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Sulzer Chemtech Ltd

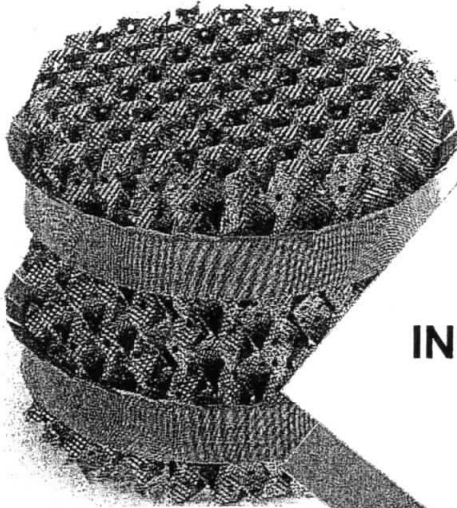
P.O. Box 65

CH-8404 Winterthur, Switzerland

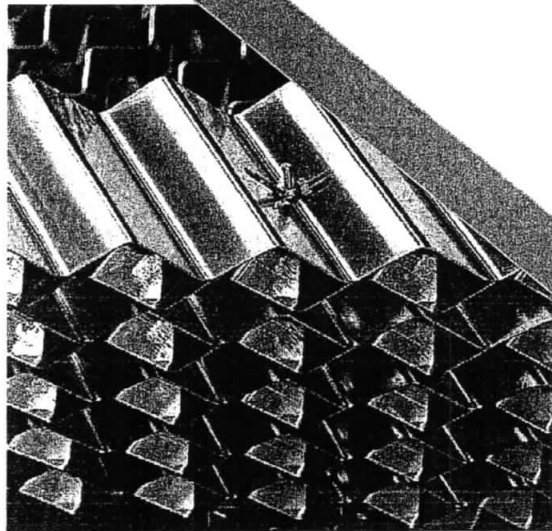


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**INSTALLATION INSTRUCTIONS  
FOR PACKINGS  
T-Hbl - 03**





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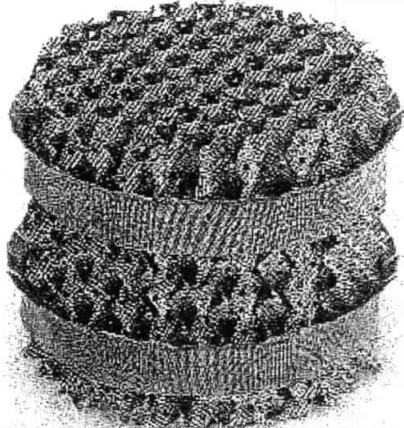
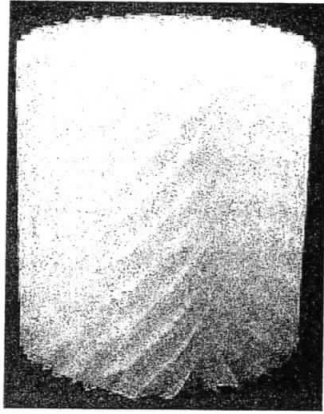
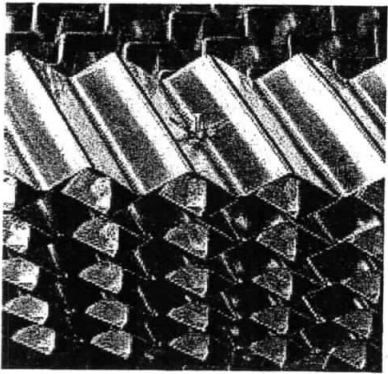
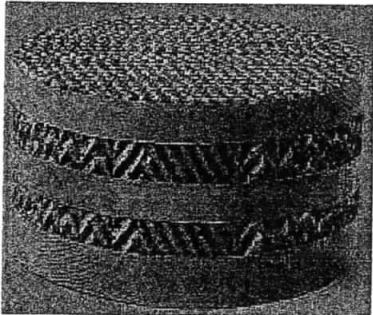
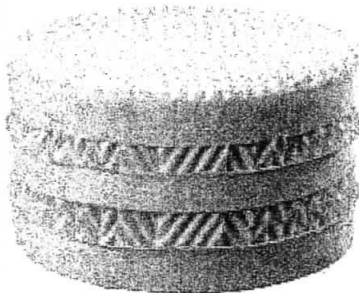

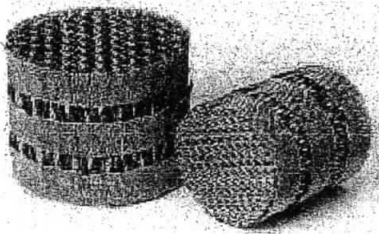
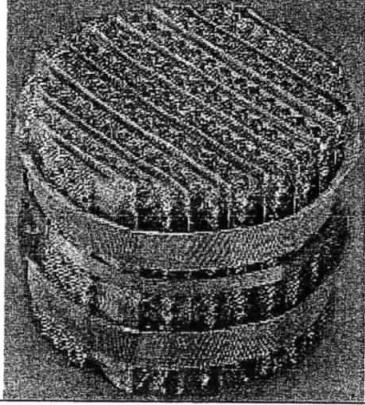
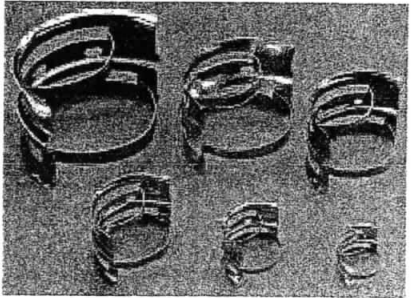
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## 1 Structured packings from Sulzer Chemtech

The following packings are fabricated in one-piece for small column diameter and segmented for larger column diameter.

The installation instructions depend on the packing material and the fabrication method. The installation procedure for one-piece packing and segmented ones are different.

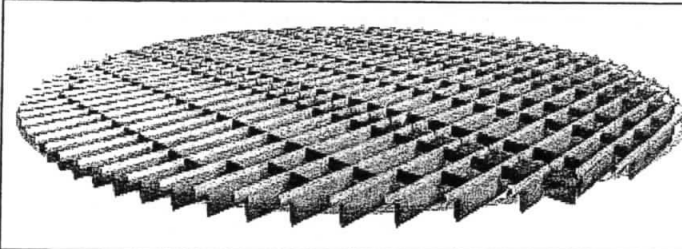
		
<b>Mellapak, MellapakPlus</b>	<b>Mellapak from plastics</b>	<b>Mellagrid</b>
		
<b>BX, BXPlus gauze packing, CY gauze packing</b>	<b>BX gauze packing from plastics</b>	<b>Mellacarbon See T-Hbl - 02</b>
		
<b>DX, EX laboratory packing, DXM, DYM laboratory packing made from sheet metal</b>	<b>Katapak - SP</b>	<b>Nutter ring random packing</b>

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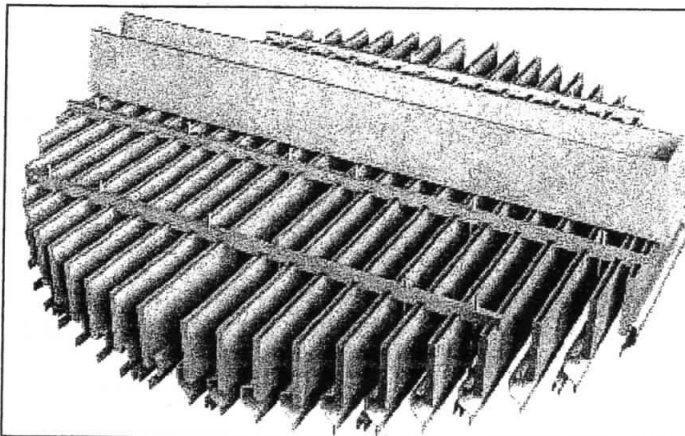
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## 2 Packing support



In columns made up from body flanged longitudinal sections, the support grids are carried on welded in cams or rings. In monoblock columns, segmented support grids are carried on support beams or support rings. The correct positioning is shown on the assembly drawing.

