


# Manual

## Installation Manual Benarx Epoxy Pipe Shell

### Installation Manual Benarx Epoxy Pipe Shell

Dokument nr. / Document no.:	Gjelder for følgende selskaper/prosjekter innen konsernet / Applies to the following companies/projects within the group:	
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**Dokumenthistorikk / History of the document:**

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0.0	21.03.2018	Trond Ullestad	Document prepared.
0.1	23.05.2018	O V Moldesæther	Document reissued
0.2	25.07.2018	Trond Ullestad	Installation method for insulated pipe shells included
0.3	31.10.2018	O V Moldesæther	Additon of Hot series and Cold series
1.0	08.10.2019	STIOYE	Republished
2.0.	02.06.2020	ADCHAA	Complete review

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## 2 Tools, Materials and Protective Equipment

Tools, components and accessories that are recommended for product installation is listed below.


Type of equipment listed herein is based on Benarx Solutions experience with works related to the Benarx Epoxy series. The list is not intended to be absolute an absolute requirement, more a guideline of necessary tools.

### 2.1 Tool list

Item no.	Item
1	Hammer (rubber)
2	Hammer
3	Vise grip (pliers)
4	Drill (pneumatic)
5	Marker pen
6	Metric measure (3 m)
7	Knife (type Mora)
8	Sheet metal shears
9	Jig saw
10	Caulking gun
11	Inch ruler (2 m)
12	Bit set
13	Pop tong (manual TT55)
14	Pop plier (machine)
15	Holesaw 22mm
18	Stanley knife
19	Protractor
20	Tightening tool
21	Locking plier, 3/4"

### 2.2 Accessory list

Item no.	Item
1	Pop rivets, A4/A4 16x4.8mm (stainless steel, quality A4)
2	Pop rivets, A4/A4 8x3.2mm (stainless steel, quality A4)
5	Drill bits, Ø 3.3mm (type Dormer)
6	Drill bits, Ø 4.9mm (type Dormer)
7	Holesaw 22mm (for drain plug)
8	Nitoseal SC N (white colour)
9	ROKU Strip 1.5 x 20mm (roll à 25 metres)
10	Fire tested and approved drain plug / Benarx Fire Drain Plug (stainless steel, quality A4)
11	Jig saw blade (Bosch T 123X)
12	Silicone spacers

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### 2.3 Protective equipment list

Item no.	Item
1	Dust mask (P2 filter)
2	Gloves (cut secure)
3	Safety overall
4	Safety eye wear
5	Safety shoes
6	Helmet

#### Notes:

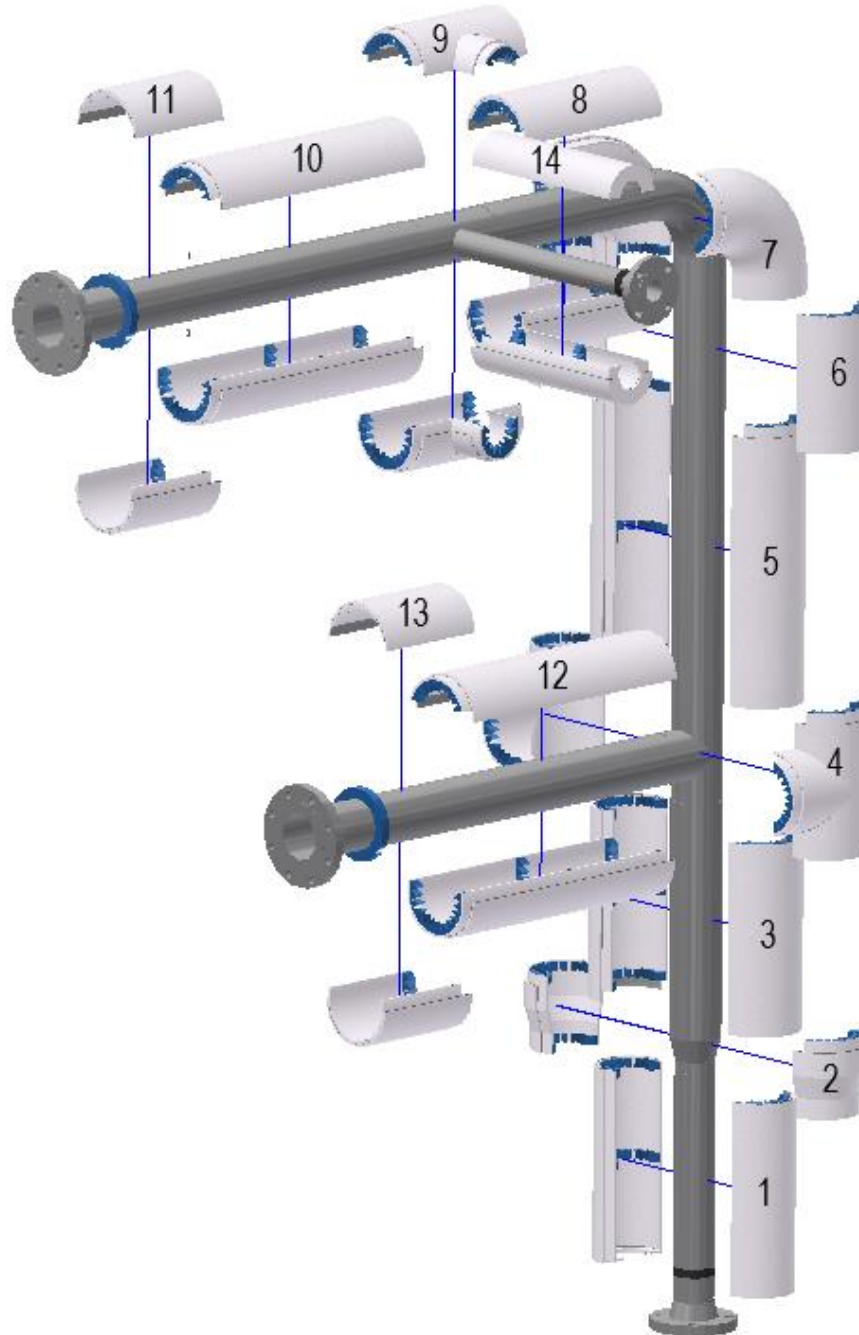
- Protective equipment shall be used in accordance with applicable health, safety and environmental requirements specified for the work place.

