

Limited liability company Composit

OPERATION MANUAL

RUBBER HOSES, BENDS,
EXPANSION JOINTS AND STEEL
RUBBER-LINED PRODUCTS FOR MINING

COMPOSIT

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1. General information

Rubber pipelines (hoses), bends, inserts for the mining and coal industry and steel-rubberized hoses, T-bends, bends, collectors used for hydro- and pneumatic transportation of abrasive (and other) materials in the pressure lines with possible vacuum forming and drain lines (at zones of crushing, floatation, separation, tailings disposal and other mining plants of chemical and metal industry including the hazardous ones because of gas and dust presence).

Feature and operation concept

1.1. Rubber pipelines (hoses), bends, inserts for the mining and coal industry

1) Rubber pipelines (hoses), bends, inserts for the mining and coal industry hereafter referred as “pipelines” («bends», «inserts», - if necessary) manufactured in a standard made or in the mining made according to TS 2550-014-11074094-2012 standards.

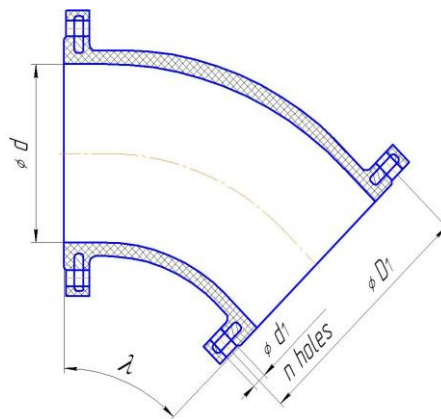
2) Technical specification:

- Working pressure up to 2.0 MPa (depending on the inner diameter);
- Working vacuum up to 0,08 MPa;
- Minimum bending radius up to five values of the inner diameter (depending on the inner diameter);
- Length of the pipeline up to 12 m;
- Bending angle of bends 30; 45; 60; 75; 90°;
- Operation temperature from -55 to + 80°C.

1.2. Construction of pipelines, bends, adaptors

1) Design of pipelines calculated to operate at a specified pressure and temperature, abrasiveness and acidity of the transported medium, and based on the required bending radius of the pipeline.

2) Main parameters of rubber bends, hoses, and inserts given in the drawing (see Fig.1, fig.2, fig.3).



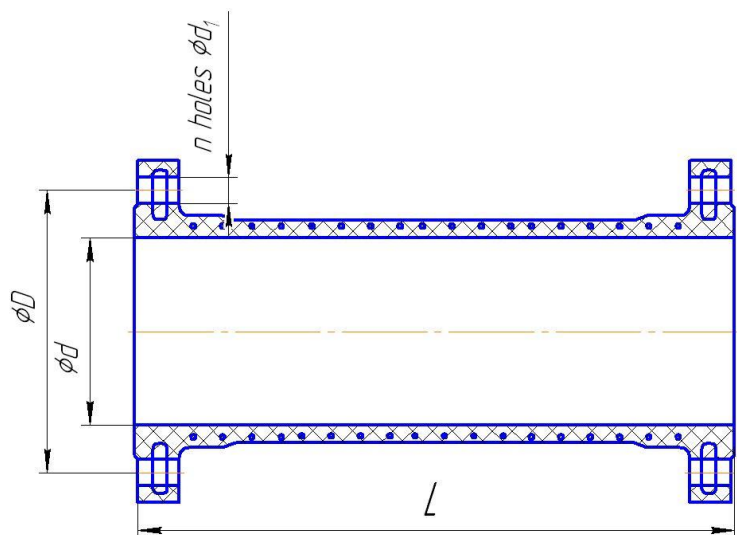
Where

Ød- inner diameter of a bend, mm;

ØD1, Ø d1; n – mounting diameters of flanges, mm;

λ-bending angle, degree.

Fig1. Rubber bend with embedded flanges



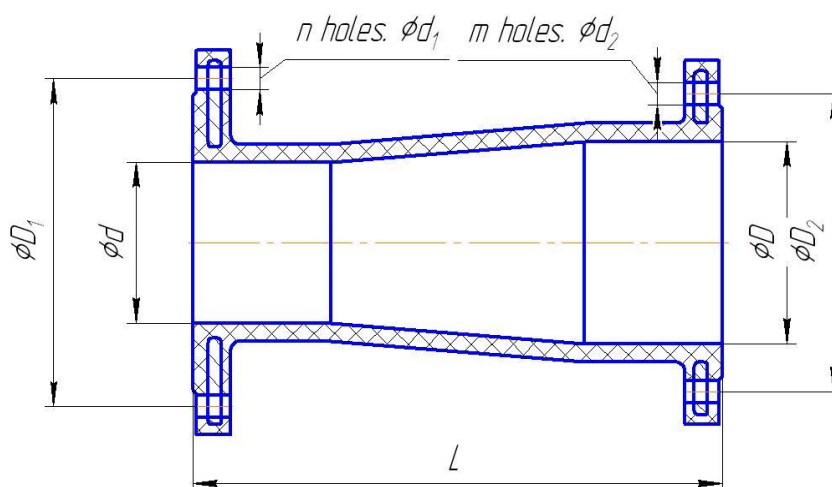
Where

ϕd -inner diameter of a hose, mm;

L - length of a hose, mm;

ϕD_1 , ϕd_1 ; n - mounting diameters of flanges, mm;

Fig.2 Rubber hose with embedded flanges



Where

ϕd - inner diameter of an insert inlet, mm;

ϕD - inner diameter of an insert outlet, mm;

L - length of an insert, mm;

ϕD_1 , ϕd_1 ; ϕD_2 , ϕd_2 , n , m - mounting diameters of flanges, mm;

Fig.3 inserts («reducing hose»).

1.3. Steel-rubberized branch pipes, T-bends, bends, collectors and others

1) Steel-rubberized branch pipes, T-bends, bends, collectors and others manufactured according to TS 2515-003-11074094-2012 standards. They used in the pressure lines with

possible vacuum forming, discharge and drainage on mining and processing plants of ore and coal industry.

2) Technical specification:

- Working pressure up to 2.0 MPa;
- Working vacuum up to 0,08 MPa;
- Bending angle of bends 30; 45; 60; 75; 90°;
- Operation temperature from -55 to + 80°C.

3) Visual appearance of the steel-rubberized branch pipes, T-bends, bends, collectors given in the drawings 4, 5, 6, 7.

