Product Technical Information
DS_TWT42_2401_EN

Series BPtemp, Model TWT42

Barstock Thermowell
Tapered design. Threaded process connection

Application

The model TWT42 is a barstock thermowell designed for heavy duty applications.

Manufactured from metal bar with Tapered design, withstands demanding process conditions, guaranties longer life time cycle for resistance and thermocouple assemblies.

Totally customized, is key system component for the PROtemp TXH 14P series of process temperature assemblies and QUIMItemp TXH 44Q series of heavy-duty temperature assemblies.

Applications in pulp and paper, chemical plants and refineries as well other branches, with the most demanding process and service conditions.

Your Advantages

Heavy-duty applications
Corrosion resistant
High temperature resistant
ASME/ANSI or ISO threads
Customization

Overview

Informative Signs

	Information	This symbol contains device-oriented information which does not result in personal injury.
	Checking	This symbol contains procedures and other facts to get the most of the device and which do not result in personal injury.
	Caution	This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in damaged device and which do not result in personal injury.
	Warning	This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury.
	Danger	This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury.

Product Overview

A thermowell is a system component designed to increase physical and corrosion resistance to RTD and thermocouple assemblies. It also allows the removal of the measuring element for maintenance or for recalibration without the process being interrupted. Can be installed regardless the orientation in pipes and tanks.

The Delta Sensor barstock thermowells are manufactured from a metal bar and designed to support demanding process conditions, fluid velocity, corrosion, pressure and temperature. Two lines of thermowells are available according to the process connection: threaded or flanged. Regardless of the option taken and in order to respond better to process requirements, these thermowells can be machined straight, tapered or stepped.

The thermowell material is generally choose to attend the medium corrosion properties and process temperature. Are available as thermowell material the most common AISI 304/316/316L, high temperature stainless steel SS310 and corrosion resistant Monel 400, Hastelloy C and SS904L.

These threaded barstock thermowells are available with ASME/ANSI and ISO standards. Other standards are available on request. Are also available with adjustable thread by compression fitting component.

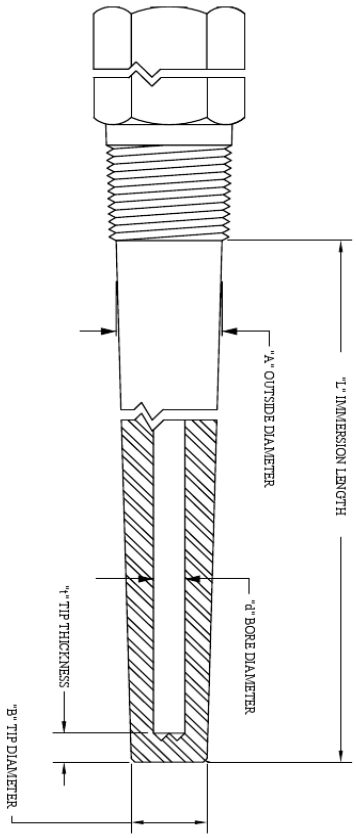
The TWT42 is a barstock thermowell with tapered design to withstand demanding process conditions of fluid velocity, corrosion resistance and high temperature mediums with threaded process connection. Ensuring proper compliance with standards, can be customized:

- ☑ Immersion and total length, regardless to lagging length.
- ☑ Upper and bottom diameter
- ☑ Bore and tip thickness
- ☑ Threaded process connection
- ☑ Threaded temperature assembly
- ☑ Thermowell material

	All material corrosion and resistance properties stated in this document should be followed as guidelines only.
	Temperature ratting of materials can be severe reduced due to presence of corrosive agents.
	Please note maximum temperature will also be dependent of thermometer sensor temperature limits.
	Make sure the thermowell has the correct immersion length not too long or too short leading a gap between thermowell tip and thermometer tip.

Mechanical Construction

Generic Configuration



	Seals or other mounting components and accessories are not included in the standard scope of supply.
	The thermowell total length results from the sum of the immersion length (L) and lagging length.
	Recommended immersion length is about 20x thermowell diameter, at least 10x thermowell diameter, depending on flow velocity. Non-compliance with this, may lead to significant measurement errors.

Materials

Below are the characteristics of the main materials, available as standard for protection tubes, process connection and protection sheaths of thermocouple elements. The information below provided should not be strictly followed, but only as guidelines for applications. Please note some of these materials are not available for BPtemp series of barstock thermowells.