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### 3 Scope of Work

#### 3.1 Overview



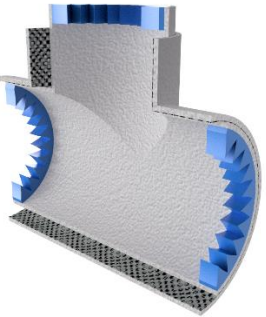
Before installation:



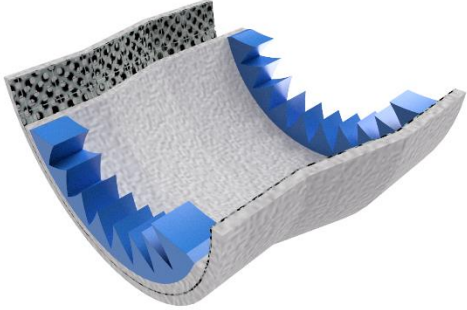

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**Parts List:**

Component	Description	Illustration
Straight Pipe		
Bend		
T-Piece		

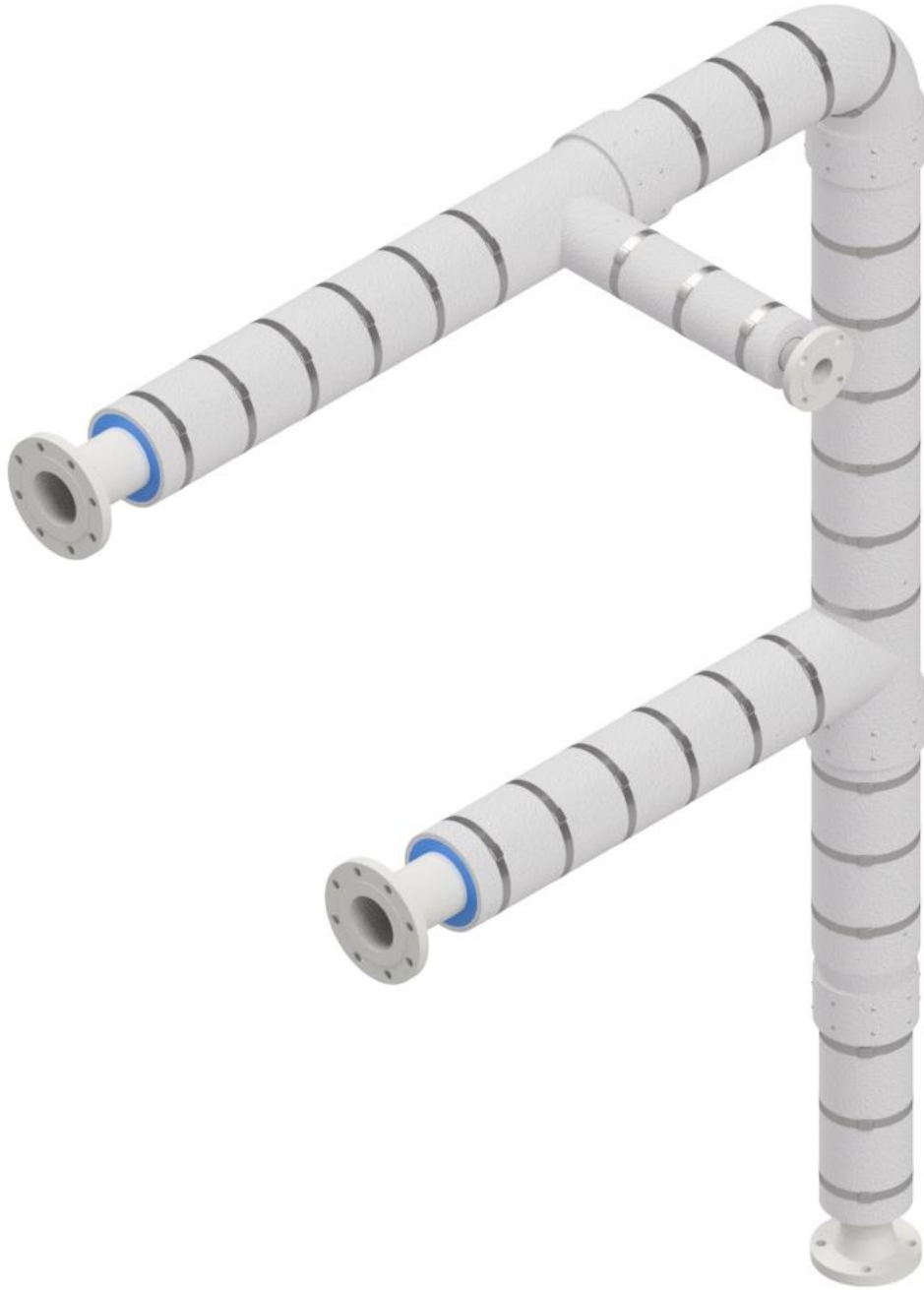
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Reducer		
Splice		



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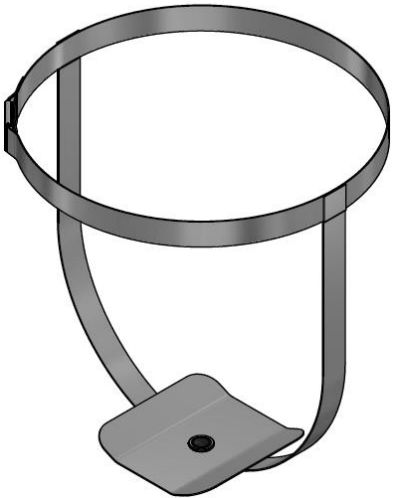