## 3 Liquid distributor above top packing layer



The VEP liquid distributor for example is placed directly on the packing supported by jigs. The correct positioning is shown on the assembly drawing.

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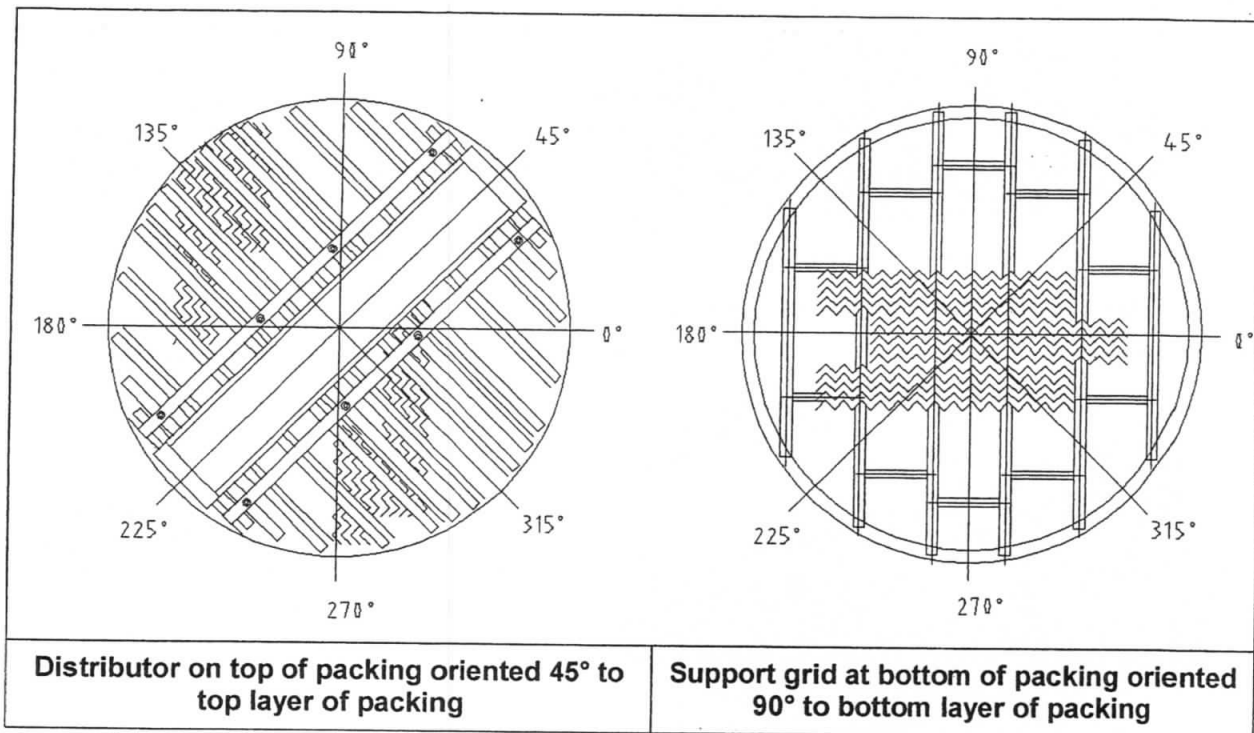
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## 4 Layer direction of bottom and top packing



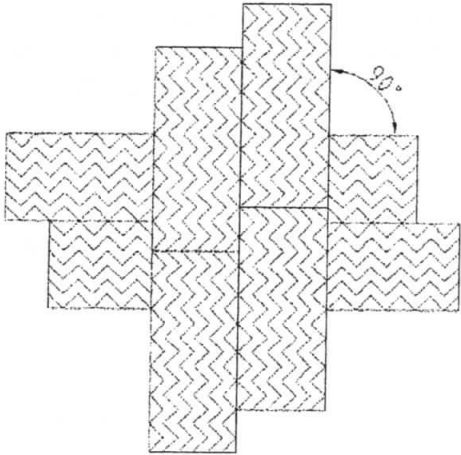


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## 5 Orientation of packing layers

	<p>Successive packings are always placed rotated by 90° to the previous one. It is important that the collars are close to the column wall.</p> <p><b>The collars must touch the column wall!</b></p>
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## 6 Column internals

Column internals are assembled in accordance with Sulzer Chemtech Installation Instructions (see THbl-04)



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## 7 General packing installation instructions

The installation should be supervised by a Sulzer supervisor. Sulzer does not take over costs caused by unqualified installation. The performance guarantee is only valid if the installation is carried out under Sulzer supervision. See also THbl-01 for General Safety instructions.

 	<p><b>Important:</b></p> <p><b>Because of danger of injury, do not handle packing without protective clothing and anti-cut gloves.</b></p>
---	--

**Attention:** When welding in the column, no inflammable products should be present, and all necessary safety precautions are to be taken.

 	<p><b>Structured packing is fire hazardous!</b></p> <p>The use of standard cleaning processes are not a guarantee that all traces of hydrocarbons have been completely removed from used packing. There is <b>always</b> the potential for residual traces of material to remain upon any packing even after cleaning has been performed. Due to this risk, any work performed above, below or near a packed bed should always be viewed as work performed next to a potential fuel source. Therefore, no hot work, oxy cutting, welding, grinding, or gouging should ever be performed above, below or near a packed bed. For further details we recommend to contact our Tower Field Service Specialist.</p>
---	--

- Packings are only fitted into columns standing vertically upright.
- Field installation can start in the pre-erected monobloc column only after all the piping and welding inside the column has been thoroughly cleaned.
- Fitting rods and metal sheets used as installation aids are supplied with the packing.

