

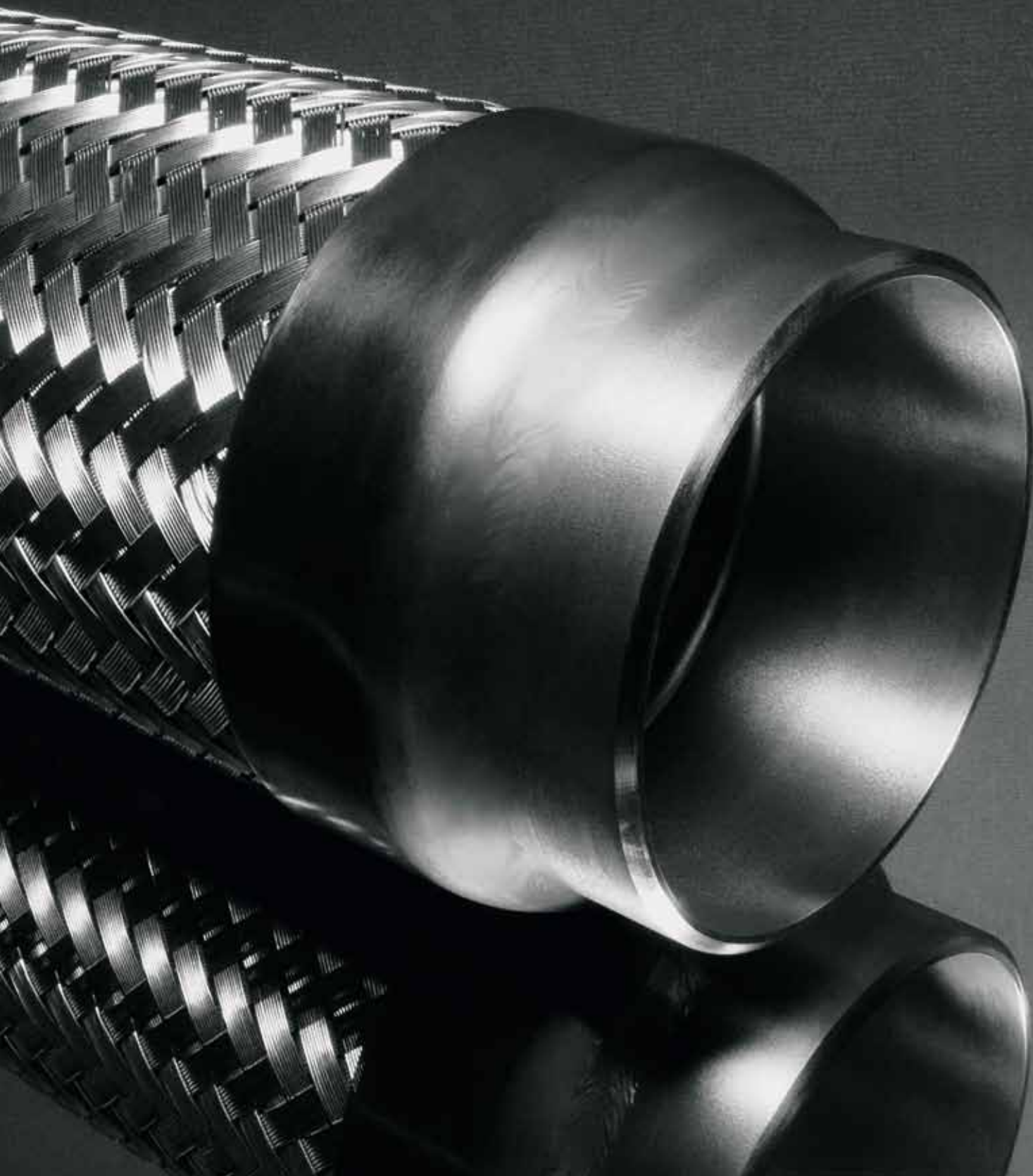


VLADIMIR PLANT OF METAL HOSES



FLEXIBLE PIPEWORK

HIGH-PRESSURE CORRUGATED METAL HOSES



ABOUT US	4
HIGH-PRESSURE CORRUGATED METAL HOSES MADE OF STAINLESS STEEL	11
How to select a corrugated metal hose properly	12
Example of designation of high-pressure corrugated metal hose	13
Characteristics of corrugated metal hoses	14
MR015. Standard bellow	14
MR017. Low cost bellow	14
MR025. Bellow with higher flexibility	14
MR030. Strengthened bellow	14
MR035. Bellow with higher flexibility for use at higher pressure	14
MR040. Bellow with two layers	14
MR050. Strengthened with higher flexibility for use at higher pressure	14
Technical characteristics of corrugated metal hoses	15
Corrugated metal hoses with welded ends	16
A01. Weld-end union with extended length and ISO pipe dimensions	16
A02. Weld-end union with ISO pipe dimensions	16
Corrugated metal hoses with flanges	17
F01. Union with fixed slip-on flange according DIN EN 1092, ANSI/ASME B16.5, etc	17
F02. Union with fixed welding neck flange according DIN EN 1092, ANSI/ASME B16.5, etc	17
F03. Union with loose plate flange according DIN EN 1092, ANSI/ASME B16.5 and weld-on plate collar	17
Corrugated metal hoses with threaded connection	18
S63. Male threaded connection. Nipple with metric thread according to ISO 261	18
S65. Male threaded connection. Nipple with pipe thread according to ISO 228	18
S67. Male threaded connection. Nipple with pipe thread according to DIN EN 10226 (ISO 7/1). On request NPT	19
Corrugated metal hose with fitting consisting of flat nipple for gasket with swivel nut	20
N72. Swivel nut with metric thread according to DIN 3870 and flat sealing and nipple with counter nut	20
N73. Swivel nut with pipe thread according to ISO 228 and flat sealing and nipple with counter nut	21
N74. Swivel nut with metric thread according to DIN EN ISO 8434 and 24° conical nipple with O-ring and counter nut	21
Corrugated metal hose with fitting consisting of nipple with cone connection and swivel nut	22
N75. Swivel nut with pipe thread according to ISO 228 and nipple with 74° inner cone and counter nut	22
N76. Swivel nut with metric thread according to DIN 3870 and nipple with 74° inner cone and counter nut	22
Corrugated metal hose with fitting consisting of spherical nipple with swivel nut	23
N77. Swivel nut with pipe thread according to ISO 228, spherical nipple according to DIN 3863 with counter nut	23
N78. Swivel nut with metric thread according to DIN 3870 and spherical nipple according to DIN 3863 with counter nut	23
Corrugated metal hoses with adapter	24
C80. Combined union: swivel nut with flat sealing and adapter to weld-end (ISO pipe dimensions)	24
C81. Combined union: swivel nut with cone sealing and adapter to weld-end (ISO pipe dimensions)	24
C82. Combined union: swivel nut with cone sealing and adapter with inner thread	25
C83. Combined union: swivel nut with cone sealing and adapter with outer thread	25
C84. Combined union: swivel nut with flat sealing and adapter with outer thread	26
C85. Combined union: swivel nut with flat sealing and adapter with inner thread	26
Corrugated metal hoses with quick couplings	27
Corrugated metal hose with camlock	27
Corrugated metal hoses with quick couplings with wedge for pressure up to 16 and 63 bar	28
SPECIAL VERSIONS OF HIGH-PRESSURE CORRUGATED METAL HOSES	29
Corrugated metal hoses with end fittings for cryogenic equipment	30
Corrugated metal hoses with claw coupling	30
Corrugated metal hoses with two circuits	31
Corrugated metal hoses with heat insulation	32
Corrugated metal hose with pipe bends	32
Corrugated metal hoses to convey gaseous media under pressure	33
Special versions of corrugated metal hoses	33
INDUSTRY SOLUTIONS WITH HIGH-PRESSURE METAL HOSES MADE OF STAINLESS STEEL	35
Bypass lines for cluster oil producing wells	37
Bypass lines for heating mains	38
Corrugated metal hoses for use in mines	38
REFERENCE DATA	39
Conversion of pressure units	40
Calculating the length of neutral areas	40
Calculating minimum hose length for various movements	40
Limit lateral movements	40
Limit deviations of length	40
Corrective calculations of technical parameters of corrugated metal hose	41
Installation conditions of high-pressure corrugated metal hoses	42
Contacts	44
Questionnaire for high-pressure corrugated metal hoses selection	45



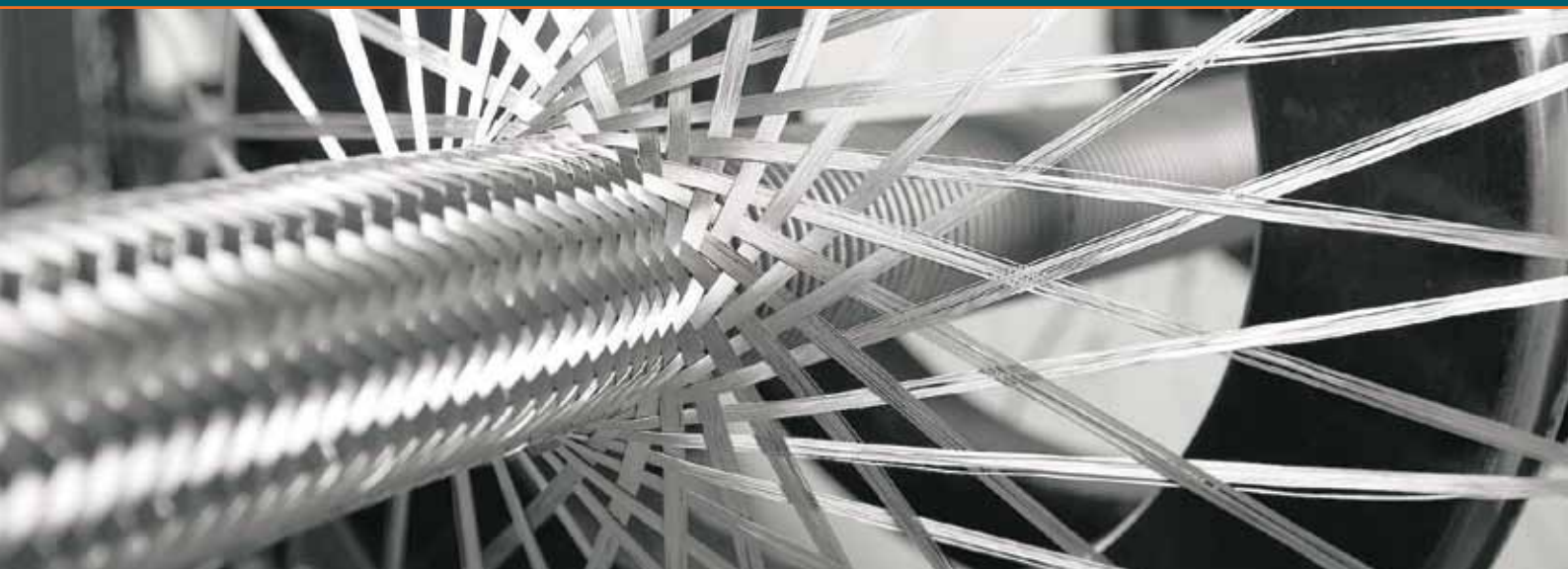
Vladimir Plant of Metal Hoses (ZAO VZM) is the Russian manufacturer of high-pressure corrugated metal hoses made of stainless steel, PTFE hoses, bellow expansion joints and end fittings. Products of ZAO VZM are widely used by leading industrial companies in Russia. ZAO VZM supplies its products throughout the territory of Russia and CIS countries.



Products manufactured by ZAO VZM:

- High-pressure corrugated metal hoses
- Flexible PTFE hose
- Bellow expansion joints
- End fittings

Vladimir Plant of Metal Hoses was found in the beginning of 2006. The company is considerably unique. Being full cycle manufacturer ZAO VZM uses modern processing equipment imported from Germany, Italy and South Korea. In order to increase performance and readjust speed our engineers have designed some portion of highly specialized equipment. This equipment has characteristics that are beyond the equivalents produced by other manufacturers.



ZAO VZM is the manufacturing company, which provides stable and reliable production at the same level as a large plant and practices not only individual approach to our customers and handles batch items only, but accepts high-technology orders that require high-tech engineering.

ZAO VZM possesses the nuisance patent for welding and assembly. Our technologies allow us to produce high-pressure corrugated metal hoses with higher reliability.

Modern test room of the plant controls quality of all pipework produced. On the first stage all materials and components pass through incoming verification. On the second stage step-by-step tests, which include tightness test on weld seams, are performed. On the third stage ready-to-use product passes through final check before dispatch. Tightness of corrugated metal hoses is checked on the stand with the test pressure equaling to 1,25 times of the working one. Quality of critical items is controlled with mass-spectrometer helium analyzer (helium leak detector).