**After successful installation:**



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#### 4 Component List

Component number	Description	Order	Illustration
1.	<p><i>Tightening band</i></p> <p>Supplied with 200 mm overlap and glassfiber tape installed on the inside and ROKUStrip under Clips.</p>	<ul style="list-style-type: none"> <li>Outer diameter of the pipe-shells must be specified.</li> <li>Quantity of pieces.</li> </ul>	
2.	<p><i>For retrofitting of Benarx Fire Drain Plug</i></p> <p>Supplied with tightening band and steel plate for T-Piece and angle bends for mouting after installation of drain plug if necessary.</p>	<ul style="list-style-type: none"> <li>Produced on site. Pop nails shall be riveted flat, on the inside to avoid damaging the surface coating of the pipe shells.</li> </ul>	
3.	<p><i>Benarx Fire Drain Plug</i></p>	<ul style="list-style-type: none"> <li>Quantity of pieces.</li> </ul>	

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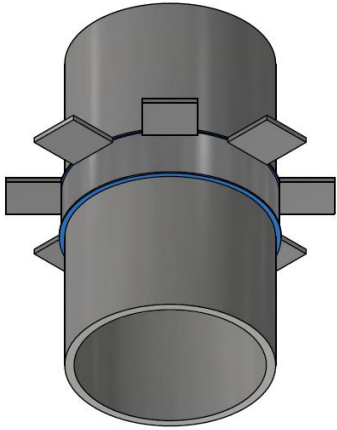
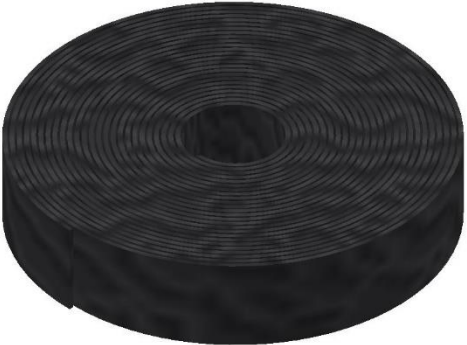

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Component number	Description	Order	Illustration
4.	<p><i>Support ring for vertical pipes</i></p> <p>Alternative 2: Fastened with tightening band</p>	<ul style="list-style-type: none"> <li>Outer diameter on pipe.</li> <li>Quantity of pieces.</li> <li>Quantity of gaskets</li> </ul> <p>Note: Gasket shall be installed on pipe in advance.</p>	
5.	<p><i>ROKU Strip 1.5 x 20mm (roll à 25 metres)</i></p>	<ul style="list-style-type: none"> <li>Number of rolls</li> </ul> <p>RUKO strip is used as a fire-sealant against non-insulating penetrating objects like pipe-supports, trunions, penetrating equipments and similar.</p>	
6.	<p>Silicone spacers 25x20mm.</p> <p>Silicone spacers are prefitted inside the pipe shells.</p> <p>Additional spacers can be ordered as accessory material for modification purposes.</p>	<ul style="list-style-type: none"> <li>Quantity of pieces</li> </ul> <p>(Number of extra spacers needed for circumferential joints after cutting and for modification purposes.)</p>	

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## 5 Installation description illustrated

### NOTES

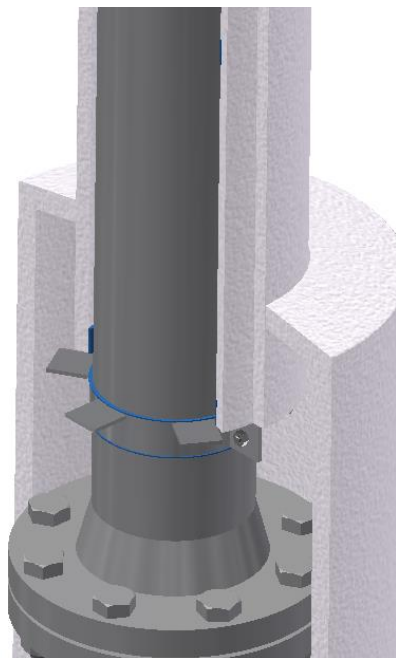
- Joints are not to be sealed with the only exception being on top of vertical splices.
- End caps in epoxy where terminations are not covered by boxes.
- Rubber End Cap Gaskets on end caps where terminations are covered by boxes.

Installation is to be executed according to the descriptions in this manual.

### 5.1 Installation of vertical supports

Installation of support ring on vertical pipe sections. The purpose of the vertical support rings is to prevent the pipe shells from sagging.

Vertical supports should always be installed at insulation termination points at the upper side for valves, flanges, pipe supports or other similar equipment requiring a box solution.



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After installation of the support ring the Pipe Shell is to be installed resting on the support ring.



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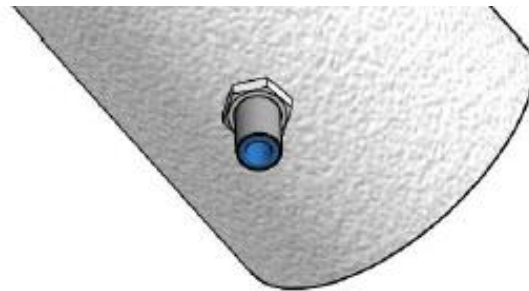
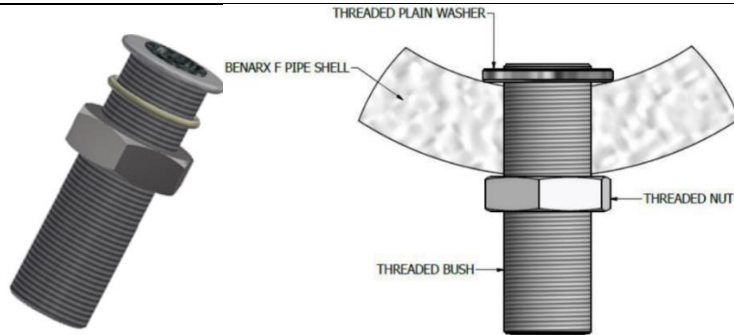
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## 5.2 Installation of drainage

Pre-drill a hole with a 22 mm holesaw at the lowest point and then install the Benarx Fire Drain plug.

