# **Rosemount<sup>™</sup> Twisted Square<sup>™</sup> 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<sup>™</sup> Twisted Square<sup>™</sup> Thermowell**

## **Product overview**

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

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

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

## **Twisted Square Thermowell calculations**

- The Twisted Square thermowell calculations are performed based on the static stress and pressure stress limit criteria of the ASME PTC 19.3 TW-2016 design standard.
- Due to the revolutionary design of the Twisted Square, the dynamic and frequency limit criteria are not limiting factors. The design suppresses more than 90 percent of harmful vibrations that typically cause thermowell failure.
- The Twisted Square thermowell calculation report highlights process information, thermowell properties and calculation result (see Figure 1).



### Figure 1. Thermowell Calculation Report (R21)

## Wide range of thermowell options and certificates for any application

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

## Experience global consistency and local support from numerous worldwide Emerson<sup>™</sup> manufacturing sites

- World-class manufacturing provides globally consistent product from every factory and the capacity to fulfill the needs of any project, large or small.
- Experienced Instrumentation Consultants help select the right product for any temperature application and offer advice on best installation practices.
- An extensive global network of Emerson service and support personnel can be on-site when and where they are needed.



## Explore the benefits of Complete Point Solutions<sup>™</sup> from Emerson

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

# Selection guide

## Ensure the sensor fits the thermowell

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



## **Basic selection guide**

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

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

### **Thermowell length**

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

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

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

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

### **Mounting configuration**

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

### Thermowell material

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

# **Rosemount Twisted Square Threaded Thermowells**



## Threaded thermowell overview

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



The common options shown in Figure 2 represent a partial offering; reference the Rosemount Threaded Ordering Information for a full list of available options.

### Figure 3. Threaded Thermowell Components

### **Tapered threads**



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

#### Note

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

## Threaded ordering information

### Figure 4. Model Number Ordering Example

Model				Units Immersion length (U)				Mounting Process style connection			Stem style	Stem Thermowell style material			l leng	th (H)	Instrument connection	Options				
1	1	4	с		E	0	0	)	6	0	т		A	Α	т	s	с	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 Threaded Ordering Information

Pla	ace #s 1-4	Model	Details						
*	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					
P	ace# 5	Dimension units	Details						
*	E	English units (inches)	Specifies whether length units will be in inches (in) or millimators (mm)						
*	М	Metric units (mm)		40					
Pla	ace #s 6-9	Immersion length (U)		Ref. page					
*	xxxx	xxx.x-in., 2.00 to 40 inches in 1/4-	in. increments (when ordered with dimension units code E)	- 40					
		Example of a 6.25-in. length whe	ere the second decimal is dropped off: 0062						
*	xxxx	xxxx mm, 50 to 1000 mm in 5 m	m increments (when ordered with dimension units code M)	- 40					
		Example of a 50 mm length: 005	0						
P	ace # 10	Mounting style							
*	Т	Threaded		N/A					
Pla 1	ace #s 1-12	Process connection							
*	AB	<sup>3</sup> /4–14 NPT	Tapered threads	N/A					
*	AC	1–11.5 NPT	Tapered threads						
*	AD	1 <sup>1</sup> /2–11.5 NPT	Tapered threads						

