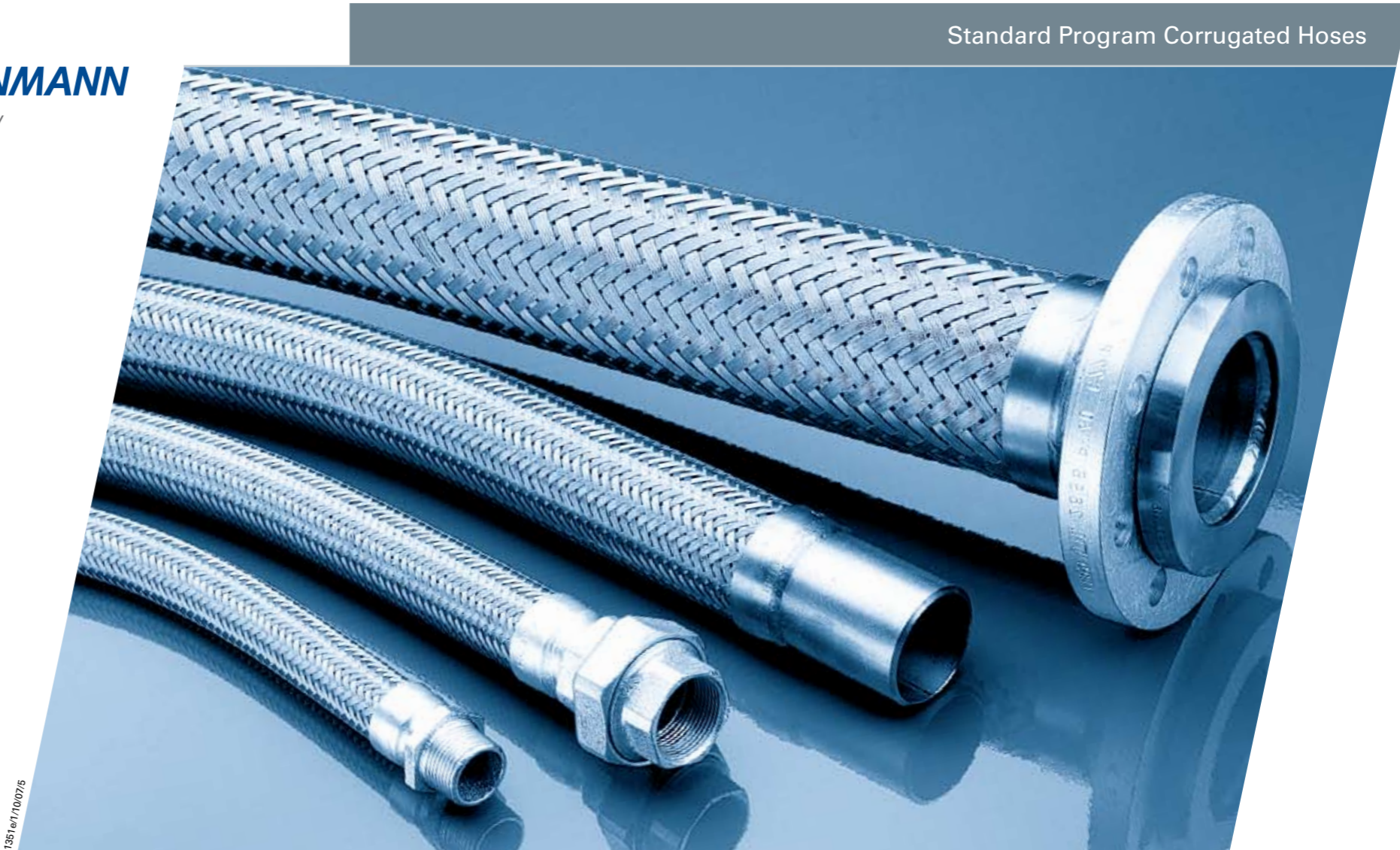


WITZENMANN
managing flexibility

Standard Program Corrugated Hoses



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HYDRA

Quality by Witzenmann



INQUIRY SPECIFICATION FOR HYDRA METAL HOSE ASSEMBLIES

Company:

Date:

Inquiry no./project:

Contact:

Quotation deadline:

Phone/fax:

E-mail:

Receiver inquiry-specific WI Group:

Item	1	2	3
Quantity			
Type description			
Nominal Diameter (DN)			
Nominal Length [mm]			
Material Hose			
Braiding			
Type description one end of			
fitting other end			
Medium			
Group as per PED: 1 – hazardous or 2 – other			
Gaseous/liquid, where pD > 0.5 bar or liquid			
Category as defined in the PED			
Operating/design data			
Max. pressure PS [bar above atmospheric]			
Min./max. temperature TS [°C]			
Installation shape* Straight/90°/180° bend			
Movement* Type and magnitude			
Load cycles per unit time			
Vibration* Ampl. [mm]/frequency [Hz]			
Direction			
External influences e.g. mechanical/chem. effects			
Approval requirements / certificate			
Hose/braiding/connection fitting/pressure test			

Additional information

*provide sketch, if possible

CORRUGATED HOSES

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From pioneer
to market
leader

The entire metal hose and expansion joint industry owes its origins to the stripwound hose first created in 1885 by Heinrich Witzenmann. The company has kept alive this spirit of invention right up to the present day: well-engineered products and innovative solutions have made Witzenmann the leader in technology within the industry. The Witzenmann Group employs more than 2,800 people in over 20 companies, making it one of the world's leading providers of metal hoses and expansion joints.

CORRUGATED HOSES

The following section contains descriptions of the most common types of hose. The two features that characterise the hoses are the version and the corrugation:

	Geometric dimension	Description
Version:	Wall thickness	medium / heavy
Corrugation:	Length of corrugation	narrow / medium wide

Note that pressure resistance increases both with wall thickness and corrugation length. Flexibility, on the other hand, decreases with both increasing corrugation length and wall thickness.

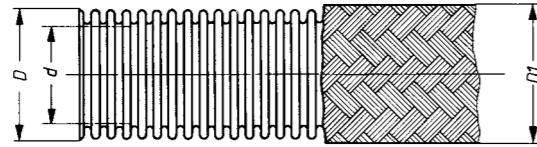
The technical detail tables are preceded by a description of the hose type. If you cannot find "your" hose, please contact us. Witzenmann produces a multitude of hose types. The hose for your application will certainly be among them.

Operating pressure

The operating pressures in the following tables that are applicable to stainless steel contain two pressure values:

- 1.) Permissible operating pressure P_{zul} at 20 °C for static loading without movement with 3-to-1 safety factor (SF 3) against bursting.
- 2.) Nominal pressure level as defined in DIN EN ISO 10380: maximum permissible pressure as defined in DIN EN ISO 10380 rounded to the associated pressure level. The maximum permissible pressure includes a safety factor of 4 (SF 4) against bursting and an average flexibility of 10,000 load cycles in the U-bend.

At higher operating temperatures, the reduction factor applies to the two pressure values.



Type 331
 Type 330

Type 331
 Type 330

Construction:

Annularly corrugated all-metal hose made of butt-welded tube with or without braiding.

Versions:

- RS ...S00 without braiding
- RS ...S12 with single stainless steel wire braiding

Type tests:

The hose type is tested in accordance with DIN EN ISO 10380.

Material of hose:

- Stainless austenitic steel to DIN EN ISO 10088-2, bright
- Standard: material no. 1.4404 comparable with AISI 316 L
 - Standard: material no. 1.4541 comparable with AISI 321
 - Other materials: e.g. material no. 1.4571 comparable with AISI 316Ti on request

Material of braiding:

- Stainless austenitic steel
- Material no. 1.4301 comparable with AISI 304
 - Material no. 1.4571 comparable with AISI 316Ti on request

Temperature range:

-270 °C up to max. 600 °C (only for the hose)

Operating pressure:

The following tables with technical data of metal hoses contain two pressure values. Please refer to the general information on page 5.

SF = Safety factor against bursting (3-resp. 4-times)

Connection fittings:

- Flanges
- Threaded connections
- Welding ends
- Customized connections on request

Production lengths:

- DN 4 5-30 m
- DN 6-50 10-100 m
- DN 65-100 20 m
- DN 125-150 10 m

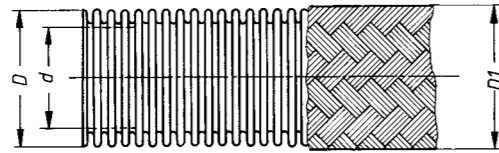
DN	Type	Inside diameter	Outside diameter	Permissible deviation	Minimum bending radius* one bending process	Nominal bending radius** frequent bending	Perm. static operating pressure at 20 °C SF 3	Nominal pressure DIN EN ISO 10380 SF 4	Weight. approx.
–	–	d	D, D1	d, D, D1	r _{min}	r _n	P _{zul}	–	–
–	–	mm	mm	mm	mm	mm	bar	PN	kg/m
4	RS331S00	4.2	7.1	±0.1	15	80	40	40	0.06
	RS331S12		8.2		25		135	100	0.11
6	RS331S00	6.2	9.7	±0.2	15	80	25	25	0.08
	RS331S12		10.8		25		200	150	0.14
8	RS331S00	8.3	12.3	±0.2	16	120	20	20	0.10
	RS331S12		13.7		32		180	100	0.21
10	RS331S00	10.2	14.3	±0.2	18	130	16	16	0.11
	RS331S12		15.7		38		140	100	0.23
12	RS331S00	12.2	16.8	±0.3	20	140	12	10	0.12
	RS331S12		18.2		45		85	65	0.25
16	RS331S00	16.2	21.7	±0.3	28	160	8	6	0.19
	RS331S12		23.3		58		90	65	0.40
20	RS331S00	20.2	26.7	±0.3	32	170	5	4	0.27
	RS331S12		28.3		70		55	40	0.49
25	RS331S00	25.5	32.2	±0.3	40	190	4	4	0.38
	RS331S12		34.2		85		65	50	0.79
32	RS331S00	34.2	41.0	±0.3	50	260	3	2.5	0.49
	RS331S12		43.0		105		35	25	0.96
40	RS331S00	40.1	49.7	±0.4	60	300	2.5	2.5	0.77
	RS331S12		52.0		130		60	40	1.46
50	RS331S00	50.4	60.3	±0.4	70	320	1.5	0.5	0.91
	RS331S12		62.6		160		35	25	1.67
65	RS331S00	65.3	78.0	±0.5	115	460	1	0.5	1.51
	RS331S12		81.2		200		40	25	2.88
80	RS331S00	80.2	94.8	±0.5	130	660	2	0.5	2.28
	RS331S12		98.0		240		35	16	4.08
100	RS331S00	100.0	116.2	±0.6	160	750	1.5	0.5	2.53
	RS331S12		119.4		290		25	10	4.54
125	RS330S00	126.2	145.0	±0.6	350	1000	0.8	0.5	2.68
	RS330S12		148.2				15	6	5.25
150	RS330S00	151.6	171.0	±1.4	400	1250	0.5	0.5	3.41
	RS330S12		174.2				10	6	6.48

* Minimum bending radius ≤ DIN EN ISO 10380 Type 1/2

** Nominal bending radius ≤ DIN EN ISO 10380 Type 1

Please quote when ordering:

1. Type of hose, material, nominal diameter (DN), nominal length (NL)
2. Type of connection fitting, material
3. Operating conditions, refer to Inquiry Specification, page 63



Type 321

Construction:

Annularly corrugated all-metal hose made of butt-welded tube with or without braiding.

Versions:

- RS ...S00 without braiding
- RS ...S12 with single stainless steel wire braiding

Type tests:

The hose type is tested in accordance with DIN EN ISO 10380.

Material of hose:

- Stainless austenitic steel to DIN EN ISO 10088-2, bright
- Standard: material no. 1.4404 comparable with AISI 316 L
 - Standard: material no. 1.4541 comparable with AISI 321
 - Other materials: e.g. material no. 1.4571 comparable with AISI 316Ti on request

Material of braiding:

- Material no. 1.4301 comparable with AISI 304
- Material no. 1.4571 comparable with AISI 316Ti on request

Temperature range:

-270 °C up to max. 600 °C (only for the hose)

Operating pressure:

The following tables with technical data of metal hoses contain two pressure values. Please refer to the general information on page 5.