Benarx Fire Drain Plug shall be sealed with Nitoseal SC N sealant only. Sealant shall be applied between the plug and cut out (hole)

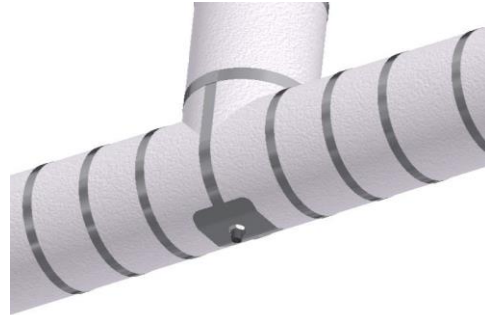


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Installation of Benarx Fire Drain Plug on T-pieces:

Benarx Fire Drain Plug with tightening band and steel plate for T-Piece.

A drain hole shall be made in the Pipe Shell prior to installation to avoid any damage to the pipe surface.



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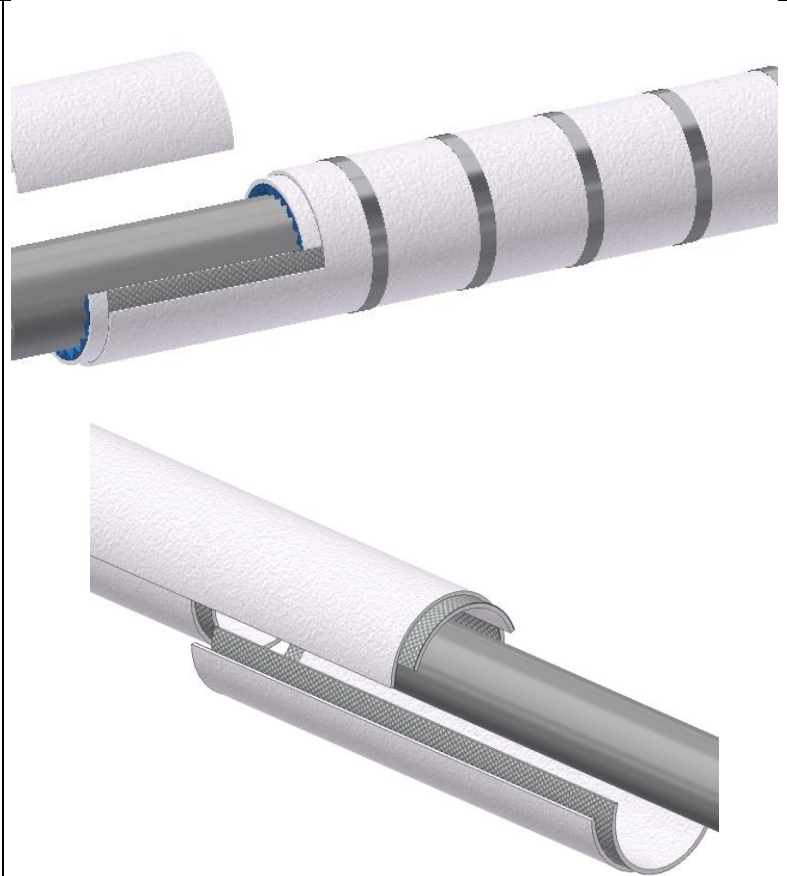
### 5.3 Installation of Benarx Epoxy Pipe shell components

Circumferential joints should be staggered to ensure integrity of the installed components.

Start with a half segment to get the joints as illustrated.

Its recommended (but not mandatory) to align the joints in a 9 & 3 o'clock position with the female Pipe Shells on top. This will ensure optimal water-shed properties on the final system.

After the Pipe Shells has been placed on the pipe it's recommed to temporary fasten them until correct c-c between tightening bands is ensured after sealing.





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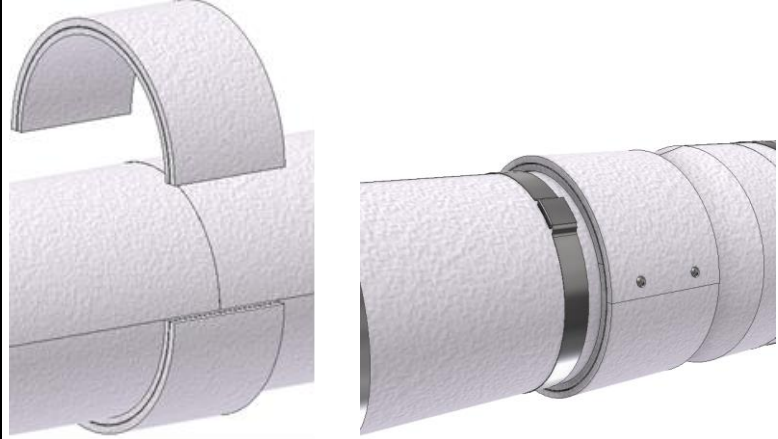
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### Circumferential butt joint

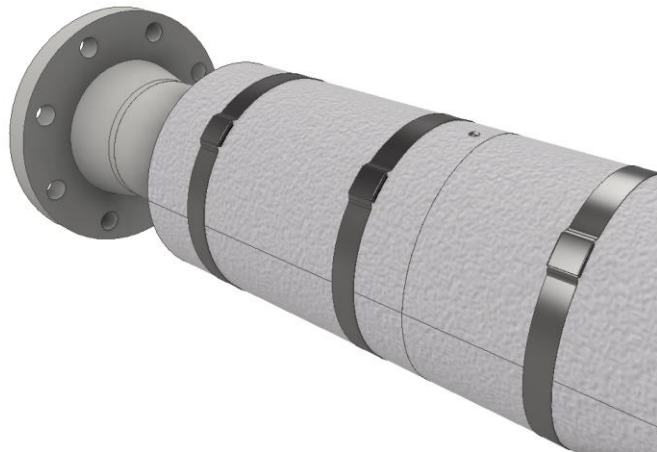
If need of Pipe Shell length modification accoure this can done by butt joint with a 100 mm wide joint cover.


