HYDRA®
Quality by Witzenmann

WITZENMANN
managing flexibility

THE GROUP

With 24 companies in 19 countries
Witzenmann is the global number 1 in the industry

World leader
Witzenmann is a global group specialising in the design and manufacture of flexible metal elements. Guided by our vision of "managing flexibility", our company has become renowned as a reliable manufacturer and as the innovative development partner of choice within the industry. Today, Witzenmann offers the widest product range worldwide for the most diverse areas of application. This enables us to offer the correct solutions time and time again.

Witzenmann Española, S.A.

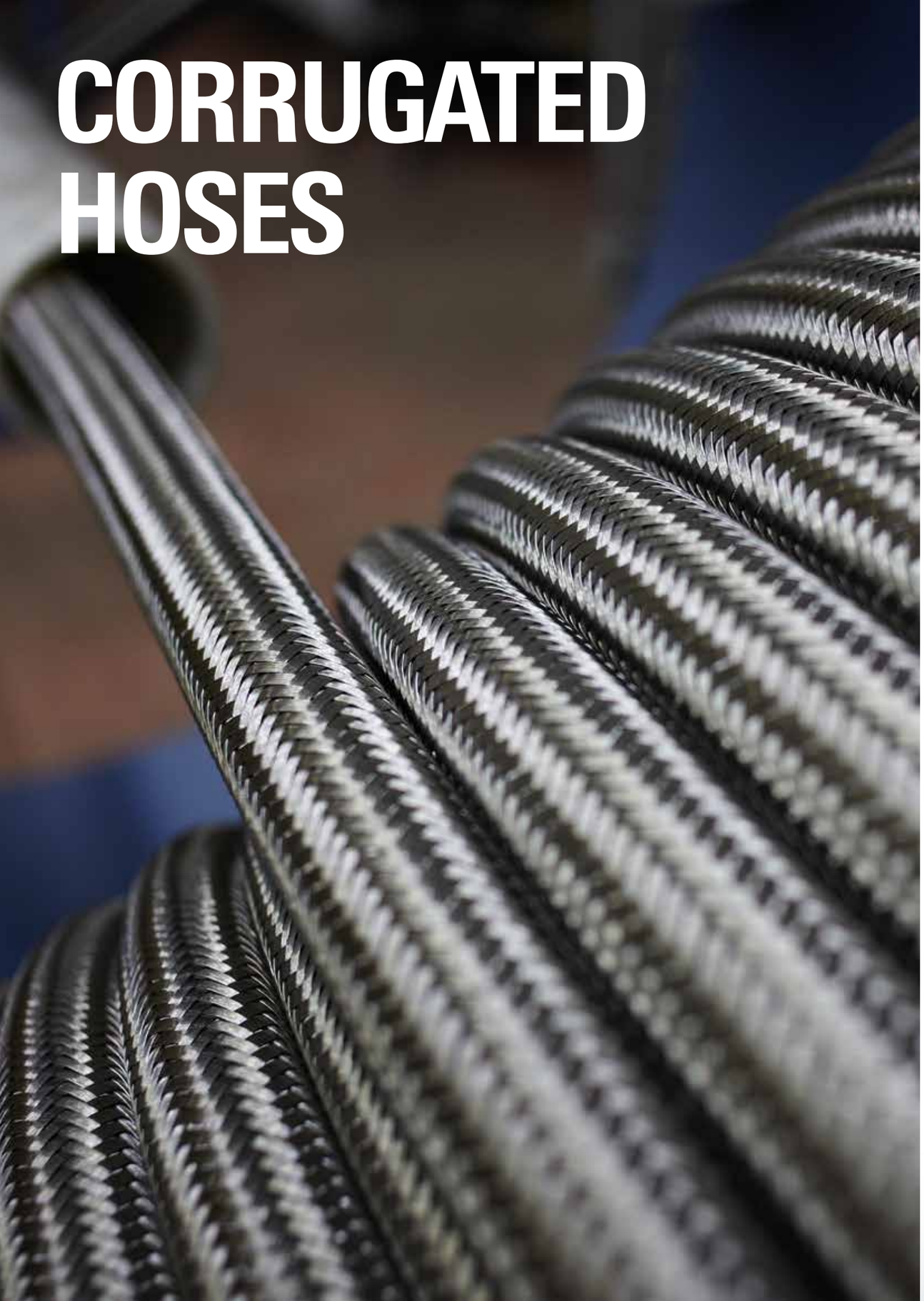
Calle Livorno s/n. Pol. Ind. Henares.
19004, Guadalajara (España).
Tel. 0034 949 325 222
Fax. 0034 949 325 208
industrial@witzenmann.com
www.witzenmann.es

8315uk/1/10/15/3

STANDARD CORRUGATED HOSE RANGE

CONTENTS

CORRUGATED HOSES



The most common hose types are described in the following section. Information about the version and corrugation is essential for defining the hose characteristics:

Corrugation	Wall thick-ness	Pressure resistance	Flexibility
narrow Hose type RS 321	standard	+	++++
standard Hose type RS 531, RS 430, RS 331	standard	++	+++
	increased	+++	++
wide Hose type RS 341	standard	++	++

It should be noted in this regard that the compressive strength increases with wall thickness but also with the length of the corrugation. By contrast, flexibility is reduced as corrugation length increases but also as wall strength increases.

The technical data tables are each preceded with a description of the hose type. If you cannot find "your" hose, please contact us. Witzenmann manufactures a large number of types of hose. There will certainly be a hose for your application among them.

Operating pressure
The following tables contain two pressure specifications:

1.) Permitted operating pressure P_{perm} at 20 °C for static pressure load without movement with quadruple security against bursting (SF 4).

2.) Nominal pressure in accordance with DIN EN ISO 10380: Maximum permissible pressure in accordance with DIN EN ISO 10380.
The maximum permissible pressure includes, among other things, a safety factor of 4 (SF4) against bursting and an average flexibility of 10,000 load alternations in the U-bend expansion joint.

For both pressure specifications, reduction factors apply at increased operating temperatures. (see p. 46)

CORRUGATED HOSES AND THEIR NAMES

The name of the hoses provides information on the annularly corrugated hose used, the braid and the nominal diameter. RS321 S00 DN32 for example stands for a tightly-corrugated annularly corrugated hose (RS321) with a nominal diameter of 32 (DN32) without connectors and without braid (S00). RS531L22 DN10 indicates a hose assembly with a nominal diameter of 10 (DN10), consisting of an annularly corrugated hose with standard corrugation and increased wall thickness (RS531) with connectors and double braid (L22).

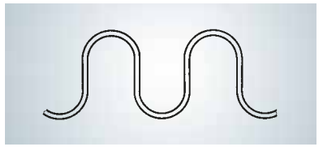
Maximum permissible nominal pressures in accordance with DIN EN 10380 for braided goods sold by the metre, for dynamic applications

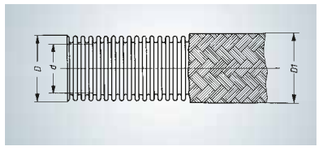
Nominal diameter	Max. rated pressure PN in accordance with DIN EN 10380 for braided goods sold by the metre					
	RS 331 / 330	RS 321	RS 341	RS 531	RS 430	RZ 331
4/5	100			200		
6	150	100	100	250		
8	125	100	100	250		60
10	100	80	65	225		45
12	75	50	65	200		35
15/16	65	50	65	200		32
20	40	40	40		100	30
25	65	40	50		100	30
32	25	20	25		80	30
40	40	20	40		65	25
50	30	16	25		65	28
65	25	16	25		50	
80	16	10	25		25	
100	10	4	16		16	
125	6				16	
150	6				16	
200					16	
250					10	
300					6	

ANNULARLY CORRUGATED MEDIUM VERSION, STANDARD CORRUGATIONS

Type RS 331 (up to DN 100), Type 330 (from DN 125)
Standard corrugation, standard wall thickness

Type RS 331/330





Design
Annularly corrugated hose made of butt-welded pipe, mechanically corrugated (DN 4 to DN 100) or hydraulically corrugated (from DN 125)

Versions
- RS 330 / RS 331 S00 without braid
- RS 330 / RS 331 S12 with single braiding

Maximum production length
- DN 4 30 m
- DN 6-50 100 m
- DN 65-100 20 m
- DN 125-150 10 m

Longer hose lines on request

Standard materials
- Annularly corrugated hose 1.4404 or 1.4541
- Braiding 1.4301

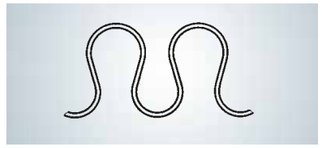
Other materials are available on request.

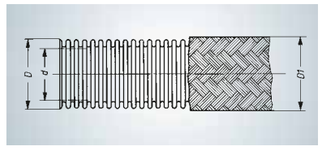
DN	Type	Inside diameter	Outside diameter	Permissible deviation	Minimum bending radius single bend	Rated bending radius frequent movements	Permissible static operating pressure at 20 °C SF4	Nominal pressure DIN EN ISO 10380 SF4	Weight approx.
-	-	d	D, D1	d, D, D1	r_{min}	r_n	P_{perm}	PN	-
-	-	mm	mm	mm	mm	mm	bar	-	kg/m
4	RS331S00 RS331S12	4.3	7.1 8.2	±0.1	15 25	80	40 100	40 100	0.06 0.11
6	RS331S00 RS331S12	6.2	9.7 10.8		15 25	80	28 150	28 150	0.08 0.14
8	RS331S00 RS331S12	8.3	12.3 13.7		16 32	120	20 125	20 125	0.10 0.21
10	RS331S00 RS331S12	10.2	14.3 15.7	±0.2	18 38	130	16 100	16 100	0.11 0.23
12	RS331S00 RS331S12	12.2	16.8 18.2		20 45	140	10 75	10 75	0.12 0.25
16	RS331S00 RS331S12	16.2	21.7 23.3		28 58	160	6 65	6 65	0.19 0.40
20	RS331S00 RS331S12	20.2	26.7 28.3		32 70	170	5 40	5 40	0.27 0.49
25	RS331S00 RS331S12	25.5	32.2 34.2	±0.3	40 85	190	4 65	4 65	0.38 0.79
32	RS331S00 RS331S12	34.2	41.0 43.0		50 105	260	2.5 25	2.5 25	0.49 0.96
40	RS331S00 RS331S12	40.1	49.7 52.0		60 130	300	2.5 40	2.5 40	0.77 1.46
50	RS331S00 RS331S12	50.4	60.3 62.3	±0.4	70 160	320	1 30	1 30	0.91 1.67
65	RS331S00 RS331S12	65.3	78.0 81.2		115 200	460	1 35	1 25	1.51 2.88
80	RS331S00 RS331S12	80.2	94.8 98.0	±0.5	130 240	660	2 32	2 16	2.28 4.08
100	RS331S00 RS331S12	100.0	116.2 119.4		160 290	750	1 16	1 10	2.53 4.54
125	RS330S00 RS330S12	126.2	145.0 148.2	±0.6	350	1000	0.5 10	0.5 6	2.68 5.25
150	RS330S00 RS330S12	151.6	171.0 174.2	±1.4	400	1250	0.5 10	0.5 6	3.41 6.48

ANNULARLY CORRUGATED MEDIUM VERSION, NARROWLY CORRUGATED, HIGHLY FLEXIBLE

Type RS 321,
narrow corrugation, standard wall thickness

Type RS 321





Design
Highly flexible annularly corrugated hose made of butt-welded pipe,

mechanically corrugated

Versions
- RS 321 S00 without braid
- RS 321 S12 with single braiding

Maximum production length
- DN 6-32 70 m
- DN 40-50 20 m
- DN 65-100 7 m

Longer hose lines on request

Standard materials
- Annularly corrugated hose 1.4404 or 1.4541
- Braiding 1.4301

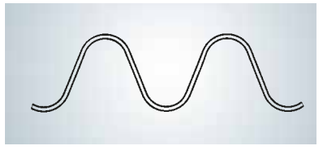
Other materials are available on request.

