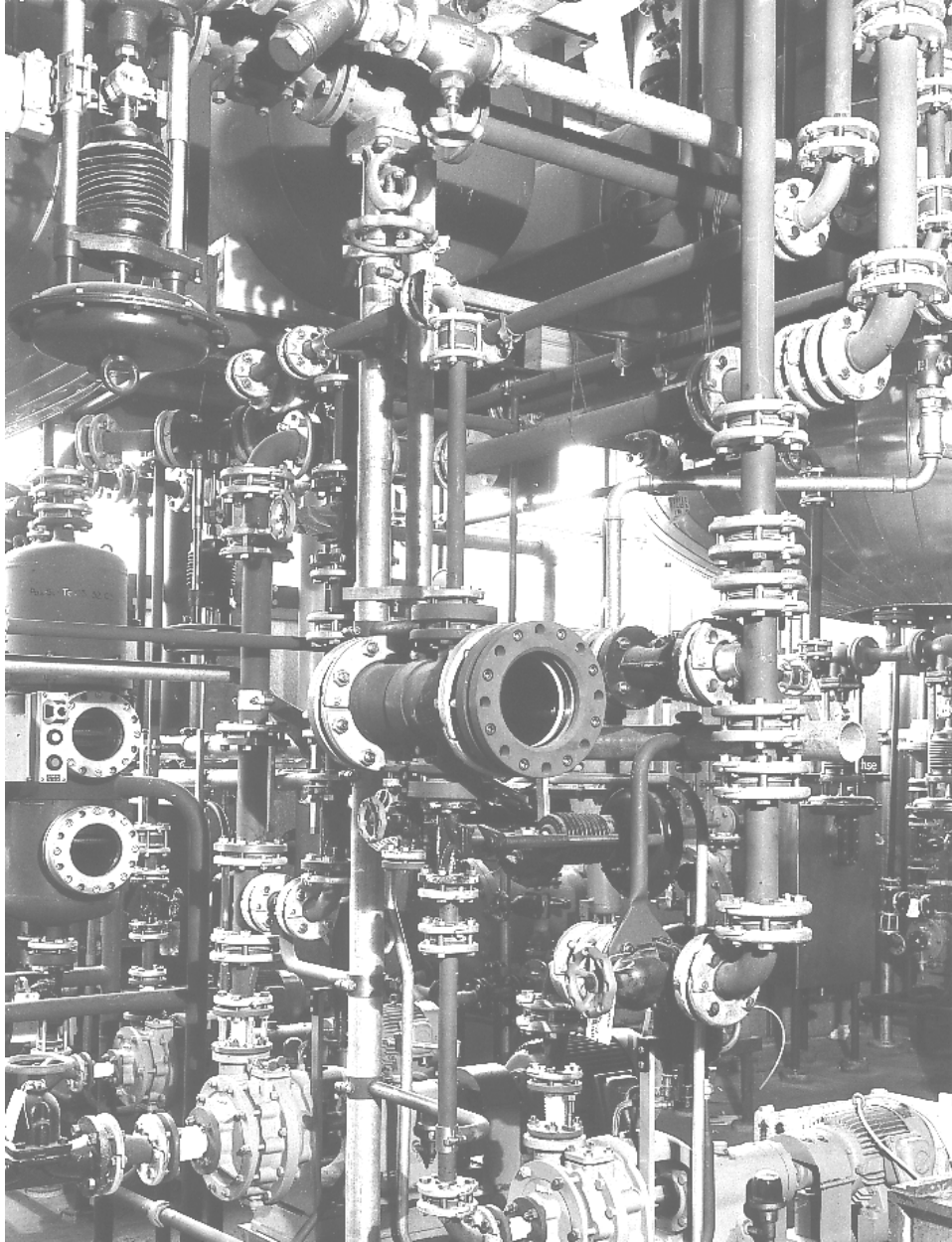


# *ASSEMBLY INSTRUCTIONS*



*Facts for Fitters*



# TERMINOLOGY

## **Pipe System**

The assembly of pipes, fittings, valves, etc. within a (plant) installation.

## **Pipe Section**

Part of a pipe system whose boundaries can easily be recognized or made recognizable

## **Pipe Length**

Individual piece of pipe of any given length

## **Component**

Individual part of a pipe system of any given shape and size, such as pipes, fittings, valves, spacers, flanges, expansion joints, etc.

All information and recommendations given in this publication are based on many years of experience in the production and installation of glass lined parts.

Nevertheless, particular operating conditions and unknown factors may considerably affect the general knowledge, thus excluding any warranty for our recommendations

# Contents

	Page
1. General information on glass lined pipes and fittings	1
2. Acceptance and handling of glass lined pipes and fittings on site	2
3. Transportation of glass lined pipes and fittings on site	3
4. Assembly of glass lined pipe systems	3/7
5. Pipe supports	8
6. Pre-operational inspections of glass lined pipe systems	18
7. Pre-operational leak testing of glass lined pipe systems	18
8. Pre-operational temperature cycle testing of glass lined pipe systems	19
9. Essential handling and assembly instructions in brief	21
10. Possible causes of damage during operation in brief	22
11. Manufacturing range	24

## 1. GENERAL INFORMATION ON GLASS LINED PIPES AND FITTINGS

High quality low carbon steels are used to manufacture glass lined pipes and fittings. The glass lining process in which the parts are heated to temperature above 820°C for at least seven times, requires an oversize wall thickness. This in turn ensures a strong and sturdy pipe for installation.

The highly chemical resistant glass of a glass lining is a modified type of glass, which on heating to high temperature enters into a chemical reaction with the steel substrate, resulting in a firm bond to that substrate. It is sufficiently elastic to follow the movements of a pipe system on heating and cooling in spite of the different thermal expansion coefficients.

When the glass lined parts leave our works, they have passed a rigid quality control check. They have been tested twice at 20.000 v DC for porosity and have been checked for straightness and alignment against set tolerances.

The glass lining is susceptible to impact and the glossy surface should not be damaged by scratching. Therefore, glass lined parts shall not be dropped or struck by mechanical blows and under no condition shall unprotected glass lined surfaces be put down on rough substrates.

Before transportation, the ends are protected with rubber caps, and all parts are packed in wooden crates embedded in soft wood wool. On unpacking they shall be checked on possible transportation damage. The latter are covered by insurance, however, only when reported promptly.

Operating temperature (Subject to use of special gaskets)	-10/+ 200° C
Operating pressure (Other on request)	- 1 / + 10 bar
Dimensions and tolerances	according to DIN 2873 PN10
Technical delivery conditions	according to DIN 2876
Flange connections	Split backing flanges acc. to DIN 28150
Chemical resistance	see corrosion table

Our standard sheets 2-000, 3-000, 5-000, 6-000, 10-051, 10-151, 5-100, 6-100 and 1-001 provides detailed information on all above mentioned subjects.

ESTRELLA AG delivers all pipes and fittings according to PED 97/23/EC.

## 2. ACCEPTANCE AND HANDLING OF GLASS LINED PIPES AND FITTINGS ON SITE

### Arrival of goods

Check crates for transportation damage while still on the truck

#### CRATES ACCEPTABLE

- unload
- store clean and dry

#### CRATES DAMAGED

- reject acceptance
- inform insurance

#### RECEIVING DEPARTMENT

- unpack goods
- remove rubber caps
- inspect parts visually for glass lining damage
- store clean and dry
- file all parts in storage register

- file damaged and suspect parts in separate register
- Store parts separately from other

#### RECEIVING DEPARTMENT/ISSUE

- Supervisor hands over ISO and/or part list to warehouse personnel
- Warehouse personnel collect all parts on list (pipes, fittings, flanges, valves, bolting, gaskets, expansion joints, etc.)
- remove protection caps
- parts are inspected visually for glass lining damage
- parts are tested at 7 kV DC
- replace protection caps
- all parts are combined to suitable lots for the fitter
- all parts taken away are filed in register with:
  - \* quantity
  - \* type
  - \* date of issue
  - \* signature

- file damaged and suspect parts in separate register
- store separately from others

#### FITTER

- checks lots for completeness against ISO and parts list
- confirms acceptance in warehouse register with date and signature

- return all rejected and suspect parts in one lot to manufacturer for inspection and eventual reglassing

### 3. TRANSPORTATION OF GLASS LINED PIPES AND FITTINGS ON SITE

The fitter transports the parts which he has taken over to the assembly location, packed such that they cannot be damaged by impact.