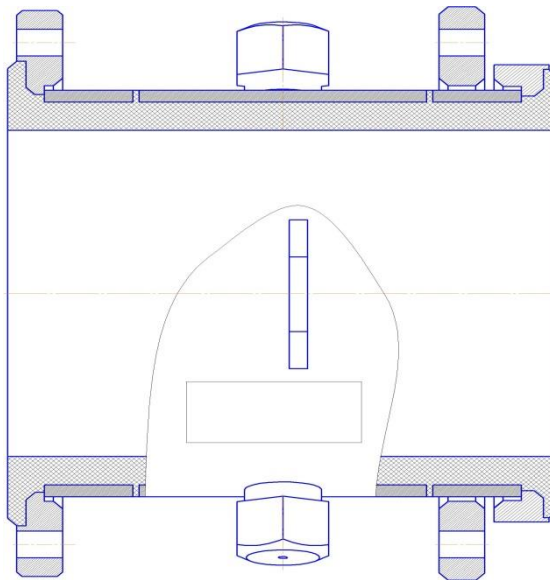


Fig.4 Steel-rubberized branch pipes

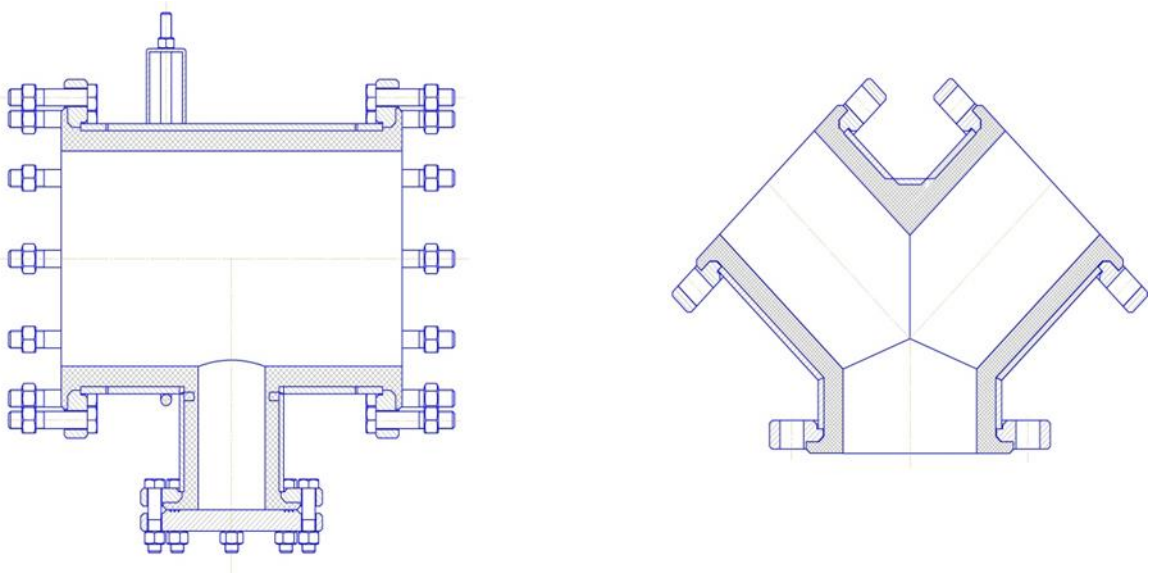


Fig.5 Steel-rubberized T-bends

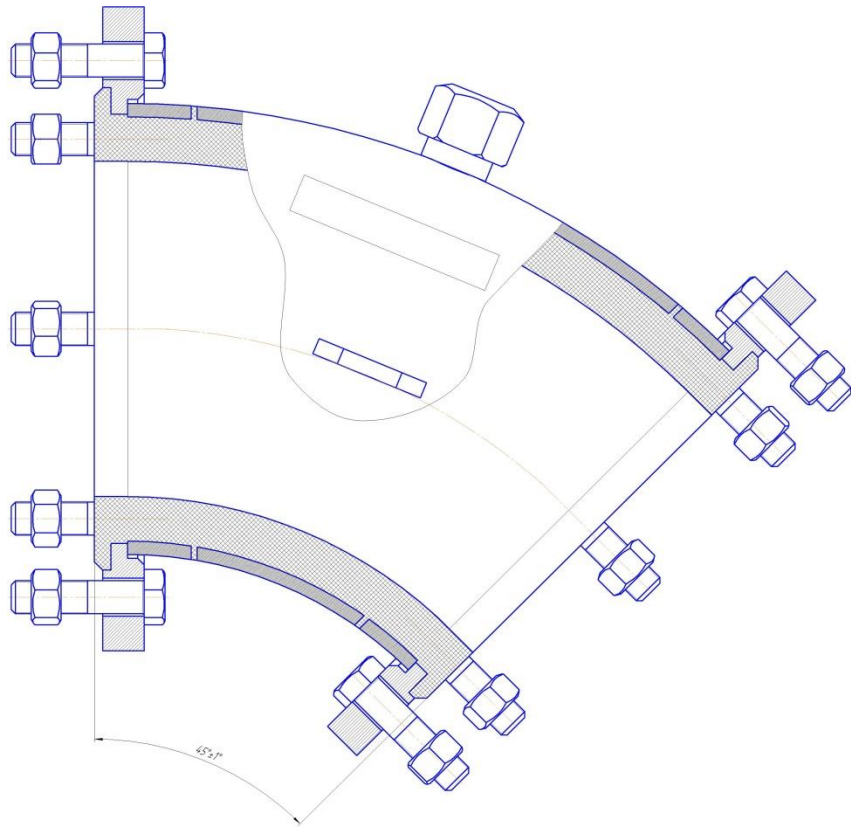


Fig.6 Steel-rubberized bend

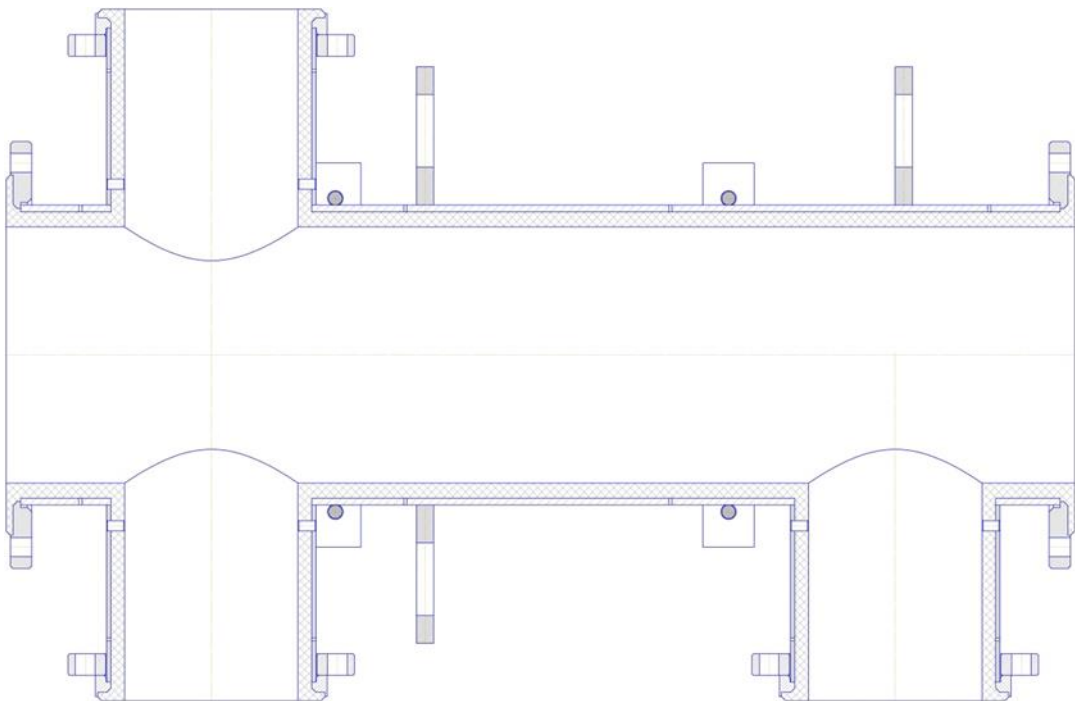


Fig.7 Steel-rubberized collector

2. Mounting

2.1. General guidelines for the preparation of hose and steel-rubberized products installation at the customer's plant

1) Working conditions and the mode of the pipelines operation on site must meet the requirements of technical documents that operate on the customer's plant.

2) Pipelines installation and operation must comply with the requirements of GOST 12.1.004-91, GOST 12.2.003-91, and GOST 12.3.002-75, GOST 12.3.009-76, GOST 12.4.009-83 and safety instructions applicable in the company-consumer.

3) In lines of pipelines installation is necessary to provide for the installation of protective devices (inverted and air-inlet valves) for protection from water hammer and vacuum (up to 0.08 MPa)

2.2. Hose installation

1) Pipeline installation should be in accordance with the technical documentation (activities management plan), developed by the contractor, taking into account the recommendations of the data in technical project and in accordance with the technical conditions TS 2550-014-11074094-2012.

2) The part of activities management plan related to location of the construction of the supporting beams (lodgments) for the installation of pipelines and ways of fastening of pipelines to the supporting beams needs to be designed to the linear and radial expansion of the pipeline at operating pressure and taking into account the location and characteristics of existing building structures and terrain.

3) Pipelines should mounted directly on support beams, pre-installed along the pumped product transfer line. Fastening of pipelines to the supporting beams must made by means of clamps, and should place at intervals:

- 0.8 m for hoses with inner diameter from 50 to 114mm;
- 1.0 m for hoses with inner diameter from 114 to 219 mm;
- 1.25 m for hoses with inner diameter from 219 to 300mm;
- 1.5 m for hoses with inner diameter from 300mm and above.

Recommended scheme of installation of the horizontal section of the pipeline shown in figure 8.

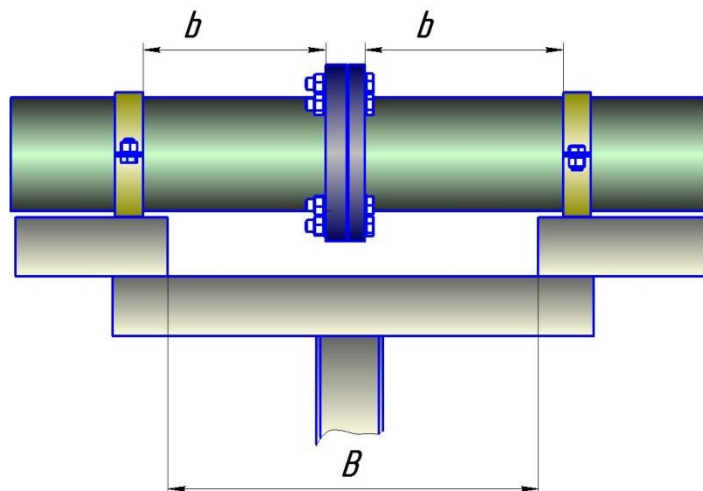


Fig.8

Recommended parameters for mounting given in Table 1.