Installation is performed by placing the joint cover (splice bar) over the joint, ensuring a 50 mm overlap to each side of the joint. Fastening by pop rivets.



Circumferential overlap joints. When Pipe Shell not is mounted "**staggerd**".

To minimize longitudinal movement one pop rivet to be fastened in each circumferential overlap joint.



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#### 5.4 Termination end caps

<p>Uninsulated termination</p> <p>Pipe Shell with uninsulated termination shall include epoxy end cap.</p>	
<p>Insulated termination</p> <p>Pipe Shell with insulated termination can be finished with Benarx Rubber End Cap.</p>	

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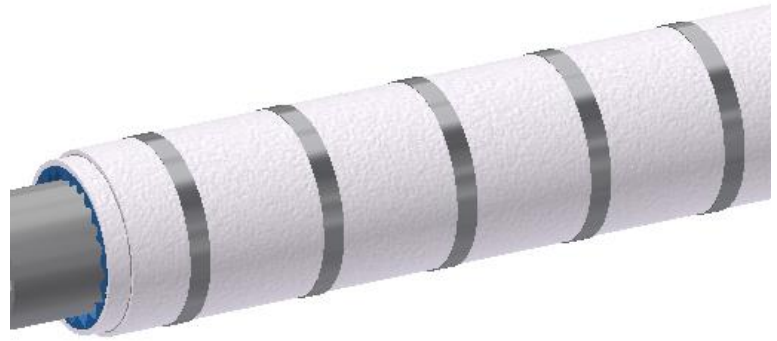
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## 5.5 Installation of tightening band

Measure and mark the correct location of the tightening bands.

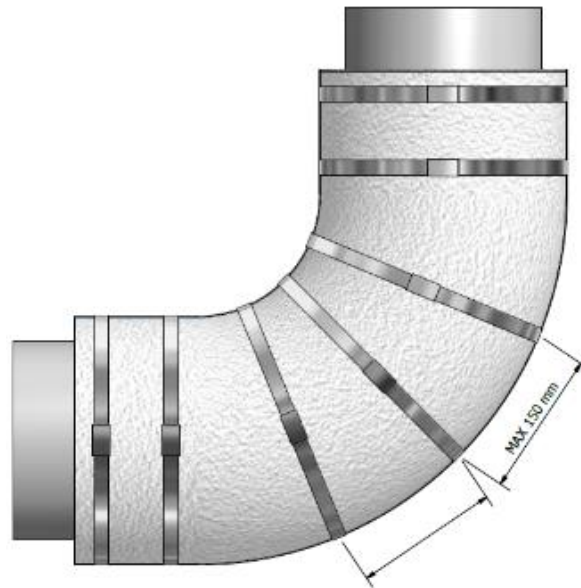
The recommended pattern for installation of tightening bands is shown to the right. This will also ensure that the joints are available for inspection of sealant.

The c-c distance between the tightening bands shall be max. 150 mm. Distance from Pipe Shell ends shall be max 75 mm



Tightening of bands on elbow-pieces.

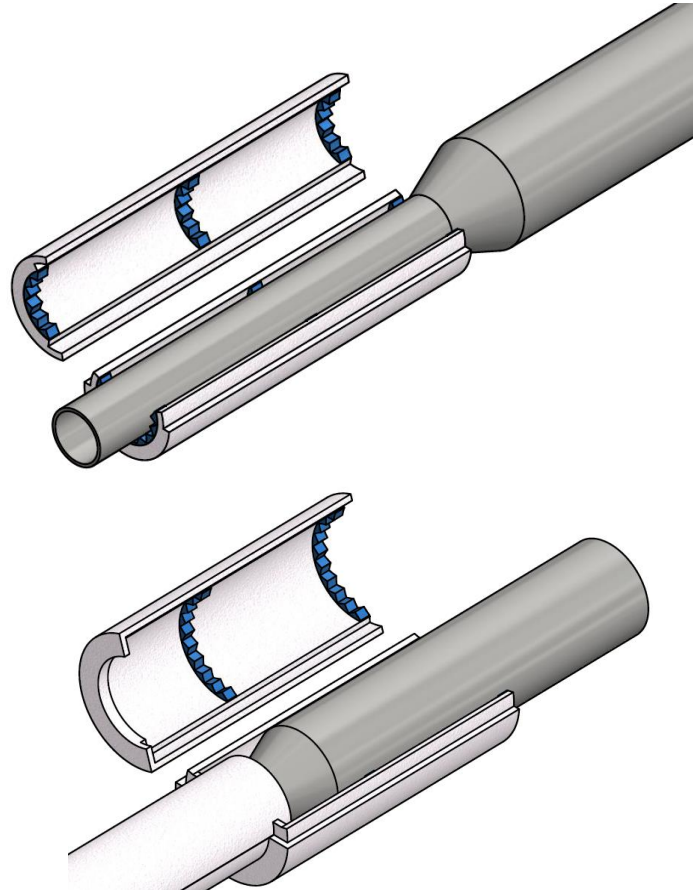
Tightening bands shall have maximum c-c of 150mm measured on the outside of the elbow.



