process connections including flanged, threaded, welded, 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.

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Rosemount 114C Thermowell

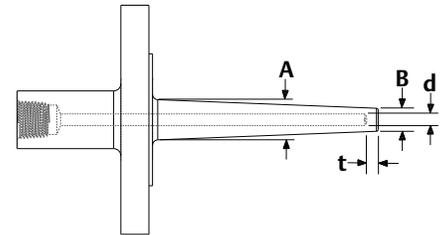
Product overview

Temperature sensors are rarely inserted directly into an industrial process. They are installed into a thermowell to isolate them from the potentially damaging process conditions of flow-induced stresses, high pressure, and corrosive chemical effects. Thermowells are closed-end metal tubes or barstock installed into the process vessel or piping and become an integral pressure-tight part of the process vessel or pipe. They permit the sensor to be quickly and easily removed from the process for calibration or replacement without requiring a process shutdown and possible drainage of the pipe or vessel.

The Rosemount 114C Thermowell is made from solid barstock to ensure strength and integrity. The Rosemount 114C was designed to accommodate a host of industry standard configurations, but has the flexibility to adapt to special configurations for different types of applications.

Flexible design modifiers accommodate many process requirements

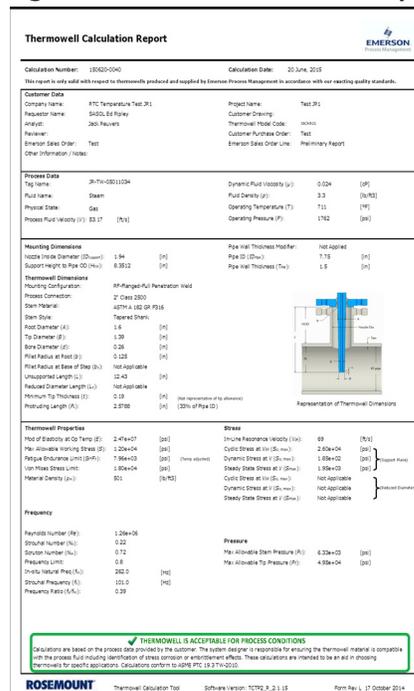
- Different sizes of root (A), tip (B), and bore (d) diameters
- Different tip (t) thickness as required
- Numerous combinations for various industrial applications
- Meet ASME PTC 19.3 TW-2016 standard with flexible design



Thermowell calculations ensure thermowell design is compatible with process conditions

- Thermowells inserted into any process are subjected to forces from the fluid flow.
- ASME released design standard PTC 19.3 TW that defines a series of qualitative calculations to determine design suitability to withstand process conditions.
- Calculations are based on process conditions, process fluid, installation method, thermowell geometry and material.
- The thermowell calculation tool from Emerson™ is designed to meet the ASME standard.
- The free online software version can be used for preliminary calculations. Click [here](#) to access the tool.
- Formal calculations by our expert team of engineers are available prior to order placement to ensure design is acceptable.
- Recommendations are also made if thermowell design is found to be unacceptable for the application.
- Order Thermowell Calculation option (R21) to receive a formal report with product shipment.

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.



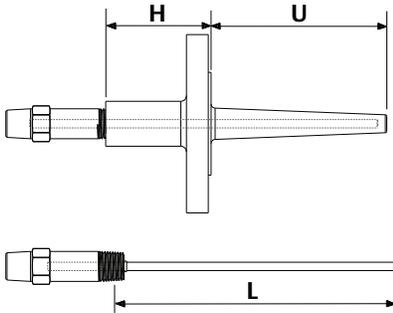
Explore the benefits of a Complete Point Solution™ from Emerson

- 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 sensor fits 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 four 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:

- 10× the thermowell root diameter for air or gas
- 5× 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. Welded, threaded, flanged, and Van Stone are standard mounting configuration options.

Thermowell stem profile

Factors to be considered when selecting a stem style include the process pressure, required response speed of the measurement, drag force of the fluid flow on the well, and the wake frequency. The stem or shank is the part of a thermowell inserted into the process piping or vessel. Straight, stepped and tapered stem styles are available. Each profile has its advantages depending on the need and situation.

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.

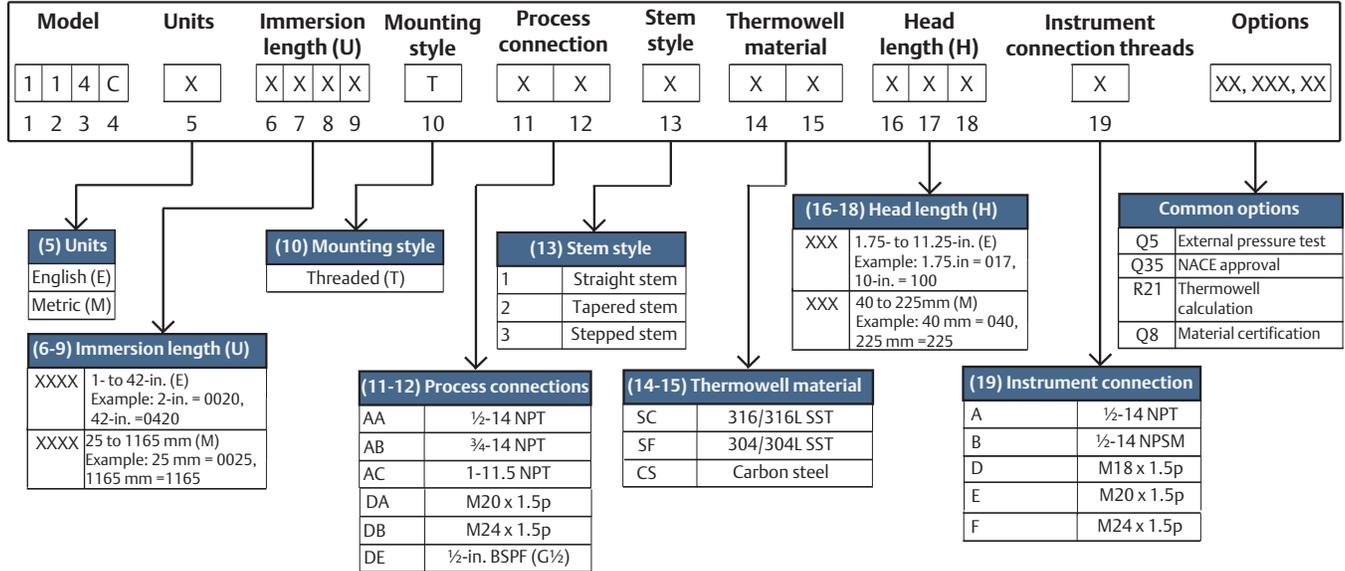
Rosemount 114C Threaded Thermowells



Threaded thermowell overview

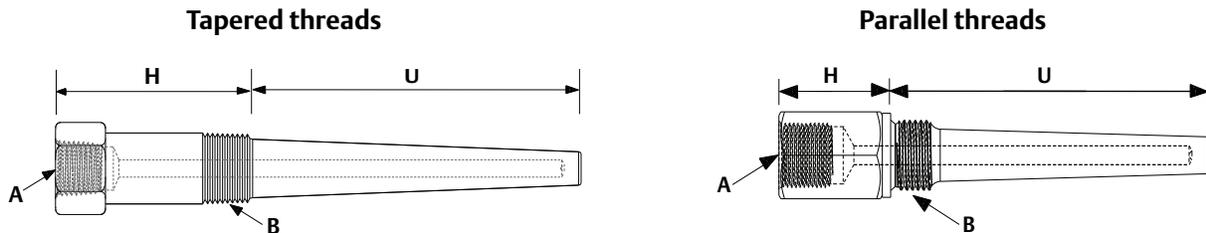
Threaded thermowells are threaded into a process pipe or tank, allowing for easy installation and removal when necessary. While this is a common mounting method, it has the lowest pressure rating of all mounting configuration options.

Figure 2. Standard Offering–Threaded



The common options shown in Figure 2 represent a partial offering; reference the [Rosemount 114C Threaded Ordering Information](#) for a full list of available options.

Figure 3. Threaded Thermowell Components



A. Instrument connection
B. Process connection

H. Head length
U. Immersion length

Note

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

Use the form below to record your model code:

| Model | | | | Units | Immersion length (U) | Mounting style | Process connection | Stem style | Thermowell material | Head length (H) | Instrument connection | Options |
|-------|---|---|---|-------|----------------------|----------------|--------------------|------------|---------------------|-----------------|-----------------------|---------|
| 1 | 1 | 4 | C | | | T | | | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 through 9 | 10 | 11 and 12 | 13 | 14 and 15 | 16 through 18 | 19 | XXXXX |

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 | 1 | 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.

Table 1. Rosemount 114C Threaded Ordering Information

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

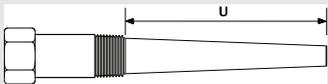
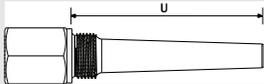
| Place #s 1-4 | Model | Details | | Ref. page |
|-----------------------|--|---|---|-----------|
| ★ 114C | Barstock temperature thermowell | Made with a standard bore diameter of 0.26-in. (6.6 mm) and tip wall thickness of 0.25-in. (6.4 mm) | | N/A |
| Place # 5 | Dimension units | | | |
| ★ E | English units (inches) | Specifies whether length units will be in inches (in) or millimeters (mm) | | 56 |
| ★ M | Metric units (mm) | | | 56 |
| Place #s 6-9 | Immersion length (U) | Tapered threads | Parallel threads | |
| | |  |  | |
| ★ xxxx | xxx.x-in., 1.00 to 100 inches in 1/4-in. increments (when ordered with dimension units code E) | Example of a 6.25-in. length where the second decimal is dropped off: 0062 | | 56 |
| ★ xxxx | xxxx mm, 25 to 2500 mm in 5 mm increments (when ordered with dimension units code M) | Example of a 50 mm length: 0050 | | 56 |
| Place # 10 | Mounting style | | | |
| ★ T | Threaded | | | N/A |
| Place #s 11-12 | Process connection | | | |
| ★ AA | 1/2-14 NPT | Tapered threads | | N/A |
| ★ AB | 3/4-14 NPT | Tapered threads | | N/A |
| ★ AC | 1-11.5 NPT | Tapered threads | | N/A |
| ★ AD | 1 1/2-11.5 NPT | Tapered threads | | N/A |
| ★ AE | 1/2-in. BSPT | Tapered threads | | N/A |

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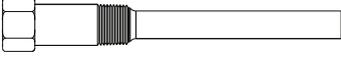
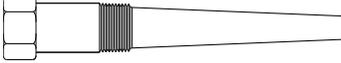
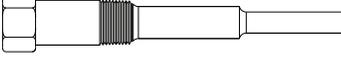
| | | | | | |
|-----------------------|----|--------------------------------------|--|--|------------------|
| ★ | AF | 3/4-in. BSPT | Tapered threads | N/A | |
| ★ | AG | 1-in. BSPT | Tapered threads | N/A | |
| ★ | DA | M20 × 1.5p | Parallel threads | N/A | |
| ★ | DB | M24 × 1.5p | Parallel threads | N/A | |
| ★ | DC | M27 × 2p | Parallel threads | N/A | |
| | DD | M33 × 2p | Parallel threads | N/A | |
| ★ | DE | 1/2-in. BSPF (G ^{1/2}) | Parallel threads | N/A | |
| ★ | DF | 3/4-in. BSPF (G ^{3/4}) | Parallel threads | N/A | |
| ★ | DG | 1-in. BSPF (G1) | Parallel threads | N/A | |
| Place # 13 | | Stem style | Details | Image | Ref. page |
| ★ | 1 | Straight | Minimum immersion length 1-in. (25 mm) - Tapered threads 1.75-in. (45 mm) - Parallel threads |  | 57 |
| ★ | 2 | Tapered | Minimum immersion length 1-in. (25 mm) - Tapered threads 1.75-in. (45 mm) - Parallel threads |  | 57 |
| ★ | 3 | Stepped | Minimum immersion length 3-in. (75 mm) - Tapered threads 3.75-in. (95 mm) - Parallel threads |  | 57 |
| Place #s 14-15 | | Thermowell material | Details | | |
| ★ | SC | 316/316L dual rated | | | 58 |
| | SD | 316/316L dual rated (NORSOK) | Must order the Q8 Material Certificate to get NORSOK documentation | | 59 |
| ★ | SF | 304/304L dual rated | | | 58 |
| ★ | CS | Carbon steel (A-105) | | | 58 |
| | SG | 316Ti SST | | | 58 |
| | SL | 310 SST | | | 58 |
| | SM | 321 SST | | | 58 |
| | AB | Alloy B3 | | | 58 |
| | AC | Alloy C-276 | | | 58 |
| | AG | Alloy 20 | | | 59 |
| | AH | Alloy 400 | | | 58 |
| | AK | Alloy 600 | | | 58 |
| | MO | Molybdenum | | | 58 |
| | CA | Chrome-Moly Grade B-11/F-11 Class II | | | 58 |

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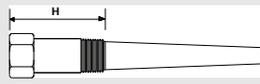
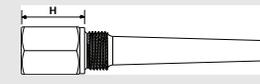
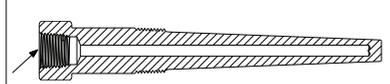
| | | | | |
|----------------------|------------------------------|---|--|------------------|
| | CB | Chrome-Moly Grade B-22/ F-22 Class III | | 58 |
| | CC | Chrome-Moly Grade F-91 | | 58 |
| | NK | Nickel 200 | | 58 |
| | TT | Titanium Grade 2 | | 58 |
| | DS | Super duplex SST Grade F-53 | | 58 |
| | DT | Super duplex SST Grade F-53 – NORSOK | Must order the Q8 Material Certificate to get NORSOK documentation | 59 |
| | DU | Duplex 2205 Grade F51 | | 58 |
| | DV | Duplex 2205 Grade F51 – NORSOK | Must order the Q8 Material Certificate to get NORSOK documentation | 59 |
| Place # 16-18 | Head length (H) | Tapered threads | | Ref. page |
| | | Parallel threads | | |
| | |  |  | |
| ★ | xxx | xx.x-in., 1.75 to 11.25 inches in 1/4-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 = 1.75-in.) | | 60 |
| ★ | 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 = 45 mm) | | 60 |
| Place # 19 | Instrument connection | Details | Image | |
| ★ | A | 1/2-14 NPT |  | 61 |
| ★ | B | 1/2-14 NPSM | | 61 |
| | C | 3/4-14 NPT | | 61 |
| | D | M18 × 1.5p | | 61 |
| | E | M20 × 1.5p | | 61 |
| | F | M24 × 1.5p | | 61 |
| | G | G 1/2-in. (BSPF) | | 61 |
| | H | G 3/4-in. (BSPF) | | 61 |
| | J | M27 × 2p | | 61 |
| | K | M14 × 1.5p | | 61 |

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Options (include with selected model number)

| Sensor/thermowell assemble to options | | | Details | Ref. page |
|---------------------------------------|-----|---|--|-----------|
| ★ | XT | Hand tight assembly of sensor and thermowell | Ensures sensor is threaded into thermowell but only hand tightened | 62 |
| ★ | XW | Process-ready assembly of sensor and thermowell | Ensures sensor is threaded into thermowell and torqued for process-ready installation | 62 |
| Extended product warranty | | | | |
| ★ | WR3 | 3-year limited warranty | This warranty option extends manufacturer's warranty to three or five years for manufacturer related defects | 62 |
| ★ | WR5 | 5-year limited warranty | | 62 |
| Thermowell calculation | | | | |
| ★ | R21 | Thermowell calculation | Set of calculations to ensure thermowells are safe in certain process conditions | 63 |
| NACE approval | | | | |
| ★ | Q35 | NACE approval | Meets MR0175/ISO 15156 and MR0103 requirements | 63 |
| PMI testing | | | | |
| | Q76 | PMI testing | Verifies chemical composition of material | 64 |
| Material certification | | | | |
| ★ | Q8 | Material certification | Certificate for material conformance and traceability in accordance with EN 10204 type 3.1 | 64 |
| Material tests | | | | |
| | M01 | Low temperature Charpy Test | Measures the low temperature ductility of the material | 64 |
| | M02 | Ultrasonic material test | Examination of steel forgings for flaws and inclusions | 65 |
| Surface finish | | | | |
| | Q16 | Certification | Certificate showing measured surface finish values | 65 |
| | R14 | Finish < Ra 0.3 μm (12 μin) | Improves surface roughness of thermowell | 65 |
| Electropolish | | | | |
| | R20 | Electropolish | Improve smoothness and surface quality | 65 |
| Hydrostatic pressure test | | | | |
| ★ | Q5 | External pressure test | Verifies structural quality and checks for leaks at thermowell process connection and stem | 66 |
| ★ | Q85 | Internal pressure test | Verifies internal structural integrity of thermowell | 66 |
| Canadian Registration Number | | | | |
| | Q17 | Canadian Registration Number | Canadian approvals for all provinces (Approved materials in reference section) | 67 |

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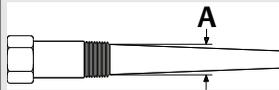
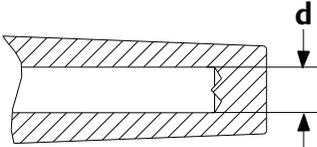
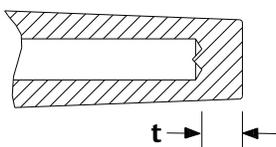
| Dye penetration test | | Details | Ref. page |
|--------------------------------------|--|---|------------------|
| ★ Q73 | Dye penetration test | Checks quality of material | 67 |
| Wall thickness test | | | |
| Q83 | Ultrasonic test | Checks the bore concentricity of the thermowell | 68 |
| Special cleaning | | | |
| Q6 | Special cleaning | Oxygen enriched environment cleaning per ASTM G93 | 68 |
| Thermowell markings | | | |
| R40 | Test markings on thermowell | External marking of the thermowell for specific tests (see reference page for list of tests) | 68 |
| Spherical tip | | | |
| R60 | Spherical tip | Changes the flat tip to spherical | 69 |
| Vent hole | | | |
| R11 | Vent hole | Allows for the venting of a thermowell and for indication that thermowell structural integrity has been compromised | 70 |
| Thermowells with wrench flats | | | |
| R37 | Thermowells with wrench flats | Converts the two wrench flats to hex wrench flats; only applies to exotic materials | 75 |
| Root diameter (A) | |  | |
| Axxx | x.xx-in., 0.36 to 3.15 inches in 0.01-in. increments (when ordered with dimension units code E) Examples: Code A040 = 0.4-in., Code A315 = 3.15-in. | | 76 |
| Axxx | xx.xx mm, 10 to 80 mm in 0.5 mm increments (when ordered with dimension units code M) Examples: Code A100 = 10.0 mm, Code A755 = 75.5 mm | | 76 |
| Tip diameter (B) | |  | |
| Bxxx | x.xx-in., 0.36 to 1.83 inches in 0.01-in. increments (when ordered with dimension units code E) Examples: Code B040 = 0.4-in., Code B180 = 1.80-in. | | 77 |
| Bxxx | xx.xx mm, 10 to 46 mm in 0.5-mm. increments (when ordered with dimension units code M) Examples: Code B100 = 10.0 mm, Code B455 = 45.5 mm | | 77 |

Table 1. Rosemount 114C Threaded Ordering Information

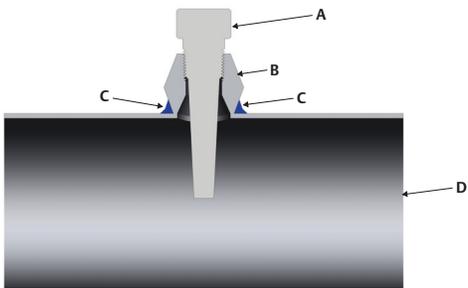
The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

| Non-standard bore diameter (d) | | Details | Image | Ref. page |
|--------------------------------|-------------------|-----------------------------|--|-----------|
| D01 | 0.276-in./7.0 mm | Default = 0.26-in. (6.5 mm) |  | 78 |
| D03 | 0.138-in./3.5 mm | | | 78 |
| D04 | 0.386-in./9.8 mm | | | 78 |
| D05 | 0.354-in./9.0 mm | | | 78 |
| D06 | 0.433-in./11.0 mm | | | 78 |
| Non-standard tip thickness (t) | | | | |
| T01 | 0.197-in./5.0 mm | Default = 0.25-in. (6.4 mm) |  | 78 |
| T02 | 0.236-in./6.0 mm | | | 78 |

Threaded installation

Threaded thermowells are screwed into the process using a threaded fitting or directly into a tapped pipe if there is sufficient wall thickness. Tapered threads will deform to each other to create a seal. Thread sealant and appropriate torque should be applied to reduce risk of leaks.

