Thermowells

Thermowell are provided to protect the basic sensor from mechanical damage and corrosion. An extremely sturdy design may increase the life of the sensor but may lead to a poor response. Similarly, a delicate design will have poor life but will improve the response time. Therefore, a proper balance needs to be struck.

For given process parameters, we can arrive at an optimum Thermowell design considering aspects such as temperature, pressure, fluid velocity and corrosion. Such designs will conform to ASTM PTC 19.3.

The Thermowell material can be brass, SS304, SS316, SS316L, SS310, Inconel® 600, Incoloy® 800, Monel®, Hastelloy® depending upon the process parameters and type of fluid. For proper selection of Thermowell material, expert advice is available from our design department.
Various Types of Thermowells

- Bar Stock Threaded (BT)
  (Process threads NPT, BSP or Metric)

- Bar Stock Flanged (BF)
  (Flanges as per ANSI, BS or DIN)

- Bar Stock Weld In (BW)

- Fabricated Threaded (FT)

- Fabricated Flanged (FF)

- Fabricated Weld In (FW)

Barstock Thermowell is normally offered up to an insertion length of 600mm. Fabricated Thermowells are recommended above 600mm. If required, insertion length can be determined by performing wake frequency calculations, in accordance with PTC 19.3.

Welding (tig welding process) of the Thermowell is performed by professional and approved welders following practice laid down in the ASME code and weld joints can be tested up to 600 kg/ cm².

Bore concentricity within 10% of wall thickness can be checked by radiography or ultrasonic method. Special material tests such as ultrasonic test for flaw detection are also available. For steam/ feed water service, an IBR certificate in form IIIC can be issued.

Routine Tests:
- Chemical Analysis
- Dimensional
- Hydro Test
- Dye Penetration
- Bore Concentricity
- Physical
- Microstructure
- Post Weld H/T (if specified)

Type Tests:
- NACE Compliance
- Radiography
- Ultrasonic
- Physical Testing
**Thermowells**