P	lace # 13	Stem style	Details	Image	Ref. page			
*	Т	Twisted	Minimum immersion length 2-in. (50 mm)		N/A			
Pl 1	ace #s 4-15	Thermowell material			Ref. page			
*	SC	316/316L dual rated			41			
*	SF	304/304L dual rated			41			
*	CS	Carbon steel (A-105)			41			
	SL	310 SST			41			
	SM	321 SST			41			
	AB	Alloy B3			41			
	AC	Alloy C-276			41			
	AG	Alloy 20			41			
	AH	Alloy 400			41			
	AK	Alloy 600			41			
	CA	Chrome-Moly Grade B-11/F-11 Class II			41			
	СВ	Chrome-Moly Grade B-22/ F-22 Class III			41			
	СС	Chrome-Moly Grade F-91			41			
	NK	Nickel 200			41			
	TT	Titanium Grade 2			41			
	DS	Super duplex SST Grade F-53			41			
	DU	Duplex 2205 Grade F51			41			
P  1	ace # 6-18	Head length (H)			Ref. page			
*	xxx	xx.x-in., 1.75 to 11.25 inches in <sup>1</sup>	/4-in. increments (when ordered with o	limension units code E)	47			
Ĺ		Example of a 6.25-in. length whe	where the second decimal is dropped off: 062 (default head length = 1.75-in.)					
+	YYY	xxx mm, 40 to 225 mm in 5 mm	m increments (when ordered with dimension units code M)					
	~~~	Example of a 50 mm length: 050	(default head length = 45 mm)		-12			

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.

Р	lace # 19	Instrument connection	Details	Image	Ref. page
*	A	<sup>1</sup> /2–14 NPT			43
*	В	<sup>1</sup> /2–14 NPSM			43
	D	M18 x 1.5p	Female threads	A Martin Consult	43
	E	M20 x 1.5p			43
	G	G <sup>1</sup> /2-in. (BSPF)			43

## **Options** (include with selected model number)

Se op	ensor/t otions	hermowell assemble to	Details	Ref. page					
*	хт	Hand tight assembly of sensor and thermowell	Ensures sensor is threaded into thermowell but only hand tightened	44					
*	XW	Process-ready assembly of sensor and thermowell	Ensures sensor is threaded into thermowell and torqued for process-ready installation	44					
Sł	ielded	llength		Ref. page					
+	Cvvv	xx.x-in., 0.5 to 40 inches in 1/4-ir	n. increments (when ordered with dimension units code E)						
×	3XXX	Example of a 6.25-in. length whe	ere the second decimal is dropped off: 062						
+	Cvvv	xxx mm, 13 to 1000 mm in 1 mn	n increments (when ordered with dimension units code M)	- 11					
Î	3777	Example of a 50 mm length: 050	)						
Ex	tende	d product warranty	Details	Ref. page					
*	WR3	3-year limited warranty	Extends manufacturer's warranty to three or five years for manufacturer	45					
*	WR5	5-year limited warranty	related defects	45					
W	ake fre	equency calculation	Details	Ref. page					
*	R21	Thermowell calculation	Set of calculations to ensure thermowells are safe in certain process conditions	45					
N	ACE ap	proval	Details						
*	Q35	NACE approval	Meets MR0175/ISO 15156 and MR0103 requirements	45					

Ы	VI test	ing	Details	Ref. page						
	Q76	PMI testing	Verifies chemical composition of material	46						
М	aterial	certification	Details	Ref. page						
*	Q8	Material certification	Certificate for material conformance and traceability in accordance with EN 10204 type 3.1	46						
Sı	ırface f	finish	Details	Ref. page						
	Q16	Certification	Certificate showing measured surface finish values	46						
El	ectrop	olish	Details	Ref. page						
	R20	Electropolish	Improve smoothness and surface quality	46						
H	ydrosta	atic pressure test	Details	Ref. page						
*	Q5	External pressure test	Verifies structural quality and checks for leaks at thermowell process connection and stem	47						
*	Q85	Internal pressure test	Verifies internal structural integrity of thermowell	47						
Ca	anadia	n Registration Number	Details							
	Q17	Canadian Registration Number	Canadian approvals for all provinces (Approved materials in reference section)	47						
D	ye pen	etration test	Details	Ref. page						
*	Q73	Dye penetration test	Checks quality of material	48						
Sp	oecial c	leaning	Details	Ref. page						
	Q6	Special cleaning	Oxygen enriched environment cleaning per ASTM G93	48						
Tł	hermo	well markings	Details	Ref. page						
	R40	Test markings on thermowell	External marking of the thermowell for specific tests (see reference page for list of tests)							
Ve	ent hol	e	Details	Ref. page						
	R11	Vent hole	Allows for the venting of a thermowell and for indication that thermowell structural integrity has been compromised	50						

Tł	hermov	wells with wrench flats	Details					
	R37	Thermowells with wrench flats	Converts the two wrench flats to hex wrench flats; only applies to exotic materials					
N	on-sta	ndard bore diameter (d)	Details	Image				
	D01	0.276-in./7.0 mm	Default = 0.26-in. (6.6 mm)	d t	52			
Re	oot dia	meter (A)	Details	Image	Ref. page			
	A087	0.875-in. if ordering in English units (E)	Standard root diameter 0.75-in.	A +				
	A220	22.23 mm if ordering in Metric units (M)	Standard root diameter 19.05 mm					

## Threaded thermowell drawings

### Figure 5. Thread Mount Thermowell Drawings <sup>(1)</sup>



A. Root diameterP. Process connectionC. Total length (U + H)S. Shielded lengthd. Bore diametert. Tip thicknessE. Wrench allowanceU. Immersion length

- N. Instrument connection
- Table 2. Thread Mount Thermowells<sup>(1)</sup>

Codo	Code T, threaded mounting style	Wrench f	lat size "G"	Thread		
Code	Process connection "P"	Metric units (code M)	U.S. customary units (code E)	specification		
AB	<sup>3</sup> /4–14 NPT	1.18 (30)	1 <sup>1</sup> /8 (28.6)			
AC	1–11.5 NPT	1.34 (34)	1 <sup>1</sup> /4(31.8)	71051		
AD	1 <sup>1</sup> /2–11.5 NPT	1.89 (48)	1 <sup>3</sup> /4 (44.5)	(reference PS-71)		

1. Dimensions are in inches (millimeters).

<sup>1.</sup> Total length = U+ H.

# **Rosemount Twisted Square Flanged Thermowells**



## Flanged thermowell overview

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

### Full penetration weld (F)

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



### Partial penetration weld (P)

- Adequate for most process applications
- Weld withstands same pressure and temperature rating as flange

Lower cost than full penetration weld





The common options shown in Figure 6 represent a partial offering; reference the Rosemount Flanged Ordering Information for a full list of available options.

#### Figure 7. Flanged Thermowell Components



U. Immersion length

#### Note

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

## Flanged ordering information

### Figure 8. Model Number Ordering Example

Model				Units Immersion length (U)					n I)	Mounting Process connection			Stem style	Stem Thermowell style material			Head length (H)			Instrument connection	Options			
1	1	4	с		E	0		1	5	0		F		Α	с	Т		S	с	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 3. Rosemount Flanged Ordering Information

Pla	ace #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.	N/A								
P	ace # 5	Dimension units	Details									
*	E	English units (in)	Specifies whether length units will be in inches (in) or	40								
*	М	Metric units (mm)	millimeters (mm)	40								
Pl	ace # 6-9	Immersion length (U)										
*	XXXX	xx.x-in., 2 to 40 inches in 1/4-in. increments (when ordered with dimension units code E)										
	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Example of a 6.25-in. length where the sec	cond decimal is dropped off: 0062									
*	XXXX	xxxx mm, 50 to 1000 mm in 5 mm increments (when ordered with dimension units code M)										
	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Example of a 50 mm length: 0050										
P	ace # 10	Mounting style	Details									
*	Р	Flange, partial penetration weld	Weld refers to welding of the flange to thermowell stem	N/A								
*	F	Flange, full penetration weld	weld refers to welding of the hange to thermowell stem	N/A								
Pla 1	ace #s 1-12	Process connection	Details									
		Partial weld (P)	Full penetration weld (F)									
*	AA	1-in. Class 150	1-in. Class 150	N/A								
*	AB	11/2-in. Class 150	1 <sup>1</sup> /2-in. Class 150	N/A								

The starred offerings ( $\star$ ) represent the most common options and should be selected for best delivery. The non-starred offerings are subj	ect
to additional delivery lead time.	

*	AC	2-in. Class 150	2-in. Class 150		N/A
*	AD	3-in. Class 150	3-in. Class 150		N/A
*	AE	4-in. Class 150	4-in. Class 150		N/A
*	AF	6-in. Class 150	6-in. Class 150		N/A
*	AG	<sup>3</sup> /4-in. Class 300	<sup>3</sup> /4-in. Class 300		N/A
*	AH	1-in. Class 300	1-in. Class 300		N/A