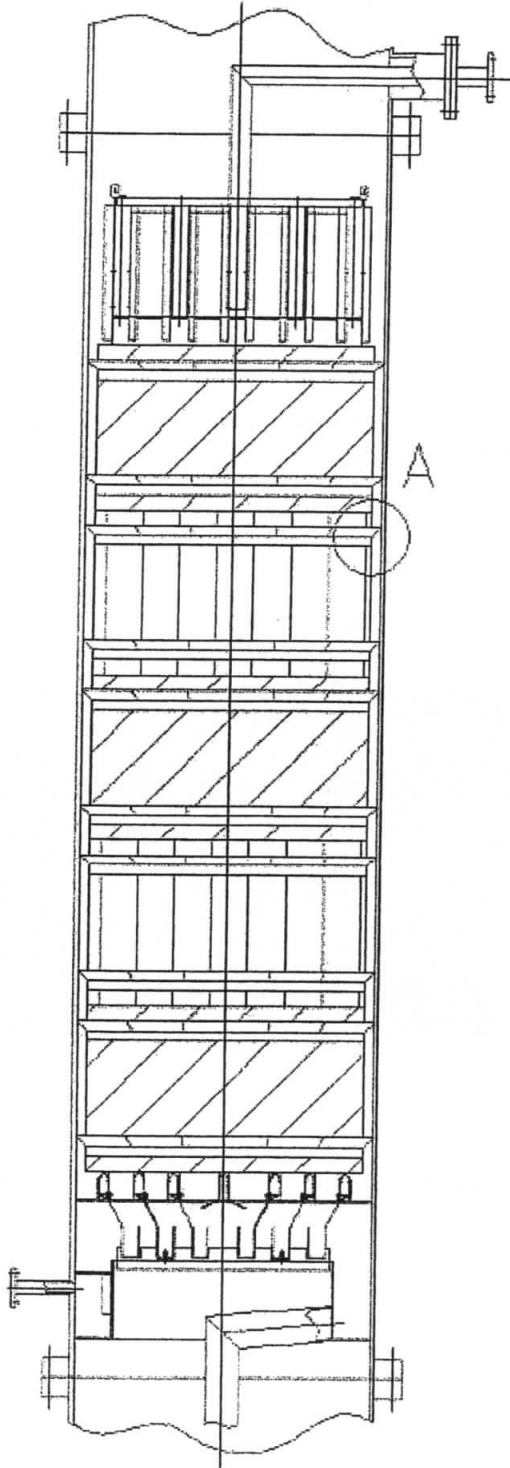
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## 7.1 Installation instructions for one-piece metal packings

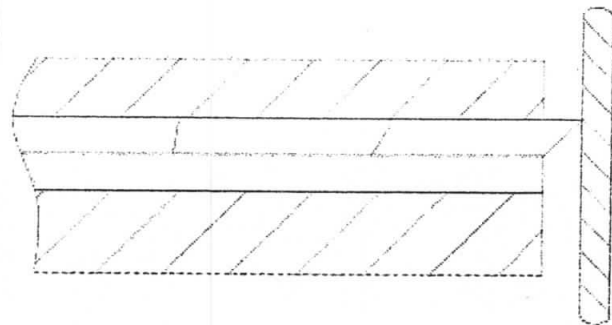
### Packing with fixed collars



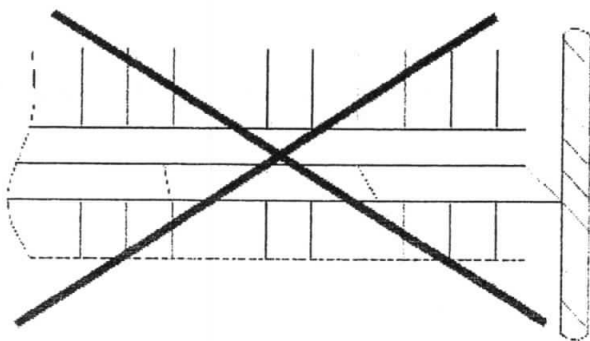
One piece packings have two collars fitted on the circumference of each layer to seal the gap between the packing and column wall. The collars must be bent outwards before installation.

Packing of a diameter over 500 mm should be installed using 3 fitting rods which uniformly support the packing element under the centre band as it is lowered down the column.

Detail A: **CORRECT**



Detail A: **WRONG**



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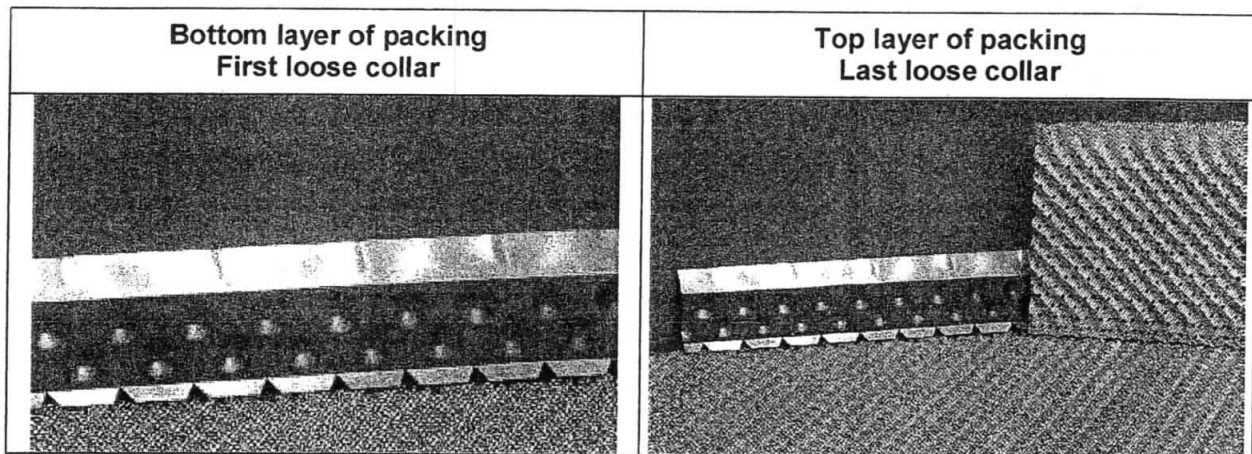
## 7.2 Installation sequence of segmented metal packings

Segmented packings are sealed as standard to the column wall with loose collars. Start the installation of the segmented layer with the head segment. The last segments will then be on the opposite side of the column. The last packing segments are installed with the aid of metal plates. This allows the segments to slide against one another. (See Fig 1)

The gap between the packing and the column wall is given by the loose collar. The Packing segments have to be as close as possible installed at the collar / column wall. Gaps between collar and column wall or between packing and collars have to be avoided. Possible gaps between segments have to be distributed evenly over the whole cross section. (See Fig. 2)

The loose collars are placed on the circumference of the packing after the installation of the first packing layer is complete.

The collars should have a minimum 20 mm overlap at the intersecting points with the outer segment of the successive packing layer, the loose collar is then pushed to the column wall in such a way that it touches the column wall.



