

Section
6

FLEXIBLE HOSES
TYPE FSH SERIES METALLIC BRAIDED FLEXIBLE HOSE

DESIGN CONDITIONS		MATERIALS OF CONSTRUCTION		IDENTIFICATION
Max. Working Pressure	To suit specific client applications	Hose	321 / 316 Stainless Steel	As required acc. to P.E.D. 97/23/EC
Temperature Rating		Outer Braid	304 Stainless Steel	
Max. Test Pressure		Ferrules	Stainless Steel	
		Fittings	Carbon or stainless Steel	

SPECIFICATION

FlexEJ type FSH metallic flexible hose to suit client's specific pressure, temperature, movements or vibration applications.

End fittings to suit client specific requirements. Refer to next page for end fitting examples.

TECHNICAL DATA						
NOMINAL BORE	HOSE LENGTH mm	HOSE Dimms I/Dia mm	HOSE Dimms O/Dia mm	MIN.BEND RADIUS mm	PRESSURE RATING 20°C Bar	Number of Outer Braids
6 (1/4") through to 250 (10")	Unlimited	Size Dependant Refer to sheet 6-4 and 6-5	Size Dependant Refer to sheet 6-4 and 6-5	Size Dependant Refer to sheet 6-4 and 6-5	Size Dependant Refer to sheet 6-4 and 6-5	Size and Pressure Dependant

TYPICAL APPLICATIONS

FSH metallic flexible hoses are designed to allow maximum flexibility for misalignment of pipe work, compensate for pipe line thermal expansion and vibration isolation. Due to the flexibility of this range of hoses, special care must be taken during installation - always refer to installation instructions.

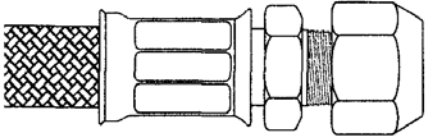
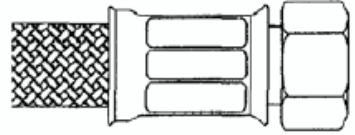
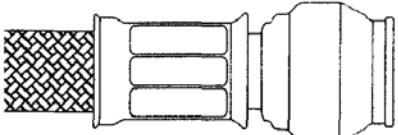
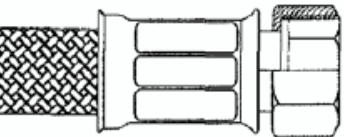
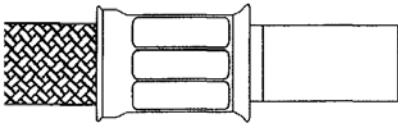
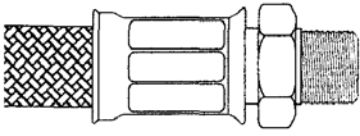
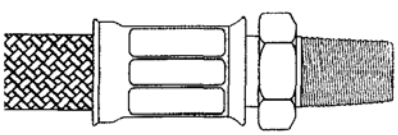
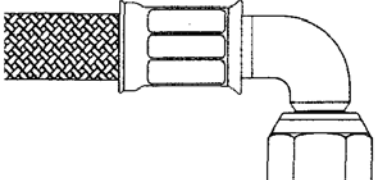
ACCESSORIES

FSH hoses can be provided with vapour sealed Armaflex class 'O' insulation when required on chilled water applications.



2011

Typical Flexible Hose End Fitting Options (HVAC)

END FITTING OPTION	DESCRIPTION	NOMINAL BORE
	CF Compression Fitting c/w Brass Nut and Olive	13, 20, 25 1/2", 3/4", 1"
	SCF Swivel Female Nut c/w Cone Seat	13, 20, 25 1/2", 3/4", 1"
	PF Nickel Plated Brass 'PUSHFIT' c/w John Guest, Tectite, OR other fittings	13 1/2"
	SFF Swivel Female Nut c/w Flat Face Seat	13, 20, 25 1/2", 3/4", 1"
	SP 25mm Long Brass Stub pipe end To suit copper fittings	13, 20, 25 1/2", 3/4", 1"
	PM Fixed Male c/w Parallel Thread	13, 20, 25 1/2", 3/4", 1"
	TM Fixed Male c/w BSP Taper Male	13, 20, 25 1/2", 3/4", 1"
	EF 90° Elbow with Swivel Female Nut c/w Flat Face Seat	13, 20, 25 1/2", 3/4", 1"

METAL HOSE DESIGN

Influence of the service conditions on the metal hose design

In view of the wide variety of potential applications the working pressures and bending radius stated in the technical tables can only be used as a guideline. They are valid for predominantly static stress and room temperature (20 °C). The bursting pressure of the hoses is a factor of 4X greater than the working pressure stated in the tables. The maximum allowable testing pressure is 1.5X the working pressure. The actual service conditions (i.e. pulsating and discontinuous demand, type and frequency of motion, higher working temperature etc) exert additional demands on the hose material. These influences must be taken into account when determining the safe working and working life of the hose assemblies using the tables and formulae given here.