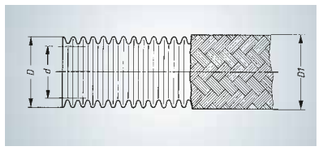
DN	Type	Inside diameter	Outside diameter	Permissible deviation	Minimum bending radius single bend	Nominal bending radius frequent movements	Permissible static operating pressure at 20 °C SF4	Nominal pressure DIN EN ISO 10380 SF4	Weight approx.
-	-	d	D, D1	d, D, D1	r_{min}	r_n	P_{perm}	PN	-
-	-	mm	mm	mm	mm	mm	bar	-	kg/m
6	RS321S00 RS321S12	6.1	9.9 11.0	±0.2	20 25	70	25 100	25 100	0.10 0.17
8	RS321S00 RS321S12	8.2	12.5 13.9		25 30	80	16 100	16 100	0.14 0.25
10	RS321S00 RS321S12	10.1	14.4 15.8		30 35	90	10 80	10 80	0.14 0.26
12	RS321S00 RS321S12	12.1	17.0 18.4		35 40	100	8 50	8 50	0.17 0.30
16	RS321S00 RS321S12	16.2	22.0 23.6		40 50	110	6 50	6 50	0.26 0.46
20	RS321S00 RS321S12	20.2	26.8 28.4	±0.3	50 55	130	4 40	4 40	0.31 0.53
25	RS321S00 RS321S12	25.5	32.2 34.2		60 65	150	4 40	4 40	0.49 0.90
32	RS321S00 RS321S12	34.2	41.0 43.0		70 75	200	2.5 20	2.5 20	0.50 0.97
40	RS321S00 RS321S12	40.0	49.8 52.1	±0.4	80 90	210	1 30	1 20	1.13 1.81
50	RS321S00 RS321S12	50.1	60.5 62.8	±0.5	100 110	240	1 25	1 16	1.34 2.10
65	RS321S00 RS321S12	65.0	78.2 81.4		145 200	280	1 20	1 16	1.96 3.33
80	RS321S00 RS321S12	80.0	95.0 98.2		200 240	400	1 16	1 10	3.12 4.92
100	RS321S00 RS321S12	99.4	116.8 120.0	±0.6	240 290	500	1 16	1 4	3.70 5.71

ANNULARLY CORRUGATED MEDIUM VERSION, WIDE CORRUGATIONS

Type RS 341
Wide corrugation, standard wall thickness

Type RS 341





Design
Annularly corrugated hose made of butt-welded pipe, mechanically corrugated

Versions
- RS 341 S00 without braid
- RS 341 S12 with single braiding

Maximum production length
- DN 6-8 10 m
- DN 10 - 50 100 m
- DN 65-100 6.5 m

Longer hose lines on request

Standard materials
- Annularly corrugated hose 1.4404 or 1.4541
- Braiding 1.4301

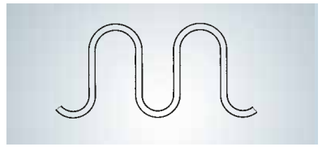
Other materials are available on request.

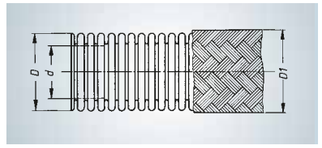
DN	Type	Inside diameter	Outside diameter	Permissible deviation	Minimum bending radius single bend	Nominal bending radius frequent move-ments	Permissible static operating pressure at 20 °C SF4	Nominal pressure DIN EN ISO 10380 SF4	Weight approx.
-	-	d	D, D1	d, D, D1	r_{min}	r_n	P_{perm}	PN	-
-	-	mm	mm	mm	mm	mm	bar	-	kg/m
6	RS341S00 RS341S12	6.3	9.5 10.6		11 25	110	65 135	65 100	0.05 0.12
8	RS341S00 RS341S12	8.5	12.0 13.4	±0.3	15 32	130	25 150	25 100	0.07 0.18
10	RS341S00 RS341S12	10.3	14.1 15.5		18 38	150	16 90	16 65	0.09 0.20
12	RS341S00 RS341S12	12.5	16.4 18.0	±0.2	20 45	165	18 80	18 65	0.10 0.23
16	RS341S00 RS341S12	16.3	21.4 23.0	±0.3	25 58	195	13 65	13 65	0.15 0.36
20	RS341S00 RS341S12	20.7	26.5 28.1		30 70	225	20 40	20 40	0.31 0.54
25	RS341S00 RS341S12	25.8	31.7 33.7	±0.4	35 85	260	16 60	16 50	0.39 0.80
32	RS341S00 RS341S12	34.6	41.0 43.0		40 105	300	2.5 35	2.5 25	0.36 0.82
40	RS341S00 RS341S12	40.5	49.5 51.5	±0.5	50 130	340	3 40	3 40	0.57 1.26
50	RS341S00 RS341S12	50.8	60.2 62.5		60 160	390	2.5 35	2.5 25	0.71 1.47
65	RS341S00 RS341S12	65.7	77.7 80.9	±0.4	75 200	460	4 32	4 25	1.07 2.44
80	RS341S00 RS341S12	80.6	94.2 97.4	±0.5	90 240	660	4 30	4 25	1.72 3.52
100	RS341S00 RS341S12	100.4	115.0 118.2	±0.6	110 290	750	3 16	3 16	1.95 3.94

ANNULARLY CORRUGATED HEAVY-DUTY VERSION, STANDARD CORRUGATIONS

Type RS 531 (DN 5 -16)
Standard corrugation, increased wall thickness

Type RS 531





Design
Annularly corrugated hose made of butt-welded pipe, mechanically corrugated

Versions
- RS 531 S00 without braid
- RS 531 S12 with single braiding
- RS 531 S22 with double braiding

Maximum production length
DN 5 - 16 100 m

Standard materials
- Annularly corrugated hose 1.4404 or 1.4541
- Braiding 1.4301

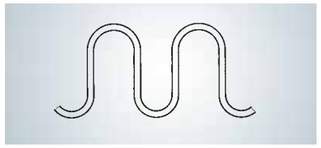
Other materials are available on request.

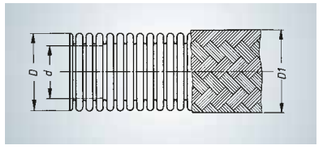
DN	Type	Inside diameter	Outside diameter	Permissible deviation	Minimum bending radius single bend	Nominal bending radius frequent movements	Permissible static operating pressure at 20 °C SF4	Nominal pressure DIN EN ISO 10380 SF4	Weight approx.
-	-	d	D, D1	d, D, D1	r_{min}	r_n	P_{perm}	PN	-
-	-	mm	mm	mm	mm	mm	bar	-	kg/m
5	RS531S00 RS531S12 RS531S22	5.3	9.1 10.2 11.3	±0.2	15 25 35	100	25 150 200	25 150 200	0.10 0.14 0.20
6	RS531S00 RS531S12 RS531S22	6.2	10.2 11.6 13.0		15 25 40	110	50 200 250	50 200 250	0.12 0.23 0.33
8	RS531S00 RS531S12 RS531S22	8.0	12.9 14.5 16.1		20 32 50	130	50 200 250	50 200 250	0.20 0.35 0.49
10	RS531S00 RS531S12 RS531S22	10.0	15.9 17.5 19.1	±0.3	25 38 60	150	25 150 225	25 150 225	0.29 0.48 0.66
12	RS531S00 RS531S12 RS531S22	12.1	18.7 20.3 21.9		30 45 70	165	25 100 200	25 100 200	0.41 0.62 0.82
16	RS531S00 RS531S12 RS531S22	16.1	23.8 25.8 27.8		40 58 90	195	20 150 200	20 150 200	0.55 0.92 1.29

ANNULARLY CORRUGATED HEAVY-DUTY VERSION, STANDARD CORRUGATIONS

Type RS 430 (DN 20 - 300)
Standard corrugation, increased wall thickness

Type RS 430





Design
Annularly corrugated hose made of butt-welded pipe, hydraulically shaped

Versions
- RS 430 S00 without braid
- RS 430 S12 with single braiding
- RS 430 S22 with double braiding
- RS 430 S42 with single braiding, knurled
- RS 430 S52 with double braiding, knurled
- RS 430 S92 with double special braiding

Maximum production length
DN 20 - 125 10 m
DN 150 - 300 3 m
Longer hose assemblies can be produced from component parts on request.

Standard materials
- Annularly corrugated hose 1.4404 or 1.4541
- Braiding, standard 1.4301, knurled 1.4306

Other materials are available on request.

DN	Type	Inside diameter	Outside diameter	Permissible deviation	Minimum bending radius single bend	Nominal bending radius frequent movements	Permissible static operating pressure at 20 °C SF4	Nominal pressure DIN EN ISO 10380 SF4	Weight approx.
-	-	d	D, D1	d, D, D1	r_{min}	r_n	P_{perm}	PN	-
-	-	mm	mm	mm	mm	mm	bar	-	kg/m
20	RS430S00 RS430S12 RS430S22	20.2	29.2 31.2 33.2	±0.3	45 70 70	285	6 90 125	6 65 100	0.54 0.93 1.31
25	RS430S00 RS430S12 RS430S22	25.2	34.2 36.2 38.2		50 85 85	325	6 65 100	6 50 100	0.65 1.07 1.49
32	RS430S00 RS430S12 RS430S22	33.7	42.7 45.0 47.2		60 105 105	380	4 65 80	4 65 80	0.77 1.41 2.05
40	RS430S00 RS430S12 RS430S22	40.0	55.0 57.3 59.5	±0.4	75 130 130	430	2.5 40 65	2.5 40 65	1.37 2.09 2.81
50	RS430S00 RS430S12 RS430S22	50.0	65.0 68.2 71.3		90 160 160	490	2.5 50 80	2.5 50 65	1.61 2.91 4.15
65	RS430S00 RS430S12 RS430S22	65.0	81.0 84.2 87.3	±0.4	110 200 200	580	0.5 35 50	0.5 25 50	2.06 3.46 4.89
80	RS430S00 RS430S12 RS430S22	79.8	98.3 101.5 104.6	±0.5	135 240 240	800	0.5 25 50	0.5 16 25	2.82 4.65 6.46
100	RS430S00 RS430S12 RS430S22	99.8	117.8 121.0 124.1		160 290 290	1000	0.5 30 40	0.5 10 16	3.59 5.97 8.25

ANNULARLY CORRUGATED HEAVY-DUTY VERSION, STANDARD CORRUGATIONS

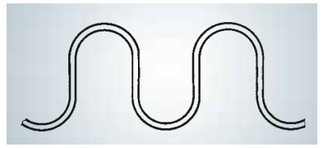
Type RS 430 (DN 20 - 300)
Standard corrugation, increased wall thickness

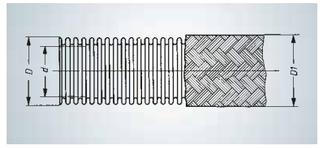
DN	Type	Inside diameter	Outside diameter	Permissible deviation	Minimum bending radius single bend	Nominal bending radius frequent movements	Permissible static operating pressure at 20 °C SF4	Nominal pressure DIN EN ISO 10380 SF4	Weight approx.
-	-	d	D, D1	d, D, D1	r_{min}	r_n	P_{perm}	PN	-
-	-	mm	mm	mm	mm	mm	bar	-	kg/m
125	RS430S00 RS430S12 RS430S22	125.6	146.0 149.2 152.4	±0.6	350	1250	0.5 16 30	0.5 10 16	5.23 7.80 10.30
150	RS430S00 RS430S12 RS430S42 RS430S22 RS430S92	151.9	177.4 180.6 181.4 183.7 184.6	±1.4	400	800	0.2 6 10 12 16	- 6 10 10 16	4.97 8.10 8.27 11.20 11.37
200	RS430S00 RS430S12 RS430S42 RS430S22 RS430S92 RS430S52	202.2	231.4 235.0 236.9 238.5 239.7 242.4	±1.6	520	1100	0.2 6 10 12 16 16	- 6 10 10 16 16	7.92 12.32 12.42 16.72 16.82 16.92
250	RS430S00 RS430S42 RS430S52	248.4	284.2 289.7 295.2		620	1350	0.2 8 12	- 6 10	13.0 17.96 22.96
300	RS430S00 RS430S42 RS430S52	298.6	335.8 341.3 346.8		1000	1600	0.1 4 6	- 4 6	17.20 23.03 28.83

ANNULARLY CORRUGATED BRONZE MEDIUM VERSION, STANDARD CORRUGATIONS

Type RZ 331
Standard corrugation/Wall thickness

Type RZ 331





Design
Annularly corrugated hose made of butt-welded pipe, mechanically corrugated

Versions
- RZ 331 S00 without braid
- RZ 331 S13 with single braiding

Maximum production length
- DN 8 - 25 50 m
- DN 32 30 m
- DN 40 - 50 8 m

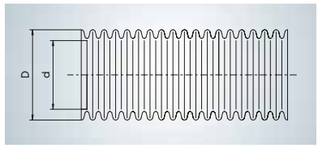
Standard materials
- Annularly corrugated hose 2.1010 (CuSn2)
- Braiding 2.1016 (CuSn4, CW450K)

DN	Type	Inside diameter	Outside diameter	Permissible deviation	Minimum bending radius single bend	Nominal bending radius frequent movements	Permissible static operating pressure at 20 °C SF3	Weight approx.
-	-	d	D, D1	d, D, D1	r_{min}	r_n	P_{perm}	-
-	-	mm	mm	mm	mm	mm	bar	kg/m
8	RZ331S00 RZ331S13	8.6	12.6 14.0	±0.2	16 32	90	6 60	0.11 0.23
10	RZ331S00 RZ331S13	10.7	15.1 16.5		18 38	130	6 45	0.13 0.27
12	RZ331S00 RZ331S13	12.7	17.7 19.1		20 45	150	4 35	0.14 0.31
16	RZ331S00 RZ331S13	16.7	22.2 23.6		28 58	170	4 32	0.24 0.47
20	RZ331S00 RZ331S13	20.6	27.1 28.5		32 70	200	4 30	0.44 0.71
25	RZ331S00 RZ331S13	25.6	33.2 35.5	±0.3	40 85	230	2.5 30	0.46 0.97
32	RZ331S00 RZ331S13	32.6	42.0 44.3		50 105	260	2.5 30	0.72 1.43
40	RZ331S00 RZ331S13	40.5	52.0 54.0		60 130	310	1.6 25	0.95 1.83
50	RZ331S00 RZ331S13	50.5	63.0 66.2	±0.4	70 160	360	1.6 28	1.35 2.77

ANNULARLY CORRUGATED SEMI-FLEXIBLE MECHANICALLY CORRUGATED

Type RS 351, very wide corrugation, standard wall thickness
Type IX 331, flat corrugation, standard wall thickness

Type RS 351



Design
Semi-flexible annularly corrugated hose, mechanically corrugated

Versions
RS 351 S00 without braid

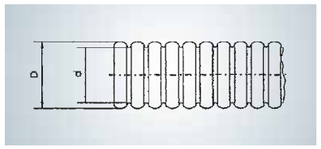
Maximum production length
DN 12 - 25 100 m

Standard material
1.4404

The RS 351 is primarily designed for static applications. It should not be used for the absorption of repeated movements and vibrations. The RS 351 is optimised for self-assembly connection fittings.