*	AJ	1 <sup>1</sup> /2-in. Class 300	1 <sup>1</sup> /2-in. Class 300		N/A
*	AK	2-in. Class 300	2-in. Class 300		N/A
	AL	1-in. Class 400/600	1-in. Class 400/600		N/A
	AM	1 <sup>1</sup> /2-in. Class 400/600	1 <sup>1</sup> /2-in. Class 400/600		N/A
	AN	2-in. Class 400/600	2-in. Class 400/600		N/A
	AP	N/A	1-in. Class 900/1500		N/A
	AQ	N/A	1 <sup>1</sup> /2-in. Class 900/1500		N/A
	AR	N/A	2-in. Class 900/1500		N/A
	AT	N/A	1 <sup>1</sup> /2-in. Class 2500		N/A
	AU	N/A	2-in. Class 2500		N/A
	AV	3-in. Class 300	3-in. Class 300		N/A
	1	1	1		
Р	lace # 13	Stem style	Details	Image	Ref. page
*	T	Stem style	Details Minimum immersion length = 2-in. (50 mm)	Image	Ref. page
₽ ★ ₽ ₽ 1	lace # 13 T ace #s 14-15	Stem style Twisted Thermowell material	Details Minimum immersion length = 2-in. (50 mm)	Image	Ref. page N/A Ref. page
P * PI 1	lace # 13 T ace #s 4-15	Stem style         Twisted         Thermowell material         316/316L dual rated	Details Minimum immersion length = 2-in. (50 mm)	Image	Ref. page N/A Ref. page
P * PI 1 *	lace #         13         T         ace #s         4-15         SC         SF	Stem style         Twisted         Thermowell material         316/316L dual rated         304/304L dual rated	Details Minimum immersion length = 2-in. (50 mm)	Image	Ref. page N/A Ref. page 41
P * PI 1 * *	Iace #       13       T       ace #s       4-15       SC       SF       CS	Stem style         Twisted         Thermowell material         316/316L dual rated         304/304L dual rated         Carbon steel (A-105)	Details Minimum immersion length = 2-in. (50 mm)	Image	Ref.           page           N/A           Ref.           page           41           41           41           41
P * PI 1 * *	Iace #         13         T         ace #s         I4-15         SC         SF         CS         SL	Stem style         Twisted         Thermowell material         316/316L dual rated         304/304L dual rated         Carbon steel (A-105)         310 SST	Details Minimum immersion length = 2-in. (50 mm)	Image	Ref.           page           N/A           Ref.           page           41           41           41           41           41           41
P * PI 1 * *	lace #           13           T           ace #s           4-15           SC           SF           CS           SL           SM	Stem style         Twisted         Thermowell material         316/316L dual rated         304/304L dual rated         Carbon steel (A-105)         310 SST         321 SST	Details Minimum immersion length = 2-in. (50 mm)		Ref.           page           N/A           Ref.           page           41           41           41           41           41           41           41           41           41
P * PI 1 * *	lace #           13           T           ace #s           4-15           SC           SF           CS           SL           SM           AB	Stem style         Twisted         Thermowell material         316/316L dual rated         304/304L dual rated         Carbon steel (A-105)         310 SST         321 SST         Alloy B3	Details Minimum immersion length = 2-in. (50 mm)		Ref.           page           N/A           Ref.           page           41           41           41           41           41           41           41           41           41           41           41
P * PI 1 * *	Iace #           13           T           ace #s           4-15           SC           SF           CS           SL           SM           AB           AC	Stem styleTwistedThermowell material316/316L dual rated304/304L dual ratedCarbon steel (A-105)310 SST321 SSTAlloy B3Alloy C-276	Details Minimum immersion length = 2-in. (50 mm)	Image	Ref.           page           N/A           Ref.           page           41           41           41           41           41           41           41           41           41           41           41           41           41           41           41           41
P + PI 1 * *	Iace #         13         T         ace #s         J4-15         SC         SF         CS         SL         SM         AB         AC	Stem styleTwistedThermowell material316/316L dual rated304/304L dual rated304/304L dual ratedCarbon steel (A-105)310 SST321 SSTAlloy B3Alloy 20	Details Minimum immersion length = 2-in. (50 mm)		Ref.           page           N/A           Ref.           page           41           41           41           41           41           41           41           41           41           41           41           41           41           41           41           41           41           41           41

# 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.

	AK	Alloy 600			41		
	CA	Chrome-Moly Grade B-11/F-11 Class II			41		
	СВ	Chrome-Moly Grade B-22/ F-22 Class III			41		
	СС	Chrome-Moly Grade F-91			41		
	NK	Nickel 200			41		
	TT	Titanium Grade 2			41		
	DS	Super duplex SST Grade F-53			41		
	DU	Duplex 2205 Grade F51			41		
Pla 1	ace #s 6-18	Head length	Details		Ref. page		
		xx.x-in., 2.25 to 11.25 inches in 1/4-in. incre	ements (when ordered with dim	ension units code E)			
*	XXX	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)					
+	VVV	xxx mm, 45 to 225 mm in 5 mm increments (when ordered with dimension units code M)					
Î	~~~	Example of a 50 mm length: 050 (default h	nead length = 60 mm for flanges	under Class 900)	42		
Pl	ace # 19	Instrument connection	Details	Image	Ref. page		
*	А	<sup>1</sup> /2-14 NPT			43		
*	В	1/2-14 NPSM			43		
	D	M18 x 1.5p	Female threads		43		
	E	M20 x 1.5p			43		
	G	G 1/2-in. (BSPF)			43		

**Options** (include with selected model number)

Sł	nieldec	llength		Ref. page			
*	Sxxx xx.x-in., 1 to 40 inches in <sup>1</sup> /4-in. increments		s (when ordered with dimension units code E)				
	5,000	Example of a 6.25-in. length where the second decimal is dropped off: 062					
+	CVVV	xxx mm, 25 to 1000 mm in 1 mm increme	nts (when ordered with dimension units code M)	11			
Â	3777	Example of a 50 mm length: 050		44			
Se	ensor/t	hermowell assemble to options	Details	Ref. page			
*	XT	Hand tight assembly of sensor and thermowell	Ensures sensor is threaded into thermowell but only hand tightened	44			

*	XW	Process-ready assembly of sensor and thermowell	Ensures sensor is threaded into thermowell and torqued for process-ready installation	44
E	ktende	d product warranty	Details	Ref. page
*	WR3	3-year limited warranty	Extends manufacturer's warranty to three or five years for	45
*	WR5	5-year limited warranty	manufacturer related defects	45
Т	hermo	well calculation	Details	Ref. page
*	R21	Thermowell calculation	Set of calculations to ensure thermowells are safe in certain process conditions	45
N	ACE ap	proval	Details	Ref. page
*	Q35	NACE approval	Meets MR0175/ISO 15156 and MR0103 requirements	45
PI	MI test	ing	Details	Ref. page
	Q76	PMI testing	Verifies chemical composition of material	46
м	lateria	certification	Details	Ref. page
*	Q8	Material certification	Certificate for material conformance and traceability in accordance with EN 10204 type 3.1	46
Sı	urface	finish	Details	Ref. page
	Q16	Certification	Certificate showing measured surface finish values	46
El	ectrop	olish	Details	Ref. page
	R20	Electropolish	Improve smoothness and surface quality	46
Н	ydrost	atic pressure test	Details	Ref. page
*	Q5	External pressure test	Verifies structural quality and checks for leaks at thermowell process connection and stem	47
*	Q85	Internal pressure test	Verifies internal structural integrity of thermowell	47
C	anadia	n Registration Number	Details	Ref. page
	Q17	Canadian Registration Number	Canadian approvals for all provinces (Approved materials in reference section)	47
D	ye pen	etration test	Details	Ref. page
*	Q73	Dye penetration test	Checks quality of welds and material	48
S	pecial	leaning	Details	Ref. page
	Q6	Special cleaning	Oxygen enriched environment cleaning per ASTM G93	48

Т	nermo	well markings	Details		Ref. page	
	R40	Test markings on thermowell	External marking of the thermorpage for list of tests)	owell for specific tests (see reference	48	
X	-ray/ra	diograph test	Details			
	Q81	X-ray/radiograph	Verifies quality of full penetrati	on flange welds	49	
P	ug and	l chain	Details			
	R06	Stainless steel	Protects thermowell threads w	hen sensor is not installed	49	
	R23	Brass			49	
V	/ent hole		Details		Ref. page	