Quality management system on ZAO VZM:

- Quality control of ALL ready products with cross-wise methods,
- 100% quality control of weld seams,
- 100% tightness control,
- 100% control with test pressure equaling to 1,25 times of the working one,
- Stage-by-stage quality control on every stage of process flow,
- ZAO VZM personnel passes through special training programs and certifications,
- Quality management system is certified in accordance with GOST ISO 9001-2011.
- Quality management system is certified with international agency TÜV Rheinland (Germany) to ISO 9001:2008 standard.

Production audits initiated by our customers have confirmed high level of organization of manufacturing process and quality of ZAO VZM products for many times.



Production facilities of ZAO VZM have successfully passed certification by TÜV Rheinland (Germany) against quality management system standard ISO 9001:2008.



ZAO VZM has licenses of Rostekhnadzor (RTN) for design and manufacturing products for nuclear facilities.

ZAO VZM is the official supplier with accreditation of the largest Russian companies, including Gazprom, Rosneft and Transneft.

High-pressure corrugated metal hoses produced by ZAO VZM are widely used in the whole range of primary industries. For instance, in metallurgy they are used to supply oxygen, nitrogen and other gases to furnaces. They are also used to supply water to furnace cooling systems.

Resistance to chemically active environments and high reliability of high-pressure corrugated metal hoses manufactured by ZAO VZM result in their active use in nuclear, oil and gas and petrochemical fields.

Reliable performance in the conditions of high vibration loads makes our flexible hoses essential in design of turbines of various applications.

ZAO VZM has developed special bellow design for aerospace field, which provides higher flexibility combined with capability for operation with increased working pressure.

Use of corrugated hoses when connecting a pipework allows to avoid welding in the conditions of high explosion hazard, for example when using them in mines or oil development and gas production.



ZAO VZM products are mostly widespread in the following fields:

- Metallurgy
- Nuclear
- Aerospace
- Ship building
- Chemical and petrochemical
- Machines building
- Mining
- Housing and utilities
- Technical gases

Features of high-pressure corrugated metal hoses produced by ZAO VZM

Forming thin-walled welded tube made of stainless steel and control over quality of weld seam are the most critical stages during production of the corrugated metal hoses. Particularly, the fullest control over production of flexible bellow is the main factor for such operation characteristics of corrugated metal hoses as long lifetime, reliability during long operating life, ability to handle peak loads. Welding an end fitting to a bellow is another critical stage of production. Majority of plants perform welding operation manually. Therefore, global producers of high-pressure corrugated hoses face with human factor problem. Usually it is solved with special training systems and certification of welding operators.

ZAO VZM has taken the way of technical innovations – a lot of work and means were spent to develop original design of corrugated metal hose, which allowed to simplify this complicated operation significantly and provided additional quality assurance of the products being manufactured. The reliability of the products increases due to more even load distribution between parts of the hose structure.

Some types of metal hoses can be made using orbital welding machines.

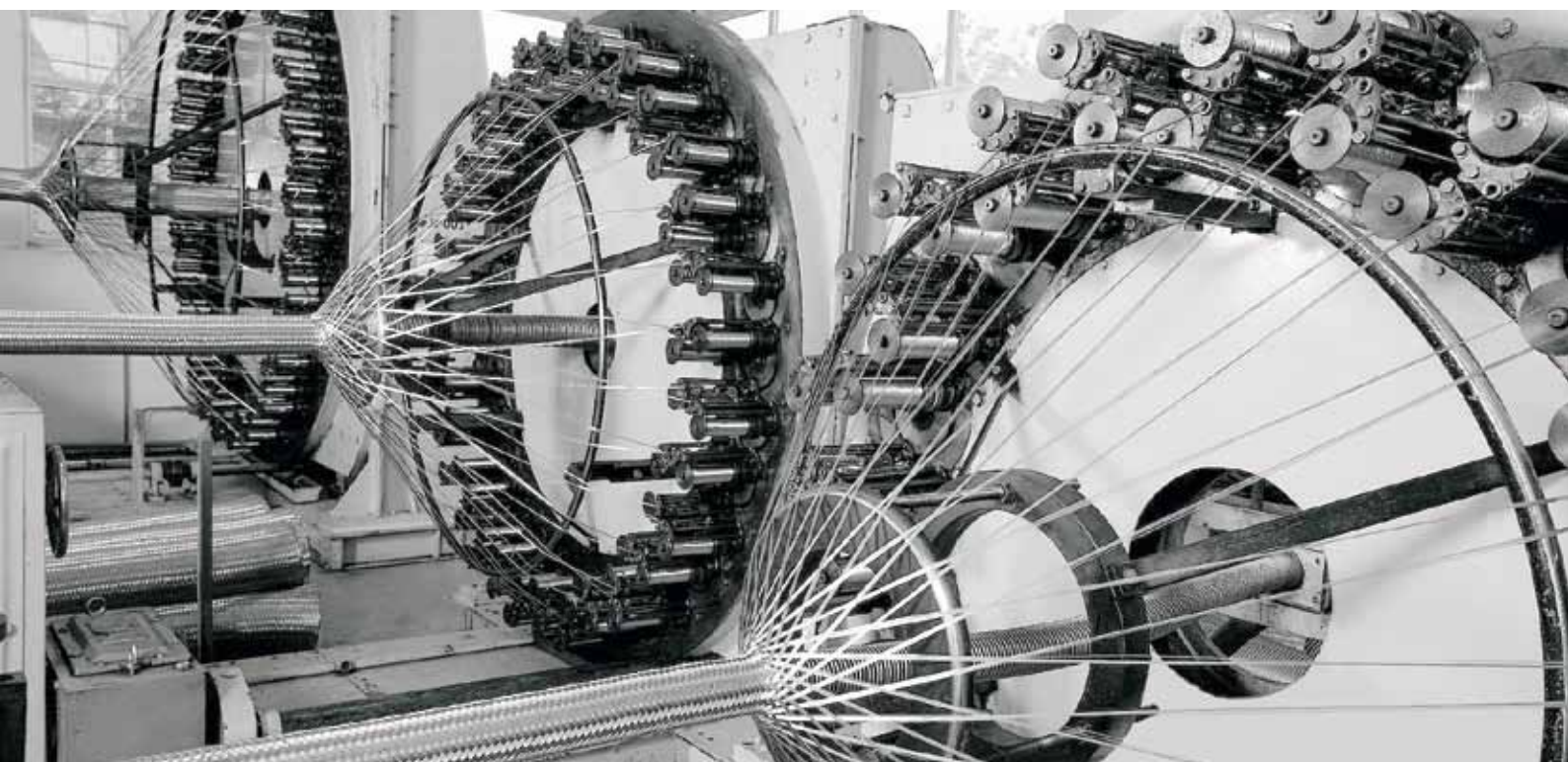
ZAO VZM uses German welding equipment for these purposes.



Full-cycle production of ZAO VZM provides the following benefits:

- The hose is assembled using original patented technology.
- Hydraulic forming of bellows on own production facilities decrease costs for the customers.
- Control over all manufacturing stages to provide the customers with products of the highest quality.

ZAO VZM uses only high-quality materials for production and applies exclusive standards to the quality of raw materials. 100% quality control over incoming materials prevents low quality materials to be used for production.



End fittings production

Corrugated metal hoses produced by ZAO VZM can be equipped with end fittings to make easier their installation to customer's equipment.

The plant supplies the metal hoses with various end fittings:

- Weld ends
- Thread connections
- Combined connections
- Flanges
- Quick-connect fittings
- Special versions

As per requirements of the customer ZAO VZM adapts end fittings to specific conditions of operation.

Services provided by ZAO VZM

Vladimir plant of Metal Hoses has proved oneself as flexible producer, which is capable to respond to new needs of its customers.



Benefits from the services provided by ZAO VZM:

- ZAO VZM can maintain constant stock reserves in accordance with production schedule of customers.
- Qualified design selection in accordance with operating conditions of customer,
- Stock reserves of specific products are formed for regular customers.
- Engineering solutions are developed together with the customer.





HIGH-PRESSURE CORRUGATED METAL HOSES MADE OF STAINLESS STEEL



HOW TO SELECT A CORRUGATED METAL HOSE PROPERLY

When selecting a high-pressure corrugated metal hose you should determine and consider the following base parameters:

Bellow`s type

Bellow is a load-bearing element within the structure of corrugated metal hose.

It provides base operating performances of high-pressure metal hose – tightness, flexibility, resistance and reliability.

ZAO VZM produces 5 types of bellows. These types of bellows have different operating characteristics and, thereafter are used in different operating conditions.

The bellows are manufactured as standard versions, which meet the requirements of majority of the customers as in different specialized versions:

- with higher flexibility
- for use at higher pressure
- low-cost version

Description of types of the bellows and technical characteristics of the high-pressure corrugated metal hoses with different types of the bellows are specified on pages 14-15 of the catalogue.

Braid

Braid allows to maintain operating parameters of metal hoses under high loads. It provides their operation at required pressure and protects the bellow from mechanical damages. If the number of bellow braids is increased then operating pressure of corrugated metal hose is increased a little, while its flexibility decreases.

Corrugated metal hoses can be manufactured without the braid, with one, two or three braids.

Values of working pressure for different versions of high-pressure corrugated metal hoses are specified in the table on page 15.

Type of end fittings

To provide tight connection of metal hose being mounted to customer`s equipment you should select type of relevant end fittings properly. We recommend to order the end fittings together with mating parts. ZAO VZM offers wide range of end fittings that correspond to different standards. We have wide experience and required technical capabilities to develop and produce end fittings as per customer`s drawings.

Nominal diameter (DN)

Nominal diameter is selected considering calculated velocity and working pressure of the flow of the media being transported. We do not recommend to use high-pressure corrugated metal hoses if media velocity exceeds 8 m/s for liquids and 50 m/s for gaseous products.

Too small internal diameter of the metal hose together with high flow velocity results in higher outlet working pressure. While too large internal diameter together with low flow velocity leads to lower working pressure.

Working pressure (Pw)

Working pressure is the maximum pressure of media being transported. In standard conditions allowable working pressure of corrugated metal hoses with different types of the bellows is defined using the Table on page 15. For severe operating conditions of corrugated metal hose under higher temperatures (more than 200°C) and higher dynamic loads “Maximum working pressure” (Pwork) parameter should be adjusted in accordance with the equations in “Reference data” section on page 41.

Hose length and minimum bending radius

You should select the length of the hose properly as using too long or too short hose can lead to its damage. When selecting the length of the hose neutral areas near end fittings, which are not subjected to bending during hose operation, should be provided. Calculations of the lengths of neutral areas and minimal length of hoses are specified in "Reference data" section on page 40. Bending of hose with radius smaller than required (see Table on page 15 and calculated data on page 40) is not allowed.

Example of designation of high-pressure corrugated metal hose:

Stamp of manufacturer	Number of braids	Nominal diameter (DN), mm	Length of metal hose, mm
Vladimir Plant Of metal hose	0 Without braid 1 With one braid 2 With two braids 3 With three braids		
VZM MR015.1A02/A01 50x40x1000 T			
Version	End fitting type	Working pressure, bar	Special versions
015 Standard			
017 Low-cost	A weld-end union	<i>For reference:</i> 10 bar = 1 MPa = 10,2 kgf/sm ²	
025 With higher flexibility	F flanges		
030 Strengthened	Q quick connect fitting		
035 With higher flexibility for use at higher pressure	S male threaded connections		
	N Nipple with threaded nut		
040 With two layers	C Combined connection		
050 Strengthened With higher flexibility for use at increased pressure	01-... Number – end-fitting code (in catalogue)		T Thermal protection

If end fittings are the same on both sides, then end fitting reference is specified once.

For example, the hose with standard bellow, one braid, nominal diameter 50 mm, working pressure 40 bar and length 1000 mm will have the following designation:

VZM MR015.1A01 50x40x1000

When selecting required technical parameters contact ZAO VZM specialists for consultation.

You can use form of online order on our website <http://en.vzmr.ru/buy-hoses/> to select and order corrugated metal hose. We are pleased to support you in your search for optimal technical solution.



CHARACTERISTICS OF CORRUGATED METAL HOSES

General characteristics of bellows with parallel corrugations:

Operating temperature: from -270°C to +600 °C.

Possible number of braids:

Without braid, with one braid, with two braids, with three braids.

Bellow material:

Strap according to GOST 4986-79 made of corrosion-resistant steels AISI 321, AISI 304, AISI 304L, AISI 316L and others

Braid material:

Wiring according to GOST 18143-72 made of corrosion-resistant steel AISI 304, AISI 321 and their equivalents.

MR015. Standard bellow

Average wall thickness. For DN6 - DN300 mm.

MR017. Low cost bellow

For DN6 – DN100 mm.

MR025. Bellow with higher flexibility

Average wall thickness. For DN20 – DN300 mm.

MR030media. Strengthened bellow

Increased wall thickness. For DN6 - DN300 mm.

MR035. Bellow with higher flexibility for use at increased pressure

Average wall thickness. For DN25 -300 mm.