DN	Type	Inside diameter	Outside diameter	Permissible deviation	Minimum bending radius single movement	Permissible static operating pressure at 20 °C	Weight approx.
-	-	d	D, D1	d, D, D1	r_{min}	P_{perm}	-
-	-	mm	mm	mm	mm	bar	kg/m
12	RS351S00	12.5	16.6	± 0.3	20	18	0.095
16	RS351S00	16.7	21.3	± 0.3	16	17	0.125
20	RS351S00	20.5	26.4	± 0.4	20	9	0.165
25	RS351S00	25.8	31.7	± 0.4	35	10	0.360

Type IX 331



Design
Semi-flexible annularly corrugated hose, mechanically corrugated

Versions
IX 331 S00 without braid

Maximum production length
DN 12 - 25 100 m

Standard material
1.4404

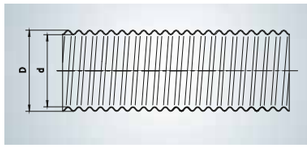
The IX 331 is only designed for static applications. It should not be used for the absorption of repeated movements and vibrations. The IX 331 is optimised for self-assembly connection fittings.

DN	Type	Inside diameter	Outside diameter	Permissible deviation	Minimum bending radius single movement	Permissible static operating pressure at 20 °C	Weight approx.
-	-	d	D, D1	d, D, D1	r_{min}	P_{perm}	-
-	-	mm	mm	mm	mm	bar	kg/m
12	IX331S00	12.3	15.8	± 0.25	32	34	0.100
16	IX331S00	16.5	20.4	± 0.25	40	18	0.120
20	IX331S00	20.6	24.9	± 0.3	50	18	0.155
25	IX331S00	25.6	30.7	± 0.3	60	16	0.245

ANNULARLY CORRUGATED SEMI-FLEXIBLE MECHANICALLY CORRUGATED

Type ME 539, very wide corrugation, standard wall thickness

Type ME 539



Design
Semi-flexible annularly corrugated hose, mechanically corrugated

Versions
ME 539 S00 without braid

Maximum production length
DN 25 350 m
DN 32 300 m
DN 40 300 m
DN 50 200 m

Standard material
1.4404

The ME 539 is a semi-flexible hose and is primarily designed for static applications. This type of hose is not be used for the absorption of repeated movements and vibrations.
The ME 539 is intended for self-assembly connection fittings. Corresponding connecting components on request.

DN	Type	Inside diameter	Outside diameter	Permissible deviation	Minimum bending radius single movement	Permissible static operating pressure at 20 °C	Weight approx.
-	-	d	D	d, D	r_{min}	P_{perm}	-
-	-	mm	mm	mm	mm	bar	kg/m
25	ME539S00	32	35.2	± 0.5	On request	16	0.335
32	ME539S00	40	44.8	± 0.5	On request	16	0.55
40	ME539S00	49	54.8	± 0.5	On request	16	0.85
50	ME539S00	61	66.6	± 0.5	On request	16	0.995

CONNECTION FITTINGS FOR CORRUGATED HOSES

Flexible and perfectly fitting

A large number of different connections guarantees a wide range of applications for our metal hoses. Depending on the operating conditions and the materials used, the connections with the hose are either welded or soldered (brazed). You can see a selection of current connection types below. You can recognise the particular connection type from the first letters of the particular model name.

Flange connection

A Loose flange with welding neck
Rotating flange

B Loose flange with collar pipe
Rotating flange

C Loose flange with welding rim
Rotating flange

G Welding neck flange
Fixed flange

Threaded connection

L Internal thread, fixed

M External thread, fixed

N Internal thread, rotatable

Screw connection

Q Internal thread

R External thread

S Pipe end

Pipe connection

U Any kind of pipe connections

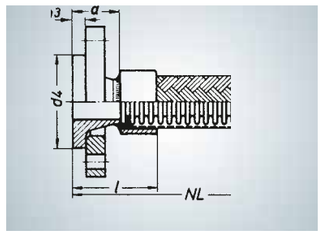
Miscellaneous

W Couplings

CONNECTION FITTINGS CORRUGATED HOSES

Type AB12, AB22, AB82

Type AB12/22/82



Rotating flange joint
Welding neck: steel or stainless steel 1.4541 or 1.4571
Loose flange: steel or stainless steel 1.4541 or 1.4571
Welded or brazed

Connection fitting type				Material		Permissible operating temperature
PN 10	PN 16	PN 25	PN 40	Welding neck	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 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

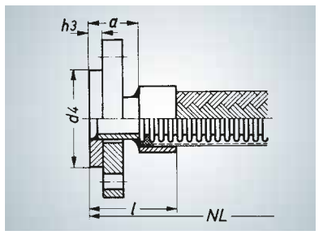
Connection dimensions PN 10 as per DIN 2501 / DIN EN 1092

When ordering, please specify: connection fitting type, nominal diameter (DN), operating temperature, with stainless steel material no.

CONNECTION FITTINGS CORRUGATED HOSES

Type BB12, BB22, BB82

Type BB12/22/82



Rotating flange joint
Collar pipe: steel or stainless steel 1.4541 or 1.4571
Loose flange: steel or stainless steel 1.4541 or 1.4571
Welded or brazed

Connection fitting type				Material		Permissible operating temperature
PN 10	PN 16	PN 25	PN 40	Welding neck	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 1092)	46	46	57	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

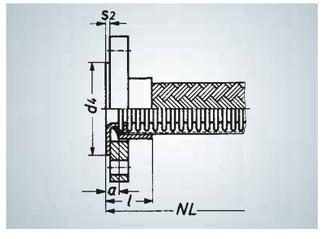
Connection dimensions PN 10 as per DIN 2501 / DIN EN 1092

When ordering, please specify: connection fitting type, nominal diameter (DN), operating temperature, with stainless steel material no.

CONNECTION FITTINGS CORRUGATED HOSES

Type CA22, CA82

Type CA22/82



Rotating flange joint
Unturned welding flange: stainless steel 1.4541 or 1.4571
Loose flange: steel or stainless steel 1.4541 or 1.4571
Welded or brazed

Connection fitting type		Material		Permissible operating temperature
PN 10	PN 16 (to DN 150)	Welding neck	Flange	
CA82D	CA82E	Stainless steel	Steel	480 °C
CA22D	CA22E	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
s2 (DIN 2642)	3	3	3	3.5	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	30	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 as per DIN 2501 / DIN EN 1092

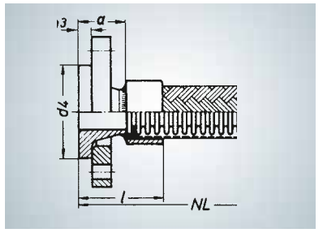
*** Dimension not standardised in DIN EN 1092*

When ordering, please specify: connection fitting type, nominal diameter (DN), operating temperature, with stainless steel material no.

CONNECTION FITTINGS CORRUGATED HOSES

Type CA22, CA82 – ANSI

Type CA22/82



Flanged joint, rotatable
Welding rim (stub-end) in accordance with ANSI made from stainless steel 1.4404
Loose flange (lap-joint) in accordance with ANSI, made from steel or stainless 1.4404
Welded

Connection fitting type ASA 150 lbs	Connection fitting type ASA 300 lbs	Material welding joint (stub-end)	Material Flange	Permissible operating temperature
CA82L	CA82M	Stainless steel	Steel	480 °C
CA22L	CA22M	Stainless steel	Stainless steel	550 °C

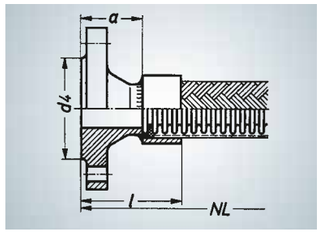
Dimensions in mm, weight G in kg

DN	16	20	25	32	40	50	65	80	100	125	150	200
d4	34.9	42.9	50.8	63.5	73.0	92.1	104.8	127.0	157.2	185.7	215.9	269.9
h3	2.1	2.1	2.8	2.8	2.8	2.8	3.1	3.1	3.1	3.4	3.4	3.8
a	50.8	50.8	50.8	50.8	50.8	63.5	63.5	63.5	76.2	76.2	88.9	101.6
l	62.0	62.0	65.0	65.0	70.0	80.0	82.0	85.0	105.0	107.0	130.0	140.0
G approx.	0.6	1.0	1.2	1.6	1.7	2.8	3.8	4.4	7.1	8.3	10.8	16.8

CONNECTION FITTINGS CORRUGATED HOSES

Type GB12, GB22

Type GB12/22/82



Fixed flanged joint
Welding neck flange steel or stainless steel 1.4541 or 1.4571
Welded or brazed

Connection fitting type				Material	Permissible operating temperature
PN 10	PN 16	PN 25	PN 40	Flange	
GB12D	GB12E	GB12F	GB12G	Steel	480 °C
GB22D	GB22E	GB22F	GB22G	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 1092)	35	38	40	42	42	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

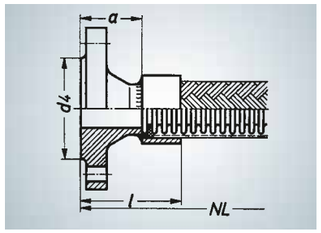
Connection dimensions PN 10 as per DIN 2501 / DIN EN 1092

When ordering, please specify: connection fitting type, nominal diameter (DN), operating temperature, with stainless steel material no.

CONNECTION FITTINGS CORRUGATED HOSES

Type GB12, GB22 – ANSI

Type GB12/22/82



Fixed flanged joint
Welding flange in accordance with ANSI B 16.5 made from steel or stainless steel 1.4404
Welded

Connection fitting type	Connection fitting type	Material	Material	Permissible operating temperature
ASA 150 lbs	ASA 300 lbs		Flange	
GB82L	GB82M	Stainless steel	Steel	480 °C
GB22L	GB22M	Stainless steel	Stainless steel	550 °C

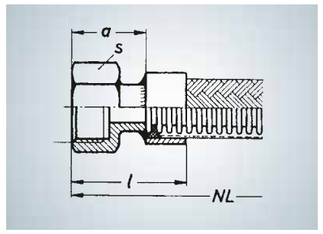
Dimensions in mm, weight G in kg

DN	16	20	25	32	40	50	65	80	100	125	150	200
d4	34.9	42.9	50.8	63.5	73.0	92.1	104.8	127.0	157.2	185.7	215.9	269.9
a	47.6	52.4	55.6	57.1	61.9	63.5	69.8	69.8	76.2	88.9	88.9	101.6
l	58.0	68.0	74.0	77.0	82.0	90.0	98.0	100.0	116.0	130.0	130.0	150.0
G approx.	0.9	0.9	1.4	1.4	1.4	2.7	3.6	4.5	6.8	8.6	10.9	17.7

CONNECTION FITTINGS CORRUGATED HOSES

Connection LA12S, LA22S, LA52S
Connection MA12S, MA22S, MA52S

Connection LA12S/22S/52S



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

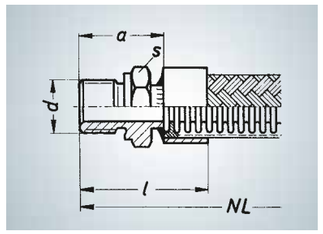
Connection fitting type	Material	Permissible operating temperature
LA12S	Steel	300 °C
LA22S	Stainless steel	550 °C
LA52S	Brass	250 °C

Dimensions in mm, weight G in kg

PN	100							63			40	
DN	6	8	10	12	16	20	25	32	40	50	65	80
d	Rp¼	Rp¼	Rp⅜	Rp½	Rp½	Rp¾	Rp1	Rp1¼	Rp1½	Rp2	Rp2½	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

When ordering, please specify: connection fitting type, nominal diameter (DN), operating temperature, with stainless steel material no.

Type MA12S/22S/52S



Threaded connection, fixed
Hexagon nipple with Whitworth pipe thread ISO 228/1
Made of steel, stainless steel 1.4541 or 1.4571 or brass
Welded or brazed

Connection fitting type	Material	Permissible operating temperature
MA12S	Steel	300 °C
MA22S	Stainless steel	550 °C
MA52S	Brass	250 °C

Dimensions in mm, weight G in kg

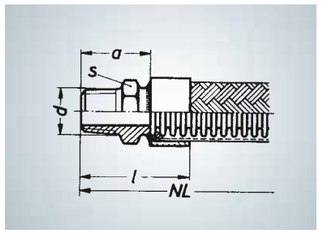
PN	250				160		100			63	40		
DN	6	8	10	12	16	20	25	32	40	50	65	80	100
d	G¼A	G¼A	G⅜A	G½A	G½A	G¾A	G1A	G1¼A	G1½A	G2A	G2½A	G3A	G4A
a	24	25	25	29	29	32	38	40	43	45	52	54	64
l	32	35	35	41	43	48	56	60	65	70	78	84	96
s	19	19	22	27	27	32	41	50	55	70	85	100	120
G approx.	0.04	0.04	0.06	0.08	0.08	0.12	0.2	0.29	0.32	0.47	0.75	0.85	1.35

When ordering, please specify: connection fitting type, nominal diameter (DN), operating temperature, with stainless steel material no.
Also available with metric fine thread on request.