**Never remove protection rubber caps during transportation!**

### 4. ASSEMBLY

When assembling glass lined pipe systems, it shall be taken into account that, due to high temperature process during lining, slight deformations of stubends may occur. The allowable tolerances are set in DIN 2873.

**Stress and shockfree assembly of glass lined pipe systems is paramount**

**We recommend the following procedure:**

#### **Step 1**

Before assembling, the fitter checks each individual part for glass lining damage. Damaged and suspect parts shall not be installed.

#### **Step 2**

The first component of a pipe section is installed freely movable, i.e. such that it can be shifted and rotated in the best possible position, and suspended or supported in that position.

#### **Step 3**

The next component is now mounted to it, such that after placing of the gasket the faces of both stub ends are parallel to each other. This position can be obtained by rotating the components opposite each other.

Piping components shall never be positioned oblique to each other as the edges of the stub end may damage the gaskets.

#### **Step 4**

The flange connection is tightened loosely. The pipe section is then completed according to plan (ISO, piping plan, etc.), repeating Step 3 each time.

In case the specified pipe lengths should exclude stressfree assembling of a pipe section, spacers shall be used to compensate the missing lengths. The variety of our spacer range enables assembling any required length. We recommend to have a certain number of spacers in excess.

Small differences in lengths (< 5 mm) can be compensated by using an extra gasket.

## Step 5

The appropriate type of support is then selected and mounted. Next, the piping section is aligned exactly and bolted up free of stresses. Each pipe section shall be mounted as intended, i.e. with fixed and sliding supports. Typical examples are given in our standard sheets 11-005, 11-006, 11-007 and 11-008.

The allowable pipe support spans can be found in section 5.1.

Lateral forces due to pipe branches shall be compensated or absorbed by installing fixed supports.

**Glass lined piping systems shall be mounted free of stresses. Any aligning or straightening by mechanical force is strictly forbidden.**

## Step 6

Next the flanged connections are closed by tightening the bolts with a torque wrench. The bolt torques shall be appropriate for the type of gaskets applied. A selection of suitable gasket types is given in table 1. A summary of recommended bolt torques for each type of these gaskets is given in table 2.

After the first heating cycle the bolts shall be re-torqued when cold again.

## Gasket types

Generally flat face gaskets are used in glass lined piping systems.

The types listed below have good resistance to acids and alkalis.

The types are mentioned as examples and the application is recommended.

Type	Composition	Thickness	Operating range
1	<ul style="list-style-type: none"><li>• PTFE-envelope gasket</li><li>• with/without corrugated ring</li><li>• and aramid insert</li></ul>	Up to DN 250 7 / 5mm	-25°C / + 160°C
2	<ul style="list-style-type: none"><li>• PTFE-envelope gasket</li><li>• with/without corrugated ring and graphite insert</li></ul>	From DN 300 10 / 8mm	- 50° C / + 230° C
3	<ul style="list-style-type: none"><li>• Modified PTFE</li></ul>	3,2 to 6,3mm	- 50° C / + 200° C
4	<ul style="list-style-type: none"><li>• 100% expanded PTFE</li><li>- GORE-GR</li><li>- GORE-Style 800</li></ul>	3 to 9 mm 6 mm	- 50° C / + 230° C

Table 1



## Tightening torques

The bolt torques as stated below are based on results both from tests and from actual application. We emphasize that the values are given as recommendation and hold for mounting at ambient temperature while using greased bolts. Bolts shall be tightened cross-wise with ever increasing torques.

DN (mm)	Bolts (number x size)	Bolt torques (Nm)
25	4 X M 12	30
32	4 X M 16	50
40	4 X M 16	55
50	4 X M 16	70
65	4 X M 16	90
80	8 X M 16	55
100	8 X M 16	60
125	8 X M 16	80
150	8 X M 20	100
200	8 X M 20	150
250	12 X M 20	130
300	12 X M 20	150

Table 2

Note: These values are indicative. Based on experience for particular services torquening and re-torquening has to be adjusted.

To obtain even compression of the whole gasket while maintaining the faces of the stub ends in parallel position, the bolts shall be thightened in sequence as shown below:

## Tightening sequence

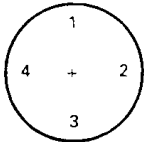
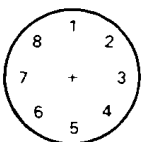
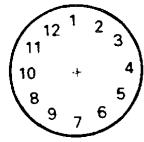
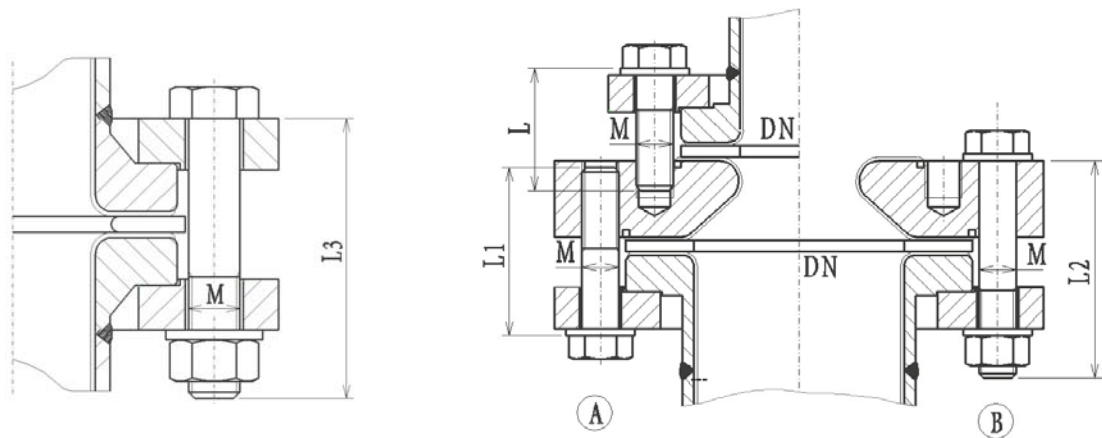
Number of bolts	4	8	12
			
<b>Tightening sequence</b>	1,3,2,4	1,5,3,7 2,6,4,8	1,7,4,10 2,8,5,11 3,9,6,12

Table 3

## Important instructions

- a selection of possible flange connection is shown in table 4
- the connecting screws of the split flanges shall be tightened before mounting the flanges
- the split flanges shall be exactly centered over the stub end
- the gaskets shall be exactly centered between the flange faces of the stub ends
- grease bolts before mounting
- washers shall be applied under all nuts
- before installation expansion joints shall be fixed at their intended length by means of limitation bolts
- complicated pipe assemblies or manifolds shall be preassembled at the assembly location and mounted as unit in the piping system

