

Quick reference

HANSA FLEX
Quick reference



Measurement methodology for frequently occurring hose fittings

Hose size			Light series metric				Heavy series metric				Fine thread metric		Banjo		French metric (pipe in inches)				French metric (metric pipe light)			French metric (metric pipe heavy)					
			24°		24°		24°		24°		60°				24°		24°		24°			24°					
Nom. Ø	SIZE	INCH	SW	AOL DKOL AFL DKL	HL CEL	FL BEL	SW	AOS DKOS AFS DKS	HS CES	FS BES	A DKM	HM AM flat sealing	B RNM	BR inches for banjo screw	SW	AF DKF	HF CEF	FF BEF	SW	AFLF	HLF	Pipe	SW	AFSF	HSF	Pipe	
	3	2	1/8					17	12.5	14x1.5	6		10x1	8.1													
4 (5)	3	3/16	14	10.5	12x1.5	6	19	14.5	16x1.5	8			10.1														
6	4	1/4	17	12.5	14x1.5	8	22	16.5	18x1.5	10		14x1.5	12.1	1/4 13.2													
8	5	5/16	19	14.5	16x1.5	10	24	18.5	20x1.5	12		16x1.5	14.1														
10	6	3/8	22	16.5	18x1.5	12	27	20.5	22x1.5	14*		18x1.5	16.1	3/8 16.7	24	18.5	20x1.5	13.25									
13 (12)	8	1/2	27	20.5	22x1.5	15	30	22.5	24x1.5	16		22x1.5	18.1	1/2 21.0	30	22.5	24x1.5	16.75									
16	10	5/8	32	24.5	26x1.5	18	36	27.9	30x2	20		26x1.5	22.1	5/8 23.0	36	28.5	30x1.5	21.25	32	25.5	27x1.5	18	32	25.5	27x1.5	20	
20 (19)	12	3/4	36	27.9	30x2	22	41 46	33.9	36x2	25	28.5	30x1.5	26.1	3/4 26.5	46	34.6	36x1.5	26.75	36	28.5	30x1.5	22	41	31.5	33x1.5	25	
25	16	1	41	33.9	36x2	28	50	39.9	42x2	30	36.5	38x1.5	30.1	1 33.3	55	43.0	45x1.5	33.5	46	34.5	36x1.5	28	46	37.5	39x1.5	30	
32 (31)	20	1 1/4	50	42.9	45x2	35	60	49.9	52x2	38	43.0	45x1.5															
40 (38)	24	1 1/2	60	49.9	52x2	42					50.5	52x1.5															
50 (51)	32	2									62.9	65x2															
60	40	2 3/8									75.9	78x2															
76	48	3																									

Note: Pipe fittings FS, FL and FF are not standardised, and must not be used for new designs!

Measuring conical threads: External diameter = 1st thread turn; Internal diameter = largest thread turn

Key to abbreviations: L = light series, S = heavy series, SW = width across flats (guideline value, supplier-independent),

A = Hose connector, internal thread, H = Hose connector, external thread

* Pipe diameter 14 not standardised, subject to changes

Dimensions for hose identification

DN	5	6	8	10	12	16	19	25	31	38	51	60	63	76	90	102	114	127	152	178	203
Inches	3/16	1/4	5/16	3/8	1/2	5/8	3/4	1	1 1/4	1 1/2	2	2 3/8	2 1/2	3	3 1/2	4	4 1/2	5	6	7	8

