



WILLBRANDT Stainless Steel Hose Type 310/311

Type 310

Stainless steel corrugated hose without braiding

Type 311

Stainless steel corrugated hose with braiding

Design

Parallel corrugated all-metal hose manufactured from butt welded pipe. Available with or without braiding.

Hose materials

Standard: 1.4541/DIN17440

Special material: 1.4571/DIN17440

Braiding

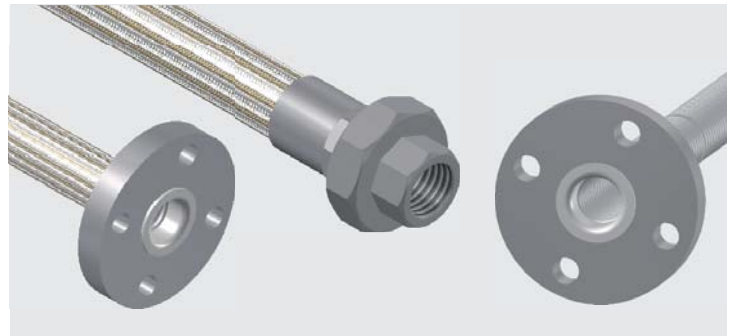
Standard: 1.4301

Also available in 1.4571 or 1.4541 on request.

Other special materials are available for hose and braiding subject to specific order quantities on request.

Temperature

Operating range from -270°C to max. +600°C possible.



Bending radius

Use the following table as a guide.

Distinction must be made between: Minimum bending radius with single bending and normal bending radius for frequent bending.

Material connection

Available are various types of connections that are shown on the following page. These connections are available in diverse materials.

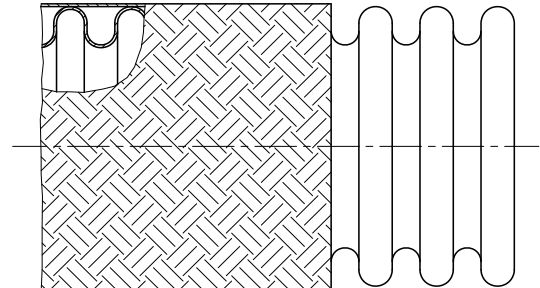
The following table contains selection criteria:

Selection criteria		Material of the connections				
		Steel	Stainless steel	Brass	Malleable cast iron	Red cast
001	Collar loose flange	X	X			
002	Fixed flange	X	X			
003	Pipe fixed flange	X	X			
004	Pipe collar loose flange	X	X			
005	Flared tube end loose flange	X	X			
006	Tube socket / weld end	X	X	X	X	
007	Conical outside threading	X	X	X	X	X
008	Bushing	X	X	X	X	X
009	Cylindrical outside threading	X	X	X	X	X
010	Hexagonal bushing	X	X	X	X	X
011	Conical screw fitting with outside threading	X	X		X	X
012	Conical screw fitting with inside threading	X	X		X	X
013	Flat sealed screw fitting with outside threading	X	X		X	X
014	Flat sealed screw fitting with inside threading	X	X		X	X
015	Socket union nut	X	X	X	X	X

Further connections on request.



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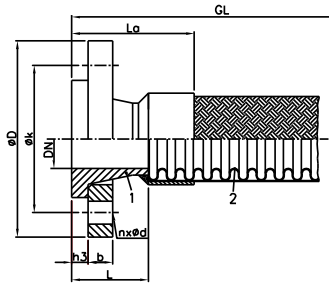
Characteristics