MR040. Bellow with two layers

For DN25 – DN100 mm.

MR050. Strengthened bellow with higher flexibility for use at increased pressure

Increased wall thickness. For DN25 – 300 mm.



Parameters on page 15 are specified provided that media temperature is 20°C and significant dynamic loads are not applied.

For severe operating conditions these parameters should be adjusted in accordance with the equations in “Reference data” section on page 41.

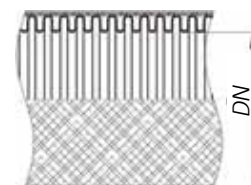


DN, Nominal diameter

P_{work}, working pressure

R_{work}, minimum allowable bend radius for single movement

R_{min}, minimum allowable bend radius for frequent movements

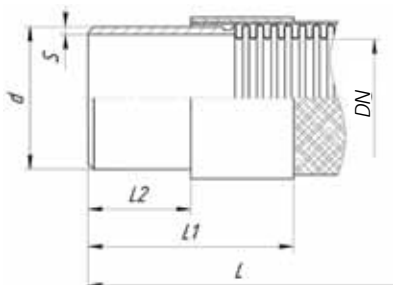


Technical characteristics of corrugated metal hoses

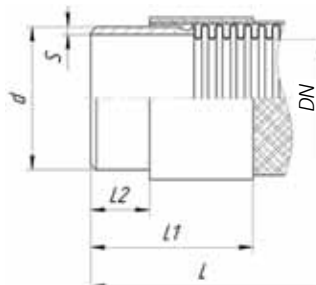
DN mm	Braid	MR015			MR025			MR030			MR035		
		P _{work} bar	R _{min} mm	R _{work} mm	P _{work} bar	R _{min} mm	R _{work} mm	P _{work} bar	R _{min} mm	R _{work} mm	P _{work} bar	R _{min} mm	R _{work} mm
6	0	10	14	90				40	25	140			
	1	160	22	90				330	30	190			
	2	280	22	110				440	30	190			
8	0	10	14	90				35	32	180			
	1	160	24	90				220	40	230			
	2	250	24	110				320	40	230			
10	0	8	17	100				32	38	220			
	1	110	29	100				200	45	250			
	2	250	29	125				300	45	250			
12	0	5	20	120				30	45	250			
	1	110	34	120				200	55	300			
	2	180	34	140				300	55	300			
16	0	3	26	140				20	58	300			
	1	70	44	140				150	75	350			
	2	100	50	150				230	75	350			
20	0	2	32	160	2	32	130	7	39	257			
	1	65	53	160	65	53	130	110	70	257			
	2	110	60	170	130	55	150	140	70	285			
25	0	2	38	180	2	35	150	4	47	293	2	31	125
	1	55	64	180	60	60	150	80	85	293	73	54	125
	2	75	75	190	100	70	170	120	85	325	110	63	150
32	0	1,4	47	210	1,4	47	180	1,4	58	342	1,4	41	160
	1	65	79	210	50	79	180	80	105	342	73	71	160
	2	100	85	220	78	83	210	105	105	380	90	75	190
40	0	0,6	59	240	0,6	59	200	0,6	72	387	0,6	50	180
	1	45	98	240	40	98	200	70	130	387	53	88	180
	2	80	105	250	75	100	220	90	130	430	80	90	200
50	0	0,6	72	280	0,6	72	240	0,6	88	441	0,6	61	220
	1	45	120	280	40	120	240	55	160	441	63	108	220
	2	70	135	290	75	130	260	88	160	490	100	117	240
65	0	0,5	90	330	0,5	90	280	0,5	110	522	0,5	72	250
	1	35	150	330	28	140	280	50	200	522	55	126	250
	2	50	160	350	40	150	310	60	200	580	65	135	280
80	0	0,4	108	460	0,4	108	400	1,5	132	648	0,4	82	360
	1	30	180	460	28	160	400	40	240	648	45	144	360
	2	45	190	500	48	170	460	50	240	720	53	153	420
100	0	0,2	131	530	0,2	131	480	0,9	140	600	0,2	108	440
	1	25	218	530	25	210	480	32	260	650	36	189	440
	2	35	250	600	35	235	550	40	280	700	40	212	495
125	0	0,1	189	800	0,1	189	700	0,5	189	800	0,1	161	625
	1	23	315	800	22	315	700	25	315	800	28	284	625
	2	28	340	900	30	315	750	37	350	850	40	284	675
150	0	<0,1	216	1050	<0,1	216	950	0,5	216	1050	<0,1	195	750
	1	25	360	1050	23	360	950	27	360	1050	33	324	750
	2	30	390	1150	25	350	960	32	380	1100	45	315	865
200	0	<0,1	281	1300	<0,1	281	1200	0,4	281	1300	<0,1	252	980
	1	20	468	1300	16	468	1200	22	468	1300	22	421	980
	2	23	550	1500	25	500	1300	25	550	1400	36	450	1170
250	0	<0,1	335	1700	<0,1	335	1550	0,3	335	1700	<0,1	301	1250
	1	11	558	1700	13	558	1550	13	558	1700	16	503	1250
	2	17	670	1800	19	600	1600	19	595	1800	26	540	1440

CORRUGATED METAL HOSES WITH WELDED ENDS

A01. Weld-end union with extended length and ISO pipe dimensions



A02. Weld-end union with ISO pipe dimensions

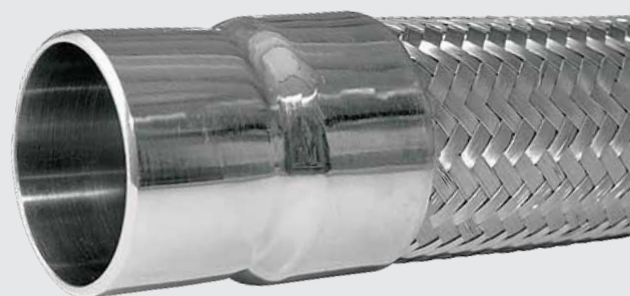


All dimensions are in mm

DN	d	L1			L2			S
		A01	A02	Permissible deviation	A01	A02	Permissible deviation	
6	10,1	60	40	+5	40	20	-1,0	2
8	12	60	45	+5	40	25	-1,0	1,8
10	13,5	60	45	+5	40	25	-1,0	1,8
12	17,2	60	45	+5	40	25	-1,0	1,8
16	21,3	60	45	+10	40	25	-1,0	2
20	26,9	65	50	+10	40	25	-1,0	2,3
25	33,7	65	50	+10	40	25	-1,0	2,6
32	42,4	65	50	+10	40	25	-1,0	2,6
40	48,3	70	55	+10	35	20	-1,0	2,6
50	60,3	80	55	+10	45	20	-1,0	2,9
65	76,1	80	65	+10	45	30	-1,0	2,9
80	88,9	80	65	+10	45	30	-1,0	3,2
100	114,3	82	67	+10	45	30	-1,0	3,6
125	139,7	82	67	+10	45	30	-1,0	4
150	168,3	103	85	+10	60	40	-1,0	4,5
200	219	103	85	+10	60	40	-1,0	6
250	273	123	105	+10	80	60	-1,0	6,3

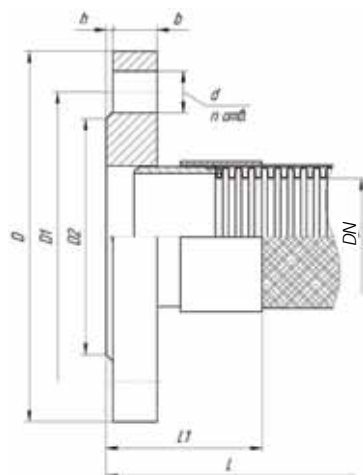
GOST pipe dimensions are suitable for order.

Also, end-fittings can be made as per customer's requirements in accordance with confirmed drawing. Combined end fittings can be manufactured.

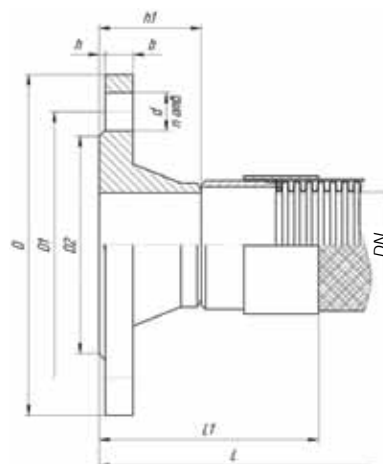


HIGH-PRESSURE CORRUGATED METAL HOSES WITH FLANGES

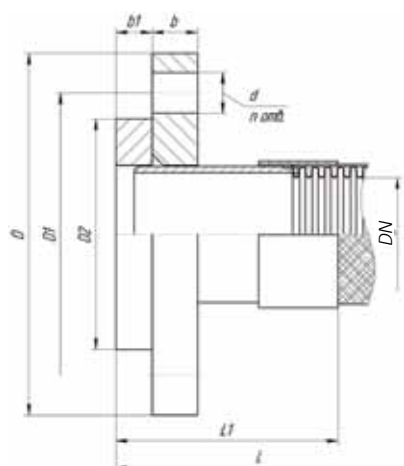
F01. Union with fixed slip-on flange according DIN EN 1092, ANSI/ASME B16.5, etc.



F02. Union with fixed welding neck flange according DIN EN 1092, ANSI/ASME B16.5, etc.



F03. Union with loose plate flange according DIN EN 1092, ANSI/ASME B16.5 and weld-on plate collar



Flanges can be made as per customer's requirements in accordance with confirmed drawing.
Materials: standard – stainless steel (AISI 304, AISI 321 and their equivalents), carbon steel and its equivalents on request.



CORRUGATED METAL HOSES WITH THREADED CONNECTION

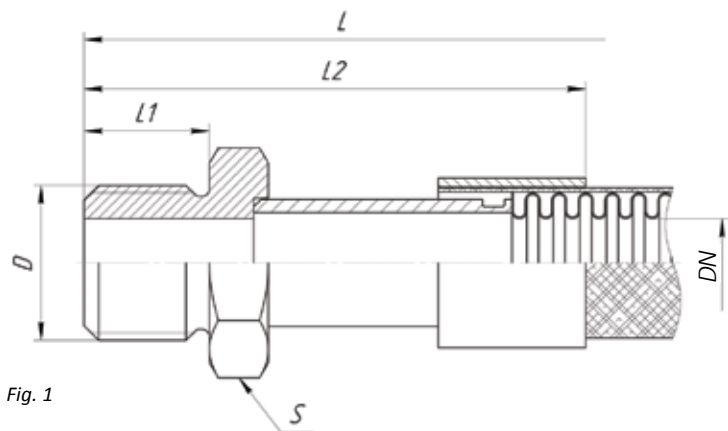


Fig. 1

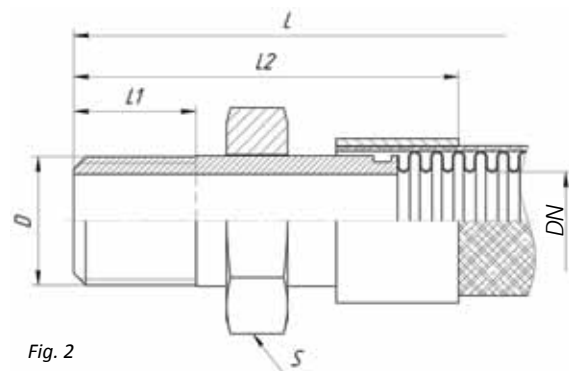


Fig. 2

All dimensions are in mm

S63. Male threaded connections. Nipple with metric thread according to ISO 261

DN	D	S	L1	L2	Permissible deviation L1	Figure No
6	M12x1,5	19	10	56	+5	1
8	M12x1,5	19	10	61	+5	1
10	M16x1,5	19	14	64	+5	1
12	M20x1,5	27	16	67	+5	1
16	M20x1,5	32	20	63	+10	2
20	M25x1,5	36	20	68	+10	2
25	M32x1,5	46	20	70	+10	2
32	M40x1,5	55	25	73	+10	2
40	M50x1,5	55	25	86	+10	1
50	M63x1,5	70	30	91	+10	1
65	M75x1,5	90	30	90	+10	2
80	M90x1,5	100	35	111	+10	1

S65. Male threaded connections. Nipple with pipe thread according to ISO 228

DN	D	S	L1	L2	Permissible deviation L1	Figure No
6	G 1/4	19	10	56	+5	1
8	G 1/4	19	10	61	+5	1
10	G 3/8	19	17	67	+5	1
12	G 1/2	27	17	68	+5	1
16	G 1/2	32	20	63	+10	2
20	G3/4	36	20	68	+10	2
25	G 1	46	20	70	+10	2
32	G 1 1/4	55	25	73	+10	2
40	G 1 1/2	60	25	84	+10	2
50	G 2	75	30	90	+10	2
65	G 2 1/2	90	30	90	+10	2
80	G 3	100	30	95	+10	2

Material:

Stainless steel AISI 321, AISI 304 and their equivalents

S67. Male threaded connections. Nipple with pipe thread according to DIN EN 10226 (ISO 7/1). On request NPT.