## Flange connections



DN (mm)	Bolts (Metric)	Pipe to reducing flange	Pipe to reducing flange	Reducing flange to pipe	Pipe to pipe	Pipe to valve
		L	L1	L2	L3	L3
25	4XM12	45	-	-	75	65
32	4XM16	50	60	-	80	70
40	4XM16	50	60	-	80	70
50	4XM16	50	65	-	90	75
65	4XM16	55	65	90	90	75
80	8XM16	55	65	90	100	80
100	8XM16	60	80	110	100	90
125	8XM16	60	80	110	100	90
150	8XM20	70	80	120	120	100
200	8XM20	75	90	120	130	100
250	12XM20	80	90	130	140	110
300	12XM20	80	100	140	150	120

Table 4

## Recommendation

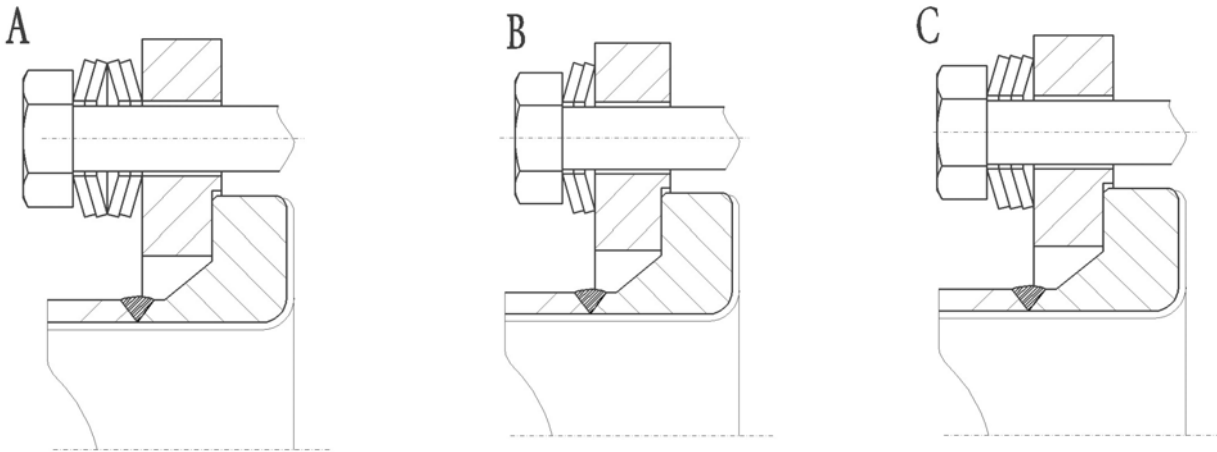
Piping systems operating at elevated temperature in discontinuous or batch operations are subject to varying thermal elongations. Following as a consequence the gaskets are loaded resp. unloaded differently. To maintain the prestress set on the gaskets by bolt torque at a constant level we recommend to install spring washers at the bolt connections.

## Principle

The insertion of spring washers enables compensation of deviations in the piping system (setting of gaskets, expansion of screws) and assures a constant tightening.

Lengths of screws according to specification 5-050 to 5-052 with regard to addition between the bracket (\*).

## Possibilities of assembly



DN	Screws (*)	Type	Washer size
25	4 x M12 (+ 5)	A	D.23/12.2 X 1.5
32	4 x M16 (+10)	A	D. 34/16.3 X 2.0
40	4 x M16 (+10)	A	D. 34/16.3 X 2.0
50	4 x M16 (+10)	A	D. 34/16.3 X 2.0
65	4 x M16 (+10)	A	D. 34/16.3 X 2.0
80	8 x M16 (+10)	A	D. 34/16.3 X 2.0
100	8 x M16 (+10)	A	D. 34/16.3 X 2.0
125	8 x M16 (+10)	A	D. 34/16.3 X 2.0
150	8 x M20 (+ 5)	B	D.40/20.4 X 2.5
200	8 x M20 (+10)	C	D.40/20.4 X 2.5
250	12 x M20 (+10)	C	D.40/20.4 X 2.5
300	12 x M20 (+10)	C	D.40/20.4 X 2.5

Table 5

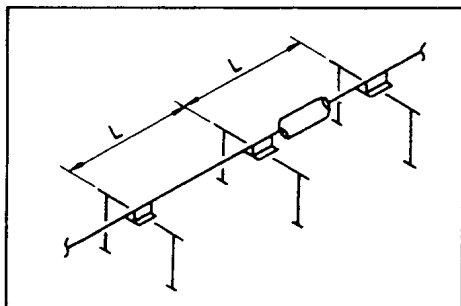
## 5. PIPE SUPPORTS

### 5.1 pipe spans

The following figures show a number of standard executions which in combination with the coefficients give required pipe spans „L“.

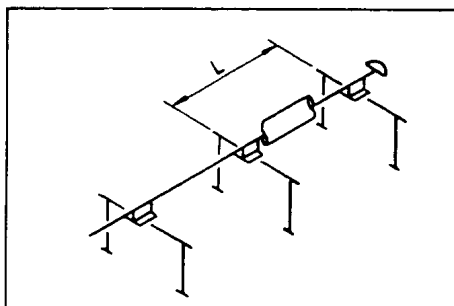
Fall: A

Koeff. = 1,0



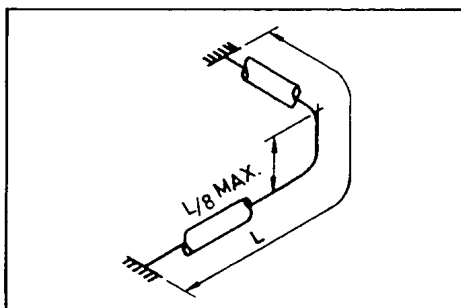
Fall: B

Koeff. = 0,85



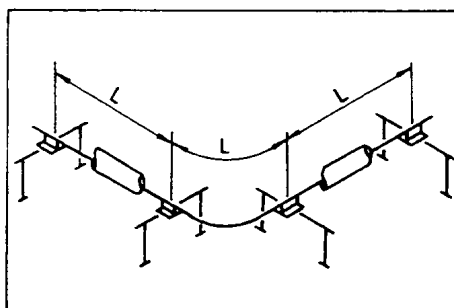
Fall: C

Koeff. = 0,84



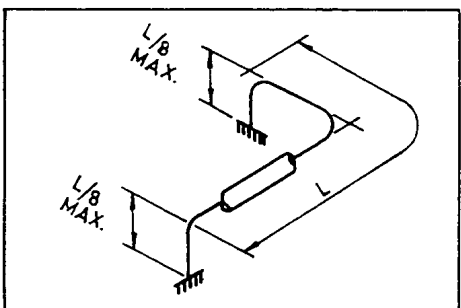
Fall: D

Koeff. = 0,72



Fall: E

Koeff. = 0,64



The spans must be multiplied by the appropriate coefficients

Examples C to E pipe span measured over the radius.

The maximum allowable pipe span is 3000 mm. This pipe span shall be multiplied with the applicable coefficient. Maintaining the resulting lengths „L“ ensures troublefree action of the piping system (recommendation).

DN	25	32	40	50	65	80	100	125	150	200	250
L	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
Max. production length	2000	2000	3000	3000	3000	3000	3000	3000	3000	3000	3000

## 5.2 Pipe support constructions

Appropriate supports in sufficient numbers are essential! Maximum allowable pipe spans, determined as per section 5.1, shall at all times be observed..