**Bar Stock Threaded Thermowell**

**How to Order**

```
Well Material*
S4-SS304  
S6-SS316  
S5-SS310  
SH-SS446  
4L-SS304L  
8L-SS316L  
C-CS to A105  
S1-SS410  
S7-SS317  
1825-Incoloy®  
6-Inconel 600  
8-Inconel 600  
2-SS321  
K-Kanthal  
HC-Hastelloy® C-276  
HB-Hastelloy® B  
SH-SS446  
I8-Incoloy 825  
6-Inconel 600  
I8-Incoloy 800  
S2-SS317  
HC-Hastelloy C-276  
HB-Hastelloy B  
S-Monel 400  
T-Titanium  
N-Nickel 200  
D-CS to A105  
S1-SS410  
S7-SS317  
I8-Incoloy 825  
6-Inconel 600  
I8-Inconel 600  
2-SS321  
K-Kanthal  
HC-Hastelloy C-276  
HB-Hastelloy B  
M-Monel 400  
T-Titanium  
N-Nickel 200  

*Exotic material if required as forged, please mention F in the bracket after mentioning the code e.g. M (F) or SH (F) etc.*

**Note:**
1. Wherever coating / lining (sleeve) thickness varies than what is specified, specify the required thickness in the bracket e.g. QP (2 mm)
2. Wherever sleeve is required, thermowell shall be straight & not tapered.

**Typical Model No.: TW-BT-S6-28-15 NT F-20 NT M-7-21-16-200-50-4-0**

**WELL MATERIAL**

<table>
<thead>
<tr>
<th>Code</th>
<th>Material</th>
</tr>
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<tbody>
<tr>
<td>S4</td>
<td>SS304</td>
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<td>S5</td>
<td>SS310</td>
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<tr>
<td>SH</td>
<td>SS446</td>
</tr>
<tr>
<td>4L</td>
<td>SS304L</td>
</tr>
<tr>
<td>8L</td>
<td>SS316L</td>
</tr>
<tr>
<td>C-CS</td>
<td>CS to A105</td>
</tr>
<tr>
<td>S1</td>
<td>SS410</td>
</tr>
<tr>
<td>S7</td>
<td>SS317</td>
</tr>
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</table>

**DIA OF BARSTOCK In mm (D)**

**INSTRUMENT / PROCESS CONNECTION**

<table>
<thead>
<tr>
<th>Size</th>
<th>Type</th>
<th>Male / Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-3/4'</td>
<td>NT - NPT</td>
<td>M - Male</td>
</tr>
<tr>
<td>10</td>
<td>BP - BSP</td>
<td>F - Female</td>
</tr>
<tr>
<td>15-1/2</td>
<td>BT - BSP</td>
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<tr>
<td>20-3/4</td>
<td>PF - PF</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>GS - Gas</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>NS - NPSM</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>-1/12”</td>
<td></td>
</tr>
<tr>
<td>18 M</td>
<td>M 18 x 1.5</td>
<td></td>
</tr>
<tr>
<td>20 M</td>
<td>M 20 x 1.5</td>
<td></td>
</tr>
<tr>
<td>24 M</td>
<td>M 24 x 1.5</td>
<td></td>
</tr>
<tr>
<td>27 M</td>
<td>M 27 x 2</td>
<td></td>
</tr>
<tr>
<td>33 M</td>
<td>M 33 x 2</td>
<td></td>
</tr>
<tr>
<td>X X</td>
<td>Any other</td>
<td></td>
</tr>
</tbody>
</table>

**COLD END DIAMETER IN mm (D2)**

**HOT END DIAMETER IN mm (D1)**

**INSERTION LENGTH IN mm (U)**

**Process Connection**

**Instrument Connection**

**Construction Type**

**Well Material**

**Dia of Bar-stock (mm) (D)**

**Instrument Connection**

**Bore ID (mm) (d)**

**Hot End Diameter (mm) (D1)**

**Insertion Length (mm) (U)**

**Extension Length (mm) (T)**

**Tip Thickness (mm) (t)**

**SPECIAL REQUIREMENT**

- U-Ultrasonic Test
- X1-X-Ray for Bore Concentricity
- X2-X-Ray for weld joints
- FP-Full penetration weld
- D-Dye Penetration Test
- I-IBR
- W-PWHT
- H-H2 Service
- N-NACE to MR-01-75
- R-RF portion in material same as thermowell
- C1-Companion flange in CS to A105
- C2-Companion flange in same material as that of thermowell
- F-Studs / Nuts & Gasket
- Z1-Nozzle / Stub in CS to A106 or A105
- Z2-Nozzle / Stub in same material as that of flange
- ST-1 mm Ti sleeve
- SN-1 mm Ni sleeve
- SH-1 mm HC sleeve
- Sta-0.4 mm Ta sleeve
- QP-1 mm PTFE coating
- QZ-1 mm Zirconium oxide coating
- Qt05-0.5 mm Tungsten carbide coating
- Qt10-1 mm Tungsten carbide coating
- QS-1 mm Stellite coating
- EN-Extension Nipple

**EN - Extension Nipple**

Specify length x size, material

eg. 100mm, 1/2” NPT(M) x M20x1.5(F), C1 plated CS.

**www.prisma-instruments.com**
**Bar Stock Weld In Thermowell**

**How to Order**

**Type**: TW-BW

**WELL MATERIAL**

- S4-SS304
- S6-SS316
- S3-SS310
- SH-SS446
- 4L-SS304L
- 6L-SS316L
- C-CS to A105
- S1-SS410
- S7-SS317
- 7L-SS317L
- I825- Incoloy 825
- I6-Inconel 600
- I8-Incoloy 800
- S2-SS321
- K-Kanthal
- HC-Hastelloy C-276
- HB-Hastelloy B
- M-Monel 400
- T-Ti-II
- N-Nickel 200

**SPECIAL REQUIREMENT**

- U-Ultrasonic Test
- X1-X Ray for Bore Concentricity
- X2-X Ray for weld joints
- FP-Full penetration weld
- D-Dye Penetration Test
- I- IBR
- W-PWHT
- H-H2 Service
- N-NACE to MR-01-75
- R-RF portion in material same as thermowell
- C1-Companion flange in CS to A105
- C2-Companion flange in same material as that of thermowell flange
- F-Studs / Nuts & gasket
- Z1-Nozzle / Stub in CS to A105 or A105
- Z2-Nozzle / Stub in same material as that of flange
- ST-1 mm Ti sleeve
- SN-1 mm Ni sleeve
- SH-1 mm Hc sleeve
- Sta-0.4 mm Ta sleeve
- QP-1 mm PTFE coating
- QS-1 mm stellite coating
- QZ-1 mm zirconium oxide coating
- Qt05 - 0.5 mm Tungsten carbide coating
- Qt10- 1 mm Tungsten carbide coating