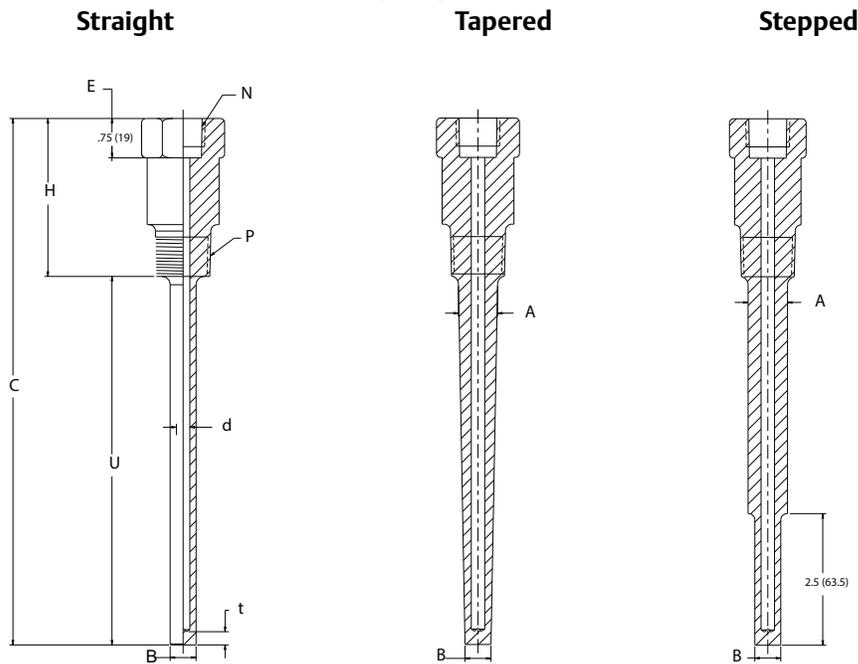
Figure 5. Installation Components



- A. Thermowell
- B. Threaded fitting
- C. Weld
- D. Process

Threaded thermowell drawings

Figure 6. Thread Mount Thermowell Drawings (Tapered Thread)⁽¹⁾



A. Root diameter
 B. Tip diameter
 C. Total length (U + H)
 E. Wrench allowance
 F. Thread allowance
 H. Head length

N. Instrument connection
 P. Process connection
 U. Immersion length
 d. Bore diameter
 t. Tip thickness

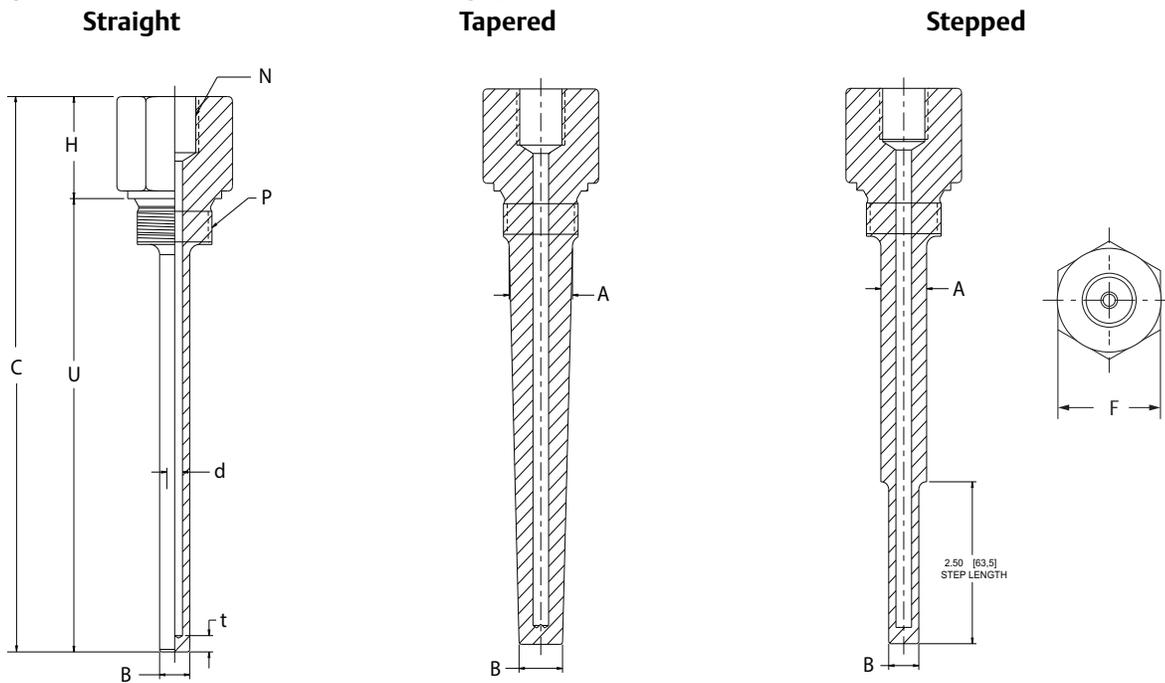
Table 2. Thread Mount Thermowells (Tapered Thread)⁽¹⁾

| Code | Code T, threaded mounting style | Wrench flat size "C" | | Root diameter stepped stem | Root diameter tapered stem | Tip diameter tapered stem | Root diameter straight stem | Thread specification |
|------|---------------------------------|-----------------------|------------------------|----------------------------|----------------------------|---------------------------|-----------------------------|--|
| | Process connection "P" | Metric units (code M) | English units (code E) | | | | | |
| AA | 1/2-14 NPT | 1.18 (30) | 1 1/8 (28.6) | 0.67 (17) | 0.67 (17) | 0.50 (12.7) | 0.669 (17) | NPT per SAE-AS 71051 (reference PS-71) |
| AB | 3/4-14 NPT | 1.18 (30) | 1 1/8 (28.6) | 0.75 (19) | 0.89 (22.5) | 0.63 (16) | 0.71 (18) | |
| AC | 1-11.5 NPT | 1.34 (34) | 1 1/4 (31.8) | 0.85 (21.5) | 1.04 (26.5) | 0.71 (18) | 0.71 (18) | |
| AD | 1 1/2-11.5 NPT | 1.89 (48) | 1 3/4 (44.5) | 0.85 (21.5) | 1.04 (26.5) | 0.71 (18) | 0.71 (18) | |
| AE | 1/2-in. BSPT | 1.18 (30) | 1 1/8 (28.6) | 0.67 (17) | 0.67 (17) | 0.50 (12.7) | 0.669 (17) | THD per ISO 7/1 (BS 21) |
| AF | 3/4-in. BSPT | 1.18 (30) | 1 1/8 (28.6) | 0.75 (19) | 0.89 (22.5) | 0.63 (16) | 0.71 (18) | |
| AG | 1-in. BSPT | 1.34 (34) | 1 1/4 (31.8) | 0.85 (21.5) | 1.04 (26.5) | 0.71 (18) | 0.71 (18) | |

1. Dimensions are in inches (millimeters).

1. Total length = U+ H.

Figure 7. Thread Mount Thermowell Drawings (Parallel Thread)⁽¹⁾



- A. Root diameter
- B. Tip diameter
- C. Total length (U + H)
- F. Hex size
- H. Head length
- N. Instrument connection
- P. Process connection
- U. Immersion length
- d. Bore diameter
- t. Tip thickness

Table 3. Thread Mount Thermowells (Parallel Thread)⁽¹⁾

| Code | Code T, threaded mounting style | Hex size "F" | Root diameter stepped stem | Root diameter tapered stem | Tip diameter tapered stem and straight stem | Thread specification |
|------|----------------------------------|-------------------------|----------------------------|----------------------------|---|--------------------------------|
| | Process connection "P" | | | | | |
| DA | M20 × 1.5 | 1.18 (30) | 0.67 (17) | 0.67 (17) | 0.5 (12.7) | Thread per BS3643 |
| DB | M24 × 1.5 | 1.18 (30) | 0.75 (19) | 0.75 (19) | 0.5 (12.7) | |
| DC | M27 × 2 | 1.26 or 1.42 (32 or 36) | 0.75 (19) | 0.75 (19) | 0.5 (12.7) | |
| DD | M33 × 2 | 1.61 (41) | 0.85 (21.5) | 1.04 (26.5) | 0.71 (18) | |
| DE | 1/2-in. BSPF (G ¹ /2) | 1.06 (27) | 0.67 (17) | 0.67 (17) | 0.5 (12.7) | Thread per ISO 228/1 (BS 2779) |
| DF | 3/4-in. BSPF (G ³ /4) | 1.26 (32) | 0.75 (19) | 0.75 (19) | 0.5 (12.7) | |
| DG | 1-in. BSPF (G1) | 1.61 (41) | 0.85 (21.5) | 1.04 (26.5) | 0.71 (18) | |

1. Dimensions are in inches (millimeters).

Note

Hex size will be different depending on units selected (english and metric).
 Wrench flats are used on exotic materials instead of hex flats. For hex flats on exotic materials, select option R37.
 Additional root and tip diameters available.

1. Total length = U+ H.

Rosemount 114C Flanged Thermowells

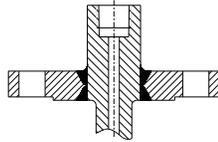


Flanged thermowell overview

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.

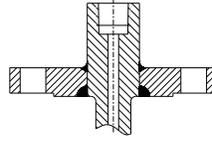
Full penetration weld (F)

- 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 2016
- Eliminates weld qualifications and failures
- Used in extreme process applications

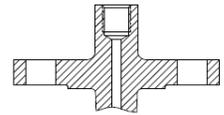


Figure 8. Standard Offering–Flanged

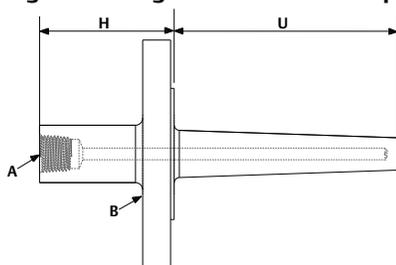
| Model | Units | Immersion length (U) | Mounting style | Process connection | Stem style | Thermowell material | Head length (H) | Instrument connection threads | Options |
|---------|-------|----------------------|----------------|--------------------|------------|---------------------|-----------------|-------------------------------|-------------|
| 1 1 4 C | X | X X X X | X | X X | X | 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) | | F Full penetration weld | | 1 Straight stem | | XXX 2.25- to 11.25-in. (E) | | Q5 External pressure test | |
| Metric (M) | | P Partial penetration weld | | 2 Tapered stem | | Example: 2.25-in. = 022, 10-in. = 100 | | Q35 NACE approval | |
| | | G Forged, no welds | | 3 Stepped stem | | XXX 40 to 225 mm (M) | | R21 Thermowell calculation | |
| | | | | | | Example: 40 mm = 040, 225 mm = 225 | | Q8 Material certification | |
| | | | | | | | | Q73 Dye penetration test | |

| | | | | | | | |
|--|--|------------------------------------|--|------------------------------------|--|-----------------------------------|--|
| (6-9) Immersion length (U) | | (11-12) Process connections | | (14-15) Thermowell material | | (19) Instrument connection | |
| XXXX 0.5- to 42-in. (E) | | AA 1-in. Class 150 | | SC 316/316L SST | | A ½-14 NPT | |
| Example: 0.5-in. = 0005, 42-in. = 0420 | | AB 1½-in. Class 150 | | SF 304/304L SST | | B ½-14 NPSM | |
| XXXX 25 to 1165 mm (M) | | AC 2-in. Class 150 | | CS Carbon steel | | D M18 x 1.5p | |
| Example: 25 mm = 0025, 1165 mm = 1165 | | AH 1-in. Class 300 | | | | E M20 x 1.5p | |
| | | AJ 1½-in. Class 300 | | | | F M24 x 1.5p | |
| | | AK 2-in. Class 300 | | | | | |

The common options shown in Figure 8 represent a partial offering; reference the Rosemount 114C Flanged Ordering Information for a full list of available options.

Figure 9. 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).

Use the form below to record your model code:

| Model | | | | Units | Immersion length (U) | Mounting style | Process connection | Stem style | Thermowell material | Head length (H) | Instrument connection | Options |
|-------|---|---|---|-------|----------------------|----------------|--------------------|------------|---------------------|-----------------|-----------------------|---------|
| 1 | 1 | 4 | C | | | | | | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 through 9 | 10 | 11 and 12 | 13 | 14 and 15 | 16 through 18 | 19 | XXXXX |

Flanged ordering information

Figure 10. 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 | 1 | 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.

Table 4. Rosemount 114C Flanged Ordering Information

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

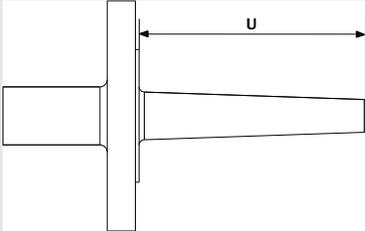
| Place #s 1-4 | Model | Details | Ref. page |
|--------------------|--|--|-----------|
| ★ 114C | Barstock temperature thermowell | Made with a standard bore diameter of 0.26-in. (6.6 mm) and tip wall thickness of 0.25-in. (6.4 mm). Default ASME flange facing is raised face with spiral serrations. Default EN 1092-1 flange facing is raised face Type B1. | N/A |
| Place # 5 | Dimension units | | |
| ★ E | English units (inches) | Specifies whether length units will be in inches (in) or millimeters (mm) | 56 |
| ★ M | Metric units (mm) | | 56 |
| Place # 6-9 | Immersion length (U) |  | |
| ★ xxxx | xx.x-in., 1 to 100 inches in 1/4-in. increments (when ordered with dimension units code E) Example of a 6.25-in. length where the second decimal is dropped off: 0062 | | 56 |
| ★ xxxx | xxxx mm, 25 to 2500 mm in 5 mm increments (when ordered with dimension units code M) Example of a 25 mm length: 0025 | | 56 |
| Place # 10 | Mounting style | | |
| ★ 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 T-shaped forging, no welds | N/A |

Table 4. Rosemount 114C Flanged Ordering Information

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

| Place # 11-12 | Process connection | Details | | Ref. page |
|------------------|----------------------|-----------------------|---------------------------|--------------|
| | | Partial weld (P) | Full penetration weld (F) | |
| ★ AA | 1-in. Class 150 | 1-in. Class 150 | 1-in. Class 150 | N/A |
| ★ AB | 1½-in. Class 150 | 1½-in. Class 150 | 1½-in. Class 150 | N/A |
| ★ AC | 2-in. Class 150 | 2-in. Class 150 | 2-in. Class 150 | N/A |
| ★ AD | 3-in. Class 150 | 3-in. Class 150 | 3-in. Class 150 | N/A |
| ★ AE | 4-in. Class 150 | 4-in. Class 150 | 4-in. Class 150 | N/A |
| ★ AF | 6-in. Class 150 | 6-in. Class 150 | 6-in. Class 150 | N/A |
| ★ AG | ¾-in. Class 300 | ¾-in. Class 300 | ¾-in. Class 300 | N/A |
| ★ AH | 1-in. Class 300 | 1-in. Class 300 | 1-in. Class 300 | N/A |
| ★ AJ | 1½-in. Class 300 | 1½-in. Class 300 | 1½-in. Class 300 | N/A |
| ★ AK | 2-in. Class 300 | 2-in. Class 300 | 2-in. Class 300 | N/A |
| AL | 1-in. Class 400/600 | 1-in. Class 400/600 | 1-in. Class 400/600 | N/A |
| AM | 1½-in. Class 400/600 | 1½-in. Class 400/600 | 1½-in. Class 400/600 | N/A |
| AN | 2-in. Class 400/600 | 2-in. Class 400/600 | N/A | N/A |
| AP | N/A | 1-in. Class 900/1500 | N/A | N/A |
| AQ | N/A | 1½-in. Class 900/1500 | N/A | N/A |
| AR | N/A | 2-in. Class 900/1500 | N/A | N/A |
| AT | N/A | 1½-in. Class 2500 | N/A | N/A |
| AU | N/A | 2-in. Class 2500 | N/A | N/A |
| AV | 3-in. Class 300 | 3-in. Class 300 | N/A | N/A |
| FA | DN 20/PN 2.5/6 | DN 20/PN 2.5/6 | N/A | N/A |
| FE | DN 20/PN 10/16/25/40 | DN 20/PN 10/16/25/40 | N/A | N/A |
| FG | DN 20/PN 63/100 | DN 20/PN 63/100 | N/A | N/A |
| GA | DN 25/PN 2.5/6 | DN 25/PN 2.5/6 | N/A | N/A |
| GE | DN 25/PN 10/16/25/40 | DN 25/PN 10/16/25/40 | N/A | N/A |
| GG | DN 25/PN 63/100 | DN 25/PN 63/100 | N/A | N/A |
| JA | DN 40/PN 2.5/6 | DN 40/PN 2.5/6 | N/A | N/A |
| JE | DN 40/PN 10/16/25/40 | DN 40/PN 10/16/25/40 | N/A | N/A |
| JG | DN 40/PN 63/100 | DN 40/PN 63/100 | N/A | N/A |
| KA | DN 50/PN 2.5/6 | DN 50/PN 2.5/6 | N/A | N/A |
| KC | DN 50/PN 10/16 | DN 50/PN 10/16 | N/A | N/A |
| KE | DN 50/PN 25/40 | DN 50/PN 25/40 | N/A | N/A |
| KF | DN 50/PN 63 | DN 50/PN 63 | N/A | N/A |