	R11	Vent hole	Allows for the venting of a ther	mowell	50	
Fl	Flange face		Details		Ref. page	
	R09	Concentric serrations	Concentric serrations on flange	e face per ASME B16.5	50	
	R10	Flat	Flat flange face per ASME B16.	5 or EN 1092-1 facing Type A	50	
	R16	RTJ	Ring type joint flange face per a	ASME B16.5	51	
N	on-sta	ndard bore diameter (d)	Details	Image	Ref. page	
	D01	0.276-in./7.0 mm	Standard = 0.26-in. (6.6 mm)	d d	52	
N	on-sta	ndard tip thickness (t)	Details	Image	Ref. page	
	T01	0.197-in./5.0 mm			52	
	T02	0.236-in./6.0 mm	Standard = 0.25-in. (6.4 mm)		52	
R	oot dia	meter (A)	Details Image		Ref. page	
	A087	0.875-in.	Standard root diameter 0.75-in.	A		
	A220	22.5 mm	Standard root diameter 19.05 mm		N/A	

## Flanged thermowell drawings





H. Head length

N. Instrument connection

t. Tip thickness U. Immersion length

	Table 4.	Flange	Mount	Thermowe	lls <sup>(1)</sup>
--	----------	--------	-------	----------	--------------------

	Code P, flange mounting style	Code F, flange mounting style	
Code	Partial penetration weld	Full penetration weld	Flanges per specification
	Process Co	onnection	•
AA	1-in. CLASS 150	1-in. CLASS 150	
AB	1 <sup>1</sup> /2-in. CLASS 150	1 <sup>1</sup> /2-in. CLASS 150	
AC	2-in. CLASS 150	2-in. CLASS 150	
AD	3-in. CLASS 150	3-in. CLASS 150	
AE	4-in. CLASS 150	4-in. CLASS 150	ASME B16.5
AF	6-in. CLASS 150	6-in. CLASS 150	
AG	<sup>3</sup> /4-in. CLASS 300	<sup>3</sup> /4-in. CLASS 300	
AH	1-in. CLASS 300	1-in. CLASS 300	
AJ	1 <sup>1</sup> /2-in. CLASS 300	1 <sup>1</sup> /2-in. CLASS 300	

## Table 4. Flange Mount Thermowells<sup>(1)</sup>

	Code P, flange mounting style	Code F, flange mounting style	
Code	Partial penetration weld	Full penetration weld	Flanges per specification
	Process Co	onnection	
AK	2-in. CLASS 300	2-in. CLASS 300	
AL	1-in. CLASS 400/600	1-in. CLASS 400/600	
AM	1 <sup>1</sup> /2"-in.CLASS 400/600	1 <sup>1</sup> /2-in. CLASS 400/600	ASME B16.5
AN	2-in. CLASS 400/600	2-in. CLASS 400/600	
AV	3-in CLASS 300	3-in CLASS 300	

1. Dimensions are in inches (millimeters).

# **Rosemount Twisted Square Van Stone Thermowells**



## Van Stone thermowell overview

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

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



The common options shown in Figure 10 represent a partial offering; reference the Rosemount Van Stone Ordering Information for a full list of available options.

Figure 11. Van Stone Thermowell Components



#### Note

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

## Van Stone ordering information

### Figure 12. Model Number Ordering Example

	Mo	odel			Unit	5	lr I	nmo eng	ersic th (L	J)	N	Mounting style	Pro conn	cess ection	Stem style	Ther ma	mowell terial	Hea	d leng	th (H)	Instrument connection	Options
1	1	4	c	:	м		0	1	5	0		V	A	В	т	S	с	0	5	0	A	WR5, Q76
1	2	3	4		5		6	7	8	9		10	11	12	13	14	15	16	17	18		XXXXX

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

### Table 5. Rosemount Van Stone Ordering Information

Pla	ace #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
P	ace # 5	Dimension units	Details	Ref. page
*	E	English units (inches)	Specifies whether length units will be in inches (in) or	40
*	М	Metric units (mm)	millimeters (mm)	40
P	ace # 6-9	Immersion length (U)		Ref. page
*	xxxx	xx.x-in., 2 to 40 inches in 1/4-in. incremer	nts (when ordered with dimension units code E)	40
		Example of a 6.25-in. length where the s	econd decimal is dropped off: 0062	
*	xxxx	xxxx mm, 50 to 1000 mm in 5 mm increa	ments (when ordered with dimension units code M)	40
		Example of a 50 mm length: 0050		
P	ace # 10	Mounting style	Details	
*	V	Van Stone, lap flange	Default cover flange material is carbon steel	N/A
Pla 1	ace #s 1-12	Process connection		
*	AA	1-in. Class 150		N/A
*	AB	11/2-in. Class 150		N/A
*	AC	2-in. Class 150		N/A
*	AH	1-in. Class 300		N/A

*	AJ	1 <sup>1</sup> /2-in. Class 300			N/A
*	AK	2-in. Class 300			N/A
*	AL	1-in. Class 400/600			N/A
*	AM	1 <sup>1</sup> /2-in. Class 400/600			N/A
*	AN	2-in. Class 400/600			N/A
	AP	1-in. Class 900/1500			N/A
	AQ	1 <sup>1</sup> /2-in. Class 900/1500			N/A
	AR	2-in. Class 900/1500			N/A
	AS	1-in. Class 2500			N/A
	AT	1 <sup>1</sup> /2-in. Class 2500			N/A
	AU	2-in. Class 2500			N/A
Р	lace #	Stem style	Details	Image	Ref.
	15				page
*	Т	Twisted	Minimum immersion length = 2-in. (50 mm)		N/A
<b>P</b>	ace #s 4-15	Thermowell material			Ref. page
Pl 1	ace #s 4-15 SC	Thermowell material     316/316L dual rated			Ref. page
Pl 1 *	<b>ace #s</b> <b>4-15</b> SC SF	Thermowell material         316/316L dual rated         304/304L dual rated			<b>Ref.</b> <b>page</b> 41 41
PI ↑ ★ ★	<b>ace #s</b> <b>4-15</b> SC SF CS	Thermowell material         316/316L dual rated         304/304L dual rated         Carbon steel (A-105)			Ref.           page           41           41           41
PI 1 * *	<b>ace #s</b> <b>4-15</b> SC SF CS SL	Thermowell material316/316L dual rated304/304L dual ratedCarbon steel (A-105)310 SST			Ref.           page           41           41           41           41
PI ↑ ★ ★	ace #s 4-15 SC SF CS SL SM	Thermowell material316/316L dual rated304/304L dual ratedCarbon steel (A-105)310 SST321 SST			Ref.           page           41           41           41           41           41           41           41
PI         1         ★         ★         ★	ace #s 4-15 SC SF CS SL SM AB	Thermowell material316/316L dual rated304/304L dual ratedCarbon steel (A-105)310 SST321 SSTAlloy B3			Ref.           page           41           41           41           41           41           41           41           41           41
PI         1         ★         ★         ★	ace #s 4-15 SC SF CS SL SM AB AC	Thermowell material316/316L dual rated304/304L dual ratedCarbon steel (A-105)310 SST321 SSTAlloy B3Alloy C-276			Ref.         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41
PI       1       ★       ★	ace #s 4-15 SC SF CS SL SM AB AC AG	Thermowell material316/316L dual rated304/304L dual ratedCarbon steel (A-105)310 SST321 SSTAlloy B3Alloy C-276Alloy 20			Ref.         Page         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41
PI       1       ★       ★	ace #s 4-15 SC SF CS SL SM AB AC AG AH	Thermowell material316/316L dual rated304/304L dual ratedCarbon steel (A-105)310 SST321 SSTAlloy B3Alloy 20Alloy 400			Ref.         Page         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41          41
PI 1 * *	ace #s 4-15 SC SF CS SL SM AB AC AG AH AK	Thermowell material316/316L dual rated304/304L dual ratedCarbon steel (A-105)310 SST321 SSTAlloy B3Alloy C-276Alloy 20Alloy 400Alloy 600			Ref.         Page         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41          41
	AC AC AC AC AC AC AC AC AC AC AC AC AC A	Thermowell material316/316L dual rated304/304L dual rated304/304L dual ratedCarbon steel (A-105)310 SST310 SSTAlloy S3Alloy C-276Alloy 20Alloy 400Alloy 600Chrome-Moly Grade B-11/F-11 Class II			Ref.         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41           41
	ACC ACC ACC ACC ACC ACC ACC ACC ACC ACC	Image: constraint of the provided with the provide			Ref.         Page         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41          41          41          41          41
	ace #s 4-15 SC SF CS SL SM AB AC AB AC AG AH AK CA CB CC	Image: constant of the section of t			Ref.         Page         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41          41          41          41          41
	ace #s 4-15 SC SF CS SL SM AB AC AB AC AG AH AK CA CB CC NK	Image: constraint of the section of			Ref.         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41         41           41          41          41          41          41          41          41          41          41          41          41     <

# 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.

	DS	Super duplex SST Grade F-53			41			
	DU	Duplex 2205 Grade F51			41			
Place #s 16-18		Head length (H)						
		xx.x-in., 1.75to 11.25 inches in <sup>1</sup> /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)						
+	~~~~	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)						
P	ace # 19	Instrument connection	Details	Image	Ref. page			
*	А	1/2-14 NPT		Π	43			
*	В	<sup>1</sup> /2–14 NPSM	1		43			
	D	M18 x 1.5p	Female threads		43			
	E	M20 x 1.5p			43			
	G	G 1/2-in. (BSPF)			43			