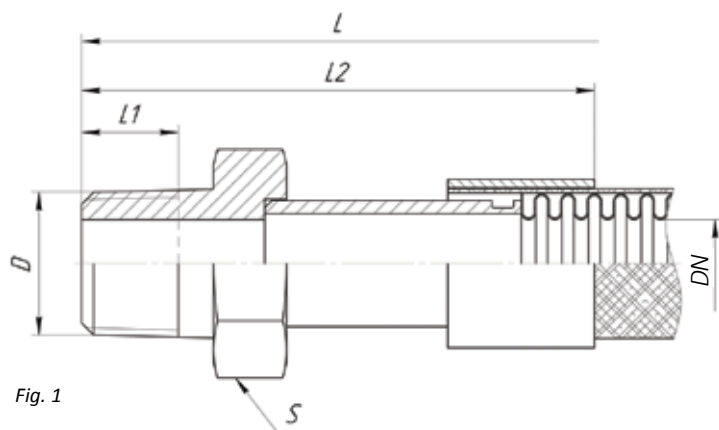


Fig. 1

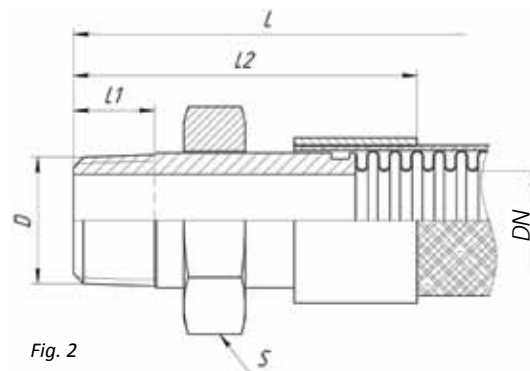


Fig. 2

All dimensions are in mm

DN	D	S	L1	L2	Permissible deviation L1	Figure No
6	R 1/4"	19	9,7	57	+5	1
8	R 1/4"	19	9,7	59	+5	1
10	R 3/8"	19	10,1	62	+5	1
12	R 1/2"	27	13,2	70	+5	1
16	R 1/2"	32	13,2	56	+10	2
20	R 3/4"	36	14,5	65	+10	2
25	R 1"	46	16,8	68	+10	2
32	R 1 1/4"	55	19,1	67	+10	2
40	R 1 1/2"	60	19,1	79	+10	2
50	R 2"	75	23,4	85	+10	2
65	R 2 1/2"	90	26,7	88	+10	2
80	R 3"	100	29,8	95	+10	2

Material:

Stainless steel AISI 321, AISI 304 and their equivalents

Dimensions in the Table above are specified for reference only. We produce end fittings according to your technical requirements and specifications.

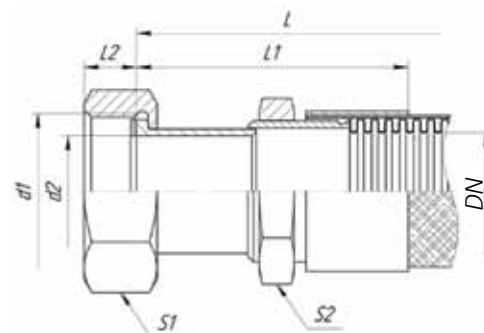


CORRUGATED METAL HOSES WITH “FLAT NIPPLE AGAINST GASKET WITH SWIVEL NUT” END FITTING

N72. Swivel nut with metric thread according to DIN 3870 and flat sealing and nipple with counter nut

All dimensions are in mm

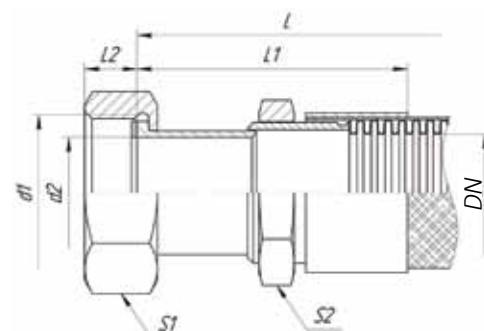
DN	d1	d2	S1	S2	L1	Permissible deviation L1	L2
6	M14x1	4	17	17	62	+5	12
8	M16x1,5	6	22	19	68,5	+5	10
10	M18x1,5	8	22	22	67	+5	11
12	M22x1,5	12	27	24	67	+5	11
16	M27x1,5	14	32	32	73	+10	12
20	M30x1,5	18	36	36	78	+10	12
25	M39x1,5	26	46	46	95	+10	17
32	M45x1,5	32	55	55	90	+10	15
40	M52x2	38	60	60	90	+10	14
50	M68x2	48	75	75	100	+10	25



N73. Swivel nut with pipe thread according to ISO 228 and flat sealing and nipple with counter nut

All dimensions are in mm

DN	d1	d2	S1	S2	L1	Permissible deviation L1	L2
6	G 1/4"	4	17	17	62	+5	14
8	G 3/8"	8	22	19	70	+5	10
10	G 1/2"	7	22	22	71	+5	12
12	G 5/8"	10	27	24	75	+5	12
16	G 3/4"	15	32	32	75	+10	12
20	G 1"	18	36	36	82	+10	15
25	G 1 1/4"	26	46	46	95	+10	17
32	G 1 1/2"	32,5	55	55	82	+10	22
40	G 1 3/4"	38	60	60	93	+10	18
50	G 2"	44	75	75	85	+10	14,5



Material:

Stainless steel AISI 321, AISI 304 and their equivalents

Dimensions in the Table above are specified for reference only. We produce end fittings according to your technical requirements and specifications.



CORRUGATED METAL HOSES WITH END FITTING “NIPPLE WITH CONE CONNECTION TO SWIVEL NUT”

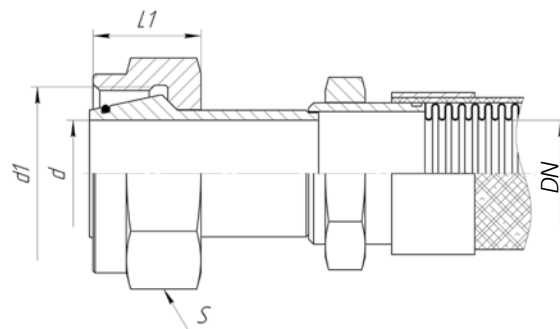
N74. Swivel nut with metric thread according to DIN EN ISO 8434 and 24° conical nipple with O-ring and counter nut

All dimensions are in mm

DN	d*	d1	S*	L1*
6	6	M18x1,5	22	17,5
8	8	M20x1,5	24	17,5
10	10	M22x1,5	27	17
12	11	M24x1,5	30	20,5
16	14	M30x2	36	24
20	19	M36x2	46	27
25	24	M42x2	50	29
32	32	M52x2	60	32,5

Material:

Stainless steel AISI 321, AISI 304 and their equivalents



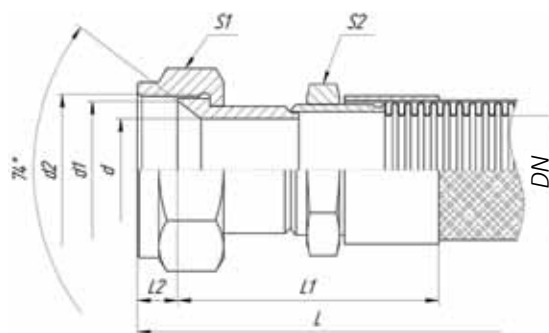
Dimensions in the Table above are specified for reference only. We produce end fittings according to your technical requirements and specifications.



N75. Swivel nut with pipe thread according to ISO 228 and nipple with 74° inner cone and counter nut

All dimensions are in mm

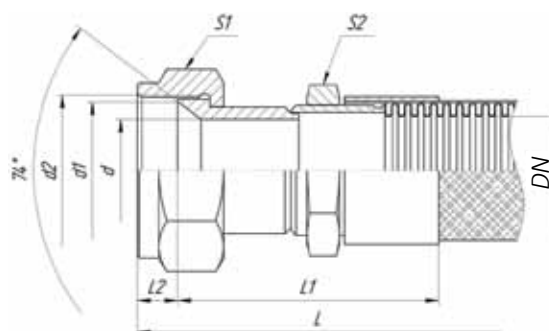
DN	d	d1	d2	S1	S2	L1	Permissible deviation L1	L2
6	4	10,5	G 1/4"	17	17	65	+5	6
8	6	12	G 3/8"	22	19	70	+5	8
10	8	15,5	G 1/2"	24	22	74	+5	9
12	10	17,5	G 5/8"	27	24	67	+5	10
16	14	22	G 3/4"	32	32	77	+10	10
20	18	27,5	G 1"	41	36	72	+10	12
25	23	33,5	G 1 1/4"	50	46	90	+10	12
32	30	43	G 1 3/4"	60	55	88	+10	19
40	38	51	G 2"	70	60	98	+10	19
50	48	66	G 2 1/2"	85	75	104	+10	25



N76. Swivel nut with metric thread according to DIN 3870 and nipple with 74° inner cone and counter nut

All dimensions are in mm

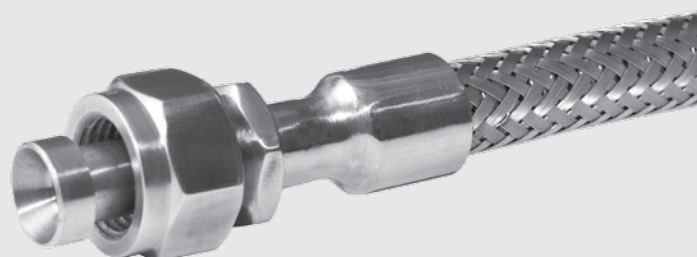
DN	d	d1	d2	S1	S2	L1	Permissible deviation L1	L2
6	4	10,5	M14x1	19	17	65	+5	6
8	6	12	M16x1,5	22	19	70	+5	6
10	8	15,5	M20x1,5	27	22	70	+5	10
12	10	17,5	M22x1,5	27	24	67	+5	9
16	14	22	M27x1,5	32	32	76	+10	10
20	18	27,5	M33x1,5	41	36	76	+10	10
25	23	33,5	M39x1,5	46	46	77	+10	14
32	30	43	M48x1,5	55	55	88	+10	19
40	38	51	M56x1,5	65	60	97	+10	15
50	48	66	M72x1,5	85	75	104	+10	23



Material:

Stainless steel AISI 321, AISI 304 and their equivalents

Dimensions in the Table above are specified for reference only. We produce end fittings according to your technical requirements and specifications.

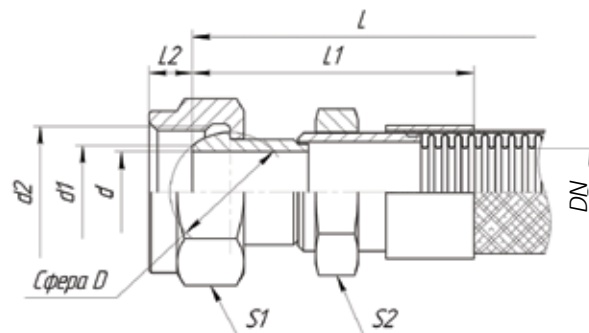


CORRUGATED METAL HOSES WITH END FITTINGS “SPHERICAL NIPPLE WITH SWIVEL NUT”

N77. Swivel nut with pipe thread according to ISO 228, spherical nipple according to DIN 3863 with counter nut

All dimensions are in mm

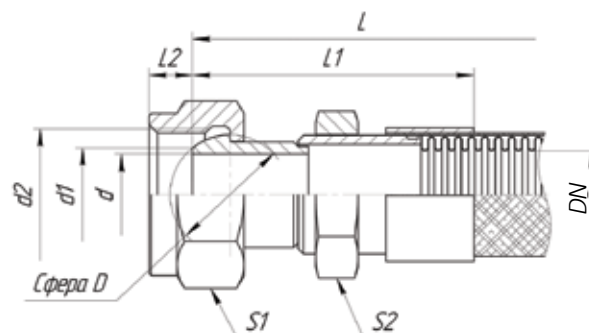
DN	d	d1	d2	D	S1	S2	L1	Permissible deviation L1	L2
6	3	4	G 1/4"	11	19	17	67	+5	9
8	8	9,5	G 1/2"	15,5	24	19	65	+5	5,9
10	8	11,3	G 1/2"	18	27	22	79	+5	9
12	10	13,5	G 5/8"	19,5	27	24	75	+5	9
16	14	17,4	G 3/4"	24,5	32	32	79	+10	7,5
20	18	21,5	G 1"	28	41	36	78	+10	11,5
25	23	26,5	G 1 1/8"	34	46	46	80	+10	12,4
32	30	34	G 1 1/2"	43	55	55	92	+10	13
40	38	42	G 1 3/4"	50	60	60	105	+10	14,4
50	48	52	G 2 1/2"	65	85	75	115	+10	16,5



N78. Swivel nut with metric thread according to DIN 3870 and spherical nipple according to DIN 3863 with counter nut

All dimensions are in mm

DN	d	d1	d2	D	S1	S2	L1	Permissible deviation L1	L2
6	6	7,5	M 16x1,5	13,5	22	17	58	+5	4,5
8	6	9,6	M 18x1,5	15,5	22	19	65	+5	6,9
10	8	12,5	M 20x1,5	17,5	27	22	71	+5	8
12	10	13,5	M 22x1,5	19,5	27	24	68	+5	8
16	14	18,5	M 27x1,5	24,5	32	32	79	+10	8
20	18	21,5	M 30x1,5	28	36	36	74	+10	10
25	23	26,5	M 36x1,5	34	41	46	82	+10	13
32	30	34	M 45x1,5	43	50	55	92	+10	6
40	38	42	M 52x1,5	50	60	60	105	+10	13,4
50	48	52	M 68x2,0	65	75	75	105	+10	15,5



Material:

Stainless steel AISI 321, AISI 304 and their equivalents

Dimensions in the Table above are specified for reference only. We produce end fittings according to your technical requirements and specifications.