Table 4. Rosemount 114C Flanged Ordering Information

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

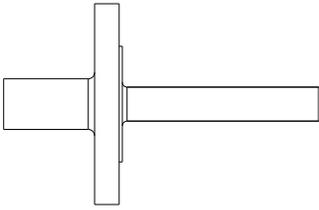
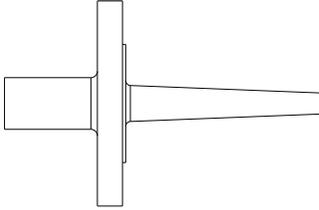
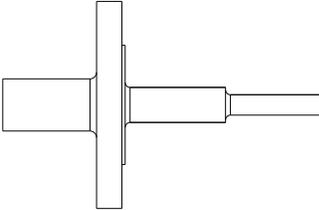
| Place # 11-12 | | Process connection | Details | | Ref. page |
|------------------|------------|--|---|----------------------|--------------|
| | | Partial weld (P) | Full penetration weld (F) | Forged, no welds (G) | |
| KG | | DN 50/PN 100 | DN 50/PN 100 | N/A | N/A |
| LA | | DN 65/PN 2.5/6 | DN 65/PN 2.5/6 | N/A | N/A |
| LC | | DN 65/PN 10/16 | DN 65/PN 10/16 | N/A | N/A |
| LE | | DN 65/PN 24/40 | DN 65/PN 24/40 | N/A | N/A |
| LF | | DN 65/PN 63 | DN 65/PN 63 | N/A | N/A |
| LG | | DN 65/PN 100 | DN 65/PN 100 | N/A | N/A |
| MA | | DN 80/PN 2.5/6 | DN 80/PN 2.5/6 | N/A | N/A |
| MC | | DN 80/PN 10/16 | DN 80/PN 10/16 | N/A | N/A |
| ME | | DN 80/PN 25/40 | DN 80/PN 25/40 | N/A | N/A |
| MF | | DN 80/PN 63 | DN 80/PN 63 | N/A | N/A |
| MG | | DN 80/PN 100 | DN 80/PN 100 | N/A | N/A |
| NA | | DN 100/PN 2.5/6 | DN 100/PN 2.5/6 | N/A | N/A |
| NC | | DN 100/PN 10/16 | DN 100/PN 10/16 | N/A | N/A |
| NE | | DN 100/PN 25/40 | DN 100/PN 25/40 | N/A | N/A |
| NF | | DN 100/PN 63 | DN 100/PN 63 | N/A | N/A |
| NG | | DN 100/PN 100 | DN 100/PN 100 | N/A | N/A |
| Place # 13 | Stem style | Details | Image | | |
| ★ 1 | Straight | Minimum immersion length = 1-in. (25 mm) |  | 57 | |
| ★ 2 | Tapered | Minimum immersion length = 1-in. (25 mm) |  | 57 | |
| ★ 3 | Stepped | Minimum immersion length = 3-in. (75 mm) |  | 57 | |

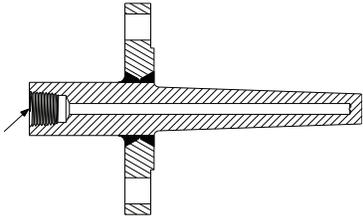
Table 4. Rosemount 114C Flanged Ordering Information

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

| Place #s 14-15 | Thermowell material | Details | Ref. page |
|-------------------|--|--|--------------|
| ★ SC | 316/316L dual rated | | 58 |
| SD | 316/316L dual rated (NORSOK) | Must order the Q8 Material Certificate to get NORSOK documentation | 59 |
| ★ SF | 304/304L dual rated | | 58 |
| ★ CS | Carbon steel (A-105) | | 58 |
| SG | 316Ti SST | | 58 |
| SH | 316/316L SST with tantalum sheath | Only available as a straight stem profile with a 0.75 diameter thus requires option A075 for English units | 59 |
| SJ | 316/316L SST with PFA coating | | 58 |
| SK | 304/304L SST with PTFE coating | | 58 |
| SL | 310 SST | | 58 |
| SM | 321 SST | | 58 |
| AB | Alloy B3 | | 58 |
| AC | Alloy C-276 | | 58 |
| AD | Alloy C-4 (with 304/304L SST flange) | Not available with G (Fully forged) mounting style | 58 |
| AE | Alloy C-22 (with 304/304L SST flange) | Not available with G (Fully forged) mounting style | 58 |
| AF | Alloy C-22 (with 316/316L SST flange) | Not available with G (Fully forged) mounting style | 58 |
| AG | Alloy 20 | | 58 |
| AH | Alloy 400 | | 58 |
| AJ | Alloy 400 (with 304/304L SST flange) | Not available with G (Fully forged) mounting style | 58 |
| AK | Alloy 600 | | 58 |
| AL | Alloy 600 (with 304/304L SST flange) | Not available with G (Fully forge) mounting style | 58 |
| CA | Chrome-Moly Grade B-11/F-11 Class II | | 58 |
| CB | Chrome-Moly Grade B-22/ F-22 Class III | | 58 |
| CC | Chrome-Moly Grade F-91 | | 58 |
| NK | Nickel 200 | | 58 |
| TT | Titanium Grade 2 | | 58 |
| DS | Super duplex SST Grade F-53 | | 58 |
| DT | Super duplex – NORSOK | Must order the Q8 Material Certificate to get NORSOK documentation | 59 |
| DU | Duplex 2205 Grade F51 | | 58 |
| DV | Duplex 2205 – NORSOK | Must order the Q8 Material Certificate to get NORSOK documentation | 59 |

Table 4. Rosemount 114C Flanged Ordering Information

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

| Place #s 16-18 | Head length (H) | | | Ref. page |
|----------------|--|----------------|---|-----------|
| ★ xxx | xx.x-in., 2.25 to 11.25 inches in 1/4-in. increments (when ordered with dimension units code E) | | | 60 |
| | 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) | | | 60 |
| | Example of a 50 mm length: 050 (default head length = 60 mm for flanges under Class 900) | | | |
| Place # 19 | Instrument connection | Details | Image | |
| ★ A | 1/2-14 NPT | Female threads |  | 61 |
| ★ B | 1/2-14 NPSM | | | 61 |
| C | 3/4-14 NPT | | | 61 |
| D | M18 × 1.5p | | | 61 |
| E | M20 × 1.5p | | | 61 |
| F | M24 × 1.5p | | | 61 |
| G | G 1/2-in. (BSPF) | | | 61 |
| H | G 3/4-in. (BSPF) | | | 61 |
| J | M27 × 2p | | | 61 |
| K | M14 × 1.5p | | | 61 |

Options (include with selected model number)

| Sensor/thermowell assemble to options | | Details | Ref. page |
|---------------------------------------|---|---|-----------|
| ★ XT | Hand tight assembly of sensor and thermowell | Ensures sensor is threaded into thermowell but only hand tightened | 62 |
| ★ XW | Process-ready assembly of sensor and thermowell | Ensures sensor is threaded into thermowell and torqued for process-ready installation | 62 |
| Extended product warranty | | | |
| ★ WR3 | 3-year limited warranty | This warranty option extends manufacturer’s warranty to three or five years for manufacturer related defects | 62 |
| ★ WR5 | 5-year limited warranty | | 62 |
| Thermowell calculation | | | |
| ★ R21 | Thermowell calculation | Set of calculations to ensure thermowells are safe in certain process conditions <i>Note: If your chosen mounting style is flange with full penetration weld (F) then you must choose dye penetration option (Q73) to meet the ASME PTC 19.3 TW standard requirements.</i> | 63 |
| NACE approval | | | |
| ★ Q35 | NACE approval | Meets MR0175/ISO 15156 and MR0103 requirements | 63 |
| PMI testing | | | |
| Q76 | PMI testing | Verifies chemical composition of material | 64 |

Table 4. Rosemount 114C Flanged Ordering Information

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| Material certification | | | | Ref. page |
|------------------------------|-----|------------------------------|--|-----------|
| ★ | Q8 | Material certification | Certificate for material conformance and traceability in accordance with EN 10204 type 3.1 | 64 |
| Material tests | | | | |
| | M01 | Low temperature Charpy Test | Measures the low temperature ductility of the material | 64 |
| | M02 | Ultrasonic material test | Examination of steel forgings for flaws and inclusions | 65 |
| Surface finish | | Details | | |
| | Q16 | Certification | Certificate showing measured surface finish values | 65 |
| | R14 | Finish < Ra 0.3 μm (12 μin) | Improves surface roughness of thermowell | 65 |
| Electropolish | | | | |
| | R20 | Electropolish | Improve smoothness and surface quality | 65 |
| Hydrostatic pressure test | | | | |
| ★ | Q5 | External pressure test | Verifies structural quality and checks for leaks at thermowell process connection and stem | 66 |
| ★ | Q85 | Internal pressure test | Verifies internal structural integrity of thermowell | 66 |
| Canadian Registration Number | | | | |
| | Q17 | Canadian Registration Number | Canadian approvals for all provinces (Approved materials in reference section) | 67 |
| Dye penetration test | | | | |
| ★ | Q73 | Dye penetration test | Checks quality of welds and material | 67 |
| Wall thickness test | | | | |
| | Q83 | Ultrasonic test | Checks the bore concentricity of the thermowell | 68 |
| Special cleaning | | | | |
| | Q6 | Special cleaning | Oxygen enriched environment cleaning per ASTM G93 | 68 |
| Thermowell markings | | | | |
| | R40 | Test markings on thermowell | External marking of the thermowell for specific tests (see reference page for list of tests) | 68 |
| X-ray/radiograph test | | | | |
| | Q81 | X-ray/radiograph | Verifies quality of full penetration flange welds | 68 |
| Spherical tip | | | | |
| | R60 | Spherical tip | Changes the flat tip to spherical | 69 |
| Plug and chain | | | | |
| | R06 | Stainless steel | Protects thermowell threads when sensor is not installed | 69 |
| | R23 | Brass | | 69 |

Table 4. Rosemount 114C Flanged Ordering Information

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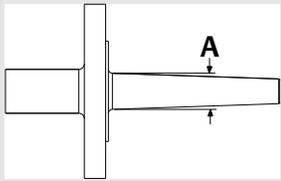
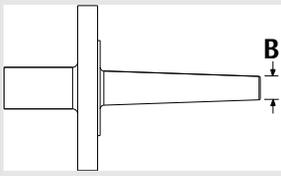
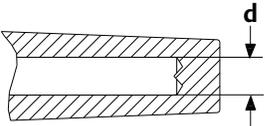
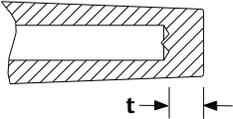
| Vent hole | | | Ref. page |
|--------------------------------|--|---|---|
| R11 | Vent hole | Allows for the venting of a thermowell | 70 |
| Flange face | | | |
| R09 | Concentric serrations | Concentric serrations on flange face per ASME B16.5 | 70 |
| R10 | Flat | Flat flange face per ASME B16.5 or EN 1092-1 facing Type A | 71 |
| R15 | Raised face, Type B2 | Raise face per EN 1092-1 facing Type B2 | 71 |
| R16 | RTJ | Ring type joint flange face per ASME B16.5 | 72 |
| R18 | Groove, Type D | Groove, Type D per EN 1092-1 | 73 |
| R19 | Tongue, Type C | Tongue, Type C per EN 1092-1 | 73 |
| R24 | Spigot, Type E | Spigot Type E per EN 1092-1 | 74 |
| R25 | Recess, Type F | Recess Type F per EN 1092-1 | 75 |
| Root diameter (A) | |  | |
| Axxx | x.xx inches, 0.36 to 3.15 inches in 0.01-in. increments (when ordered with dimension units code E) Examples: Code A040 = 0.4-in, Code A315 = 3.15-in. | | 76 |
| Axxx | x.xx mm, 10 to 80 mm in 0.5-mm increments (when ordered with dimension units code M) Examples: Code A100 = 10.0 mm, Code A755 = 75.5 mm | | 76 |
| Tip diameter (B) | |  | |
| Bxxx | x.xx-in., 0.36 to 1.83 inches in 0.01-in. increments (when ordered with dimension units code E) Examples: Code B040 = 0.4-in, Code B180 = 1.80-in. | | 77 |
| Bxxx | xx.x mm, 10 to 46 mm in 0.5 mm. increments (when ordered with dimension units code M) Examples: Code B100 = 10.0 mm, Code B455 = 45.5 mm | | 77 |
| Non-standard bore diameter (d) | | Details | Image |
| D01 | 0.276-in./7.0 mm | Standard = 0.26-in. (6.6 mm) |  |
| D03 | 0.138-in./3.5 mm | | |
| D04 | 0.386-in./9.8 mm | | |
| D05 | 0.354-in./9.0 mm | | |
| D06 | 0.433-in./11.0 mm | | |

Table 4. Rosemount 114C Flanged Ordering Information

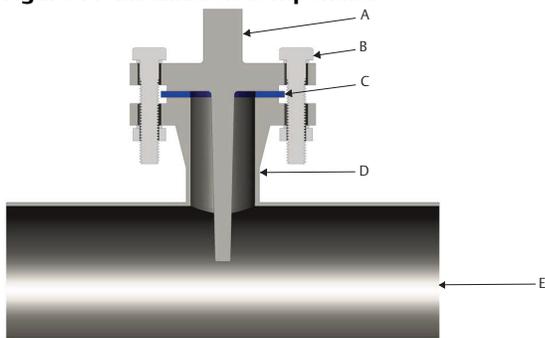
The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

| Non-standard tip thickness (t) | | | | Ref. page |
|--------------------------------|------------------|------------------------------|---|-----------|
| T01 | 0.197-in./5.0 mm | Standard = 0.25-in. (6.4 mm) |  | 78 |
| T02 | 0.236-in./6.0 mm | | | 78 |

Flanged installation

Flanged thermowells are bolted to a mating flange which protrudes from the process. It is important to select appropriate gasket for the process conditions, to provide a seal between the flange faces. The Rosemount 114C Thermowells come standard with a raised face and spiral serrations designed per the ASME B16.5 standard. These should be installed with an inside bolt circle (IBC) gasket/ring gasket, which extends to and is centered by the bolts. Other flange face options are available.

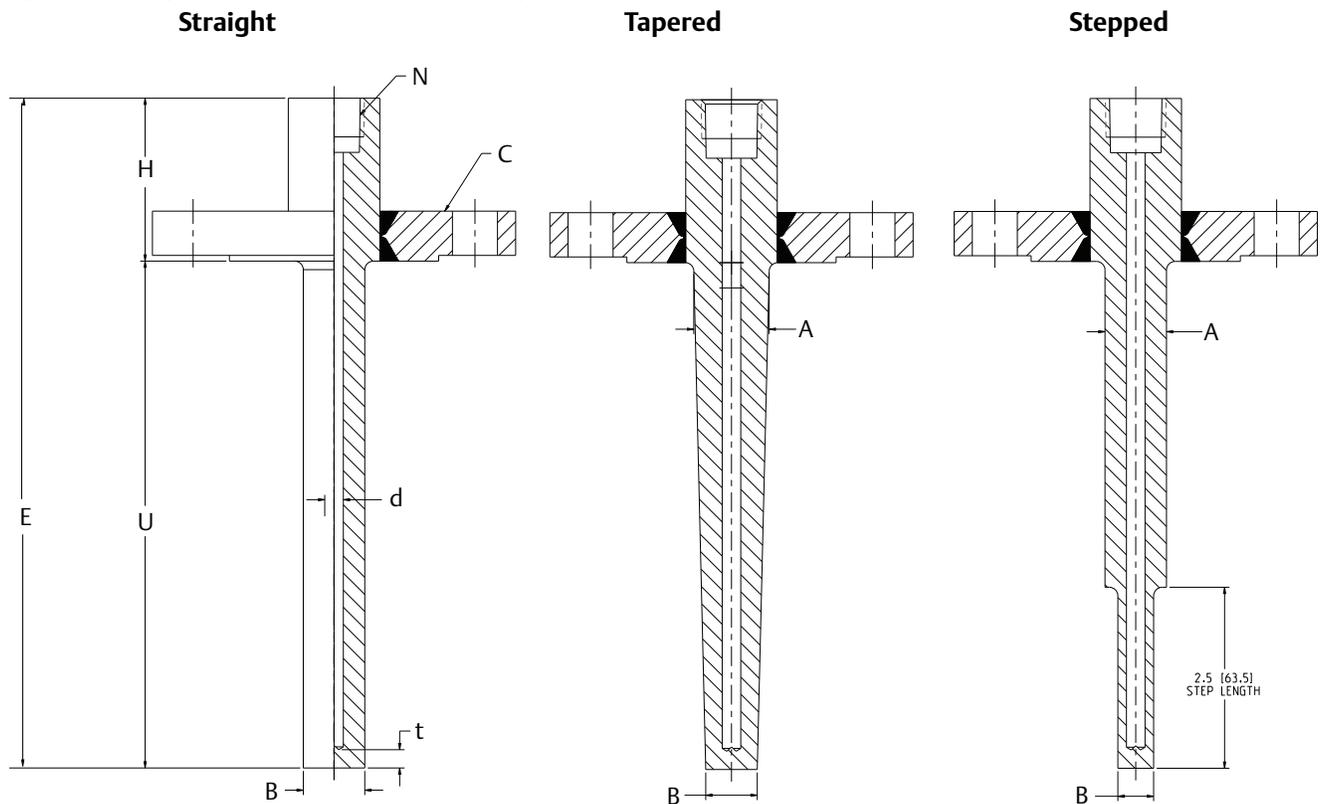
Figure 11. Installation Components



- A. Thermowell
- B. Bolt/washers
- C. Ring gasket
- D. Nozzle and mating flange
- E. Process

Flanged thermowell drawings

Figure 12. Flange Mounted Thermowell Drawings⁽¹⁾



- A. Root diameter
- B. Tip diameter
- C. ASME B16.5 lap flange
- E. Total length (U + H)
- H. Head length

- N. Instrument connection
- U. Immersion length
- d. Bore diameter
- t. Tip thickness