CONNECTION FITTINGS CORRUGATED HOSES

Type MH02S
Type MH12S, MH22S, MH52S

Type MH02S



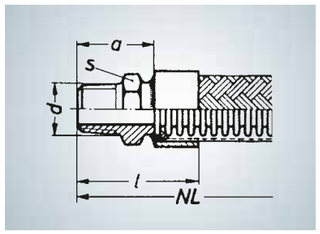
Threaded connection, fixed
Hexagon nipple with Whitworth pipe thread DIN EN10226 (ISO 7/1)
Made of malleable iron
Brazed

Connection fitting type	Permissible operating temperature	Permissible operating pressure
MH02S	see page 46	see page 46

Dimensions in mm, weight G in kg

DN	10	12	16	20	25	32	40	50	65	80
d	R⅜	R½	R½	R¾	R1	R1¼	R1½	R2	R2½	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/22S/52S



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

Connection fitting type	Material	Permissible operating temperature
MH12S	Steel	300 °C
MH22S	Stainless steel	550 °C
MH52S	Brass	250 °C

Dimensions in mm, weight G in kg

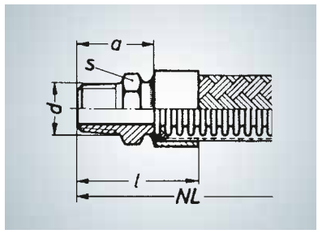
PN	100							63			40	
DN	6	8	10	12	16	20	25	32	40	50	65	80
d	R¼	R¼	R⅜	R½	R½	R¾	R1	R1¼	R1½	R2	R2½	R3
a	24	24	25	29	29	32	38	40	40	47	52	56
l	32	34	35	41	43	48	56	60	62	72	80	86
s	14	14	17	22	22	27	36	46	50	60	80	90
G approx.	0.02	0.03	0.04	0.05	0.06	0.09	0.14	0.23	0.25	0.43	0.65	0.75

When ordering, please specify: connection fitting type, nominal diameter (DN), operating temperature, with stainless steel material no.

CONNECTION FITTINGS CORRUGATED HOSES

Type MQ12S, Type MQ22S – ANSI

Type MQ12S/22S



Threaded connection, fixed
Hexagon nipple with NPT thread in accordance with ANSI B1.20.1
made of steel, made of stainless steel AISI 1.4404
Welded

Connection fitting type	Material	Permissible operating temperature
MQ12S	Steel	300°C
MQ22S	Stainless steel	550°C

Dimensions in mm, weight G in kg

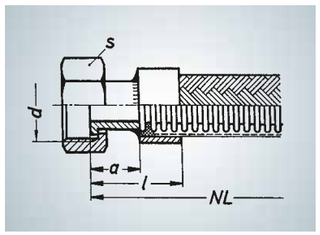
PN	100 bar (1500lbs)							63 bar (900 lbs)		
DN	6	8	10	12	16	20	25	32	40	50
d	1/4"	1/4"	3/8"	1/2"	1/2"	3/4"	1"	5/4"	6/4"	2"
a	24	24	25	29	29	32	38	40	40	47
l	32	34	35	41	43	48	56	60	62	72
s	14	14	17	22	22	27	36	46	50	60
G approx.	0.02	0.03	0.04	0.05	0.06	0.09	0.14	0.23	0.25	0.43

When ordering, please specify: connection fitting type, nominal diameter (DN), operating temperature, with stainless steel material no.

CONNECTION FITTINGS CORRUGATED HOSES

Type NA12S, NA22S, NA52S
Type NF12S, NF22S, NF52S

Type NA12S/22S/52S



Threaded connection, swivel
Collar pipe, flat sealing
Union nut with Whitworth pipe thread ISO 228/1
Made of steel, stainless steel 1.4541 or 1.4571 or brass
Welded or brazed

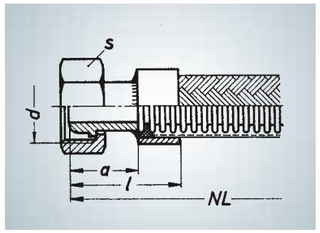
Connection fitting type	Material	Permissible operating temperature
NA12S	Steel	300 °C
NA22S	Stainless steel	550 °C
NA52S	Brass	250 °C

Dimensions in mm, weight G in kg

PN	100					63				40
DN	6	8	10	12	16	20	25	32	40	50
d	G1/4	G3/8	G1/2	G5/8	G3/4	G1	G1 1/4	G1 1/2	G1 3/4	G2 1/4
a	20	21	21	24	24	24	26	26	29	29
l	28	31	31	36	38	40	44	46	51	54
s	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

When ordering, please specify: connection fitting type, nominal diameter (DN), operating temperature, with stainless steel material no.

Type NF12S/22S/52S



Threaded connection, swivel
Ball lining in accordance with DIN 3863
Union nut with Whitworth pipe thread ISO 228/1
Made of steel, stainless steel 1.4541 or 1.4571 or brass
Welded or brazed

Connection fitting type	Material	Permissible operating temperature
NF12S	Steel	300 °C
NF22S	Stainless steel	550 °C
NF52S	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*
d	G1/4	G3/8	G1/2	G5/8	G3/4	G1	G1 1/4	G1 1/2	G1 3/4	G2 1/4
a	24	24	24	29	29	29	31	31	31	34
l	32	34	34	41	43	45	49	51	53	59
s	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

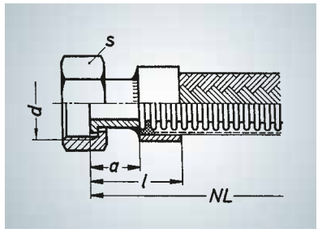
** DN 50 is not standardised!*

When ordering, please specify: connection fitting type, nominal diameter (DN), operating temperature, with stainless steel material no.

CONNECTION FITTINGS CORRUGATED HOSES

Type NI12S, NI22S, NI52S
Type NL12Q, NL22Q

Type NI12S/22S/52S



Threaded connection, swivel
Collar pipe, flat sealing
Union nut with metric thread according to DIN 3870, LL series
Made of steel, stainless steel 1.4541 or 1.4571 or brass
Welded or brazed

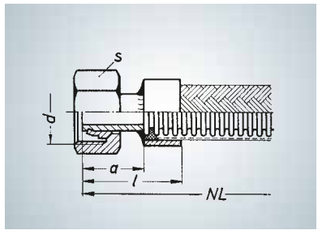
Connection fitting type	Material	Permissible operating temperature
NI12S	Steel	300 °C
NI22S	Stainless steel	550 °C
NI52S	Brass	250 °C

Dimensions in mm, weight G in kg

PN	100					63				40
DN	6	8	10	12	16	20	25	32	40	50
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

When ordering, please specify: connection fitting type, nominal diameter (DN), operating temperature, with stainless steel material no.

Type NL12Q/22Q



Threaded connection, swivel
Precision nipple with cutting ring DIN 3861, DIN EN ISO 8434-1
Union nut with metric thread according to DIN EN ISO 8434-1, L series
Made of steel or stainless steel 1.4541 or 1.4571 (union nut 1.4571),
Welded or brazed

Connection fitting type	Material	Permissible operating temperature
NL12Q	Steel	300 °C
NL22Q	Stainless steel	550 °C

Dimensions in mm, weight G in kg

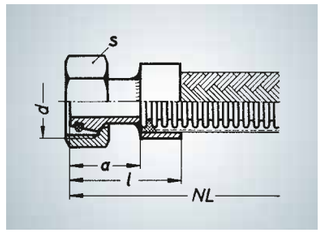
PN	250					160		100		
DN	4	6	8	10	12	16	20	25	32	40
Pipe dimension	6x1	8x1	10x1.5	12x1.5	15x2	18x1.5	22x2	28x2	35x2	42x3
d	M12x1.5	M14x1.5	M16x1.5	M18x1.5	M22x1.5	M26x1.5	M30x2	M36x2	M45x2	M52x2
a	28	28	30	30	32	32	36	40	45	45
l	36	36	40	40	44	46	52	58	65	67
s	14	17	19	22	27	32	36	41	50	60
G approx.	0.04	0.04	0.04	0.06	0.09	0.11	0.16	0.21	0.31	0.44

When ordering, please specify: connection fitting type, nominal diameter (DN), operating temperature, with stainless steel material no.

CONNECTION FITTINGS CORRUGATED HOSES

Type NN12Q, NN22Q

Type NN12Q/22Q



Threaded connection, swivel
24°-conical nipple with O-ring*, union nut DIN ISO 12151-2,
L series made of steel or stainless steel 1.4541 or 1.4571 (union nut 1.4571),
Welded or brazed

Connection fitting type	Material		Permissible operating temperature*
	Threaded connection	O-ring	
NN12Q	Steel	NBR (buna N) or FPM (Viton)	-20 to +90 °C
NN22Q	Stainless steel		-20 to +200 °C

**O-ring with DVGW certification can be used up to +80 °C*

Dimensions in mm, weight G in kg

PN	250				160		100		
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
Associated outer pipe diameter	8	10	12	15	18	22	28	35	42

When ordering, please specify: connection fitting type, nominal diameter (DN), operating temperature, O-ring material, with stainless steel material no.

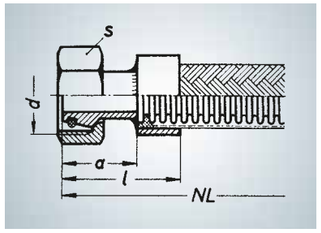
Information

This threaded connection is suitable for the cutting ring connection according to DIN EN ISO 8434-1, L series or for connection to threaded pin with drill hole form W (24°), L series according to DIN 3861.

CONNECTION FITTINGS CORRUGATED HOSES

Type NN12R, NN22R

Type NN12R/22R



Threaded connection, swivel

24°-conical nipple with O-ring*, union nut DIN ISO 12151-2,
S series made of steel or stainless steel 1.4541 or 1.4571 (union nut 1.4571),
Welded or brazed

Connection fitting type	Material		Permissible operating temperature*
	Threaded connection	O-ring	
NN12R	Steel	NBR (buna N) or FPM (Viton)	-20 to +90 °C
NN22R	Stainless steel		-20 to +200 °C

**O-ring with DVGW certification can be used up to +80 °C*

Dimensions in mm, weight G in kg

PN	630			400			250	
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
Associated outer pipe diameter	10	12	14	16	20	25	30	38

When ordering, please specify: connection fitting type, nominal diameter (DN), operating temperature, O-ring material, with stainless steel material no.

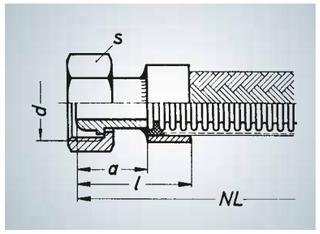
Information

This threaded connection is suitable for the cutting ring connection according to DIN EN ISO 8434-1, S series or for connection to threaded pin with drill hole form W (24°), S series according to DIN 3861.

CONNECTION FITTINGS CORRUGATED HOSES

Type NO12S, NO22S, NO52S
Type QA02S

Type NO12S/22S/52S



Threaded connection, swivel

Ball lining in accordance with DIN 3863
Union nut with metric thread according to DIN 3870, LL series
Made of steel, stainless steel 1.4541 or 1.4571 or brass
Welded or brazed

Connection fitting type	Material	Permissible operating temperature
NO12S	Steel	300 °C
NO22S	Stainless steel	550 °C
NO52S	Brass	250 °C

Dimensions in mm, weight G in kg

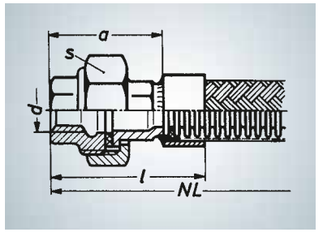
PN	100					63				40	25
DN	6	8	10	12	16	20	25	32	40	*50	*65
d	M14x1.5	M16x1.5	M18x1.5	M22x1.5	M26x1.5	M30x1.5	M38x1.5	M45x1.5	M52x1.5	M65x2	M78x2
a	24	24	24	29	29	29	31	31	31	34	40
l	32	34	34	41	43	45	49	51	53	59	68
s	17	19	22	27	32	36	46	50	60	75	90
G approx.	0.03	0.04	0.05	0.08	0.10	0.12	0.22	0.30	0.31	0.48	0.72

**DN 50 + 60 is not standardised! When ordering, please specify: connection fitting type, nominal diameter (DN), operating temperature, O-ring material, with stainless steel material no.*

Information

This threaded connection is suitable for connection to the bore hole form U and Y (60°) as per DIN 3863.