SF = Safety factor against bursting (3-resp. 4-times)

Connection fittings:

- Flanges
- Threaded connections
- Welding ends
- Customized connections on request

Production lengths:

- DN 6-32 10-70 m
- DN 40-50 20 m
- DN 65-100 7 m

Type 321

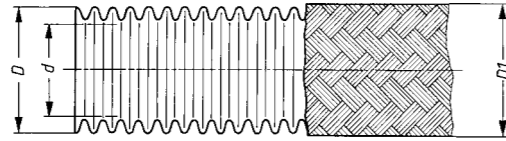
DN	Type	Inside diameter	Outside diameter	Permissible deviation	Minimum bending radius* one bending process	Nominal bending radius** frequent bending	Perm. static operating pressure at 20 °C SF 3	Nominal pressure DIN EN ISO 10380 SF 4	Weight. approx.
–	–	d	D, D1	d, D, D1	r _{min}	r _n	P _{zul}	–	–
–	–	mm	mm	mm	mm	mm	bar	PN	kg/m
6	RS321S00	6.1	9.9		20	70	20	20	0.10
	RS321S12				25				
8	RS321S00	8.2	12.5		25	80	16	16	0.14
	RS321S12				30				
10	RS321S00	10.1	14.4	±0.2	30	90	10	10	0.14
	RS321S12				35				
12	RS321S00	12.4	17.1		35	100	8	6	0.17
	RS321S12				40				
16	RS321S00	16.2	22.0		40	110	6	6	0.26
	RS321S12				50				
20	RS321S00	20.2	26.8		50	130	4	4	0.31
	RS321S12				55				
25	RS321S00	25.1	32.2	±0.3	60	150	5	4	0.49
	RS321S12				65				
32	RS321S00	34.2	41.0		70	200	2.5	2.5	0.50
	RS321S12				75				
40	RS321S00	40.0	49.8	±0.4	80	210	2	0.5	1.13
	RS321S12				90				
50	RS321S00	50.1	60.5		100	240	1	0.5	1.34
	RS321S12				110				
65	RS321S00	65.0	78.2	±0.5	145	280	1.5	0.5	1.96
	RS321S12				200				
80	RS321S00	80.0	95.0		200	400	2	0.5	3.12
	RS321S12				240				
100	RS321S00	99.4	116.8	±0.6	240	500	1.5	0.5	3.70
	RS321S12				290				

* Minimum bending radius ≤ DIN EN ISO 10380 Type 1/2

** Nominal bending radius ≤ DIN EN ISO 10380 Type 1

Please quote when ordering:

1. Type of hose, material, nominal diameter (DN), nominal length (NL)
2. Type of connection fitting, material
3. Operating conditions, refer to Inquiry Specification, page 63



Type 341

Type 341

Construction:

Annularly corrugated all-metal hose made of butt-welded tube with or without braiding.

Versions:

- RS 341S00 without braiding
- RS 341S12 with single stainless steel wire braiding

Type tests:

The hose type is tested in accordance with DIN EN ISO 10380.

Material of hose:

- Stainless austenitic steel to DIN EN ISO 10088-2, bright
- Standard: material no. 1.4404 comparable with AISI 316 L
 - Standard: material no. 1.4541 comparable with AISI 321
 - Other materials:
e.g. material no. 1.4571 comparable with AISI 316Ti on request

Material of braiding:

- Material no. 1.4301 comparable with AISI 304

Temperature range:

-270 °C up to max. 600 °C (only for the hose)

Operating temperature:

At higher operating temperatures, different reduction factors apply depending on the material
→ see page 56

Operating pressure:

The following tables with technical data of metal hoses contain two pressure values. Please refer to the general information on page 5.

SF = Safety factor against bursting (3-resp. 4-times)

Connection fittings:

In addition to the common types and versions, there are special connections, e.g. for building service equipment.

Production lengths:

- DN 6-8 10 m
- DN 10-50 10-100 m
- DN 65-100 6,5 m

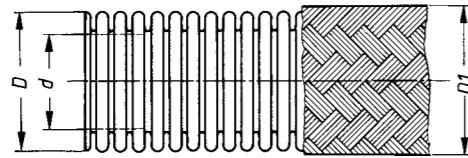
DN	Type	Inside diameter	Outside diameter	Permissible deviation	Minimum bending radius* one bending process	Nominal bending radius** frequent bending	Perm. static operating pressure at 20 °C SF 3	Nominal pressure DIN EN ISO 10380 SF 4	Weight approx.
–	–	d	D, D1	d, D, D1	r _{min}	r _n	P _{zul}	–	–
–	–	mm	mm	mm	mm	mm	bar	PN	kg/m
6	RS341S00	6.3	9.5	±0.3	11	110	65	65	0.05
	RS341S12		10.6		25		175	100	0.12
8	RS341S00	8.5	12.0	±0.3	15	130	35	25	0.07
	RS341S12		13.4		32		150	100	0.18
10	RS341S00	10.3	14.1	±0.3	18	150	16	16	0.09
	RS341S12		15.5		38		105	65	0.20
12	RS341S00	12.5	16.5	±0.2	20	165	18	16	0.10
	RS341S12		18.0		45		80	65	0.23
16	RS341S00	16.3	21.4	±0.3	25	195	13	10	0.15
	RS341S12		23.0		58		80	65	0.36
20	RS341S00	20.7	26.5	±0.3	30	225	20	20	0.31
	RS341S12		28.1		70		55	40	0.54
25	RS341S00	25.8	31.7	±0.4	35	260	16	16	0.39
	RS341S12		33.7		85		60	50	0.80
32	RS341S00	34.6	41.0	±0.5	40	300	2.5	2.5	0.36
	RS341S12		43.0		105		35	25	0.82
40	RS341S00	40.5	49.5	±0.5	50	340	3	2.5	0.57
	RS341S12		51.5		130		50	40	1.26
50	RS341S00	50.8	60.2	±0.5	60	390	2.5	2.5	0.71
	RS341S12		62.5		160		35	25	1.47
65	RS341S00	65.7	77.7	±0.4	75	460	4	4	1.07
	RS341S12		80.9		200		40	25	2.44
80	RS341S00	80.6	94.2	±0.5	90	660	4	4	1.72
	RS341S12		97.4		240		40	25	3.52
100	RS341S00	100.4	115.0	±0.6	110	750	3	2.5	1.95
	RS341S12		118.2		290		20	16	3.94

* Minimum bending radius ≤ DIN EN ISO 10380 Type 1/2

** Nominal bending radius ≤ DIN EN ISO 10380 Type 1

Please quote when ordering:

1. Type of hose, material, nominal diameter (DN), nominal length (NL)
2. Type of connection fitting, material
3. Operating conditions, refer to Inquiry Specification, page 63



Type RS 531
Type RS 430

Construction:

Annularly corrugated all-metal hose made of butt-welded tube with or without braiding.

Versions:

- RS ...S00 without braiding
- RS ...S12 with single stainless steel wire braiding
- RS ...S22 with double stainless steel braiding
- RS ...S42 with single stainless steel knurled braiding
- RS ...S52 with double stainless steel knurled braiding
- RS ...S92 with double stainless steel braiding of special design

Type tests:

The hose type is tested in accordance with DIN EN ISO 10380.

Material of hose:

- Stainless austenitic steel to DIN EN ISO 10088-2, bright
- Standard: material no. 1.4404 comparable with AISI 316 L (< DN 150)
 - Standard: material no. 1.4541 comparable with AISI 321
 - Other materials:
e.g. material no. 1.4571 comparable with AISI 316Ti on request

Material of braiding:

- Material no. 1.4301 comparable with AISI 304
- Material no. 1.4306 comparable with AISI 304 L (knurled braiding DN 150-300)
- Material no. 1.4571 comparable with AISI 316Ti on request

Temperature range:

-270 °C up to max. 600 °C (only for the hose)

Operating pressure:

The following tables with technical data of metal hoses contain two pressure values. Please refer to the general information on page 5.

SF = Safety factor against bursting (3- resp. 4-times)

Connection fittings:

- Flanges
- Threaded connections
- Welding ends
- High-pressure type connection fittings
- Customized connections on request

Production lengths:

- DN 5-16 10-100 m
- DN 20-125 10 m
- DN 150-300 3 m

Type RS 531
Type RS 430

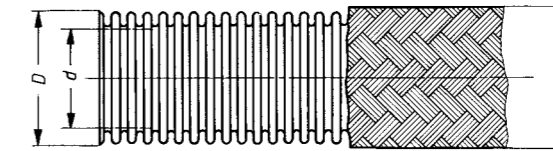
DN	Type	Inside diameter	Outside diameter	Permissible deviation	Minimum bending radius* one bending process	Nominal bending radius** frequent bending	Perm. static operating pressure at 20 °C SF 3	Nominal pressure DIN EN ISO 10380 SF 4	Weight. approx.
–	–	d	D, D1	d, D, D1	r _{min}	r _n	P _{zul}	–	–
–	–	mm	mm	mm	mm	mm	bar	PN	kg/m
5	RS531S00	5.3	10.2	±0.2	15	100	32	25	0.10
	RS531S12				25		200	0.16	
	RS531S22				35		200	0.22	
6	RS531S00	6.2	11.6	±0.2	15	110	50	50	0.12
	RS531S12				25		200	0.23	
	RS531S22				40		250	0.33	
8	RS531S00	8.0	14.5	±0.2	20	130	50	50	0.20
	RS531S12				32		200	0.35	
	RS531S22				50		250	0.49	
10	RS531S00	10.0	17.5	±0.3	25	150	35	25	0.29
	RS531S12				38		150	0.48	
	RS531S22				60		200	0.66	
12	RS531S00	12.1	20.3	±0.3	30	165	32	25	0.41
	RS531S12				45		100	0.62	
	RS531S22				70		200	0.82	
16	RS531S00	16.1	25.8	±0.3	40	195	20	20	0.55
	RS531S12				58		150	0.92	
	RS531S22				90		200	1.29	
20	RS430S00	20.2	31.2	±0.3	45	285	8	6	0.54
	RS430S12				70		65	0.93	
	RS430S22				70		100	1.32	
25	RS430S00	25.2	36.2	±0.3	50	325	6	6	0.65
	RS430S12				85		50	1.07	
	RS430S22				85		100	1.49	
32	RS430S00	33.7	42.7	±0.3	60	380	4	4	0.77
	RS430S12				105		65	1.41	
	RS430S22				105		65	2.05	
40	RS430S00	40.0	55.0	±0.4	75	430	2.5	2.5	1.37
	RS430S12				130		40	2.09	
	RS430S22				130		65	2.82	
50	RS430S00	50.0	65.0	±0.4	90	490	3	2.5	1.61
	RS430S12				160		50	2.91	
	RS430S22				160		65	4.21	

* Minimum bending radius ≤ DIN EN ISO 10380 Type 1/2

** Nominal bending radius ≤ DIN EN ISO 10380 Type 1

Please quote when ordering:

1. Type of hose, material, nominal diameter (DN), nominal length (NL)
2. Type of connection fitting, material
3. Operating conditions, refer to Inquiry Specification, page 63



Type RS 531
Type RS 430

Type RZ 331

DN	Type	Inside diameter	Outside diameter	Permissible deviation	Minimum bending radius* one bending process	Nominal bending radius** frequent bending	Perm. static operating pressure at 20 °C SF 3	Nominal pressure DIN EN ISO 10380 SF 4	Weight approx.	
–	–	d	D, D1	d, D, D1	r _{min}	r _n	p _{zul}	–	–	
–	–	mm	mm	mm	mm	mm	bar	PN	kg/m	
65	RS430S00	65.0	81.0	±0.4	110	580	2	0.5	2.06	
	RS430S12		84.2		200		40	25	3.46	
	RS430S22		87.3		200		60	50	4.86	
80	RS430S00	79.8	98.3	±0.5	135	800	1.5	0.5	2.82	
	RS430S12		101.5		240		40	16	4.65	
	RS430S22		104.6		240		60	25	6.48	
100	RS430S00	99.8	117.8		160		1000	1.5	0.5	3.59
	RS430S12		121.0		290			35	10	5.97
	RS430S22		124.1		290			60	16	8.35
125	RS430S00	125.6	146.0	±0.6	350	1250	1	0.5	5.23	
	RS430S12		149.2				25	10	7.80	
	RS430S22		152.4				45	16	10.40	
150	RS430S00	151.9	177.4	±1.4	400	800	0.2	-	4.97	
	RS430S12		180.6				10	6	8.10	
	RS430S42		181.4				15	10	8.37	
	RS430S22		183.7				17	10	11.20	
	RS430S92		185.4				25	16	11.90	
200	RS430S00	202.2	231.4	±1.6	520	1100	0.2	-	7.92	
	RS430S12		234.4				8	6	11.90	
	RS430S42		236.9				13	10	12.5	
	RS430S22		237.1				15	10	15.90	
	RS430S92		239.7				16	16	16.50	
	RS430S52		242.4				16	16	17.3	
250	RS430S00	248.4	284.2	±1.6	620	1350	0.2	-	13.0	
	RS430S42		289.7				8	6	18.10	
	RS430S52		295.2				15	10	23.40	
300	RS430S00	298.6	335.8	±1.6	720	1600	0.1	-	17.20	
	RS430S42		341.3				5	4	23.10	
	RS430S52		346.8				9	6	29.10	

* Minimum bending radius ≤ DIN EN ISO 10380 Type 1/2

** Nominal bending radius ≤ DIN EN ISO 10380 Type 1

Please quote when ordering:

1. Type of hose, material, nominal diameter (DN), nominal length (NL)
2. Type of connection fitting, material
3. Operating conditions, refer to Inquiry Specification, page 63

Construction:

Annularly corrugated all-metal hose made of butt-welded tube with or without braiding.