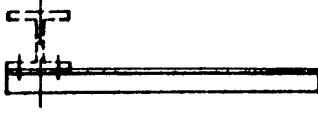
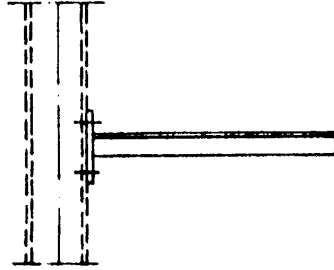
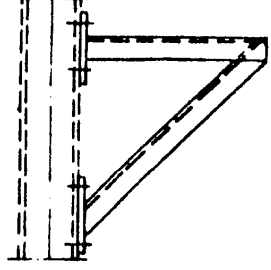
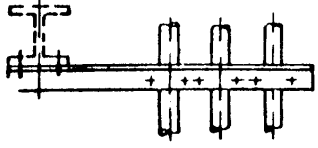
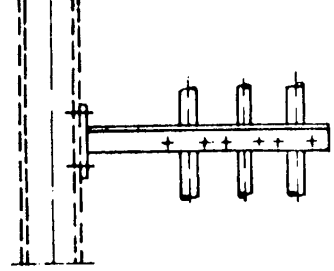
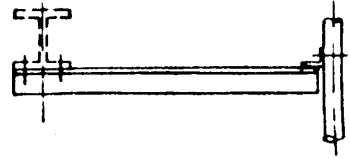
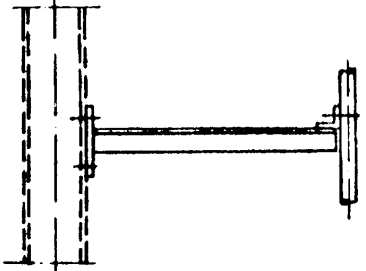
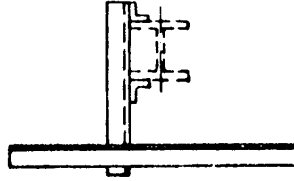
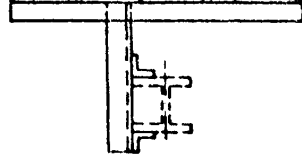
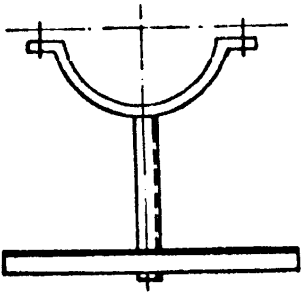
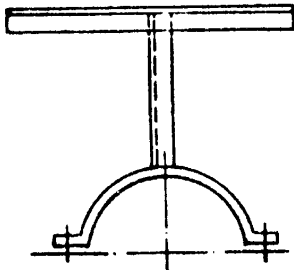
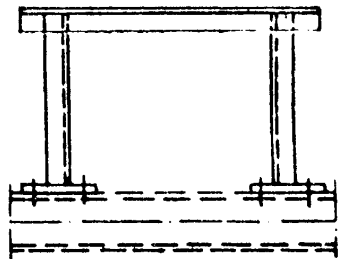
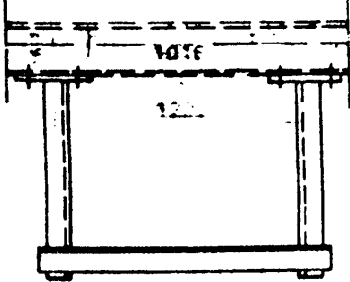
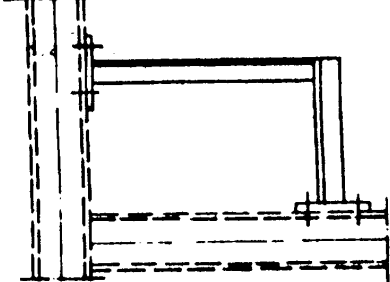
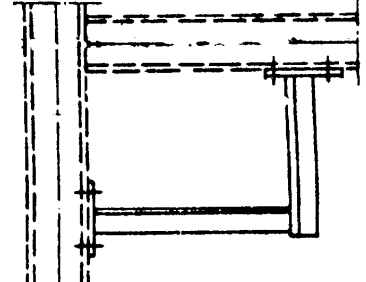
Support constructions are distinguished for the following cases:

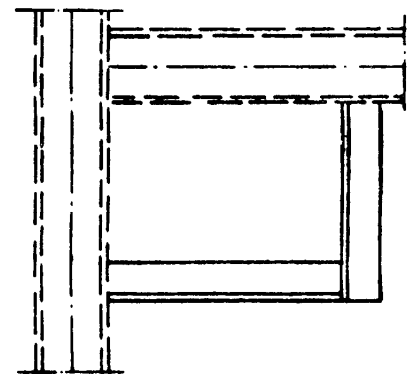
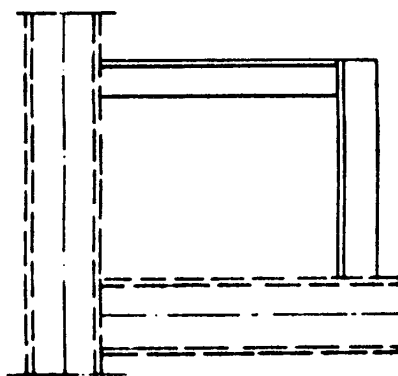
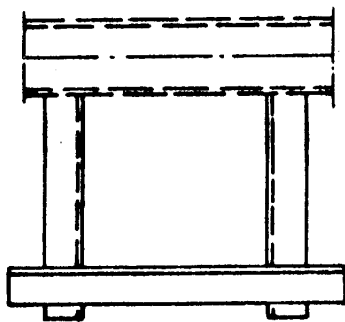
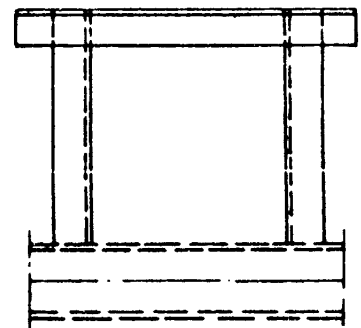
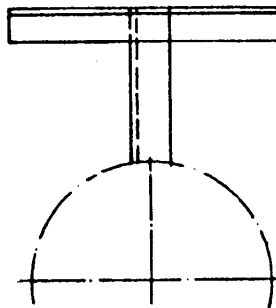
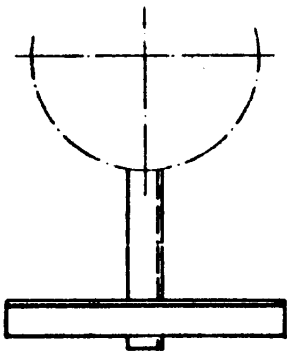
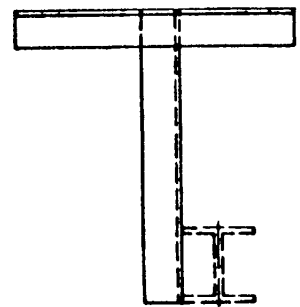
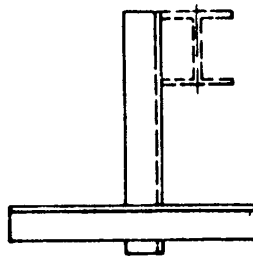
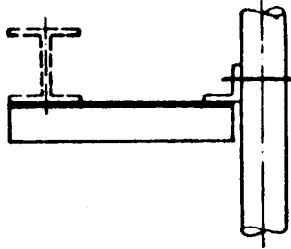
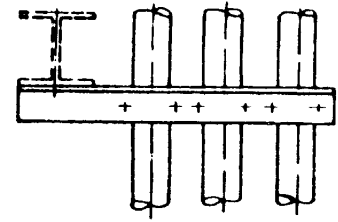
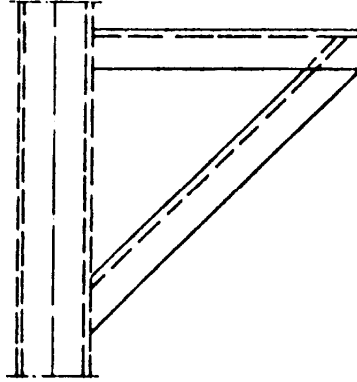
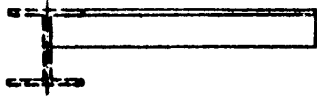
- fixed points
- sliding points
- hangers
- valves
- expansion joints