## **Options** (include with selected model number)

sI	nielded	length		Ref. page			
*	Sxxx	xx.x-in., 1 to 40 inches in 1/4-in. increments (when ordered with dimension units code E)					
	5,000	Example of a 6.25-in. length where the s	second decimal is dropped off: 062				
+	Svvv	xxx mm, 25 to 999 mm in 1 mm increments (when ordered with dimension units code M)					
Î	3	Example of a 50 mm length: 050		44			
Se	ensor/t	hermowell assemble to options	Details				
*	ХТ	Hand tight assembly of sensor and thermowell	Ensures sensor is threaded into thermowell but only hand tightened				
*	xw	Process-ready assembly of sensor and thermowell	Ensures sensor is threaded into thermowell and torqued for process-ready installation				

E	tende	d product warranty	Details	Ref. page	
*	WR3	3-year limited warranty	Extends manufacturer's warranty to three or five years for	45	
*	WR5	5-year limited warranty	manufacturer related defects	45	
Tł	nermov	vell calculation	Details	Ref. page	
*	R21	Thermowell calculation	Set of calculations to ensure thermowells are safe in certain process conditions	45	
N	АСЕ ар	proval	Details	Ref. page	
*	Q35	NACE approval	Meets MR0175/ISO 15156 and MR0103 requirements	45	
Ы	VI testi	ng	Details	Ref. page	
	Q76	PMI testing	Verifies chemical composition of material	46	
м	aterial	certification	Details	Ref. page	
*	Q8	Material certification	Certificate for material conformance and traceability in accordance with EN 10204 type 3.1	46	
Sı	ırface f	inish	Details	Ref. page	
	Q16	Certification	Certificate showing measured surface finish values	46	
El	ectrop	olish	Details	Ref. page	
	R20	Electropolish	Improve smoothness and surface quality	46	
H	ydrosta	atic pressure test	Details	Ref. page	
*	Q5	External pressure test	Verifies structural quality and checks for leaks at thermowell process connection and stem	47	
*	Q85	Internal pressure test	Verifies internal structural integrity of thermowell	47	
Ca	anadia	n Registration Number	Details	Ref. page	
	Q17	Canadian Registration Number	Canadian approvals for all provinces (Approved materials in reference section)	47	
D	ye pen	etration test	Details	Ref. page	
*	Q73	Dye penetration test	Checks quality of welds and material	48	
Sp	oecial c	leaning	Details		
	Q6	Special cleaning	Oxygen enriched environment cleaning per ASTM G93	48	

тΙ	hermo	well markings	Details		
	R40	Test markings on thermowell	External marking of the thermowell for specific tests (see reference page for list of tests)		
Р	ug and	chain	Details		Ref. page
	R06	Stainless steel	Protects thermowell threads	when sensor is not installed	49
	R23	Brass			49
V	ent hol	e	Details		Ref. page
	R11	Vent hole	Allows for the venting of a the	ermowell	50
FI	ange fa	ace	Details		Ref. page
	R09	Concentric serrations	Concentric serrations on flang	ge face per ASME B16.5	50
	R16	RTJ	Ring type joint flange face pe	r ASME B16.5	51
N	on-stai	ndard bore diameter (d)	Details	Image	Ref. page
	D01	0.276-in./7.0 mm	Standard = 0.26-in. (6.6mm)	d	52
N	on-stai	ndard tip thickness (T)	Details	Image	Ref. page
	T01	0.197-in./5.0 mm	Standard = 0.25 in		52
	T02	0.236-in./6.0 mm	(6.4 mm)		52
R	oot dia	meter (A)	Details	Image	Ref. page
	A087	0.875-in. if ordering in English units (E)	Standard root diameter 0.75-in.		
	A220	22.5 mm if ordering in Metric units (M)	Standard root diameter 19.05 mm		N/A
Lä	ap flang	ge material for Van Stone design	Details		
	C01	No flange	Provides a Van Stone stem without a lap flange		
	C02	316/316LSST flange	Provides a Van Stone stem wi	th a 316/316LSST lap flange	53
	C03	Flange per stem material	Provides a Van Stone stem wi material. Coatings do not app	th a matching lap flange per stem ly to lap flange.	53