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## 5.6 Installation of Reducers

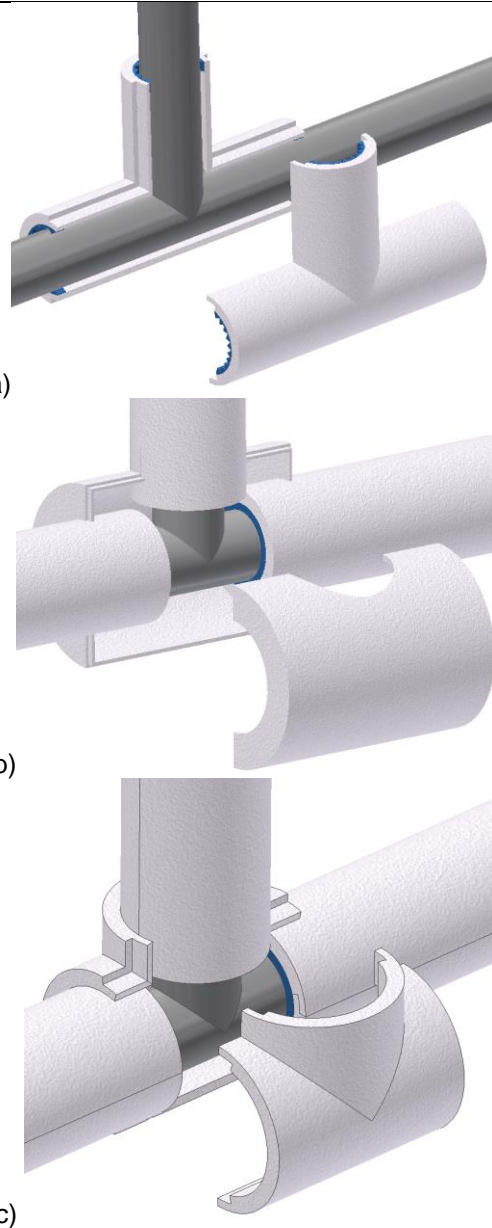
Install the smaller dimension pipe shell adjacent to the termination Pipe Shell, and seal the connection with Nitoseal SC N (white).




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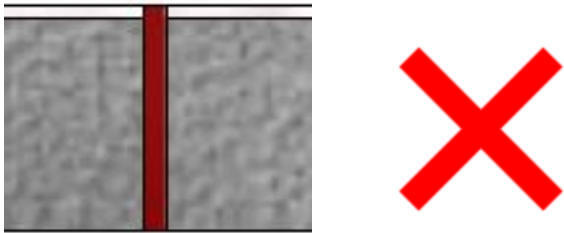
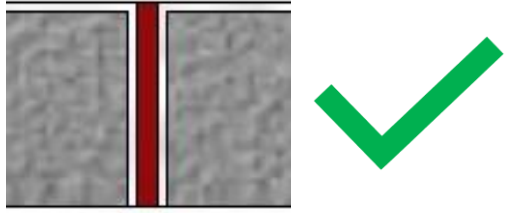
### 5.7 Installation of T-pieces

There are three different types of T-piece. The three types vary in space requirement, ability to absorb movement and ease of installation:



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### 5.8 Application of sealant

<p>The main purpose of applying sealant is to ensure a watertight barrier into the Pipe Shell. This is to prevent the Pipe Shell from absorbing water.</p> <p>Secondly, sealant can be applied for the Pipe Shell to provide a water tight barrier, isolating the interior from environmental exposure.</p> <p>Nitoseal SC N shall be used as sealing compound on outer joints with the purpose of preventing water ingress.</p> <p>White colour shall be utilized unless otherwise is specified.</p>	
<p>Application of sealant in joints with no coating on pipe shell edges.</p> <p><b>Sealant is indicated with red color in illustrations</b></p>	
<p>Wrong application of sealant in joints with no coating on pipe shell edges.</p> <p>This type of bad workmanship can result in water ingress!</p>	
<p>Application of sealant in joints with coating on edges.</p>	

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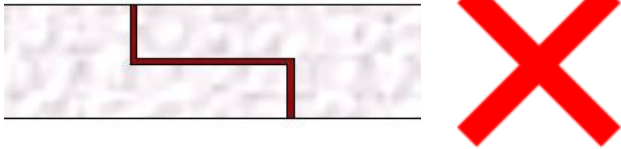
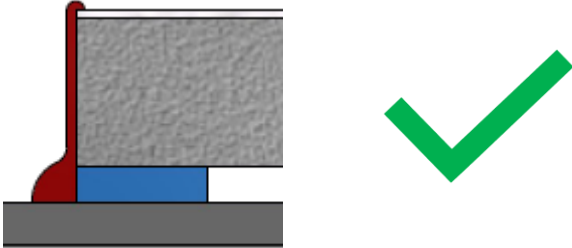
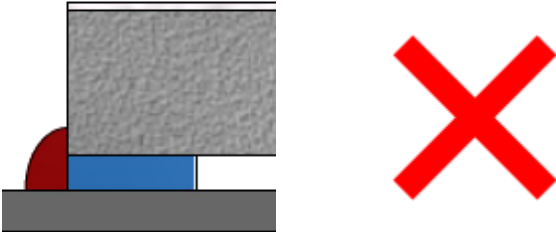
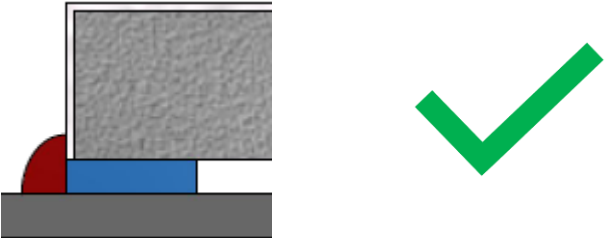
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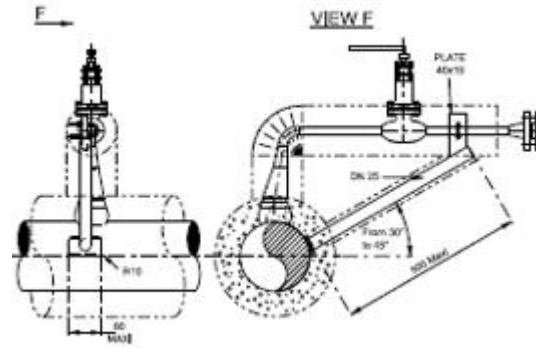
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<p>Application of sealant in outer joints.</p> <p>The outer joint should be filled with sealant to achieve a water-tight system.</p>	
<p>Incorrect application of sealant.</p> <p>This will cause the pipe shells to be very difficult to disassemble without inflicting damage to the pipe shells.</p>	
<p>Application of sealant on end-terminations with no coating on pipe shell edges.</p>	
<p>Wrong application of sealant on end terminations with no coating on pipe shell edges.</p> <p>This type of bad workmanship can result in water ingress!</p>	
<p>Application of sealant on end-terminations with coating on pipe shell edges.</p>	