CORRUGATED METAL HOSES WITH ADAPTERS

C80. Combined union: swivel nut with flat sealing and adapter to weld-end (ISO pipe dimensions).

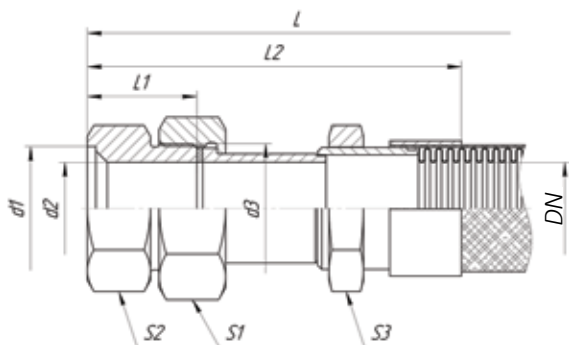


Fig. 1
All dimensions are in mm

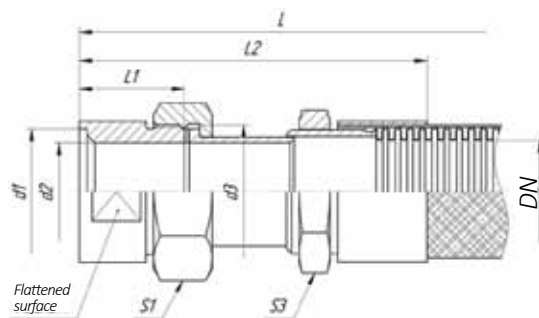


Fig. 2

DN	Fig. No	d1	d2	d3	S1	S2	S3	Flattened surface k	L1	L2	Permissible deviation L2
6	1	10,3	4	M14x1	17	17	17	-	27	91	+5
8	1	12,3	6	M16x1,5	22	22	19	-	25	95,5	+5
10	1	14	8	M18x1,5	22	22	22	-	27	96	+5
12	1	17,8	12	M22x1,5	27	27	24	-	26	95	+5
16	1	22	14	M27x1,5	36	32	32	-	26	101	+10
20	1	27,5	18	M30x1,5	36	36	36	-	28	108	+10
25	1	34,8	26	M39x1,5	46	41	46	-	40	135	+10
32	1	43	32	M45x1,5	55	50	55	-	38	130	+10
40	2	49	38	M52x2	60	-	60	50	41	136	+10
50	2	60,3	48	M68x2	75	-	75	60	65	168	+10

C81. Combined union: swivel nut with 24° taper sealing and adapter to weld-end (ISO pipe dimensions).

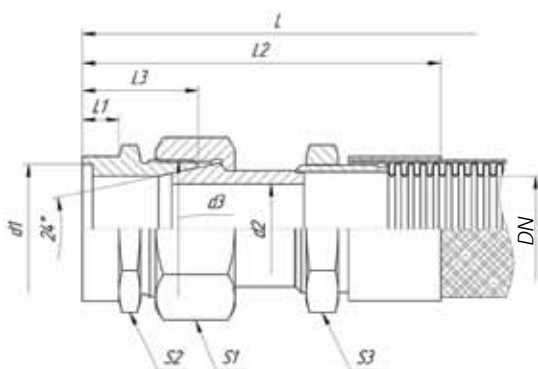


Fig. 1

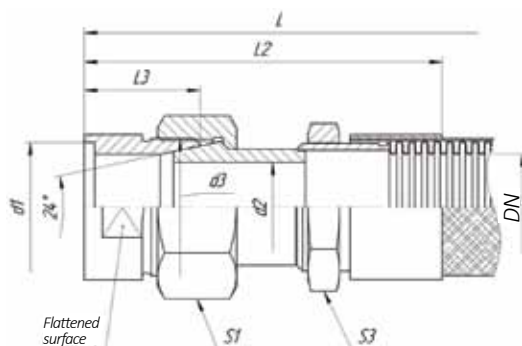


Fig. 2

DN	Fig. No	d1	d2	d3	S1	S2	S3	Flattened surface k	L1	L2	Permissible deviation L2	L3
6	1	10	6	M16x1	19	19	17	-	12	104	+5	35
8	1	13	8	M16x1	19	19	19	-	12	110	+5	34
10	1	14	10	M20x1	24	22	22	-	12	108	+5	34
12	1	18	12	M22x1,5	27	27	24	-	12	106,5	+5	34
16	1	22	15	M27x1,5	32	32	32	-	12	113	+10	36
20	1	28	20	M33x1,5	41	36	36	-	12	120,5	+10	38
25	1	35	25	M39x1,5	46	46	46	-	14	119,5	+10	41
32	1	43	28	M45x1,5	55	50	55	-	14	133	+10	50
40	2	49	34	M52x1,5	60	-	60	50	-	136	+10	44
50	2	61	48	M60x1,5	65	-	75	65	-	144	+10	48

Material:

Stainless steel AISI 321, AISI 304 and their equivalents

Dimensions in the Table above are specified for reference only. We produce end fittings according to your technical requirements and specifications.

C82. High-pressure metal hoses with end fittings "Connection to adapter with inner thread and cone sealing"

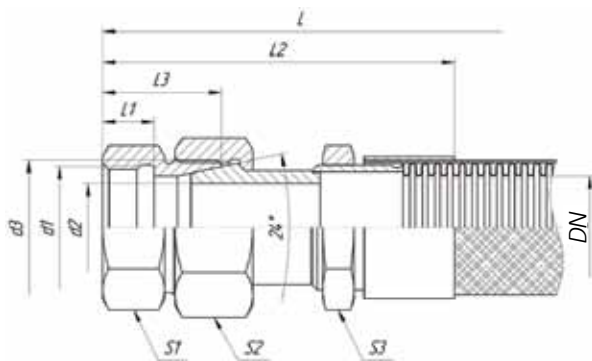


Fig. 1

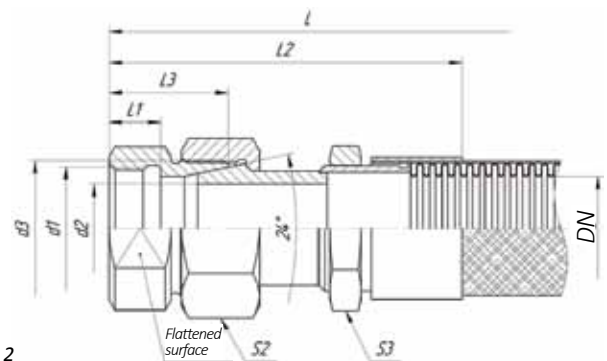


Fig. 2

DN	Fig. No	d1	d2	d3	S1	S2	S3	Flattened surface	L1	L2	Permissible deviation L2	L3
6	1	G 1/4"	6	M16x1	19	19	17	-	12	108	+5	29
8	1	G 1/4"	8	M16x1	19	19	19	-	12	105	+5	29
10	1	G 3/8"	10	M20x1	22	24	22	-	12	112	+5	36
12	1	G 1/2"	12	M22x1,5	27	27	24	-	15	112	+5	37
16	1	G 1/2"	15	M27x1,5	27	32	32	-	15	114	+10	37
20	1	G 3/4"	20	M33x1,5	41	41	36	-	16,5	125	+10	40
25	1	G 1"	25	M39x1,5	46	46	46	-	19,5	122	+10	45
32	2	G 1 1/4"	28	M45x1,5	-	55	55	50	20	136	+10	52
40	2	G 1 1/2"	34	M52x1,5	-	60	60	55	20	136	+10	46
50	2	G 2"	48	M60x1,5	-	65	75	65	24	148	+10	52

C83. High-pressure metal hoses with end fitting "Connection to adapter with outer thread and cone sealing"

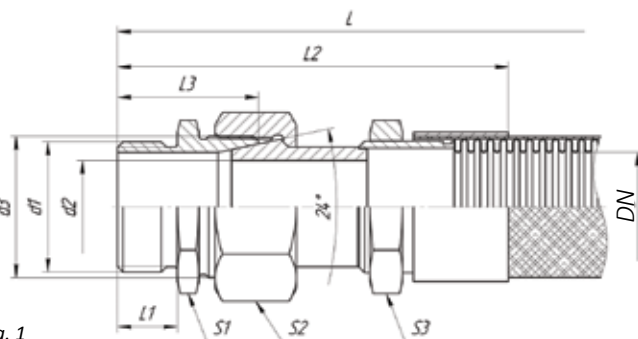


Fig. 1

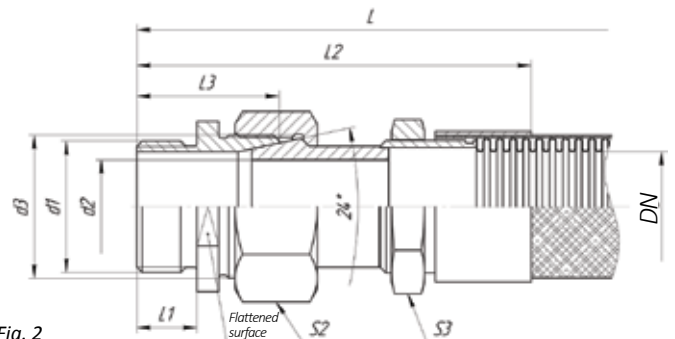


Fig. 2

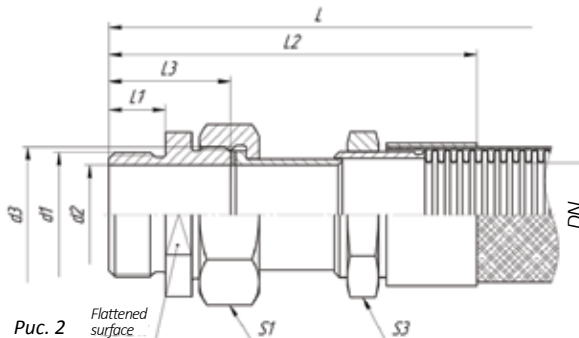
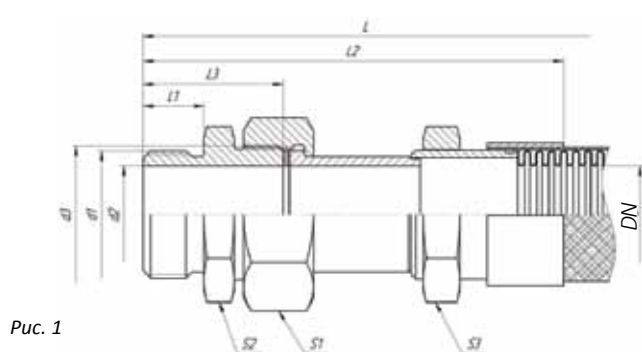
DN	Fig. No	d1	d2	d3	S1	S2	S3	Flattened surface	L1	L2	Permissible deviation L2	L3
6	1	G 1/4"	6	M16x1	19	19	17	-	12	103,5	+5	34
8	1	G 1/4"	8	M16x1	19	19	19	-	12	110	+5	34
10	1	G 3/8"	10	M20x1	22	24	22	-	12	108	+5	34
12	1	G 1/2"	12	M22x1,5	27	27	24	-	14	108,5	+5	36
16	1	G 1/2"	15	M27x1,5	32	32	32	-	14	115	+10	38
20	1	G 3/4"	20	M33x1,5	36	41	36	-	16	122,5	+10	40
25	1	G 1"	25	M39x1,5	46	46	46	-	18	123,5	+10	45
32	1	G 1 1/4"	28	M45x1,5	50	55	55	-	20	143	+10	56
40	2	G 1 1/2"	34	M52x1,5	-	60	60	55	22	144	+10	52
50	2	G 2"	48	M60x1,5	-	65	75	65	24	157,5	+10	61

Material:

Stainless steel AISI 321, AISI 304 and their equivalents

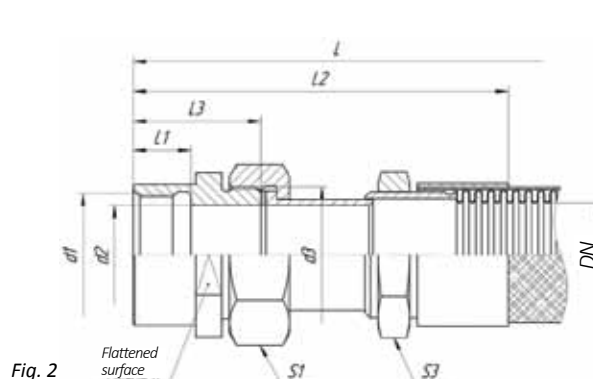
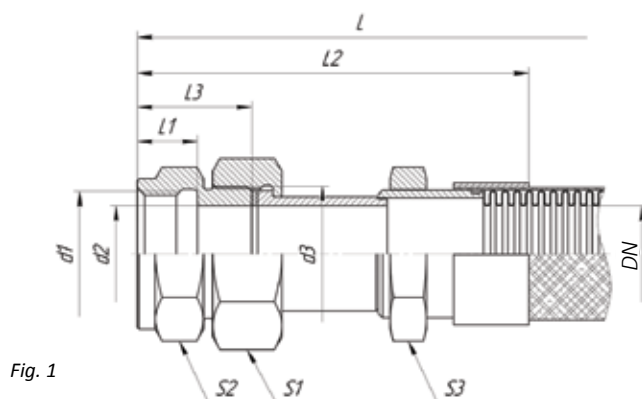
Dimensions in the Table above are specified for reference only. We produce end fittings according to your technical requirements and specifications.