Table 1

Size of the item	B, mm, min	b, mm, min
ID – 050-076	230	100
ID – 102-133	280	320
ID – 152	300	350
ID – 159-245	320	370
ID – 273-377	350	400
ID – 402-530	370	420
ID – 610-630	400	450

4) Support beams (lodgments) serve for support of flexible hoses on all length of the hose. The profile and characteristics of the supporting beams basic choose at the business-to-consumer on the calculation depending on distance between supports, standard size of the installed hose and the density of the pumped-over material.

The recommended options of support beams in fig.9.

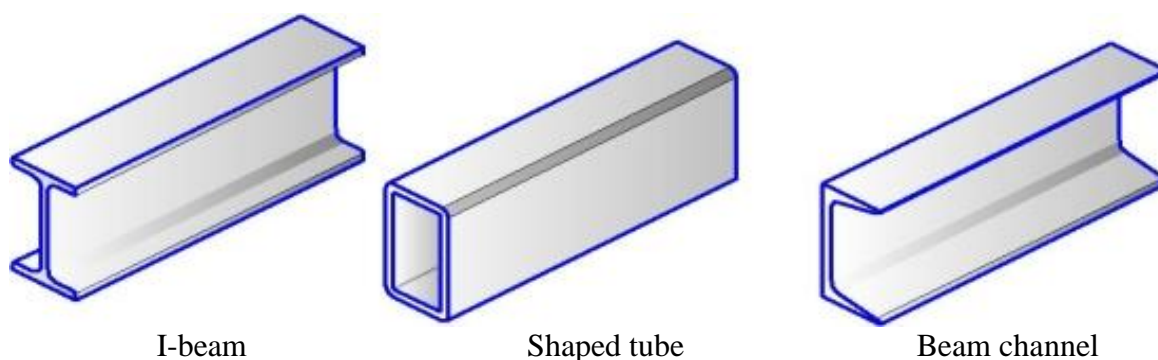


Fig.9

Selection guideline for support beams see in Tables 2, 3.

(All values are given based on slurry density of 3 tons/m³)

Table 2

Design load														
Inner diameter of a product, mm														
mm	50	65-76	102	114	133-152	159-200	219-245	273-300	325-351	377-402	426	457	508	530-610
inch	2	2 1/2-3	4	4 1/2	5 1/2 -6	6 1/4 -8	8 1/2 -9 3/4	10 3/4 -11 3/4	12 3/4 -13 3/4	14 3/4 -15 3/4	16 3/4	18	20	20 3/4 -24
Design load (kg/m)	10	22	36	54	75	135	202	287	396	508	641	712	795	1133
Pin load (kg)	8,6	9,8	12	14,6	77,4	86,2	87,2	107,8	119	155,8	167,6	176,3	188,4	224

Table 3

Distance between beams (m)	Required section modulus, W (x 10 ³ mm ³)												
	Inner diameter of a product												
mm	50	65	76	102	114	133	152	159	170	200	219	245	273
inch	2	2 1/2	3	4	4 1/2	5 1/2	6	6 1/4	6 3/4	8	8 1/2	9 3/4	10 3/4
1	0	1	1	1	1	3	3	4	4	4	5	5	6
2	1	2	2	2	3	8	8	11	11	11	14	14	20
3	2	3	3	5	7	14	14	22	22	22	29	29	40
4	3	5	5	8	12	23	23	36	36	36	49	49	68
5	4	8	8	13	19	33	33	53	53	53	74	74	103
6	6	11	11	18	26	45	45	74	74	74	104	104	145
7	8	15	15	24	36	59	59	98	98	98	139	139	194
8	10	20	20	31	46	75	75	125	125	125	179	179	251
9	12	25	25	39	58	93	93	156	156	156	224	224	315
10	15	30	30	48	71	113	113	190	190	190	274	274	385

Table 3 (continuation)

Distance between beams (m)	Required section modulus, W (x 10 ³ mm ³)										
	Inner diameter of a product										
mm	300	325	351	377	402	426	457	508	530	610	
inch	11 3/4	12 3/4	13 3/4	14 3/4	15 3/4	16 3/4	18	20	20 3/4	24	
1	6	8	8	10	10	12	15	15	20	20	
2	20	26	26	33	33	40	49	49	68	68	
3	40	53	53	69	69	85	104	104	144	144	
4	68	91	91	117	117	145	178	178	249	249	
5	103	138	138	178	178	221	272	272	382	382	
6	145	196	196	252	252	314	386	386	544	544	
7	194	263	263	338	338	422	520	520	733	733	
8	251	340	340	437	437	547	673	673	951	951	
9	315	427	427	549	549	687	847	847	1198	1198	
10	385	524	524	674	674	844	1040	1040	1473	1473	

Note: Support beams are not included in the assortment of COMPOSIT LLC.

5) The recommended specifications of the clamps reflected in the product drawing (see Fig. 10) and given in Table 4.

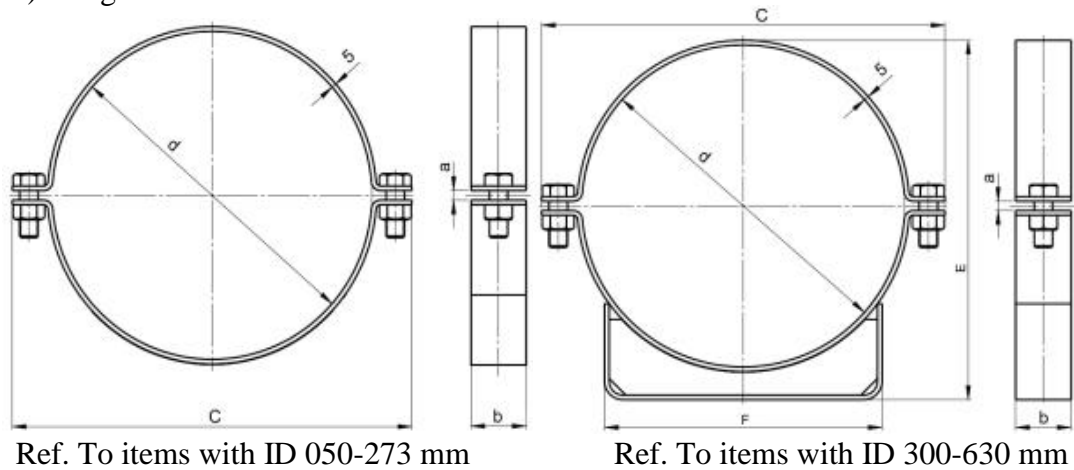


Fig. 10

Table 4

Nominal size	d	C	b	a	E	F	Bolts size	
ID 050	85±1,0	138	40	8	-	-	M10x40	
ID 065	100±1,0	155						
ID 076	113±1,0	172	50				10	M16x50
ID 102	138±2,0	216						
ID 114	152±2,0	230						
ID 133	170±2,0	250						
ID 152	184±2,0	262						
ID 159	198±2,0	276						
ID 170	211±2,0	290						
ID 200	245±2,0	327	60	12			M20x80	
ID 219	265±2,0	352		10				
ID 245	294±2,0	382						
ID 273	322±2,0	410						
ID 300	349±2,0	436						
ID 325	376±2,0	463						
ID 351	417±2,0	505	70	12	390	300		
ID 377	465±2,0	552			415	330		
ID 402	470±2,0	557			455	350		
ID 426	499±2,0	627			505	380		
ID 457	457±2,0	570			510	385		
ID 508	585±2,0	690	100	15	540	405	M24x80	
ID 530	610±2,0	715			510			
ID 610	690±2,0	800			630	470		
ID 630	705±2,0	850			650	490		
					730	560	M24x100	
					750	570		

Sizes of clamps specified regarding the outer diameter of the hose and based on the installation site.

When mounted vertically it strongly recommended placing clamps within the interval not exceeding 0.8 m for hoses of any size.

IMPORTANT! When installing the clamp it should fit tightly on the outer diameter of the hose and when tightening the clamps on the hose it not allowed the deformation on the outside diameter of the hose.

Clamps fixed to the support beams by welding (see Fig.11).