Type QA02S



Screw connection, internal thread

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

Connection fitting type	Permissible operating temperature	Permissible operating pressure
QAO2S	see page 46	see page 46

Dimensions in mm, weight G in kg

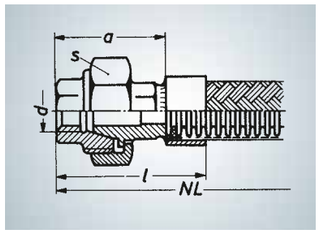
DN	6	8	10	12	16	20	25	32	40	50
d	Rp¼	Rp¼	Rp⅜	Rp½	Rp½	Rp¾	Rp1	Rp1¼	Rp1½	Rp2
a	52	52	54	59	59	65	70	78	85	94
l	60	62	64	71	73	81	88	98	107	119
s	28	28	32	39	39	48	55	67	74	90
G approx.	0.11	0.12	0.14	0.18	0.19	0.31	0.42	0.68	0.87	1.31

When ordering, please specify: connection fitting type, nominal diameter (DN), operating temperature, O-ring material, with stainless steel material no.

CONNECTION FITTINGS CORRUGATED HOSES

Type QB02S
Type QB12W, QB22W, QB52W

Type QB02S



Screw connection, internal thread
Tapered seal, with Whitworth pipe thread DIN EN 10226 (ISO 7/1)
Made of malleable iron, brazed

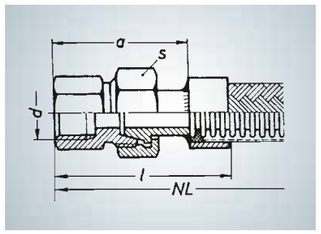
Connection fitting type	Permissible operating temperature	Permissible operating pressure
QB02S	see page 46	see page 46

Dimensions in mm, weight G in kg

DN	6	8	10	12	16	20	25	32	40	50
d	Rp¼	Rp¼	Rp⅜	Rp½	Rp½	Rp¾	Rp1	Rp1¼	Rp1½	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

When ordering, please specify: connection fitting type, nominal diameter (DN), operating temperature

Type QB12W/22W/52W



Screw connection, internal thread
Tapered sealing with 24° cone angle
Suitable for bore hole forms W DIN 3861 L, DIN EN ISO 8434-1 with Whitworth pipe thread DIN EN 10226 (ISO 7/1) made of steel, stainless steel 1.4541 or 1.4571 (union nut 1.4301), welded or brazed

Connection fitting type	Material	Permissible operating temperature
QB12W	Steel	300 °C
QB22W	Stainless steel	550 °C
QB52W	Brass	250 °C

Dimensions in mm, weight G in kg

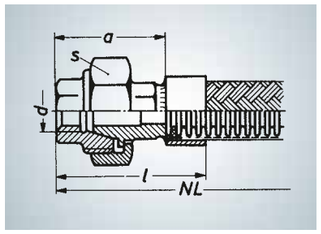
PN	100							63		
DN	6	8	10	12	16	20	25	32	40	50
d	Rp¼	Rp¼	Rp⅜	Rp½	Rp½	Rp¾	Rp1	Rp1¼	Rp1½	Rp2
a	43	44	47	52	53	60	66	71	75	83
l	51	54	57	64	67	76	84	91	97	108
s	17	19	22	27	32	36	41	50	60	70
G approx.	0.05	0.06	0.08	0.13	0.16	0.21	0.31	0.48	0.61	0.81

When ordering, please specify: connection fitting type, nominal diameter (DN), operating temperature, with stainless steel material no.

CONNECTION FITTINGS CORRUGATED HOSES

Type QQ12S, Type QQ22S – ANSI

Type QQ12S/22S



Screw connection, internal thread
Tapered seal, with NPT internal thread in accordance with ANSI B1.20.1
made of steel, made of stainless steel 1.4404, welded

Connection fitting type	Material	Permissible operating temperature
QQ12S	Steel	300°C
QQ22S	Stainless steel	550°C

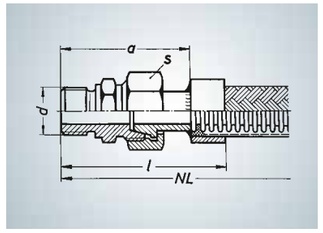
Dimensions in mm, weight G in kg

PN	100 bar (1500lbs)							63 bar (900 lbs)		
DN	6	8	10	12	16	20	25	32	40	50
d	1/4"	1/4"	3/8"	1/2"	1/2"	3/4"	1"	5/4"	6/4"	2"
a		44	47	52	52	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

CONNECTION FITTINGS CORRUGATED HOSES

Type RB12W, RB22W, RB52W

Type RB12W/22W/52W



Screw connection, external thread
Tapered sealing with 24° cone angle
Suitable for bore hole form W according to DIN 3861 L, DIN EN ISO 8434-1 L
With Whitworth pipe thread ISO 228/1
Made of steel or stainless steel 1.4541 or 1.4571 (union nut 1.4301) or brass
Welded or brazed

Connection fitting type	Material	Permissible operating temperature
RB12W	Steel	300 °C
RB22W	Stainless steel	550 °C
RB52W	Brass	250 °C

Dimensions in mm, weight G in kg

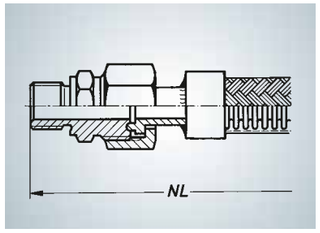
PN	100							63		
DN	6	8	10	12	16	20	25	32	40	50
d	G¼ A	G¼ A	G⅜ A	G½ A	G½ A	G¾ A	G1 A	G1¼ A	G1½ A	G2 A
a	49	51	54	59	60	68	74	79	83	92
l	57	61	64	71	74	84	92	99	105	117
s	17	19	22	27	32	36	41	50	60	70
G approx.	0.05	0.06	0.08	0.13	0.16	0.21	0.32	0.5	0.68	0.93

When ordering, please specify: connection fitting type, nominal diameter (DN), operating temperature, with stainless steel material no.

CONNECTION FITTINGS CORRUGATED HOSES SPECIAL APPLICATIONS

Type RD16, RD26

Type RD16/26



Threaded fitting for high pressure, external thread
Without intermediate seal, metal sealing
With Whitworth pipe thread ISO 228/1
Made of steel 1.0460 or stainless steel
Welded

Connection fitting type		Material	Permissible operating temperature
PN 100	PN 200		
RD16S	RD16W	Steel	350 °C
RD26S	RD26W	Stainless steel	400 °C

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

Nominal diameter
DN 6 to DN 50

Operating pressure
As per table, higher pressure levels on request

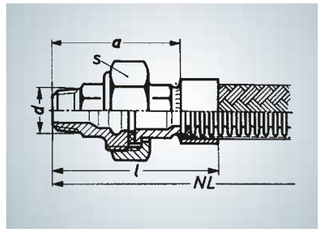
Operating temperature
As per table, higher operating temperatures on request

When ordering, please specify
- Connection fitting type
- Nominal diameter (DN)
- Operating temperature

CONNECTION FITTINGS CORRUGATED HOSES

Type RE02S
Type RF02S

Type RE02S



Screw connection, external thread
Flat sealing with Whitworth pipe thread DIN EN 10226 (ISO 7/1)
Made of malleable iron
Brazed

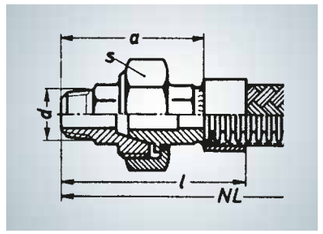
Connection fitting type	Permissible operating temperature	Permissible operating pressure
RE02S	see page 46	see page 46

Dimensions in mm, weight G in kg

DN	12	16	20	25	32	40
d	R½	R½	R¾	R1	R1¼	R1½
a	77	77	86	93	103	111
l	89	91	102	111	123	133
s	39	39	48	55	67	74
G approx.	0.21	0.22	0.33	0.48	0.74	0.91

When ordering, please specify: connection fitting type, nominal diameter (DN), operating temperature

Type RF02S



Screw connection, external thread
Tapered seal, with Whitworth pipe thread DIN EN 10226 (ISO 7/1)
Made of malleable iron
Brazed

Connection fitting type	Permissible operating temperature	Permissible operating pressure
RF02S	see page 46	see page 46

Dimensions in mm, weight G in kg

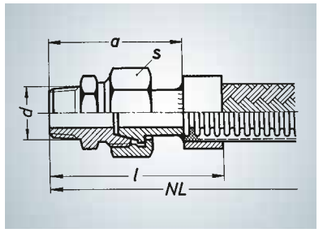
DN	6	8	10	12	16	20	25	32	40	50
d	R¼	R¼	R⅜	R½	R½	R¾	R1	R1¼	R1½	R2
a	66	66	69	77	77	86	93	103	111	123
l	74	76	79	89	91	102	111	123	133	148
s	28	28	32	39	39	50	55	67	74	90
G approx.	0.11	0.11	0.15	0.22	0.23	0.35	0.51	0.78	0.99	1.50

When ordering, please specify: connection fitting type, nominal diameter (DN), operating temperature

CONNECTION FITTINGS CORRUGATED HOSES

Type RF12W, RF22W, RF52W

Type RF12W/22W/52W



Screw connection, external thread
Tapered sealing with 24° cone angle
Suitable for bore hole forms W DIN 3861L, DIN EN ISO 8434-1
With Whitworth pipe thread DIN EN 10226 (ISO 7/1)
Made of steel, stainless steel 1.4541 or 1.4571 or brass
Welded or brazed

Connection fitting type	Material	Permissible operating temperature
RF12W	Steel	300 °C
RF22W	Stainless steel	550 °C
RF52W	Brass	250 °C

Dimensions in mm, weight G in kg

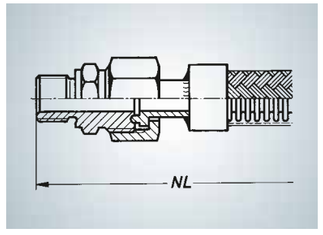
PN	100							63		
DN	6	8	10	12	16	20	25	32	40	50
d	R¼	R¼	R⅜	R½	R½	R¾	R1	R1¼	R1½	R2
a	47	49	52	59	60	67	74	80	82	93
l	55	59	62	71	74	83	92	100	104	118
s	17	19	22	27	32	36	41	50	60	70
G approx.	0.05	0.06	0.08	0.13	0.16	0.21	0.32	0.5	0.68	0.93

When ordering, please specify: connection fitting type, nominal diameter (DN), operating temperature, with stainless steel material no.

CONNECTION FITTINGS CORRUGATED HOSES SPECIAL APPLICATIONS

Type RM16, RM26

Typ RM16/26



Threaded fitting for high pressure, external thread
Without intermediate seal, metal sealing
With metric ISO thread according to DIN 13
Made of steel 1.0460 or stainless steel
Welded

Connection fitting type		Material	Permissible operating temperature
PN 100	PN 200		
RM16S	RM16W	Steel	350 °C
RM26S	RM26W	Stainless steel	400 °C

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

Nominal diameter
DN 6 to DN 50

Operating pressure
As per table, higher pressure levels on request

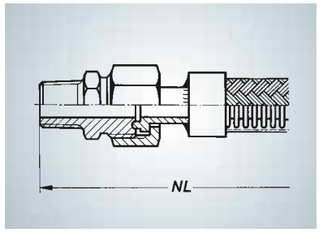
Operating temperature
As per table, higher operating temperatures on request

When ordering, please specify
- Connection fitting type
- Nominal diameter (DN)
- Operating temperature

CONNECTION FITTINGS CORRUGATED HOSES SPECIAL APPLICATIONS

Type RN16, RN26

Type RN16/26



Threaded fitting for high pressure, external thread
Without intermediate seal, metal sealing
With tapered NPT thread ANSI B1.20.1
Made of steel 1.0460 or stainless steel
Welded

Connection fitting type		Material	Permissible operating temperature
PN 100	PN 200		
RN16S	RN16W	Steel	350 °C
RN26S	RN26W	Stainless steel	400 °C

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

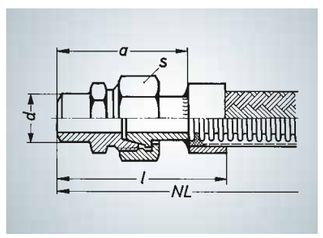
Operating temperature
As per table, higher operating temperatures on request

When ordering, please specify
- Connection fitting type
- Nominal diameter (DN)
- Operating temperature

CONNECTION FITTINGS CORRUGATED HOSES

Type SS12W, SS22W

Type SS12W/22W



Screw connection, welding end
Tapered sealing with 24° cone angle
Suitable for drill hole forms W DIN 3861 L, DIN EN ISO 8434-1 L
With welding end, pipe dimension ISO
Made of steel or stainless steel 1.4541 or 1.4571
Welded or brazed

Connection fitting type	Material	Permissible operating temperature
SS12W	Steel	300 °C
SS22W	Stainless steel	550 °C

Dimensions in mm, weight G in kg

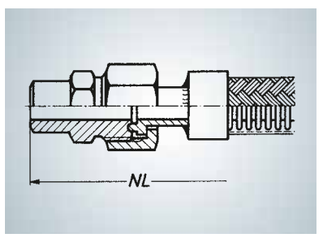
PN	100							63		
DN	6	8	10	12	16	20	25	32	40	50
d	10.2	13.5	17.2	21.3	21.3	26.9	33.7	42.4	48.3	60.3
a	45	47	49	52	53	61	65	70	74	83
l	53	57	59	64	67	77	83	90	96	108
s	17	19	22	27	32	36	41	50	60	70
G approx.	0.04	0.05	0.07	0.11	0.13	0.23	0.29	0.44	0.64	1.01

When ordering, please specify: connection fitting type, nominal diameter (DN), operating temperature, with stainless steel material no.