Single motion

Minimum bending radius for single motion tested according to ISO 10380 7.4.2 - picture 2.

Repeated motion

For repeated motion without major dynamic demand.

Dynamic motion

For dynamic motion the radius R_b is to be re-calculated according to the table with the help of the corrective factors f_t and f_{dyn}.

The allowed working pressure is calculated as follows:

$$P_{\text{toel.}} = P_{\text{max.}} \cdot f_t \cdot f_{\text{dyn}}$$

P _{toel.} =	Allowed working pressure	(bar)
P _{max.} =	Max. working pressure acc. to table	(bar)
f _t =	Reduction factor for increased temperature	(without dimensions)
f _{dyn.} =	Reduction factor for dynamic demand	(without dimensions)

The allowed bending radius is calculated as follows:

$$R_{\text{dyn.}} = \frac{R_b}{2,98} \left(1,09 + f_t \cdot f_{\text{dyn.}} + \frac{1}{f_t} + \frac{1}{f_{\text{dyn.}}} \right)$$

R _{dyn.} =	Bending radius for dynamic demand	(mm)
R _b =	Bending radius for repeated motion acc. to table	(mm)
f _t =	Reduction factor for increased temperature	(without dimensions)
f _{dyn.} =	Reduction factor for dynamic demand	(without dimensions)

UFBX DN 6 - DN 200

UFC DN 6 DN 80

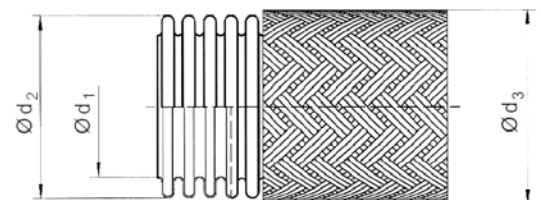
Stainless steel hose, annular corrugations

Design	UFBX / UFC 0	UFBX / UFC 1	UFBX / UFC 2
	Corrugated hose without braiding	Corrugated hose with one braiding	Corrugated hose with two braidings

Material No.	Austenitic, stainless steel	
	Hose (BS 1449 Part 2)	Braiding (BS 1554)
	321S31/ similar to AISI 321 316S11 / similar to AISI 316 L	304S31/ similar to AISI 304

Other materials available on request

Temperature	usable from -200°C to +600°C
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When ordering please specify:

- Type of hose [UFBX / UFC...]
- Hose material [321/316]
- Nominal diameter [DN]
- Total length [TL]
- Number of braiding
- End fittings (Type and material)
- Design pressure
- Working pressure
- Design temperature
- Working temperature

Please use correction factors for the permissible pressure and bending radius through increased temperature or dynamic stress from the catalogue sheet "Design of metal hoses"