1. Total length = U+H.

Table 5. Flange Mounted Thermowells⁽¹⁾

| 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 | 19 (.748) | 22.5 (.886) | 16 (.630) | 19 (.748) | ASME B16.5 |
| AB | 1 1/2-in. Class 150 | 1 1/2-in. Class 150 | 1 1/2-in. Class 150 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | |
| AC | 2-in. Class 150 | 2-in. Class 150 | 2-in. Class 150 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | |
| AD | 3-in. Class 150 | 3-in. Class 150 | 3-in. Class 150 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | |
| AE | 4-in. Class 150 | 4-in. Class 150 | 4-in. Class 150 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | |
| AF | 6-in. Class 150 | 6-in. Class 150 | 6-in. Class 150 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | |
| AG | 3/4-in. Class 300 | 3/4-in. Class 300 | 3/4-in. Class 300 | 17 (.669) | 17 (.669) | 12.5 (.495) | 17 (.669) | |
| AH | 1-in. Class 300 | 1-in. Class 300 | 1-in. Class 300 | 19 (.748) | 22.5 (886) | 16 (.630) | 19 (.748) | |
| AJ | 1 1/2-in. Class 300 | 1 1/2-in. Class 300 | 1 1/2-in. Class 300 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | |
| AK | 2-in. Class 300 | 2-in. Class 300 | 2-in. Class 300 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | |
| AL | 1-in. Class 400/600 | 1-in. Class 400/600 | 1-in. Class 400/600 | 19 (.748) | 22.5 (886) | 16 (.630) | 19 (.748) | |
| AM | 1 1/2-in. Class 400/600 | 1 1/2-in. Class 400/600 | 1 1/2-in. Class 400/600 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | |
| AN | 2-in. Class 400/600 | 2-in. Class 400/600 | 2-in. Class 400/600 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | |
| AP | N/A | 1-in. Class 900/1500 | 1-in. Class 900/1500 | 19 (.748) | 22.5 (886) | 16 (.630) | 19 (.748) | |
| AQ | N/A | 1 1/2-in. Class 900/1500 | 1 1/2-in. Class 900/1500 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | |
| AR | N/A | 2-in. Class 900/1500 | 2-in. Class 900/1500 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | |
| AT | N/A | 1 1/2-in. Class 2500 | 1 1/2-in. Class 2500 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | |
| AU | N/A | 2-in. Class 2500 | 2-in. Class 2500 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | |
| AV | 3-in. Class 300 | 3-in. Class 300 | 3-in. Class 300 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | |
| FA | DN 20/PN 2.5/6 | DN 20/PN 2.5/6 | DN 20/PN 2.5/6 | 17 (.669) | 17 (.669) | 12.7 (.500) | 17 (.669) | |
| FE | DN 20/PN 10/16/25/40 | DN 20/PN 10/16/25/40 | DN 20/PN 10/16/25/40 | 17 (.669) | 17 (.669) | 12.7 (.500) | 17 (.669) | |
| FG | DN 20/PN 63/100 | DN 20/PN 63/100 | DN 20/PN 63/100 | 17 (.669) | 17 (.669) | 12.7 (.500) | 17 (.669) | |
| GA | DN 25/PN 2.5/6 | DN 25/PN 2.5/6 | DN 25/PN 2.5/6 | 19 (.748) | 19 (.748) | 12.7 (.500) | 19 (.748) | |
| GE | DN 25/PN 10/16/25/40 | DN 25/PN 10/16/25/40 | DN 25/PN 10/16/25/40 | 19 (.748) | 19 (.748) | 12.7 (.500) | 19 (.748) | |
| GG | DN 25 PN 63/100 | DN 25 PN 63/100 | DN 25/PN 63/100 | 19 (.748) | 19 (.748) | 12.7 (.500) | 19 (.748) | |
| GH | DN 25/PN 160 | DN 25/PN 160 | DN 25/PN 160 | 19 (.748) | 19 (.748) | 12.7 (.500) | 19 (.748) | |
| GJ | DN 25/PN 250 | DN 25/PN 250 | DN 25/PN 250 | 19 (.748) | 19 (.748) | 12.7 (.500) | 19 (.748) | |
| GK | DN 25/PN 320 | DN 25/PN 320 | DN 25/PN 320 | 19 (.748) | 19 (.748) | 12.7 (.500) | 19 (.748) | |
| GL | DN 25/PN 400 | DN 25/PN 400 | DN 25/PN 400 | 19 (.748) | 19 (.748) | 12.7 (.500) | 19 (.748) | |
| JA | DN 40/PN 2.5/6 | DN 40/PN 2.5/6 | DN 40/PN 2.5/6 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | |
| JE | DN 40/PN 10/16/25/40 | DN 40/PN 10/16/25/40 | DN 40/PN 10/16/25/40 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | |
| JG | DN 40/PN 63/100 | DN 40/PN 63/100 | DN 40/PN 63/100 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | |
| JH | DN 40/PN 160 | DN 40/PN 160 | DN 40/PN 160 | 21.5 (.846) | 26.5 (1.043) | 16 (.630) | 21.5 (.846) | |
| JJ | DN 40/PN 250 | DN 40/PN 250 | DN 40/PN 250 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | |
| JK | DN 40/ PN 320 | DN 40/ PN 320 | DN 40/ PN 320 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | |
| JL | DN 40/PN 400 | DN 40/PN 400 | DN 40/PN 400 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | |
| KA | DN 50/PN 2.5/6 | DN 50/PN 2.5/6 | DN 50/PN 2.5/6 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | |
| KC | DN 50/PN 10/16 | DN 50/PN 10/16 | DN 50/PN 10/16 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | |
| KE | DN 50/PN 25/40 | DN 50/PN 25/40 | DN 50/PN 25/40 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | |
| KF | DN 50/PN 63 | DN 50/PN 63 | DN 50/PN 63 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | |
| KG | DN 50/PN 100 | DN 50/PN 100 | DN 50/PN 100 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | |
| KH | DN 50/PN 160 | DN 50/PN 160 | DN 50/PN 160 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | |

Table 5. Flange Mounted Thermowells⁽¹⁾

| 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 | | | | | |
| KJ | DN 50/PN 250 | DN 50/PN 250 | DN 50/PN 250 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | EN 1092-1 |
| KK | DN 50/PN 320 | DN 50/PN 320 | DN 50/PN 320 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | |
| KL | DN 50/PN 400 | DN 50/PN 400 | DN 50/PN 400 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | |
| LA | DN 65/PN 2.5/6 | DN 65/PN 2.5/6 | DN 65/PN 2.5/6 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | |
| LC | DN 65/PN 10/16 | DN 65/PN 10/16 | DN 65/PN 10/16 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | |
| LE | DN 65/PN 24/40 | DN 65/PN 24/40 | DN 65/PN 24/40 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | |
| LF | DN 65/PN 63 | DN 65/PN 63 | DN 65/PN 63 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | |
| LG | DN 65/PN 100 | DN 65/PN 100 | DN 65/PN 100 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | |
| LH | DN 65/PN 160 | DN 65/PN 160 | DN 65/PN 160 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | |
| LJ | DN 65/PN 250 | DN 65/PN 250 | DN 65/PN 250 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | |
| LK | DN 65/PN 320 | DN 65/PN 320 | DN 65/PN 320 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | |
| LL | DN 65/PN 400 | DN 65/PN 400 | DN 65/PN 400 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | |
| MA | DN 80/PN 2.5/6 | DN 80/PN 2.5/6 | DN 80/PN 2.5/6 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | |
| MC | DN 80/PN 10/16 | DN 80/PN 10/16 | DN 80/PN 10/16 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | |
| ME | DN 80/PN 25/40 | DN 80/PN 25/40 | DN 80/PN 25/40 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | |
| MF | DN 80/PN 63 | DN 80/PN 63 | DN 80/PN 63 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | |
| MG | DN 80/PN 100 | DN 80/PN 100 | DN 80/PN 100 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | |
| MH | DN 80/PN 160 | DN 80/PN 160 | DN 80/PN 160 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | |
| MJ | DN 80/PN 250 | DN 80/PN 250 | DN 80/PN 250 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | |
| MK | DN 80/PN 320 | DN 80/PN 320 | DN 80/PN 320 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | |
| ML | DN 80/PN 400 | DN 80/PN 400 | DN 80/PN 400 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | |
| NA | DN 100/PN 2.5/6 | DN 100/PN 2.5/6 | DN 100/PN 2.5/6 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | |
| NC | DN 100/PN 10/16 | DN 100/PN 10/16 | DN 100/PN 10/16 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | |
| NE | DN 100/PN 25/40 | DN 100/PN 25/40 | DN 100/PN 25/40 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | |
| NF | DN 100/PN 63 | DN 100/PN 63 | DN 100/PN 63 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | |
| NG | DN 100/PN 100 | DN 100/PN 100 | DN 100/PN 100 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | |
| NH | DN 100/PN 160 | DN 100/PN 160 | DN 100/PN 160 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | |
| NJ | DN 100/PN 250 | DN 100/PN 250 | DN 100/PN 250 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | |
| NK | DN 100/PN 320 | DN 100/PN 320 | DN 100/PN 320 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | |
| NL | DN 100/PN 400 | DN 100/PN 400 | DN 100/PN 400 | 21.5 (.846) | 26.5 (1.043) | 18 (.709) | 21.5 (.846) | |

1. Dimensions are in inches (millimeters).

Table 6. External Pressure Test—EN 1092-1

| EN 1092-1 flanged thermowells | |
|--------------------------------------|---------------------|
| Nominal pressure (bar) | Test pressure (bar) |
| 16 | 40 |
| 40 | 100 |
| 100 | 250 |
| Test to 2.5× nominal pressure rating | |

Rosemount 114C Van Stone Thermowells

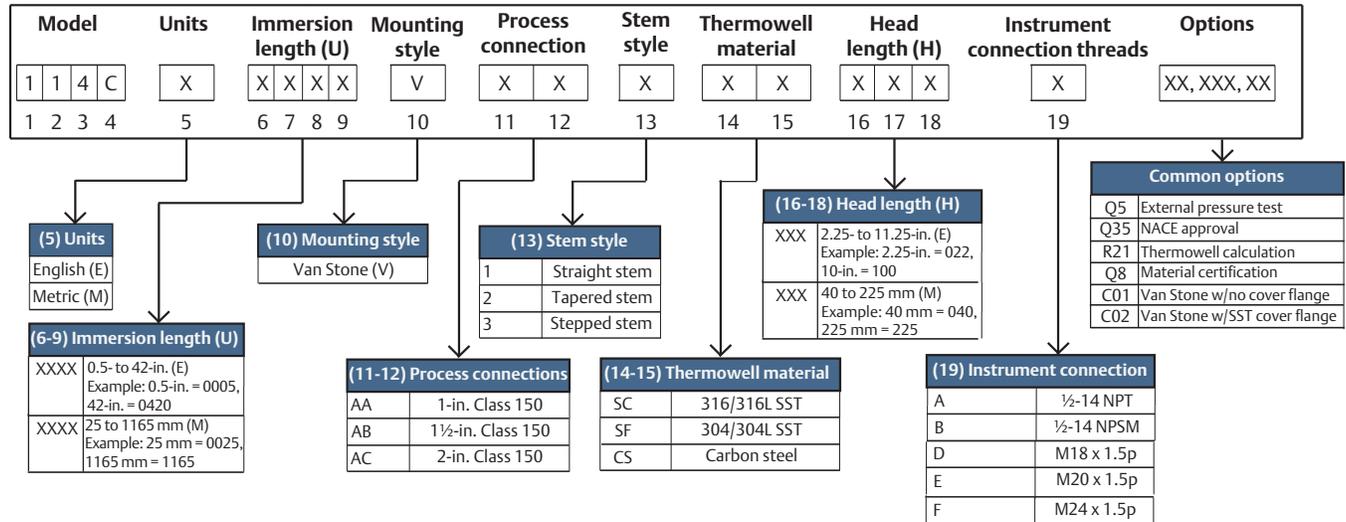


Van Stone thermowell overview

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.

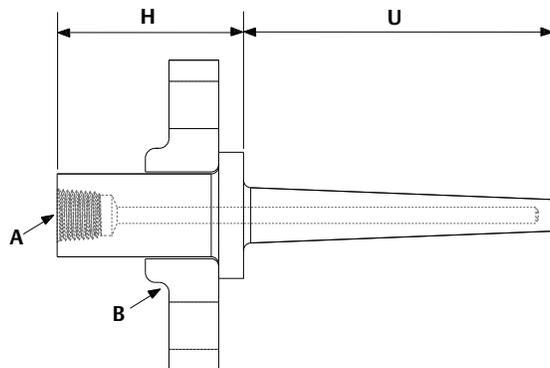
The standard offering figure below shows the thermowell configurations that can typically be shipped in two weeks or less.

Figure 13. Standard Offering–Van Stone



The common options shown in Figure 13 represent a partial offering; reference the [Rosemount 114C Van Stone Ordering Information](#) for a full list of available options.

Figure 14. 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).

Use the form below to record your model code:

| Model | | | | Units | Immersion length (U) | Mounting style | Process connection | Stem style | Thermowell material | Head length (H) | Instrument connection | Options |
|-------|---|---|---|-------|----------------------|----------------|--------------------|------------|---------------------|-----------------|-----------------------|---------|
| 1 | 1 | 4 | C | | | V | | | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 through 9 | 10 | 11 and 12 | 13 | 14 and 15 | 16 through 18 | 19 | XXXXX |

Van Stone ordering information

Figure 15. 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 | 1 | 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.

Table 7. Rosemount 114C Van Stone Ordering Information

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery lead time. The Expanded offering is subject to additional delivery lead time.

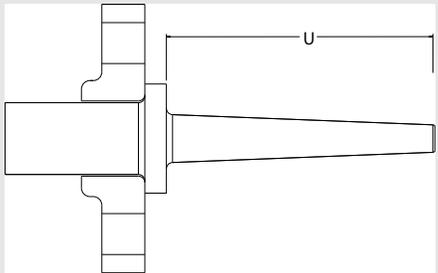
| Place #s 1-4 | Model | Details | Ref. page |
|-----------------------|--|---|-----------|
| ★ 114C | Barstock temperature thermowell | Made with a standard bore diameter of 0.26-in. (6.6 mm) and tip wall thickness of 0.25-in. (6.4 mm) | N/A |
| Place # 5 | Dimension units | | |
| ★ E | English units (inches) | Specifies whether length units will be in inches (in) or millimeters (mm) | 56 |
| ★ M | Metric units (mm) | | 56 |
| Place # 6-9 | Immersion length (U) |  | |
| ★ XXXX | xx.x-in., 1.0 to 100 inches in 1/4-in. increments (when ordered with dimension units code E) Example of a 6.25-in. length where the second decimal is dropped off: 0062 | | 56 |
| ★ XXXX | xxxx mm, 25 to 2500 mm in 5 mm increments (when ordered with dimension units code M) Example of a 25 mm length: 0025 | | 56 |
| Place # 10 | Mounting style | | |
| ★ V | Van Stone, lap flange | Default cover flange material is carbon steel | N/A |
| Place #s 11-12 | Process connection | | |
| ★ AA | 1-in. Class 150 | | N/A |
| ★ AB | 1 1/2-in. Class 150 | | N/A |
| ★ AC | 2-in. Class 150 | | N/A |

Table 7. Rosemount 114C Van Stone Ordering Information

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery lead time. The Expanded offering is subject to additional delivery lead time.

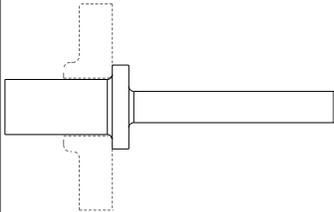
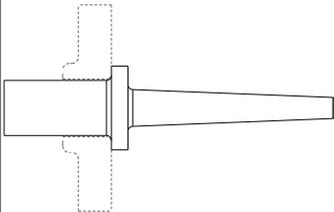
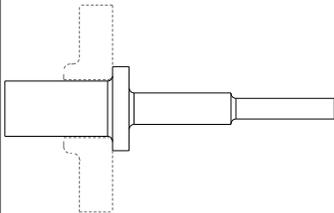
| ★ | AH | 1-in. Class 300 | | | N/A |
|-------------------|---------------------|------------------------------|--|--|-----|
| ★ | AJ | 1½-in. Class 300 | | | N/A |
| ★ | AK | 2-in. Class 300 | | | N/A |
| ★ | AL | 1-in. Class 400/600 | | | N/A |
| ★ | AM | 1½-in. Class 400/600 | | | N/A |
| ★ | AN | 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 |
| Place # 13 | Stem style | Details | Image | Ref. page | |
| ★ | 1 | Straight | Minimum immersion length = 1-in. (25 mm) |  | 57 |
| ★ | 2 | Tapered | Minimum immersion length = 1-in. (25 mm) |  | 57 |
| ★ | 3 | Stepped | Minimum immersion length = 3-in. (75 mm) |  | 57 |
| Place #s 14-15 | Thermowell material | | | | |
| ★ | SC | 316/316L dual rated | | | 58 |
| | SD | 316/316L dual rated (NORSOK) | Must order the Q8 Material Certificate to get NORSOK documentation | | 59 |
| ★ | SF | 304/304L dual rated | | | 58 |

Table 7. Rosemount 114C Van Stone Ordering Information

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery lead time. The Expanded offering is subject to additional delivery lead time.

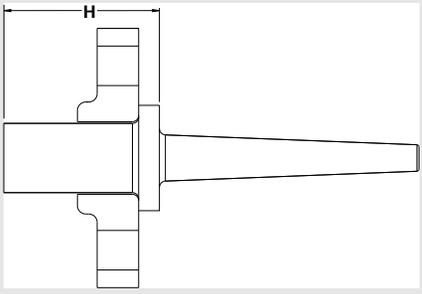
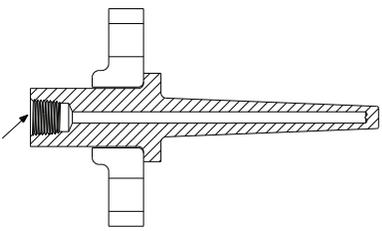
| | | | | |
|-----------------------|------------------------|---|--|----|
| ★ | CS | Carbon steel (A-105) | | 58 |
| | SG | 316Ti SST | | 58 |
| | SH | 316/316L SST with tantalum sheath | | 58 |
| | SJ | 316/316L SST with PFA coating | | 58 |
| | SK | 304/304L SST with PTFE coating | | 58 |
| | SL | 310 SST | | 58 |
| | SM | 321 SST | | 58 |
| | AB | Alloy B3 | | 58 |
| | AC | Alloy C-276 | | 58 |
| | AG | Alloy 20 | | 58 |
| | AH | Alloy 400 | | 58 |
| | AK | Alloy 600 | | 58 |
| | MO | Molybdenum | | 58 |
| | CA | Chrome-Moly Grade B-11/F-11 Class II | | 58 |
| | CB | Chrome-Moly Grade B-22/ F-22 Class III | | 58 |
| | CC | Chrome-Moly Grade F-91 | | 58 |
| | NK | Nickel 200 | | 58 |
| | TT | Titanium Grade 2 | | 58 |
| | DS | Super duplex SST Grade F-53 | | 58 |
| | DT | Super duplex – NORSOK | Must order the Q8 Material Certificate to get NORSOK documentation | 59 |
| | DU | Duplex 2205 Grade F51 | | 58 |
| | DV | Duplex 2205 – NORSOK | Must order the Q8 Material Certificate to get NORSOK documentation | 59 |
| Place #s 16-18 | Head length (H) |  | | |
| ★ | xxx | xx.x-in., 1.75to 11.25 inches in 1/4-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 inches for flanges under Class 900) | | 60 |
| ★ | 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) | | 60 |

Table 7. Rosemount 114C Van Stone Ordering Information

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery lead time. The Expanded offering is subject to additional delivery lead time.

| Place # 19 | Instrument connection | Details | Image | Ref. page |
|------------|-----------------------|----------------|--|-----------|
| ★ A | 1/2-14 NPT | Female threads |  | 61 |
| ★ B | 1/2-14 NPSM | | | 61 |
| C | 3/4-14 NPT | | | 61 |
| D | M18 × 1.5p | | | 61 |
| E | M20 × 1.5p | | | 61 |
| F | M24 × 1.5p | | | 61 |
| G | G 1/2-in. (BSPF) | | | 61 |
| H | G 3/4-in. (BSPF) | | | 61 |
| J | M27 × 2p | | | 61 |
| K | M14 × 1.5p | | | 61 |

Options (include with selected model number)

| Sensor/thermowell assemble to options | | Details | Ref. page |
|---------------------------------------|---|--|-----------|
| ★ XT | Hand tight assembly of sensor and thermowell | Ensures sensor is threaded into thermowell but only hand tightened | 62 |
| ★ XW | Process-ready assembly of sensor and thermowell | Ensures sensor is threaded into thermowell and torqued for process-ready installation | 62 |
| Extended product warranty | | | |
| ★ WR3 | 3-year limited warranty | This warranty option extends manufacturer’s warranty to three or five years for manufacturer related defects | 62 |
| ★ WR5 | 5-year limited warranty | | 62 |
| Thermowell calculation | | | |
| ★ R21 | Thermowell calculation | Set of calculations to ensure thermowells are safe in certain process conditions | 63 |
| NACE approval | | | |
| ★ Q35 | NACE approval | Meets MR0175/ISO 15156 and MR0103 requirements | 63 |
| PMI testing | | | |
| Q76 | PMI testing | Verifies chemical composition of material | 64 |
| Material certification | | | |
| ★ Q8 | Material certification | Certificate for material conformance and traceability in accordance with EN 10204 type 3.1 | 64 |
| Material tests | | | |
| M01 | Low temperature Charpy Test | Measures the low temperature ductility of the material | 64 |
| M02 | Ultrasonic material test | Examination of steel forgings for flaws and inclusions | 65 |