**Note:**

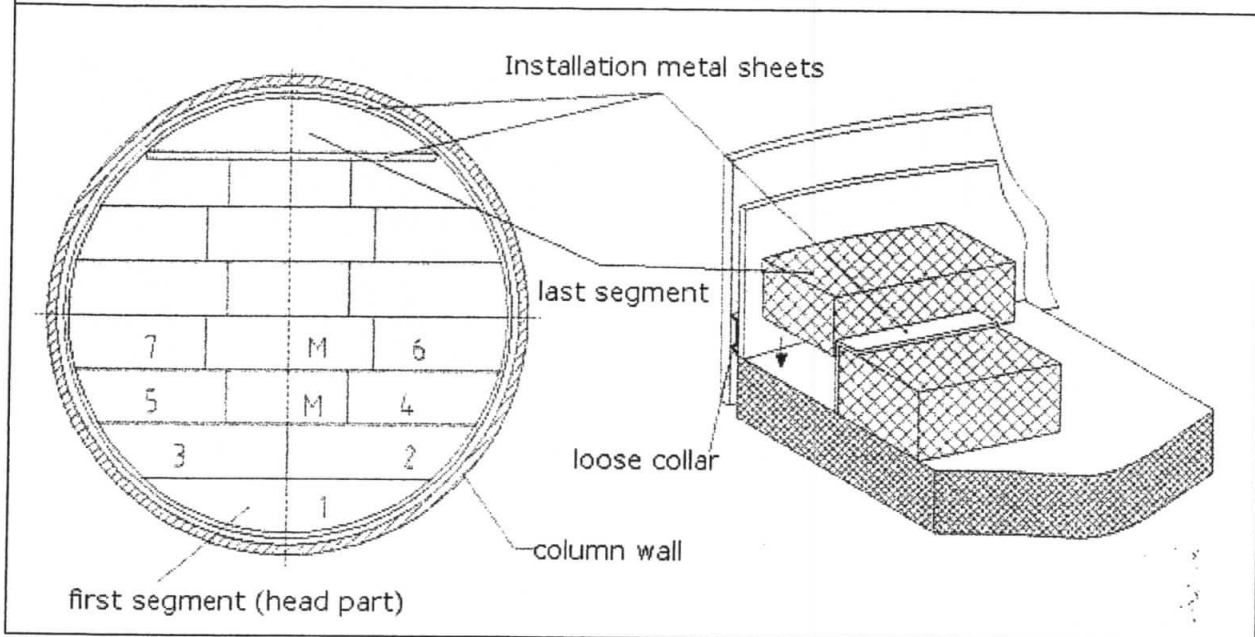
First layer of packing has to be installed without collars. After that every layer of packing has to be installed with collars.

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**Packing layer installation (Figure 1)**



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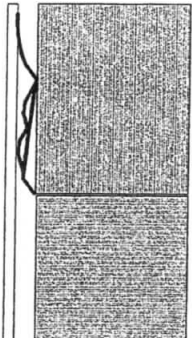
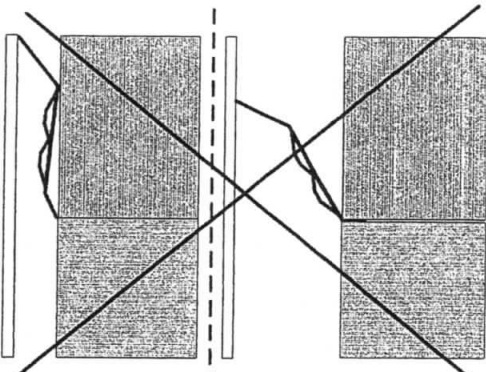
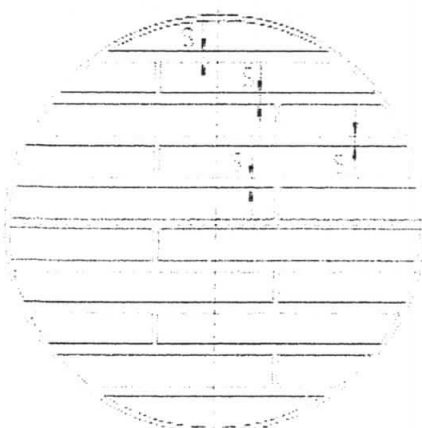
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correctly installed	wrong
	
 <p>Figure 1</p> <p>Dashed line marked on technical drawing</p>	<p><b>Segment gaps</b></p> <p>Gap S between segments are to be distributed evenly.</p> <p>Gaps between column wall and collar or between collar and packing have to be avoided.</p>

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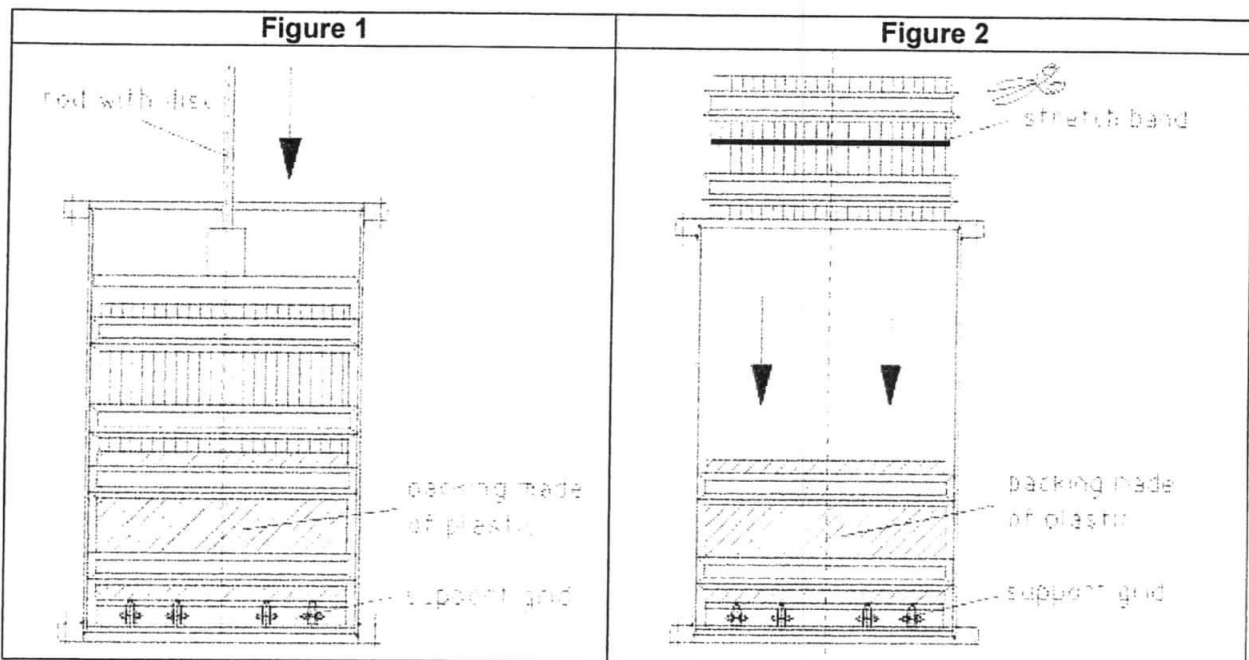
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### 7.3 Installation procedure for one-piece packings made of plastic

The same instructions as for metal packings are valid. In addition, the following points have to be considered:

**Min. handling temperature:** Below a temperature of 10°C plastics materials (e.g. PP, PVDF, PVC etc) are getting brittle and glass-like. The risk of damage due to handling is increasing rapidly. Hence, handling of plastic parts shall be avoided below a temperature of 10°C.