## Van Stone thermowell drawings

### Figure 13. Van Stone Thermowells



A. Root diameterN. Instrument connectionC. Total length (U + H)P. Process connectiond. Bore diameterS. Shielded lengthE. Socket sizet. Tip thicknessF. Stub thicknessU. Immersion lengthH. Head lengthH. Head length

#### Table 6. Van Stone Mount Thermowells<sup>(1)</sup>

Code	Code V, Van Stone mounting style LAP flange Process connection	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
AA	1-in. CLASS 150	1.31 [33.4]	1.99 [50.8]	2.50 [63.5]		.644 [16.35]
AB	1 <sup>1</sup> /2-in. CLASS 150	1.90 [48.3]	2.87 [73]	3.25 [82.5]		.644 [16.35]
AC	2"-in. CLASS 150	2.37 [60.3]	3.62 [92.1]	4 [102]	.394 [10]	.644 [16.35]
AH	1-in. CLASS 300	1.31 [33.4]	1.99 [50.8]	2.75 [70]		.644 [16.35]
AJ	1 <sup>1</sup> /2-in. CLASS 300	1.90 [48.3]	2.87 [73]	3.56 [90.5]		.644 [16.35]

Code	Code V, Van Stone mounting style LAP flange Process connection	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
AK	2"-in. CLASS 300	2.37 [60.3]	3.62 [92.1]	4.25 [108]		.707 [17.92]
AL	1-in. CLASS 400/600	1.31 [33.4]	1.99 [50.8]	2.75 [70]		.644 [16.35]
AM	1 <sup>1</sup> /2-in. CLASS 400/600	1.90 [48.3]	2.87 [73]	3.56 [90.5]		.644 [16.35]
AN	2-in. CLASS 400/600	2.37 [60.3]	3.62 [92.1]	4.25 [108]		707 [17.92]
AP	1"-in. CLASS 900/1500	1.31 [33.4]	1.99 [50.8]	2.81 [71.5]	204 [10]	.644 [16.35]
AQ	1 <sup>1</sup> /2-in. CLASS 900/1500	1.90 [48.3]	2.87 [73]	3.62 [92]	.394[10]	.644 [16.35]
AR	2-in. CLASS 900/1500	2.37 [60.3]	3.62 [92.1]	4.88 [124]		707 [17.92]
AS	1-in. CLASS 2500	1.31 [33.4]	1.99 [50.8]	3.25 [82.5]		.644 [16.35]
AT	1 <sup>1</sup> /2-in. CLASS 2500	1.90 [48.3]	2.87 [73]	4.50 [114]		707 [17.92]
AU	2-in. CLASS 2500	2.37 [60.3]	3.62 [92.1]	5.25 [133]		707 [17.92]

### Table 6. Van Stone Mount Thermowells<sup>(1)</sup>

1. Dimensions are in inches (millimeters).

# **Rosemount Twisted Square 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 in Figure 13 shows the thermowell configurations that can typically be shipped in two weeks or less.

### Figure 13. Standard Offering–Welded



The common options shown in Figure 13 represent a partial offering; reference the Welded ordering information for a full list of available options.

#### Figure 14. Welded Thermowell Components - Socket Weld



A. Instrument connection

B. Process connection (dependent on weld point)

U. Immersion length

H. Head length

#### Note

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

## Welded ordering information

-				
				- 1
FIGUED 15		umbor()	rdorina	France
I IUUI C I J	INDUCTIN	unider Of	IUCIIIU	

	Мс	odel		ι	Jnits		mm leng	ersio th (l	J)	Mounting style	Pro conne	cess ection	Stem style	Thern mat	nowell erial	Head	l leng	th (H)	Instrument connection	Options
1	1	4	с		E	0	0	6	0	w	A	В	т	S	с	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 Welded Ordering Information