Inch	Inner-Ø	Tolerance (inner)	Type	Outer-Ø	Tolerance (outer)	Pressure	Nominal bend radius	Minimum bend radius	Weight ± 10 %
	mm	mm		mm	mm		kg/cm ²	Frequently bending	
							mm	mm	g/m
3/8	10.6	0.3	310	16.1	0.6	5.0	125	35	150
			311	17.5	0.8	75.0	190	35	300
1/2	12.9	0.3	310	19.3	0.6	5.0	140	35	160
			311	20.8	0.8	70.0	210	35	320
5/8	15.7	0.4	310	23.7	0.8	4.0	190	45	250
			311	25.2	1.0	65.0	285	45	500
3/4	19.8	0.4	310	28.8	0.8	3.0	215	55	280
			311	30.3	1.0	50.0	310	55	530
1	25.8	0.4	310	34.5	0.8	3.0	250	70	380
			311	36.0	1.0	40.0	375	70	750
1 1/4	33.0	0.4	310	43.7	0.8	3.0	270	80	420
			311	45.7	1.0	35.0	405	80	950
1 1/2	40.0	0.5	310	52.0	1.0	2.0	320	100	700
			311	54.0	1.2	30.0	480	100	1350
2	51.6	0.5	310	65.5	1.0	1.0	360	130	880
			311	67.5	1.2	25.0	550	130	1600
2 1/2	66.0	0.6	310	85.4	1.2	1.0	450	175	1250
			311	87.9	1.4	20.0	675	175	2600
3	76.6	0.6	310	97.5	1.2	1.0	500	200	1750
			311	100.0	1.4	18.0	750	200	3200
4	103.0	1.0	310	125.0	1.2	1.0	600	250	2100
			311	128.0	1.4	14.0	920	250	4400
5	127.5	1.0	310	151.5	1.2	1.0	750	325	3250
			311	154.5	1.4	12.5	1160	325	5750
6	151.5	1.0	310	177.0	1.2	0.8	850	375	4000
			311	180.0	1.4	10.0	1320	375	6900

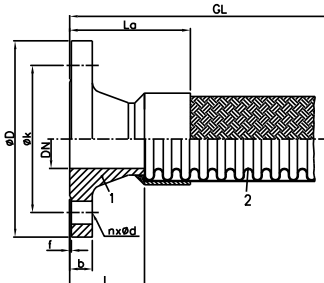


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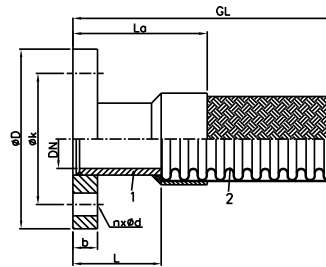
Connection options for stainless steel hoses type 310/311



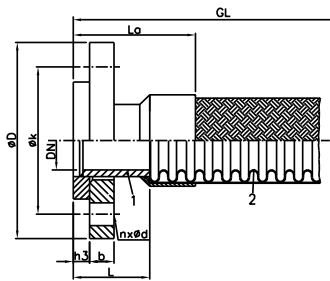
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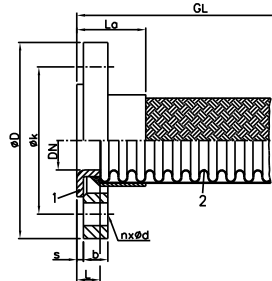
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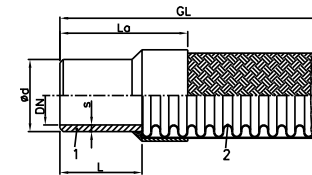
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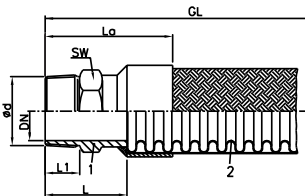
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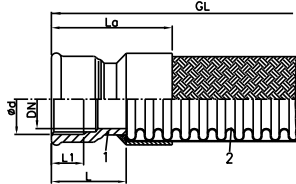
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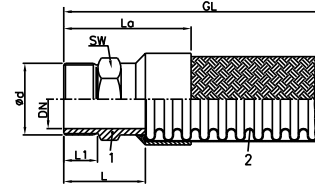
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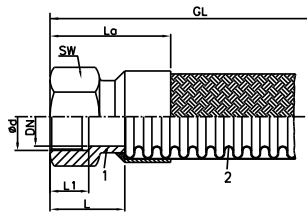
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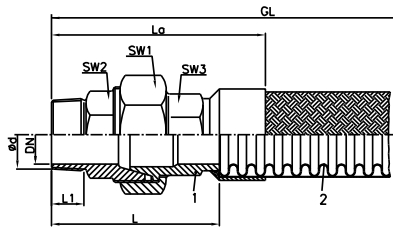
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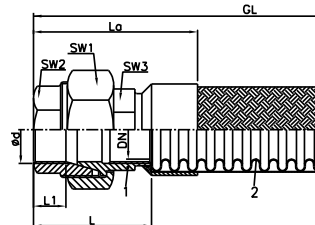
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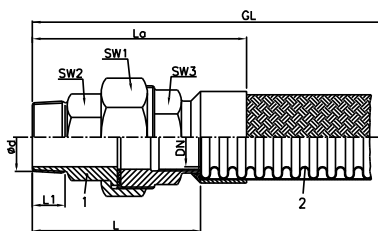
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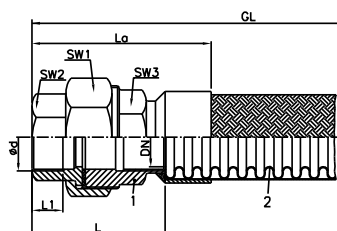
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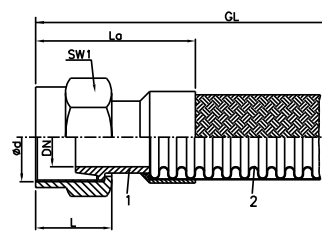
012