SS 304 (1.4301 / X5CrNi18-10)

AISI 304 is a widely-used austenitic chromium-nickel stainless steel. Stainless steel 304 has excellent corrosion resistance in a wide variety of environments and when in contact with different corrosive media. Pitting and crevice corrosion can occur in environments containing chlorides. Stress corrosion cracking can occur at temperatures over 60°C. Stainless steel 304 has good resistance to oxidation in intermittent service up to 870°C and in continuous service to 900°C. However, continuous use at 425-860°C is not recommended if corrosion resistance in water is required. The steel is common throughout industry particularly in food processing as the material is not susceptible to corrosion from acids found in common foodstuffs. As a consequence, such steel is ideal for items such as sinks, work surfaces, preparation areas and refrigerators. It is also a perfect material for use in the pharmaceutical industry for environments such as clean rooms.

SS 316L (1.4404 / X2CrNiMo17-12-2)

SS 316 is the standard molybdenum-bearing grade, second in importance to 304 amongst the austenitic stainless steels. The molybdenum gives to SS 316 better overall corrosion resistant properties than Grade 304, particularly higher resistance to pitting and crevice corrosion in chloride environments. The SS 316L, the low carbon version of 316 and is immune from sensitization (grain boundary carbide precipitation). Thus, it is extensively used in heavy gauge welded components. The austenitic structure also gives these grades excellent toughness, even down to cryogenic temperatures. Compared to chromium-nickel austenitic stainless steels, 316L stainless steel offers higher creep, stress to rupture and tensile strength at elevated temperatures. SS 316L with excellent corrosion resistance properties in acids (low concentration and temperature phosphoric and sulfuric) in non-oxidizing atmospheres. Maximum temperature of 927ºC.

SS 321 (1.4541 / X6CrNiTi18-10)

Stainless steel similar to SS 304 but with titanium compound, which gives it better properties when subjected to welding operations and increasing chemical resistance for use in the food and chemical industry. Characterised by high corrosion resistance in general atmospheric corrosive environments it exhibits excellent resistance to most oxidizing agents, general foodstuffs, sterilizing solutions, dyestuffs, most organic chemicals plus a wide variety of inorganic chemicals, also hot petroleum gases, steam combustion gases, nitric acid, and to a lesser extent sulphuric acid. It displays good oxidation resistance at elevated temperatures has excellent resistance to intergranular corrosion and has excellent weldability. Maximum temperature of 900ºC.

Inconel 600 (2.4816 / NiCr15Fe)

Alloy 600 is a nonmagnetic, nickel-based high temperature alloy possessing an excellent combination of high strength, hot and cold workability, and resistance to ordinary form of corrosion. This alloy also displays good heat resistance and freedom from aging or stress corrosion throughout the annealed to heavily cold worked condition range. The high chromium content of alloy 600 raises its oxidation resistance considerably above that of pure nickel, while its high nickel content provides good corrosion resistance under reducing conditions. This alloy exhibits high levels of resistance to stress and salt water, exhaust gases, and most organic acids and compounds. Good resistance to oxidation at high temperatures. Maximum temperature of 1149ºC.

SS 446-1 (1.4749 / X18CrN28)

SS 446-1 is a ferritic, heat resisting, stainless chromium steel, characterized by extremely good resistance to reducing sulphurous gases, very good resistance to oxidation in air, good resistance to oil-ash corrosion and good resistance to molten copper, lead and tin. SS 446-1 should be chosen mainly for service at temperatures above 700°C where the excellent resistance of the material to slag corrosion and sulphidizing gases is particularly advantageous. Typical applications for SS 446-1 are recuperators in the metallurgical and glass industries, thermocouple protection tubes, soot blower tubes, injection nozzles and muffle tubes in continuous wire annealing furnaces.

ALLOY C-276 (2.4819 / UNS N10276)

ALLOY C-276 is a Nickel-chromium-molybdenum wrought alloy that is considered the most versatile corrosion resistant alloy available. This alloy is resistant to the formation of grain boundary precipitates in the weld heat-affected zone, thus making it suitable for most chemical process applications in an as welded condition. Alloy C-276 also has excellent resistance to pitting, stress-corrosion cracking and oxidizing atmospheres up to 1030ºC. Alloy C-276 has exceptional resistance to a wide variety of chemical environments. Some typical applications of ALLOY C-276 include equipment components in chemical and petrochemical organic chloride processes and processes utilizing halide or acid catalysts. Other industry applications are pulp and paper (digesters and bleach areas), scrubbers and ducting for flue gas desulfurization, pharmaceutical and food processing equipment.

MONEL 400 (2.4361 / UNS N04400)

Monel 400 is a nickel-copper alloy (about 67% Ni – 23% Cu) that is resistant to sea water and steam at high temperatures as well as to salt and caustic solutions. This nickel alloy is particularly resistant to hydrochloric and hydrofluoric acids when they are de-aerated. As would be expected from its high copper content, alloy 400 is rapidly attacked by nitric acid and ammonia systems. A low corrosion rate in rapidly flowing brackish or seawater combined with excellent resistance to stress-corrosion cracking in most freshwaters, and its resistance to a variety of corrosive conditions led to its wide use in marine applications and other non-oxidizing chloride solutions. Monel 400 can be used in temperatures up to 535ºC.