Pla	ace #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			
P	lace # 5	Dimension units	Details				
*	E	English units (inches)	Specifies whether length units will be in inches (in) or	40			
*	М	Metric units (mm)	millimeters (mm)	40			
P	lace # 6-9	Immersion length (U)		Ref. page			
*	xxxx	xxx-in., 2 to 40 inches in <sup>1</sup> /4-in. increments	(when ordered with dimension units code E)	40			
Example of a 6.25-in. length where the second decimal is dropped off: 0062							
*	~~~~	xxxx mm, 50 to 1000 mm in 5 mm increments (when ordered with dimension units code M)					
	<i>X</i> 000	Example of a 50 mm length: 0050					
P	lace # 10	Mounting style					
*	W	Welded-socket weld		N/A			
Pla 1	ace #s 1-12	Process connections					
		Welded–socket weld (W)					
*	AA	<sup>3</sup> /4-in. pipe		N/A			
*	AB	1-in. pipe		N/A			
*	AC	1 <sup>1</sup> /4-in pipe		N/A			
*	AD	1 <sup>1</sup> /2-in. pipe		N/A			

Ρ	lace # 13	Stem style	Details	Image	Ref. page				
*	Т	Twisted	Minimum immersion length = 2-in. (25 mm)		N/A				
Pl 1	ace #s 4-15	Thermowell material			Ref. page				
*	SC	316/316L dual rated			41				
*	SF	304/304L dual rated			41				
*	CS	Carbon steel (A-105)			41				
	SL	310 SST			41				
	SM	321 SST			41				
	AB	Alloy B3			41				
	AC	Alloy C-276			41				
	AG	Alloy 20			41				
	AH	Alloy 400			41				
	AK	Alloy 600			41				
	CA	Chrome-Moly Grade B-11/F-11 Class II			41				
	CB	Chrome-Moly Grade B-22/ F-22 Class III			41				
	СС	Chrome-Moly Grade F-91			41				
	NK	Nickel 200			41				
	TT	Titanium Grade 2			41				
	DS	Super duplex SST Grade F-53			41				
	DU	Duplex 2205 Grade F51			41				
Place #s 16-18		Head length (H)	H		Ref. page				
*	xxx	xx.x-in., 1.75 to 11.25 inches in <sup>1</sup> /4-in. incr	ements (when ordered with dime	nsion units code E)	42				
		Example of a 6.25-in. length where the se	cond decimal is dropped off: 062	(default head length = 1.75-in.)					
*	xxx	xxx mm, 40 to 225 mm in 5-mm incremer	nts (when ordered with dimensior	n units code M)	47				
		xample of a 50 mm length: 050 (default head length = 45 mm)							

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.

Р	lace # 19	Instrument connection	Details	Image	Ref. page
*	A	<sup>1</sup> /2–14 NPT			43
*	В	<sup>1</sup> /2–14 NPSM			43
	D	M18 x 1.5p	Female threads	43	
	E	M20 x 1.5p			43
	G	G 1/2-in. (BSPF)			43

## **Options** (include with selected model number)

Se	ensor/t	hermowell assemble to options	Details				
*	ХТ	Hand tight assembly of sensor and thermowell	Sensor is threaded into thermowell but only hand tightened	44			
sŀ	ielded	length	S S	Ref. page			
★ Sxxx		xx.x-in., .0.5 to 40 inches in <sup>1</sup> /4-in. increme	nts (when ordered with dimension units code E)	44			
		Example of a 6.25-in. length where the second decimal is dropped off: 062					
*	Sxxx	xxx mm, 13 to 1000 mm in 1 mm increme	ncrements (when ordered with dimension units code M)				
		Example of a 50 mm length: 050					
Ex	tende	d product warranty	Details	Ref. page			
*	WR3	3-year limited warranty	Extends manufacturer's warranty to three or five years for	45			
*	WR5	5-year limited warranty	manufacturer related defects	45			
Tł	iermov	well calculation	Details	Ref. page			
*	R21	Thermowell calculation	Set of calculations to ensure thermowells are safe in certain process conditions	45			
N	ACE ap	proval	Details	Ref. page			
*	Q35	NACE approval	Meets MR0175/ISO 15156 and MR0103 requirements	45			
PN	Al test	ing	Details				
	Q76	PMI testing	Verifies chemical composition of material	46			

Material certification			Details	Details	
*	Q8	Material certification	Certificate for material conform accordance with EN 10204 type	aance and traceability in e 3.1	46
S	Surface finish		Details		Ref. page
	Q16	Certification	Certificate showing measured	surface finish values	46
E	Electropolish		Details		Ref. page
	R20	Electropolish	Improves smoothness and surf	ace quality	46
н	ydrost	atic pressure test	Details		Ref. page
*	Q85	Internal pressure test	Verifies internal structural integ	rity of thermowell	47
C	anadia	n Registration Number	Details		Ref. page
	Q17	Canadian Registration Number	Canadian approvals for all prov reference section)	nces (Approved materials in	47
T	Thermowell markings		Details	Details	
	R40	Test markings on thermowell	External marking of the thermowell for specific tests (see reference page for list of tests)		48
S	pherica	al tip	Details		Ref. page
	R60	Spherical tip	Changes the flat tip to spherica	l	49
P	lug and	l chain	Details		Ref. page
	R06	Stainless steel	Protects thermowell threads w	hen sensor is not installed	49
	R23	Brass			49
Vent hole		e	Details		Ref. page
	R11 Vent hole		Allows for the venting of a ther	nowell	50
N	Non-standard bore diameter (d)		Details	Image	Ref. page
	D01	0.276-in./7.0 mm	Standard = 0.26-in. (6.6 mm)	d d	52

Non-standard tip thickness (t)			Details	Image	Ref. page
	T01	0.197-in./5.0 mm			52
	T02	0.236-in./6.0 mm	Standard = 0.25-in. (6.4 mm)		52
Root diameter (A)			Details	Image	Ref. page
	A087	0.875-in. if ordering in English units (E)	Standard root diameter 0.75-in.	<b>A</b>	
1	1	1	1		∣ N/A

## Welded thermowell drawings

### Figure 16. Welded Thermowells



A. Root diameterN. Instrument connectionC. Total length (U + H)P. Process connectiond. Bore diameterS. Shielded lengthE. Socket sizet. Tip thicknessF. Stub thicknessU. Immersion lengthH. Head lengthH. Head length

### Table 8. Welded Mount Thermowell<sup>(1)</sup>

Codo	Code W, welded mounting style	Sockotsiza	Root diameter	
Code	Process connection	SOCKET SIZE		
AA	<sup>3</sup> /4-in. pipe	1.05 [26.67]	.75 [19.05]	
AB	1-in. pipe	1.32 [33.40]	.75 [19.05]	
AC	1 <sup>1</sup> /4-in. pipe	1.66 [42.16]	.75 [19.05]	
AD	1 <sup>1</sup> /2-in. pipe	1.90 [48.26]	.75 [19.05]	

1. Dimensions are in inches (millimeters).

# **Ordering information detail**

## **Dimension units**

Back to Threaded ordering table Back to Flanged ordering table Back to Van Stone ordering table Back to Welded ordering table

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)

Back to Threaded ordering table

Back to Flanged ordering table Back to Van Stone ordering table

Back to Welded ordering table

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 9. Minimum Immersion Length by Profile Style

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

## Thermowell material

Back to Threaded ordering table Back to Flanged ordering table Back to Van Stone ordering table Back to Welded ordering table

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 10. Thermowell Materials

Code	Thermowell material	Flange material
SC	316/316L SST UNS S31600/S31603 ASTM A479	316/316L SST UNS S31600/S31603 ASTM A182 or A240
SF	304/304L SST UNS S30400/S30403 ASTM A479	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
SM	321 SST UNS S32100 ASTM A479	321 SST UNS S32100 ASTM A182 or A240
CS	Carbon steel UNS K03504 ASTM A105	Carbon steel UNS K03504 ASTM A105, A216 GR WCB, or A515 GR 70
TT	Titanium grade 2 UNS R50400 ASTM B348 GR 2	Titanium grade 2 UNS R50400 ASTM B381 GR 2
DS	Super duplex UNS 32750 ASTM A479 GR F53	Super duplex UNS 32750 ASTM A182 GR F53 or A240
DU	Duplex 2205 UNS 31803 ASTM A479 GR F51	Duplex 2205 UNS 31803 ASTM A182 GR F51or A240
СС	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

Code	Thermowell material	Flange material
NK	Nickel 200 UNS N02200 ASTM B160	Nickel 200 UNS N02200 ASTM B162 or B564
AB	Alloy B3 UNS N10001 ASTM B335	Alloy B3 UNS N10001 ASTM B333
AC	Alloy C-276 UNS N10276 ASTM B574	Alloy C-276 UNS N10276 ASTM B462 or B575
AG	Alloy 20 UNS N08020 ASTM B473	Alloy 20 UNS N08020 ASTM B462 or B463
AH	Alloy 400 UNS N04400 ASTM B164	Alloy 400 UNS N04400 ASTM B564 or B127
AK	Alloy 600 UNS N06600 ASTM B166	Alloy 600 UNS N06600 ASTM B564 or B168
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
СВ	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

## Head length (H)

Back to Threaded ordering table Back to Flanged ordering table Back to Van Stone ordering table Back to Welded ordering table

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