**DIA OF BARSTOCK In mm (D)**

**INSTRUMENT / PROCESS CONNECTION**

<table>
<thead>
<tr>
<th>Size</th>
<th>Type</th>
<th>Male / Female</th>
</tr>
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<td>6-1/4&quot;</td>
<td>NT - NPT</td>
<td>M - Male</td>
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<tr>
<td>10-3/8&quot;</td>
<td>BP - BSP</td>
<td>F - Female</td>
</tr>
<tr>
<td>15-1/2&quot;</td>
<td>BT - BSPT</td>
<td></td>
</tr>
<tr>
<td>20-3/4&quot;</td>
<td>PF - PF</td>
<td></td>
</tr>
<tr>
<td>25-1&quot;</td>
<td>GS - Gas</td>
<td></td>
</tr>
<tr>
<td>32 - 1.1/4&quot;</td>
<td>NS - RPSN</td>
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</tr>
<tr>
<td>40 - 1.1/2&quot;</td>
<td>M - Male</td>
<td></td>
</tr>
</tbody>
</table>

**BORE in diameter in mm (d)**

**Weld in diameter in mm (t)**

**HOW END DIAMETER IN mm (D1)**

**COLD END DIAMETER IN mm (D2)**

**Typical Model No.: TW-BW-S4-30-20 NT F-7-22-18-100-50-4-I**

*Exotic material if required as forged, please mention F in the bracket after mentioning the code e.g. M (F) or SH (F) etc.

Note: 1. Wherever coating / lining (sleeve) thickness varies than what is specified, specify the required thickness in the bracket e.g. QP (2 mm)
2. Wherever sleeve is required, thermowell shall be straight & not tapered.

**www.prisma-instruments.com**
## Thermowells

### Bar Stock Flanged Thermowell

**How to Order**

**INSTRUMENT / PROCESS CONNECTION**

<table>
<thead>
<tr>
<th>Size</th>
<th>Code</th>
<th>Rating</th>
<th>Code</th>
<th>Facing</th>
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<td>NPT</td>
<td>F</td>
<td>N</td>
<td>F</td>
</tr>
<tr>
<td>10-3/8&quot;</td>
<td>BP</td>
<td>BSPT</td>
<td>B</td>
<td>BSPT</td>
<td>B</td>
</tr>
<tr>
<td>15-1/2&quot;</td>
<td>PF</td>
<td>PF</td>
<td>G</td>
<td>NPSN</td>
<td>G</td>
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<tr>
<td>20-3/4&quot;</td>
<td>GS</td>
<td>GSN</td>
<td>F</td>
<td>N</td>
<td>F</td>
</tr>
<tr>
<td>25-1&quot;</td>
<td>NS</td>
<td>NPSN</td>
<td>B</td>
<td>BSPT</td>
<td>B</td>
</tr>
<tr>
<td>32-1-1/4&quot;</td>
<td>N5</td>
<td>NPSN</td>
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<td>BSPT</td>
<td>B</td>
</tr>
<tr>
<td>40-1-1/2&quot;</td>
<td>N6</td>
<td>NPSN</td>
<td>B</td>
<td>BSPT</td>
<td>B</td>
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**INSTRUMENT / PROCESS CONNECTION**

<table>
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<th>Size</th>
<th>Code</th>
<th>Rating</th>
<th>Code</th>
<th>Facing</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>18 M - M 18 x 1.5</td>
<td>NT</td>
<td>NPT</td>
<td>F</td>
<td>N</td>
<td>F</td>
</tr>
<tr>
<td>20 M - M 20 x 1.5</td>
<td>BP</td>
<td>BSPT</td>
<td>B</td>
<td>BSPT</td>
<td>B</td>
</tr>
<tr>
<td>24 M - M 24 x 1.5</td>
<td>PF</td>
<td>PF</td>
<td>G</td>
<td>NPSN</td>
<td>G</td>
</tr>
<tr>
<td>27 M - M 27 x 2</td>
<td>GS</td>
<td>GSN</td>
<td>F</td>
<td>N</td>
<td>F</td>
</tr>
<tr>
<td>33 M - M 33 x 2</td>
<td>NS</td>
<td>NPSN</td>
<td>B</td>
<td>BSPT</td>
<td>B</td>
</tr>
<tr>
<td>40 - 1.1/2&quot;</td>
<td>X X</td>
<td>Any other</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**WELL MATERIAL**

- S4-SS304
- S6-SS316
- S3-SS310
- SH-SS446
- 4L-SS304L
- 6L-SS316L
- CI/CS to A105
- HB-Hastelloy® B
- SI-SS410
- S7-SS317
- 7L-SS317L
- I825-Incoloy® 825
- I6-Inconel® 600
- I8-Incoloy® 800
- S2-SS321
- K-Kanthal
- HC-Hastelloy® C-276
- HB-Hastelloy® B
- M-Monel® 400
- T-Ti-II
- N-Nickel 200

**SPECIAL REQUIREMENT**

- U-Ultrasonic Test
- X-X Ray for Bore Concentricity
- X2-X Ray for weld joints
- FP-Full penetration weld
- D-Dye Penetration Test
- I- IBR
- W-PWHT
- H-H2 Service
- N-NACE to MR-01-75
- RF portion in material same as thermowell
- B-Tail portion in bar stock
- C1-Companion flange in CS to A105
- C2-Companion flange in same material as that of thermowell flange
- F-Studs / Nuts & Gasket
- ZL-Nozzle / Stub in CS to A105 or A106
- ZZ-Nozzle / Stub in same material as that of flange
- ST-1 mm Ti sleeve
- SN-1 mm Ni sleeve
- SH-1 mm Hac sleeve
- Sta-0.4 mm Ta sleeve
- OP-3 mm PTFE coating
- OZ-1 mm zirconium oxide coating
- OB3-0.5 mm Tungsten carbide coating
- QB3-1 mm Tungsten carbide coating
- QS-1 mm stellite coating
- TP150-Tapered for tail portion of 150mm

**Typical Model No.**: TW-BF-S6-30-15 NT F-25 A RF-S6-7-21-16-200-50-4-N

*Exotic material if required as forged, please mention F in the bracket after mentioning the code e.g. M (F) or SH (F) etc.  ***For flange material refer the same code as that of well material.  If the flange is with ‘HUB’ specify the same in the bracket e.g. 20 BRF (HUB).

**Note**: 1. Wherever coating / lining (sleeve) thickness varies than what is specified, specify the required thickness in the bracket e.g. QP (2 mm) 2. Wherever sleeve is required, thermowell shall be straight & not tapered.

www.prisma-instruments.com
### Thermowells

#### Fabricated Weld In Thermowell

**How to Order**

![Diagram of Thermowell](image)

**Pipe size & schedule**
- ½” Sch 40 - 15A