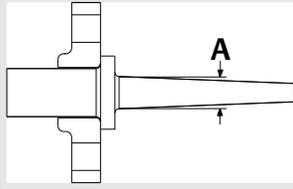
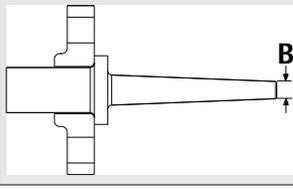
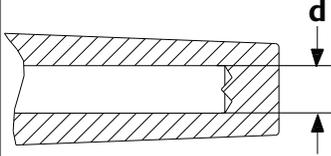
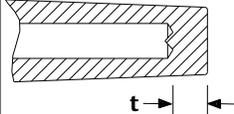
Table 7. Rosemount 114C Van Stone Ordering Information

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery lead time. The Expanded offering is subject to additional delivery lead time.

| Surface finish | | Details | Ref. page |
|-------------------------------------|------------------------------|--|-----------|
| Q16 | Certification | Certificate showing measured surface finish values | 65 |
| R14 | Finish < Ra 0.3 μm (12 μin) | Improves surface roughness of thermowell | 65 |
| Electropolish | | | |
| R20 | Electropolish | Improve smoothness and surface quality | 65 |
| Hydrostatic pressure test | | | |
| ★ Q5 | External pressure test | Verifies structural quality and checks for leaks at thermowell process connection and stem | 66 |
| ★ Q85 | Internal pressure test | Verifies internal structural integrity of thermowell | 66 |
| Canadian Registration Number | | | |
| Q17 | Canadian Registration Number | Canadian approvals for all provinces (Approved materials in reference section) | 67 |
| Dye penetration test | | | |
| ★ Q73 | Dye penetration test | Checks quality of welds and material | 67 |
| Wall thickness test | | | |
| Q83 | Ultrasonic test | Checks the bore concentricity of the thermowell | 68 |
| Special cleaning | | | |
| Q6 | Special cleaning | Oxygen enriched environment cleaning per ASTM G93 | 68 |
| Thermowell markings | | | |
| R40 | Test markings on thermowell | External marking of the thermowell for specific tests (see reference page for list of tests) | 68 |
| Spherical tip | | | |
| R60 | Spherical tip | Changes the flat tip to spherical | 69 |
| Plug and chain | | | |
| R06 | Stainless steel | Protects thermowell threads when sensor is not installed | 69 |
| R23 | Brass | | 69 |
| Vent hole | | | |
| R11 | Vent hole | Allows for the venting of a thermowell | 70 |
| Flange face | | | |
| R09 | Concentric serrations | Concentric serrations on flange face per ASME B16.5 | 70 |
| R16 | RTJ | Ring type joint flange face per ASME B16.5 | 71 |

Table 7. Rosemount 114C Van Stone Ordering Information

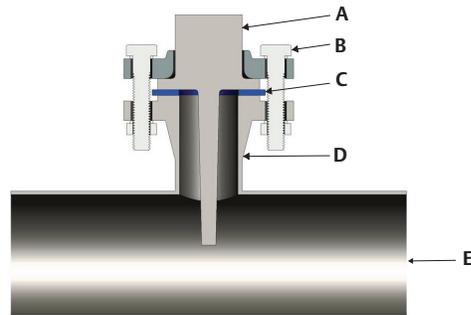
★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery lead time. The Expanded offering is subject to additional delivery lead time.

| Root diameter (A) | |  | Ref. page |
|--|---|--|--|
| Axxx | x.xx-in., 0.36 to 3.15 inches in 0.01-in. increments (when ordered with dimension units code E) Examples: Code A040 = 0.4-in, Code A315 = 3.15-in. | | 76 |
| Axxx | xx.x mm, 10 to 80 mm in 0.5 mm increments (when ordered with dimension units code M) Examples: Code A100 = 10.0 mm, Code A755 = 75.5 mm | | 76 |
| Tip diameter (B) | |  | |
| Bxxx | x.xx-in., 0.36 to 1.83 inches in 0.01-in. increments (when ordered with dimension units code E) Examples: Code B040 = 0.4-in, Code B180 = 1.80-in. | | 77 |
| Bxxx | xx.x mm, 10 to 46 mm in 0.5 mm. increments (when ordered with dimension units code M) Examples: Code B100 = 10.0 mm, Code B455 = 45.5 mm | | 77 |
| Non-standard bore diameter (d) | | Details | Image |
| D01 | 0.276-in./7.0 mm | Standard = 0.26-in. (6.6mm) |  |
| D03 | 0.138-in./3.5 mm | | |
| D04 | 0.386-in./9.8 mm | | |
| D05 | 0.354-in./9.0 mm | | |
| D06 | 0.433-in./11.0 mm | | |
| Non-standard tip thickness (t) | | | |
| T01 | 0.197-in./5.0 mm | Standard = 0.25-in. (6.4 mm) |  |
| T02 | 0.236-in./6.0 mm | | |
| Lap flange material for Van Stone design | | | |
| C01 | No flange | Provides a Van Stone stem without a lap flange. | 79 |
| C02 | 316/316LSST flange | Provides a Van Stone stem with a 316/316LSST lap flange. | 79 |
| 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. | 79 |

Van Stone installation

Van Stone thermowells are installed using a lap joint flange which slips over the stub end of the thermowell. The lap joint flange has no flange face. Instead the flange is bolted over the stub end which acts as the flange face and compresses the gasket. The Rosemount 114C Thermowells come standard with spiral serrations on the stub end designed per the ASME B16.5 standard. These should be installed with an inside bolt circle (IBC) gasket/ring gasket, which extends to and is centered by the bolts. Other flange face options are available.

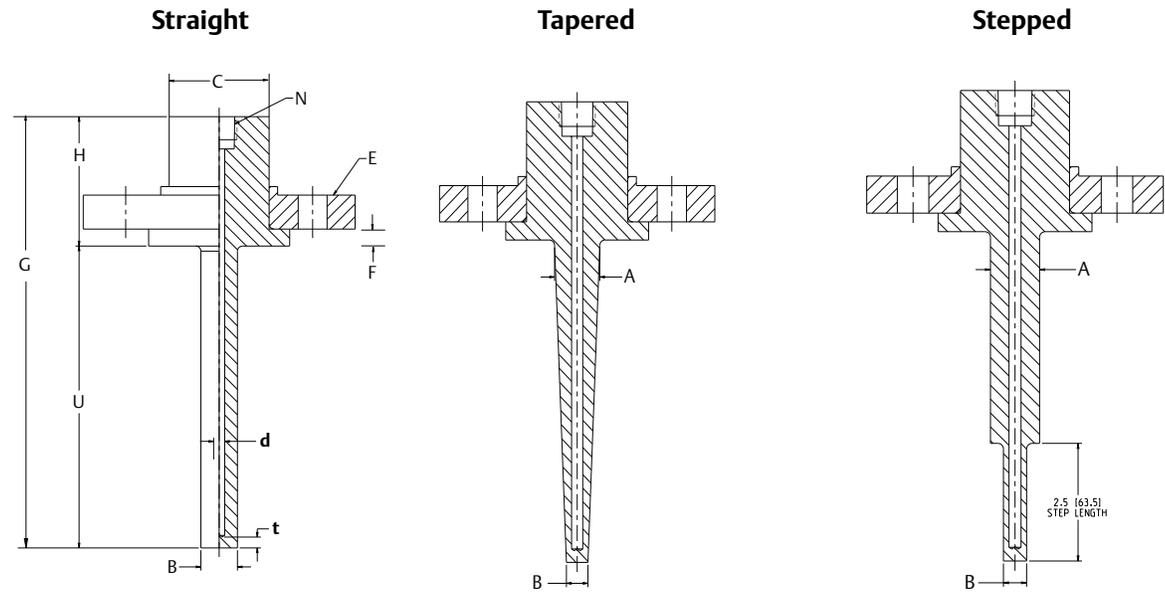
Figure 16. Installation Components



- A. Thermowell
- B. Bolt/washers
- C. Ring gasket
- D. Nozzle and mating flange
- E. Process

Van Stone thermowell drawings

Figure 17. Van Stone/Lap Flanged Mounted Thermowell Drawings⁽¹⁾



A. Root diameter
 B. Tip diameter
 C. Head diameter
 E. ASME B16.5 lap flange

F. Stub thickness
 H. Head length
 N. Instrument connection (1/2-in. NPT)
 U. Immersion length

d. Bore diameter
 t. Tip thickness

1. Total length = U + H.

Table 8. Van Stone/Lap Flanged Mounted Thermowells⁽¹⁾

| Code | Code V, Van Stone lap flange mounting style | Lagging diameter "C" | Stub diameter K standard raised face | Stub diameter K ring type joint option R16 | Stub thickness "F" standard raised face | Stub thickness "F" ring type joint option R16 | Root diameter stepped stem | Root diameter tapered stem | Tip diameter tapered stem | Tip diameter straight stem |
|------|---|----------------------|--------------------------------------|--|---|---|----------------------------|----------------------------|---------------------------|----------------------------|
| | Process connection | | | | | | | | | |
| AA | 1-in. Class 150 | 1.31 (33.4) | 1.99 (50.8) | 2.50 (63.5) | 10 (.394) | 0.644 (16.35) | 0.75 (19) | 0.89 (22.5) | 0.63 (16) | .75 (19) |
| AB | 1 1/2-in. Class 150 | 1.90 (48.3) | 2.87 (73) | 3.25 (82.5) | | 0.644 (16.35) | 0.85 (21.5) | 1.04 (26.5) | 0.71 (18) | .85 (21.5) |
| AC | 2-in. Class 150 | 2.37 (60.3) | 3.62 (92.1) | 4 (102) | | 0.644 (16.35) | 0.85 (21.5) | 1.04 (26.5) | 0.71 (18) | .85 (21.5) |
| AH | 1-in. Class 300 | 1.31 (33.4) | 1.99 (50.8) | 2.75 (70) | | 0.644 (16.35) | 0.75 (19) | 0.89 (22.5) | 0.63 (16) | .75 (19) |
| AJ | 1 1/2-in. Class 300 | 1.90 (48.3) | 2.87 (73) | 3.56 (90.5) | | 0.644 (16.35) | 0.85 (21.5) | 1.04 (26.5) | 0.71 (18) | .85 (21.5) |
| AK | 2-in. Class 300 | 2.37 (60.3) | 3.62 (92.1) | 4.25 (108) | | 0.707 (17.92) | 0.85 (21.5) | 1.04 (26.5) | 0.71 (18) | .85 (21.5) |
| AL | 1-in. Class 400/600 | 1.31 (33.4) | 1.99 (50.8) | 2.75 (70) | | 0.644 (16.35) | 0.75 (19) | 0.89 (22.5) | 0.63 (16) | .75 (19) |
| AM | 1 1/2-in. Class 400/600 | 1.90 (48.3) | 2.87 (73) | 3.56 (90.5) | | 0.644 (16.35) | 0.85 (21.5) | 1.04 (26.5) | 0.71 (18) | .85 (21.5) |
| AN | 2-in. Class 400/600 | 2.37 (60.3) | 3.62 (92.1) | 4.25 (108) | | 0.707 (17.92) | 0.85 (21.5) | 1.04 (26.5) | 0.71 (18) | .85 (21.5) |
| AP | 1-in. Class 900/1500 | 1.31 (33.4) | 1.99 (50.8) | 2.81 (71.5) | | 0.644 (16.35) | 0.75 (19) | 0.89 (22.5) | 0.63 (16) | .75 (19) |
| AQ | 1 1/2-in. Class 900/1500 | 1.90 (48.3) | 2.87 (73) | 3.62 (92) | | 0.644 (16.35) | 0.85 (21.5) | 1.04 (26.5) | 0.71 (18) | .85 (21.5) |
| AR | 2-in. Class 900/1500 | 2.37 (60.3) | 3.62 (92.1) | 4.88 (124) | | 0.707 (17.92) | 0.85 (21.5) | 1.04 (26.5) | 0.71 (18) | .85 (21.5) |
| AS | 1-in. Class 2500 | 1.31 (33.4) | 1.99 (50.8) | 3.25 (82.5) | | 0.644 (16.35) | 0.75 (19) | 0.89 (22.5) | 0.63 (16) | .75 (19) |
| AT | 1 1/2-in. Class 2500 | 1.90 (48.3) | 2.87 (73) | 4.50 (114) | | 0.707 (17.92) | 0.85 (21.5) | 1.04 (26.5) | 0.71 (18) | .85 (21.5) |
| AU | 2-in. Class 2500 | 2.37 (60.3) | 3.62 (92.1) | 5.25 (133) | | 0.707 (17.92) | 0.85 (21.5) | 1.04 (26.5) | 0.71 (18) | .85 (21.5) |

1. Dimensions are in inches (millimeters).

Rosemount 114C Welded Thermowells

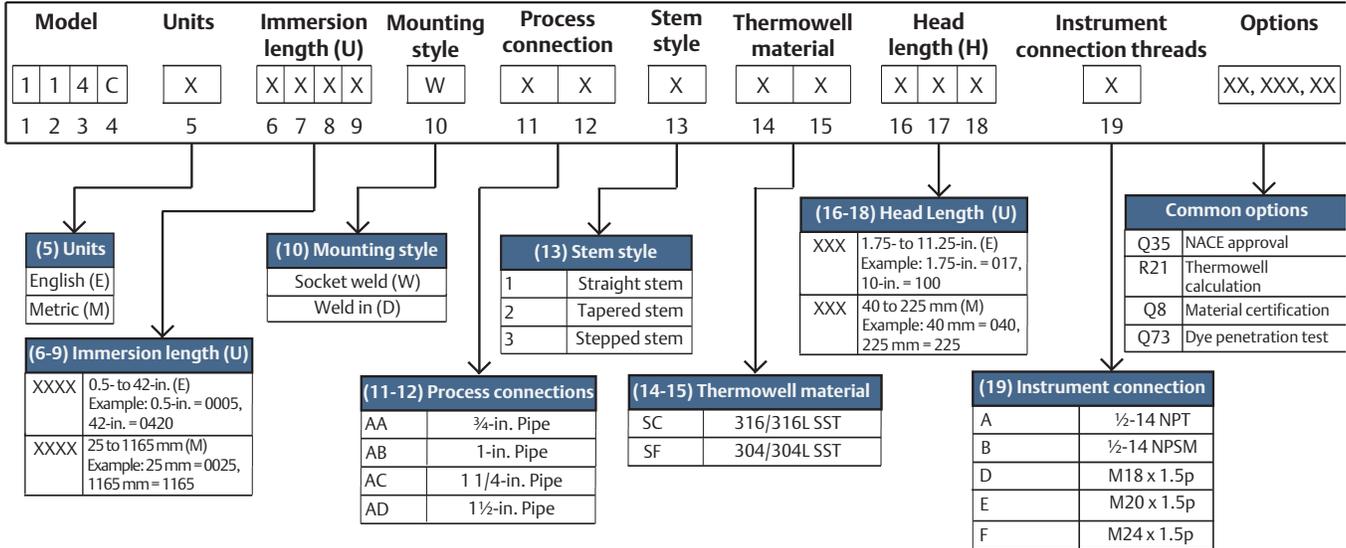


Welded thermowell overview

Welded thermowells are permanently welded to process pipes or tanks. Welded 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.

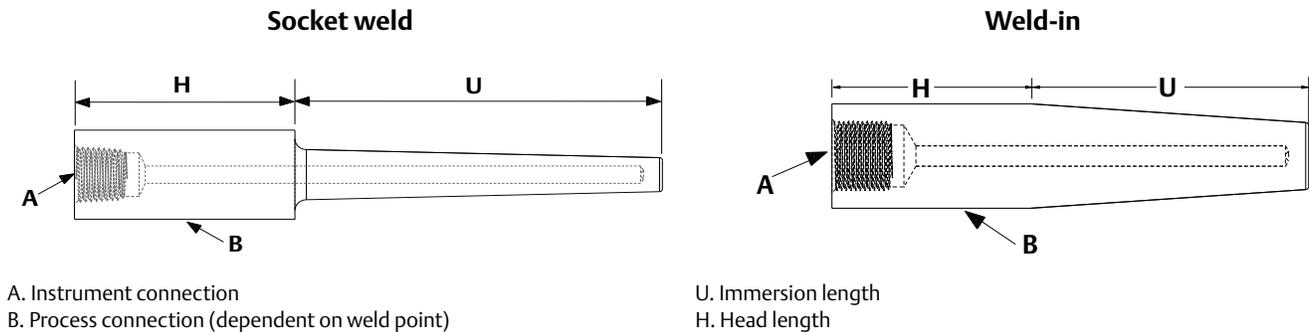
The standard offering figure below shows the thermowell configurations that can typically be shipped in two weeks or less.

Figure 18. Standard Offering–Welded



The common options shown in Figure 18 represent a partial offering; reference the [Rosemount 114C Welded Ordering Information](#) for a full list of available options.

Figure 19. Welded Thermowell Components



Note

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

Use the form below to record your model code:

| Model | | | | Units | Immersion length (U) | Mounting style | Process connection | Stem style | Thermowell material | Head length (H) | Instrument connection | Options |
|-------|---|---|---|-------|----------------------|----------------|--------------------|------------|---------------------|-----------------|-----------------------|---------|
| 1 | 1 | 4 | C | | | | | | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 through 9 | 10 | 11 and 12 | 13 | 14 and 15 | 16 through 18 | 19 | XXXXX |

Welded ordering information

Figure 20. 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 | 1 | 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.

Table 9. Rosemount 114C Welded Ordering Information

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery lead time. The Expanded offering is subject to additional delivery lead time.

| Place #s 1-4 | Model | Details | | 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 | |
| Place # 5 | Dimension units | | | | |
| ★ E | English units (inches) | Specifies whether length units will be in inches (in) or millimeters (mm) | | 56 | |
| ★ M | Metric units (mm) | | | 56 | |
| Place # 6-9 | Immersion length (U) | | | | |
| ★ xxxx | xxx-in., 1 to 100 inches in 1/4-in. increments (when ordered with dimension units code E) Example of a 6.25-in. length where the second decimal is dropped off: 0062 | | | 56 | |
| ★ xxxx | xxxx mm, 25 to 2500 mm in 5 mm increments (when ordered with dimension units code M) Example of a 50 mm length: 0050 | | | 56 | |
| Place # 10 | Mounting style | | | | |
| ★ W | Welded–socket weld | | | N/A | |
| ★ D | Welded–weld-in (only available in tapered stem profile) | | | N/A | |
| Place #s 11-12 | Process connections | | | | |
| | Welded–socket weld (W) | | Welded–weld-in (D) (only available in tapered stem profile) | | |
| ★ AA | 3/4-in. pipe | | 3/4-in. pipe | | N/A |
| ★ AB | 1-in. pipe | | 1-in. pipe | | N/A |
| ★ AC | 1 1/4-in pipe | | 1 1/4-in pipe | | N/A |
| ★ AD | 1 1/2-in. pipe | | 1 1/2-in. pipe | | N/A |
| AE | N/A | | Custom diameters (required for Root [Axxx] and tip [Bxxx] modifications) | | N/A |

Table 9. Rosemount 114C Welded Ordering Information

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery lead time. The Expanded offering is subject to additional delivery lead time.