CONNECTION FITTINGS CORRUGATED HOSES SPECIAL APPLICATIONS

Type ST16, ST26

Type ST16/26



Threaded fitting for high pressure, welding end
Without intermediate seal, metal sealing
Made of steel 1.0460 or stainless steel
Welded

Connection fitting type		Material	Permissible operating temperature
PN 100	PN 200		
ST16S	ST16W	Steel	350 °C
ST26S	ST26W	Stainless steel	400 °C

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

Nominal diameter
DN 6 to DN 50

Operating pressure
As per table, higher pressure levels on request

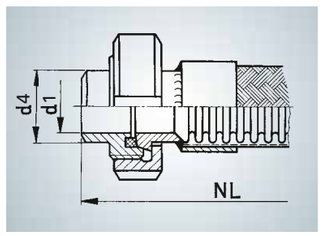
Operating temperature
As per table, higher operating temperatures on request

When ordering, please specify
- Connection fitting type
- Nominal diameter (DN)
- Operating temperature

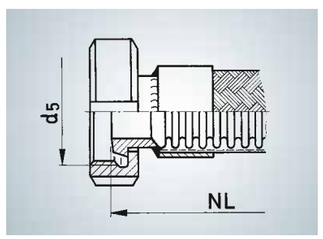
CONNECTION FITTINGS CORRUGATED HOSES SPECIAL APPLICATIONS

Type SY22S, SY22U, SY22V

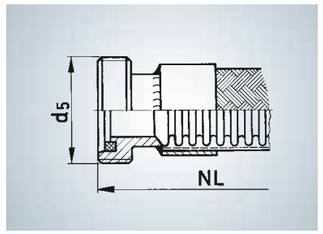
Type SY22S/22U/22V



Type SY22S/22U/22V



Type SY22S/22U/22V



Screw connection DIN 11851 for liquid foods
Made of stainless steel 1.4301, burr and crack-free welded, sterilisable

Type SY22S
Conical connecting piece with groove union nut with round thread DIN 405.
Thread feed pipe with welding end.

Type SY22U
Conical connecting piece with groove union nut with round thread DIN 405.

Type SY22V
Thread feed pipe with sealing ring.

Connection fitting type	Material		Permissible operating temperature
	Screw connection	Sealing ring	
SY22S SY22U SY22V	Stainless steel 1.4301 Other material no. On request	NBR (buna N) FPM (Viton) MVQ (silicon) or PTFE (Teflon)	-20 to +230 °C Depending on sealing material and flow medium

Dimensions in mm, weight G in kg

PN	40							25		
DN	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	Rd28x1/8	Rd34x1/8	Rd44x1/6	Rd52x1/6	Rd58x1/6	Rd65x1/6	Rd78x1/6	Rd95x1/6	Rd110x1/4	Rd130x1/4

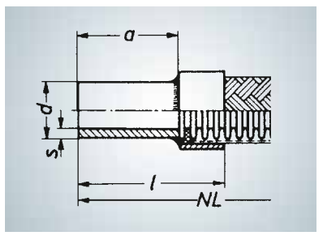
** on request also with ISO pipe dimensions, see page 46.*

When ordering, please specify: connection fitting type, nominal diameter (DN), operating temperature, sealing ring material or medium, pressure.

CONNECTION FITTINGS CORRUGATED HOSES

Type UA12S, UA22S
Type UD12Q, UD22Q

Type UA12S/22S



Pipe connection
Welding end with
ISO pipe dimensions
Made of steel or stainless steel 1.4541 or 1.4571
Welded or brazed

Connection fitting type	Material	Permissible operating temperature
UA12S	Steel	480 °C
UA22S	Stainless steel	550 °C

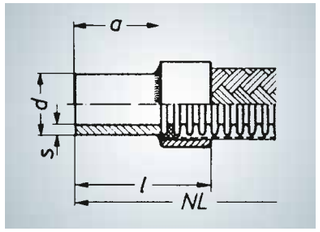
Dimensions in mm, weight G in kg

PN	160				100		40									16	
DN	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) with stainless steel: s = 1.6 2) with steel 10.2 x 1.6

When ordering, please specify: connection fitting type, nominal diameter (DN), operating temperature, with stainless steel material no.

Type UD12Q/22Q



Pipe connection
Precision pipe sockets for
Cutting ring screw connection DIN 3861 (L series), DIN EN ISO 8434-1
Made of steel or stainless steel 1.4541 or 1.4571
Welded or brazed

Connection fitting type	Material	Permissible operating temperature
UD12Q	Steel	300 °C
UD22Q	Stainless steel	550 °C

Dimensions in mm, weight G in kg

PN	250					160		100		
DN	4*	6*	8*	10*	12*	16*	20*	25	32	40
Pipe dimension	6	8	10	12	15	18	22	28	35	42
d	1	1	1.5	1.5	2	1.5	2	2	2	3
a	28	28	30	30	32	32	36	40	45	45
l	36	36	40	40	44	46	52	58	65	67
G approx.	0.02	0.02	0.02	0.03	0.04	0.04	0.06	0.10	0.14	0.18

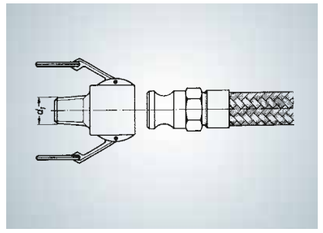
** Also suitable for Swagelok® screw connections for metric pipe dimensions*

When ordering, please specify: connection fitting type, nominal diameter (DN), operating temperature, with stainless steel material no.

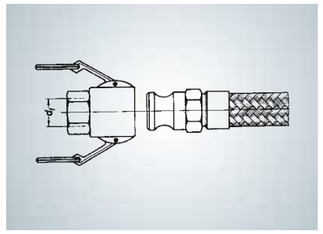
CONNECTION FITTINGS CORRUGATED HOSES SPECIAL APPLICATIONS

Type WA22S, WA32S

Internal thread



External thread



Quick release coupling
Lever arm coupling DIN EN 14420-7 with Whitworth pipe thread ISO 228/1
or Whithworth external thread DIN EN 10226 (ISO 7/1)
Made of brass or stainless steel
Welded or brazed

Connection fitting type	Material		Permissible operating pressure	Permissible operating temperature
	Quick release coupling	Sealing ring		
WA22S	Stainless steel	NBR (buna N)	16 bar	65 °C (NBR)
WA32S	Brass	FPM (Viton)		FPM on request

This quick release coupling stands out particularly through easy handling, quick mounting, robust design work and a long service life. In order to complete the coupling process, the two halves of the coupling are put together and securely connected with each other by applying both cam levers. As there is compression of the inserted seals rather than a turning movement when coupling up, the connection can be completed without damaging the hose by twisting.

Area of application
Lever arm couplings DIN EN 14420-7 are used to join hoses with connections for conveying liquids, solids and gases, except liquid gases and steam. Particular care is to be taken with the use of materials that are subject to the regulations on dangerous materials (Ordinance on Hazardous Substances – GefStoffV). The couplings can be used in a pressure range of -800 mbar to 25 bar in a working temperature range of - 20 °C to +65 °C. WARNING: Reduce the pressure in the pipeline before decoupling.

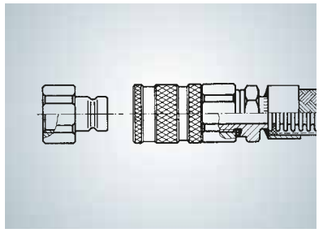
When ordering, please specify
Please state the following when ordering: connection fitting, nominal diameter (DN), operating temperature, internal or external thread, sealing material or medium, pressure. If only one half of the coupling is required (male or female part), this must be highlighted. Other DN upon request.

DN	20	25	32	40	50	65	80	100
d1 R/G	¾	1	1¼	1½	2	2½	3	4

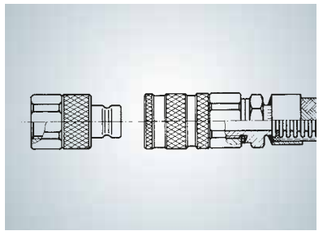
CONNECTION FITTINGS CORRUGATED HOSES

Type WB12S, WB22S, WB52S

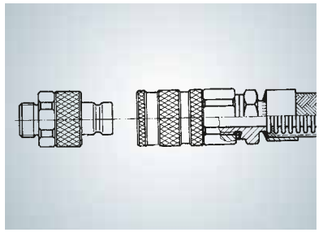
Version 1



Version 2



Version 3



Quick disconnect coupler
Connected on hose side
with threaded connection type MA … (page 22)
consisting of sealing coupling (female part) and plug nipple (male connector)
Thread: Whitworth pipe thread ISO 228/1

Connection fitting type	DN	Material		Permissible operating temperature
P_{perm} Bar and vacuum		Coupling	Sealing ring	
WB12S 30 - 100 bar	4 - 50	Zinc-plated steel	NBR (buna N)	-50 to +200 °C
WB22S 20 - 200 bar		Stainless steel	FPM (Viton)	depending on sealing material and flow medium
WB52S 20 - 200 bar		Brass	EP (ethylene-propylene)	

Nominal diameter: DN 4 to DN 50, PN to 400 bar, dependent on DN.
When ordering, please specify: connection fitting type, nominal diameter (DN), operating temperature, version for male connector and/or female part, sealing material or medium, pressure.
Other materials and other versions upon request.

Version 1
Sealing coupling (female part) – self-closing after decoupling

Sealing coupling (male part) with internal thread – open passageway

Version 2
Sealing coupling (female part) – self-closing after decoupling

Sealing coupling (male part) with internal thread – self-closing after decoupling

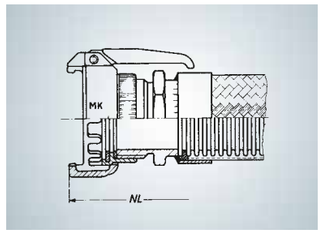
Version 3
Sealing coupling (female part) – self-closing after decoupling

Sealing coupling (male part) with external thread – self-closing after decoupling

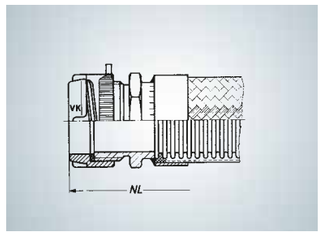
CONNECTION FITTINGS CORRUGATED HOSES SPECIAL APPLICATIONS

Type WC22S, WC52S

MK coupling



VK-Coupling



Quick release coupling for tank lorry DIN 28450
Connected on hose side with threaded connection type MA … (page 24) consisting of rotatable female part (MK coupling) with coupling lever or fixed male connector (VK coupling)

Both male connector and female part can be mounted on the hose.
Connection: Whitworth pipe thread as per ISO 228/1

Connection fitting type	Material		Permissible operating temperature
PN 10	Coupling	Sealing ring	
WC22S	Stainless steel	AU, EU (Vulkollan) NBR (buna N) FPM (Viton) CSM (Hypalon) or PTFE (Teflon)	100 °C
WC52S	Brass		

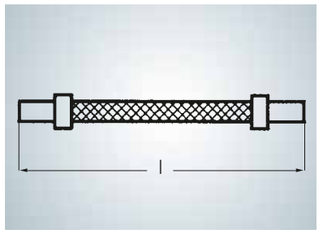
DN	50	80	100
Name for: male connector female part	 VK50 MK50	 VK80 MK80	 VK100 MK100

When ordering, please specify: connection fitting type, operating temperature, nominal diameter designation for male connector and/or female part, sealing material or medium, pressure.
Higher temperatures upon request.