- ½” Sch 80 - 15B
- ¾” Sch 160 - 15C
- ¾” Sch 40 - 20A
- ¾” Sch 80 - 20B
- 1” Sch 20 - 10D
- 1xØ - 10D
- 1½” - 14D

**Instrument / Process Connection**

<table>
<thead>
<tr>
<th>Size</th>
<th>Type</th>
<th>Male / Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-1/4”</td>
<td>NT - NPT</td>
<td>N - Male, F - Female</td>
</tr>
<tr>
<td>10-2”</td>
<td>BP - BSP</td>
<td>F - Female</td>
</tr>
<tr>
<td>15-1/2”</td>
<td>BT - BSPT</td>
<td>F - Female</td>
</tr>
<tr>
<td>20-3/4”</td>
<td>PF - PF</td>
<td>F - Female</td>
</tr>
<tr>
<td>25-1”</td>
<td>G - Gais</td>
<td>F - Female</td>
</tr>
<tr>
<td>32-1.1/4”</td>
<td>NS - NPSM</td>
<td>F - Female</td>
</tr>
<tr>
<td>40-1.1/2”</td>
<td>-</td>
<td>F - Female</td>
</tr>
</tbody>
</table>

**Metric Threads**
- 18 M - M 18 x 1.5
- 20 M - M 20 x 1.5
- 24 M - M 24 x 1.5
- 27 M - M 27 x 2
- 33 M - M 33 x 2
- XX - Any other

**Weld in diameter in mm**

**Extension Length (mm) (T)**

**Insertion Length (mm) (U)**

**Construction Type**
- TW-FW

**Pipe size & schedule**
- Sch 40
- Sch 80
- Sch 160
- Sch 40
- Sch 80
- 1”
- 1½”

**Pipe size & schedule**

**Well Material**
- S4-SS304
- S6-SS316
- S3-SS310
- SH-SS446
- 4L-SS304L
- 6L-SS316L
- C5S to A105
- F5-S5410
- F7-S5317
- T-III
- TL-S5317L

**Special Requirement**
- U-Ultrasonic Test
- X1-XRay for Bore Concentricity
- X2-XRay for weld joints
- FP-Full penetration weld
- D-Dye Penetration Test
- I-IBR
- W-PWHT
- H-H2 Service
- N-NACE to MR-01-75
- R- RF portion in material same as thermowell
- B-Tail portion in the bar stock**
- C1-Companion flange in CS to A105
- C2-Companion flange in same material as that of thermowell flange
- F-Studs / Nuts & Gasket
- Z1-Nozzle / Stub in CS to A106 or A105
- Z2-Nozzle / Stub in same material as that of flange
- ST-1 mm Ti sleeve
- SN-1 mm Ni sleeve
- SH-1 mm HaC sleeve
- STA-0.4 mm Ta sleeve
- QP-1 mm PTFE coating
- QZ-1 mm zirconium oxide coating
- Qt05-0.5 mm Tungsten carbide coating
- Qt10-1 mm Tungsten carbide coating
- QS-1 mm stellite coating
- S1-SS410
- S2-SS321
- S3-SS310
- S4-SS304
- S6-SS316
- S7-SS317
- 4L-SS304L
- 6L-SS316L
- 7L-SS317L
- I825- Incoloy 825
- I6-Inconel 600
- I8-Incoloy 800
- K-Kanthal
- HC-Hastelloy C-276
- HB-Hastelloy B
- HS-Hastelloy C-276
- HC-Hastelloy C-446
- HB-Hastelloy B
- M-Monel 400
- T-Ti II
- N-Nickel 200

**Note:**
1. Wherever coating / lining (sleeve) thickness varies from what is specified, specify the required thickness in the bracket e.g. QP (2 mm)
2. ** Tail portion of 100 mm / 150 mm in bar stock to be mentioned as 100 B or 150 B etc.

**Typical Model No.: TW-FW-S3-15A-10 NT F-28-150-50-4-0**

**Online Catalog:**
www.prisma-instruments.com
## Thermowells

### Fabricated Threaded Thermowell

#### How to Order

![Diagram of Thermowell](image)

**Type:** TW-FT

**Special Requirement**
- Ultrasonic Test (U)
- X Ray for Bore Concentricity (X1)
- X Ray for weld joints (X2)
- Full penetration weld (FP)
- Dye Penetration Test (D)
- IBR
- PWHT
- H2 Service (H)
- NACE to MR- 01-75 (N)
- RF portion in material same as thermowell (R)
- Companion flange in CS to A105 (C1)
- Companion flange in same material as that of thermowell flange (C2)
- D-Studs / Nuts & Gasket
- Nozzle / Stub in CS to A106 or A105 (Z1)
- Nozzle / Stub in same material as that of flange (Z2)
- 1 mm Ti sleeve (ST)
- 1 mm Ni sleeve (SN)
- 1 mm HcNi sleeve (SH)
- 0.4 mm Ta sleeve (Sta)
- 1 mm PTFE coating (QP)
- 1 mm zirconium oxide coating (QZ)
- 0.5 mm Tungsten carbide coating (Qt05)
- 1 mm Tungsten carbide coating (Qt10)
- 1 mm stellite coating (QS)

### Instrument / Process Connection

#### Size
- Metric Threads
  - 6-1/4" x 18 M - M 18 x 1.5
  - 10-3/8" x 20 M - M 20 x 1.5
  - 15-1/2" x 24 M - M 24 x 1.5
  - 20-3/4" x 27 M - M 27 x 2.0
  - 25-1" x 33 M - M 33 x 2.0
  - 32-1-1/4" x 40 M - M 40 x 1.7

#### Well Material
- S4-SS304
- S6-SS316
- S3-SS310
- SH-SS446
- 4L-SS304L
- S7-SS317
- TL-SS337L
- K-Kanthal
- HC-Hastelloy C-276
- Ni-Hastealloy B-271
- M-MonoNichlo 400
- T-Ti II

### Fabricated Threaded Thermowell

#### How to Order

- **Typical Model No.:** TW-FT-S6-15B-15 NT F-20 BP M-125-50-4-Q P (1mm)

#### Table:

<table>
<thead>
<tr>
<th>Well Material</th>
<th>Instrument Connection</th>
<th>Insertion Length (mm)</th>
<th>Tip Thickness (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>S4-SS304</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>S6-SS316</td>
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<tr>
<td>S3-SS310</td>
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<td>SH-SS446</td>
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<tr>
<td>4L-SS304L</td>
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<tr>
<td>S7-SS317</td>
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</tr>
<tr>
<td>TL-SS337L</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

### Note:
1. Wherever coating / lining (sleeve) thickness varies than what is specified, specify the required thickness in the bracket e.g. QP (1mm)