013



014



015



WILLBRANDT Safety advice Type 310/311

Our metal hoses are quality products. They provide safe operation and long service life. Conditions herefore are, however, the selection of the appropriate hose type and an adequate and correct installation. We can only include some particular aspects here, which, in general, should already be considered before placing an order. Such aspects and qualities are, e. g.:

Design/Inspection/Service Life

Hoses must be applied only under the operation and installation conditions mentioned in the order and confirmed by the producer. Dynamic stress such as vibrations/pressure impulses/pulsations will reduce service life and must be taken into consideration in design by incorporating the appropriate pressure reduction factors. If there is no information on operating pressure, the producer will only carry out a leakage inspection. The operator will have to carry out quality inspections (pressure and sight inspection) of hoses assemblies at adequate intervals. If the braiding is torn, the hose line must not be used any longer. Further application of buckled, damaged or corroded hose assemblies is also prohibited. Repair must be carried out by the manufacturer.

Temperature Influence

The nominal pressure/operating pressure indicated in publications on hoses refers to room temperature (20 °C). At higher temperatures, the permissible operating pressure or the service life is reduced. Temperature reduction factors must be taken into consideration in the calculation of the permissible operating pressure.

Materials/Corrosion/Insulation

Suitability and selection of hose materials must be checked on the basis of the resistance tests in the specialized literature and/or in the manual. Special cleaning or finishing instructions, e. g. free of oil and grease, free of tarnish, sealed ends, etc., must be agreed upon when the order is placed. During welding and soldering processes, the hose assemblies must be protected against weld and/or flux spatter. Flux residues must be removed. Measures must be taken to protect the soldering points of the connection fittings against excessive temperatures or desoldering. The mordanting of metal hoses is not permissible. Insulating materials which may cause corrosion of metal hose materials must not be used. If hoses have to absorb movements or vibrations, a reliable anchor must be fixed to the pipe section directly behind the hose.

Bursting or Breaking of Hoses

Metal hose assemblies may burst or break due to overload caused by excessive pressures or temperatures, wrong or inadequate installation and movement conditions. The same may happen if the service life is exceeded. Equipment or persons in the direct surroundings of the hose may be endangered by uncontrolled movements or hazardous fluids.

Correct Handling and Care

Hoses assemblies must be protected against external mechanical damage. They should therefore not be pulled across the ground or over sharp edges. Contact of a hose with another or with objects in the surroundings must be avoided during operation.

Avoidance of Torsional Strain on corrugated hoses

In most cases, torsional strain can be avoided by proper installation of the hoses: If absorption of movements is required, it must be made sure during installation that the hose axis and the direction of movement are in the same plane, thus avoiding torsional strain on the hose.