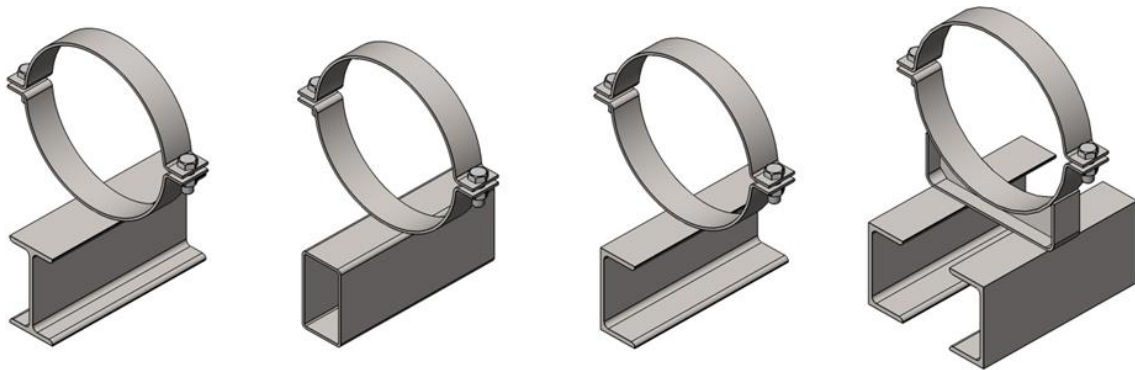


Fig.11

Plan of the support beams and clamps location.

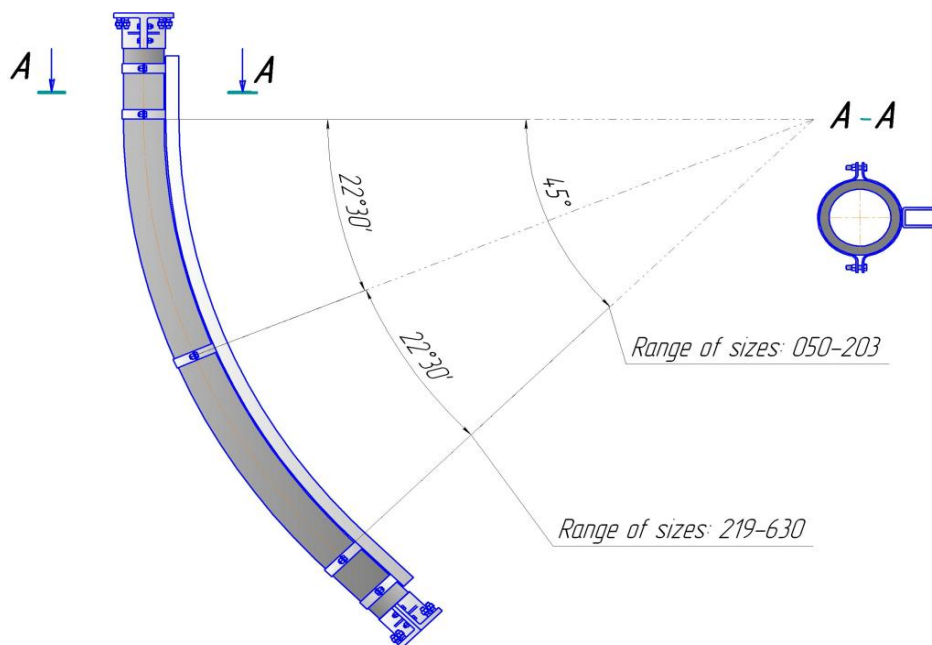


Fig.12

Fixing the hose with clamps on the support beam placed to the inner bending radius of the hose (bending angle 45°) (see Fig.12)

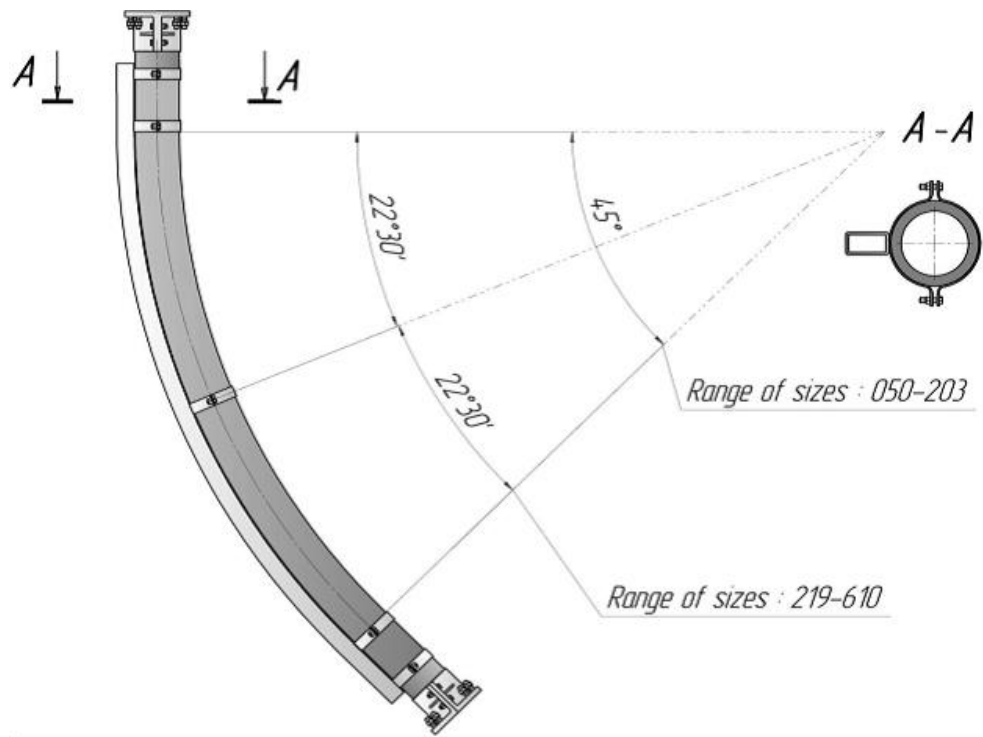


Fig.13

Fixing the hose with clamps on the support beam placed to the outer bending radius of the hose (bending angle 45 °) (see Fig.13)

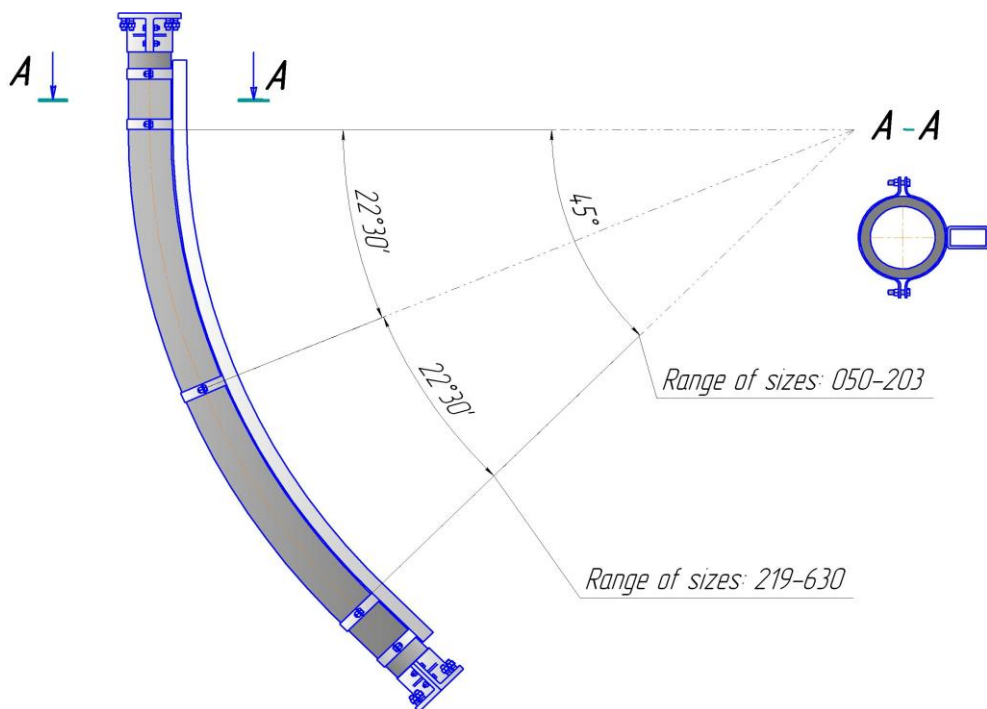


Fig.14

Fixing the hose with clamps on the support beam placed directly under the hose (bending angle 45°). (see Fig.14)