2. **Tail portion of 100 mm / 150 mm in stock to be mentioned as 100 B or 150 B etc.

www.prisma-instruments.com
**FABRICATED FLANGED THERMOWELL**

**How to Order**

- **Pipe size & schedule**
  - ½" Sch 40 - 15A
  - ½" Sch 80 - 15B
  - ½" Sch 160 - 15C
  - ¾" Sch 40 - 20A
  - ¾" Sch 80 - 20B
  - 10" - 1000
  - 145 - 1460

- **Instrument / Process Connection**
  - **Size**
    - 6-1/4"
    - 10 - 3/8"
    - 15 - 3/8"
    - 20 - 3/4"
    - 25 - 1"
    - 32 - 1.1/4"
    - 40 - 1.1/2"
  - **Type**
    - NT - NPT
    - BP - BSP
    - BT - BSPT
    - GS - Gis
    - NS - NSM
  - **Male / Female**
    - M - Male
    - F - Female
  - **Metric Threads**
    - 18 M - M 18 x 1.5
    - 20 M - M 20 x 1.5
    - 24 M - M 24 x 1.5
    - 27 M - M 27 x 2
    - 33 M - M 33 x 2
    - X X - Any other

- **Special Requirement**
  - U-Ultrasonic Test
  - X1-X Ray for Bore Concentricity
  - X2-X Ray for weld joints
  - FP-Full penetration weld
  - D-Dye Penetration Test
  - I-IBR
  - W-PWHT
  - H-H2 Service
  - N-NACE to MR-01-75
  - R-RF portion in material same as thermowell
  - C1-Companion flange in CS to A105
  - C2-Companion flange in same material as that of thermowell flange
  - F-Studs / Nuts & Gasket
  - Z1-Nozzle / Stub in CS to A106 or A105
  - Z2-Nozzle / Stub in same material as that of flange
  - ST-1 mm Ti sleeve
  - SN-1 mm Ni sleeve
  - SH-1 mm Hastelloy C-276 sleeve
  - S1-0.4 mm Ti sleeve
  - QP-1 mm PTFE coating
  - QT05-0.5 mm Tungsten carbide coating
  - QT10-1 mm Tungsten carbide coating
  - Q5-1 mm stellite coating

**For flange material refer the same code as that of well material. If the flange is with ‘HUB’ specify the same in the bracket e.g. 20 BRF (HUB).**

**Note:**
1. Wherever coating/lining (sleeve) thickness varies than what is specified, specify the required thickness in the bracket e.g. QP (2 mm).
2. Wherever sleeve is required, thermowell shall be straight & not tapered.
3. **Tail portion of 100 mm / 150 mm in bar stock to be mentioned as 100 B or 150 B etc.**

**Typical Model No.:** TW-FF-S6-15A-15 NT F-40 C RTJ-S6-175-70-3-N
Van Stone Type Thermowell

For high pressure applications and where welding is to be avoided, Van Stone design thermowells are used. These are machined from a single barstock, sandwiched between the nozzle flange and cover (companion) flange. The O D of the machined portion corresponding the raised face portion of the flange. Wake frequency calculations (in accordance with PTC 19.3) are performed where ever data is made available and are essential in order to suggest appropriate dimensions of thermowell.

How to Order

**TYPE : TW-V**

**SPECIAL REQUIREMENT**

- U-Ultrasonic Test
- X1-X Ray for Bore Concentricity
- X2-X Ray for weld joints
- F-Full penetration weld
- D-Dye Penetration Test
- I- IBR
- W-PWHT
- H-H2 Service
- N-NACE to MR- 01-75
- R-RF portion in material same as thermowell
- B-Tail portion in bar stock**
- Z1-Nozzle / Stub in CS to A105 or A105
- Z2-Nozzle / Stub in same material as that of flange
- C1-Companion flange in CS to A105
- C2-Companion flange in same material as that of thermowell flange
- F-Studs / Nuts & Gasket
- S6-1 mm Ti sleeve
- SH-1 mm Ni sleeve
- SN-1 mm Ta sleeve
- QP-1 mm PTFE coating
- Qt05 -0.5 mm Tungsten carbide coating
- Qt10-1 mm Tungsten carbide coating
- QS-1 mm stellite coating
- ST-1 mm Ti sleeve
- SN-1 mm Ni sleeve
- SH-1 mm Ni sleeve
- S7-1 mm Ta sleeve
- QP-1 mm PTFE coating
- Qt05 -0.5 mm Tungsten carbide coating
- Qt10-1 mm Tungsten carbide coating
- QS-1 mm stellite coating

**INSTRUMENT CONNECTION**

<table>
<thead>
<tr>
<th>Size</th>
<th>Type</th>
<th>Male / Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-1/4&quot;</td>
<td>NT</td>
<td>N - Male</td>
</tr>
<tr>
<td>10-3/8&quot;</td>
<td>MT</td>
<td>F - Female</td>
</tr>
<tr>
<td>15-1/2&quot;</td>
<td>BF</td>
<td>D</td>
</tr>
<tr>
<td>20-3/4&quot;</td>
<td>BT</td>
<td>T</td>
</tr>
<tr>
<td>25-1&quot;</td>
<td>BF</td>
<td>D</td>
</tr>
<tr>
<td>32 - 1.1/4&quot;</td>
<td>BS</td>
<td>T</td>
</tr>
<tr>
<td>40 - 1.1/2&quot;</td>
<td>BS</td>
<td>T</td>
</tr>
</tbody>
</table>

**Metric Threads**

- 18 M - M 18 x 1.5
- 20 M - M 20 x 1.5
- 24 M - M 24 x 1.5
- 27 M - M 27 x 2
- 33 M - M 33 x 2
- X X - Any other

**Back-up flange size, rating & facing**

<table>
<thead>
<tr>
<th>Size</th>
<th>Code</th>
<th>Rating</th>
<th>Code</th>
<th>Facing</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>¼&quot;</td>
<td>15</td>
<td>150#</td>
<td>A</td>
<td>RF</td>
<td>RF</td>
</tr>
<tr>
<td>½&quot;</td>
<td>20</td>
<td>300#</td>
<td>B</td>
<td>FF</td>
<td>FF</td>
</tr>
<tr>
<td>1&quot;</td>
<td>25</td>
<td>600#</td>
<td>C</td>
<td>RTJ</td>
<td>RTJ</td>
</tr>
<tr>
<td>1½&quot;</td>
<td>40</td>
<td>900#</td>
<td>D</td>
<td>LT</td>
<td>LT</td>
</tr>
<tr>
<td>2&quot;</td>
<td>50</td>
<td>1500#</td>
<td>E</td>
<td>LG</td>
<td>LG</td>
</tr>
<tr>
<td>3&quot;</td>
<td>80</td>
<td>2500#</td>
<td>F</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Typical Model No.**