WILLBRANDT Installation instructions Type 310/311

Handling and installation

The arrangement of a metal hose installation is primarily determined by the direction, size and frequency of a movement. Typical installation options are illustrated and described on the following pages. During installation it must be ensured that all hoses are fitted without twist. Movements during installation or subsequent operations must not result in torsion. It is important to ensure that the centre axes of fittings are in the same plane as the movement. Please remember that an installation must be free from induced stresses and free from torsion.

Correct choice of hose length

Movement and bending stresses are not permitted directly at the connections. This so-called neutral part of the hose end should be of adequate length. If necessary, an buckling protection can be fitted to the ends.

Stress free installation

Attach hose firmly to one side first. Leave the other side loose initially. Pull the hose two or three times in the desired direction of movement so that it can be aligned without twist. Only then tighten the connection. Screwed joints always require the use of a second spanner to hold the hose against the action of tightening. When specifying the end fittings, make sure that at least one side of the hose permits rotation at the connection.

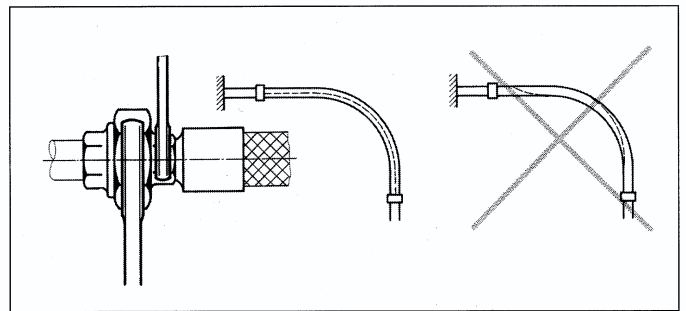
Observe minimum bending radius

The minimum bending radius depends on pressure, temperature and the required number of stress reversals. These figures are given in the technical specification of the chosen type of hose.

Example 1

Connecting a hose without twist. In the case of rotating threaded joints, a second spanner must be employed to hold the hose against the action of tightening.

If there are no spanner flats on the insert nipple, then use a pipe wrench to hold the hose.

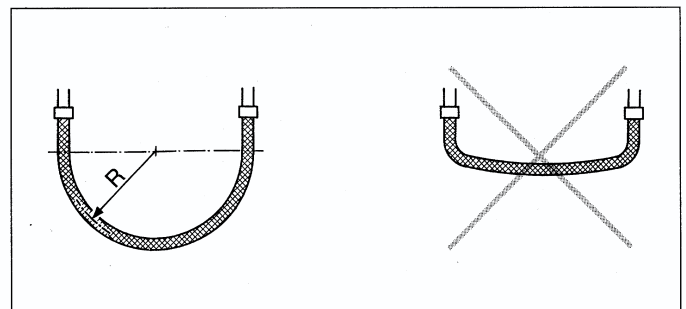


Straight movements

Example 2

Install hose line at 180° bend with sufficiently neutral hose ends. Determination of length is carried out according to formula for 180° bends.

Determine installation distance according to the required bending radius.

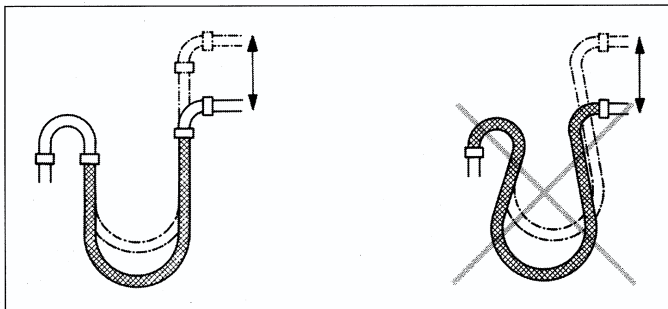




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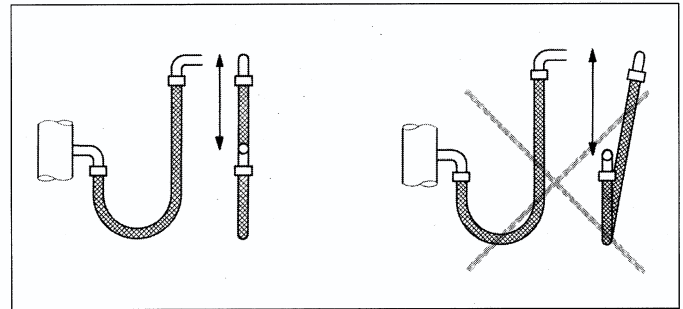
Example 3

Avoid impermissible deflections directly behind the connection fittings by application of rigid pipe bends. Observe minimum bending radius.