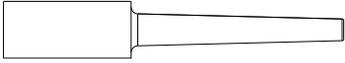
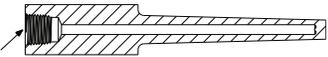
| | | | | | |
|-----------------|--------------|--|--|---|------------------|
| | DA | N/A | DIN 43772-4-7 (18 h7/3.5 mm bore/M14) | N/A | |
| | DB | N/A | DIN 43772-4-7 (24 h7/7.0 mm bore/M18) | N/A | |
| | DC | N/A | DIN 43772-4-7 (26 h7/7.0 mm bore/G ¹ / ₂ or M20) | N/A | |
| | DD | N/A | DIN 43772-4-7 (26 h7/9.0 mm bore/G ¹ / ₂ or M20) | N/A | |
| | DE | N/A | DIN 43772-4-7 (32 h11/11.0 mm bore/G ³ / ₄ or M27) | N/A | |
| Place # | 13 | Stem style | Details | Image | Ref. page |
| ★ | 1 | Straight | Minimum immersion length = 1-in. (25 mm) |  | 57 |
| ★ | 2 | Tapered | Minimum immersion length = 1-in. (25 mm) |  | 57 |
| ★ | 3 | Stepped | Minimum immersion length = 3-in. (75 mm) |  | 57 |
| Place #s | 14-15 | Thermowell material | Details | | |
| ★ | SC | 316/316L dual rated | | | 58 |
| | SD | 316/316L dual rated (NORSOK) | Must order the Q8 Material Certificate to get NORSOK documentation | | 59 |
| ★ | SF | 304/304L dual rated | | | 58 |
| ★ | CS | Carbon steel (A-105) | | | 58 |
| | SG | 316Ti SST | | | 58 |
| | SL | 310 SST | | | 58 |
| | SM | 321 SST | | | 58 |
| | AB | Alloy B3 | | | 58 |
| | AC | Alloy C-276 | | | 58 |
| | AG | Alloy 20 | | | 58 |
| | AH | Alloy 400 | | | 58 |
| | AK | Alloy 600 | | | 58 |
| | MO | Molybdenum | | | 58 |
| | CA | Chrome-Moly Grade B-11/F-11 Class II | | | 58 |
| | CB | Chrome-Moly Grade B-22/ F-22 Class III | | | 58 |
| | CC | Chrome-Moly Grade F-91 | | | 58 |
| | NK | Nickel 200 | | | 58 |
| | TT | Titanium Grade 2 | | | 58 |
| | DS | Super duplex SST Grade F-53 | | | 58 |
| | DT | Super duplex – NORSOK | Must order the Q8 Material Certificate to get NORSOK documentation | | 59 |

Table 9. Rosemount 114C Welded Ordering Information

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery lead time. The Expanded offering is subject to additional delivery lead time.

| | | | | |
|-----------------------|------------------------------|---|---|------------------|
| | DU | Duplex 2205 Grade F51 | | 58 |
| | DV | Duplex 2205 – NORSOK | Must order the Q8 Material Certificate to get NORSOK documentation | 59 |
| Place #s 16-18 | Head length (H) | |  | Ref. page |
| ★ | xxx | xx.x-in., 1.75 to 11.25 inches in 1/4-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 = 1.75-in.) | | 60 |
| ★ | 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 = 45 mm) | | 60 |
| Place # 19 | Instrument connection | Details | Image | |
| ★ | A | 1/2-14 NPT |  | 61 |
| ★ | B | 1/2-14 NPSM | | 61 |
| | C | 3/4-14 NPT | | 61 |
| | D | M18 × 1.5p | | 61 |
| | E | M20 × 1.5p | | 61 |
| | F | M24 × 1.5p | | 61 |
| | G | G 1/2-in. (BSPF) | | 61 |
| | H | G 3/4-in. (BSPF) | | 61 |
| | J | M27 × 2p | | 61 |
| | K | M14 × 1.5p | | 61 |

Options (include with selected model number)

| | | | | |
|--|-----|--|--|----|
| Sensor/thermowell assemble to options | | Details | Ref. page | |
| ★ | XT | Hand tight assembly of sensor and thermowell | Sensor is threaded into thermowell but only hand tightened | 62 |
| Extended product warranty | | | | |
| ★ | WR3 | 3-year limited warranty | This warranty option extends manufacturer’s warranty to three or five years for manufacturer related defects | 62 |
| ★ | WR5 | 5-year limited warranty | | 62 |
| Thermowell calculation | | | | |
| ★ | R21 | Thermowell calculation | Set of calculations to ensure thermowells are safe in certain process conditions | 63 |

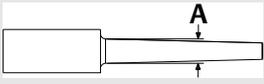
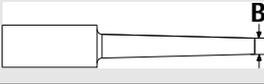
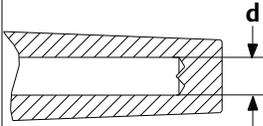
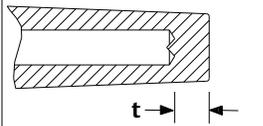
Table 9. Rosemount 114C Welded Ordering Information

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery lead time. The Expanded offering is subject to additional delivery lead time.

| NACE approval | | Details | Ref. page | |
|-------------------------------------|-----|------------------------------|--|----|
| ★ | Q35 | NACE approval | Meets MR0175/ISO 15156 and MR0103 requirements | 63 |
| PMI testing | | | | |
| | Q76 | PMI testing | Verifies chemical composition of material | 64 |
| Material certification | | | | |
| ★ | Q8 | Material certification | Certificate for material conformance and traceability in accordance with EN 10204 type 3.1 | 64 |
| Material tests | | | | |
| | M01 | Low temperature Charpy Test | Measures the low temperature ductility of the material | 64 |
| | M02 | Ultrasonic material test | Examination of steel forgings for flaws and inclusions | 65 |
| Surface finish | | | | |
| | Q16 | Certification | Certificate showing measured surface finish values | 65 |
| | R14 | Finish < Ra 0.3µm (12µin) | Improves surface roughness of thermowell | 65 |
| Electropolish | | | | |
| | R20 | Electropolish | Improves smoothness and surface quality | 65 |
| Hydrostatic pressure test | | | | |
| ★ | Q85 | Internal pressure test | Verifies internal structural integrity of thermowell | 66 |
| Canadian Registration Number | | | | |
| | Q17 | Canadian Registration Number | Canadian approvals for all provinces (Approved materials in reference section) | 67 |
| Dye penetration test | | | | |
| ★ | Q73 | Dye penetration test | Checks quality of welds and material | 67 |
| Wall thickness test | | | | |
| | Q83 | Ultrasonic test | Checks the bore concentricity of the thermowell | 68 |
| Special cleaning | | | | |
| | Q6 | Special cleaning | Oxygen enriched environment cleaning per ASTM G93 | 68 |
| Thermowell markings | | | | |
| | R40 | Test markings on thermowell | External marking of the thermowell for specific tests (see reference page for list of tests) | 68 |
| Spherical tip | | | | |
| | R60 | Spherical tip | Changes the flat tip to spherical | 69 |
| Plug and chain | | | | |
| | R06 | Stainless steel | Protects thermowell threads when sensor is not installed | 69 |
| | R23 | Brass | | 69 |

Table 9. Rosemount 114C Welded Ordering Information

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery lead time. The Expanded offering is subject to additional delivery lead time.

| Vent hole | | Details | Ref. page |
|---------------------------------------|---|---|---|
| R11 | Vent hole | Allows for the venting of a thermowell | 70 |
| Root diameter (A) | |  | |
| Axxx | x.xx-in., 0.36 to 3.15 inches in 0.01-in. increments (when ordered with dimension units code E) Examples: Code A040 = 0.4-in, Code A315 = 3.15-in. | | 76 |
| Axxx | xx.xx mm, 10 to 80 mm in 0.5 mm increments (when ordered with dimension units code M) Examples: Code A100 = 10.0 mm, Code A755 = 75.5 mm | | 76 |
| Tip diameter (B) | |  | |
| Bxxx | x.xx-in., 0.36 to 1.83 inches in 0.01-in. increments (when ordered with dimension units code E) Examples: Code B040 = 0.4-in, Code B180 = 1.80-in. | | 77 |
| Bxxx | xx.xx mm, 10 to 46 mm in 0.5 mm. increments (when ordered with dimension units code M) Examples: Code B100 = 10.0 mm, Code B455 = 45.5 mm | | 77 |
| Non-standard bore diameter (d) | | Details | Image |
| D01 | 0.276-in./7.0 mm | Standard = 0.26-in. (6.6 mm) |  |
| D03 | 0.138-in./3.5 mm | | |
| D04 | 0.386-in./9.8 mm | | |
| D05 | 0.354-in./9.0 mm | | |
| D06 | 0.433-in./11.0 mm | | |
| Non-standard tip thickness (t) | | | |
| T01 | 0.197-in./5.0 mm | Standard = 0.25-in. (6.4 mm) |  |
| T02 | 0.236-in./6.0 mm | | |

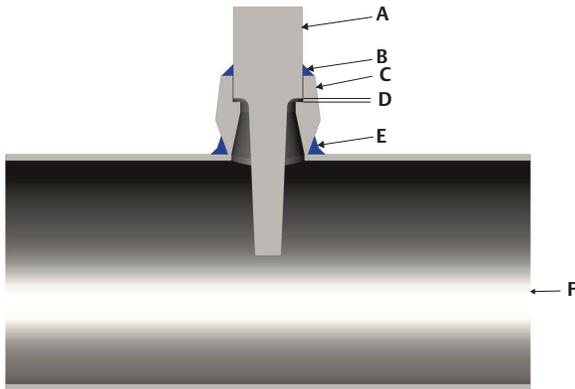
Socket weld installation

Socket weld thermowells are typically welded into a socket weld fitting. Welds should be designed according to the appropriate standards. It is important to order a head length (H) that leaves enough space so the instrument threads will not be deformed by welding at installation. The customer should also make sure the root diameter of the thermowell will fit through the inner diameter of the weld fitting.

Note

When specified in a thermowell calculation, the unsupported length for a socket weld thermowell is from the point of weld (B shown on [Figure 21 on page 51](#)) to the thermowell tip.

Figure 21. Installation Components

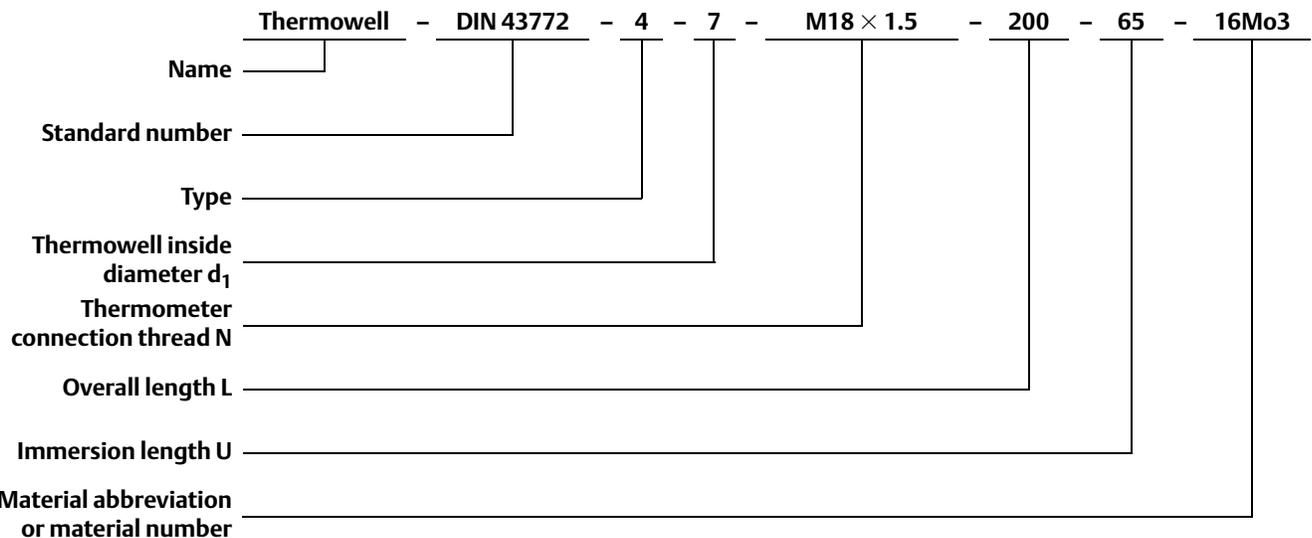


- A. Thermowell
- B. Weld
- C. Socket weld fitting
- D. 1/16-in. gap
- E. Weld
- F. Process

Weld-in Type 4 thermowells according to DIN 43772

This section only defines the requirement necessary to provide a Type 4 thermowell according to the DIN 43772 Standard (for ordering information on weld-in thermowells outside the DIN Standard, see [Table 9 on page 46](#)).

The illustration below shows the breakdown of a model according to the DIN Standard:



[Table 10](#), [Table 11](#), and [Table 12](#) show all required thermowell dimensions necessary to conform to DIN 43772 Type 4 and the relationship to the Rosemount 114C Thermowell.

Ordering process

- Select overall length (L) and immersion length (U) from [Table 10](#).

$U = 65 \text{ mm}$

$L = 200 \text{ mm}$

$H = L - U = 135 \text{ mm}$

Rosemount 114C = U = **0065**

Rosemount 114C = H = **135**

Table 10. DIN Required Lengths

| Immersion length (U) | | Overall length (L) (U + H) | Head length (H) | |
|----------------------|------|-------------------------------|-----------------|------|
| (mm) | Code | (mm) | (mm) | Code |
| 65 | 0065 | 110 | 45 | 045 |
| 65 | 0065 | 140 | 75 | 075 |
| 65 | 0065 | 200 | 135 | 135 |
| 125 | 0125 | 260 | 135 | 135 |
| 275 | 0275 | 410 | 135 | 135 |

2. Select process connection (PC), instrument connection (IC), and bore diameter (BD) from Table 11.

PC = 18 h7/3.5 mm

IC = M14 × 1.5

BD = 3.5 mm

Rosemount 114C = 18 h7/3.5 mm = DA

Rosemount 114C = M14 × 1.5 = K

Rosemount 114C = 3.5 mm = D03

Table 11. DIN Connection Information

| Process connection (PC) | | Instrument connection (IC) | | Bore diameter (BD) | |
|-------------------------|------|--------------------------------------|------|--------------------|------|
| Type | Code | Internal threads | Code | (mm) | Code |
| 18 h7 | DA | M14 × 1.5 | K | 3.5 | D03 |
| 24 h7 | DB | M18 × 1.5 | D | 7.0 | D01 |
| 26 h7 | DC | G ¹ / ₂ (BSPF) | G | 7.0 | D01 |
| 26 h7 | DD | M20 × 1.5 | E | 9.0 | D05 |
| 32 h11 | DE | G ³ / ₄ (BSPF) | H | 11.0 | D06 |
| 32 h11 | DE | M27 × 2 | J | 11.0 | D06 |

3. Determine thermowell material from Table 12.

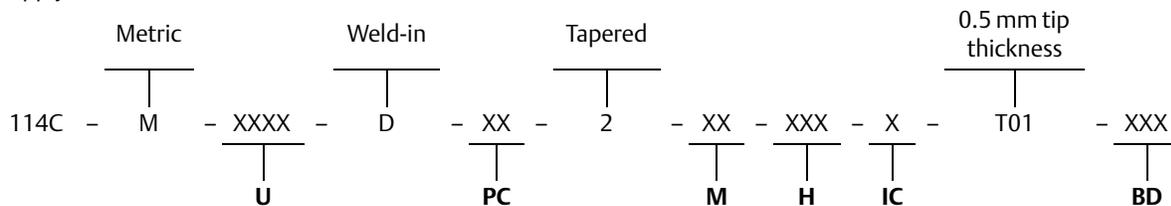
Material = 316 Ti SST

Rosemount 114C = 316 Ti SST = SG

Table 12. DIN Material

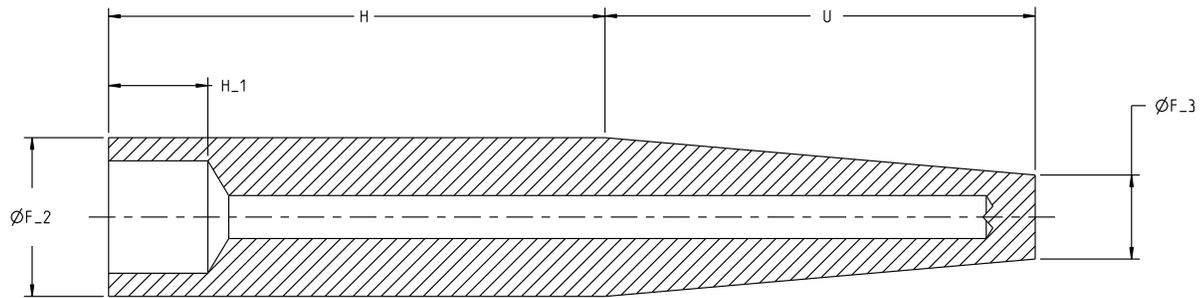
| Thermowell material (M) | Material code |
|--------------------------------------|---------------|
| Molybdenum DIN 1.5415 EN 10273 | MO |
| Chrome-Moly B-11 DIN 1.7335 EN 10273 | CA |
| Chrome-Moly B-22 DIN 1.7380 EN 10273 | CB |
| 316 Ti SST DIN 1.4571 EN 10272 | SG |

4. Apply to Rosemount 114C model as shown below:



Resulting model code example: 114C-M-0065-D-DA-2-SG-135-K-T01-D03

Figure 22. Weld Mounted Thermowell Drawings (Weld-in)



H. Head length
 Ø F₂, Ø F₃, and H₁, refer to Table 13.
 U. Immersion length

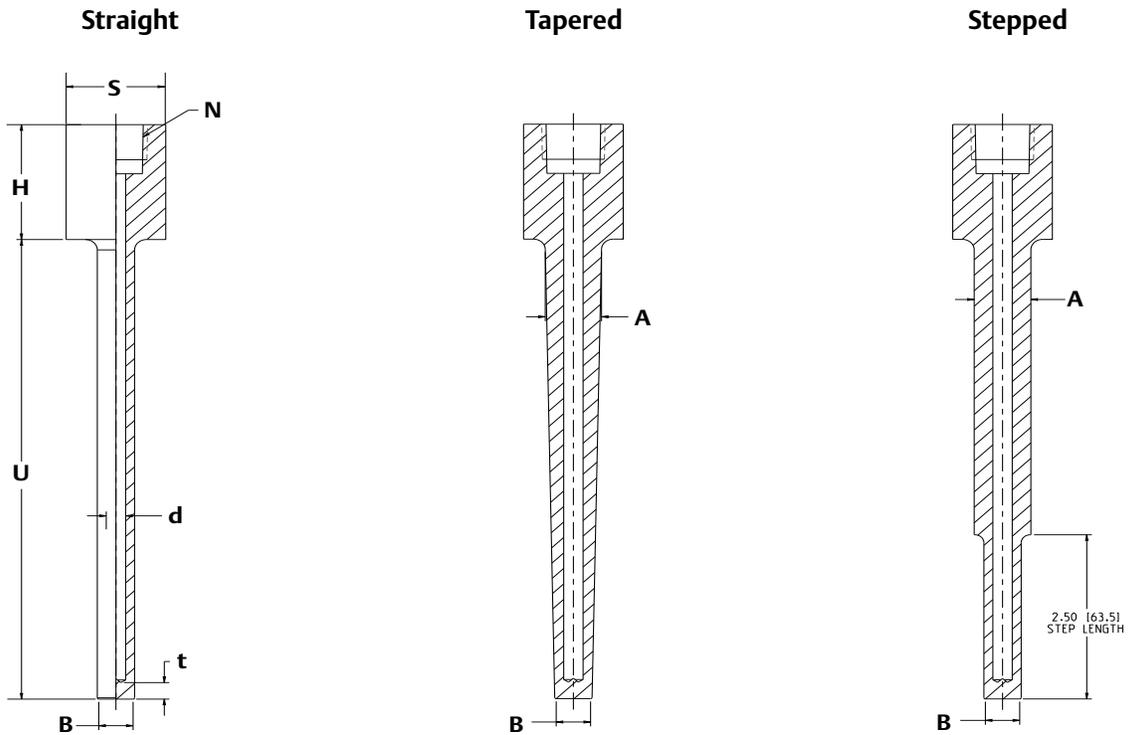
Table 13. DIN Weld Mounted Thermowells (Weld-in)⁽¹⁾

| Code | Code D, welded (weld-in) style | Head diameter “Ø F ₂ ” | Tip diameter “Ø F ₃ ” | Thread length “H ₁ ” |
|------|--|-----------------------------------|----------------------------------|---------------------------------|
| | Process connection | | | |
| DA | DIN 43772-4-7 (18 h7/3.5 mm bore/M14) | 18 h7 (+0.000/-0.018 mm) | 9 ±0.27 | 16 |
| DB | DIN 43772-4-7 (24 h7/7 mm bore/M18) | 24 h7 (+0.000/-0.021 mm) | 12.5 ±0.38 | 16 |
| DC | DIN 43772-4-7 (26 h7/7 mm bore/G ¹ / ₂ or M20) | 26 h7 (+0.000/-0.021 mm) | 12.5 ±0.38 | 19 |
| DD | DIN 43772-4-7 (26 h7/9 mm bore/G ¹ / ₂ or M20) | 26 h7 (+0.000/-0.021 mm) | 15 ±0.38 | 19 |
| DE | DIN 43772-4-7 (32 h11/11 mm bore/G ³ / ₄ or M27) | 32 h11 (+0.000/-0.160 mm) | 17 ±0.38 | 22 |