- TW-V S6 73 15 NT F 40 A RF S6 7-30 16 150 75 6 0

**WELL MATERIAL**

- S4-SS304
- S6-SS316
- S3-SS310
- SH-SS410
- 4L-SS304L
- S1-SS410
- S7-SS317
- 7L-SS317L
- I8-SS317L
- I6-Inconel 600®
- I8-Incoloy 800®
- S2-SS321
- K-Kanthal®
- HC-Hastelloy C-276®
- HB-Hastelloy B®
- M-Monel 400®
- T-Ti-II
- N-Nickel 200
- HC-Hastelloy C-276®
- HB-Hastelloy B®
- M-Monel 400®
- T-Ti-II
- N-Nickel 200

**Special Thermowells**

Note: 1. Wherever coating / lining (sleeve) thickness varies than what is specified, specify the required thickness in the bracket e.g. QP (2 mm)

2. ** Tail portion of 100 mm / 150 mm in bar stock to be mentioned as 100 B or 150 B etc.

**Typical Model No.**

- TW-V S6 73 15 NT F 40 A RF S6 7-30 16 150 75 6 0

**Website:** www.prisma-instruments.com
Welding Operation

Thermowells are often with welded design. Welding is the most critical operation as improper welding can cause failure of welding in process in form of corrosion & crack. This is particularly serious when thermowell is being used for critical application such as Hydrogen, H2S or explosive media.

We have approved welder specification for several combinations of material. The applicable standard is ASME SEC IX. We maintain complete record of all the welding procedure specification (WPS) and procedures qualification record (PQR).

<table>
<thead>
<tr>
<th>WPS NO.</th>
<th>PQR No.</th>
<th>Material – I</th>
<th>Material – II</th>
</tr>
</thead>
<tbody>
<tr>
<td>WPS029</td>
<td>PQ R029</td>
<td>SS446</td>
<td>P7</td>
</tr>
<tr>
<td>WPS010</td>
<td>PQ R101</td>
<td>SS316L</td>
<td>P8</td>
</tr>
<tr>
<td>WPS027</td>
<td>PQ R027</td>
<td>F44</td>
<td>P8</td>
</tr>
<tr>
<td>WPS009</td>
<td>PQ R009</td>
<td>P91 Monel®</td>
<td>P42</td>
</tr>
<tr>
<td>WPS010</td>
<td>PQ R019</td>
<td>A106</td>
<td>P1</td>
</tr>
<tr>
<td>WPS008</td>
<td>PQ R008</td>
<td>SS316L</td>
<td>P8</td>
</tr>
<tr>
<td>WPS4012</td>
<td>PQ R012</td>
<td>A105</td>
<td>P1</td>
</tr>
<tr>
<td>WPS006</td>
<td>PQ R006</td>
<td>SS316L</td>
<td>P8</td>
</tr>
<tr>
<td>WPS007</td>
<td>PQ R007</td>
<td>F-11</td>
<td>P4</td>
</tr>
<tr>
<td>WPS1013</td>
<td>PQ R101</td>
<td>LF2</td>
<td>P1</td>
</tr>
<tr>
<td>WPS023</td>
<td>PQ R023</td>
<td>A105</td>
<td>P1</td>
</tr>
<tr>
<td>WPS018</td>
<td>PQ R018</td>
<td>Hastelloy®</td>
<td>P44</td>
</tr>
<tr>
<td>WPS041</td>
<td>PQ R041</td>
<td>Duplex SS</td>
<td>P10H</td>
</tr>
<tr>
<td>WPS042</td>
<td>PQ R042</td>
<td>Inconel® 600</td>
<td>P43</td>
</tr>
<tr>
<td>WPS043</td>
<td>PQ R043</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Nozzle suitable for Collar Design Thermowell

Customers many times face lot of problems in installing collar design thermowells at site due to the following reasons:

a) Nozzle ID is inconsistent.
b) Some weld material penetrates inside Nozzle blocking entry of collar.

To solve these problems we supply collar design thermowells along with the matching nozzle. Client only has to weld the weldolet at site.
Special Thermowells

One of the most difficult problems in temperature measurement of process parameters has been the rapid wearing out of Thermowells made out of conventional stainless steel. Various factors could cause the failure of the thermowells, the most difficult, have been the erosion due to severe particle impigement. The corrosion due to chemically aggressive fluids; the combination of high temperature, high velocity fluids & the thermal shock faced by the sensor protective sheaths in the glass & metallurgical industries.

With an experience of over three decades, is in a position to offer some solutions to most of these problems. Some of the standard designs are described and illustrated in this literature.

Solid Sintered Tungsten Carbide Thermowell

These thermowells are ideally suited for use in very abrasive environment such as in air preheaters & coal mills of coal based power plants (mill classifier or pulveriser outlet) or steam generation units, for temperature measurement of coal and air mixture.

Typical Specifications
Type: Built-up threaded
Material: Solid Sintered Tungsten Carbide brazed to 316 SS threaded bushing.
Process connection: M 33 x 2 or as required
Bore: 7 mm, 10.5 mm
Outer diameter: 16 mm, 20 mm as standard or else to be specified
Immersion length: IL - 160, 200, 250, 320, 400
Extension length: EL - 100, 160 in the form of ½” schedule 80 nipple generally
Note: When the length are longer, it is recommended to use tungsten carbide only for the tail portion of say 200 to 250 mm.

<table>
<thead>
<tr>
<th>Sensor &amp; Bulb dia (mm)</th>
<th>d</th>
<th>D1</th>
<th>IL</th>
</tr>
</thead>
<tbody>
<tr>
<td>M1 TC 6 mm dia</td>
<td>6.5</td>
<td>16</td>
<td>160, 200, 250, 320, 350</td>
</tr>
<tr>
<td>M1 RTD 6 mm dia</td>
<td>6.5</td>
<td>16</td>
<td>160, 200, 250, 320, 350</td>
</tr>
<tr>
<td>Temp Gauge or Switch 10 mm dia</td>
<td>10.5</td>
<td>20</td>
<td>160, 200, 250, 320, 350</td>
</tr>
</tbody>
</table>
Lined (Sleeved) Thermowell