Versions:

- RZ 331S00 without braiding
- RZ 331S13 with single bronze wire braiding

Material of hose:

- Bronze to DIN 1791
- Material no. 2.1010 (CuSn 2)

Material of braiding:

- Bronze wire, bright, material no. 2.1016 (CuSn 4) or CW450K, DIN EN 1652

Temperature range:

-196 °C up to max. 250 °C (only for the hose)

Operating pressure:

The permissible operating pressure stated in the table applies to static pressure and movement loading at +20 °C. For reduction factors for higher operating temperature → see page 56.

Exposure to dynamic stresses caused by movement or pressure necessitates a special design. Please contact us if this applies to you.

Connection fittings:

To customer specification

Production lengths:

- DN 8-25 10 - 50 m
- DN 32 10 - 30 m
- DN 40-50 8 m

ANNULARLY CORRUGATED HOSES OF BRONZE TYPE RZ 331

medium version, normal corrugation

Type RZ 331

DN	Type	Inside diameter	Outside diameter	Permissible deviation	Minimum bending radius one bending process	Nominal bending radius frequent bending	Perm. static operating pressure at 20 °C SF 3	Weight approx.	
–	–	d	D, D1	d, D, D1	r _{min}	rn	P _{zul}	–	
–	–	mm	mm	mm	mm	mm	bar	kg/m	
8	RZ331S00	8.6	12.6	±0.2	16	90	6	0.11	
	RZ331S13		14.0		32		75	0.23	
10	RZ331S00	10.7	15.1		18	130	6	0.13	
	RZ331S13		16.5		38		50	0.27	
12	RZ331S00	12.7	17.7		20	150	4	0.14	
	RZ331S13		19.1		45		40	0.31	
16	RZ331S00	16.7	22.2		28	170	4	0.24	
	RZ331S13		23.6		58		40	0.47	
20	RZ331S00	20.6	27.1		32	200	4	0.44	
	RZ331S13		28.5		70		35	0.71	
25	RZ331S00	25.6	33.2		40	230	2.5	0.46	
	RZ331S13		35.5		85		35	0.97	
32	RZ331S00	32.6	42.0	±0.3	50	260	2.5	0.72	
	RZ331S13		44.3		105		35	1.43	
40	RZ331S00	40.5	51.5		60	310	1.6	0.95	
	RZ331S13		53.8		130		28	1.83	
50	RZ331S00	50.5	63.0		±0.4	70	360	1.6	1.35
	RZ331S13		66.2			160		30	2.77

Please quote when ordering:

1. Type of hose, material, nominal diameter (DN), nominal length (NL)
2. Type of connection fitting, material
3. Operating conditions, refer to Inquiry Specification, page 63

CONNECTION FITTINGS FOR CORRUGATED HOSES



Versatile and perfectly fitting

A multitude of different connections ensures that our metal hoses have a broad range of applications. Depending on the operating conditions and materials used, the connections are either welded or brazed to the hose. Below is a selection of common connection types. The first letter of the type description indicates the respective connection type.

Flange connection

- A Loose flange with welding collar Swivel flange
- B Loose flange with collar connection piece Swivel flange
- C Loose flange with welding rim Swivel flange
- G Welding neck flange Fixed flange

Threaded connection

- L Fixed, internal thread
- M Fixed, external thread
- N Swivel, internal thread

Threaded fitting

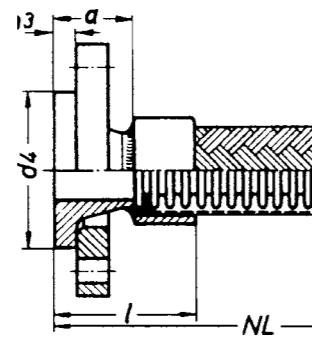
- Q Internal thread
- R External thread
- S Pipe end

Pipe fitting

- U Pipe fittings of all kinds

Other

- W Couplings



Type AB12
Type AB22
Type AB82

Flange connection, swivelling

Welding collar of steel or stainless steel 1.4541 or 1.4571
loose flange of steel or stainless steel 1.4541 or 1.4571
welded or brazed

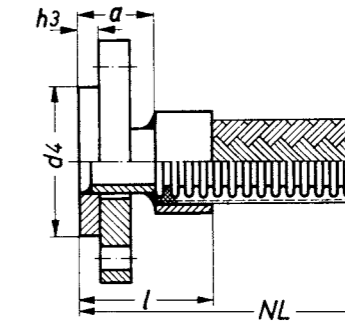
Fitting type				Material		Maximum operating temperature
PN 10	PN 16	PN 25	PN 40	Welding collar	Flange	
AB12D	AB12E	AB12F	AB12G	Steel	Steel	480 °C
AB82D	AB82E	AB82F	AB82G	Stainless steel	Steel	480 °C
AB22D	AB22E	AB22F	AB22G	Stainless steel	Stainless steel	550 °C

Dimensions in mm, weight G in kg

DN	10	16	20	25	32	40	50	65	80	100	125	150	200	250	300
d4 / d1	40	45	58	68	78	88	102	122	138	158	188	212	268	320	370
h3 (DIN 2673)	10	10	12	12	12	12	14	14	16	16	18	18	20	22	22
F (DIN EN 1092)	12	12	14	14	14	14	16	16	16	18	18	20	20	22	22
a (DIN 2673)	35	35	40	40	40	40	45	45	50	50	50	50	55	60	60
a (DIN EN 1092)	35	38	40	40	42	45	45	45	50	52	55	55	62	68	68
l (DIN 2673)	45	49	56	58	60	62	70	73	80	82	86	90	100	110	115
l (DIN EN 1092)	45	52	56	58	62	67	70	73	80	84	91	95	107	118	123
G approx.	0.70	0.80	1.06	1.43	2.05	2.40	3.02	3.77	4.84	5.60	7.35	8.90	12.9	17.7	23.3

Connection dimensions PN 10 and PN 16/25/40 up to DN 65 to DIN 2501 / DIN EN 1092

Please quote when ordering: fitting type, nominal diameter (DN), operating temperature, material no. if stainless steel



Type BB12
Type BB22
Type BB82

Flange connection, swivelling

Collar pipe of steel or stainless steel 1.4541 or 1.4571
loose flange of steel or stainless steel 1.4541 or 1.4571
welded or brazed

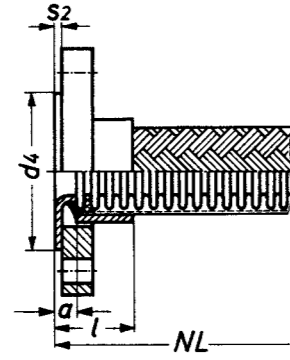
Fitting type				Material		Maximum operating temperature
PN 10	PN 16	PN 25	PN 40	Collar pipe	Flange	
BB12D	BB12E	BB12F	BB12G	Steel	Steel	480 °C
BB82D	BB82E	BB82F	BB82G	Stainless steel	Steel	480 °C
BB22D	BB22E	BB22F	BB22G	Stainless steel	Stainless steel	550 °C

Dimensions in mm, weight G in kg

DN	10	16	20	25	32	40	50	65	80	100	125	150	200	250	300
d4 / d1	40	45	58	68	78	88	102	122	138	158	188	212	268	320	370
h3 (DIN 2642)	10	10	12	12	12	12	14	14	16	16	18	18	20	22	22
F (DIN EN 1092)	12	12	14	14	14	14	16	16	16	18	18	20	20	22	22
a (DIN 2642)	45	45	46	51	51	51	57	57	63	68	79	79	85	85	90
a (DIN EN 1092)	46	46	47	52	52	52	58	58	63	69	79	80	85	85	90
l (DIN 2642)	55	59	62	69	71	73	82	85	93	100	115	119	130	135	145
l (DIN EN 1092)	56	60	63	70	72	74	83	86	93	101	115	120	130	135	145
G approx.	0.72	0.84	1.08	1.48	2.13	2.46	3.08	3.90	5.00	5.75	8.00	9.80	13.5	18.4	24.3

Connection dimensions PN 10 and PN 16/25/40 up to DN 65 to DIN 2501 / DIN EN 1092

Please quote when ordering: fitting type, nominal diameter (DN), operating temperature, material no. if stainless steel



Type CA22
Type CA82

Flange connection, swivelling

Welding rim of stainless steel 1.4541 or 1.4571
loose flange of steel or stainless steel 1.4541 or 1.4571
welded or brazed

Fitting type	Material		Maximum operating temperature
	PN 10	PN 16 (up to DN 150)	
CA82D	CA82E	Welding rim: Stainless steel Flange: Steel	480 °C
CA22D	CA22E	Welding rim: Stainless steel Flange: Stainless steel	550 °C

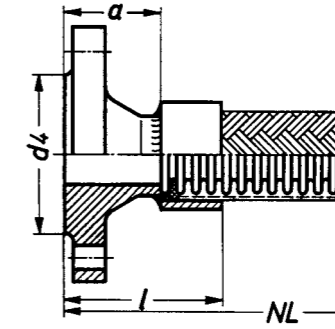
Dimensions in mm, weight G in kg

DN	10	16	20	25	32	40	50	65	80	100	125	150	200	250	300
d4 / d1	40	45	58	68	78	88	102	122	138	158	188	212	268	320	370
s2 (DIN 2642)	3	3	3	3	3.5	3.5	3.5	3.5	4	4	4	4	4	5	5
s2** (DIN EN 1092)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
a (DIN 2642)	9	9	12	15	15	17	23	23	23	28	30	30	35	30	35
a** (DIN EN 1092)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
l (DIN 2642)	19	23	28	33	35	39	48	51	53	60	66	70	75	80	90
l** (DIN EN 1092)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
G approx.	0.63	0.71	0.84	1.15	1.68	1.90	2.21	2.88	3.55	3.86	4.95	6.00	8.2	11.0	13.7

Connection dimensions PN 10 and PN 16/25/40 up to DN 65 to DIN 2501 / DIN EN 1092

** Dimension not standardized in DIN EN 1092

Please quote when ordering: fitting type, nominal diameter (DN), operating temperature, material no. if stainless steel



Type GB12
Type GB22

Flange connection, fixed

Welding neck flange of steel or stainless steel 1.4541 or 1.4571
welded or brazed

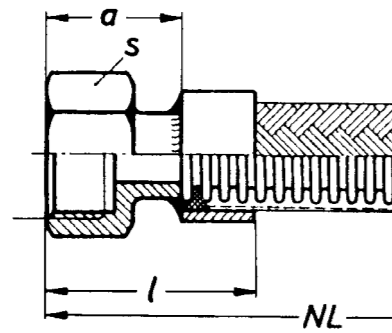
Fitting type	Material		Maximum operating temperature
	PN 10	PN 16	
GB12D	GB12E	Welding neck flange: Steel	480 °C
GB22D	GB22E	Welding neck flange: Stainless steel	550 °C

Dimensions in mm, weight G in kg

DN	10	16	20	25	32	40	50	65	80	100	125	150	200	250	300
d4 / d1	40	45	58	68	78	88	102	122	138	158	188	212	268	320	370
a (DIN 2632)	35	35	38	38	40	42	45	45	50	52	55	55	62	68	68
a (DIN EN 1092)	35	38	40	42	45	45	45	45	50	52	55	55	62	68	68
l (DIN 2632)	45	49	54	56	60	64	70	73	80	84	91	95	107	118	123
l (DIN EN 1092)	45	52	56	58	62	67	70	73	80	84	91	95	107	118	123
G approx.	0.60	0.67	1.00	1.20	1.76	2.00	2.66	3.30	3.95	4.95	6.75	8.35	12.4	16.1	20.0

Connection dimensions PN 10 and PN 16/25/40 up to DN 65 to DIN 2501 / DIN EN 1092

Please quote when ordering: fitting type, nominal diameter (DN), operating temperature, material no. if stainless steel



Type LA12S
Type LA22S
Type LA52S

Threaded connection, fixed

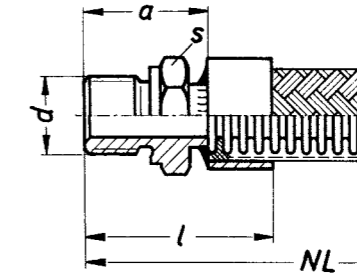
Hexagon socket with Whitworth pipe thread DIN EN 10226 (ISO 7/1) of steel, stainless steel 1.4541 or 1.4571 or brass welded or brazed

Fitting type	Material	Max. operating temperature
LA12S	Steel	300 °C
LA22S	Stainless steel	550 °C
LA52S	Brass	250 °C