UFBX

Standard pitch high pressure hose with high flexibility

DN		Type	Dimensions					Bend radius		Max working pressure at 20 ⁰	Weight
			Internal diameter		External diameter			Single motion	Dynamic motion		
			d ₁ (mm)	Tol± (mm)	d ₂ (mm)	d ₃ (mm)	Tol± (mm)	Rst (mm)	Rb (mm)	P max (bar)	(± 10%) (kg/m)
mm	inch										
6	1/4"	UFBX 0			9.8	-	0.3	16	110	10.0	0.08
		UFBX 1	7.0	0.25	-	11.5	0.4	25	110	167.0	0.16
		UFBX 2			-	13.1	0.5	25	110	220.0	0.25
8	5/16"	UFBX 0			11.8	-	0.3	20	130	10.0	0.12
		UFBX 1	8.3	0.25	-	13.5	0.4	32	130	136.0	0.23
		UFBX 2			-	15.2	0.5	32	130	210.0	0.33
10	3/8"	UFBX 0			14.6	-	0.3	22	150	5.5	0.16
		UFBX 1	10.3	0.25	-	16.3	0.4	38	150	100	0.27
		UFBX 2			-	18.0	0.5	38	150	178.0	0.38
12	1/2"	UFBX 0			19.3	-	0.3	24	165	5.5	0.17
		UFBX 1	14.9	0.30	-	20.9	0.4	45	165	74.0	0.35
		UFBX 2			-	22.6	0.5	45	165	103.0	0.52
16	5/8"	UFBX 0			21.7	-	0.3	28	195	5.0	0.28
		UFBX 1	16.3	0.30	-	23.4	0.4	50	195	70.0	0.46
		UFBX 2			-	25.1	0.5	50	195	125.0	0.63
20	3/4"	UFBX 0			25.5	-	0.3	30	200	4.1	0.27
		UFBX 1	20.1	0.30	-	27.4	0.4	70	200	65.0	0.53
		UFBX 2			-	29.3	0.5	70	200	86.0	0.79
25	1"	UFBX 0			33.3	-	0.4	44	200	4.1	0.32
		UFBX 1	27.4	0.40	-	35.8	0.5	85	200	50.0	0.71
		UFBX 2			-	38.3	0.6	85	200	76.0	1.10
32	1 1/4"	UFBX 0			40.7	-	0.4	55	250	3.4	0.40
		UFBX 1	34.3	0.40	-	43.2	0.5	105	250	39.0	0.86
		UFBX 2			-	45.7	0.6	105	250	57.0	1.32
40	1 1/2"	UFBX 0			47.5	-	0.4	70	250	2.4	0.67
		UFBX 1	39.4	0.40	-	50.0	0.5	127	250	35.0	1.19
		UFBX 2			-	52.5	0.6	127	250	55.0	1.71
50	2"	UFBX 0			61.7	-	0.4	90	350	1.0	0.82
		UFBX 1	53.0	0.40	-	64.2	0.5	160	350	30.0	1.56
		UFBX 2			-	66.7	0.6	160	350	44.0	2.29
65	2 1/2"	UFBX 0			76.1	-	0.4	110	410	1.0	1.80
		UFBX 1	64.3	0.40	-	78.6	0.5	200	410	26.0	2.68
		UFBX 2			-	81.1	0.6	200	410	46.0	3.57
80	3"	UFBX 0			89.4	-	0.4	130	450	1.0	2.21
		UFBX 1	76.5	0.40	-	91.9	0.5	230	450	22.0	3.29
		UFBX 2			-	94.5	0.6	230	450	40.0	4.37
100	4"	UFBX 0			119.0	-	0.6	131	530	0.1	1.81
		UFBX 1	100.0	0.50	-	122.6	0.7	218	530	20.0	3.89
125	5"	UFBX 0			145.6	-	0.7	189	800	0.1	2.58
		UFBX 1	124.9	0.60	-	150.4	0.8	315	800	20.0	6.00
150	6"	UFBX 0			173.2	-	0.8	216	1050	0.1	3.55
		UFBX 1	150.4	0.70	-	178.0	0.9	360	1050	23.0	8.28
200	8"	UFBX 0			227.0	-	0.9	281	1300	0.1	4.75
		UFBX 1	200.7	0.80	-	231.8	1.0	468	1300	15.0	10.46