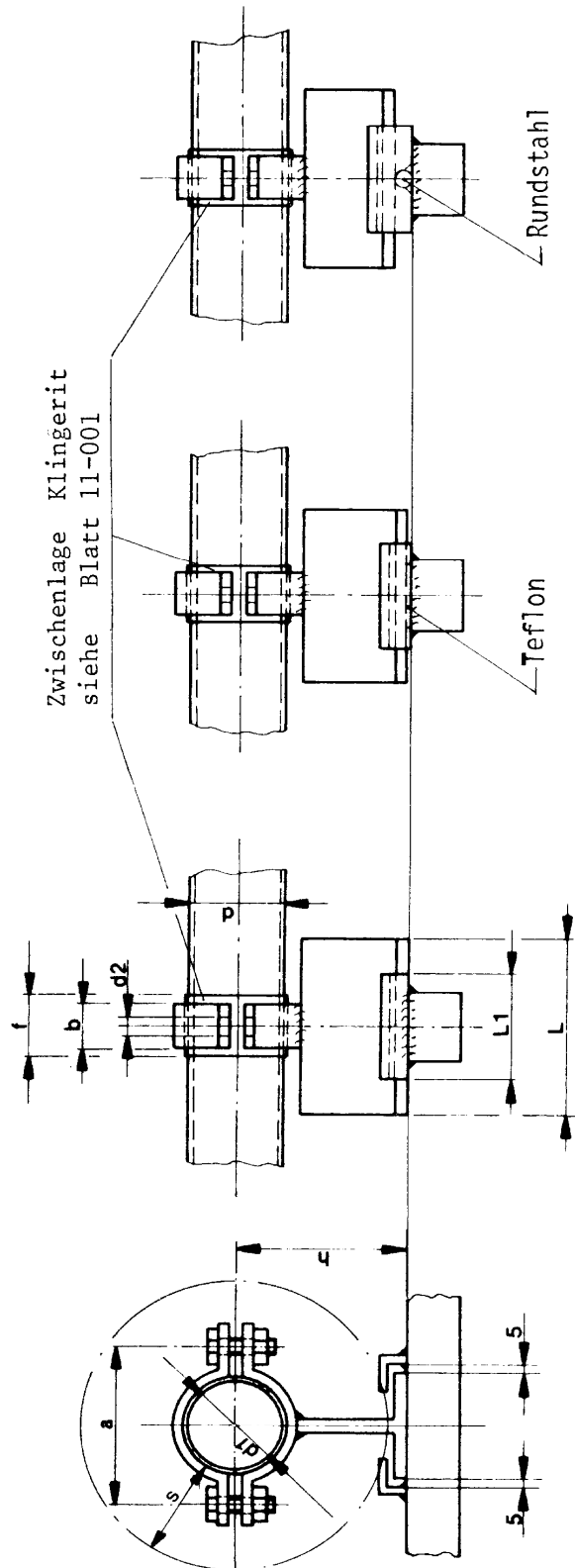
The various tapes of brackets and supports with their constructional drawings are given in standard sheets 11-002, 11-003, 11-005, 11-006, 11-007, 11-008, 11-009 und 11-010.

### Important instruction

- Each pipe section shall have one fixed point to ensure a well defined expansion for that particular section
- Nozzles of equipment and pumps are considered to be fixed points, unless they exert a lateral force due to their own thermal expansion, in which case the support of the first pipe section shall be adapted.
- Each individual valve or valve manifold shall be supported independently
- Each expansion joint shall be installed with a fixed point at one end and a sliding point at the other
- Fixed points shall be made such that they ensure free moving of the piping system
- Sliding points shall be made such that they ensure free moving of the piping system
- Brackets and supports shall be made such that they do not give rise to unforeseen stresses in the piping system due to deviating dimensions
- Transitions through plant structures and walls with limited space are to be considered as sliding supports and to be executed as such
- Soft inlays shall be placed between pipes and pipe clamps to prevent any unforeseen stresses in the piping system
- No welding operations shall be carried out on glass lined pipes; all brackets, supports and their auxiliary parts shall be executed for bolted constructions exclusively.

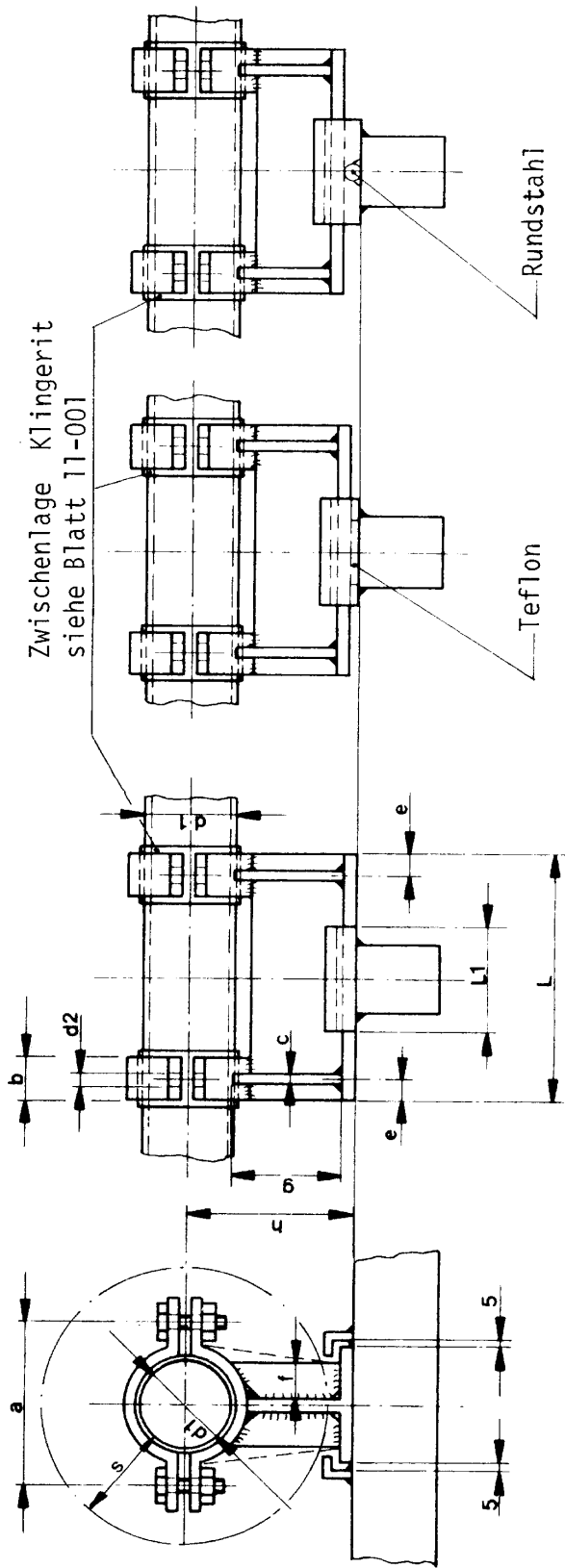




S = Isolationsstärke

Rohr Nw	Rohrschelle nach Bl. Nr. 11-001					T - Profil		L - Profil		h	f	Gew. kg
	d1	a	b	d2	S min.	S max.	L	L1				
15	21,3	61	30	11	30	50	60	80	20x15x3,5	60	40	1,40
20	26,0	67	30	11	30	50	60	80	20x15x3,5	60	40	1,43
25	33,7	76	30	11	30	50	60	80	20x15x3,5	60	40	1,45
32	42,4	88	30	11	35	50	60	80	20x15x3,5	60	40	1,48
40	48,3	104	40	13	35	50	60	80	30x15x3,5	60	50	1,50
50	60,3	118	40	13	40	70	80	100	30x15x3,5	80	50	2,73
65	76,1	129	40	13	40	70	80	100	30x15x3,5	80	50	2,82
80	88,9	155	50	18	40	70	80	100	30x15x3,5	80	60	2,91
100	114,3	182	50	18	55	70	80	120	30x15x3,5	100	60	3,00