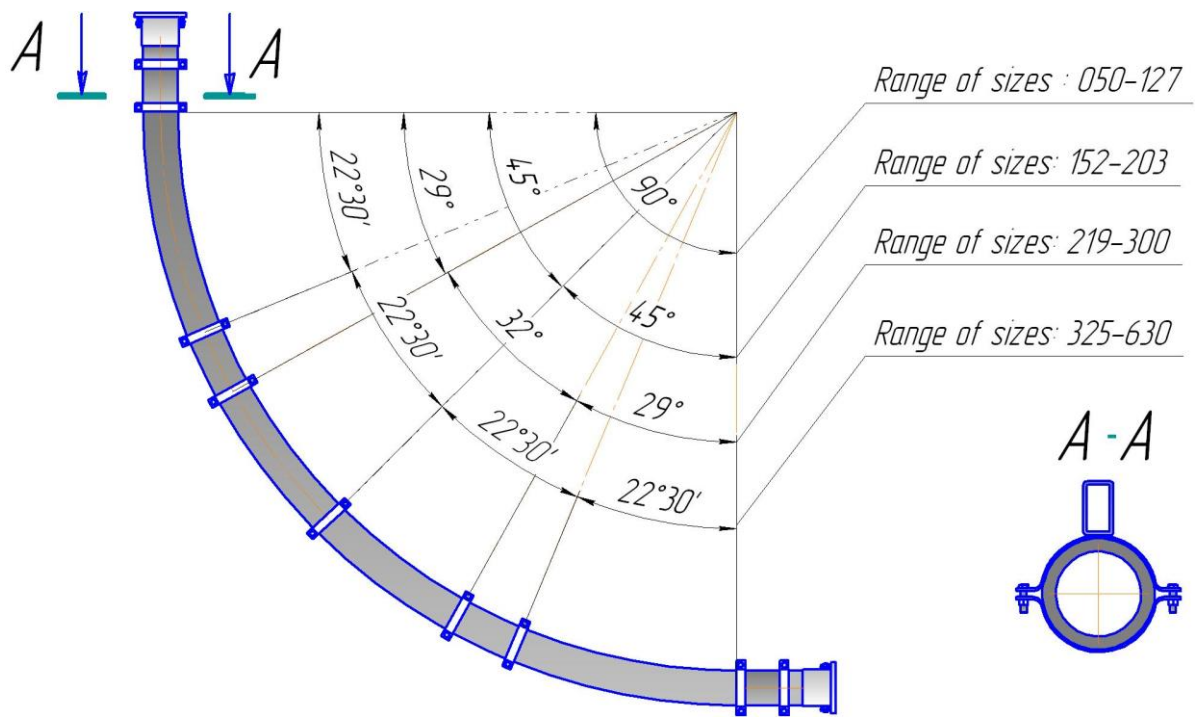


Fig.15

Fixing the hose with clamps on the support beam placed directly under the hose (bending angle 90°) (see Fig.15)

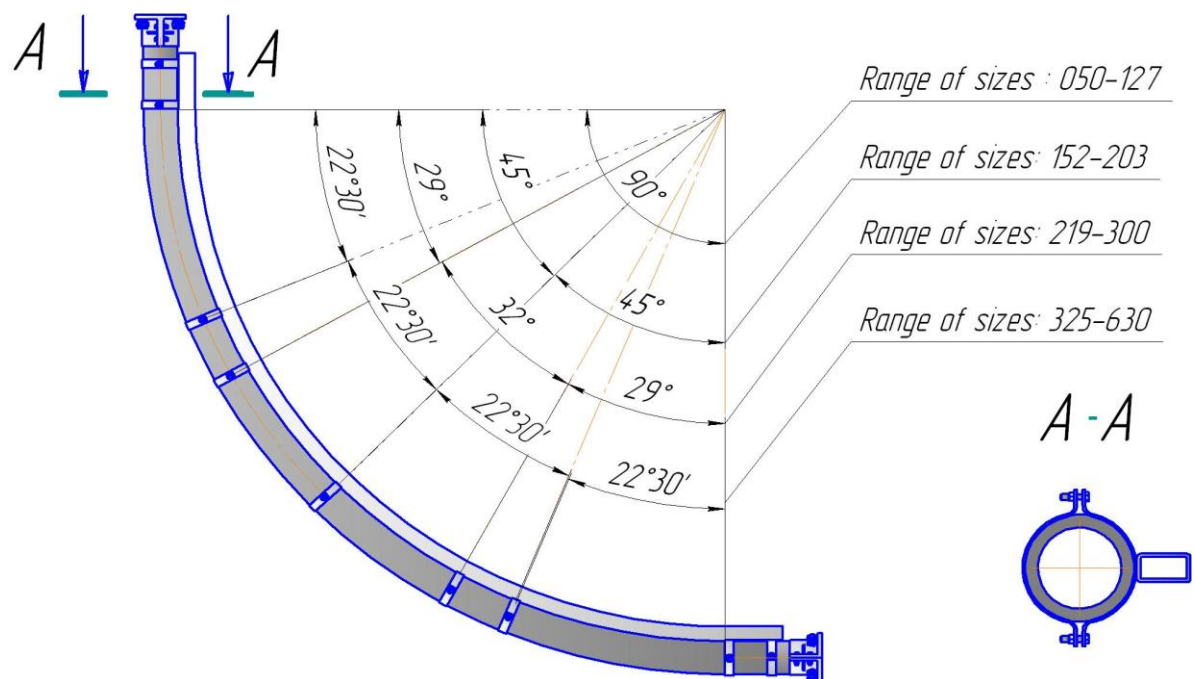


Fig.16

Fixing the hose with clamps on the support beam placed to the inner bending radius of the hose (bending angle 90 °) (see Fig.16)

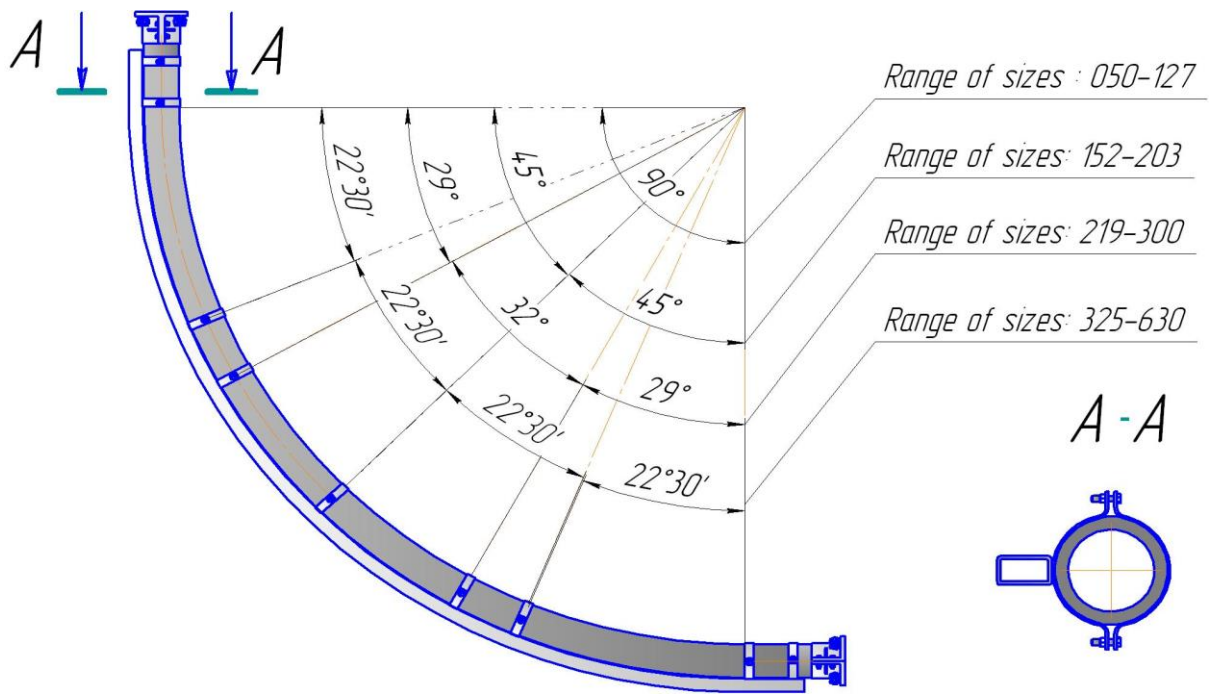


Рис.17

Fixing the hose with clamps on the support beam placed to the outer bending radius of the hose (bending angle 90 °) (see Fig.17)

ATTENTION:

- these recommendations intended for pipelines that have a metal frame in their construction.
- installation of pipelines is necessary to produce observing the condition of perpendicularity of the clamping surface of the flange to the pipe axis;
- lodgments and supports shall not have sharp edges and when the work should not lead to the hose outer layer.
- is recommended to rotate the hoses used to transport materials, to 90 degrees every 3 months to ensure regular wear.