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In inches BSPP				US				NPTF/ NPT	NPSM	Japanese		Flange connectors SAE				Hose size				
				Conical seal 74° = JIC (2 x 37°)		UN(F)				Ref. dimension	60°								60°	
60°	60°			45°	ORFS flat sealing															
DKR	DRF flat sealing	AGR	AGF flat sealing	DKJ	AGJ	HSA	AJF	HJOF	HN conical external thread	AGN conical external thread	AN cylindrical internal thread	JIS metric	JIS in inches	SFL	SFS	CAT	SFK Komatsu			
AB	AR	HB	HR	AJ	HJ	ASA			HN	AGN	AN	ALI metric	ARI in inches	SF Ø	SF6 Ø	SF9 Ø	SFK Ø	Norm. Ø	SIZE	INCH
8.5	1/8-28		9.7															3	2	1/8
									1/8-27 9.7									4 (5)	3	3/16
11.4	1/4-19		13.1	7/16-20 10.0 ▲ 11.1		9/16-18 13.0 ▲ 14.3	1/4-18 13.1	1/4-18 11.4	12.5	1/4-19 11.4								6	4	1/4
				1/2-20 11.6 ▲ 12.7					14.5									8	5	5/16
14.9	3/8-19		16.6	9/16-18 13.0 ▲ 14.3	5/8-18 14.7	11/16-16 15.4 ▲ 17.4	3/8-18 16.3	3/8-18 15.1	16.5	3/8-19 14.9								10	6	3/8
18.6	1/2-14		20.9	3/4-16 17.6 ▲ 19.0		13/16-16 18.6 ▲ 20.5	1/2-14 20.2	1/2-14 18.6	20.5	1/2-14 18.6	30.2	31.8		34.0				13 (12)	8	1/2
20.6	5/8-14		22.9	7/8-14 20.5 ▲ 22.2		1-14 23.1 ▲ 25.3			22.5								34.0	16	10	5/8
24.1	3/4-14		26.4	1 1/16-12 24.7 ▲ 26.9		1 3/16-12 27.5 ▲ 30.1	3/4-14 25.5	3/4-14 24.1	28.5	3/4-14 24.1	38.0	41.3	41.3					20 (19)	12	3/4
30.3	1-11		33.2	1 5/16-12 31.2 ▲ 33.3	33.8	1 7/16-12 33.8 ▲ 36.4	1-11 1/2 32.2	1-11 1/2 30.2	31.5	1-11 30.3	44.5	47.6	47.6					25	16	1
39.0	1 1/4-11		41.9	1 5/8-12 39.2 ▲ 41.2	44.2	1 11/16-12 40.2 ▲ 42.8	1 1/4-11 1/2 41.0		34.5	1 1/4-11 39.3	50.8	54.0	54.0					32 (31)	20	1 1/4
44.8	1 1/2-11		47.8	1 7/8-12 45.4 ▲ 47.6	48.1	2-12 48.1 ▲ 50.7	1 1/2-11 1/2 47.0		40.5	1 1/2-11 44.8	60.3	63.5	63.5					40 (38)	24	1 1/2
56.6	2-11		59.6	2 1/2-12 61.5 ▲ 63.5			2-11 1/2 58.9				71.4	79.4						50 (51)	32	2
											84.1							60	40	2 3/8
											101.6							76	48	3

Characteristics for SF connectors:

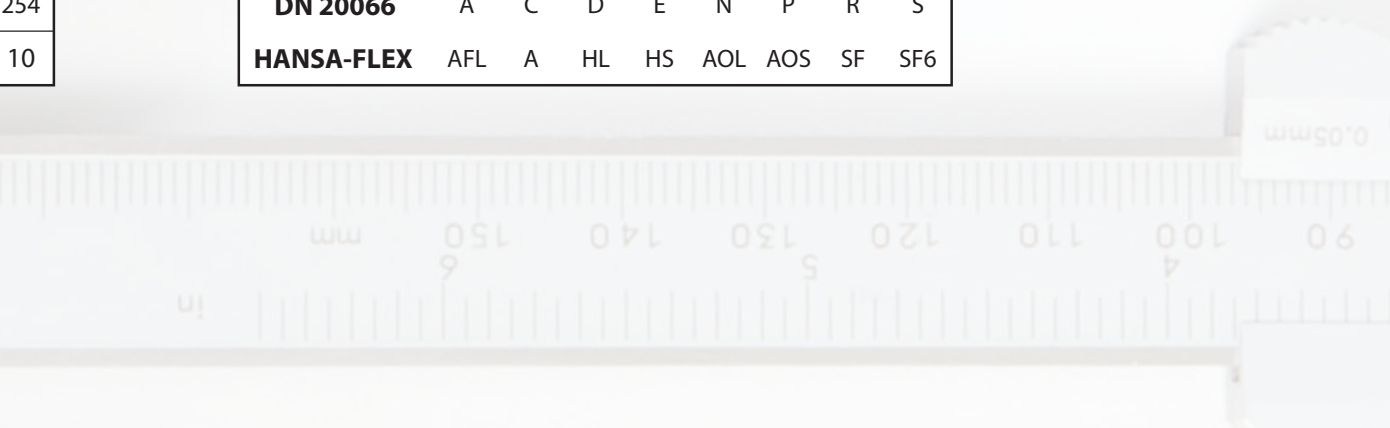
- SF = Shoulder height 6.7-9.5 mm
- SF6 = Shoulder height 8.8-12.6 mm
- SF9 = Shoulder height 14.6 mm
- SFK = Shoulder height 8.1 mm