LENGTH MEASUREMENT

Permitted deviations

Stretched hose length



The following guidelines apply for measuring the length of the individual hose types:

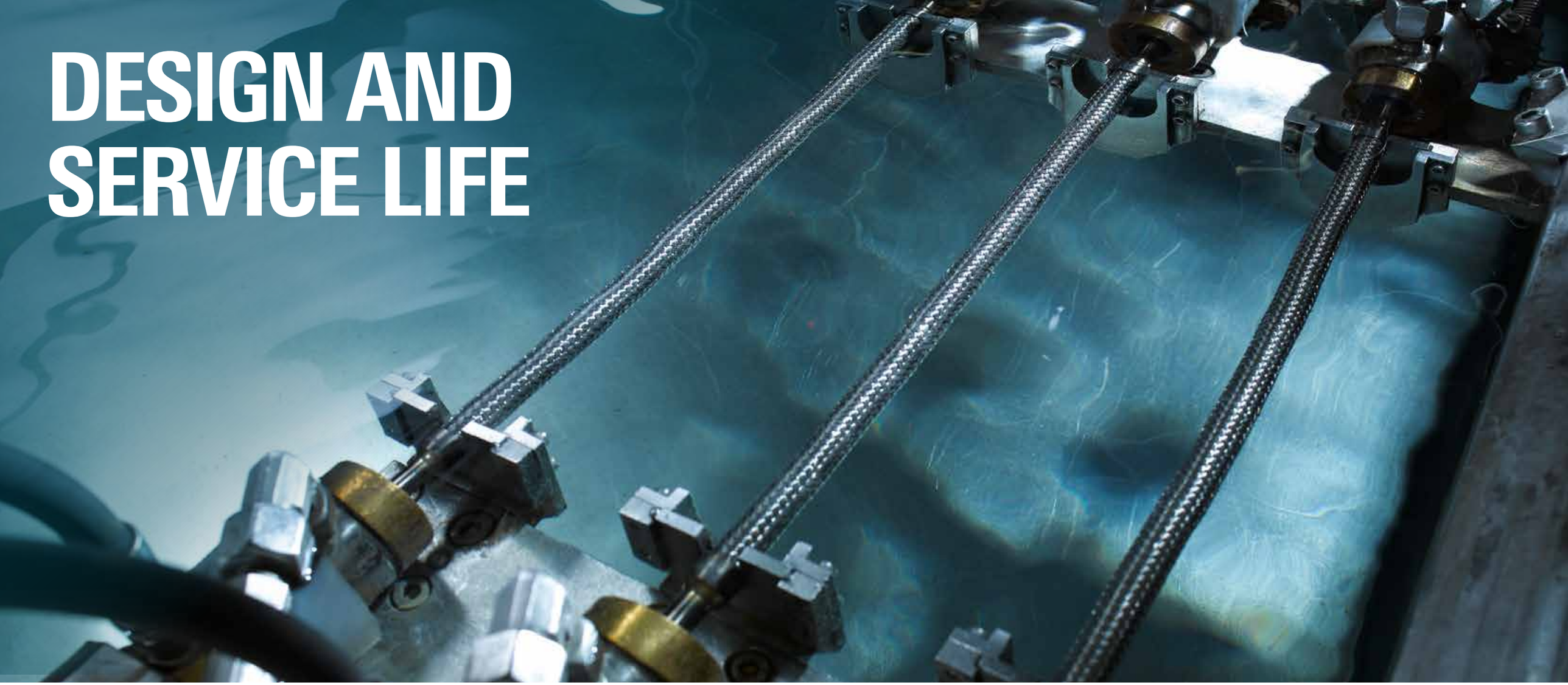
Corrugated hoses
Annularly corrugated hoses with or without braiding are measured in a depressurized, already fitted state.

Permitted deviations
The nominal length (NL) relates to the hose fitted with connection fittings and describes the total length of the hose. Unless otherwise agreed in the order, the following permissible variations in length are to be taken into account in checking the nominal length:

Connection fitting type	Permissible operating temperature
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 they have to be agreed when the order is placed.

DESIGN AND SERVICE LIFE



The basis of every design:
Type testing in accordance with DIN EN ISO 10380
The two essential static design criteria described in DIN EN ISO 10380 are cracking pressure and permanent elongation under pressure (with PT = 1.5 x PS). This demonstrates the strength of the flexible metal tube, braiding, connection fitting and connection technology. The standard examines service life by means of load alternation attempts with examples from a few important installation types. For example, for hose lines up to DN 100, for fitting in the vertical U-bend expansion joint, an average service life of 10,000 (50,000) load alternations applies, but at least 8,000 (40,000) load alternations (with unlubricated braiding).

Service life issues are mostly discussed in relation to unbraided hose lines. Several failure mechanisms are conceivable. The connection technology (flexible metal hose to connection fitting) and friction effects between hose and braiding are of key significance. Computations can currently only capture these influences to some degree. Whenever a failure could lead to a risk to persons or disproportionately high property damage, the manufacturer must always be informed before issuing the order. The service life can be verified empirically or using an empirical/computation process. We have the equipment and procedures required to do this. Please get in touch with us. Flexible metal tubes for use in vehicles are generally subject to special quality demands and must be specified separately in consultation with us.

Taking dynamic loads into account
Previously we have only taken dynamic load influences into account via reduction factors. Due to the test conditions changed by DIN EN ISO 10380 (load alternations at rated pressure), a reduction may not be applicable for the movements covered by the tests. The rated pressures specified in the tables in accordance with DIN EN ISO 10380 also apply for applications absorbing movements, heat expansions and vibrations, to the extent that our design guidelines and installation instructions are observed for the particular application case. If special mechanical stresses, such as pressure pulses, impact-like movements or strong vibrations/resonance oscillations are expected, an individual design in consultation with us is required.

The following are the primary influence factors on service life
- Operating pressure
- Operating temperature
- Mounting situation (e.g. shape and radius)
- Proper storage, handling and installation
- Corrosion resistance to the line medium and external influences such as seawater
- Dynamic stress, e.g. from movements, vibrations or pressure pulsations
- Flow conditions (including dependence on medium characteristics and speed)

REDUCTION FACTORS

Operating pressures and temperatures

$$p_{20\,°C} = PS/k_t$$

Reduction factors at increased operating temperature

The permissible operating pressures for flexible metal tubes and connection fittings apply only to operating conditions at room temperature (20 °C). These operating pressures must be reduced at higher operating temperatures. In many cases flexible metal tubes are designed in accordance with DGRL 97/23/EG, the associated product standard EN 14585 as well as supporting standards such as DIN EN ISO 10380. In the last case there are reductions for, among other things, stainless steels at increased operating temperatures. For flexible metal lines whose reduction is not specified in ISO 10380, the reduction of operating pressure takes place via the drop in heat resistance. These can be found, for example, in our flexible metal tube manual, where the strength metrics represent information from the material manufacturer or guaranteed values from internal material tests.

Material	Temperature °C											
	20	50	100	150	200	250	300	350	400	450	500	550
	Reduction factors											
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	1.00	0.90	0.73	0.67	0.61	0.58	0.53	0.51	0.50	0.49	0.47	0.47
1.4435												
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 pressures and temperatures for malleable iron threaded connections

Threaded connections made of malleable iron can be used at up to the operating pressures in the following table, depending on the flow media and operating temperature. Particular care is required with the seal. The sealing materials are to be adjusted to the operating conditions. Only permitted sealants may be used to seal threaded connections in drinking water and gas installations. Only the highest quality connecting threads are suitable for demanding operating requirements.

Permissible operating pressure for the flow media					
DN	d Inch	Water and gas up to max. 120 °C	Gases and vapours up to max. 150 °C	Gases and vapours up to max. 300 °C	Oils up to 200 °C
Nipple, flat sealing screw connections					
6 - 50	¼ - 2	65 bar	50 bar	40 bar	35 bar
Conical sealing screw connections					
6 - 32	¼ - 1 ¼	65 bar	50 bar	40 bar	35 bar
40	1 ½	65 bar	50 bar	40 bar	30 bar
50	2	55 bar	40 bar	32 bar	24 bar

CALCULATION

of the permitted operating pressure

Material requirements for low temperature applications

EN 14585 generally permits stainless steels in accordance with the preceding table up to -200 °C, material 1.4301 only being permitted as a braided material. In addition, materials 1.4306 and 1.4435 may only be used up to -270 °C.

Note 1

Revision of the product standard EN 14585 already started with its publication.

Note 2

The AD 2000 regulations also apply with the regulations standardised in accordance with the DGRL. In accordance with AD 2000-W10, the materials 1.4541 and 1.4571 can be used up to -270 °C, a notched bar impact test being prescribed at -196 °C. When the AD 2000 regulations are used their overall concept is to be observed.

Conversion of the operating pressure to standard conditions at 20 °C

$$p_{20\,°C} = PS/k_t$$

$p_{20\,°C}$	Operating pressure converted to standard conditions at 20 °C in bar
PS	Permitted operating pressure at operating temperature TS in bar
k_t	Temperature reduction factor values from table page 46

Calculation example

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

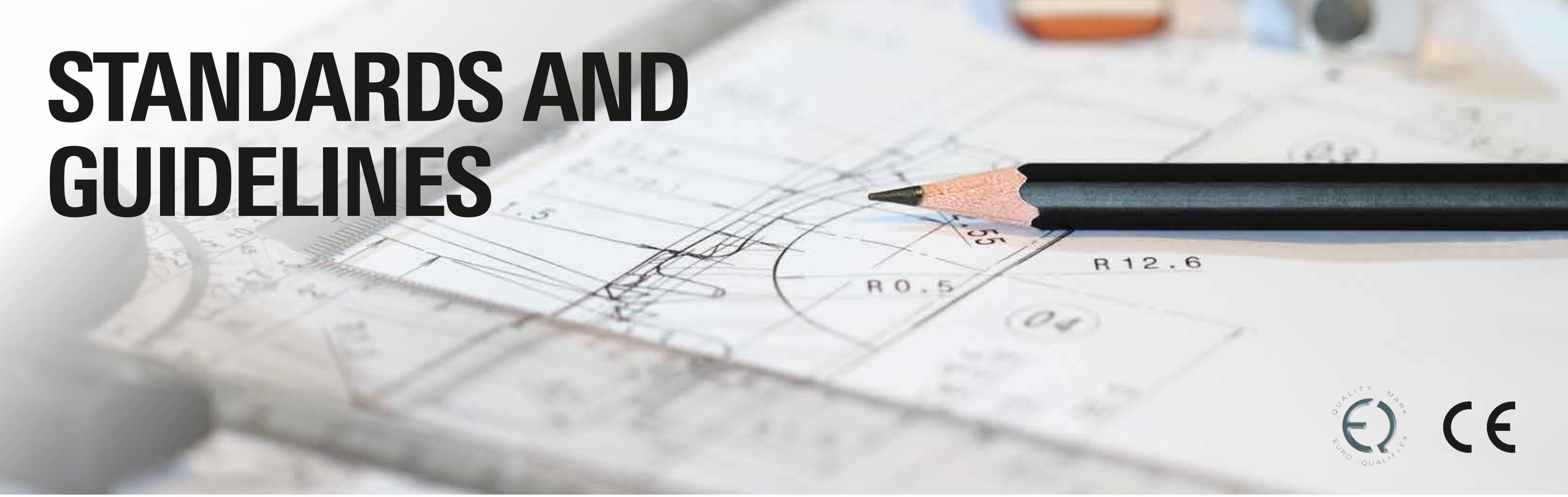
Temperature reduction factor for 1.4301: k_t = 0,60
(take lowest tube or braiding value into account, table page 46)

$$p_{20\,°C} = PS/k_t$$

$p_{20\,°C}$ = 13/0.60 = 21.7 bar

The rated pressure of an appropriate flexible metal tube must be at least as large as the calculated operating pressure, e.g. RS331L12, DN 50, **PN 25**.

STANDARDS AND GUIDELINES



The construction, design and use of flexible metal tubes are influenced by different general and/or application-related standards. The most important general rules for flexible metal tubes are the pressure devices guidelines (guideline 97/23/EG, in short DGRL) with the accompanying product standard DIN EN 14585-1 "Corrugated metal hose assemblies for pressure application" and DIN EN ISO 10380 "Corrugated metal hoses and metal hose assemblies". Explanations are provided below:

Pressure devices guideline and DIN EN 14585-1
The Pressure Equipment Directive applies for deliveries inside or to the European Economic Area (EEA). The guideline has legal validity and is binding on the user and manufacturer. It regulates the manufacture and marketing of pressure vessels with a maximum permissible operating pressure PS > 0.5 bar. According to the terminology of the guideline, metal hoses fall under the "pipeline" type of pressure devices.

The significant element of the pressure device guideline is the classification of pressure devices according to their potential risk in different categories. The potential risk of metal hoses is determined by the nominal diameter, the maximum permissible operating or design pressure PS, the danger of the medium, the aggregate status (liquid/gaseous) and the steam pressure of the medium.
All metal hose assemblies DN < 25 come under the area of „"good engineering practice" (GIP).

Categories I and II are typical for metal hose assemblies, category III less so. Hose assemblies in categories I – III are allocated a "CE" label. Depending on the category, the hose manufacturer has to carry out a conformity assessment. There are 9 different procedures with 11 modules available. The modules describe procedures that the manufacturer uses to ensure and explain that the relevant product meets the requirements of the guideline.

Special metal hose applications for the air and space industry, nuclear technology, vehicle technology, medical technology or the field of technical building equipment are regulated by other guidelines and are therefore excluded from the DGRL. The DGRL only describes the basic requirements for pressure containers. The specification of regulations for certain components are subject to relevant specialist or product standards. For metal hose that is DIN EN 14585-1. It describes the classification, materials, design, manufacture, approval and documentation for metal hose assemblies. In particular, with regard to type examination, DIN EN 14585-1 refers to DIN EN ISO 10380.

ISO 10380
DIN EN ISO 10380 "Corrugated metal hoses and metal metal hose assemblies" is the most important international standard for metal hoses. It was last updated in 2013 and sets out the minimum requirements for the design, manufacture and inspection of corrugated metal hoses and metal hose assemblies. Within the meaning of the DGRL, DIN EN ISO 10380 has the character of a supportive standard. According to DIN EN ISO 10380 metal hoses are characterised by their nominal width (DN), the operating pressure at the working temperature (PS), the nominal pressure (PN) and the service life in the U-bend expansion joint test or cantilever test.