6) Metal clamps holding the hose on the lodgment must not have rough and sharp edges. Lodgments should be set to line without distortions and shifts in vertical and horizontal direction.

7) For vertical hose installation (mounting by bolts with flanges) to fixed metal parts is necessary to provide for the installation of mounting flanges, rigidly fixed to support structure. (see Annex A).

8) Supporting structures, lodgments, mounting flanges, clamps made of metal, should protected from corrosion by coating.

9) Installation of hoses to the mating flanges of the parts of the hoses installation lines must made with bolts and nuts through the split, rotating, mounting or adapter flanges. Bolts should diametrically opposed. Flange connecting scheme is in the figure18.

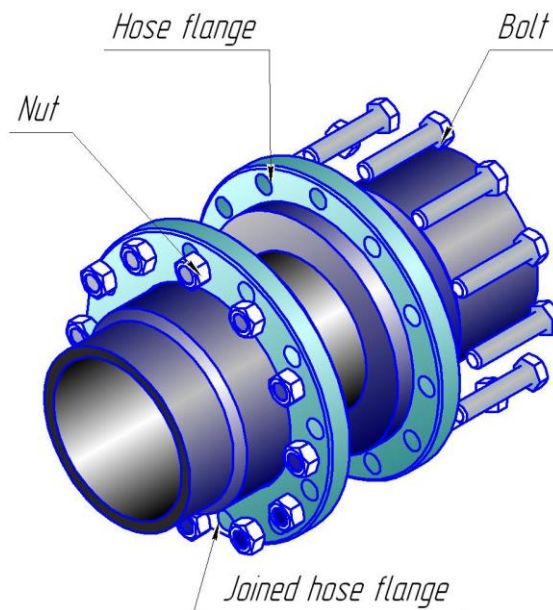


Fig.18 Pipelines installation

2.3. Steel-rubberized products installation

1) Depending on the peculiarity of pipeline construction, the products that are parts of the pipeline can be fix to the supporting beams, columns, and beams with clamps, mounting flanges, and other elements, which determined by the developer in the preparation of technical project.

2) The construction of the rubber products may include special grips or lugs designed for mounting of the products to the supporting beams (see Fig.19). The mounting with the legs and lugs should implemented mechanically or by welding the legs to the supporting structures.

ATTENTION: do not weld any mounting components directly to the jacket of steel-rubberized products!!!

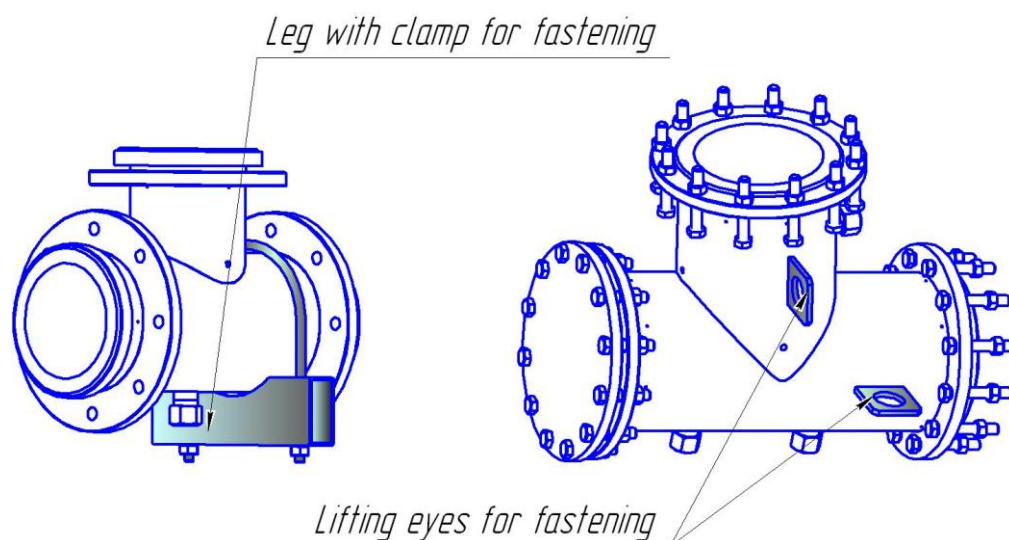


Fig.19

3) When welding the product mounting legs to the supporting beams, the mounting legs should be preliminary removed from the product.

3. Operation

3.1. Operation of all kinds of products

1) Use of products should be in accordance with the requirements of the technical project.

2) During the use of the product in the lines of transporting the products, it is necessary to control the parameters of the working process with the help of instrumentation (pressure gauge, vacuum gauge, etc.).

PROHIBITED:

- use hoses for transporting the products not provided for it by the technical specifications;
- leave in the hose transported product for a long period of time;
- perform welding or other hot works closer than 1 meter from the location of the hose.

ATTENTION:

- creases, wrinkles in the process of moving the hose, operation and storage can lead to the destruction of the hose;
- it is not allowed to bend the hoses included in the slurry hose systems radii less than indicated on the drawings of products and in this manual;
- the use of hoses with a deviation in the geometric shape when changing the roundness of the passage diameter (dents, creases, convex, concave, etc.) can lead to the destruction of the hose in the areas of geometrical form violation;
- vertical hose installation without supporting structures can lead to sagging of the hose and weakening the contact of the outer surface of the hose and of the inner split flange coupling which creates the prerequisites for an emergency situation breakdown of the hose from the split flange coupling;
- repetitive mechanical action on the outer surface of the hose (friction) without rubber gaskets can cause destruction of the hose;

3.2. Maintenance

1) Maintenance of hoses performed in order to prevent failure of the hose during the warranty period and after warranty period.

2) Visual inspection should be carried out once a week.

Moreover it should be detected the presence of delamination of the outer layer, availability of wrinkles, depressions, inflations and places with a visible softening of the outer layer.

All places of split flange couplings and hose connections must be tightened.

If you notice wrinkles, indentations, blisters, places with the softened outer layer it should be decided on the possibility of further operation of the hose based on the degree of integrity of the internal frame structure of the hose.

If you find a leak in the hose, it must be changed.

4. Handling and Transportation

1) To avoid the damage of the hoses when loading and unloading is necessary to produce with using special spreader bar in accordance with the fig.20, avoiding hose collapses and bends.

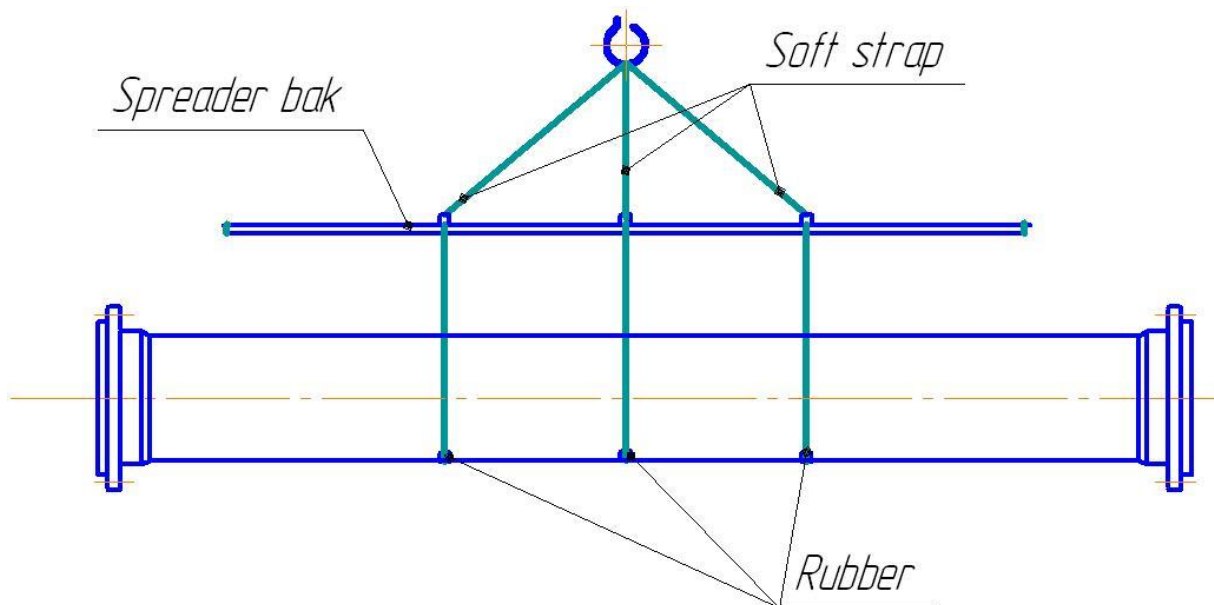


Fig. 20 Handling with spreader bar

2) To avoid the damage of the bends when loading and unloading is necessary to produce with soft straps in accordance with the fig.21.