**Storage:** Do not store Plastic Packings in direct sunlight (UV-radiation)



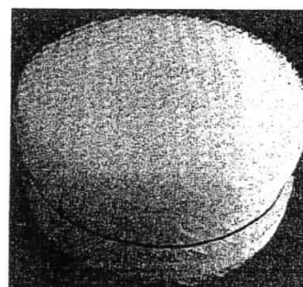
**Packing with stretch band**

**Figure 1:**

Each packing element has two sealing collars, fixed on the packing.

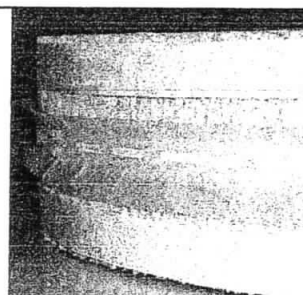
**Figure 2:**

For column diameters between 550 and 800 mm [22" to 32"] the packing segments are hold together by a stretch band which has to be removed before installation.



**Example of sealing collar**

The installation procedure is similar as for metal packings. The sealing is done by means of sealing collars. The sealing collars must close the gap between packing and column wall in its entire circumference.



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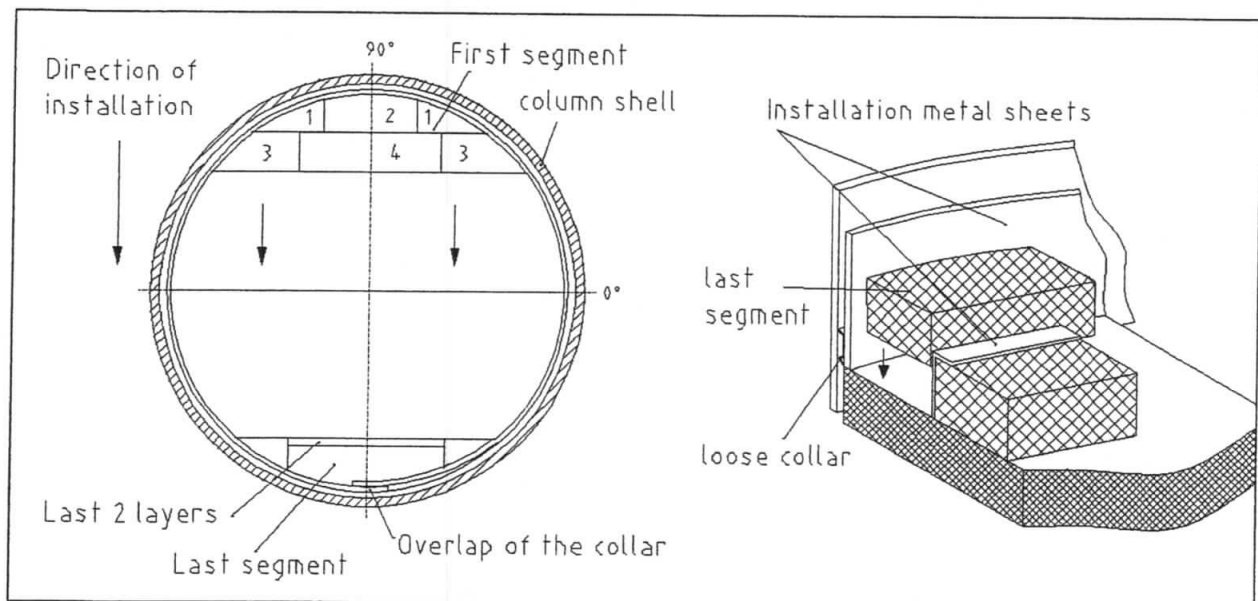
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## 7.4 Installation procedure for segmented packings made of plastic

The installation procedure is similar as for metal packings.

Sealing of the elements against the column wall is done with loose collars of the same material as that of the packing. The single loose collar pieces have a length of 500 mm [20"], and have to be plugged together to fit the circumference of the column. In addition, the following has to be considered.

### Packing element installation



Overlap of the collar at 90° in respect of the direction of the previous packing element layers.

Installation of the packing segments beginning at the opposite side of the overlap of the collar. Begin by putting the edge segments (1) close to the column wall, and then push the segment (2) in between them, also close to the wall.

Last middle segment (at the overlap): take away two layers of the segment, push the segment against the column wall and then insert the two layers again.



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## 8 Installation instruction for KATAPAK-SP packings made of metal

### 8.1 Storage and prevention from dehydration:

Just like for the pure catalyst, the following measures should be applied in order to avoid a dehydration of the catalytic packing elements before the installation of the KATAPAK-SP into the column:

- Keep the KATAPAK-SP elements in their unopened original crates.
- Keep crates in a covered warehouse to avoid direct sunlight.
- Do not store the Packing at a temperature below 0°C.

When the installation of the KATAPAK-SP cannot be finished by the end of the day, care must be taken, that the installed KATAPAK-SP elements are kept wet either by installing a temporary pump-around of **demineralized** water or that the column is closed, so that the packing stays in a humid atmosphere.

### 8.2 Packing installation instruction for one-piece KATAPAK-SP

The same instructions as for metal packings are valid. In addition, the following has to be considered:

- Install the KATAPAK-SP elements in a short as possible time.
- Open only the original wooden crate just before you install the packing.
- Packings are only fitted into columns standing vertically upright.
- Fitting rods and metal sheets used as installation aids are supplied with the packing.

After installation of the KATAPAK-SP layers, flush the packings with **demineralized** water through a flexible hose for at least 2 minutes.

### 8.3 Installation procedure for segmented KATAPAK-SP packings made of metal

The same instructions as for metal packings are valid. In addition, the following has to be considered:

Install the KATAPAK-SP elements in a short as possible time, to avoid the dehydration as much as possible.

Open only the original wooden crate just before you install the packing. Take out one layer, consisting of several segments and close the crate again to avoid drying of the catalyst.

Transport and lift the single elements with the catalyst pockets in horizontal position and only when you place it on the foregoing packing layer inside the column you turn the segments into its vertical position.

The stainless steel stiffener plates shall be installed between all the segments of the first packing layer of each KATAPAK bed.

Should the elements end up with a gap on the center line of the column, then this gap shall be closed with the loose MELLAPAK layer provided.

Before installing the next KATAPAK-SP layer, flush the already installed packings with **demineralized** water through a flexible hose for 1 minute.