C84. High-pressure metal hoses with end fitting "Connection to adapter with outer thread and flat seal"



DN	Fig. No	d1	d2	d3	S1	S2	S3	Flattened surface	L1	L2	Permissible deviation L2	L3
6	1	G 1/4"	4	M14x1	17	17	17	-	12	97	+5	33
8	1	G 1/4"	6	M16x1,5	22	19	19	-	12	102,5	+5	32
10	1	G 3/8"	8	M18x1,5	22	22	22	-	12	101	+5	32
12	1	G 1/2"	12	M22x1,5	27	24	24	-	14	103	+5	34
16	1	G 1/2"	14	M27x1,5	32	32	32	-	15	111	+10	36
20	1	G 3/4"	18	M30x1,5	36	32	36	-	16	123	+10	43
25	1	G 1"	22	M42x1,5	46	50	46	-	25	152	+10	55
32	1	G 1 1/4"	32	M45x1,5	55	50	55	-	20	138	+10	46
40	2	G 1 1/2"	38	G 1 3/4"	60	-	60	55	22	142	+10	47
50	2	G 2"	42	G 2"	75	-	75	70	25	165	+10	62

C85. High-pressure metal hoses with end fitting "Connection to adapter with inner thread and flat sealing"



DN	Fig. No	d1	d2	d3	S1	S2	S3	Flattened surface	L1	L2	Permissible deviation L2	L3
6	1	G 1/4"	4	M14x1	17	17	17	-	12	97	+5	33
8	1	G 1/4"	6	M16x1,5	22	19	19	-	12	102,5	+5	32
10	1	G 3/8"	8	M18x1,5	22	22	22	-	12	101	+5	32
12	1	G 1/2"	12	M22x1,5	27	24	24	-	14	103	+5	34
16	1	G 1/2"	14	M27x1,5	32	32	32	-	15	111	+10	36
20	1	G 3/4"	18	M30x1,5	36	32	36	-	16	123	+10	43
25	1	G 1"	22	M42x1,5	46	50	46	-	25	152	+10	55
32	1	G 1 1/4"	32	M45x1,5	55	50	55	-	20	138	+10	46
40	2	G 1 1/2"	38	G 1 3/4"	60	-	60	55	22	142	+10	47
50	2	G 2"	42	G 2"	75	-	75	70	25	165	+10	62

Material:

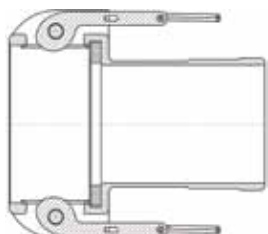
Stainless steel AISI 321, AISI 304 and their equivalents

Dimensions in the Table above are specified for reference only. We produce end fittings according to your technical requirements and specifications.

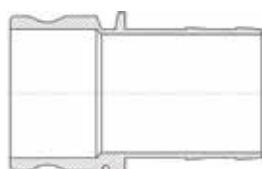
CORRUGATED METAL HOSES WITH CAMLOCK

Quick-connect fittings of eccentric type are used to connect corrugated metal hoses of any type to a pipework and to provide their quick replacement in case of failure.

Type C



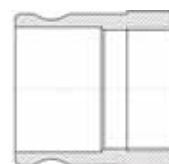
Type E



Type D



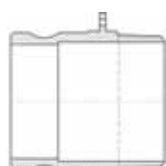
Type A



Type B



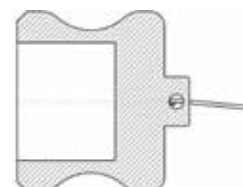
Type F



Type DC



Type DP



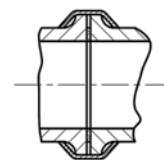
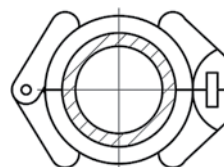
Camlock's pressures

Nominal diameter (DN), mm	15	20	25	32	40	50	65	80	100	125	150
P_{work} bar	10	17	17	17	17	17	10	8	7	5	5



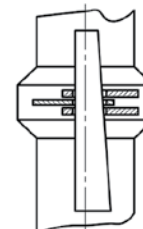
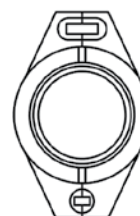
Q35. Camlock with gusset for pressure of 63 bar

	Q-100	Q-125	Q-150	Q-200	Q-250
Nominal diameter (DN), mm	100	125	150	200	250



Q36. Camlock with gusset for pressure of 16 bar

	Q-50	Q-80	Q-100	Q-150	Q-200
Nominal diameter (DN), mm	50	80	100	150	200



Material:

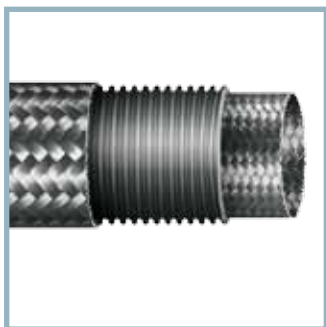
Stainless steel AISI 321, AISI 304 and their equivalents

Dimensions in the Table above are specified for reference only. We produce end fittings according to your technical requirements and specifications.





SPECIAL VERSIONS OF HIGH-PRESSURE CORRUGATED METAL HOSES





CORRUGATED METAL HOSES WITH END FITTINGS FOR CRYOGENIC EQUIPMENT

Media: technical gases (nitrogen, ammonia, argon, acetylene, hydrogen, helium, oxygen, propane, welding gas mixtures), cryogenic liquids (liquid nitrogen, liquid argon, liquid oxygen, liquid carbon acid, liquid helium), clean gases.

Corrugated metal hoses with claw couplings

Claw coupling is used to provide sealed connection between pipework and corrugated metal hoses when transporting cryogenic products and in their drain and fill systems.



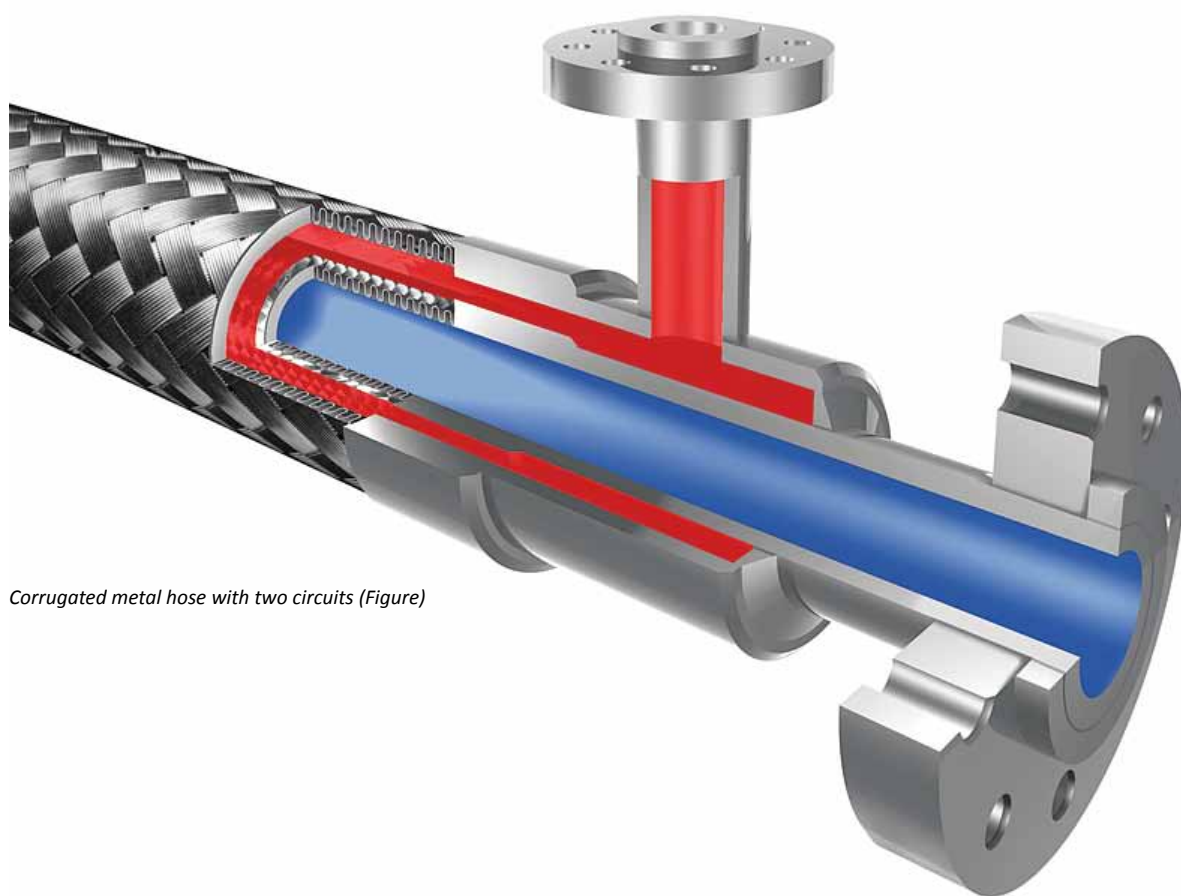
Claw coupling is used as quick-connection fitting when performing drain and filling operations at temperatures from -200°C to $+100^{\circ}\text{C}$ and pressure 12 bar. To provide sealing between two claw clamps O-rings are used. ZAO VZM produces corrugated metal hoses with claw clamps according to DIN and GOST 19334-73 with DN40, DN65 and DN100.

Standarts noted above are specified for reference only. We produce end fittings according to your technical requirements and specifications.



CORRUGATED METAL HOSES WITH TWO CIRCUITS

Design of such corrugated metal hose brings to mind a thermos bottle, “hose in hose”. Pumped media is transported via central channel of the hose while a media located in the outer channel operates as thermal insulation maintaining operating thermal mode. It is used when performing draining and filling operations and conveying hot liquid oil bitumen and other products where constant temperature mode should be maintained. Corrugated metal hoses are also used as alarm systems on critical sections of pipework or when conveying extreme poisonous or hazardous media. For example, pressure in outer channel can indicate failure in the central one.



Corrugated metal hose with two circuits (Figure)

CORRUGATED METAL HOSES WITH HEAT INSULATION

The most popular version of heat insulation is heat insulation in the form of integral sheath made of fiberglass with protective cover. It is mounted over high-pressure corrugated metal hose. To protect high-pressure corrugated metal hoses with larger diameters heat insulation in the form of sheets with clips or fasteners is used. Heat insulation protects corrugated metal hose from drops of smelt, heat radiation, abrasion, corrosion-active media, humidity, chemical substances and vibration. Heat insulation also provides efficient protection of personnel from burns due to contact with hot corrugated metal hoses and pipework. Momentary thermal resistance of heat insulation can reach up to 1650°C.

To order corrugated metal hoses with heat insulation option you should specify additional parameters:

- media that corrugated metal hose is exposed to,
- media temperature in case of long-term exposure,
- media temperature in case of short-term exposure,
- additional exposures (if available).



CORRUGATED METAL HOSES WITH PIPE BENDS

ZAO Vladimir plant of metal hoses supplies corrugated metal hoses with pipe bends. We manufacture corrugated metal hoses with pipe bends made of carbon and stainless steel. Special tooling and attachments are manufactured for special versions according to technical requirement of the customer.