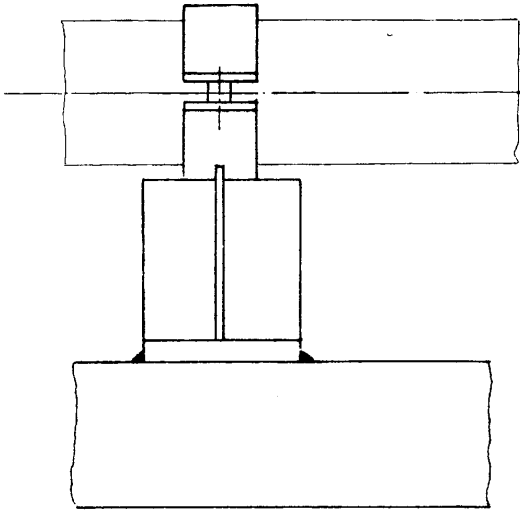




Rohr Nw	Rohrschelle n. Bl. Nr. 11-001			T-Profil		Flach.- St.			L-Profil		h	S max.	Gew.	
	d1	a	b.	d2	Flach-St	L	f.c	g	e	L1				
100	114,3	182	50	18	50x8	80	25x6	85	25	17x12x16	125	145	90	8,29
125	139,7	207	50	18	50x8	80	25x6	80	25	17x12x16	125	158	90	8,49
150	168,3	240	50	18	50x8	100	30x6	95	25	20x13x18	125	192	90	11,18
200	219,1	292	50	18	50x8	120	35x6	125	25	20x13x18	150	238	90	12,58
250	273,0	349	60	23	60x8	120	35x6	120	30	20x13x18	150	265	110	20,38
300	323,9	400	60	23	60x8	106	45x6	140	30	20x13x18	150	310	110	21,58

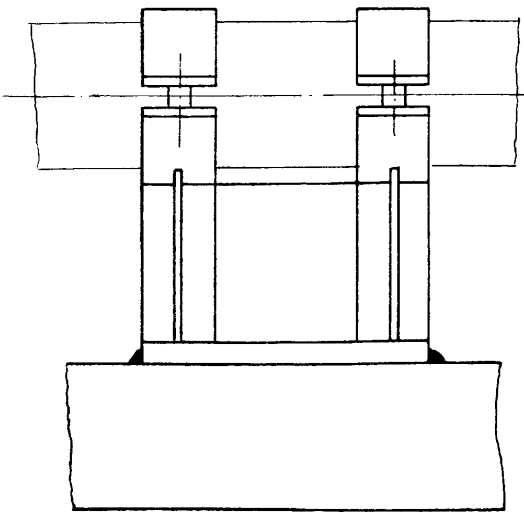
Abmessungen siehe Blatt "11-005"

DN 15-100

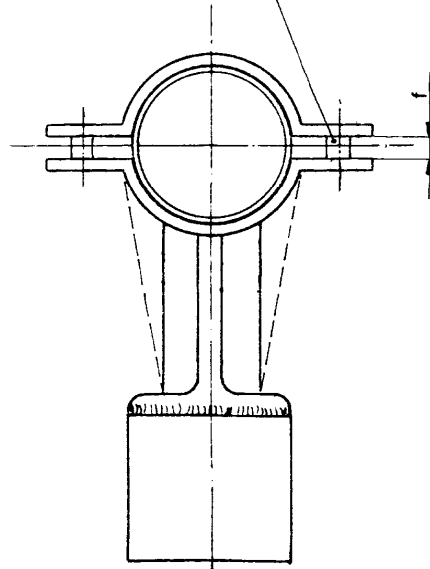


Festlager nur in Verbindung  
mit Distanzrohr einbauen

DN 125-300

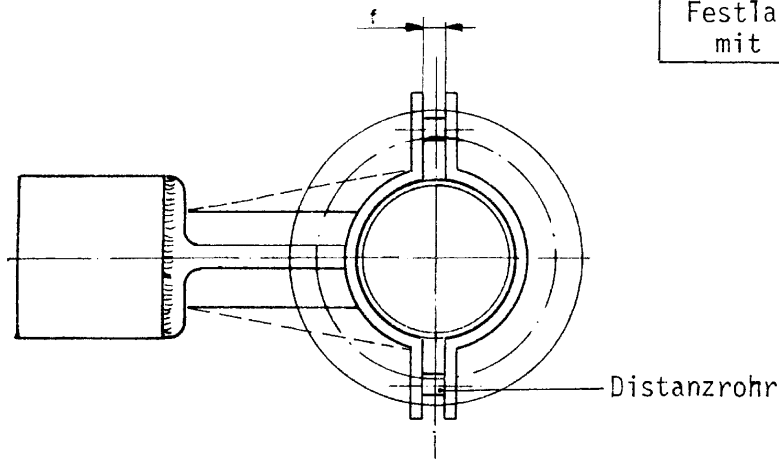
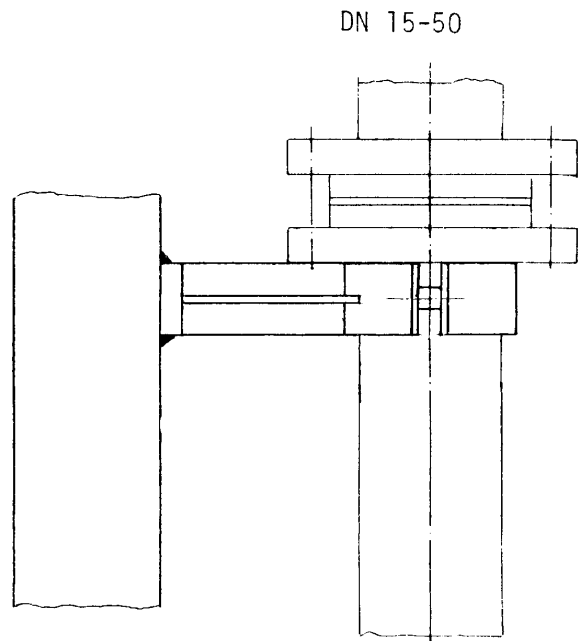
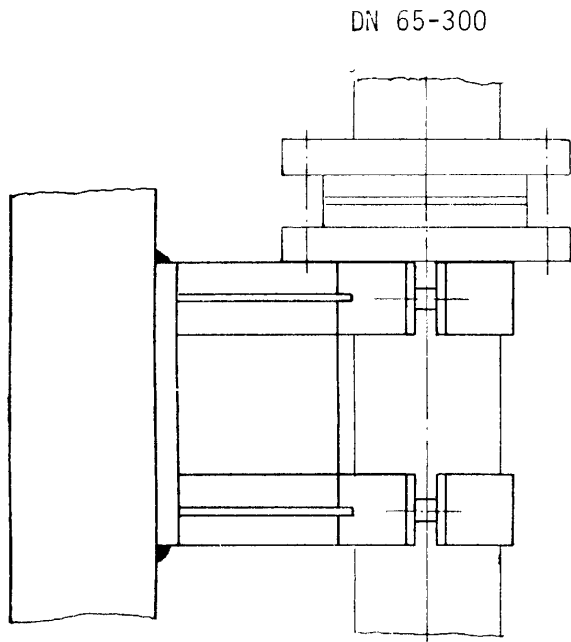