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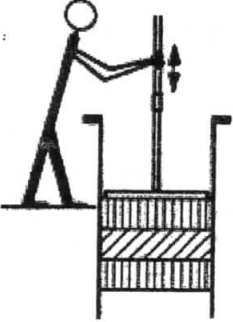
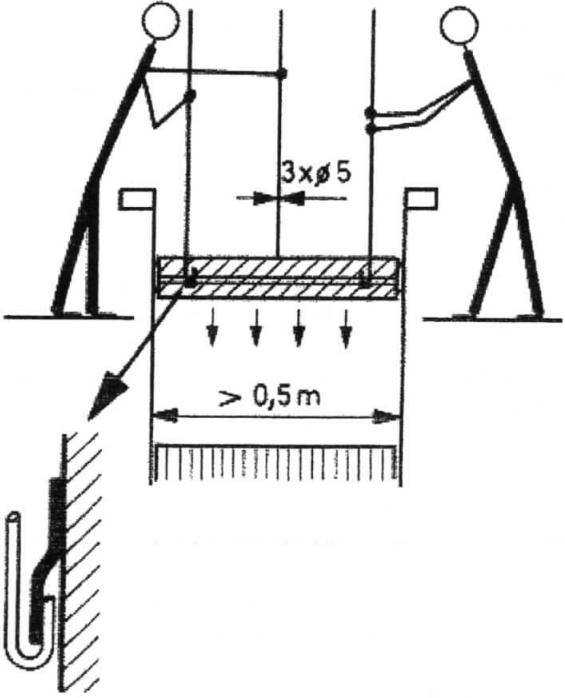
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## 9 Field installation of packing

General Installation remarks:

- Structured Packing elements are only fitted into columns standing vertically upright. (Exception to this rule: Special packings made for particular applications for fitting into a horizontal column.)
- Do not directly step on the packing surface. Walking is allowed only by using protection sheets with an area of at least 1200 cm<sup>2</sup> [1.3 ft<sup>2</sup>]. (sheet-size 2x40x30cm / [1"x16"x12"])
- Each installed layer has to be verified after installation
  - Correct orientation of the layer
  - Evenly distributed gaps over the whole column area.
  - Levelness of the packing (acceptable deviation within column-ID/300 or 0.33% of the column inner diameter)
  - Correct and gap-free placement of collar

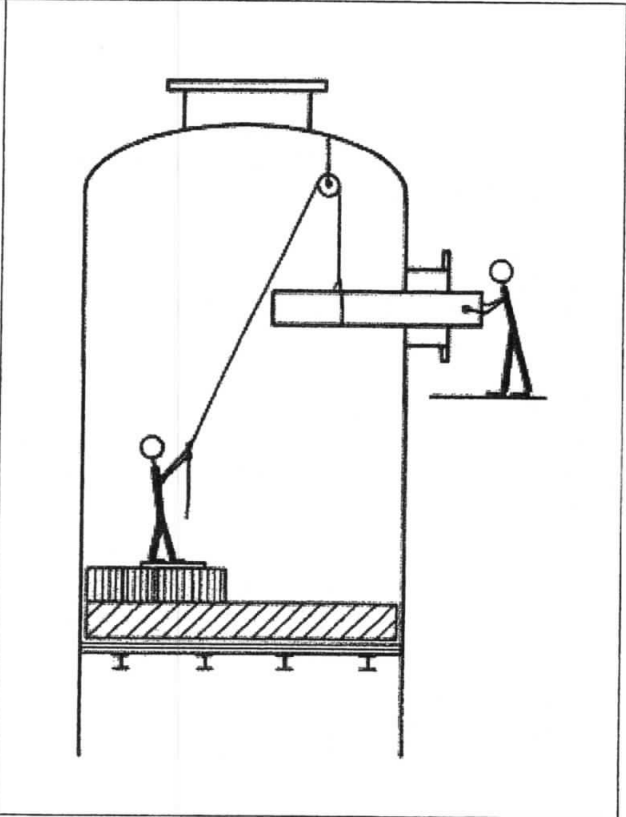
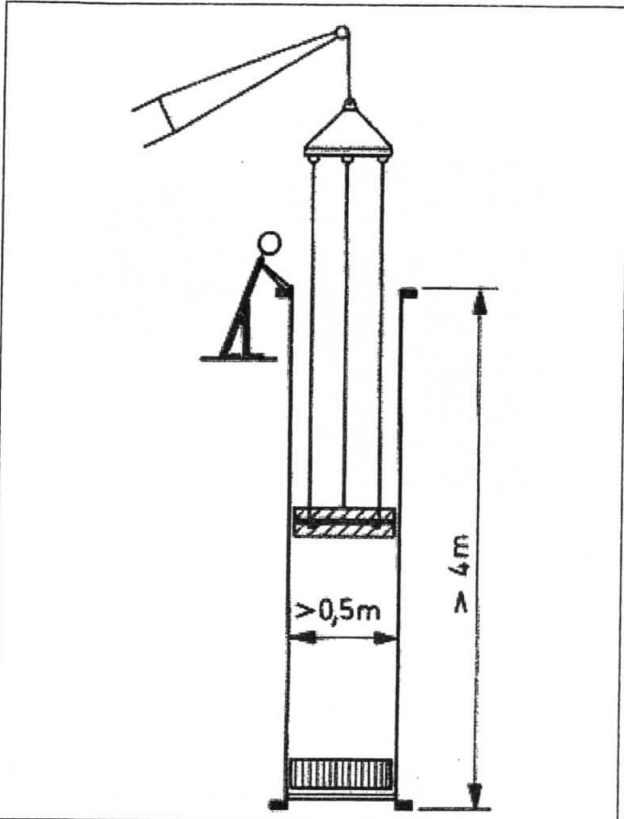
Please use following installation instructions for packings.

<p><b>One-piece packings</b></p> <p>Flanged columns <math>\varnothing \leq 0,5 \text{ m}</math> [20"] and length <math>\leq 4 \text{ m}</math> [13 ft]</p> <p>Use a rod with disc for installation.</p>	
<p><b>One-piece packings</b></p> <p>Flanged columns <math>\varnothing &gt; 0,5 \text{ m}</math> [20"] and <math>\varnothing \leq 1,2 \text{ m}</math> [47"] and length <math>\leq 4 \text{ m}</math> [13 ft].</p> <p>Use fitting rods for installation.</p>	

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### One-piece packings

Flanged columns  $\varnothing \leq 0,8 \text{ m}$  [32"] and length  $> 4 \text{ m}$  [13 ft]

Installation by means of fitting rods and crane equipment

### Segment packings

Monoblock columns and flanged columns with  $\varnothing > 0,8 \text{ m}$  [32"]

Installation through manhole or column flange segment by segment

### Special note for KATAPAK-SP:

Transport and lift the single elements for **KATAPAK-SP** with the catalyst pockets in horizontal position and only when you place it on the foregoing packing layer inside the column you turn the segments into its vertical position.

