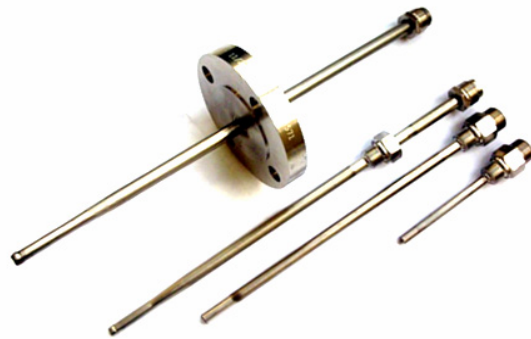


# Tubular Thermowell Best Practices

A tubular thermowell, often referred to as a protection tube, is manufactured from metal tubing and sealed with a welded end cap on the tip. The process seal is achieved either by a flange or a machined, threaded fitting welded along the tube. Typically, tubular thermowells have a uniform stem profile, however some industries have specific non-uniform stem profile requirements.

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**Figure 1-1. Common Tubular Thermowell Designs**



Alternatively, barstock thermowells are drilled and machined from a solid piece of round stock. There are no welds at the tip of the thermowell. Barstock thermowells can be machined to a variety of stem profiles to meet the customer's application.

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**Figure 1-2. Common Barstock Thermowell Designs**



Because of their construction, barstock thermowells can withstand higher process pressures and forces. Common uses for barstock thermowells include:

- Safety critical applications
- High velocity fluid flow
- Extreme temperature and pressure conditions
- Where vortex shedding and stress calculations are desired

Applications where the process conditions are not as demanding may allow the use of a tubular thermowell. The DIN 43772 standard provides some general process condition limitations for tubular thermowells. Common uses of tubular thermowells include:

- Tanks
- Storage vessels
- Low velocity fluid flow
- Low pressure applications

Table 1-1 shows the advantages and disadvantages of using tubular and barstock thermowells.

**Table 1-1. Tubular Barstock Comparison<sup>(1)</sup>**

	<b>Barstock</b>	<b>Tubular</b>
Temperature	Higher	Lower
Pressure	Higher	Lower
Flow Condition	Higher	Lower
Strength	Higher	Lower
Time Response	Slower	Faster
Length	Single piece limit of about 3 ft (1 m)	No limit
Corrosion/Erosion	Higher	Lower
Thermowell Calculations per ASME PTC 19.3TW-2010	Yes	No
Cost	Higher	Lower
Stem Profile	Wide variety of profiles	Limited profiles

*(1) Subjective evaluation of characteristics on commonly available designs.*

As shown in Table 1-1, tubular thermowells fulfill particular needs in process measurement. Tubular construction is an attractive alternative to barstock due to its lower cost, especially for longer thermowells. Also, NAMUR, an association of process automation users, has a recommended tapered stem profile tubular thermowell for installations where a faster time response is needed.

Table 1-2. Application Conditions for Standard Rosemount® Tubular Thermowells

Type	Dimensions	Process connection	Max. flow velocity (m/s)		Immersion length (mm)	Max. pressure (bar)	At temperature (°C)			
			Air	Water			At 0 °C	100	200	300
GN GB	9 x 1 mm 1.4571 (316 Ti)	Screw Socket G <sup>1/2</sup>	25	3	160	50	48	44	40	36
					250	40	40	40	40	36
					400	18	18	18	18	18
GN	11 x 2 mm 1.4571 (316 Ti)	Screw Socket G1	40	5	160	100	95	92	88	80
					250	50	50	50	50	50
					400	18	18	18	18	18
NAMUR	12 x 2.5 mm 1.4571 (316 Ti)	Screw Socket G1	40	5	160	100	100	100	100	100
					220	100	100	100	78	78
					280	100	100	100	55	55

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