One of the most economical solutions to protect the thermowells from chemically aggressive fluids is to provide a bar-stock flanged thermowell made out of conventional stainless steel with loose lining in the form of a sleeve on the entire wetted portion. This will provide strength from stainless steel & corrosion resistance from the lining.

Specifications

<table>
<thead>
<tr>
<th>Type</th>
<th>Bar-stock flanged</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well Material</td>
<td>SS316</td>
</tr>
<tr>
<td>Lining Material</td>
<td>Hastelloy® C, Nickel, Titanium, Tantalum, Silver</td>
</tr>
<tr>
<td>Lining thickness</td>
<td>0.4 mm for Tantalum &amp; Silver, 1 to 1.5 mm for other materials as standard. Other thicknesses can be provided on request.</td>
</tr>
<tr>
<td>Process Connection</td>
<td>Flanged 1&quot; (DN25) to 3&quot; (DN80) as per ANSI or DIN as standard. Other on request.</td>
</tr>
<tr>
<td>Insertion length</td>
<td>To be specified.</td>
</tr>
<tr>
<td>Note</td>
<td>Sometimes even the conventional stainless steel flanged thermowells can be provided with carbon steel flange corresponding to ASTMA105, with a lining of 3 mm thick stainless steel plate on the RF portion of the flange. This construction offers a very economical solution without having to surrender corrosion resistant characteristics of stainless steels for wetted parts.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Basic Well</th>
<th>Lining</th>
<th>d</th>
<th>D</th>
<th>D1</th>
<th>Insertion Length (U)</th>
</tr>
</thead>
<tbody>
<tr>
<td>316 SS</td>
<td>Hastelloy® C, Ni, Ti</td>
<td>6.25</td>
<td>13.8</td>
<td>16</td>
<td>200, 250, 300, 400, 500</td>
</tr>
<tr>
<td>316 SS</td>
<td>Tantalum, Silver</td>
<td>6.25</td>
<td>14.1</td>
<td>15</td>
<td>200, 250, 300, 400, 500</td>
</tr>
</tbody>
</table>
Thermowells for use in high temperature applications

For use in Chemical Plants for installing on Flue Gas areas of Boilers, Furnaces, Kilns, Heat Recovery Units, Incinerators, Reformers & Gasifiers, Material of Construction is recommended based on the working temperature, pressure & other process parameters. The general guide line for selection of materials for protecting tubes can be regarded as given in the table below.

<table>
<thead>
<tr>
<th>Working Temperature</th>
<th>Material of Construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upto 800°C</td>
<td>Conventional Stainless Steels 321 SS, 316 SS</td>
</tr>
<tr>
<td>800°C to 1100°C</td>
<td>Heat resistant Stainless Steels, 310 SS, 446 SS &amp; high alloy steels such as Incoloy® 800 &amp; Inconel® 600</td>
</tr>
<tr>
<td>1100°C to 1500°C</td>
<td>Ceramic Material grade 610 &amp; 710</td>
</tr>
</tbody>
</table>

The length, diameter & the thickness will depend on the process parameters. However, as a general guide line we would recommend a minimum thickness of 3.5 mm for metallic tubes.

The wake frequency calculations can be performed in accordance with PTC 19.3, in order to ascertain exact insertion length and outer dimension like O D to save it from breakage due to high velocity service.
For high temperature applications, generally, Ceramic protecting tubes are used in different industries such as Iron & Steel, glass, cement etc. It has high resistance to thermal shocks. It is inert to most chemicals and has a high dielectric strength. These are primarily used to protect noble metal thermocouples (like R, S & B type). They are available in variety of sizes. Normally it is cemented (by high temperature withstanding cement) to metal tubes (which are termed as holding tubes). The process connection slides or is welded to this metallic portion of the tube. For double protection, inner ceramic tube is also used. Mainly two grades of ceramic are used. Ceramic 610 (also termed as Mullite) & Ceramic 710 (recrystallised Alumina-99.5% purity) can withstand up to 1500°C & 1800°C respectively. It should be remembered that it has poor mechanical shock resistance. It is impervious to gases at high temperatures.

Silicon Carbide protecting tubes are also used generally as a secondary protection for applications such as Kilns, Furnaces, Stove Dome etc. Recrystallised silicon carbide has a very high abrasion resistance. Also used for flue gas application or incinerators in waste management system. It can withstand 1600°C & direct flame impingement. It is extremely hard & chemically inert. It resists most of the acids, molten salts. Generally used in conjunction with ceramic tube.

Cermet (LT-1) which is metal ceramic composite (combination of chromium & aluminium oxide) is stable in oxidising atmospheres upto 1300°C. Cermet tubes are stronger & more resistant to thermal & mechanical shocks than ceramic protecting tubes. Main area of usage is in molten copper, open hearth furnace, blast furnace. Ceramic primary tube is recommended when Cermet is used.
# Thermowell material selection guide

<table>
<thead>
<tr>
<th>APPLICATION</th>
<th>MATERIAL</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IRON AND STEEL</strong></td>