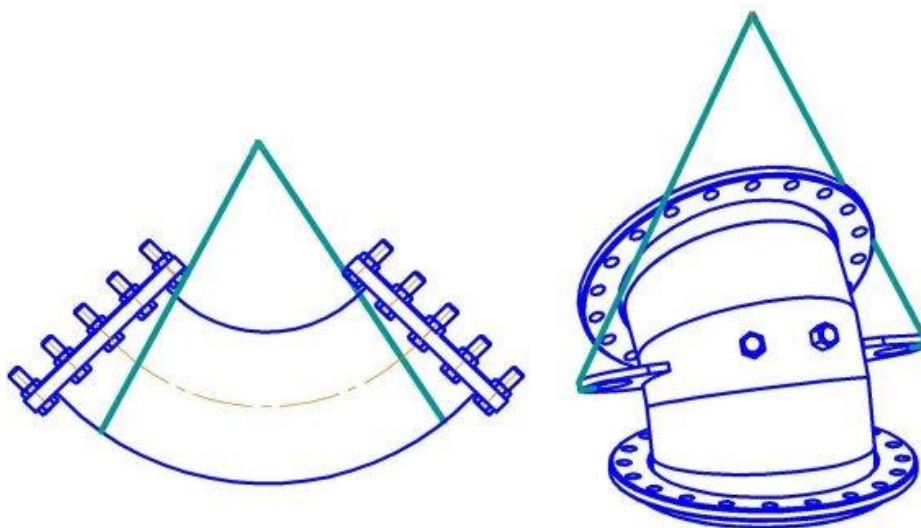


Рис.21 Loading of rubber bend and steel rubberized bend with soft straps.

3) Loading and unloading of steel-rubberized T-bends, branch pipes, bends, collectors and others must carried out using straps, attached to the lifting eyes of the product in accordance with Fig.22.

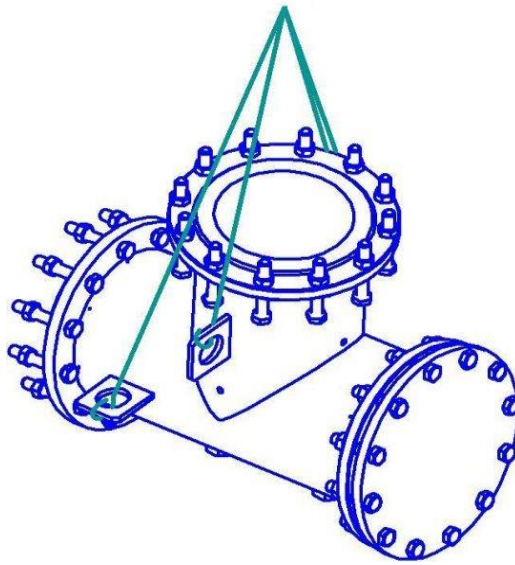


Fig. 22 Loading of steel-rubberized products

ATTENTION:

- is forbidden to move the pipelines and steel-rubberized products on a hard surface by dragging!
- when moving is not allowed to hook a hook or other metal devices to fastening holes of the pipeline flanges!
- transportation of pipelines should be carried out when stacking them on a flat horizontal platform with a length not less than the length of the pipeline, by road or rail.

During transportation of the pipelines it is necessary to provide measures for the protection of the outer rubber layer from damage (mechanical damage, creases, etc.).

5. Storage

1) The storage of hoses must be carried out in enclosed spaces; permitted short-term storage, no more than thirty days, outdoors in the closed position at manufacturer plant.
Storage temperature from -35° to $+40^{\circ}\text{C}$.

2) The storage of hoses should be made on the horizontal surface but no more than two rows in height for the hoses with inner diameter up to 273 mm and no more than one row for the hoses with inner diameter over 273 mm, avoiding bends on hoses.

At sub-zero temperatures, the storage of hoses is permitted only in the expanded form.

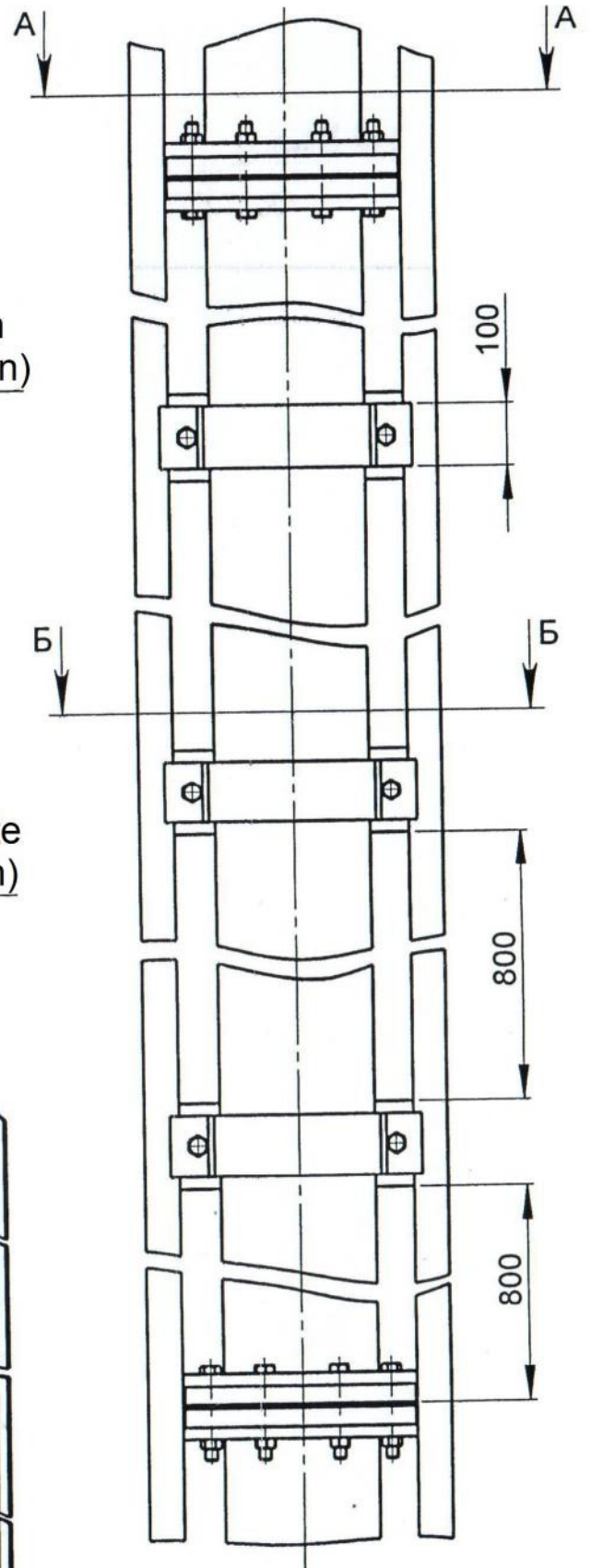
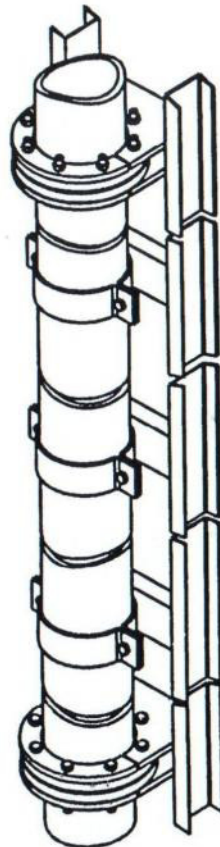
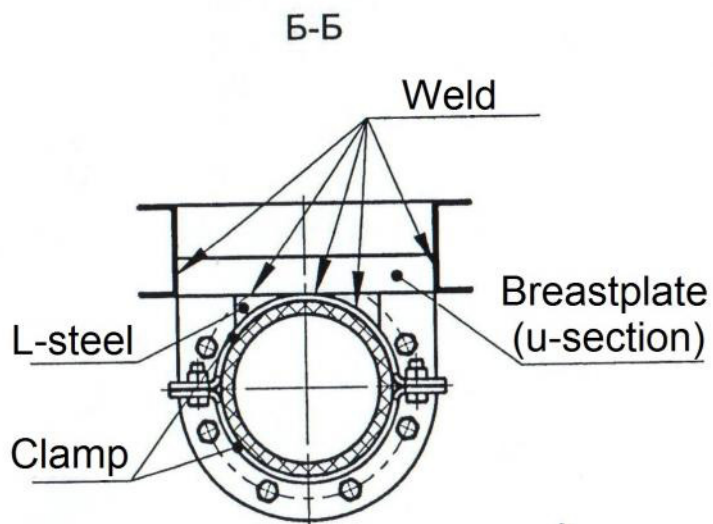
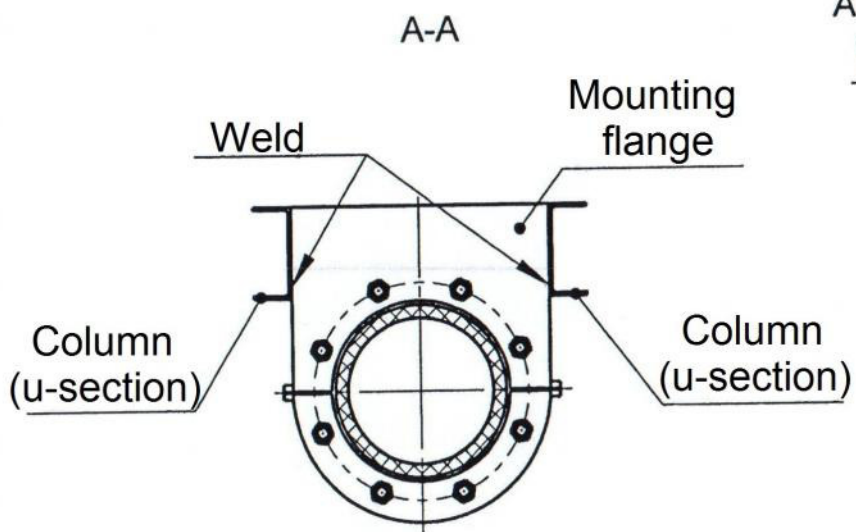
3) It is not allowed to store the hoses close to working of radio electronic and other equipment, contribute to the formation of ozone, as well as artificial light sources emitting ultraviolet light.