CORRUGATED METAL HOSES TO CONVEY GASEOUS MEDIA UNDER PRESURE

This corrugated metal hose is called as compensating.

Special insert is mounted into standard corrugated metal hose and provides:

- lower level of turbulence of the media being conveyed
- lower level of cavitation when pumping a liquid media
- lower power of pneumatic impacts when pumping gaseous media

This solution allows to reduce vibrations, including resonance ones and noise level when the product is conveyed. It also increases life of corrugated metal hose.

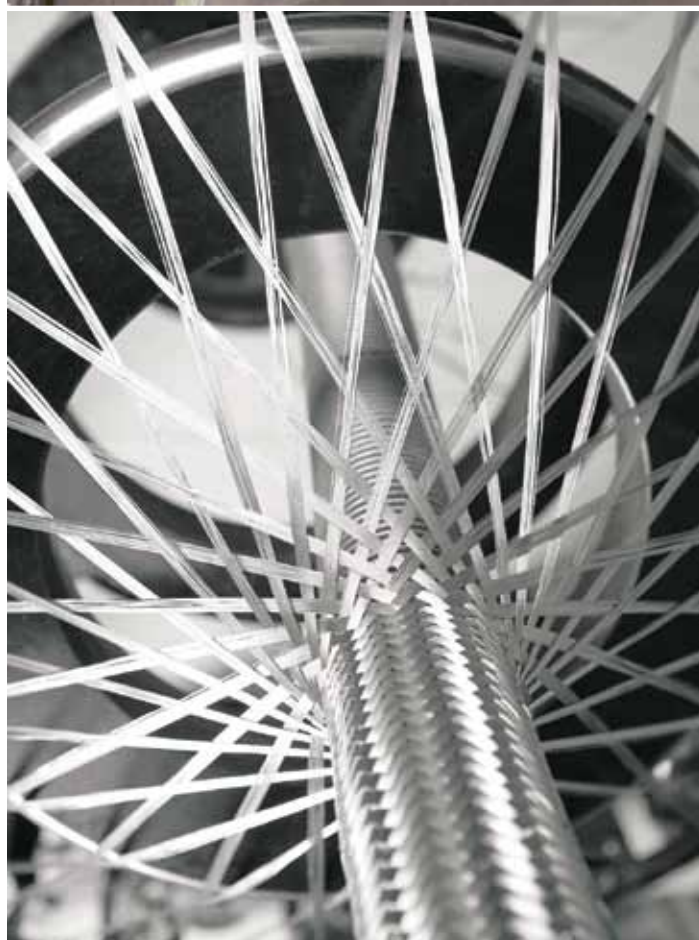
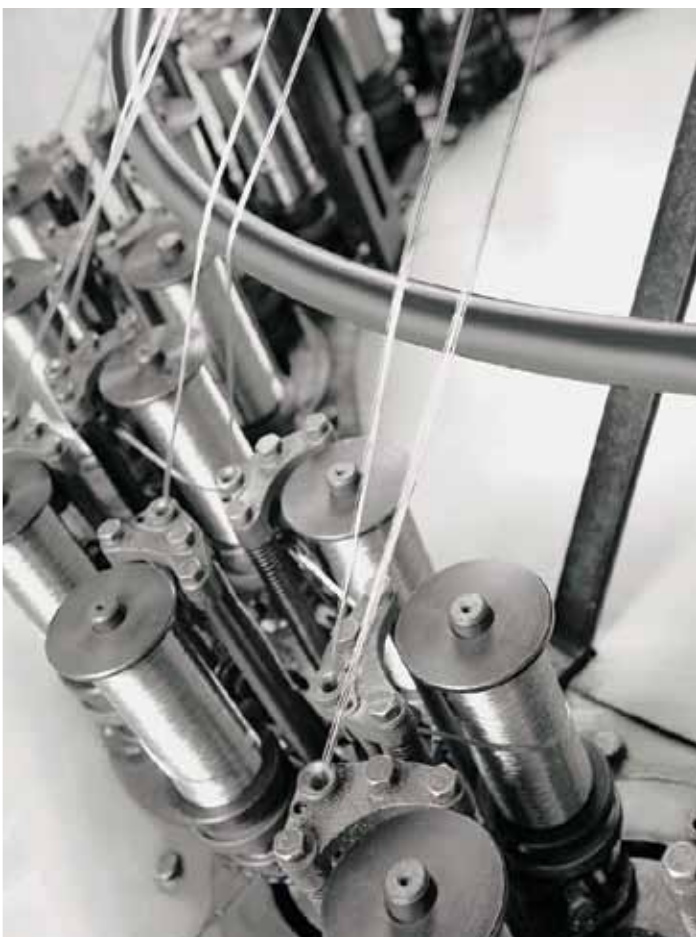


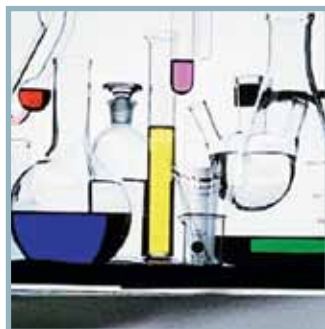
Compensating corrugated metal hose to convey gas under pressure (Figure)

SPECIAL VERSIONS OF CORRUGATED METAL HOSES

Experience, which was accumulated when designing and manufacturing corrugated metal hoses and end fittings, allows ZAO VZM to meet complicated and non-standard requirements of the customers.







INDUSTRY SOLUTIONS WITH HIGH-PRESSURE METAL HOSES MADE OF STAINLESS STEEL



Introducing modern technologies, developing industry and federal standards, extending fields of application of corrugated metal hoses – all this applies new requirements to the product.

When facing to actual challenges specialists of ZAO VZM offer new technical solutions to industrial companies from different fields

In addition to standard line of metal hoses, we develop and manufacture innovative products to solve specific production objectives of our customers.

For example:

- bypass lines for cluster oil producing wells,
- bypass lines for heating mains,
- corrugated metal hoses with minimum tolerance and high-precision geometry for use in turbines,
- special versions of multi-layer hoses for use in nuclear field,
- corrugated metal hoses with higher flexibility for use at increased pressure for shipbuilding and aerospace fields.
- and many others complicated technical and process solutions.

Specialists of Vladimir Plant of Metal Hoses are ready to introduce new designs and solve complicated technical tasks that our customers face to.

BYPASS LINES

This pipes are used as bypass channel during repair of main line of pipework system.



Advantages of bypass line include:

- Mobility and convenience for transportation.
- Quick and convenient installation.
- Reduces time for pipework repair.
- Allows to prevent or minimize welding operations on hazardous sites.
- Allows to avoid long shutdown times of the equipment during pipework repair.

To extend service life of bypass lines you should wash them carefully and dry after their use before packing for storage.

Bypass lines for cluster oil producing wells

They are used to convey oil in the conditions of operating temperatures from -60°C to $+100^{\circ}\text{C}$, primarily for work on the Far North. These bypass lines can be also used to convey other liquids and gaseous media. Bypass lines used to be assembled with materials at hand. Bypass line from Vladimir Plant of Metal Hoses is a modern and professional development for industrial application. Its installation does not require fire hazardous works.

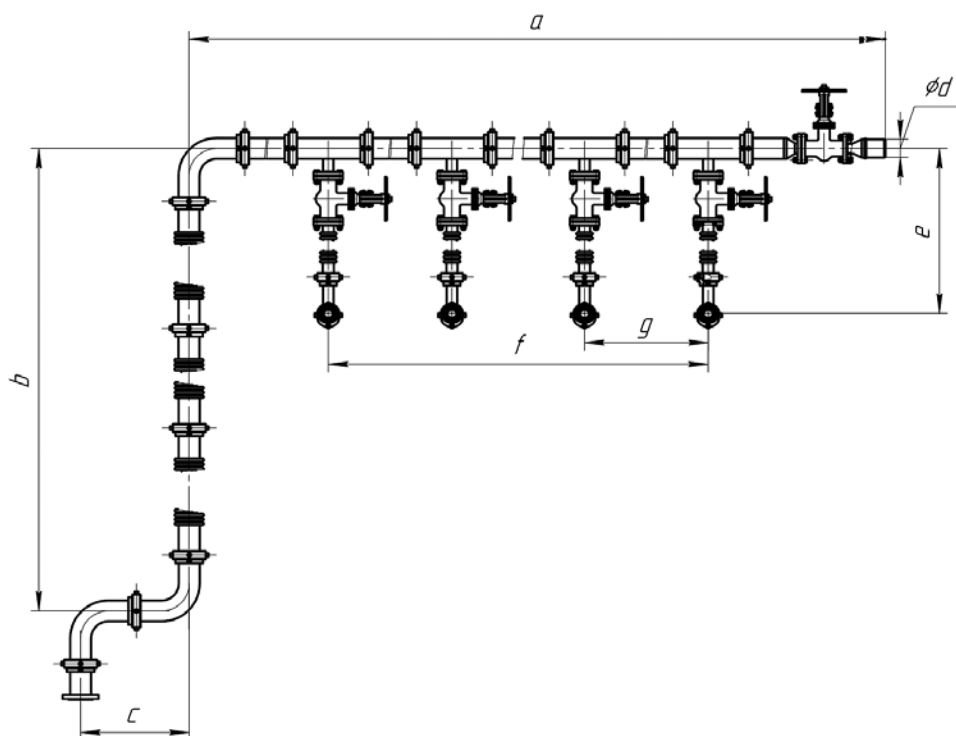
As a result of industrial safety expert review carried out by Federal Environmental Industrial and Nuclear Supervision service of Russia, ZAO VZM has received:

- permit No PPC 00-31892 for use its bypass line in oil and gas field,
- permit No PPC 00-049666 for use of equipment on hazardous production facilities in oil and gas field.

Today bypass lines produced by ZAO VZM are used on cluster fields of Rosneft.



Installation of bypass line from ZAO VZM on the Far North



Example of assembly layout of bypass line from ZAO VZM for cluster oil producing wells

Bypass lines for heating mains

They are designated to supply water during repair of main line of heating mains and further pressure test of repaired area.

Cooldown process of heating mains using bypass line reduces repair time considerably and allows to meet the strictest regulations for utility and emergency services.



Advantages of the bypass line for heating mains:

- mobility
- assembly speed
- one line can be used for various configurations of pipework system
- possibility to use long and many times

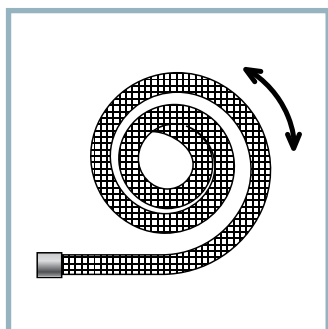
CORRUGATED METAL HOSES FOR USE IN MINING

Specialists of ZAO VZM have developed new bellow type for this special version of corrugated metal hose that envisages all aspects of routing and operation in mines.



Advantages of special version of corrugated metal hose:

- Special fasteners for vertical installation.
- Special fasteners for installation in suspended condition.
- Increased life time.
- Combination of different steels types when manufacturing end fittings.

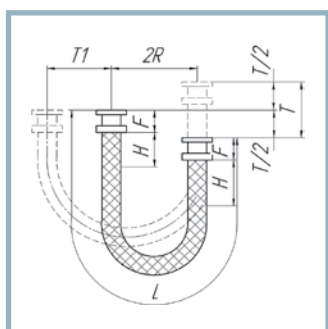
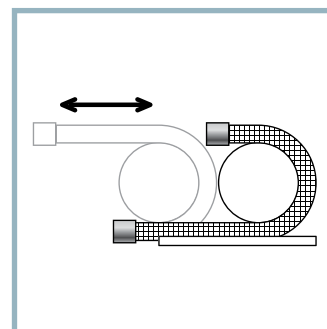
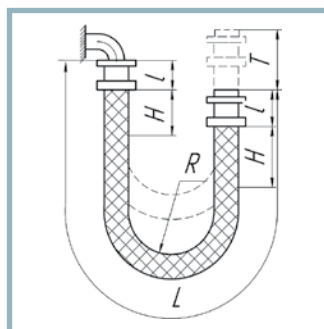


$$P_{work}^t = P_{work} \cdot k_t \cdot k_{dyn}$$

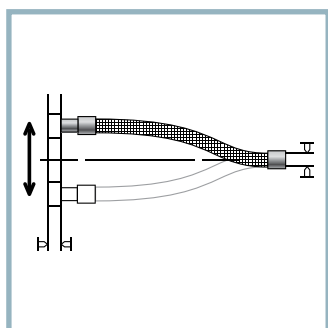
$$L = 2 \cdot H + T + 3,14 \cdot R + 2 \cdot F$$

$$R_{dyn} = \frac{R_{work}}{2,98} \cdot (1,09 + k_t \cdot$$

$$L = 2 \cdot H + 1,5 \cdot T + T/2$$



REFERENCE DATA



Conversion of pressure units

1 MPa = 10,2 kgf/cm² = 10 bar

Calculating the length of neutral area

The hoses should be mounted in accordance with Operation Manual.