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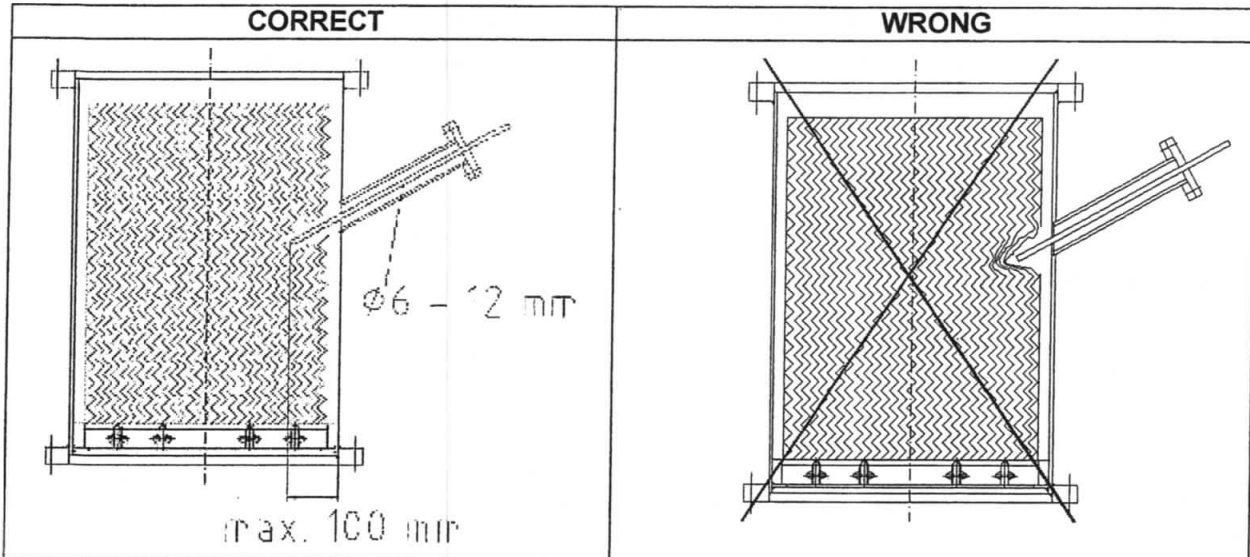
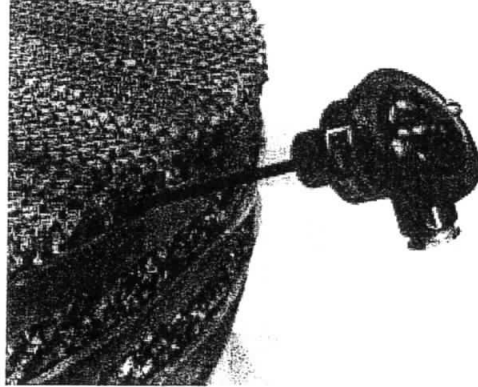
## 10 Installation of temperature sensor in SULZER-Packings

Via the instrument connection, a hole is to be carefully made into the packing to take the temperature sensor.

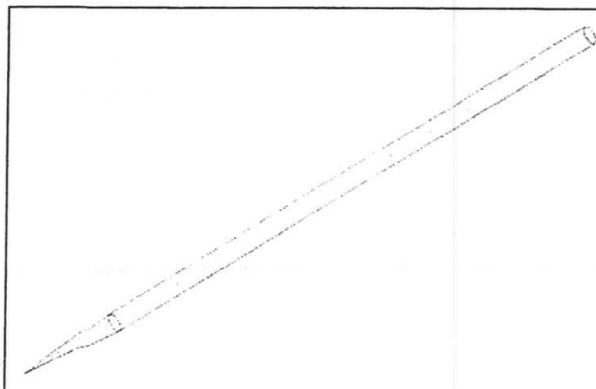


(except for KATAPAK-SP)

The diameter of the protective tube should be as small as possible (max. 12 mm) [1/2"]. The depth of penetration into the packing is not to exceed 100 mm [4"].



### 10.1 Installation of temperature sensor in Gauze and sheet packing (except KATAPAK-SP)



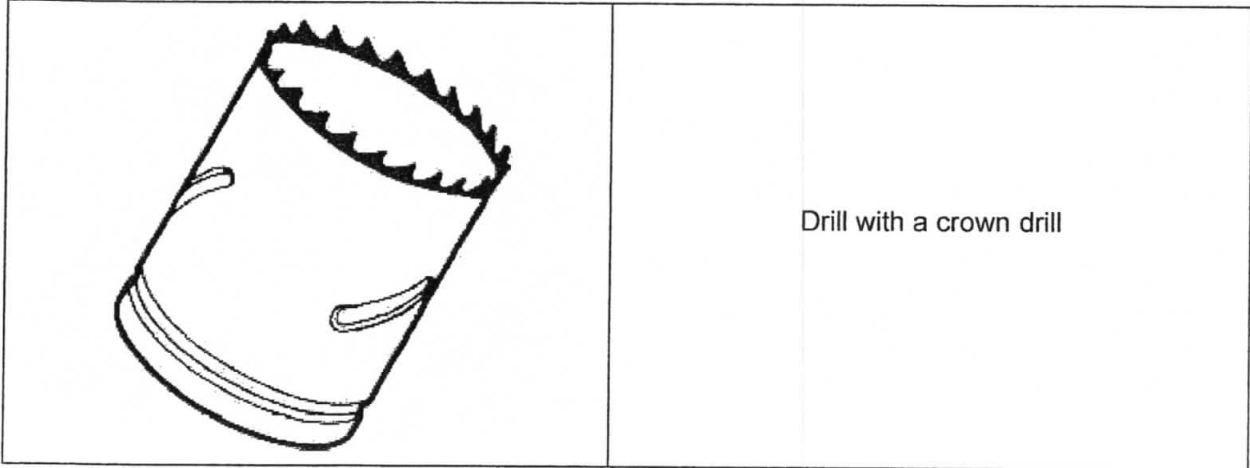
Pierce and broaden out with a pointed round metal bar

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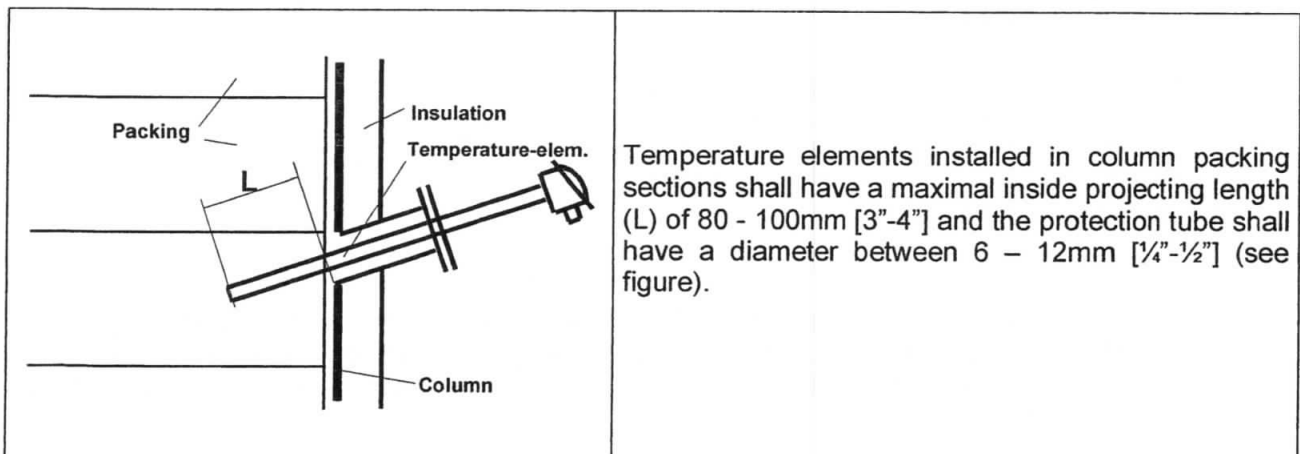
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## 10.2 Installation of temperature sensor in Packing made of plastic



## 10.3 Installation of temperature sensor in KATAPAK-SP

When reaching a location of a thermowell / temperature element, then the temperature element shall be installed, just after placing the corresponding KATAPAK-SP element in order to check that the location is correct and the catalyst pockets are not damaged.