1. Dimensions are in inches (millimeters).

Welded thermowell drawings

Figure 23. Weld Mounted Thermowell Drawings (Socket Weld)⁽¹⁾



A. Root diameter
 B. Tip diameter
 H. Head length
 N. Instrument connection

S. Socket size
 U. Immersion length
 d. Bore diameter
 t. Tip thickness

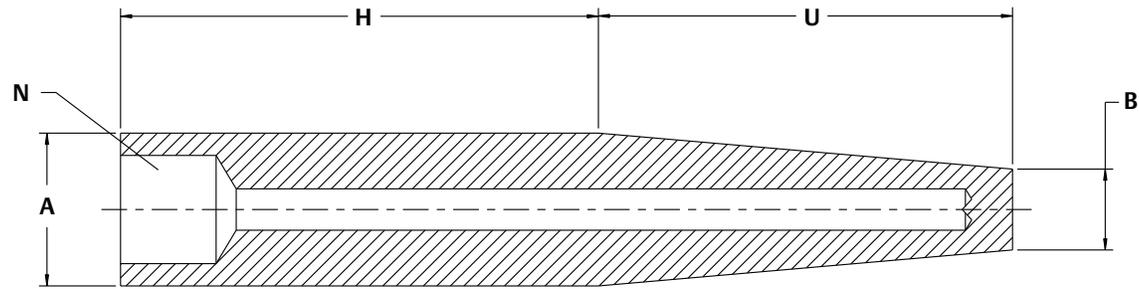
Table 14. Weld Mounted Thermowells (Socket Weld)⁽¹⁾

| Code | Code W, welded mounting style | Socket size “ \varnothing S” | Root diameter “ \varnothing A” | Tip diameter “ \varnothing B” |
|------|---|--------------------------------|----------------------------------|---------------------------------|
| | Process connection | | | |
| AA | ³ / ₄ -in. pipe | 1.05 (26.67) | 0.75 (19) | 0.50 (12.7) |
| AB | 1-in. pipe | 1.32 (33.4) | 0.75 (19) | 0.50 (12.7) |
| AC | 1 ¹ / ₄ -in. pipe | 1.66 (42.16) | 0.75 (19) | 0.50 (12.7) |
| AD | 1 ¹ / ₂ -in. pipe | 1.90 (48.26) | 0.75 (19) | 0.50 (12.7) |

1. Dimensions are in inches (millimeters).

1. Total length = U + H.

Figure 24. Weld Mounted Thermowell Drawings (Weld-in)⁽¹⁾



- A. Root diameter
- B. Tip diameter
- H. Head length
- N. Instrument connection
- U. Immersion length

Table 15. Weld Mounted Thermowells (Weld-in)⁽¹⁾

| Code | Code D, welded mounting style | Root diameter “Ø A” | Tip diameter “Ø B” |
|------|-------------------------------|-------------------------------------|-------------------------------------|
| | Process connection | | |
| AA | 3/4-in. pipe | 1.050 (26.67) | .748 (19) |
| AB | 1-in. pipe | 1.315 (33.40) | .846 (21.5) |
| AC | 1 1/4-in. pipe | 1.660 (42.16) | 1.043 (26.5) |
| AD | 1 1/2-in. pipe | 1.900 (48.26) | 1.250 (31.75) |
| AE | Custom | Specified by design modifier “AXXX” | Specified by design modifier “BXXX” |

1. Dimensions are in inches (millimeters).

1. Total length = U + H.

Ordering information detail

Dimension units

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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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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.

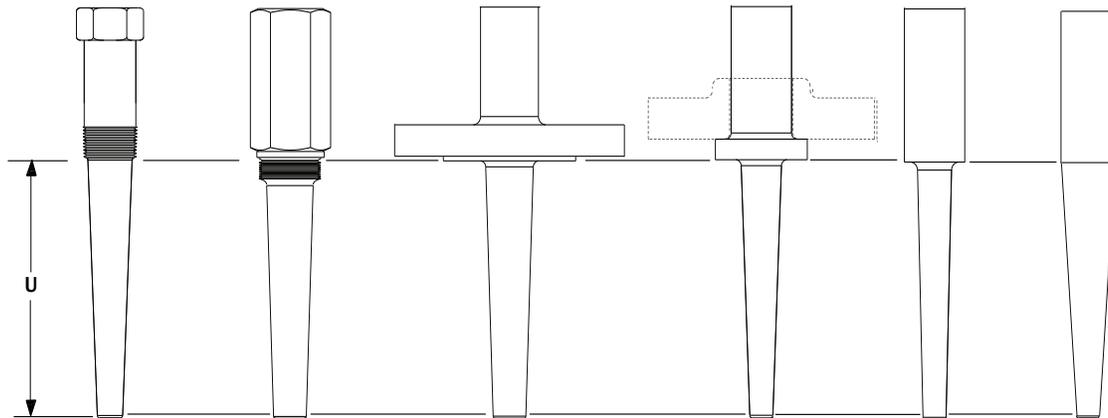


Table 16. Minimum Immersion Length by Profile Style

| Profile | Minimum length | Minimum length (parallel threads) |
|----------|----------------|-----------------------------------|
| Straight | 1-in. (25 mm) | 2-in. (50 mm) |
| Tapered | 1-in. (25 mm) | 2-in. (50 mm) |
| Stepped | 3 -in. (75 mm) | 4-in. (100 mm) |

Note

Long-length thermowells are those longer than 42-in. (1065 mm) and may be manufactured from two or three pieces of bar stock.

Stem style

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Straight style thermowells (1)

Straight style thermowells have the same diameter along the entire immersion length. They present the largest profile to the process medium and have the highest drag force compared to other styles with the same root diameter. Because of the large tip diameter, there is more mass to heat which slows the thermal response of the measurement assembly. The minimum immersion length (U) allowed with this profile is 1-in. (25 mm) except for parallel threaded thermowells that have a minimum immersion of 2-in. (50 mm).



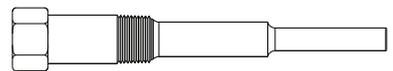
Tapered style thermowells (2)

Tapered style thermowells have an outside diameter that decreases uniformly from root to tip. For the same root diameter, this design represents a good compromise between straight and stepped thermowells. Its drag will be less than a straight style, but greater than a stepped style. The response time will be faster than a straight style and slower than a stepped style. The two general forms of a tapered stem are uniform (tapered from root to tip) and non-uniform (straight portion followed by tapered portion). Because of its profile shape, it is a good compromise for strength between the two other styles. It is the common choice for high velocity flow applications where the flow forces typically are too great to use a stepped well. The tapered design has faster response than the straight style offering an optimal balance of strength and response time factors. The minimum immersion length (U) allowed with this profile is 1-in. (25 mm) except for parallel threaded thermowells that have a minimum immersion of 2-in. (50 mm).



Stepped style thermowells (3)

Stepped style thermowells have two straight sections with the smaller diameter straight section at the tip. For the same root diameter as a straight profile thermowell, this design has less profile exposure to the flowing process and exhibits less drag force and quicker response time due to the smaller mass at the tip. In general, stepped thermowells will have thinner walls. By the geometry of its design, the stepped well has a higher natural frequency than the other styles with the same root diameter, and is less susceptible to vibration induced failure. Since this design has less material at the tip, its considered the best thermowell for fast time response. The minimum immersion length (U) allowed with this profile is 3-in. (75 mm) except for parallel threaded thermowells that have a minimum immersion of 4-in. (100 mm).



Thermowell material

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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 17. Thermowell Materials

| Code | Thermowell material | Flange material | Code | Thermowell material | Flange material |
|-------------------|---|--|------|---|--|
| SC | 316/316L SST UNS S31600/S31603 ASTM A479 | 316/316L SST UNS S31600/S31603 ASTM A182 or A240 | AB | Alloy B3 UNS N10001 ASTM B335 | Alloy B3 UNS N10001 ASTM B333 |
| SD ⁽¹⁾ | 316/316L SST dual rated (NORSOK) UNS S31600/S31603 ASTM A479 NORSOK M-630 MDS D57 | 316/316L SST dual rated (NORSOK) ⁽¹⁾ UNS S31600/S31603 ASTM A182 NORSOK M-630 MDS D54 | AC | Alloy C-276 UNS N10276 ASTM B574 | Alloy C-276 UNS N10276 ASTM B462 or B575 |
| SF | 304/304L SST UNS S30400/S30403 ASTM A479 | 304/304L SST UNS S30400/S30403 ASTM A182 or A240 | AD | Alloy C-4 UNS N06455 ASTM B574 | 304/304L SST UNS S30400/S30403 ASTM A182 or A240 |
| SG | 316T i SST UNS S31635 ASTM A479 | 316T i SST UNS S31635 ASTM A182 | AE | Alloy C-22 UNS N06022 ASTM B574 | 304/304L SST UNS S30400/S30403 ASTM A182 or A240 |
| SH ⁽²⁾ | 316/316L SST with Tantalum sheath UNS S31600/S31603 ASTM A479 | 316/316L SST with Tantalum sheath UNS S31600/S31603 ASTM A182 or A240 | AF | Alloy C-22 UNS N06022 ASTM B574 | 316/316L SST UNS S31600/S31603 ASTM A182 or A240 |
| | Tantalum sheath UNS R05252 | | AG | Alloy 20 UNS N08020 ASTM B473 | Alloy 20 UNS N08020 ASTM B462 or B463 |
| SJ | 316/316L SST w / PFA coating UNS S31600/S31603 ASTM A479 | 316/ 316L SST w / PFA coating UNS S31600/S31603 ASTM A182 or A240 | AH | Alloy 400 UNS N04400 ASTM B164 | Alloy 400 UNS N04400 ASTM B564 or B127 |
| SK | 304/304L SST with PTFE coating UNS S30400/S30403 ASTM A479 | 304/304L SST with PTFE coating UNS S30400/S30403 ASTM A182 or A240 | AJ | Alloy 400 UNS N04400 ASTM B164 | 304/304L SST UNS S30400/S30403 ASTM A182 or A240 |
| SL | 310 SST UNS S31008 ASTM A479 | 310 SST UNS S31008 ASTM A182 or A240 | AK | Alloy 600 UNS N06600 ASTM B166 | Alloy 600 UNS N06600 ASTM B564 or B168 |
| SM | 321 SST UNS S32100 ASTM A479 | 321 SST UNS S32100 ASTM A182 or A240 | AL | Alloy 600 UNS N06600 ASTM B166 | 304/304L SST UNS S30400/S30403 ASTM A182 or A240 |
| CS | Carbon steel UNS K03504 ASTM A105 | Carbon steel UNS K03504 ASTM A105, A216 GR WCB, or A515 GR 70 | MD | Molybdenum UNS R03600 ASTM B387 | Molybdenum UNS R03630 ASTM A204 or B386 |
| TT | Titanium grade 2 UNS R50400 ASTM B348 GR 2 | Titanium grade 2 UNS R50400 ASTM B381 GR 2 | CA | Chrome-Moly Grade B-11 UNS K11797 ASTM A739 GR B-11 | Chrome-Moly Grade F-11 UNS K11572 ASTM A182 GR F-11 CL2 or A387 GR11 CL2 |

Table 17. Thermowell Materials

| Code | Thermowell material | Flange material | Code | Thermowell material | Flange material |
|------|---|---|-------------------|---|--|
| DS | Super duplex UNS 32750 ASTM A479 GR F53 | Super duplex UNS 32750 ASTM A182 GR F53 or A240 | CB | Chrome-Moly Grade B-22 UNS K21390 ASTM A739 GR B-22 | Chrome-Moly Grade F-22 UNS K21590 ASTM A182 GR F-22 CL3, A217 GR WC9, or A387 GR22 CL2 |
| DU | Duplex 2205 UNS 31803 ASTM A479 GR F51 | Duplex 2205 UNS 31803 ASTM A182 GR F51 or A240 | DT ⁽¹⁾ | Super duplex (NORSOK) UNS 32750 ASTM A479 GR F53 NORSOK M-630 MDS D57 | Duplex 2205 (NORSOK) UNS 31803 ASTM A182 GR F53 NORSOK M-630 MDS D54 |
| CC | Chrome-Moly Grade F-91 UNS K90901 ASTM A182 | Chrome-Moly Grade F-91 UNS K90901 ASTM A182 GR F-9, A217 GR C12A, or A387 GR 91 CL2 | DV ⁽¹⁾ | Duplex 2205 (NORSOK) UNS 31803 ASTM A479 GR F51 NORSOK M-630 MDS D47 | Duplex 2205 (NORSOK) UNS 31803 ASTM A182 GR F51 NORSOK M-630 MDS D44 |
| NK | Nickel 200 UNS N02200 ASTM B160 | Nickel 200 UNS N02200 ASTM B162 or B564 | MO | Molybdenum UNS R03600 ASTM B387 DIN 1.5415 EN 10273 | Molybdenum UNS R03630 ASTM A204 or B386 DIN 1.5415 EN 10222-2 |

1. Material supplier qualified per NORSOK M-650; material qualified per NORSOK M-630.
2. Sheath thickness = 0.01-in. (0.38 mm).

NORSOK

Rosemount 114 Thermowell ordered with NORSOK will have raw material from a NORSOK M-650 approved supplier, material approved per NORSOK M-630 datasheet, and flange welding qualified to NORSOK M-601. The NORSOK material will also meet requirements of NACE MR0175/ISO 15156.

Q8 should be ordered to receive the MTR. The MTR will come with an M-650 Qualification Test Record (QTR) cover sheet. Additional testing required by the M-630 datasheet will be included in the MTR.

Some of the required testing for NORSOK Duplex in addition to ASTM requirements;

- Micrographic examination at 400 to 500× magnification
- Ferrite content analysis according to ASTM E 562 or by image analysis according to ASTM E 1245. Ferrite content shall be within 35–55 percent.
- Charpy V-notch testing according to ASTM A 370 at –46 °C. Minimum absorbed energy shall be 45 J average and 35 J single.
- Corrosion testing according to ASTM G 48 Method A. No pitting at 20× magnification; Weight loss shall be less than 4 g/m².

Full details of the material requirements can be found in the ASTM and NORSOK M-630 standards.

Head length (H)

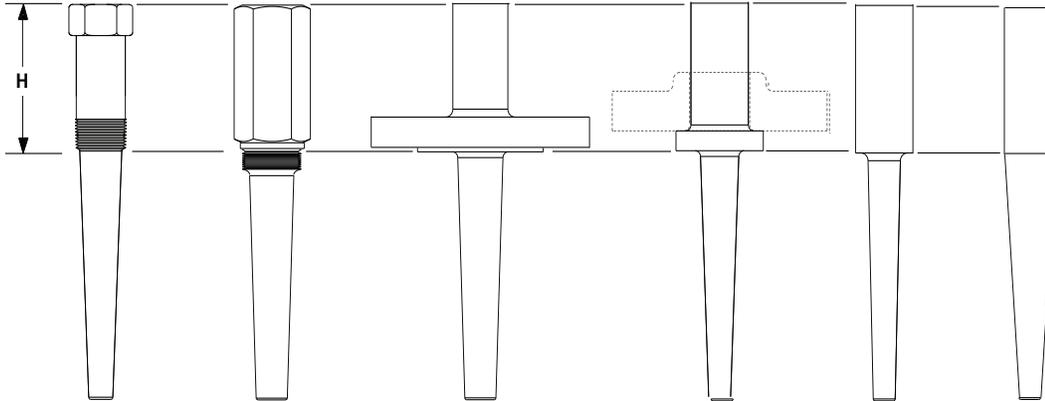
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Head length is the distance from the bottom of the process connection to the top of the thermowell. Each style has a minimum head length; the length specified must meet or exceed that minimum. It is shown below for all process connection styles.



Note

The industry standard minimum head length for flanged and Van Stone thermowells with connections under Class 900 (ASME B16.5) or PN 100 (EN 1092-1) is 2.25-in. (60 mm).

Table 18. Recommended Minimum Head Length⁽¹⁾

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

1. Dimensions are in inches (millimeters).

Table 19. Recommended Minimum Head Length by Connection Class for ASME B16.5⁽¹⁾

| Connection size | Connection class | | | | |
|-------------------------------|------------------|-----------|-----------|-----------|-----------|
| | 150 | 300 | 400/600 | 900/1500 | 2500 |
| Flanged | | | | | |
| ³ / ₄ | 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 ¹ / ₂ | 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 | | | | | |
| ³ / ₄ | 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 ¹ / ₂ | 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) | 350 (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 19. Recommended Minimum Head Length by Connection Class for ASME B16.5⁽¹⁾

| Connection size | Connection class | | | | |
|---------------------------|------------------|------------|----------------|-----------------|-------------|
| Van Stone | 150 | 300 | 400/600 | 900/1500 | 2500 |
| 1 | 1.75 (45) | 1.75 (45) | 1.75 (45) | 2.00 (50) | 2.25 (60) |
| 1 1/2 | 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 1/2 | 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) |

1. Dimensions are in inches (millimeters).

Table 20. Recommended Minimum Head Length by Connection Class for EN 1092-1⁽¹⁾

| Connection size | Connection class | | | | |
|-----------------|------------------|-----------------|-----------------|--------------|---------------|
| Flanged | PN 2.5/6 | PN 10/16 | PN 25/40 | PN 63 | PN 100 |
| DN 20 | 40 | 45 | | 50 | |
| DN 25 | 40 | 45 | | 50 | |
| DN 40 | 40 | 45 | | 50 | |
| DN 50 | 40 | 45 | | 55 | 60 |
| DN 65 | 40 | 45 | 50 | 55 | 60 |
| DN 80 | 40 | 45 | 50 | 55 | 60 |
| DN 100 | 40 | 45 | 50 | 55 | 60 |

1. Dimensions are in millimeters.

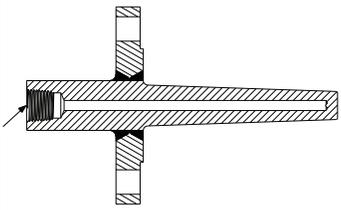
Instrument connection

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| Thread | Specification | Internal thread |
|------------------|---------------------------------|--|
| 1/2-14 NPT | SAE-AS 71082 |  |
| 1/2-14 NPSM | ASME B1.20.1, 8 threads minimum | |
| 3/4-14 NPT | SAE-AS 71082 | |
| M18 x 1.5p | BS 3643 | |
| M20 x 1.5p | | |
| M24 x 1.5p | | |
| M27 x 2p | | |
| M14 x 1.5p | | |
| G 1/2-in. (BSPF) | ISO 228/1 (BS 2779) | |
| G 3/4-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.