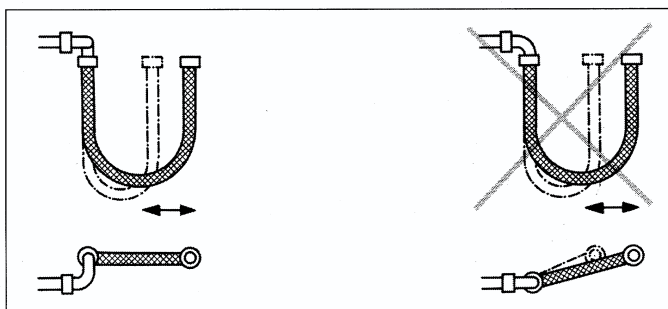
Example 5

Direction of movement and hose bend must lie in one plane. This avoids damaging torsion stresses.



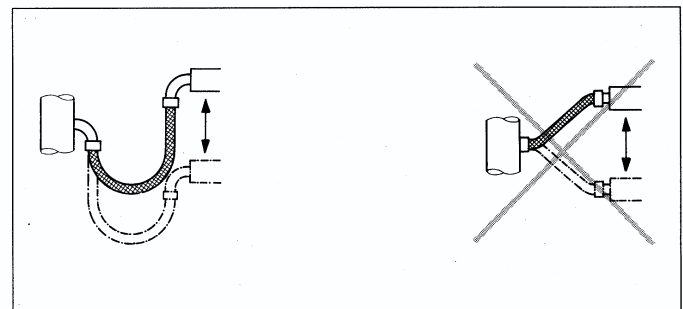
Example 4

Direction of movement and hose axis must lie in one plane. This avoids damaging torsion stresses.



Example 6

Avoidance of alternating bending stress and excessive buckling directly behind the connection fittings by application of rigid pipe bends.

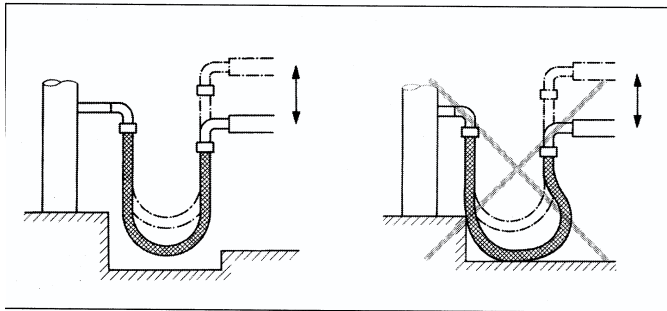




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Example 7

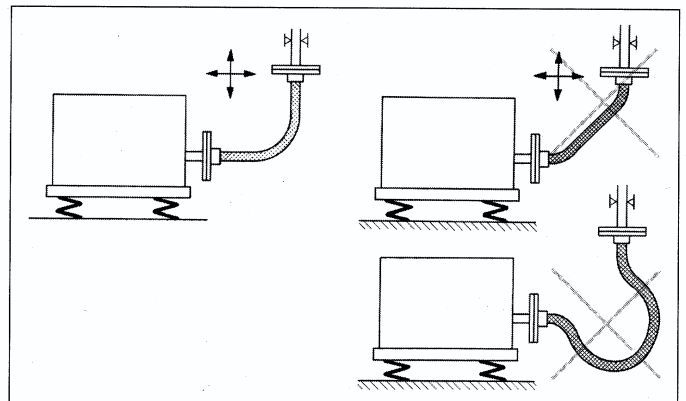
Install hose as a freely hanging bend, avoiding contact with the wall, other objects and with the ground, even at maximum extension.