Dimensions in mm, weight G in kg

PN	100							63			40	
	6	8	10	12	16	20	25	32	40	50	65	80
DN	6	8	10	12	16	20	25	32	40	50	65	80
d	Rp ¹ / ₄	Rp ¹ / ₄	Rp ³ / ₈	Rp ¹ / ₂	Rp ¹ / ₂	Rp ³ / ₄	Rp1	Rp ¹ / ₄	Rp ¹ / ₂	Rp2	Rp ² / ₂	Rp3
a	19	19	21	24	24	27	31	34	36	42	49	54
l	27	29	31	36	38	43	49	54	58	67	77	84
s	17	17	22	24	24	32	41	46	55	65	85	100
G approx.	0.02	0.03	0.04	0.06	0.07	0.10	0.19	0.22	0.31	0.41	0.86	1.22

Please quote when ordering: fitting type, nominal diameter (DN), operating temperature, material no. if stainless steel



Type MA12S
Type MA22S
Type MA 52S

Threaded connection, fixed

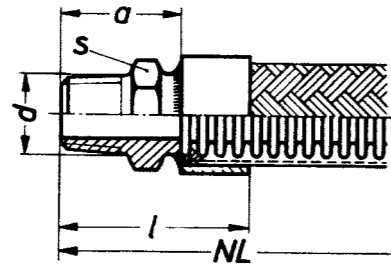
Hexagon nipple with Whitworth pipe thread ISO 228/1 of steel, stainless steel 1.4541 or 1.4571 or brass welded or brazed

Fitting type	Material	Max. operating temperature
MA12S	Steel	300 °C
MA22S	Stainless steel	550 °C
MA52S	Brass	250 °C

Dimensions in mm, weight G in kg

PN	250			160			100			63	40		
	6	8	10	12	16	20	25	32	40	50	65	80	100
DN	6	8	10	12	16	20	25	32	40	50	65	80	100
d	G1/4A	G1/4A	G3/8A	G1/2A	G1/2A	G3/4A	G1A	G11/4A	G11/2A	G2A	G21/2A	G3A	G4A
a	24	25	25	29	29	32	38	40	43	45	52	54	64
l	32	35	35	41	43	48	56	60	65	70	78	84	96
s	19	19	22	27	27	32	41	50	55	70	85	100	120
G approx.	0.04	0.04	0.06	0.08	0.08	0.12	0.2	0.29	0.32	0.47	0.75	0.85	1.35

Please quote when ordering: fitting type, nominal diameter (DN), operating temperature, material no. if stainless steel
On request, also available with metric fine-pitch thread



Type MH02S

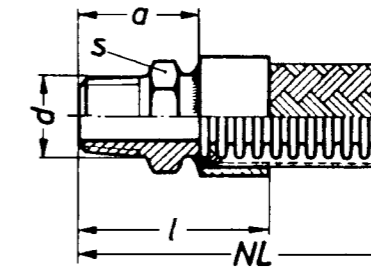
Threaded connection, fixed

Hexagon nipple with Whitworth pipe thread DIN EN 10226 (ISO 7/1) of malleable cast iron brazed

Fitting type	Maximal operating temperature	Maximal operating pressure
MH02S	see page 57	see page 57

Dimensions in mm, weight G in kg

DN	10	12	16	20	25	32	40	50	65	80
d	R ³ / ₈	R ¹ / ₂	R ¹ / ₂	R ³ / ₄	R1	R1 ¹ / ₄	R1 ¹ / ₂	R2	R2 ¹ / ₂	R3
a	32	35	35	39	42	45	48	52	55	60
l	42	47	49	55	60	65	70	77	83	90
s	22	28	28	32	42	50	55	70	85	100
G approx.	0.06	0.08	0.08	0.12	0.18	0.26	0.29	0.49	0.85	1.26



Type MH12S
Type MH22S
Type MH52S

Threaded connection, fixed

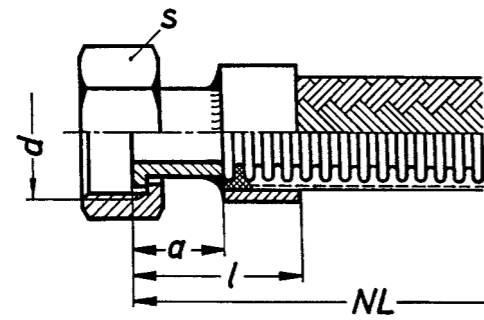
Hexagon nipple with Whitworth pipe thread DIN EN 10226 (ISO 7/1) of steel, stainless steel 1.4541 or 1.4571 or brass welded or brazed

Fitting type	Material	Maximal operating temperature
MH12S	Steel	300 °C
MH22S	Stainless steel	550 °C
MH52S	Brass	250 °C

Dimensions in mm, weight G in kg

PN	100							63			40	
DN	6	8	10	12	16	20	25	32	40	50	65	80
d	R1/4	R1/4	R3/8	R1/2	R1/2	R3/4	R1	R11/4	R11/2	R2	R21/2	R3
a	24	24	25	29	29	32	38	40	40	47	52	56
l	32	34	35	41	43	48	56	60	62	72	80	86
s	14	14	17	22	22	27	36	46	50	60	80	90
G approx.	0.02	0.03	0.04	0.05	0.06	0.09	0.14	0.23	0.25	0.43	0.65	0.75

Please quote when ordering: fitting type, nominal diameter (DN), operating temperature, material no. if stainless steel



Type NA12S
Type NA22S
Type NA52S

Threaded connection, swivelling

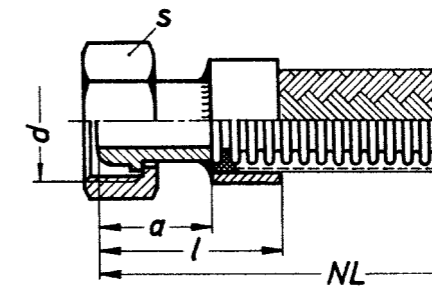
Collar pipe, flat sealing
union nut with Whitworth pipe thread ISO 228/1
of steel, stainless steel 1.4541 or 1.4571 or brass
welded or brazed

Fitting type	Material	Maximal operating temperature
NA12S	Steel	300 °C
NA22S	Stainless steel	550 °C
NA52S	Brass	250 °C

Dimensions in mm, weight G in kg

PN	25									
	6	8	10	12	16	20	25	32	40	50
DN	G ¹ / ₄	G ³ / ₈	G ¹ / ₂	G ⁵ / ₈	G ³ / ₄	G1	G1 ¹ / ₄	G1 ¹ / ₂	G1 ³ / ₄	G2 ¹ / ₄
d	20	21	21	24	24	24	26	26	29	29
a	28	31	31	36	38	40	44	46	51	54
l	17	22	27	27	32	41	50	55	65	75
G approx.	0.03	0.04	0.07	0.08	0.10	0.15	0.25	0.28	0.49	0.54

Please quote when ordering: fitting type, nominal diameter (DN), operating temperature, material no. if stainless steel



Type NF12S
Type NF22S
Type NF52S

Threaded connection, swivelling

Ball-type bushing to DIN 3863
union nut with Whitworth pipe thread ISO 228/1
of steel, stainless steel 1.4541 or 1.4571 or brass
welded or brazed

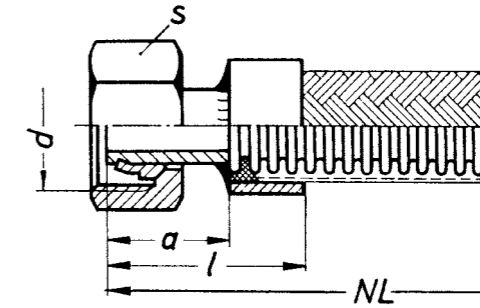
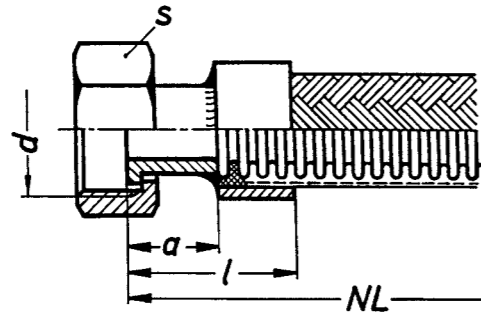
Fitting type	Material	Maximal operating temperature
NF12S	Steel	300 °C
NF22S	Stainless steel	550 °C
NF52S	Brass	250 °C

Dimensions in mm, weight G in kg

PN	25									
	6	8	10	12	16	20	25	32	40	50*
DN	G ¹ / ₄	G ³ / ₈	G ¹ / ₂	G ⁵ / ₈	G ³ / ₄	G1	G1 ¹ / ₄	G1 ¹ / ₂	G1 ³ / ₄	G2 ¹ / ₄
d	24	24	24	29	29	29	31	31	31	34
a	32	34	34	41	43	45	49	51	53	59
l	17	22	27	27	32	41	50	55	65	75
G approx.	0.03	0.04	0.07	0.08	0.10	0.15	0.28	0.29	0.47	0.58

*DN 50 is not standardized!

Please quote when ordering: fitting type, nominal diameter (DN), operating temperature, material no. if stainless steel



Type NI12S
Type NI22S
Type NI52S

Type NL12Q
Type NL22Q

Threaded connection, swivelling

Collar pipe, flat sealing
union nut with metric thread DIN 3870, series LL
of steel, stainless steel 1.4541 or 1.4571 or brass
welded or brazed

Fitting type	Material	Maximal operating temperature
NI12S	Steel	300 °C
NI22S	Stainless steel	550 °C
NI52S	Brass	250 °C

Dimensions in mm, weight G in kg

PN	25									
DN	6	8	10	12	16	20	25	32	40	50
d	M14x1.5	M16x1.5	M18x1.5	M22x1.5	M26x1.5	M30x1.5	M38x1.5	M45x1.5	M52x1.5	M65x2
a	20	21	21	24	24	24	26	26	29	29
l	28	31	31	36	38	40	44	46	51	54
s	17	19	22	27	32	36	46	50	60	75
G approx.	0.03	0.04	0.05	0.07	0.10	0.12	0.19	0.28	0.34	0.45

Please quote when ordering: fitting type, nominal diameter (DN), operating temperature, material no. if stainless steel

Threaded connection, swivelling

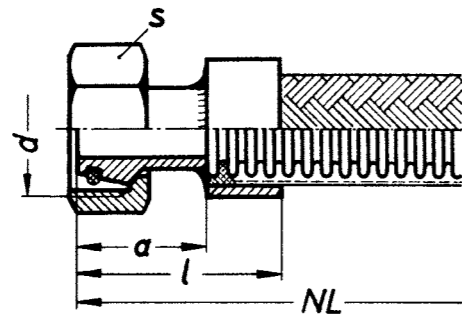
Precision pipe connection with tapping ring DIN 3861, DIN EN ISO 8434-1
union nut with metric thread to DIN EN ISO 8434-1, series L
of steel or stainless steel 1.4541 or 1.4571 (union nut 1.4571),
welded or brazed

Fitting type	Material	Maximal operating temperature
NL12Q	Steel	300 °C
NL22Q	Stainless steel	550 °C

Dimensions in mm, weight G in kg

PN	250				160			100		
DN	6	8	10	12	16	20	25	32	40	
Pipe dimensions	8x1	10x1.5	12x1.5	15x2	18x1.5	22x2	28x2	35x2	42x3	
d	M14x1.5	M16x1.5	M18x1.5	M22x1.5	M26x1.5	M30x2	M36x2	M45x2	M52x2	
a	28	30	30	32	32	36	40	45	45	
l	36	40	40	44	46	52	58	65	67	
s	17	19	22	27	32	36	41	50	60	
G approx.	0.04	0.04	0.06	0.09	0.11	0.16	0.21	0.31	0.44	

Please quote when ordering: fitting type, nominal diameter (DN), operating temperature, material no. if stainless steel



Type NN12Q
Type NN22Q

Threaded connection, swivelling

24° sealing cone with O-ring, union nut DIN ISO 12151-2, series L of steel or stainless steel 1.4541 or 1.4571 (union nut 1.4571), welded or brazed

Fitting type	Material		Maximal operating temperature
	Threaded connection	O-Ring	
NN12Q	Steel	NBR (Perbunan)	-20 bis +90 °C
NN22Q	Stainless steel	oder FPM (Viton)	-20 bis +200 °C

Dimensions in mm, weight G in kg

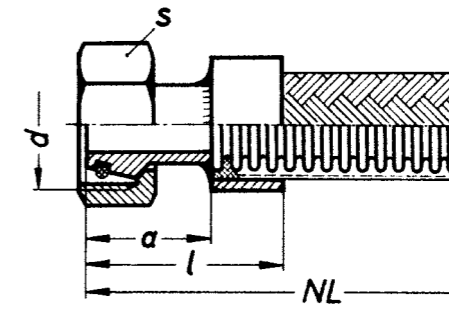
PN	250				160		100		
	6	8	10	12	16	20	25	32	40
DN	6	8	10	12	16	20	25	32	40
d	M14x1.5	M16x1.5	M18x1.5	M22x1.5	M26x1.5	M30x2	M36x2	M45x2	M52x2
a	32	35	35	35	38	40	44	46	50
l	40	45	45	47	52	56	62	66	72
s	17	19	22	27	32	36	41	55	60
G approx.	0.03	0.04	0.05	0.07	0.11	0.15	0.21	0.31	0.48

Please quote when ordering: fitting type, nominal diameter (DN), operating temperature, material for O-ring, material no. if stainless steel

Associated pipe outside diameter	8	10	12	15	18	22	28	35	42

Note

This threaded connection is suitable for the tapping ring connection to DIN EN ISO 8434-1, series L or for connection to threaded pins with bore shape W (24°), series L to DIN 3861.