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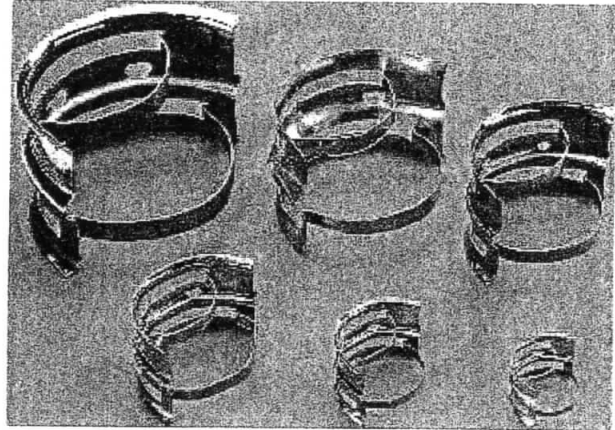
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## 11 NUTTER RING RANDOM PACKING

### 11.1 Initial receipt and storage

Nutter Ring packing is normally transported in 40 cubic foot bags. An inventory check should be made as soon as possible after delivery and a record made of the number of bags supplied. Operational problems have been known to occur because of a lack of control during filling.

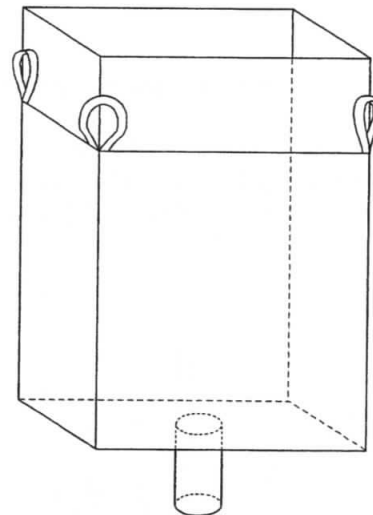
Nutter Ring packing is vulnerable to impact damage. Disorganised storage can lead to scattering of packing elements over an appreciable area, and consequently, they can become permanently damaged. Fragmented storage can result in inventory loss.



Storage facilities will be required for the period between delivery and installation. Preferably, this storage will be covered and away from the immediate plant area. Note that carbon steel packing can rust in damp storage areas. Since the presence of iron oxide is normally deleterious to column operation, dry storage should be provided in such cases.

### 11.2 Column preparation

Before Installation of the internals, care should be taken to insure that the vessel is clean and that pipes leading into the vessel are free of dirt, slag and other debris which could coat or plug distributors and/or packing.



Facilities for hoisting the bags of packing to the working elevation and into the column should be provided by the client or contractor, by agreement. The supply of scaffolding, lifting equipment, and internal walking boards will normally be the responsibility of the contractor or subcontractor carrying out the work.

Only the quantity of packing required for the bed being filled should be taken to the working area. In that way, overfilling (which could occur if the bed was inadvertently compressed during filling), or underfilling (if, for example, previously filled beds had used unexpectedly greater amounts of packing) can be avoided.

Packing support rings should be level and free of weld splatter. In revamp situations, redundant tray support rings need to be cut back to within 3/8" of the vessel wall. Downcomer bolting bars should also be cut back. Packing bed limiter lugs, where installed, should be checked to insure the correct depth of packing can be installed. After installation of the bed support plate, a continuous guideline should be drawn to indicate the depth of packing required, unless this is clearly indicated by the bed limiter lugs or other support means. This guideline should be measured from the top side of the support ring for the packing support plate.

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Packing should be installed through a suitable manhole or other means of access to the packed bed. Where appropriate, nozzles, including those with vortex breakers, should be shrouded to ensure that dropped packing elements and other debris do not enter the pipework.

### 11.3 Installation of Nutter ring random packing

1. Nutter Ring random packing should be dry packed by dumping the rings from the shipping bag or a chute. The use of a pneumatic filling device is not recommended due to the potential for ring deformation.
2. Where possible, start from the lowest packed bed and work upwards. When this is not practical, or where beds at different levels are being filled simultaneously, adequate protection must be provided for those working below.
3. Ensure that the upper limit of the bed is clearly recognizable. This will usually be indicated by the bed limiter lugs welded to the vessel wall. Where this is not the case, a chalk mark should be drawn as indicated earlier.
4. Nutter Rings can be dry dumped from the top of the bed. Care should be taken to ensure that the elements are evenly spread over the whole cross-sectional area of the column and that a reasonably level surface is maintained during the filling process. The use of a chute and filling sock is recommended in order to break the fall and to allow the elements to be efficiently distributed over the column cross-sectional area.
5. Walking directly on the packing should be avoided since it can cause localized compression and damage. Where the column diameter is such that entry into the column is necessary, walking boards must be available and the supervising engineer should specifically ensure that they are used. The boards should be rigid and used in such a way that the packing elements are not damaged. The utmost care is needed to ensure that the walking boards are subsequently removed.
6. When the desired bed depth is reached, the top of the bed should be levelled prior to the installation of the bed limiter. The bed limiter should lay directly on its supports. The bed should not be compressed to accommodate the bed limiter, nor should there be any gaps greater than 2 packing ring diameters between the top of the bed and the bed limiter.
7. At a suitable time during installation, and in any case upon completion, a count should be made to ensure that all bags have been removed from the column.

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## 12 Dismantling the packings

The method of removal of the packings depends on the type and diameter of the packing and can be carried out as follows:

### One-piece gauze packing and MELLAPAK:

The longitudinal section of the column has to be dismantled and laid horizontally. The individual packings can be removed by applying special hooks to the middle edge band and withdrawn carefully from the section of the column.

### Gauze packings and MELLAPAK made in segments:

In the reverse sequence to fitting, i.e. the last edge segment to be fitted is withdrawn by means of special hooks. The remaining segments can then be removed without special tools.

### Packings made in one piece, diameter up to 700 mm, made from plastics and carbon:


After suitable safety precautions to loosen the support grid from the column connections, lift off the section of the column vertically and push the packing downwards.

### Packings made in segments, of diameter 700 mm and above, made from plastics and carbon:

The procedure is the same as for the gauze packings and MELLAPAK made in segments except that the first edge segment has to be removed with even more care.

Sulzer is prepared to advise the customer regarding possible shutdown procedures and to make its wide experience available to the customer.

However, Sulzer is not able to accept any responsibility for the safety of the installation and of personnel.

	<p><b>Warning:</b></p> <p><b>RISK OF FIRE ! CORROSION !</b></p>
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The packings have to be as cold and dry as practicable before the column is opened. The duration for which the column is opened has to be limited to a minimum. When column is closed for a longer standstill, it should be flushed through with Nitrogen to prevent further corrosion.

In general, the use of Carbon steel packings is only practicable where corrosive influences are not to be expected.

## 13 Cleaning the packing

There are various possibilities of cleaning packing inside the column or, in emergencies, outside the column.

A few examples:

- with solvent
- with high pressure water/steam jet