The test pressure is at least 1.43 times the nominal pressure. The remaining extension of the hose assembly according to load with the test pressure must not exceed 1%. This criterion defines the nominal pressures for for non-braided hose assemblies. The nominal pressure for braided hose assemblies is generally determined by the cracking pressure of the hose assembly; it must be at least 4 times the nominal pressure. 4 quality levels differentiate the service life of the hoses:

Type 1-50 – Corrugated metal hose with high flexibility and long service life ("high cycle life hose"):
- bending radius type 1
- average service life 50,000 load cycles
- minimum service life 40,000 load cycles

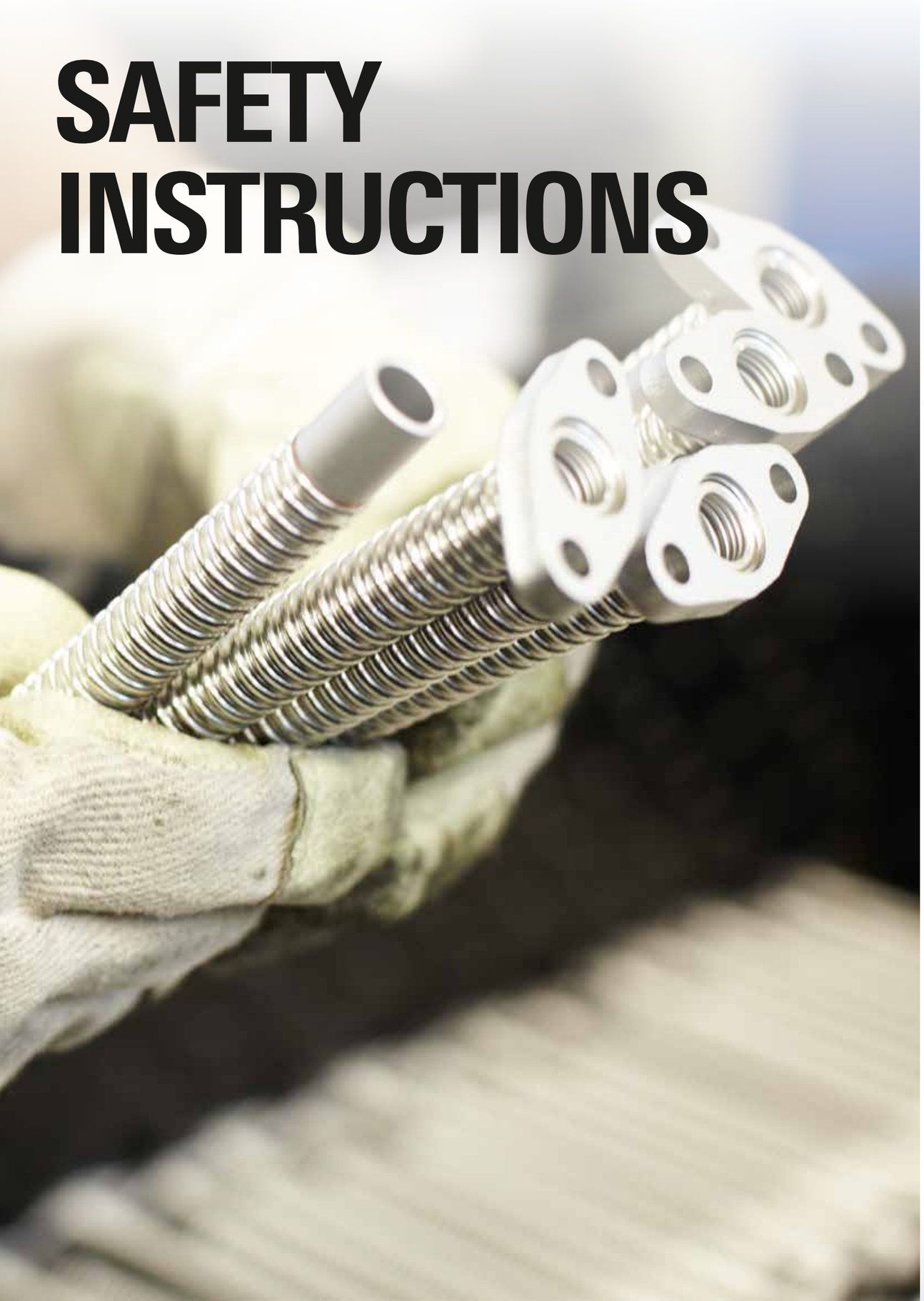
Type 1-10 – Corrugated metal hose with high flexibility and normal service life ("standard life cycle hose"):
- bending radius type 1
- average service life 10,000 load cycles
- minimum service life 8,000 load cycles

Type 2-10 – Corrugated metal hose with normal flexibility:
- expanded bending radius type 2
- average service life 10,000 load cycles
- minimum service life 8,000 load cycles

Typ 3 – Type 3 – Corrugated metal hose, with pliability requirements
- no service life specification

The type approval of the hose assemblies can be completed with or without monitoring via an external expert. In the first case, all hose assemblies can be identified as "certified products according to EN ISO 10380", in the second case merely as a "product according to EN ISO 10380". The conformity of the product characteristics with the details from the type approval must be verified for each type of hose at regular intervals by repeat tests.

Each manufacturer of metal hoses and metal hose assemblies according to EN ISO 10380 must implement a quality assurance system according to ISO 9001.



SAFETY INSTRUCTIONS

Safety instructions
HYDRA metal hoses are quality products. They are safe to operate and have a long service life. However, this requires the correct selection of hose version and professional, problem-free installation. If you have doubts, please let us advise you. The most important safety information is listed below. The safety information with installation guide is available as a pamphlet. Additional application-related information can be found in our metal hose manual or on www.flexperte.de.

Design and service life
Hose lines may only be used for the operational and installation conditions specified in the order and confirmed by the manufacturer. There is a range of factors that could have a major influence on the service life. Please see the explanations on page 44-45.

Correct selection of hose line length
Ensure no movement or bending stresses apply directly to the connections. This so-called "neutral part" of the hose end must be adequately measured. If necessary, this is taken into account in the calculation formulae. If necessary, anti-buckling protection can be added at the end.
For calculating the correct hose length, you will find an easy-to-use calculation portal at www.flexperte.de.

Temperature influence
In each case, the nominal pressure/operating pressure indicated for our hoses is relative to the room temperature (20 °C). At higher temperature, the permitted operating temperature and service life fall. Temperature reduction factors must be taken into account when calculating the permitted operating pressure (see page 46).

Materials/corrosion
The suitability and selection of the materials of all individual parts of a hose assembly are to be checked by the customer based on the resistance tables in the specialist literature or the HYDRA manual. In this process, the resistance to the line medium is to be taken into account in all operating conditions and against external influences, e.g. seawater (atmosphere). In addition, no corrosive insulation may be used. Etching and passivation, particularly of hose lines, is not permitted, as, from a structural point of view, it is difficult to remove etching and passivation residues. This could cause corrosion.

Inspections
In principle, all corrugated hose lines are subjected to a pressure and leakage test before delivery. HYDRA flexible metal hoses are maintenance-free. However, a visual check should be performed by the operating company at appropriate time intervals in accordance with the operational conditions. Particular attention should be paid to damage such as buckling, corrosion and braiding damage.

You must not continue to use flexible metal tubes with visible defects!
In many areas, tubes come under corporate safety regulations or other regulations. Please always observe the regulations that are applicable for your area.

If presssure test are performed by the user or a third party, the max. permissible testing pressure of the flexible metal tube must not be exceeded (1.5 x P_{perm}).

SAFETY INSTRUCTIONS

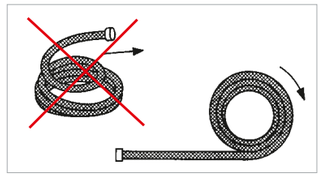
Installation

Handling and installation
Protect hose assemblies against mechanical damage. They should therefore not be dragged across the floor or over sharp edges and should not come into contact with one another during operation or with surrounding objects.

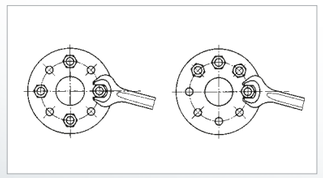
The hose line must be checked for damage before installation!
The permissible bending radius must not be underrun. The values must be taken from the tables of the selected hose type. **Torsion** is to be avoided as this could lead to a temporary failure. Therefore the following installation sequence should be observed:

Initially, the connection fitting of the hose lines is to be fastened on one side. If the hose assembly has a rotatable and a fixed connection fitting, please start with the fixed connection fitting. With hose assemblies used to absorb movements, first fasten the other side loosely. Then the hose assembly is to be moved 2 or 3 times, empty, in the desired direction of movement, so it can be aligned in a torsion-free way. Now the second side can also be fastened. To avoid torsion, it is essential that a second spanner be used for screw connections to provide counterpressure. When establishing the connection fittings, it should be noted that at least one side of the hose assembly can be connected in such a way that it can rotate. If there are movements, please install the hose so that the hose axis and direction of movement are on one level, so that no torsion may arise.

With welding or soldering work, the hose assemblies must be protected against weld or flux spatter. Flux residue has to be removed. Measures must be taken to protect the soldering joints from overheating / de-soldering. Electrical short circuit through welding electrodes or ground cable must be avoided without fail, since this can cause irreparable damage to the hose.



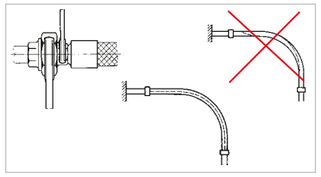
Example 1
Lay the conduit straight by rolling out the hose ring. Pulling on one end of the hose ring will result in the minimum bending radius of the hose being undercut and stressed impermissibly to torsion.



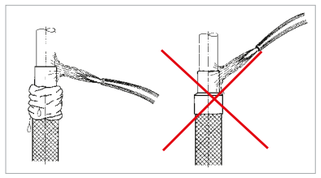
Example 2
Counter flanges must be uniformly tightened (cross-wise). Bolt holes must be exactly aligned. Use loose flange on one side.

SAFETY INSTRUCTIONS

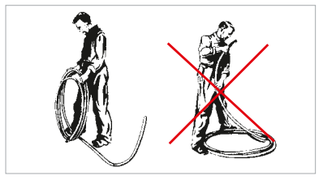
Installation



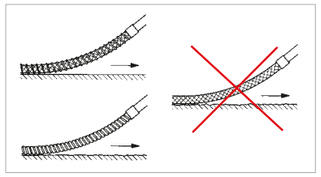
Example 3
Connect hose assembly in such a way that it is free of torsion. A second spanner must be used for rotatable threaded connections.



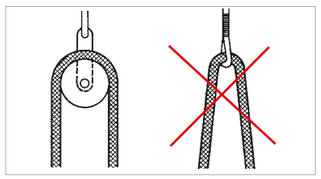
Example 4
In the case of solder connections, the hose assembly end to be soldered should be protected against excessive heating and de-soldering with a wet strip or with heat insulating paste. Keep the burner away from the hose assembly. Carefully remove flow medium residues.



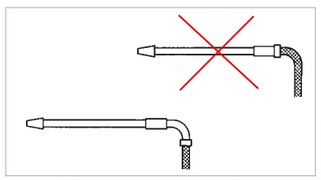
Example 5
With flexible metal tubes, special care must be taken to ensure that the tube is not damaged by improper handling, resulting in a leak. For example, a rolled out tube should not be pulled when laying, but rolled out.



Example 6
If external mechanical loads, such as frequent pulling to the ground, cannot be avoided then the hose assembly should be protected against damage, either by an external round wire coil or by a protective hose, depending on degree of load.



Example 7
Avoid too much bending stress by using a roller that corresponds to the permitted bending radius.



Example 8
Even when used manually, protect hose ends from impermissible bending stresses by using rigid pipe bends.

ORDER EXAMPLE

Hose assembly

Hose with connection fittings

Most of the connection fittings described are held in stock or can be obtained at short notice. Of course other and special connection fittings, e.g. NPT threads, ANSI flanges,vdesigns with tongue and groove, etc. can also be supplied.

A detailed example is presented below
Hose assembly DN 50
for hot water 12 bar, 180 °C
Medium characteristics in accordance with DGRL:
Group 2 non-hazardous liquid, pD > 0.5 bar
DGRL Art. 3 para.(3)
Good engineering practice
10 pieces, nominal length 2000 mm

HYDRA annularly corrugated hose, medium version, normal corrugation, made from stainless steel 1.4404 with single braiding made from stainless steel wire 1.4301.
Connecting parts, WIG-welded:
On both sides stainless steel end sleeves 1.4301
On one side: welding neck made from stainless steel 1.4571 and loose flange PN 16
Made from steel, flange dimensions in accordance with DIN EN 1092-1
On the other side: welding end
60.3 x 2.9 x 70 made from stainless steel 1.4571

Short form sufficient

For hot water 12 bar, 180 °C
RS 331L12 (1.4404), GIP
DN 50, NL 2000
on one side: AB82E (1.4571)
on the other side: UA22S (1.4571)
Welded
10 units

INQUIRY SPECIFICATION

For HYDRA® flexible metal hose assemblies

INQUIRY SPECIFICATION FOR HYDRA METAL HOSE ASSEMBLIES

Company:

Date:

Inquiry no./project:

Contact:

Quotation deadline:

Phone/fax:

Receiver inquiry-specific WI Group:

E-mail:

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