Type NN12R
Type NN22R

Threaded connection, swivelling

24° sealing cone with O-ring, union nut DIN ISO 12151-2, series S of steel or stainless steel 1.4541 or 1.4571 (union nut 1.4571), welded or brazed

Fitting type	Material		Maximal operating temperature
	Threaded connection	O-ring	
NN12R	Steel	NBR (Perbunan)	-20 bis +90 °C
NN22R	Stainless steel	or FPM (Viton)	-20 bis +200 °C

Dimensions in mm, weight G in kg

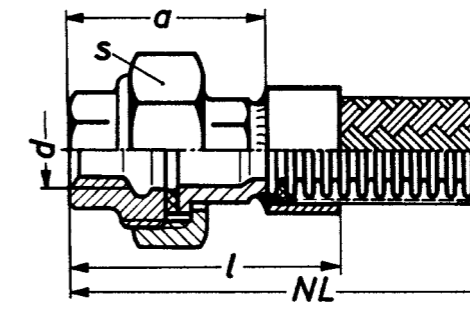
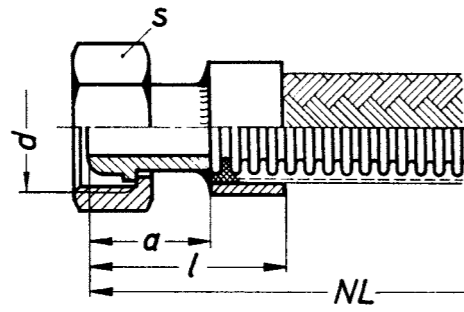
PN	630				400		250	
	6	8	10	12	16	20	25	32
DN	6	8	10	12	16	20	25	32
d	M18x1.5	M20x1.5	M22x1.5	M24x1.5	M30x2	M36x2	M42x2	M52x2
a	35	35	35	35	40	44	48	50
l	43	45	45	47	54	60	66	70
s	22	24	27	30	36	46	50	60
G approx.	0.05	0.06	0.08	0.1	0.16	0.30	0.37	0.58

Please quote when ordering: fitting type, nominal diameter (DN), operating temperature, material for O-ring, material no. if stainless steel

Associated pipe outside diameter	10	12	14	16	20	25	30	38

Note

This threaded connection is suitable for the tapping ring connection to DIN EN ISO 8434-1, series S or for connection to threaded pins with bore shape W (24°), series S to DIN 3861.



Type NO12S
Type NO22S
Type NO52S

Threaded connection, swivelling

Ball-type bushing to DIN 3863
union nut with metric thread DIN 3870, series LL
of steel, stainless steel 1.4541 or 1.4571 or brass
welded or brazed

Fitting type	Material	Maximal operating temperature
NO12S	Steel	300 °C
NO22S	Stainless steel	550 °C
NO52S	Brass	250 °C

Dimensions in mm, weight G in kg

PN	25										
	6	8	10	12	16	20	25	32	40	*50	*65
DN	M14x1.5	M16x1.5	M18x1.5	M22x1.5	M26x1.5	M30x1.5	M38x1.5	M45x1.5	M52x1.5	M65x2	M78x2
d											
a	24	24	24	29	29	29	31	31	31	34	40
l	32	34	34	41	43	45	49	51	53	59	68
s	17	19	22	27	32	36	46	50	60	75	90
G approx.	0.03	0.04	0.05	0.08	0.10	0.12	0.22	0.30	0.31	0.48	0.72

*DN 50 + 65 are not standardized!

Please quote when ordering: fitting type, nominal diameter (DN), operating temperature, material for O-ring, material no. if stainless steel

Note

This threaded connection is suitable for the connection to bore shapes U and Y (60°) to DIN 3863.

QA02S

Threaded fitting, internal thread

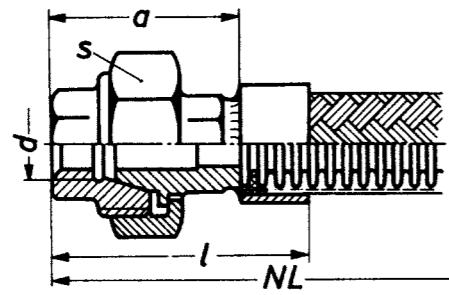
flat sealing,
with Whitworth pipe thread DIN EN 10226 (ISO 7/1)
of malleable cast iron, brazed

Fitting type	Maximal operating temperature	Maximal operating pressure
QA02S	see page 57	see page 57

Dimensions in mm, weight G in kg

DN	6	8	10	12	16	20	25	32	40	50
d	Rp ¹ / ₄	Rp ¹ / ₄	Rp ³ / ₈	Rp ¹ / ₂	Rp ¹ / ₂	Rp ³ / ₄	Rp1	Rp ¹ / ₄	Rp ¹ / ₂	Rp2
a	52	52	54	59	59	65	70	78	85	94
l	60	62	64	71	73	81	88	98	107	119
s	28	28	32	39	39	48	55	67	74	90
G approx.	0.11	0.12	0.14	0.18	0.19	0.31	0.42	0.68	0.87	1.31

Please quote when ordering: fitting type, nominal diameter (DN), operating temperature



QB02S

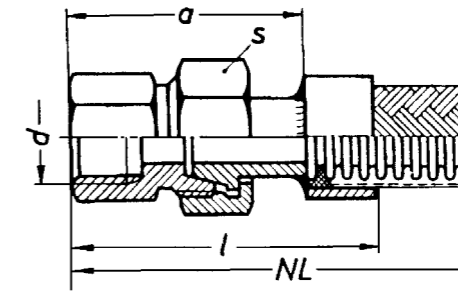
Threaded fitting, internal thread
conically sealing,
with Whitworth pipe thread DIN EN 10226 (ISO 7/1)
of malleable cast iron, brazed

Fitting type	Maximal operating temperature	Maximal operating pressure
QB02S	see page 57	see page 57

Dimensions in mm, weight G in kg

DN	6	8	10	12	16	20	25	32	40	50
d	Rp ^{1/4}	Rp ^{1/4}	Rp ^{3/8}	Rp ^{1/2}	Rp ^{1/2}	Rp ^{3/4}	Rp1	Rp1 ^{1/4}	Rp1 ^{1/2}	Rp2
a	52	52	54	59	59	65	70	78	85	94
l	60	62	64	71	73	81	88	98	107	119
s	28	28	32	39	39	48	55	67	74	90
G approx.	0.11	0.12	0.14	0.19	0.20	0.33	0.44	0.72	0.88	1.37

Please quote when ordering: fitting type, nominal diameter (DN), operating temperature



Type QB12W
Type QB22W
Type QB52W

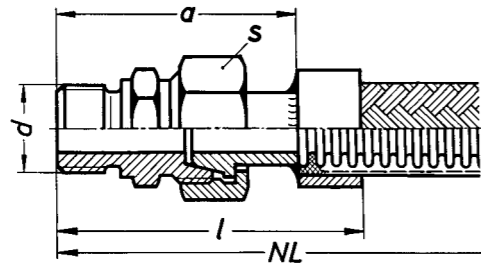
Threaded fitting, internal thread
conically sealing with 24° cone angle
suitable for bore shape W DIN 3861 L, DIN EN ISO 8434-1
with Whitworth pipe thread DIN EN 10226 (ISO 7/1)
of steel, stainless steel 1.4541 or 1.4571 (union nut 1.4301 in each case) or brass,
welded or brazed

Fitting type	Material	Maximal operating temperature
QB12W	Steel	300 °C
QB22W	Stainless steel	550 °C
QB52W	Brass	250 °C

Dimensions in mm, weight G in kg

PN	100							63		
	6	8	10	12	16	20	25	32	40	50
DN	6	8	10	12	16	20	25	32	40	50
d	Rp ^{1/4}	Rp ^{1/4}	Rp ^{3/8}	Rp ^{1/2}	Rp ^{1/2}	Rp ^{3/4}	Rp1	Rp1 ^{1/4}	Rp1 ^{1/2}	Rp2
a	43	44	47	52	53	60	66	71	75	83
l	51	54	57	64	67	76	84	91	97	108
s	17	19	22	27	32	36	41	50	60	70
G approx.	0.05	0.06	0.08	0.13	0.16	0.21	0.31	0.48	0.61	0.81

Please quote when ordering: fitting type, nominal diameter (DN), operating temperature, material no. if stainless steel



Type RB12W
Type RB22W
Type RB52W

Threaded fitting, external thread

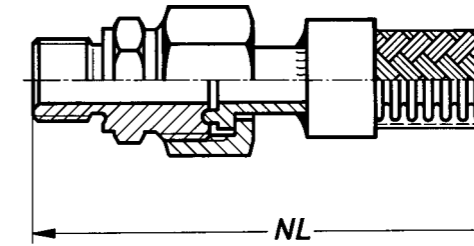
conically sealing with 24° cone angle
suitable for bore shape W to DIN 3861 L, DIN EN ISO 8434-1 L
with Whitworth pipe thread ISO 228/1
of steel, stainless steel 1.4541 or 1.4571 (union nut 1.4301) or brass,
welded or brazed

Fitting type	Material	Maximal operating temperature
RB12W	Steel	300 °C
RB22W	Stainless steel	550 °C
RB52W	Brass	250 °C

Dimensions in mm, weight G in kg

PN	100							63		
	6	8	10	12	16	20	25	32	40	50
DN	6	8	10	12	16	20	25	32	40	50
d	G ¹ / ₄ A	G ¹ / ₄ A	G ³ / ₈ A	G ¹ / ₂ A	G ¹ / ₂ A	G ³ / ₄ A	G1 A	G ¹ / ₄ A	G ¹ / ₂ A	G2 A
a	49	51	54	59	60	68	74	79	83	92
l	57	61	64	71	74	84	92	99	105	117
s	17	19	22	27	32	36	41	50	60	70
G approx.	0.05	0.06	0.08	0.13	0.16	0.21	0.32	0.5	0.68	0.93

Please quote when ordering: fitting type, nominal diameter (DN), operating temperature, material no. if stainless steel



Type RD16
Type RD26

High-pressure threaded fitting, external thread
without intermediate seal, metallically sealing
with Whitworth pipe thread ISO 228/1
of steel C22 or stainless steel,
welded

Application:

- High pressure
(also for pulsations, vibrations)
- Vacuum
- Critical media
(e.g. superheated steam, thermal oil)
- High temperatures

Nominal diameter:
DN 6 to DN 50

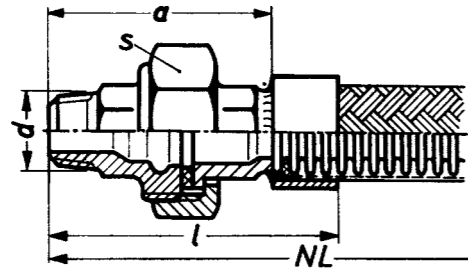
Operating pressure:
As per table
Higher pressure levels on request

Operating temperature:
As per table
Higher operating temperatures on request

Please quote when ordering:

- Fitting type
- Nominal diameter (DN)
- Operating temperature

Fitting type		Material	Maximal operating temperature
PN 100	PN 200	Steel	350 °C
RD16S	RD16W		
RD26S	RD26W	Stainless steel	400 °C



RE02S

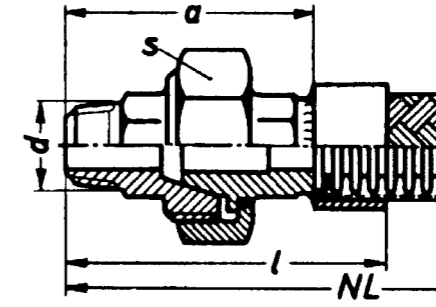
Threaded fitting, external thread
 flat sealing
 with Whitworth pipe thread DIN EN 10226 (ISO 7/1)
 of malleable cast iron
 brazed

Fitting type	Maximal operating temperature	Maximal operating pressure
RE02S	see page 57	see page 57

Dimensions in mm, weight G in kg

DN	12	16	20	25	32	40	50
d	R 1/2	R 1/2	R 3/4	R 1	R 1 1/4	R 1 1/2	R 2
a	77	77	86	93	103	111	123
l	89	91	102	111	123	133	148
s	39	39	48	55	67	74	90
G approx.	0.21	0.22	0.33	0.48	0.74	0.91	1.43