<td></td>
</tr>
<tr>
<td>Blast furnaces</td>
<td>Silicon Carbide, Inconel® 600</td>
</tr>
<tr>
<td>Stove dome</td>
<td></td>
</tr>
<tr>
<td>Hot blast main</td>
<td>Inconel® 600, SS 446</td>
</tr>
<tr>
<td>Open Hearth</td>
<td>Inconel® 600, SS 446</td>
</tr>
<tr>
<td>Flues and Stack</td>
<td></td>
</tr>
<tr>
<td>Waste heat Boiler</td>
<td></td>
</tr>
<tr>
<td><strong>CEMENT</strong></td>
<td></td>
</tr>
<tr>
<td>Exit Flue Gas</td>
<td>Inconel® 600, SS 446</td>
</tr>
<tr>
<td>Kilns, Heating Zone</td>
<td></td>
</tr>
<tr>
<td><strong>CERAMIC</strong></td>
<td></td>
</tr>
<tr>
<td>Kilns</td>
<td>Ceramic and silicon carbide</td>
</tr>
<tr>
<td>Dryers</td>
<td>Silicon carbide</td>
</tr>
<tr>
<td><strong>POWER</strong></td>
<td></td>
</tr>
<tr>
<td>Coal-air mixtures</td>
<td>Solid sintered tungsten carbide</td>
</tr>
<tr>
<td>Flue Gas</td>
<td>SS 446</td>
</tr>
<tr>
<td>Preheater</td>
<td>SS 446</td>
</tr>
<tr>
<td>Boiler Tube</td>
<td>SS 304, SS 316, SS 310</td>
</tr>
<tr>
<td><strong>INCINERATOR</strong></td>
<td></td>
</tr>
<tr>
<td>Up to 1050°C</td>
<td>Inconel® 600, SS 446</td>
</tr>
<tr>
<td>Over 1050°C</td>
<td>Ceramic 610/710 (Primary), Silicon Carbide (Secondary)</td>
</tr>
<tr>
<td><strong>CHEMICAL</strong></td>
<td></td>
</tr>
<tr>
<td>Acetic Acid</td>
<td>SS 304, Hastelloy® C, Monel® 400</td>
</tr>
<tr>
<td>10 to 50% 20°C</td>
<td>SS 316, Hastelloy® C, Monel® 400</td>
</tr>
<tr>
<td>50 % 100°C</td>
<td>Hastelloy® C, Monel®</td>
</tr>
<tr>
<td>99% 21 to 100°C</td>
<td>SS 304</td>
</tr>
<tr>
<td>Alcohol, Ethyl, Methyl</td>
<td></td>
</tr>
<tr>
<td>20 to 100°C</td>
<td>SS 304</td>
</tr>
<tr>
<td>Ammonia</td>
<td>SS 304</td>
</tr>
<tr>
<td>All concentrations 20°C</td>
<td></td>
</tr>
<tr>
<td>Ammonium Chloride</td>
<td></td>
</tr>
<tr>
<td>All Concentration 100°C</td>
<td></td>
</tr>
<tr>
<td>Brine</td>
<td></td>
</tr>
<tr>
<td>Bromine</td>
<td></td>
</tr>
<tr>
<td>Butyl Acetate</td>
<td></td>
</tr>
<tr>
<td>Calcium Hydroxide</td>
<td></td>
</tr>
<tr>
<td>Upto 50% 100°C</td>
<td></td>
</tr>
<tr>
<td>Chlorine Gas</td>
<td></td>
</tr>
<tr>
<td>Moist - 7 to 100°C</td>
<td></td>
</tr>
<tr>
<td>Chromic Acid 10 to 50% 100°C</td>
<td></td>
</tr>
<tr>
<td>Ethyl Acetate</td>
<td></td>
</tr>
<tr>
<td>Ethyl Chloride 20°C</td>
<td></td>
</tr>
<tr>
<td>Ethyl Sulphate 20°C</td>
<td></td>
</tr>
<tr>
<td>Ferric Chloride 5% 20°C to boiling</td>
<td></td>
</tr>
<tr>
<td>Formaldehyde</td>
<td></td>
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<tr>
<td>Formic Acid 5% 20 to 66°C</td>
<td></td>
</tr>
<tr>
<td>Hydrochloric Acid</td>
<td></td>
</tr>
<tr>
<td>Upto 5% 20°C</td>
<td></td>
</tr>
<tr>
<td>Upto 25% 100°C</td>
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<tr>
<td>Hydrofluoric Acid 60% 100°C</td>
<td></td>
</tr>
<tr>
<td>Hydrogen peroxide</td>
<td></td>
</tr>
<tr>
<td>Hydrogen Sulphide wet and dry</td>
<td></td>
</tr>
<tr>
<td>Phosphoric Acid</td>
<td></td>
</tr>
<tr>
<td>Upto 10% 20°C</td>
<td></td>
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<tr>
<td>10% 100°C</td>
<td></td>
</tr>
<tr>
<td>30% to 85% 100°C</td>
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</tr>
<tr>
<td>Sodium Hydroxide</td>
<td></td>
</tr>
<tr>
<td>Sulphuric Acid Upto 90% 20°C</td>
<td></td>
</tr>
</tbody>
</table>

The recommendations made in this catalogue are to be used as intended guide. No guarantee of material can be undertaken since other factors may affect the performance. We reserve the right to change the specifications mentioned in this catalogue without any notice as improvements & development is a continuous process at General. Responsibility of typographical errors is specifically disclaimed.

[www.prisma-instruments.com](http://www.prisma-instruments.com)
In-House Testing facilities for Thermowells

1. Dimensional: As per approved drawing & data sheet.
2. Hydro Test: For barstock threaded 100 Kg/cm² (internal as standard) and more as per customer requirement.
   - External if applicable
   - Flanged Thermowells - Internal / external - 1.5 times the operating pressure
   - Internal - 100 kg/cm² for ratings below 600# & 200 kg/cm² above 600# rating
   - External - In accordance with flange rating.
3. Bore Concentricity: By using "D" meter (Ultrasonic thickness tester) - Wall thickness measurement - Sample 5% at two different points & each at 180° angle to each other.
   - Radiography test by external lab (X-Ray) for immersion length portion (optional)
4. Dye Penetration Test: For weld joints of thermowell / protecting tube
5. Threading Check: Process thread & instrument thread - Check by thread gauge.
6. PMI Test

Optional Tests

1. Hardness Test
2. PWHT - Post weld heat treatment
3. Intra Granular Corrosion Test
4. Corrosion test as per A293 Method C
5. Ferrite No. Test
6. Impact test
7. Radiography for bore concentricity & weld joint as applicable
8. Physical, Chemical & Micro Analysis as applicable
9. PMI test (Positive Material Identification)
10. IBR Test

Ultrasonic Cleaning Process