SS 310 (1.4845 / X8CrNi25-21)

AISI 310 stainless steel is a high chromium nickel austenitic stainless steel with a high carbon content. It has excellent mechanical properties, high temperature oxidation resistance and heat resistance in continuous service up to 1150ºC. AISI 310 is used in various industrial furnaces, steam boilers and petroleum system parts and thermocouple protection tubes. Examples include fire box sheets, furnace linings, boiler baffles, thermocouple wells, aircraft cabin heaters, and jet engine burner liners.

SS 904L (1.4539 / X1NiCrMoCu25-20-5)

Grade 904L stainless steel is a non-stabilized austenitic stainless steel with low carbon content. This high alloy stainless steel is added with copper to improve its resistance to strong reducing acids, such as sulphuric acid. The steel is also resistant to stress corrosion cracking and crevice corrosion. Grade 904L stainless steels have excellent resistance to warm seawater and chloride attack. Grade 904L stainless steels offer good oxidation resistance. However, the structural stability of this grade collapses at high temperatures, particularly above 400ºC. major applications of grade 904L stainless steels include pulp and paper processing industries and acetic, phosphoric and sulphuric acid processing plants.

KANTHAL A-1

Kanthal A-1 is a ferritic iron-chromium-aluminium alloy (FeCrAl alloy) for use at temperatures up to 1400°C. The alloy is characterized by high resistivity and very good oxidation resistance. Typical applications for Kanthal A-1 are electrical heating elements in industrial furnaces and thermocouple protection tubes.

KANTHAL AF

Kanthal AF is a ferritic iron-chromium-aluminium alloy (FeCrAl alloy) for use at temperatures up to 1300ºC. The alloy is characterized by excellent oxidation resistance and very good form stability resulting in long element life. Typical applications for Kanthal AF are as electrical heating elements in industrial furnaces and thermocouple protection tubes.

KANTHAL APM

Kanthal APM is an advanced powder metallurgical, dispersion strengthened, ferritic iron-chromium-aluminium alloy (FeCrAl alloy) for use at tube temperatures up to 1250ºC. Kanthal APM tubes have good form stability at high temperature. Kanthal APM forms an excellent, non-scaling surface oxide, which gives good protection in most furnace environments, i.e., oxidizing, sulphurous and carburizing, as well as against deposits of carbon, ash, etc. The combination of excellent oxidation properties and form stability makes the alloy unique. Typical applications for Kanthal APM are thermocouple protection tubes and as radiant tubes in electrically or gas fired furnaces such as continuous galvanizing furnaces, seal quench furnaces, holding furnaces and dosing furnaces in the aluminium and zinc.

C610 (Pytagoras)

Ceramic material non porous. Very resistant to hydrofluoric acid, thermal mechanical shocks is used not only as external protection tubes (thermowells), but also as internal tubes and insulators. Maximum temperature: 1400ºC

C799 (Alsint 99.7)

Is the most resistant material used as internal and external protection. Excellent resistance to hydrofluoric acid, alkalis vapours and atmospheres from reducer to oxidizing. It has the highest purity and lower porosity compared with other types of ceramics. Maximum temperature: 1600ºC

Materials	Maximum Temperature [ºC]
Carbon Steel	550
Aisi 446-1	1093
Aisi 304	899
Aisi 310	1147
Hasteloy B	815
Hasteloy C	1038
Monel	893
Nicrobell	1250
Molybdenum	1870
HR-160	1200
Titanium: Oxidant Atmosphere	538
Titanium: Reducer Atmosphere	1260
Tantalum	2349
Thermo-alloy APM	1425
Ceramic C610 (Pytagoras)	1400
Ceramic C710/799 (Alsint)	1600
Metal Ceramic LT-1	1375
Recrystalized Silicone Carbide	1600
Platinum	1699

Table 2 - Maximum material service temperature: Indicative temperatures, subject to change according to atmosphere / medium

Technical Data

Equipment					
Application	Temperature measurement				
Function	Thermowell				
Design	Tapered				
Operating temperature	Min	-200°C			
	Abs. Max	1150°C			