Please quote when ordering: fitting type, nominal diameter (DN), operating temperature



RF02S

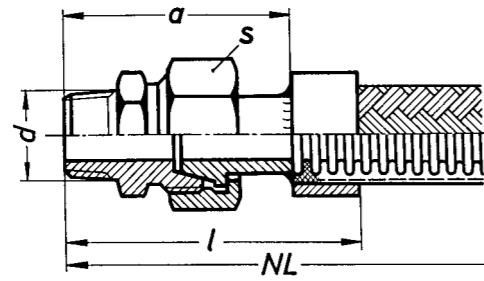
Threaded fitting, external thread
 conically sealing
 with Whitworth pipe thread DIN EN 10226 (ISO 7/1)
 of malleable cast iron
 brazed

Fitting type	Maximal operating temperature	Maximal operating pressure
RF02S	see page 57	see page 57

Dimensions in mm, weight G in kg

DN	6	8	10	12	16	20	25	32	40	50
d	R 1/4	R 1/4	R 3/8	R 1/2	R 1/2	R 3/4	R 1	R 1 1/4	R 1 1/2	R 2
a	66	66	69	77	77	86	93	103	111	123
l	74	76	79	89	91	102	111	123	133	148
s	28	28	32	39	39	50	55	67	74	90
G approx.	0.11	0.11	0.15	0.22	0.23	0.35	0.51	0.78	0.99	1.50

Please quote when ordering: fitting type, nominal diameter (DN), operating temperature



Type RF12W
Type RF22W
Type RF52W

Threaded fitting, external thread

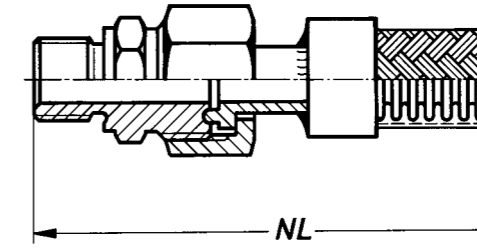
conically sealing with 24° cone angle
suitable for bore shape W DIN 3861L, DIN EN ISO 8434-1
with Whitworth pipe thread DIN EN 10226 (ISO 7/1)
of steel, stainless steel 1.4541 or 1.4571 or brass
welded or brazed

Fitting type	Material	Maximal operating temperature
RF12W	Steel	300 °C
RF22W	Stainless steel	550 °C
RF52W	Brass	250 °C

Dimensions in mm, weight G in kg

PN	100							63		
	6	8	10	12	16	20	25	32	40	50
DN	R 1/4	R 1/4	R 3/8	R 1/2	R 1/2	R 3/4	R 1	R 1 1/4	R 1 1/2	R 2
d	47	49	52	59	60	67	74	80	82	93
a	55	59	62	71	74	83	92	100	104	118
l	17	19	22	27	32	36	41	50	60	70
s	0.05	0.06	0.08	0.13	0.16	0.21	0.32	0.5	0.68	0.93
G approx.										

Please quote when ordering: fitting type, nominal diameter (DN), operating temperature, material no. if stainless steel



Type RM16
Type RM26

High-pressure threaded fitting, external thread
without intermediate seal, metallically sealing
with metric ISO thread to DIN 13
of steel C22 or stainless steel,
welded

Application:

- High pressure
(also for pulsations, vibrations)
- Vacuum
- Critical media
(e.g. superheated steam, thermal oil)
- High temperatures

Nominal diameter:
DN 6 to DN 50

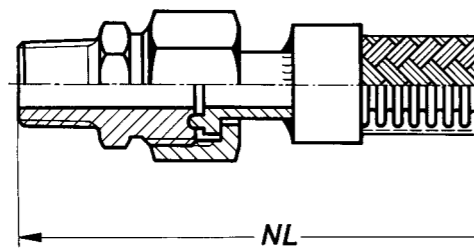
Operating pressure:
As per table
Higher pressure levels on request

Operating temperature:
As per table
Higher operating temperatures on request

Please quote when ordering:

- Fitting type
- Nominal diameter (DN)
- Operating temperature

Fitting type		Material	Maximal operating temperature
PN 100	PN 200		
RM16S	RM16W	Steel	350 °C
RM26S	RM26W	Stainless steel	400 °C



Type RN16
Type RN26

High-pressure threaded fitting, external thread
without intermediate seal, metallically sealing
with conical NPT thread ANSI B1.20.1
of steel C22 or stainless steel,
welded

Application:

- High pressure
(also for pulsations, vibrations)
- Vacuum
- High temperatures

Nominal diameter:

DN 6 to DN 50

Operating pressure:

As per table
Higher pressure levels on request

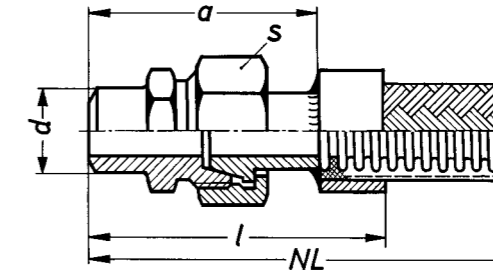
Operating temperature:

As per table
Higher operating temperatures on request

Please quote when ordering:

- Fitting type
- Nominal diameter (DN)
- Operating temperature

PN 100	Fitting type		Material	Maximal operating temperature
	PN 200			
RN16S	RN16W		Steel	350 °C
RN26S	RN26W		Stainless steel	400 °C



Type SS12W
Type SS22W

Threaded fitting, welding end

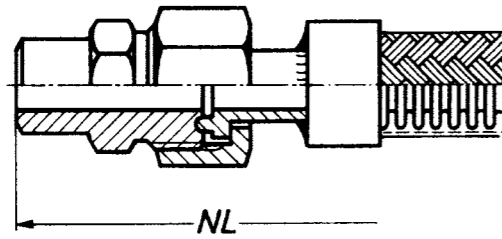
conically sealing with 24° cone angle
suitable for bore shape W DIN 3861 L, DIN EN ISO 8434-1L
with welding end, pipe dimensions ISO
of steel, stainless steel 1.4541 or 1.4571
welded or brazed

Fitting type	Material	Maximal operating temperature
SS12W	Steel	300 °C
SS22W	Stainless steel	550 °C

Dimensions in mm, weight G in kg

PN	100							63			
	DN	6	8	10	12	16	20	25	32	40	50
d		10.2	13.5	17.2	21.3	21.3	26.9	33.7	42.4	48.3	60.3
a		45	47	49	52	53	61	65	70	74	83
l		53	57	59	64	67	77	83	90	96	108
s		17	19	22	27	32	36	41	50	60	70
G approx.		0.04	0.05	0.07	0.11	0.13	0.23	0.29	0.44	0.64	1.01

Please quote when ordering: fitting type, nominal diameter (DN), operating temperature, material no. if stainless steel



Type ST16
Type ST26

High-pressure threaded fitting, welding end
without intermediate seal, metallurgically sealing
of steel C22 or stainless steel,
welded

- Application:**
- High pressure
(also for pulsations, vibrations)
 - Vacuum
 - Critical media
(e.g. superheated steam, thermal oil)
 - High temperatures

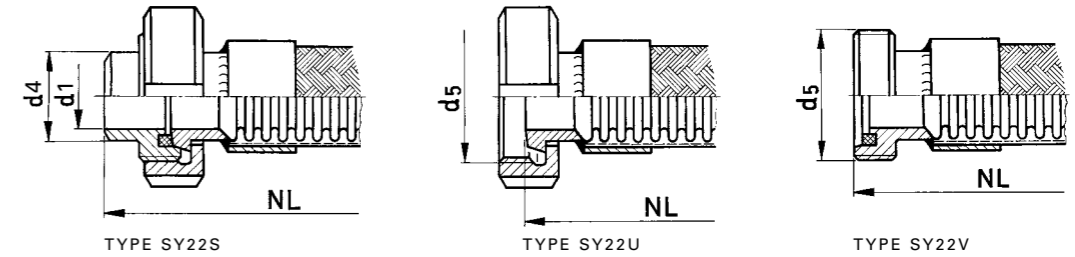
Nominal diameter:
DN 6 to DN 50

Operating pressure:
As per table
Higher pressure levels on request

Operating temperature:
As per table
Higher operating temperatures on request

- Please quote when ordering:**
- Fitting type
 - Nominal diameter (DN)
 - Operating temperature

Fitting type		Material	Maximal operating temperature
PN 100	PN 200		
ST16S	ST16W	Steel	350 °C
ST26S	ST26W	Stainless steel	400 °C



Type SY22S
Type SY22U
Type SY22V

Threaded fitting, DIN 11851 for liquid foodstuffs
of stainless steel 1.4301, welded without burr and gap,
sterilizable

Fitting type	Material		Maximal operating temperature
	Threaded fitting	Sealing ring	
SY22S	Stainless steel 1.4301	NBR (Perbunan)	20 to +230 °C depending on seal material and flow medium
SY22U	Other material no. on request	FPM (Viton)	
SY22V		MVQ (Silicone) or PTFE (Teflon)	

Type SY22S
Ball-type socket with grooved union nut with round thread DIN 405. Threaded pipe socket with welding end.

Type SY22U
Ball-type socket with grooved union nut with round thread DIN 405.

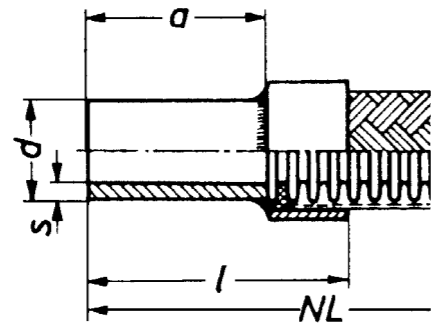
Type SY22V
Threaded pipe socket with sealing ring.

Dimensions in mm, weight G in kg

PN	40							25		
	10	16	20	25	32	40	50	65	80	100
d4*	13	19	23	29	35	41	53	70	85	104
d1*	10	16	20	26	32	38	50	66	81	100
d5	Rd28x ¹ / ₈	Rd34x ¹ / ₈	Rd44x ¹ / ₆	Rd52x ¹ / ₆	Rd58x ¹ / ₆	Rd65x ¹ / ₆	Rd78x ¹ / ₆	Rd95x ¹ / ₆	Rd110x ¹ / ₄	Rd130x ¹ / ₄

*If required, also with ISO pipe dimensions, see page 46.

Please quote when ordering: fitting type, nominal diameter (DN), operating temperature, sealing ring material or medium and pressure.



Type UA12S
Type UA22S

Pipe fitting
Welding end with
ISO pipe dimensions
of steel or stainless steel 1.4541 or 1.4571
welded or brazed

Fitting type	Material	Maximal operating temperature
UA12S	Steel	480 °C
UA22S	Stainless steel	550 °C

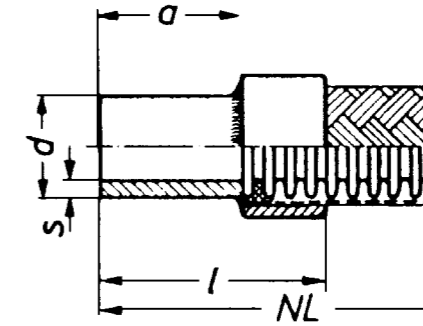
Dimensions in mm, weight G in kg

PN	160				100		40										16	
	8	10	12	16	20	25	32	40	50	65	80	100	125	150	200	250	300	
d	10.0 ²⁾	13.5	17.2	21.3	26.9	33.7	42.4	48.3	60.3	76.1	88.9	114.3	139.7	168.3	219.1	273	323.9	
s	1.5 ²⁾	1.8 ¹⁾	1.8 ¹⁾	2	2.3	2.6	2.6	2.6	2.9	2.9	3.2	3.6	4	4.5	6.3	6.3	7.1	
a	50	55	55	60	60	65	65	70	70	75	80	85	85	90	100	100	120	
l	60	65	67	74	76	83	85	92	95	103	110	117	121	130	145	150	175	
G approx.	0.04	0.05	0.06	0.08	0.13	0.18	0.26	0.30	0.41	0.55	0.74	1.10	1.54	2.14	3.83	5.13	7.95	

¹⁾ if stainless steel: s = 1.6

²⁾ if steel: 10.2 x 1.6

Please quote when ordering: fitting type, nominal diameter (DN), operating temperature, material no. if stainless steel



Type UD12Q
Type UD22Q

Pipe fitting
Precision pipe socket for
tapping ring fitting DIN 3861 (series L), DIN EN ISO 8434-1
of steel or stainless steel 1.4541 or 1.4571,
welded or brazed

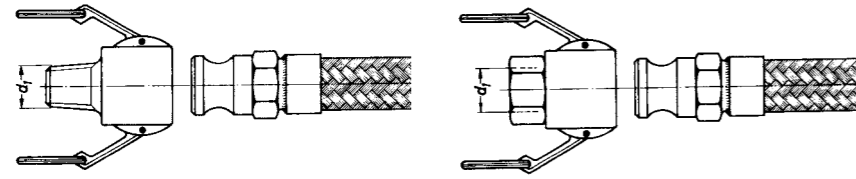
Fitting type	Material	Maximal operating temperature
UD12Q	Steel	300 °C
UD22Q	Stainless steel	550 °C