When selecting hose length you should provide neutral areas near to end fittings that are not exposed to bending during operation. The length of neutral areas should not be less than the values specified in Table 1. If the length of the hose does not provide neutral area, then the hose should be mounted as straight-line.

Limit lateral movements

It is accepted if one end of the hose moves against the other one in the plane that is perpendicular to axis of the hose by 2-3 mm for each 100 mm of flexible part.

Limit deviations of length

Limit deviations of hose length for standard products are specified in Table 2. In accordance with customer's requirement corrugated metal hoses can be manufactured with significantly lesser deviations.

Table 1

Calculating the length of neutral area
(for standard versions)

DN, mm	Min. length of neutral area of hose, mm
6 - 16	5 Dy
20 - 50	4 Dy
80 - 100	3 Dy
125 - 150	2 Dy
200 - 250	2 Dy

Table 2

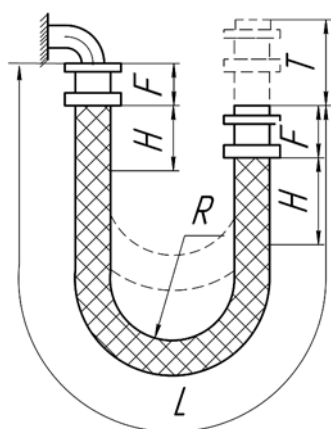
Limit deviations of hose length
(for standard versions)

Length of corrugated metal hose, mm	For hoses with DN up to 50 mm	For hoses with DN more than 50 mm
150-1000	±10	±15
1000-1500	±30	±30
1500-3000	±40	±60
3000-6000	±100	±200

Calculating minimum hose length for various movements

Vertical movement

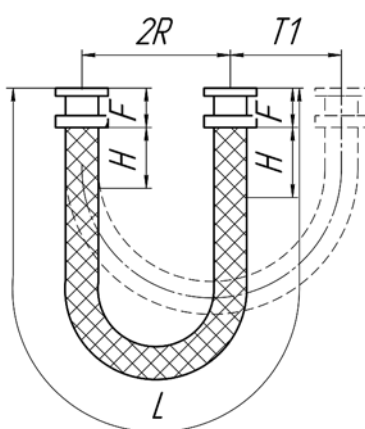
$$L = 2 \cdot H + T + 3,14 \cdot R + 2 \cdot F$$



L – hose length
H – length of neutral area

Horizontal movement

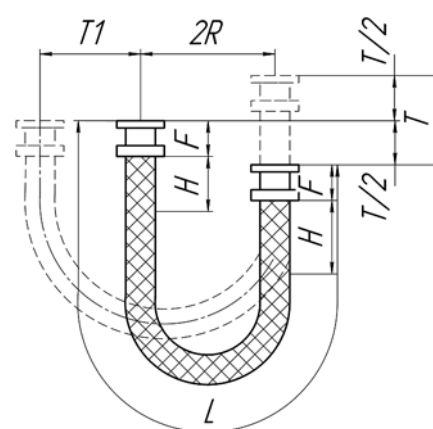
$$L = 2 \cdot H + 1,57 \cdot T_1 + 3,14 \cdot R + 2 \cdot F$$



T – value of vertical movement
T1 – value of horizontal movement

Movement in two directions

$$L = 2 \cdot H + 1,5 \cdot T_1 + T/2 + 3,14 \cdot R + 2 \cdot F$$



R – bend radius
F – fitting length

Corrective calculations of technical parameters of corrugated metal hose

In case of increased temperatures and in the conditions of significant dynamic loads minimum bend radius R_{dyn} and maximum allowable working pressure should be adjusted in accordance with the following equations:

$$P_{work}^t = P_{work} \cdot k_t \cdot k_{dyn} \quad R_{dyn} = \frac{R_{work}}{2,98} \cdot (1,09 + k_t \cdot k_{dyn} + \frac{1}{k_t} + \frac{1}{k_{dyn}})$$

Where:

P_{work}^t – maximum allowable working pressure at specified temperature and dynamic loads, bar

P_{work} – maximum allowable working pressure at $t=200$ C if significant dynamic loads are not applied, in accordance with bellow parameters (see page 15 of this catalogue), bar

R_{work} – minimum allowable bend radius in case of multiple movements, temperature of media $t=200$ C and if significant dynamic loads are not applied, mm

R_{dyn} – minimum allowable bend radius in case of multiple movements in the conditions of significant dynamic loads and/or increased temperatures, mm

k_t – corrective factor for increased temperatures in accordance with Table 3

k_{dyn} – corrective factor for significant dynamic loads in accordance with Table 4

Table 3

**Corrective factor k_t
for increased temperatures**

t, °C	Steel grade			
	AISI 304	AISI 321	AISI 316	AISI 316Ti
20	1,00	1,00	1,00	1,00
50	0,92	0,94	0,96	0,96
100	0,83	0,89	0,88	0,89
150	0,75	0,83	0,80	0,84
200	0,68	0,79	0,74	0,80
250	0,63	0,74	0,70	0,76
300	0,59	0,71	0,64	0,71
350	0,56	0,69	0,62	0,69
400	0,54	0,66	0,60	0,67
450	0,53	0,65	0,58	0,65
500	0,52	0,63	0,57	0,64
550	0,52	0,63	0,56	0,64

Table 4

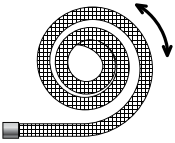
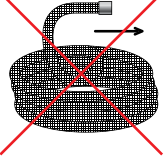
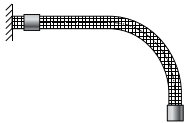
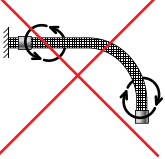
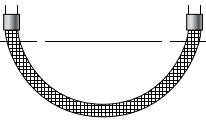
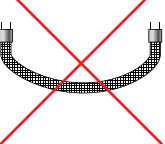
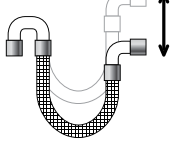

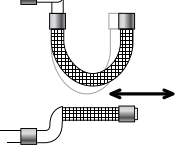
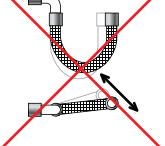
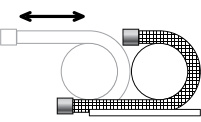
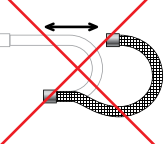
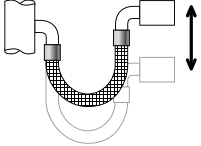
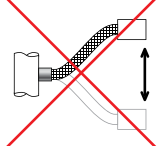
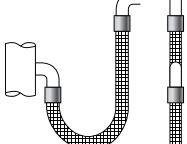
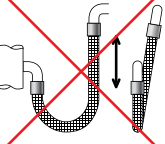
**Corrective factor
 k_{dyn} for dynamic loads**

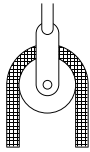

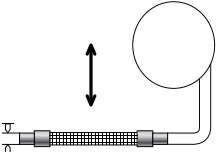
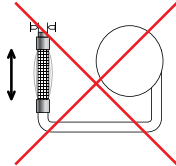
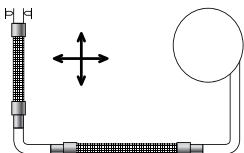
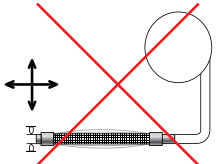
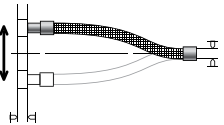
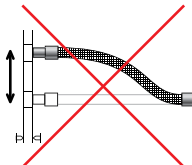
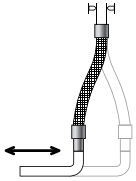
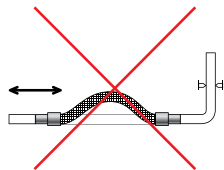
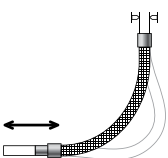
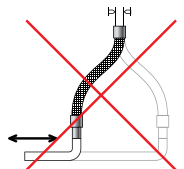
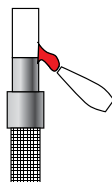
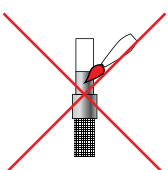
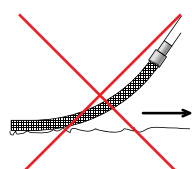
Flow	Load		
	No vibration, slow movements	Vibrations, frequent movements,	Severe vibration, rhythmical movements
Static, laminar uniform flow	1,00	0,8	0,4
Pulsating, turbulent flow	0,8	0,64	0,32
Variable, rhythmical and intermittent flow	0,4	0,32	0,16



- Do not bend hoses with radius larger than permitted.
- We do not recommend to use hoses if media velocity exceeds 8 m/s for liquids and 50 m/s for gaseous products.
- High- pressure corrugated metal hoses made of stainless steel are not subjected to repair.

INSTALLATION CONDITIONS FOR HIGH PRESSURE CORRUGATED METAL HOSES

	1. Do not pull the hose.	
	2. When mounting do not twist the hose.	
	3. Select hose length considering its operating conditions. Follow instructions on the length of neutral areas.	
	4. Use pipe bends to prevent bends with radiuses that are lesser than permitted.	
	5. The hose should move in one plane only. Do not allow it to move in the plane perpendicular to the plane of installation.	
	6. Use support. Do not allow overhanging and bending.	
	7. To absorb axial vibrations mount U-shaped hoses.	
	8. Do not allow twisting along axis when fittings are in the same plane. Mount in one plane only.	

	<p>9. Use support roller. Do not allow bends when hanging the hose.</p>	
	<p>10. Mount the hose perpendicular to the direction of vibration. The hoses are not designated to absorb vibrations along their longitudinal axis.</p>	
	<p>11. To absorb vibrations with different directions mount several hoses in a 90° line using pipe bends.</p>	
	<p>12. To absorb vibrations that are related to axis mount the hose in central position.</p>	
	<p>13. Mount the hose vertically to the direction of movement. Do not allow axis movements.</p>	
	<p>14. Avoid large lateral movements. Mount the hose at 90° angles.</p>	
	<p>15. Do not overheat the hose. Observe correct position of the burner when welding the hose.</p>	
	<p>16. Do not drag the hose on the floor.</p>	

Contact phones and addresses

Closely-held Stock Company
“Vladimir Plants of Metal Hoses”

Address:
600026, Kuybysheva str. 26,
Vladimir, Russia

Phone:
+7 (495) 564-82-02

Fax:
+7 (499) 156-14-16

E-mail:
vzm@vzmr.ru
sales@vzmr.ru

Website:
www.en.vzmr.ru



Dear customers!

This catalogue contains information that corresponds to standards and technical documentation actual by 17.04.2017. We improve quality and characteristics of our products constantly and extend our product line. All changes introduced later will be published in the next issue of this catalogue. See the latest information on www.en.vzmr.ru.

High-pressure corrugated metal hose

QUESTIONNAIRE FOR HOSE SELECTIONDate: 201 **Contacts**Company Phone City Contact person
(full name, position) E-mail **Hose identification**

(if available)

Quantity

X

Pcs.

Working parametersNominal diameter, mm Hose length, mm Working pressure, bar Peak pressure, bar

Media

Media flow (m³/h)
or media velocity (m/s)☐ m³/h☐ m/s

Working temperature, °C

Peak temperature, °C

Ambient temperature, °C

End fittings

Identification as per catalogue of ZAO VZM
(if it is more convenient to you, you can
indicate your identification and draw
a sketch on the backside of the sheet)

Material

Mating end
fittings
(if required)

End 1



End 2

**Movements**

Attach installation layout or draw it on the backside of the sheet

Maximum bend radius, mm

Nominal bend radius, mm

Number of bending cycles

Vibrations (oscillations)

Other movements

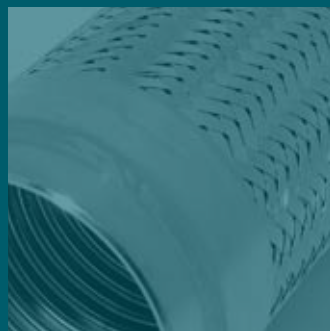
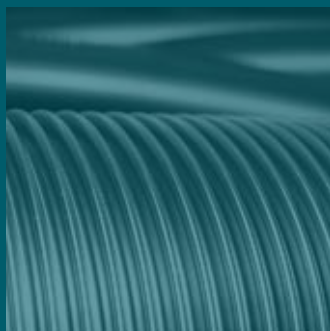
Amplitude, mm

Frequency, Hz

**Additional
information**







ID 9105083717

PED **C** **€** **EAC**
97/23/EC