Comparison

DIN and HANSA-FLEX designators for hose connectors

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DN 20066	A	C	D	E	N	P	R	S
HANSA-FLEX	AFL	A	HL	HS	AOL	AOS	SF	SF6

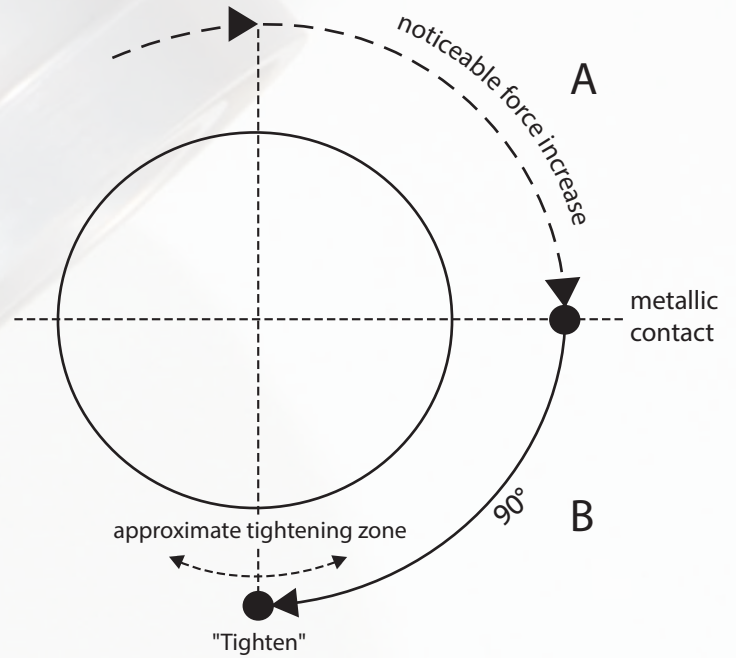


Assembly, angle of offset and technical conversions

Manual tightening of hose fittings – instead of uncertain torque

A: Manual assembly with termination when resistance increases noticeably (elastomer sealing, metallic sealing)
e.g. overcome the preload of o-ring

B: Elastomer sealing: Tightening 90° (1/4 turn)
Metallic sealing: Tightening 90° (1/4 turn)
ORFS-System: Tightening 30° to 40°
All values shown are for guidance only.

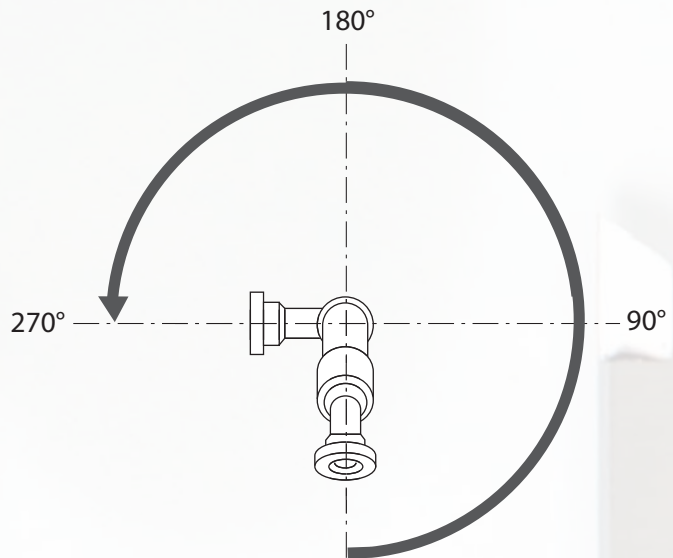


Measurement of torque angle for elbow fittings

Size:
(US) is a measured value; it is used here for the internal or external dimension.

Unit 1 SIZE = 1/16 inch
e.g., Size 8 = 8 x 1/16 = 8/16 = 1/2 inch.

Rated pressure in acc. with DIN EN 20066:
If hose and fitting have different rated pressures (perm. operating pressure of the hose item and nominal pressure of the hose fitting) only the lower pressure may be applied to the hose assembly.

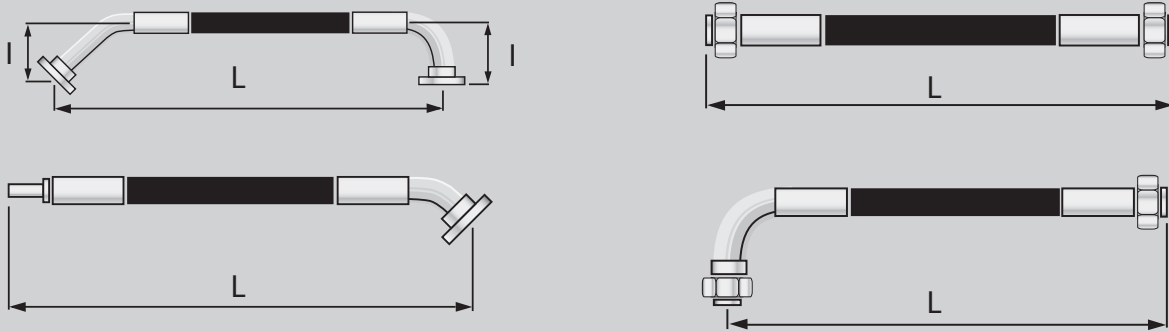


Conversion

Pressure:		Length/Diameter:	
1 psi	→ 0.06865 bar	1 inch	→ 25.4 mm
1 bar	→ 14.5035 psi	1 mm	→ 0.03934 inch
1 MPa	→ 10 bar		
1 bar	→ 0.1 MPa		
1 kPa	→ 0.01 bar		
1 bar	→ 100 kPa		