Dimensions in mm, weight G in kg

PN	250				160		100		
	6*	8*	10*	12*	16*	20*	25	32	40
DN	6*	8*	10*	12*	16*	20*	25	32	40
d	8	10	12	15	18	22	28	35	42
s	1	1.5	1.5	2	1.5	2	2	2	3
a	28	30	30	32	32	36	40	45	45
l	36	40	40	44	46	52	58	65	67
G approx.	0.02	0.02	0.03	0.04	0.04	0.06	0.10	0.14	0.18

* also suitable for Swagelok® threaded fittings for metric pipe dimensions

Please quote when ordering: fitting type, nominal diameter (DN), operating temperature, material no. if stainless steel



Type WA22S
Type WA32S

Quick-release coupling

Lever arm coupling DIN EN 14420-7 with internal Whitworth pipe thread ISO 228/1 or external Whitworth thread DIN EN 10226 (ISO 7/1) of brass or stainless steel welded or brazed

Fitting type	Material		Maximal operating pressure	Maximal operating temperature
	Quick-release coupling	Sealing ring		
WA22S	Stainless steel	NBR (Perbunan)	25 bar	65 °C (NBR) FPM on request
WA32S	Brass	FPM (Viton)		

DN	20	25	32	40	50	65	80	100
d1 R/G	¾	1	1 ¼	1 ½	2	2 ½	3	4

This quick-release coupling is characterised by simple handling, quick installation, robust construction and long service life. Offering safe and pressure-proof coupling, the connection is made by plugging the two halves of the coupling together then locking them by flipping the two cam levers. Because the inserted sealing ring is compressed and not subjected to rotational movement during the coupling action, the connection is made with no damaging twisting of the hose.

Applications:

Lever arm couplings to DIN EN 14420-7 are designed for joining hoses with connection fittings that are intended

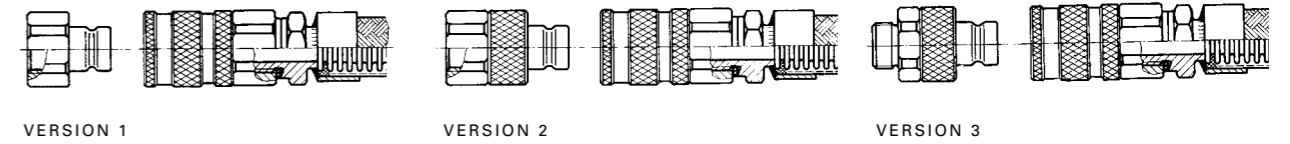
to carry liquids, solids and gases, except liquid gas and steam. Use for substances falling under the Hazardous Substances Regulations (GefStoffV) must be specifically checked. The couplings can be used in the pressure range -800 mbar to 25 bar within a range of operating temperatures from -20 °C to +65 °C.

WARNING: Reduce internal pressure before decoupling.

Please state when ordering:

Fitting type, nominal diameter (DN), operating temperature, internal and external thread, seal material or medium and pressure.

If only one half of the coupling is required (male of female part), this must be specifically stated. Other DN on request.



Type WB12S
Type WB22S
Type WB52S

Quick-sealing coupling

connected at hose end with thread fitting Type MA ... (page 23) consisting of sealing coupling (female part) and coupling nipple (male part) Thread: Whitworth pipe thread ISO 228/1

Fitting type P _{zul} bar and vacuum	Material		Maximal operating temperature
	Coupling	Sealing ring	
WB12S	Steel, galvanized	NBR (Perbunan)	-50 to +200 °C depending on seal material and flow medium
WB22S	Stainless steel	FPM (Viton)	
WB52S	Brass	EP (Ethylene-propylene)	

Nominal diameter: DN 6 to DIN 50, larger sizes on request

Please quote when ordering: fitting type, nominal diameter (DN), operating temperature, version for male part and/or female part, seal material or medium and pressure.

Other materials and versions on request.

Version 1

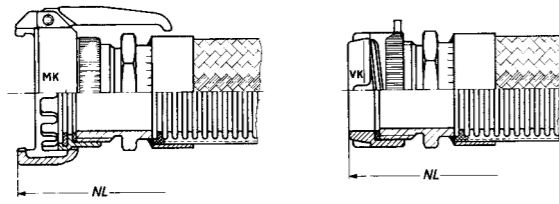
Sealing coupling (female part) – self-sealing after uncoupling
Coupling nipple (male part) with internal thread – free inner surface

Version 2

Sealing coupling (female part) – self-sealing after uncoupling
Sealing nipple (male part) with internal thread – self-sealing after uncoupling

Version 3

Sealing coupling (female part) – self-sealing after uncoupling
Sealing nipple (male part) with external thread – self-sealing after uncoupling



Type WC22S
Type WC52S

Hose with
fittings

Quick-release coupling for fuel vehicles DIN 28450

connected at hose end with thread fitting Type MA ... (page 23) consisting of swivelling female part (MK coupling) with coupling levers or fixed male part (VK coupling)

Both male part and female part can be fitted to the hose.
Thread: Whitworth pipe thread ISO 228/1

Fitting type PN 10	Coupling	Material		Maximal operating temperature
		Sealing ring		
WC22S	Stainless steel	AU, EU (Vulkollan) NBR (Perbunan) FPM (Viton)		100 °C
WC52S	Brass	CSM (Hypalon) or PTFE (Teflon)		

DN	50	80	100
Nominal diameter designation for:			
Male part	VK50	VK80	VK100
Female part	MK50	MK80	MK100

**Please quote when ordering: fitting type, operating temperature, nominal diameter designation for male part and/or female part, seal material or medium and pressure.
Higher temperatures on request.*

Most of the fittings described on the following pages are available from stock or can be obtained at short notice. It goes without saying that others and special connection fittings can be supplied, e.g. NPT thread, ANSI flange, tongue and groove type, etc.

Below is an example of a detailed ordering:

for hot water, 12 bar, 180 °C
properties of medium as defined in PED:
Group 1 non-hazardous liquid,
pD > 0.5 bar, PED Section 3 Para. (3),
Sound Engineering Practice
quantity 10, DN 50,
nominal length 2000 mm

HYDRA annularly corrugated hose, medium version, normal corrugation, of stainless steel 1.4404 with single braiding of stainless steel 1.4301.
Connection fittings, WIG-welded:
1.4301 stainless steel end sleeves at both ends
at one end: welding collar of stainless steel 1.4571 and loose flange PN 16 of steel, flange dimensions to DIN 2501
at other end: welding end 60.3 x 2.9 x 70 of 1.4571 stainless steel.

The short form sufficient for us:
for hot water 12 bar, 180 °C
RS 331L12 (1.4404), GIP
DN 50 NL 2000
one end: AB82E (1.4571)
other end: UA22S (1.4571)
welded
quantity 10

Resistant
in any
application

The following guidelines are recommended for selection of the length of individual hoses:

Corrugated metal hoses

Annularly corrugated hoses with or without braiding are measured when laid out straight and without internal pressure.

Metal stripwound hoses

Protective hoses

Types SA, SD, SG, SV, SZ are measured in the extended position (up to the stop).

Feed and suction hoses

- Types FA, FG, FS with or without seal are measured in the extended position (up to the stop).
- Types SD, SV, FG, FS with rubber seal are measured in the mean position of the movable profile convolutions. (The hose is rolled together as far as the stop and then stretched out straight again).

Permissible deviations

The nominal length (NL) relates to a hose provided with connection fittings and describes the overall length of the hose. Unless otherwise agreed when ordering, the following permissible length deviations should be taken into account when determining the nominal length:

Nominal length in mm	Permissible length deviation
up to 500	+ 10 mm - 5 mm
over 500 up to 1000	+ 15 mm - 10 mm
over 1000	+ 1,5% - 1,0%

Smaller length tolerances are possible but must be specifically agreed when ordering.

Standards

As a market and technology leader, Witzemann is represented in the most important national and international standardization committees and industrial associations. Not least for the sake of users, we work to raise and harmonize the quality standards for metal hoses.

The past ten years, in particular, have seen an abundance of standardization activities that have led to the publication of new or revised standards, although further important standards are being presently revised or prepared. These include DIN 2827 "Hoses of stainless steel for chemical substances".

The two most important bodies of regulation include European Directive 97/23/EC (Pressure Equipment Directive – PED) with the associated product standard DIN EN 14585-1 "Corrugated metal hose assemblies for pressure applications" as well as DIN EN ISO 10380 "Corrugated metal hoses and hose assemblies". A few explanations on this are given below.

Pressure equipment directive DIN EN 14585-1

After a five-year transitional period, EC directive 97/23/EC was introduced with binding effect on 29 May 2002. The so-called Pressure Equipment Directive (PED) is important for both users and manufacturers alike. It has legal status and in crucial cases must therefore be observed.

This directive regulates the manufacture and putting onto the market of pressure vessels with a maximum permissible operating pressure of PS > 0.5 bar. According to the terminology of the directive, metal hoses belong to the pressure equipment category of "Pipework".

The directive essentially only applies to deliveries within or into the European Union. The directive cites a whole range of exceptions, some of which fall under the scope of other guidelines. Among others, these include applications in the aerospace industry, nuclear engineering, automotive engineering and the medical industry.

The essential element of the PED is that pressure vessels are classified into different categories according to the hazard potential they present. The hazard potential of metal hoses depends on the nominal diameter, the maximum permissible operating or design pressure PS, the dangerousness of the medium, the state of aggregation (liquid/gaseous) and the vapour pressure of the medium.

In addition to the segment for which sound engineering practice (SEP) applies, categories I to III were defined for metal hoses. Hose assemblies of categories I–III are stamped with the CE mark.

The hose manufacturer must carry out a conformity assessment relating to the relevant category. There are 9 different procedures with 11 modules available for this. The modules describe procedures which the manufacturer must use to establish and declare that the respective product conforms to the requirements of the directive.

However, the directive only describes the fundamental requirements on pressure vessels. More detailed stipulations for specific components are stated in the respective engineering or product standards.

The product standard DIN EN 14585-1 that is decisive for metal hoses was published at the beginning of 2006.

DIN EN 14585-1 refers to DIN EN ISO 10380 in respect of type examinations, among other things.

Standards

It goes without saying that our corrugated hoses conform to the PED in respect of design, material specification, method of manufacture, etc. The stainless steel corrugated hoses conform to DIN EN 14585-1 and DIN EN ISO 10380.

With their quality systems, welding approvals and supplier selection procedures, the companies of the Witzemann Group also satisfy the requirements for the supply of hose assemblies conforming to the PED. Since metal hose specifications are generally customized to suit their intended use, they can only be categorized and assessed for conformity on the basis of the respective operating parameters.

For this, please use the inquiry specification on page 62 or our design program Flexperte, which is available on CD ROM or for download on the Internet at www.flexperte.com. The program also determines the relevant category from the PED.

If the customer gives no details on the medium and operating conditions, we assume that the hose assembly falls within the bounds of sound engineering practice as defined by the PED.

DIN EN ISO 10380

The general and currently most important standard for corrugated metal hoses is DIN EN ISO 10380 "Corrugated metal hoses and hose assemblies" of October 2003. ISO 10380 is the first to establish important standards worldwide, especially in respect of the design, manufacture and testing of metal hoses.

As meant by the PED, this has the nature of a supporting standard.

Essential new definitions are a 4-to-1 bursting pressure safety factor and the introduction of nominal pressure levels. A 3-to-1 bursting pressure safety factor was previously widespread in Europe.

The majority of our annularly corrugated hose products have been tested in accordance with this standard and the technical data modified accordingly.

The raised bursting pressure safety factor and the introduction of pressure levels mean that, on a purely calculated basis, the stated nominal/operating pressures are significantly lower than in the past.

Our product range therefore offers you maximum safety for your application corresponding to the latest state of technical development.

If you intend to compare our data with those of other manufacturers, please make sure their products also offer a 4-to-1 bursting pressure safety factor.

Design

The two fundamental static design criteria for metal hoses described in DIN EN ISO 10380 are the bursting pressure and the permanent elongation under pressure (where $PT = 1.5 \times PS$). These criteria define the strength of metal hose, braiding, fitting and jointing method.

The standard specifies that the service life be tested on the basis of load cycles for a few important installation types by way of example. For hose assemblies of diameters up to DN 100, an average life of 10,000 load cycles applies to installation in a vertical U-bend, with a minimum service life of 8,000 load cycles (with unlubricated braiding).

The principal factors affecting service life are:

- Operating pressure
- Operating temperature
- Installation situation (shape and radius, among other things)
- Correct storage, handling and assembly
- Corrosion resistance to the piped medium and external influences such as sea water
- Dynamic stresses caused by movement, vibration or pressure pulses, among other things
- Flow conditions (depending on the properties and flow rate of the medium).