Example 9

Install 90° bend with permissible bending radius and adequate neutral hose ends. Calculate the nominal length and the leg length according to the formula "90° bends for absorption of

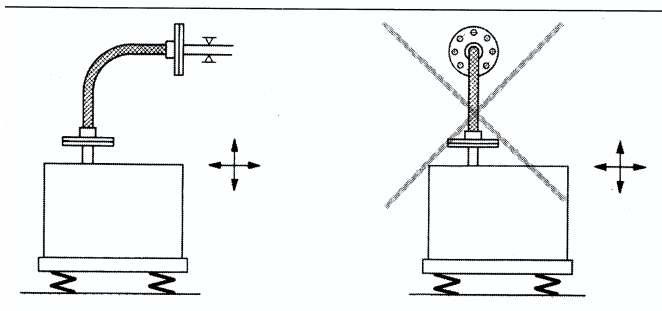
vibration". Stretching and excessive bending of the hose bend are not permitted.



Vibration

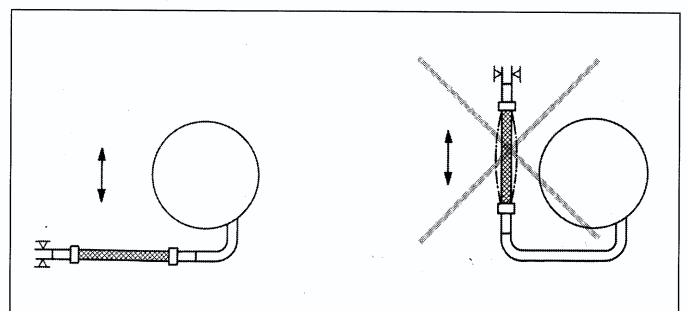
Example 8

Install hose without twist. Primary direction of oscillatory movement and hose bend must lie in one plane. This avoids damaging torsion stresses.



Example 10

Install hose at right angle to direction of oscillations.

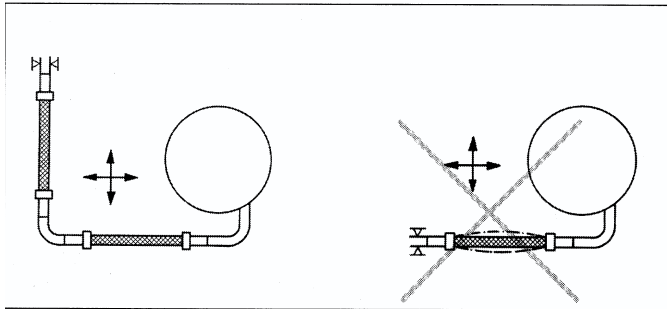




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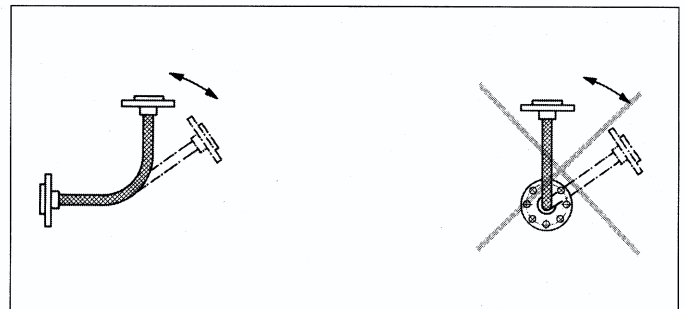
Example 11

Install hose as 90° bend in order to absorb oscillations in two or three directions. Oscillatory movement along the axis of a hose will not be absorbed.



Example 13

Angular movement and hose bend must lie in one plane. This avoids damaging torsion stresses.

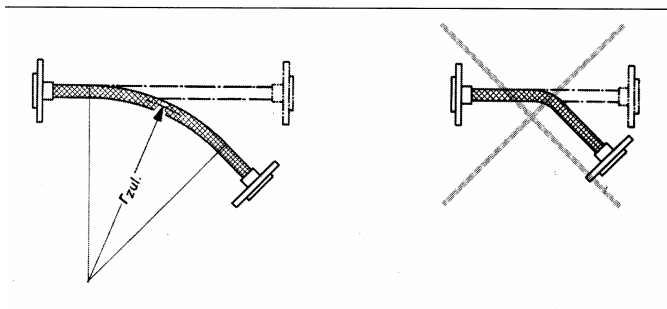


Rotation about one axis

Example 12

Install hose with adequate neutral hose ends in order to absorb rotational movements. Observe the required bending radius.