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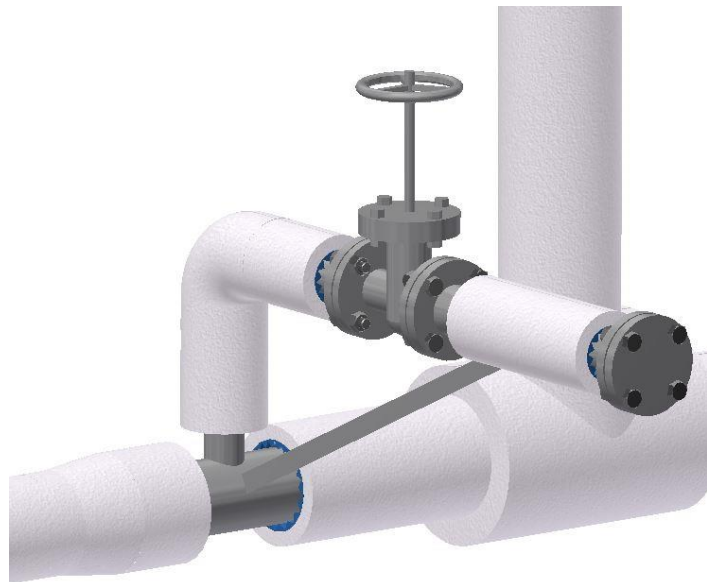
## 5.9 Solutions for complex items

Example 1: Bracing connected at T-piece



For such a problem it's recommended to utilize the standardized items as far as possible. This is shown in image to the right.

For the Tee box it's recommended to use a design with an additional split from the point where the bracing intersects the axis of the pipe.





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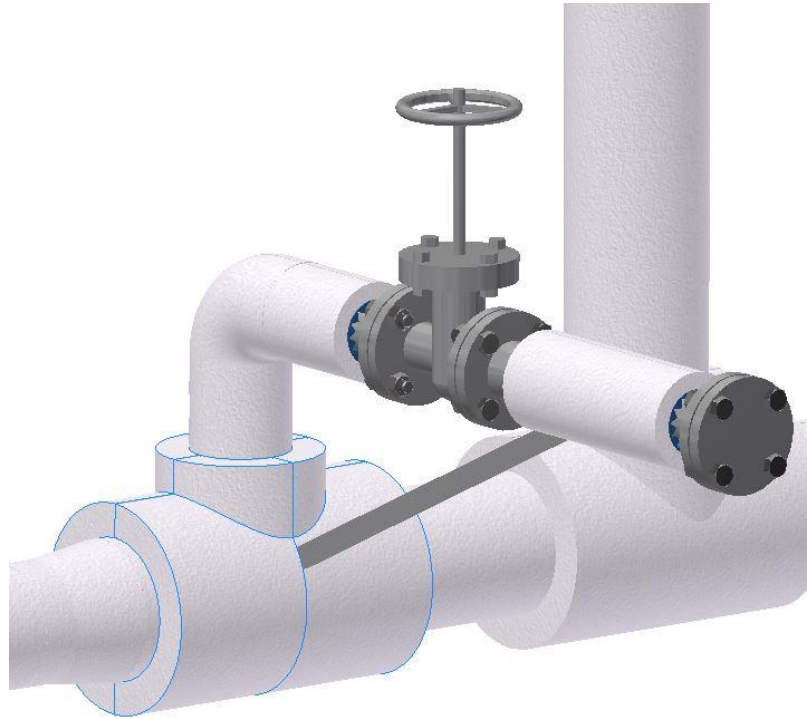
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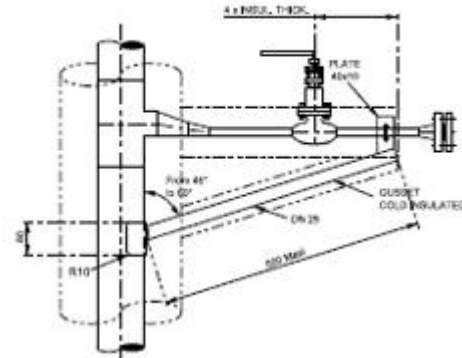
During installation of the Tee box the cut-outs for the bracing will have to be done at site.

For identical problem with very high temperatures or low temperatures the bracing itself will have to be insulated. The sequence will then be to insulate the bracing first, then install Pipeshell. By applying such a sequence, it will be easier to make cut outs in the Tee box and Pipeshell that to fit the Pipeshell to a curved surface.