#### Note

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

#### Table 11. Recommended Minimum Head Length<sup>(1)</sup>

Process connection	Minimum head length (H)
Threaded	1 75 (45)
Welded	1.75 (45)

1. Dimensions are in inches (millimeters).

### Table 12. Recommended Minimum Head Length by Connection Class for ASME B16.5<sup>(1)</sup>

Connection size	Connection class				
Flanged	150	300	400/600	900/1500	2500
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
11/2	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

Connection size	Connection class					
Flanged with RTJ	150	300	400/600	900/1500	2500	
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	
11/2	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	
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)	
11/2	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)	
11/2	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)	

Table 12. Recommended Minimum Head Length by Connection Class for ASME B16.5<sup>(1)</sup>

1. Dimensions are in inches (millimeters).

## Instrument connection

Back to Threaded ordering table Back to Flanged ordering table Back to Van Stone ordering table Back to Wedded ordering table

## Table 13.

Thread	Specification
<sup>1</sup> /2–14 NPT	SAE-AS 71082
<sup>1</sup> /2–14 NPSM	ASME B1.20.1, 8 threads minimum
M18 x 1.5p	BS 3643
M20 x 1.5p	
G 1/2 in. (BSPF)	ISO 228/1 (BS 2779)

## Sensor/thermowell assemble to options (XT, XW)

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### ΧТ

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

### XW

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

## Shielded length (Sxxx)

Back to Threaded ordering table Back to Flanged ordering table Back to Van Stone ordering table Back to Welded ordering table

This option refers to the length of the untwisted part of the thermowell. Only the immersed portion of the thermowell needs to be twisted. For installation best practices, it is recommended that the twisted portion extends 0.5 in. (13 mm) into nozzle or standoff as shown in Figure 19. If the Sxxx option is not selected the following default lengths in the table below will be used.

#### Table 14.

Code	Description	Default /min S Length
ТАВ	Threaded <sup>3</sup> /4-14 ANPT	
TAC	Threaded 1-11.5 ANPT	0 [:= (12 -===)
WAA	Welded <sup>3</sup> /4-in. pipe	0.5 IN. (13 MM)
WAB Welded 1-in. pipe		
TAD Threaded 11/2 - 11.5 ANPT		
WAC Welded 1 <sup>1</sup> /4- in. pipe		
WAD Welded 1 <sup>1</sup> /2-in. pipe		1 in. (25 mm)
	All Flanges	
	All Van Stones	





## Extended product warranty (WR3, WR5)

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

## Thermowell calculation (R21)

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

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

## NACE approval (Q35)

Back to Threaded ordering table Back to Flanged ordering table Back to Van Stone ordering table Back to Welded ordering table

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. **Table 15.** 

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
AK	Alloy 600
CA	Chrome-Moly Grade B-11/F-11 Class II
СВ	Chrome-Moly Grade B-22/ F-22 Class III

## PMI testing (Q76)

Back to Threaded ordering table Back to Flanged ordering table Back to Van Stone ordering table Back to Welded ordering table

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)

Back to Threaded ordering table Back to Flanged ordering table Back to Van Stone ordering table Back to Welded ordering table

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.

#### Table 16.

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

## Surface finish certification (Q16)

Back to Threaded ordering table Back to Flanged ordering table Back to Van Stone ordering table Back to Welded ordering table

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  $\mu$  in. CLA N6 (0.8  $\mu$ 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 option R20).

## Electropolish (R20)

Back to Threaded ordering table Back to Flanged ordering table Back to Van Stone ordering table Back to Welded ordering table

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)

Back to Threaded ordering table Back to Flanged ordering table Back to Van Stone ordering table

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. **Table 17.** 

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

### **Threaded thermowells**

1500 psi

## Internal hydrostatic pressure test (Q85)

Back to Threaded ordering table Back to Flanged ordering table Back to Van Stone ordering table Back to Welded ordering table

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)

Back to Threaded ordering table Back to Flanged ordering table Back to Van Stone ordering table Back to Welded ordering table

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.

Table 18.

Material code	CRN approved 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
AK	Alloy 600
CA	Chrome-Moly Grade B-11/F-11 Class II
СВ	Chrome-Moly Grade B-22/F-22 Class III
СС	Chrome-Moly Grade F-91
CS	Carbon Steel (A-105)
TT	Titanium Grade 2
DU	Duplex 2205 Grade F51

## Dye penetration test (Q73)

Back to Threaded ordering table Back to Flanged ordering table Back to Van Stone ordering table

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, Article6 with an acceptance criteria per ASME Section III, Div 1 NB-2546. The certificate will document the inspectors name, dye penetration acceptance criteria, and test result.

## Special cleaning (Q6)

Back to Threaded ordering table Back to Flanged ordering table Back to Van Stone ordering table

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)

Back to Threaded ordering table Back to Flanged ordering table Back to Van Stone ordering table Back to Welded ordering table

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)

#### Back to Flanged ordering table

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

## Stainless steel plug and chain (R06)

Back to Threaded ordering table Back to Flanged ordering table Back to Welded ordering table

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)

Back to Threaded ordering table Back to Flanged ordering table Back to Welded ordering table

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)

Back to Threaded ordering table Back to Flanged ordering table Back to Van Stone ordering table Back to Welded ordering table

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)

#### Back to Flanged ordering table

#### Back to Van Stone ordering table

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



## Flange face – flat (R10)

#### Back to Flanged ordering table

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



## Flange face – RTJ (R16)

Back to Flanged ordering table Back to Van Stone ordering table

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



## Thermowells with wrench flats (R37)

#### Back to Threaded ordering table

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 20.



#### Table 19. Exotic Materials

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

## Bore diameter (d0X)

Back to Threaded ordering table Back to Flanged ordering table Back to Van Stone ordering table Back to Welded ordering table

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 20. Available Bore Diameters

Code	Dimension
D01	0.276-in./7.0 mm

## Tip thickness (TOX)

Back to Threaded ordering table Back to Flanged ordering table Back to Van Stone ordering table Back to Welded ordering table

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 21. 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 (COX)

Back to Van Stone ordering table

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



Example model: 114CE0030VAATSC032A**C01** – no lap flange, only thermowell stem provided



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



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



#### **Note** Coatings do not apply to lap flange.

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