Distanzrohr



DN	15	20	25	32	40	50	65	80	100	125	150	200	250	300
f	7	7	7	7	9	9	9	11	11	11	11	11	14	14
Rohr Ø	16x2	16x2	16x2	16x2	20x3	20x3	20x3	25x3	25x3	25x3	25x3	25x3	30x3	30x3

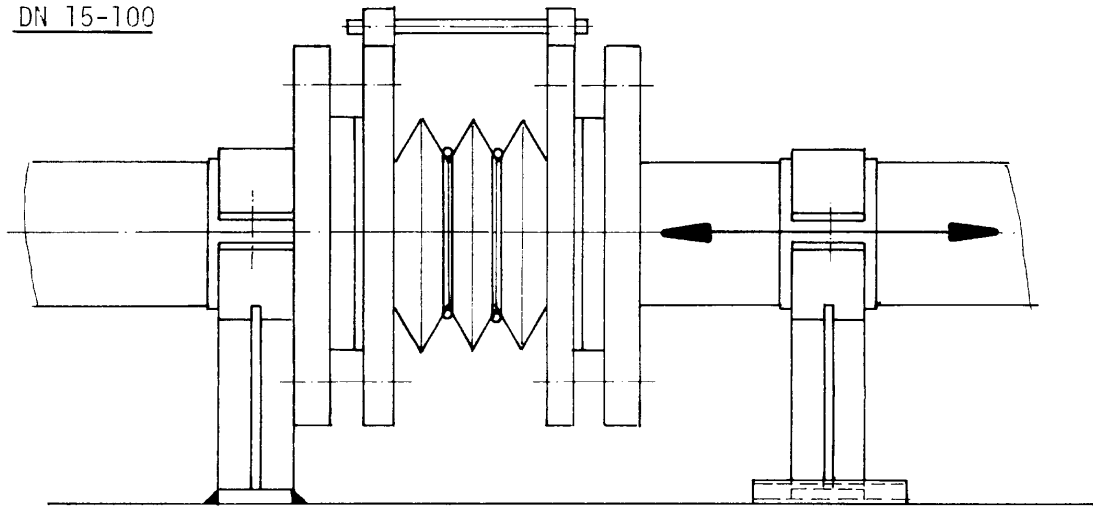
Abmessungen siehe Blatt " 11-005 "



Festlager. nur in Verbindung  
mit Distanzrohr einbauen

DN	15	20	25	32	40	50	65	80	100	125	150	200	250	300
f	7	7	7	7	9	9	9	11	11	11	11	11	14	14
Rohr Ø	16x2	16x2	16x2	16x2	20x3	20x3	20x3	25x3	25x3	25x3	25x3	25x3	30x3	30x3

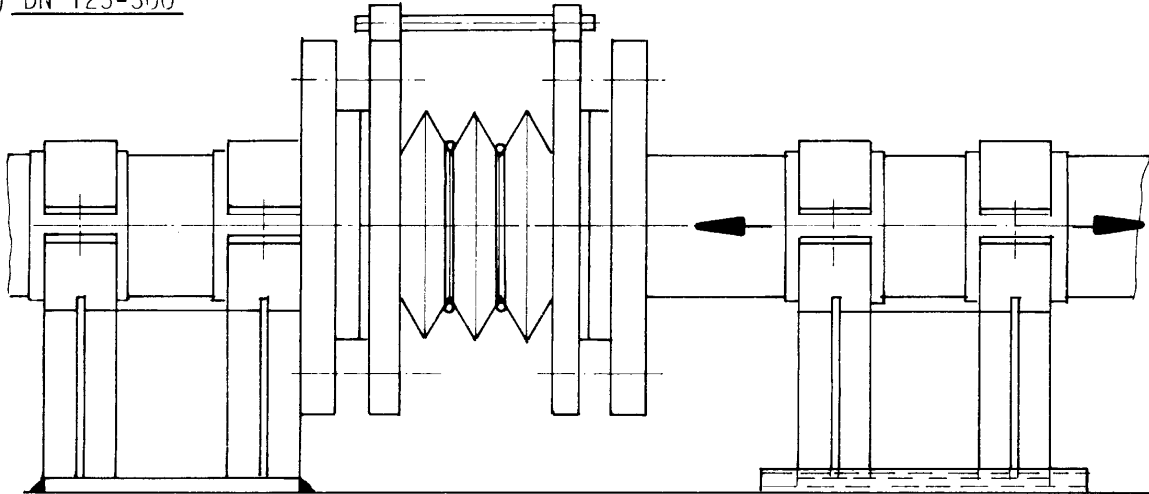
1) DN 15-100



Festlager gemäss  
Blatt "11-007"

Gleitlager gemäss  
Blatt "11-005"

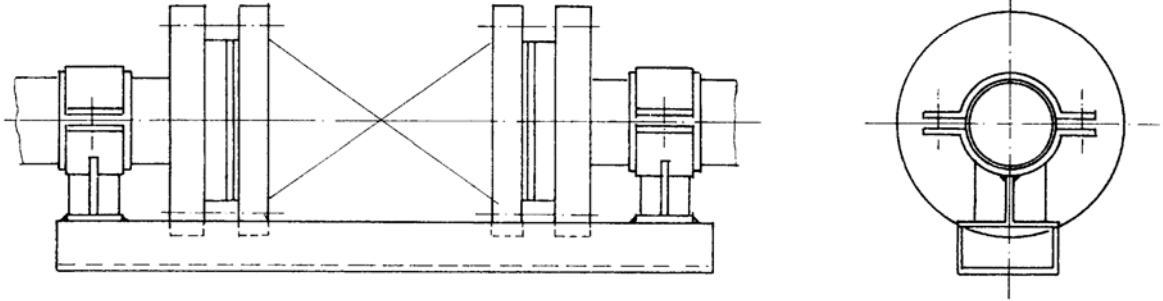
2) DN 125-300



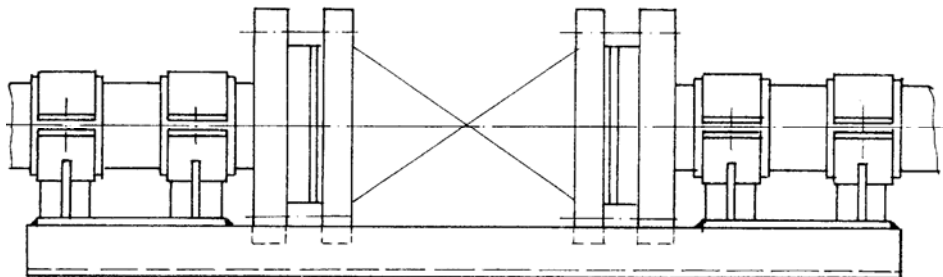
Festlager gemäss  
Blatt "11-007"

Gleitlager gemäss  
Blatt "11-006"

1) DN 15 - 100



2) DN 125 - 300



## **6. PRE-OPERATIONAL INSPECTION OF GLASS LINED PIPE SYSTEMS**

After completion of installation each piping section is visually inspected over its full length:

- are all individual pipes lined out correctly?
- are all flange connections bolted correctly?
- are all supports installed correctly, i.e. complete and free moving?
- are the envisaged pipe spans applied correctly?
- are all valves secured correctly?
- are all expansion joints supported and pre-set correctly ensuring their foreseen moving?
- are there no lateral forces acting on the piping section?
- is the piping section not jammed at any point?

Each piping section is individually mentioned in the inspection report.

The erection supervisor confirms the inspection results with date and signature, confirming that each individual piping section has been installed correctly and up to all prevailing technical standards.

an example of the inspection report is shown on page 20

## **7. PRE-OPERATIONAL LEAK TESTING OF GLASS LINED PIPING SYSTEMS IN COLD CONDITION**

ESTRELLA AG deliver all glass lined piping components according to PED/23/EC.