Determination of hose assembly length

Hose assembly length (DIN 20066)



Avoid stand pipe fittings in new designs. L = Hose assembly length, I = Leg length

$$L = l_k \cdot [1 + (Z_1 + Z_2)] \text{ [mm]}$$

L = Hose assembly length taking into account essential sagging [mm]

l_k = Design dimension [mm]: Dimension between fixed connectors and connectors directly opposite (sealing head, threaded pin, flange collar)

Z_1 = Numerical value for essential axial flexibility, e.g., 5% = 0.05

Z_2 = Numerical value for change in length, e.g., 2% = 0.02 for shortening

Hose shortening due to pressure

Numerical values Z_2 for calculation

Hose type	DN-independent
1 SN/1ST/1SC	0.04
2 SN/2ST/2SC	0.04
4 SP/4SH	0.04
SAE 100 R12, R13, R15	0.02
AF/BF	0.01
NY100	0.04
NY800	0.03

The numerical value Z_2 equals a maximum shortening on reaching the perm. **operating pressure**.

Example of calculation – Determining hose assembly length

$$\text{Hose assembly length} = \text{Design dimension} \cdot [1 + (0.05 + 0.02)]$$

axial flexibility _____ value dependent on hose type

Example values used

$$\text{Hose assembly length} = 2500 \cdot [1 + (0.05 + 0.02)] = 2500 \cdot [1 + 0.07] = 2500 \cdot 1.07 = \underline{\underline{2675 \text{ mm}}}$$

Visual inspections of hose assemblies

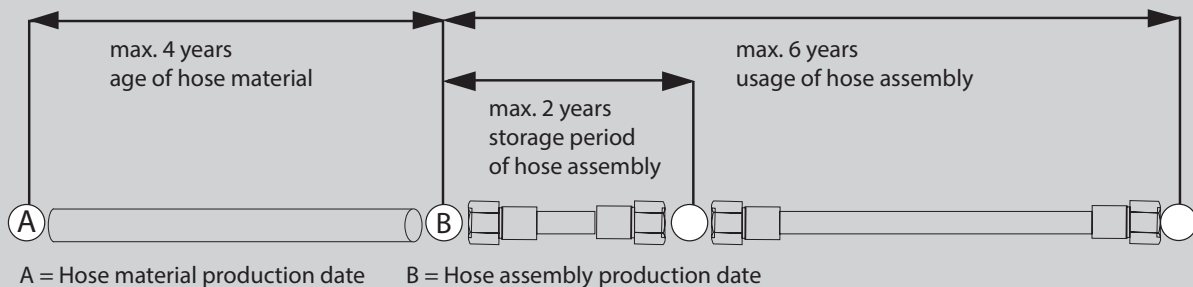
Replacement of hose assemblies (DIN 20066, paragraph 14.2)

Hose assemblies must be replaced if they fulfil the following criteria as determined by a visual inspection

- Damage to the outer layer up to the inner braiding
- Brittleness of outer layer or crack formation
- Change in the natural shape of the hose
- Hose fitting damaged or misshapen
- Hose becomes detached from the fitting
- Fitting tightness and function impaired by corrosion
- Installation requirements not complied with
- Maximum period of storage and use is exceeded (Check labels. Hose assemblies shall not be painted. Violation of identification requirement! (BGR 237))
- Leaks

A repair of the hose assembly involving the continued use of the installed hose and/or fitting (integration area) is not permitted.

Recommended period of storage and use (DIN 20066, paragraph 14.1.2)



Criteria for selecting a hose

- Resistance to pressure fluids due to loads from "inside" and "outside"
- Thermal resistance
- Pressure resistance and absorption of "external" force
- Change in length and external diameter
- Minimum bending radius
- Weight
- Abrasion characteristics
- Availability through standardisation and state of the art
- Approvals

Storage of hose assemblies/ hoses (DIN 7716)

- Store in a dry, cool and low-dust environment (rel. humidity below 65 %)
- Do not expose to direct sunlight or UV radiation
- Shield from heat sources (storage temperature +12°C to +25°C)
- Do not store together with solvents, fuels or lubricants
- Store flat and under no stress
- Protect against ozone

Risk analysis (DIN EN ISO 4413:2011-04)

- No danger to the energy supply (routing hydraulic hose assemblies and electricity supply lines together is questionable)
- Requirements imposed by installation site, transport, maintenance
- Design adequate to sustain specified pressures
- Temperature limit values not exceeded
- Prevention of leaks
- Service and inspection capabilities
- Check of mechanical movement
- Contact protection for hot surfaces
- Reliability of components