4) Keep the hoses should be away from radiators, the distance to the heaters must be at least 1 meter.

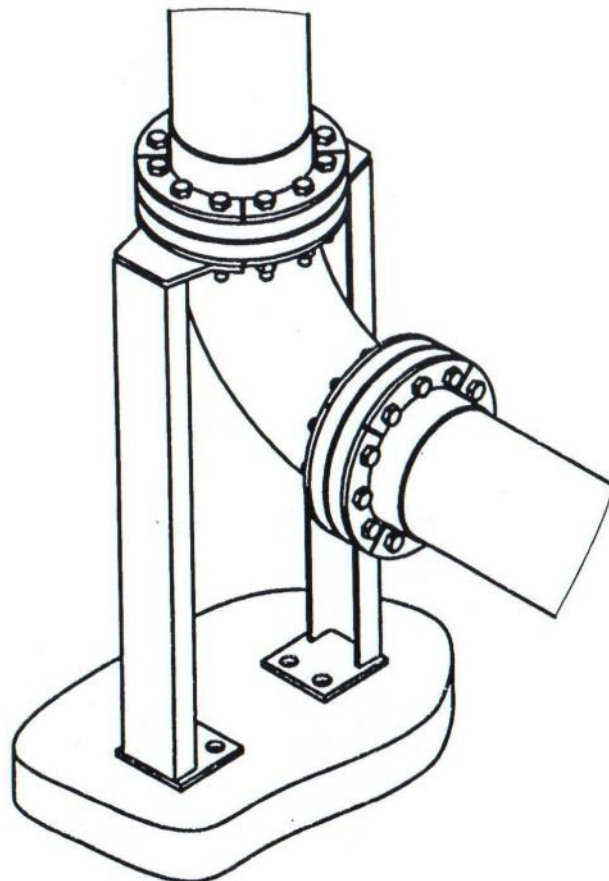
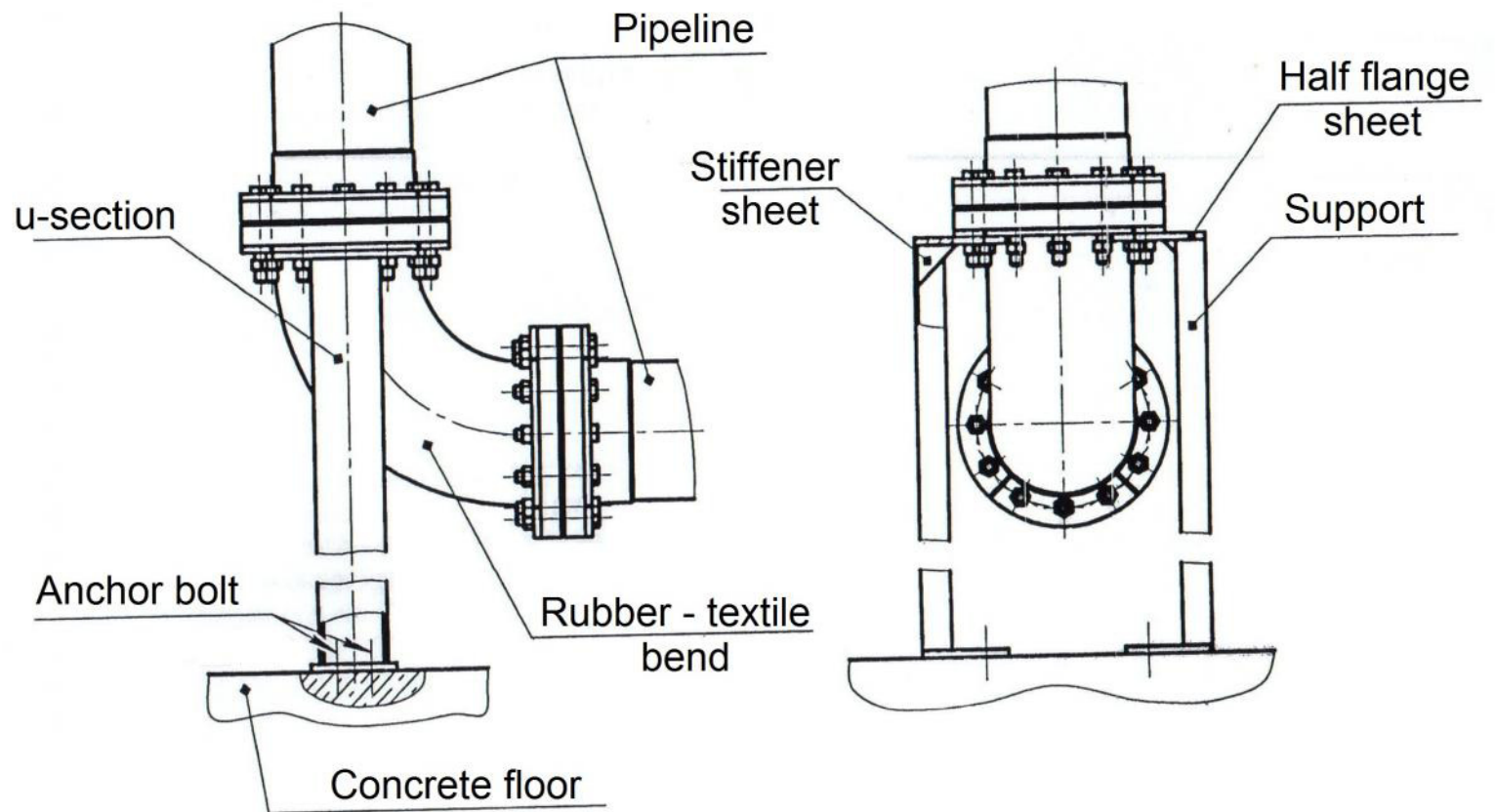
5) Keep the hoses that are the part of flexible slurry hose system in the same room with oil, gasoline, etc. substances that have a negative impact on the industrial rubber goods products not recommended.

6) The storage of hoses under the influence of external and internal pressure, as well as with excesses, is not permitted.

Appendix A



Appendix B





COMPOSIT

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