Fastening will be the same as described in previous chapters



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**Example 2: Bracing connected along pipe axis****STAINLESS STEEL WITH OR WITHOUT INSULATION**

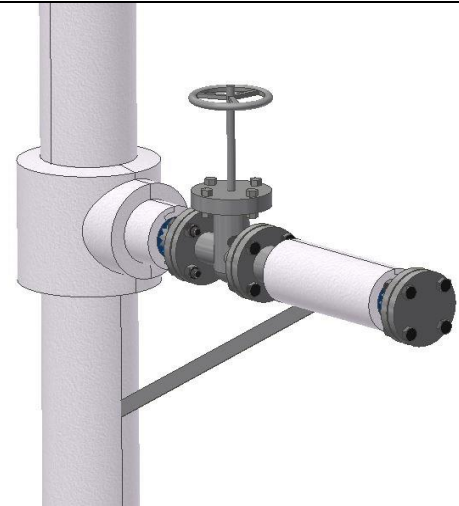
For such items where it is some distance between the Tee intersection and the bracing intersection it's recommended to utilize the Pipeshell as far as possible and complete the system with as far boxes as possible.

For this case special attention should be focused towards the Pipeshell segments below the Tee intersection. Here it's evident that the longitudinal joint is turned such that it's aligned with the intersection plane between the bracing axis and pipe axis. A small cut-out is then made in the Pipeshell.



This case is of no problem for installation of the Tee box.

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When installing the valve box, a simple cut-out is to be made for the bracing.

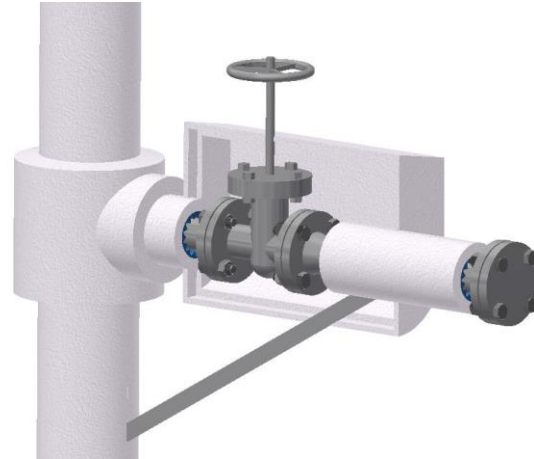
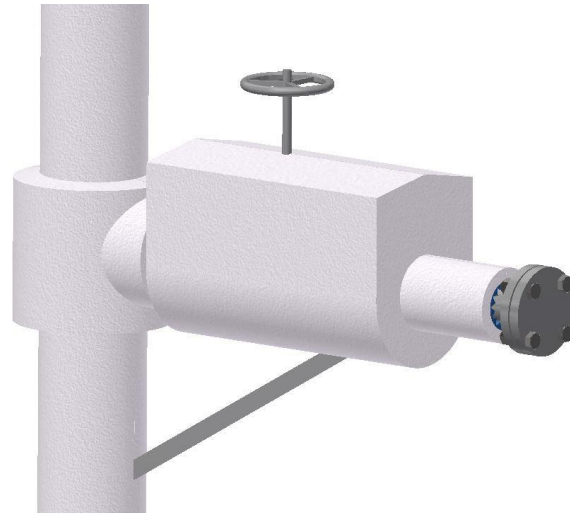


Illustration of completed design.



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Vedlegg til:

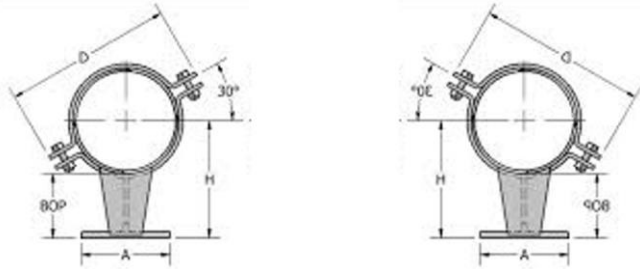
NA

Rev:

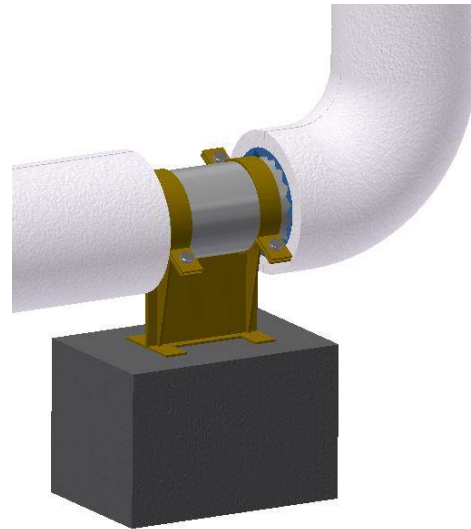
2.0

## 5.10 Supports

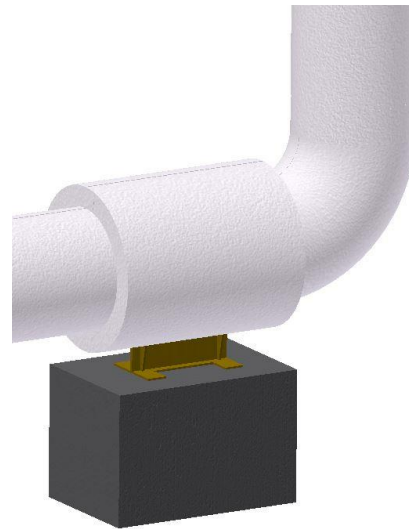
Clamped shoe support



Clamped shoe supports are easily treated by support boxes. The dimensions of the support “ears” are standardized. By including this in the design it should be possible to standardize the support box design on the same basis as the T-piece boxes.



Fastening of boxes will be like the concepts described in previous chapters.



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### 5.11 Alternative fastening methods

#### Fastening by eccentric locks

Pipe Shells can be delivered with locks as fastening method.

A safety clip (pin) shall be installed according to illustration (right) to ensure that the locks do not open.