Service life issues usually relate to braided hose assemblies. A variety of failure mechanisms are associated with these. The system for connecting the metal hose to the fitting and friction effects between hose and braiding also play a significant role in this. However, it is still only possible to estimate these effects very approximately using calculation methods. Wherever there is a risk of injury to persons or excessive damage to equipment or other property through failure of a hose, the manufacturer must be informed before the order is placed.

In these cases, it is necessary to verify the service life through empirical methods or a combination of empirical and calculation methods. We have the necessary facilities and methods to do this. Please contact us if this is the case.

Metal hoses for use in vehicles are as a matter of principle subject to particular quality standards and must be separately specified in consultation with us.

Dynamic reduction factors

Historically, we have taken account of the effects of dynamic stresses by applying reduction factors to the pressure dimensioning.

The change of test conditions stipulated by DIN EN ISO 10380 (load cycle tests at the rated pressure) can mean that a reduction is necessary as a result of the movements covered by the tests.

The rated pressures given in the tables that are defined in DIN EN ISO 10380 also apply to applications for the absorption of movement, heat expansion and vibration provided the design guidelines are observed for the respective application.

Where unusual mechanical stresses such as pressure pulses, jerky movements or heavy vibration / resonant vibration are expected in operation, assemblies must be individually designed in consultation with us.

Reduction factors

Reduction factors for higher operating temperature

The permissible operating pressures given for metal hoses and connection fittings in the tables of this manual apply to operating conditions at ambient temperature (20 °C). At higher operating temperatures, these operating pressures must be reduced.

In many cases, metal hose assemblies must be of a design that conforms to PED 97/23/EC, the associated product standard EN 14585 as well as supporting standards such as DIN EN ISO 10380. Among other materials, the latter specifies reduction factors for stainless steels at higher

operating temperatures. For metal hose assemblies for which the reduction is not specified in ISO 10380, the reduction in operating pressure needs to be calculated by means of the fall in high-temperature strength, the strength characteristic values being those specified by the material manufacturer or validated measurements from our own material tests.

The following table gives an overview of the respective pressure reduction factors for the most frequently used materials.

Parameter	Temperature °C												
	20	50	100	150	200	250	300	350	400	450	500	550	
	Reduction factors												
Material	1.4306	1.00	0.89	0.72	0.64	0.58	0.54	0.50	0.48	0.46	0.44	0.43	0.43
	1.4301	1.00	0.90	0.73	0.66	0.60	0.55	0.51	0.49	0.48	0.46	0.46	0.46
	1.4541	1.00	0.93	0.83	0.78	0.74	0.70	0.66	0.64	0.62	0.60	0.59	0.58
	1.4404 1.4435	1.00	0.90	0.73	0.67	0.61	0.58	0.53	0.51	0.50	0.49	0.47	0.47
	1.4401	1.00	0.91	0.78	0.70	0.65	0.61	0.57	0.55	0.53	0.52	0.51	0.50
	1.4571	1.00	0.92	0.80	0.76	0.72	0.68	0.64	0.62	0.60	0.59	0.58	0.58
	Bronze	1.00	0.95	0.90	0.80	0.75	0.70						

Operating pressure

Threaded fasteners of malleable cast iron are applicable up to the operating pressures indicated in the table below, depending on type of fluid and operating temperature.

permissible operating pressure for the fluids					
DN	d inch	water and gas up to max. 120 °C	gases and steam up to max. 150 °C	gases and steam up to max. 300 °C	oils up to 200 °C
nipples, flat sealing threaded fasteners					
6 - 50	1/4 - 2	65 bar	50 bar	40 bar	35 bar
conically sealing threaded fasteners					
6 - 32	1/4 - 1 1/4	65 bar	50 bar	40 bar	35 bar
40	1 1/2	65 bar	50 bar	40 bar	30 bar
50	2	55 bar	40 bar	32 bar	24 bar

Sealing is to be carried out with special care. The sealing materials are to be selected according to the operating conditions. Only approved sealing materials must be applied for sealing of threaded fasteners in drinking water and gas insulations.

Only high-quality threads are appropriate for high operating requirements.

Operating pressure

Material requirements for low-temperature applications

EN 14585 essentially permits the use of stainless steels down to -200°C in accordance with the following table, although the material 1.4301 is allowed only as braiding material. In addition, only the materials 1.4306 and 1.4435 may be used down to -270°C.

Note 1: The revision of product standard EN 14585 has already been started with its publication.

Note 2: The regulations harmonized in accordance with PED include, among others, the AD 2000 set of rules. Under AD 2000-W10, the materials 1.4541 and 1.4571 can be used down to -270°C, while a notched bar impact test at -196°C is specified. When applying the AD 2000 set of rules, it is important to understand its overall concept.

Conversion of operating pressure to standard conditions at 20°C

$$p_{20\text{ °C}} = PS/k_t$$

$p_{20\text{ °C}}$ = operating pressure converted to standard conditions at 20°C in bar

PS = permissible operating pressure at operating temperature
TS in bar

k_t = temperature reduction factor; values from table on page 56

Calculation example

HYDRA annularly corrugated hose, DN 50
Operating temperature TS: 200°C
Operating pressure PS: 13 bar

Temperature reduction factor
for 1.4301 : $k_t = 0,60$
(apply lowest value of hose or braiding, table on page 56)

$$p_{20\text{ °C}} = PS/k_t$$

$$p_{20\text{ °C}} = 13/0,60 = 21,7 \text{ bar}$$

The nominal pressure level of a suitable metal hose must be at least as great as the converted operating pressure, e.g. RS331L12, DN 50, **PN 25**.

Installation

Safety advice

HYDRA metal hoses are quality products. They are reliable and have a long service life. However, it is essential to choose the correct hose design and that the hose is properly and perfectly installed. If you have any doubts, please contact us for advice. The most important safety advice is given below. The safety advice and installation instructions are available in the form of a leaflet.

Design and service life

Hose assemblies may only be used for the operating and installation conditions named in the order and certified by the manufacturer. There is a whole series of factors that have a major affect on service life. Please refer to the explanations on page 55 on this.

Correct choice of hose assembly length

Connections must have no movement or bending stresses acting directly on them. This so-called "neutral" component at the ends of hoses must be adequately dimensioned. Where necessary, this is taken into account in the dimensioning formulae. A kink protection device can be fitted at the ends if required. To determine the correct hose length, calculation formulae are available for a variety of installation shapes at www.flexperte.de

Effect of temperature

The rated pressure / operating pressure given in each case for our hoses relates to ambient temperature (20°C). At higher temperatures, the maximum operating pressure and service life are reduced. Temperature reduction factors must be taken into account when calculating the maximum operating pressure (see page 56).

Materials/corrosion

The suitability and choice of materials of all the components of a hose assembly must be checked with the help of the resistance tables in industry literature or the HYDRA manual. Also to be taken into account are the resistance of the hose to the carried medium in all operating conditions and also to external influences such as seawater (sea atmosphere). In addition, no insulating materials that could trigger corrosion may be affixed. Etching and passivating, especially of braided hose assemblies, is not permitted since the construction of the hose makes it difficult to remove all etching and passivating residues afterwards and can therefore cause corrosion.

Tests

As a matter of principle, all corrugated hose assemblies are subjected to a pressure and leak test before shipment. HYDRA metal hose assemblies require no maintenance. However, the user should perform regular visual checks at intervals appropriate for the operating conditions. In particular, hoses should be examined for defects such as kinks, corrosion and braiding damage.

Metal hose assemblies with visible defects should be immediately taken out of service!

In many areas, hose assemblies fall under the Industrial Health and Safety Regulations or other regulations. Please abide by the rules that apply to your area.

If you or a third party carries out pressure tests, the maximum permissible test pressure for the metal hose assembly must not be exceeded. The test pressure is 1.5 times the operating pressure at 20°C or rated pressure PN stated in the technical table of hose types.

Installation

Handling and assembly

Hose assemblies must be protected from external mechanical damage. They should therefore not be dragged along the ground or over sharp edges. Physical contact with other hoses or surrounding objects must be avoided during operation.

The hose assembly must be checked for damage before installation!

The hose should not be bent tighter than the minimum **bending radius**. The values can be found in the tables for the selected hose type.

Torsion must be avoided since this can result in premature failure. Therefore make sure you adhere to the following assembly sequence:

First, fully tighten the connection fitting of the hose assembly at one end. Where the hose assembly has one fixed fitting and one swivel fitting, start with the fixed fitting. In the case of hose assemblies that are intended to absorb movements, first connect the other end loosely. Then perform the expected movement of the hose 2 to 3 times in the relevant direction in order to align it without torsion. You can now tighten this end too.

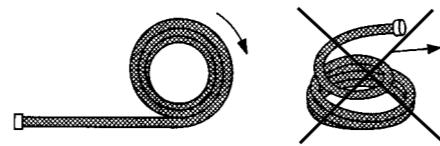
In the case of screwed joints, it is essential to use a second spanner to brace the hose against twisting. When selecting the connection fittings, make sure at least one end of the hose assembly is connected by means of a swivel joint.

Where there will be movements in operation, fit the hose so that hose axis and direction of movement are in one plane so that no torsion can arise.

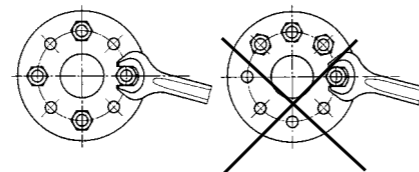
During welding or soldering, the hose assemblies must be protected from welding or soldering flux spatter. Carefully remove any flux residue. Appropriate measures must be taken to protect soldered joints of the fittings from overheating / unsoldering. Be sure to prevent short-circuits through welding electrodes or earthing cables, since this can destroy the hose.

Example 1

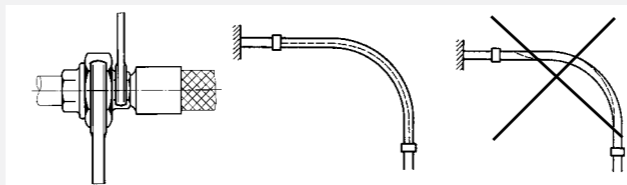
Lay hose assembly out straight by unrolling the hose coil. Avoid pulling on one end of the hose coil, as this will bend the hose tighter than the minimum permissible radius while subjecting the hose to too much torsional stress.

**Example 2**

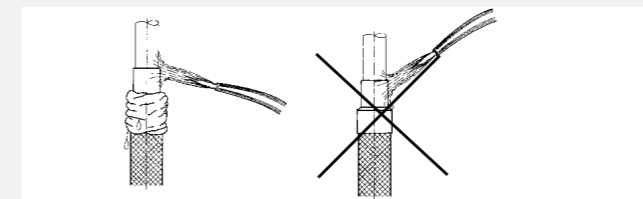
Tighten mating flanges evenly (crosswise). The bolt holes of the two flanges must be precisely aligned. Use a loose flange on one side.

**Examples 3**

Make sure hose assembly is not twisted when connecting. If using swivel hose connections, use a second spanner to brace the hose end. If the hose serves to absorb expansion or vibration, a reliable anchor must be fixed to the pipe section directly after the hose.

**Example 4**

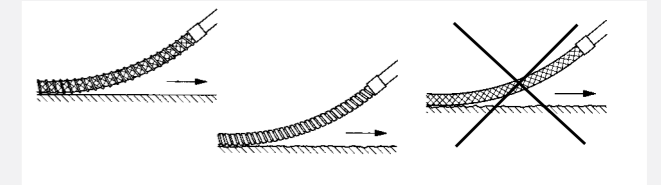
When making soldered joints, use a wet tape or heat insulating paste to protect the end of the hose assembly to be soldered from overheating and unsoldering. Keep the gas torch away from the hose assembly. Carefully remove any flux residue.

**Example 5**

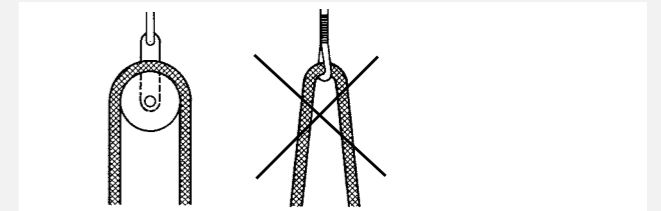
Make sure you handle metal hoses correctly, any damage to the hose can cause leaks. Avoid pulling on a rolled-up hose to straighten it out, uncoil it instead.

**Example 6**

If it is impossible to avoid mechanical stresses (for example, through frequent dragging along the ground), it may be necessary to protect the hose assembly from damage by using either an external round wire spiral or a protective hose.

**Example 7**

Avoid excessive bending stress on the hose by using a roller with a diameter at least as large as the minimum bending radius of the hose.

**Example 8**

Even when using the hose manually, the hose end should be protected from excessive bending stress by the use of a rigid elbow.