The calculation of the nominal length and installation distances according to formula for angular movements.

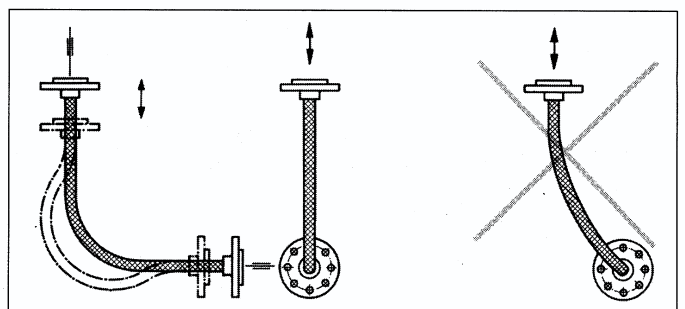


Thermal expansion

Example 14

Provide installation at 90° bend with sufficient lengths of the straight legs for absorption of heat expansions from two directions. Determine the required nominal length and

lengths of legs according to formula "90° bend for absorption of expansion from two directions". Hose bend and direction of movement must lie in one plane.

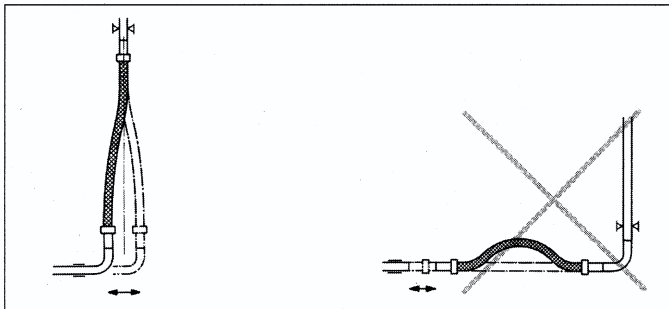




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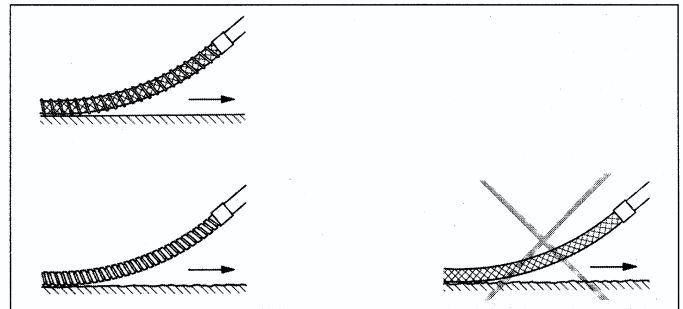
Example 15

Lateral installation only permitted when minimal expansion expected. Stretching or compression of the hose is not permitted.



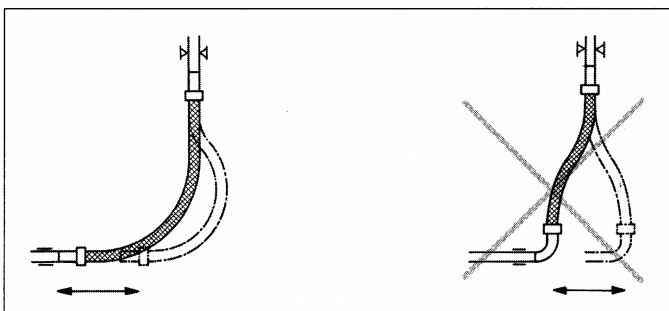
Example 17

If external mechanical influences cannot be avoided, e.g. dragging across the floor, then the hose must be protected accordingly by means of an outer wire spiral or armoured hose.



Example 16

To absorb larger expansion movements, install hose with 90° bend. Lateral installation is not permitted.



Example 18

Protect hose ends from impermissible bending stress by application of rigid pipe bends even in case of manual use.