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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The ASME PTC 19.3TW-2016 is internationally recognized as a mechanical design standard yielding reliable thermowell service in a wide range of temperature measurement applications. It includes evaluation of stresses applied to a barstock thermowell as installed in a process based on the design, material, mounting method, and process conditions. The documentation provided will detail the process information, thermowell geometry, and comprehensive calculation analysis. It will also provide an acceptable or unacceptable statement based on the analysis.

There are four quantitative criteria in ASME PTC 19.3 TW-2016 for a thermowell to be found acceptable for a particular set of process conditions:

- **Frequency Limit:** the resonant frequency of the thermowell must be sufficiently high so that destructive oscillations are not excited by the fluid flow.
- **Dynamic Stress Limit:** the maximum primary dynamic stress must not exceed the allowable fatigue stress limit. If the design requires that the thermowell pass through the in-line resonance to get to the operating conditions, there is an additional fatigue check at resonance.
- **Static Stress Limit:** the maximum steady-state stress on the thermowell must not exceed the allowable stress, as determined by the Von Mises criteria.
- **Hydrostatic Pressure Limit:** the external pressure must not exceed the pressure ratings of the thermowell tip, shank, and flange (or threads).

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 Thermowell Calculations [White Paper](#). Emerson advises that all thermowells should have a wake frequency 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 approval (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 | NACE certified material |
|---------------|-------------------------|
| SC | 316/316L Dual Rated |
| SF | 304/304L Dual Rated |
| SL | 310 SST |
| SM | 321 SST |
| AB | Alloy B3 |
| AC | Alloy C-276 |
| AG | Alloy 20 |
| AH | Alloy 400 |

| Material code | NACE certified material |
|---------------|--|
| AK | Alloy 600 |
| CA | Chrome-Moly Grade B-11/F-11 Class II |
| CB | Chrome-Moly Grade B-22/ F-22 Class III |

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.

Low temperature Charpy test (M01)

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Test is performed in accordance with ASTM A370 and report will be include in the Material Traceability Report (Q8). This report must be ordered if any documentation is required. Charpy test will be done to check toughness of the raw bar and flange material used for the construction of the thermowell. The table below shows the material available with the option, test temperature, and acceptance criteria.

| Material | Material codes | Charpy temperature | Acceptance impact value |
|----------------|--|--------------------|--|
| Duplex | DS – Super duplex DT – Super duplex (NORSOK) DU – Duplex DV – Duplex (NORSOK) | -58 °F (-50 °C) | Average: 45 J (33 ft-lb) Minimum: 35 J (26 ft-lb) |
| 300 Series SST | SC – 316/316L SST SD – 316/316L SST (NORSOK) SF – 304/304L SG – 316 Ti SH – 316/316L with tantalum sheath SJ – 316/316L with PFA coating SK – 304/304L with PTFE coating SM – 321 SST | -321 °F (-196 °C) | Average: 60 J (44 ft-lb) Minimum: 55 J (41 ft-lb) |

Ultrasonic material test (M02)

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Ultrasonic examination will be done to check quality of the raw bar and flange material used for thermowell construction. The testing shall be performed in accordance with procedures specified in ASTM A388 by a Level 2 inspector. Calibration and acceptance criteria shall be per API 6A.

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 μ m 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 options R14 and R20).

Surface finish <Ra 0.3 μ m (12 μ in) (R14)

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Improves surface finish to be less than Ra 0.3 μ m. An improved surface finish will increase corrosion resistance and make the thermowell easier to clean. This is common in sanitary applications.

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 |

DIN flanged thermowells

Table 21. External Pressure Test–DIN

| DIN flanged thermowells | |
|--------------------------------------|---------------------|
| Nominal pressure (bar) | Test pressure (bar) |
| 16 | 40 |
| 40 | 100 |
| 100 | 250 |
| Test to 2.5× nominal pressure rating | |

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 |
| SH | 316 SST with Tantalum Sheath |
| SJ | 316L SST with PFA Coating |
| SK | 304 SST with PTFE Coating |
| SL | 310 SST |
| SM | 321 SST |
| AB | Alloy B3 |
| AC | Alloy C-276 |
| AG | Alloy 20 |
| AH | Alloy 400 |
| AJ | Alloy 400 (with 304 SST Flange) |
| AK | Alloy 600 |
| AL | Alloy 600(with 304 SST Flange) |
| 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 |
| CS | Carbon Steel (A-105) |
| TT | Titanium Grade 2 |
| DU | Duplex 2205 Grade F51 |

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.

Wall thickness test (Q83)

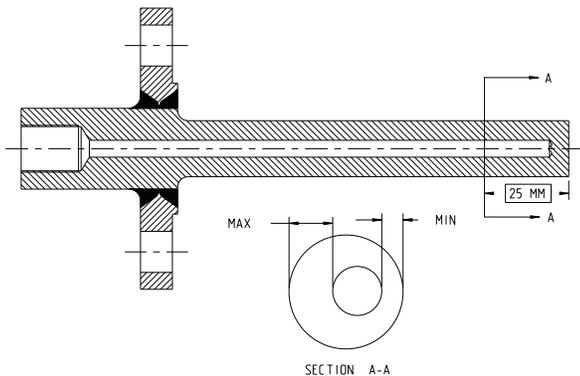
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Ultrasonic examination performed to check stem wall thickness. Min and max wall thickness measurements shall be recorded 25 mm or 1-in. from the thermowell tip. Bore position should be 10 percent of minimum stem wall thickness at nominal dimensions (see image below).



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 options 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.

Spherical tip (R60)

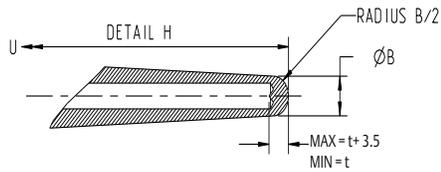
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Radius of spherical tip (B) is the same as the specified thermowell tip radius. Thermowell will still maintain specified “U” length.



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.

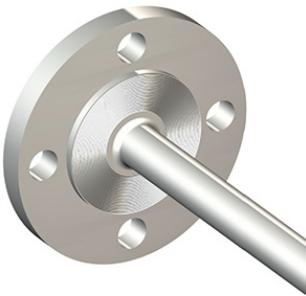
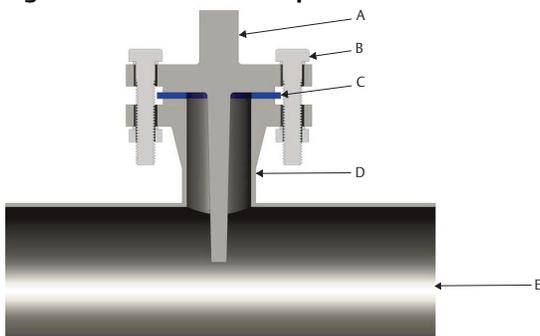


Figure 25. Installation Components



- A. Thermowell
- B. Bolt/washers
- C. Ring gasket
- D. Nozzle and mating flange
- E. Process

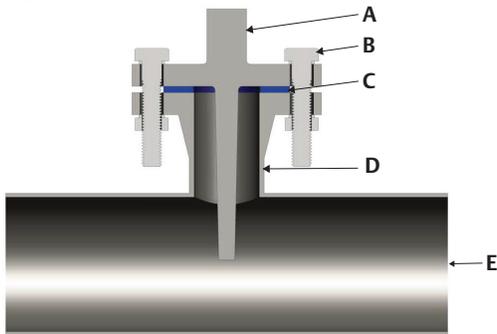
Flange face – flat (R10)

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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.



Figure 26. Installation Components



- A. Thermowell
- B. Bolt/washers
- C. Ring gasket
- D. Nozzle and mating flange
- E. Process

Raised face – Type B2 (R15)

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This option provides a smoother finish to the flange face compared to the standard Type B1 flange face.

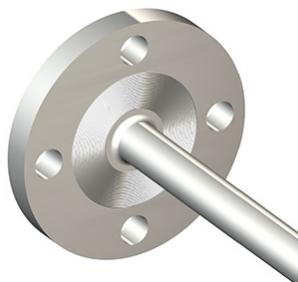
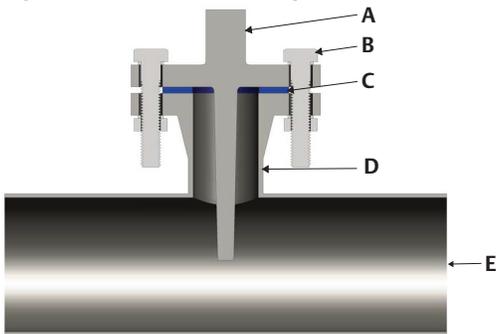


Figure 27. Installation Components



- A. Thermowell
- B. Bolt/washers
- C. Ring gasket
- D. Nozzle and mating flange
- E. Process

Flange face – RTJ (R16)

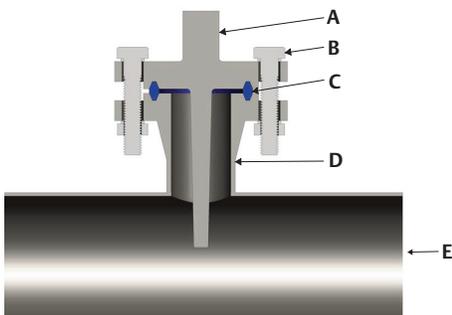
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This option changes the flange face so it has a ring type joint (RTJ). The RTJ flange face is common for high pressure applications using Class 600 flanges or higher. Both mating flanges have grooves that can accept a RTJ gasket which is usually made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



Figure 28. Installation Components



- A. Thermowell
- B. Bolt/washers
- C. Ring gasket
- D. Nozzle and mating flange
- E. Process

Flange face – groove, Type D (R18)

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Type C “tongue” will mount to Type D “groove”.

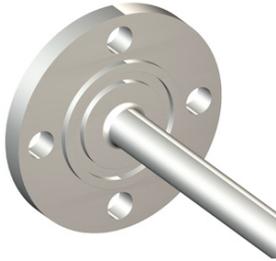
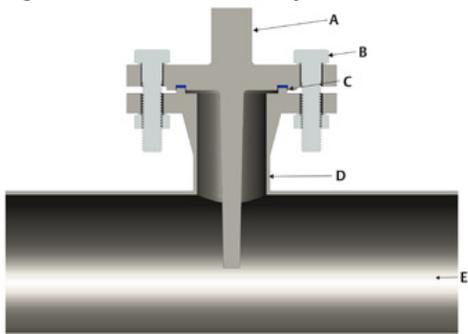


Figure 29. Installation Components



- A. Thermowell
- B. Bolt/washers
- C. Ring gasket
- D. Nozzle and mating flange
- E. Process

Flange face – tongue, Type C (R19)

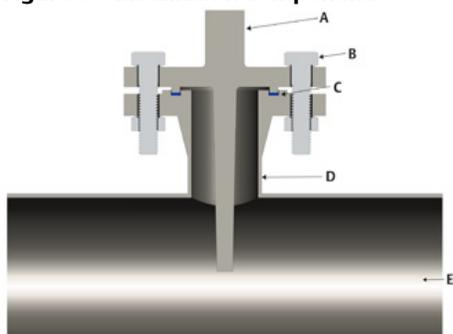
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Type C “tongue” will mount to Type D “groove”.



Figure 30. Installation Components



- A. Thermowell
- B. Bolt/washers
- C. Ring gasket
- D. Nozzle and mating flange
- E. Process

Flange face – spigot, Type E (R24)

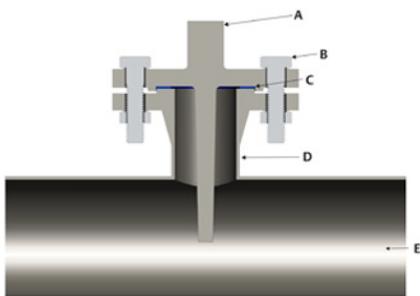
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Type E “spigot” will mount to type F “recess”.



Figure 31. Installation Components



- A. Thermowell
- B. Bolt/washers
- C. Ring gasket
- D. Nozzle and mating flange
- E. Process

Flange face – recess, Type F (R25)

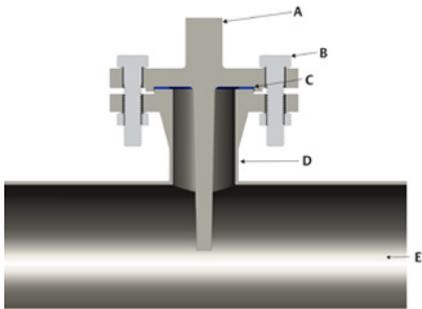
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Type E “spigot” will mount to type F “recess”.



Figure 32. Installation Components



- A. Thermowell
- B. Bolt/washers
- C. Ring gasket
- D. Nozzle and mating flange
- E. Process

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.

Figure 33. Wrench Flats

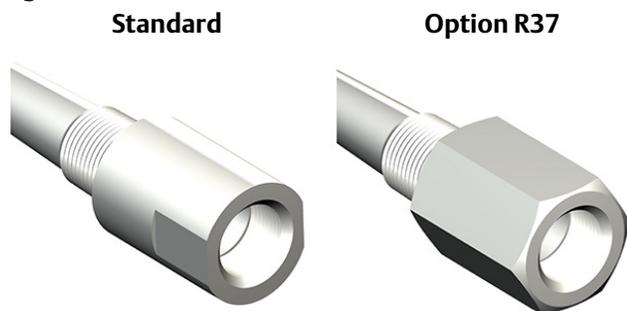


Table 22. Exotic Materials

| Code | Material | Code | Material | Code | Material |
|------|--|------|---|------|---|
| AB | Alloy B3 | AJ | Alloy 400 (with 304/304L SST flange) | NK | Nickel 200 |
| AC | Alloy C-276 | AK | Alloy 600 | TT | Titanium Grade 2 |
| AD | Alloy C-4 (with 304/304L SST flange) | AL | Alloy 600 with 304/304L SST flange) | DS | Super duplex SST Grade F-53 |
| AE | Alloy C-22 (with 304/304L SST flange) | MO | Molybdenum | DT | Super duplex SST Grade F-53 (NORSOK) |
| AF | Alloy C-22 (with 316/316L SST flange) | CA | Chrome-Moly Grade B-11/F-11 Class II | DU | Duplex 2205 Grade F-51 |
| AG | Alloy 20 | CB | Chrome-Moly Grade B-22/ F-22 Class III | DV | Duplex 2205 Grade F-51 (NORSOK) |
| AH | Alloy 400 | CC | Chrome-Moly Grade F-91 | | |

Root diameter (A0XX)

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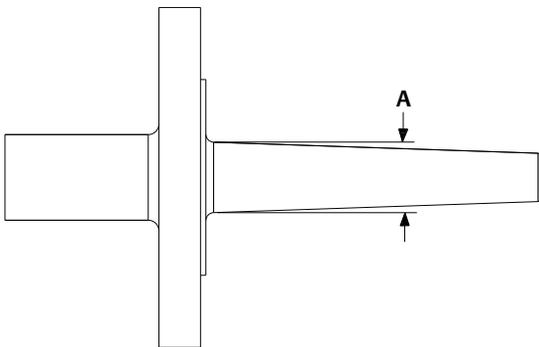
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Larger root diameters will provide greater strength. Changing the root diameter is helpful when designing a thermowell to pass wake frequency calculations.

Guidelines on specifying design modifiers based on the stem profile are as follows:

- Straight – only root diameter (Axxx) should be specified
- Tapered – both root (Axxx) and tip diameter (Bxxx) must be specified
- Stepped – if root diameter (Axxx) only is specified, the tip will be standard 0.5-in diameter; if tip diameter (Bxxx) is ordered, root diameter (Axxx) must also be specified



Tip diameter (B0XX)

Table 23. Sample Root Diameters

| Code | Dimension (E) | Code | Dimension (M) |
|------|---------------|------|---------------|
| A040 | 0.4-in. | A100 | 10 mm |
| A045 | 0.45-in. | A110 | 11 mm |
| A100 | 1.00-in. | A205 | 20.5 mm |
| A310 | 3.10-in. | A790 | 79 mm |
| A315 | 3.15-in. | A800 | 80 mm |

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Smaller tip diameters will improve time response. Changing the tip diameter is helpful when designing a thermowell to pass wake frequency calculations.

Guidelines on specifying design modifiers based on the stem profile are as follows:

- Straight – only root diameter (Axxx) should be specified
- Tapered – both root (Axxx) and tip diameter (Bxxx) must be specified
- Stepped – if root diameter (Axxx) only is specified, the tip will be standard 0.5-in. diameter; if tip diameter (Bxxx) is ordered, root diameter (Axxx) must also be specified

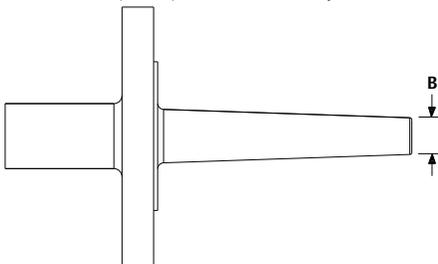


Table 24. Sample Tip Diameters

| Code | Dimension (E) | Code | Dimension (M) |
|------|---------------|------|---------------|
| B040 | 0.4-in. | B120 | 12 mm |
| B045 | 0.45-in. | B130 | 13 mm |
| B100 | 1.00-in. | B205 | 20.5 mm |
| B175 | 1.75-in. | B450 | 45 mm |
| B180 | 1.80-in. | B460 | 46 mm |

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.

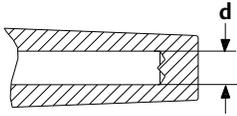


Table 25. Available Bore Diameters

| Code | Dimension | Code | Dimension (M) |
|------|------------------|------|------------------|
| D01 | 0.276-in./7.0 mm | D04 | 0.385-in./9.8 mm |
| D02 | 0.260-in./6.6 mm | D05 | 0.354-in./9 mm |
| D03 | 0.138-in./3.5 mm | D06 | 0.433-in./11 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

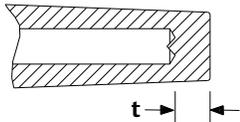


Table 26. Available Tip Thicknesses

| 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 316/316LSST 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: 114CE0030VAA2SC032A – carbon steel A105 lap flange with 316/316L SST thermowell stem provided (standard)



Example model: 114CE0030VAA2SC032AC01 – no lap flange, only thermowell stem provided



Example model: 114CE0030VAA2SC032AC02 – changes default carbon steel A105 lap cover flange to 316/316LSST flange



Example model: 114CE0030VAA2SC032AC03 – changes default cover flange to match thermowell stem material



Note

Coatings do not apply to lap flange.

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