Mechanical Characteristics					
Materials Standard availability	Aisi 304	Round, HEX	Max.	40 mm, 45 mm	
	Aisi 316(L)	Round, HEX	Max.	40 mm, 45 mm	
	Aisi 310	Round, HEX	Max.	35 mm, 45 mm	
	Aisi 904L	Round, HEX	Max.	35 mm, 27 mm	
	Monel 400	Round, HEX	Max.	40 mm, 45 mm	
	Hasteloy C-276	Round	Max.	30 mm	
Process connections	barstock	ANSI/ASME threads		½" NPT to 1 ½" NPT	
		ISO 228-1 threads		G ½" to G 1 ½"	
Thermometer	Threaded, Female	½" G, ½" NPT, M18X1.5, M20X1.5; others on demand			
Dimensions	Immersion Length	Min.	50 mm	Max.	700 mm
	Lagging Length	Min.	30 mm	Max.	200 mm
	Tip thickness	From 3.0 mm to 9 mm; others on request			
	Bore	From 3.5 mm to 9 mm; others on request			

Environmental Conditions	
Storage temperature	-60 to 80°C
Relative humidity	0 to 95 %RH, non-condensing
Weight	0.4 kg to 25 kg with standard options, strongly dependent on length and process connection
Approvals, Certifications	EN10204-2.1/2.2/3.1/3.2 (Compliance/Test Report/Inspection Certificate)
	ASME PTC 19.3
	ASME B40.200

How to Order

Sign		Instruction
Tick	✓	Single option selection field necessary
Double tick	✓✓	Multiple option selection field available
Added extra	⊕	Not mandatory selection field

Order Code		Description
TWT42-		Barstock Thermowell BPtemp Model TWT42
010	✓	Threaded Process Connection
A1		ISO 228 G 1/2", SS316(L)
A2		ISO 228 G 3/4", SS316(L)
A3		ISO 228 G 1", SS316(L)
A4		ASME 1/2" NPT, SS316(L)
A5		ASME 3/4" NPT, SS316(L)
A6		ASME 1" NPT, SS316(L)
A7		ISO 228 G 1 1/2", SS316(L)
A8		ASME 1 1/2" NPT, SS316(L)
N4		ASME 1/2" NPT M (not SS316)
N5		ASME 3/4" NPT M (not SS316)
N6		ASME 1" NPT M (not SS316)
N8		ASME 1 1/2" NPT M (not SS316)
Y9		Special version on request
Not all options are listed here. Please contact us know current production plan for this device		
020	✓	Connection to Temperature Assembly
R		G 1/2" F
T		1/2" NPT F
V		3/4" NPT F
Z		1" NPT F
Y		Special version on request
Not all options are listed here. Please contact us know current production plan for this device		
030	✓	Total Length HL
2		100 mm
3		150 mm
4		200 mm
5		250 mm
6		300 mm
7		350 mm
8		400 mm
X		Customized length
9		Special version on request

How to Order (continuation)

040	✓	Material, Original Shape
B		Aisi 316L, HEX 27
D		Aisi 316L, HEX 32
E		Aisi 316L, HEX 36
F		Aisi 304, R30-35
H		Aisi 904L (U-B6), HEX 27
I		Aisi 904L (U-B6), R27-35
J		Aisi 310S, R30-35
K		Hasteloy C-276, R25-30
M		Monel 400, HEX 38-41
N		Aisi 316, R48-50
P		Aisi 316L, R30
Q		Aisi 316L, R25
Y		Special version on request
Not all options are listed here. Please contact us know current production plan for this device		
050	✓	Process Immersion Length IL
1		50 mm
2		100 mm
3		150 mm
4		200 mm
5		250 mm
6		300 mm
7		350 mm
8		400 mm
X		Customized length
9		Special version on request
060	✓	Upper Diameter Du; Bottom Diameter Dt
TC		Tapered; 10 mm
TD		Tapered; 13 mm
TG		Tapered; 16 mm
TI		18 mm; Tapered
TJ		Tapered; 19 mm
TN		24 mm; Tapered
YY		Special version on request
Not all options are listed here. Please contact us know current production plan for this device		
070	✓	Bore; Tip Thickness
B		6.5 mm; 5.0 mm
C		6.5 mm; 6.0 mm
D		6.5 mm; 7.0 mm
F		7.0 mm; 5.0 mm
G		7.0 mm; 6.0 mm
H		7.0 mm; 6.0 mm
K		9.0 mm; 7.0 mm
S		8.5 mm; 3.0 mm
Y		Special version on request
Not all options are listed here. Please contact us know current production plan for this device		

How to Order (continuation)

080	✓	Additional Specifications
A		Not selected
Y		Special version on request
⊕ 090	✓✓	Quality Assurance Documentation
M2		Materials certificate according to EN10204-3.1
Y9		Other on request, according to specification

Selection Example	
Barstock thermowell Monel 400 tapered design with tip with 19 mm, immersion length of 300 mm and lagging of 50 mm. Process connection by ASME 1/2” NPT M and thermometer connection by ASME 1/2” NPT F. With bore of 7 mm and tip thickness of 6 mm.	
Order code	TWT42-N4T7M6TJGA+M2

My Notes

Contact

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