Reproduction not permitted

Subject to changes in design

Larger diameters available on request

UFC

Close pitch high pressure hose with high flexibility

DN		Type	Dimensions					Bend radius		Max working pressure at 20 ⁰	Weight
			Internal diameter		External diameter			Single motion	Dynamic motion		
			d ₁	Tol±	d ₂	d ₃	Tol±	Rst	Rb	P max	(± 10%)
mm	inch	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(bar)	(kg/m)		
6	1/4"	UFC 0			13.0	-	0.3	16	100	10.0	0.20
		UFC 1	7.0	0.25	-	14.5	0.4	25	100	171.0	0.31
		UFC 2			-	15.9	0.5	25	100	305.0	0.42
8	5/16"	UFC 0			12.0	-	0.3	20	140	10.0	0.19
		UFC 1	8.3	0.25	-	13.4	0.4	38	140	164.0	0.41
		UFC 2			-	14.7	0.5	38	140	210.0	0.29
10	3/8"	UFC 0			17.8	-	0.3	22	150	5.5	0.29
		UFC 1	10.3	0.25	-	19.3	0.4	40	150	151.0	0.48
		UFC 2			-	20.7	0.5	40	150	260.0	0.67
12	1/2"	UFC 0			21.8	-	0.3	24	165	5.5	0.17
		UFC 1	14.9	0.30	-	13.3	0.4	50	165	114.0	0.35
		UFC 2			-	24.7	0.5	50	165	205.0	0.52
16	5/8"	UFC 0			26.9	-	0.3	28	200	5.0	0.37
		UFC 1	16.3	0.30	-	28.6	0.4	50	200	90.8	0.64
		UFC 2			-	30.2	0.5	50	200	163.0	0.91
20	3/4"	UFC 0			28.0	-	0.3	30	200	4.1	0.48
		UFC 1	20.1	0.30	-	30.2	0.4	70	200	90.8	0.86
		UFC 2			-	32.3	0.5	70	200	150	1.20
25	1"	UFC 0			35.0	-	0.4	40	200	4.1	0.64
		UFC 1	27.4	0.40	-	37.2	0.5	90	200	79.4	1.10
		UFC 2			-	39.3	0.6	90	200	120.0	1.60
32	1 1/4"	UFC 0			46.5	-	0.4	55	250	3.2	1.30
		UFC 1	34.3	0.40	-	48.8	0.5	108	250	59.0	2.30
		UFC 2			-	50.7	0.6	108	250	89.0	3.30
40	1 1/2"	UFC 0			54.5	-	0.4	70	250	2.4	1.20
		UFC 1	39.4	0.40	-	56.7	0.5	127	250	46.0	1.90
		UFC 2			-	58.8	0.6	127	250	71.0	2.70
50	2"	UFC 0			65.5	-	0.4	90	350	1.0	1.30
		UFC 1	53.0	0.40	-	68.5	0.5	175	350	40.2	2.30
		UFC 2			-	70.9	0.6	175	350	50.0	3.30
65	2 1/2"	UFC 0			85.5	-	0.4	110	410	1.0	2.00
		UFC 1	64.3	0.40	-	88.2	0.5	200	410	35.5	3.30
		UFC 2			-	90.7	0.6	200	410	50.0	4.60
80	3"	UFC 0			97.7	-	0.4	130	450	1.0	2.50
		UFC 1	76.5	0.40	-	100.0	0.5	200	450	28.1	4.00
		UFC 2			-	103.0	0.6	200	450	50.0	5.50

Reproduction not permitted

Subject to changes in design

Larger diameters available on request

Correction Factors for Hose Systems

Temperature de-rating factors:

Material	Temperature ° C														
	-200 to -20	20	50	100	150	200	250	300	350	400	450	500	550	600	650
	Derating Factors														
1.4306 SS304L	1	1	0.89	0.72	0.64	0.58	0.54	0.5	0.48	0.46	0.44	0.43	0.43	A	—
1.4301 SS304	1	1	0.9	0.73	0.66	0.6	0.55	0.51	0.49	0.48	0.46	0.46	0.46	A	A
1.4541 SS321	1	1	0.93	0.83	0.78	0.74	0.7	0.66	0.64	0.62	0.6	0.59	0.58	A	A
1.4404 SS316L	1	1	0.9	0.73	0.67	0.61	0.58	0.53	0.51	0.5	0.49	0.47	0.47	A	—
1.4401 SS316	1	1	0.91	0.78	0.7	0.65	0.61	0.57	0.55	0.53	0.52	0.51	0.5	A	A
1.4571 SS316Ti	1	1	0.92	0.8	0.76	0.72	0.68	0.64	0.62	0.6	0.59	0.58	0.58	A	—

NB: "A" – Refer to FlexEJ

Correction factors for dynamic demand

Motion / *Flow	Without vibration, low and slow motion	low vibration, frequent uniform motion	strong vibration, rhythmical ongoing motion
Stationary or slow uniform flow	1,00	0,80	0,40
Pulsating and swelling flow	0,80	0,64	0,32
Rhythmical and discontinuous flow	0,40	0,32	0,16

*An internal liner should be used when the flow velocity of the medium is exceeding the following values:-Hose without braiding : gas 30m/s, liquid 15m/s-Hose with braiding: gas 45m/s, liquid 22.5m/s

Calculation example

Stainless steel corrugated hose material AISI 321 , UFBX 1 DN 50 is installed at a temperature of 263° C. It is exposed to low vibration and frequent uniform motion with pulsating and swelling flow.

$P_{max} = 30 \text{ bar}$ $R_b = 350\text{mm}$, $f_t = 0.71$ $f_{dyn.} = 0,64$	$R_{dyn.} = \frac{R_b}{2,98} \left(1,09 + f_t \cdot f_{dyn.} + \frac{1}{f_t} + \frac{1}{f_{dyn.}} \right)$	$P_{max} = 13.6 \text{ bar}$
$P_{toel.} = P_{max.} \cdot f_t \cdot f_{dyn.}$		
$P_{max} = 30 - 0.71 - 0.64$	$R_{dyn.} = \frac{350}{2,98} \left(1,09 + 0.71 \cdot 0.64 + \frac{1}{0.71} + \frac{1}{0.64} \right)$	$R_{dyn.} = 530 \text{ mm}$