Therefore, a pressure test of the assembled piping system at full pressure is not required..

It is sufficient to carry out a leak test with either water or air (0.2 - 0.3 bar). Leaking flange connections shall be tightened by bringing them at the required bolt torques in cold condition.

## **8. PRE-OPERATIONAL TEMPERATURE-CYCLE TESTING OF GLASS LINED PIPING SYSTEMS**

Each piping system shall be heated to its operating temperature while being filled with liquid not containing any of the process chemicals. This serves to check whether the system operates properly in its supports, whether no expansion joints bend out, whether leaking flange connections occur.

Obstructions to the free moving of the piping system are corrected while the system is at temperature.

Leaking flange connections are marked.

The piping system is then cooled down to ambient temperature. The marked flange connections are inspected visually and re-torqued to the required torque in cold condition.

Finally the installed strainers will be cleaned and in case they should be permanently installed during operation the strainer baskets will be reinstalled.

The piping system is now full tight and fit for its intended chemical operation.

Should leakages occur during operation they shall always be tightened in cold condition.

### **Inspection reports**

As each step in the assembling operation also the testing should be recorded and countersigned. As a rule we check and record each piping section individually, see example of inspection report hereafter.





## 9. ABRIDGED VERSION OF ESSENTIAL HANDLING AND ASSEMBLY INSTRUCTIONS

- Position connecting screws of split flanges on flange connections always crosswise
- Tighten always connection screws of split flanges
- Center split flange exactly over stub ends
- Check flange faces of glass lined parts to be clean
- Place gaskets between stub ends before you start tightening operation of flange connection
- Position stub ends parallelly
- Never position gaskets with screw drivers, these are no installation aids!
- Position flange faces by using a spirit level
- Rotate pipes opposite each other, if necessary, to obtain parallel position of the flange faces
- Never position piping component oblique, otherwise gaskets will be damaged by edges of stub ends
- Always grease bolts before installation
- Use washers under nuts on all flange connections
- Torque bolts crosswise
- Torque wrench always on hand
- Fix expansion joints mechanically with limitation bolts before installation
- Pre-assemble complicated piping section before installation

## 10 ABRIDGED VERSION OF POSSIBLE CAUSES OF DAMAGE DURING OPERATION

- leaking flange connections
- mechanical deformation of stub ends due to improper tightening on installation
- extreme stresses on elbows and tee pieces due to insufficient compensation of thermal expanding/shrinking and/or inappropriate supporting
- spalling of glass at stub ends by bending of pipes on pipe bridges due to insufficient support or insufficient compensation of thermal expanding/shrinking
- mechanical shock from the outside due to falling steel pieces, using the pipes as walkway, weighing down pipes, using pipes to support other pipes
- leaking in nearby piping leads to the same type of damage over the length of the piping system and up to the vessel, particularly when not sufficiently protected on the outside
- extremely acidic ambient atmosphere leads equally to formation of hydrogen and diffusion, not only on the stub ends but on the whole piping systems, especially if insufficiently protected from the outside



<p><b>Unser Fertigungsprogramm</b> Alle Rohrleitungsteile, Fittings, Kolonnen und Apparate können auf Wunsch mantelbeheizt (- auch bis zum Bund-) geliefert werden.</p>	<p><b>Our manufacturing range</b> All pipe sections, fittings, columns and vessels can be manufactured with jacket for heating or cooling (right to the flange if necessary)</p>	<p><b>Gamme de produits</b> Toutes les tuyauteries, appareils et colonnes peuvent sur demande être livrés avec double enveloppe; chauffage entier ou partiel.</p>
<p><b>1. Rohrleitungsteile, Fittings (DIN /ANSI)</b></p> <p>DN 15 - DN 300, PN 10 (PN25) Gerade Rohre Distanzstücke, Winkelscheiben Bogen 30°, 45°, 60°, 90° T-Stücke Kreuzstücke Konusse konzentrisch, exzentrisch Reduzierflansche Instrumentenanschlusssteile</p>	<p><b>1. Pipe sections, fittings (DIN /ANSI)</b></p> <p>DN 15 - DN 300, 150 psi (300 psi) Straight pipes spacers, angled spacers Elbows 30°, 45°, 60°, 90° T-pieces Crosses Reducers, concentric or excentric Reducing flanges Instrument tees</p>	<p><b>1. Tuyauteries (DIN / ANSI)</b></p> <p>DN 15 - DN 300, PN 10 (PN25) Tuyaux droits Entretoises, disques angulaires Coudes 30°, 45°, 60°, 90° Pièces en T Croix Cônes concentriques, excentriques brides de réduction Raccords pour instruments</p>
<p><b>2. Armaturen</b></p> <p>Membranventile Bodenablassventile Kugelrückschlagventile Rohrleitungsfilter Schaugläser</p>	<p><b>2. Valves</b></p> <p>Diaphragm valves Bottom run off valves Ball check valves Inline filters Sight glasses</p>	<p><b>2. Robinetterie</b></p> <p>Vannes à membranes Vannes de fond Clapet de retenue à boules Filtres pour tuyauteries Regards à verre</p>
<p><b>3. Apparate bis 25'000 L</b></p> <p>Kolonnen Lagerbehälter Vorlagen Drucknutschen Abscheider Zyklone Rohrwärmeaustauscher Röhrenbündelaustauscher</p>	<p><b>3. Vessels up to 25'000 L</b></p> <p>Column section Storage vessels Receivers Filters Separators Cyclones Heat exchangers Shell and tube heat exchangers</p>	<p><b>3. Appareils jusqu'à 25'000 L</b></p> <p>Colonne Citernes de stockage Receveurs Filtres Décanteurs Cyclones Echangeurs de température Echangeurs tubulaires</p>
<p><b>4. Zubehör (DIN 28138 - 28159)</b></p> <p>Rührer (auch geteilt) Stromstörer Thermometerrohre Einlaufrohre (auch beheizt) Stützendeckel Mannlochdeckel Mannlochschutzringe Zwischenringe Tragringe Siebplatten Apparateschaugläser Temperatur Sonden</p>	<p><b>4. Accessories (DIN 28138 - 28159)</b></p> <p>Agitator (also splitted) Baffle Thermowell Dip pipe (also jacketed) Cover Manway cover Manway protection ring Demister ring support ring Perforated plate Vessel glass unit Temp probe</p>	<p><b>4. Accessoires (DIN 28138 - 28159)</b></p> <p>Agitateur (aussi en plusieurs pièces) Brises-flux Canule pour thermomètre Tube plongeur (également à double enveloppe) Couvercle couvercle trou d'homme Anneau de protection pour trou d'homme Pièce intercalaire Anneau de supportage Plaque à trous Regard à verre Sonde de température</p>
<p><b>5. Spezialteile</b></p> <p>Wir führen gerne Spezialteile nach Kundenwunsch aus, wobei wir uns geringfügige konstruktive Anpassungen an emailliertechnische Notwendigkeiten vorbehalten müssen-</p>	<p><b>5. Special parts</b></p> <p>We are always ready to built special parts to customer's specifications, but reserve the right to carry out slight adjustments in construction for technical glass lining reasons.</p>	<p><b>5. Pièces spéciales</b></p> <p>Nous élaborons également, sur demande, des pièces spéciales conçues d'après les impératifs de fabrication des pièces vitrifiées.</p>
<p><b>6. Die Estrella AG ist vom TÜV Südwest anerkannter Fachbetrieb nach § 19 I WHG (Wasserhaushaltsgesetz) The Estrella AG is accredited special shop acc. to § 19 I WHG (water conservation regulation) by TÜV Südwest Estrella AG est une société qualifiée par le TÜV Südwest d'après § 19 I WHG (règlementation des effluents)</b></p>		