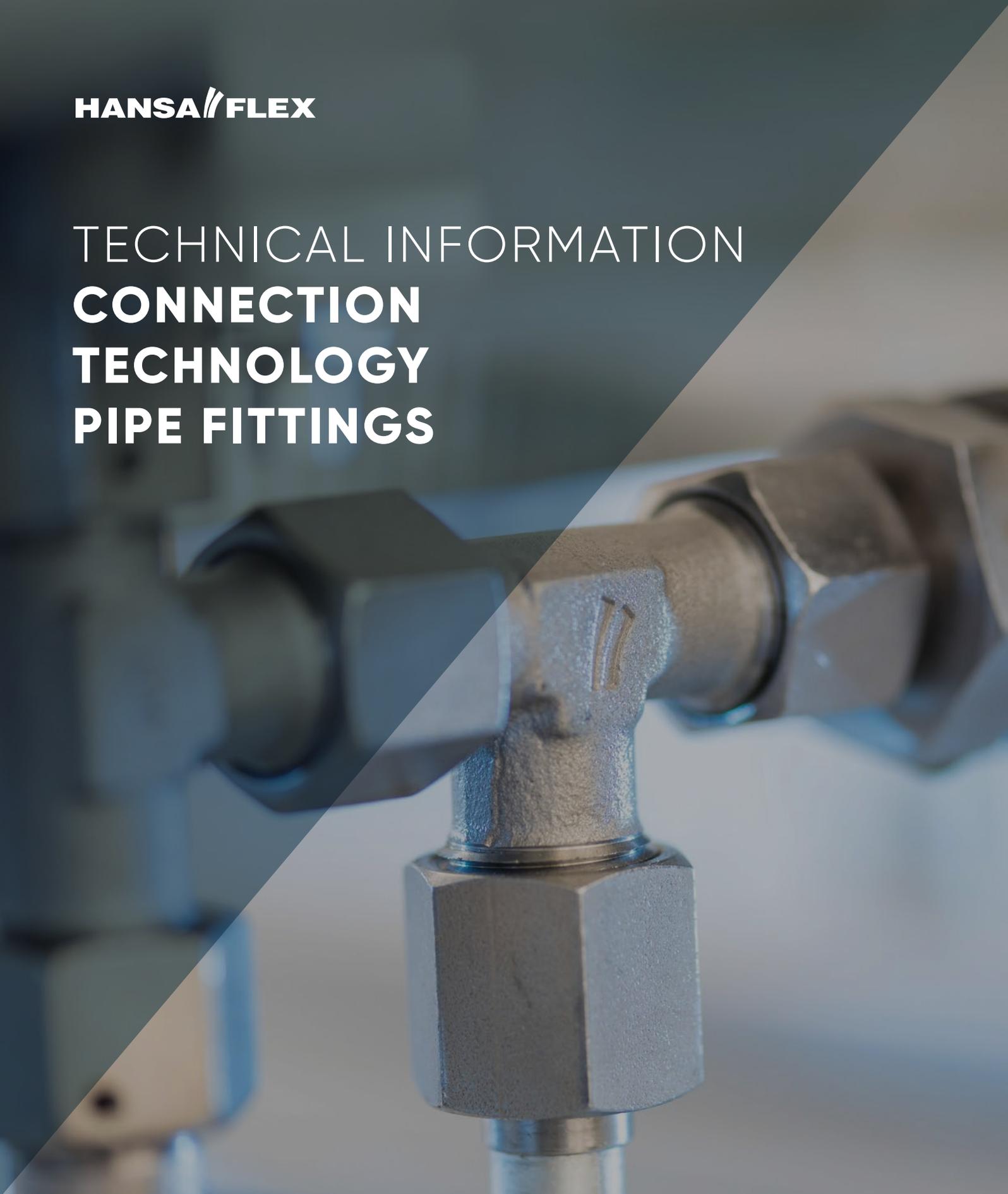


HANSA FLEX

TECHNICAL INFORMATION
**CONNECTION
TECHNOLOGY
PIPE FITTINGS**



Connection Technology: Technical Information for Pipe fittings/24° cone connector

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3. Tightening torques for HANSA-FLEX 24° cone connectors with stud ends

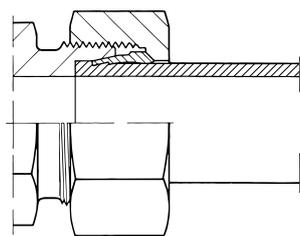
Introduction

Connection technology at HANSA-FLEX means: safe and reliable connections at transitions between different systems or components. This is the case with HANSA-FLEX pipe fittings in accordance with ISO 8434-1 or with the wide range of HANSA-FLEX adapters, including connections in accordance with ISO 8434-2, ISO 8434-3 etc.

Whether pipe fittings or adapters, the important thing is that all connections perform reliably and provide a safe seal over the long term. This document illustrates and explains HANSA-FLEX connection technology in detail.

1. Pipe fittings

1.1 Design and function of 24° cone connectors



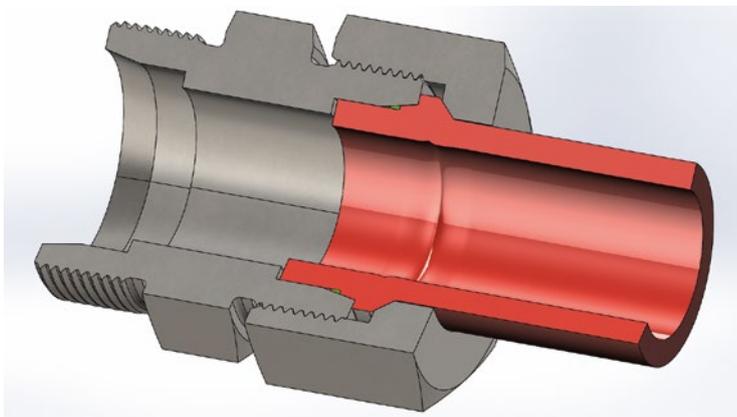
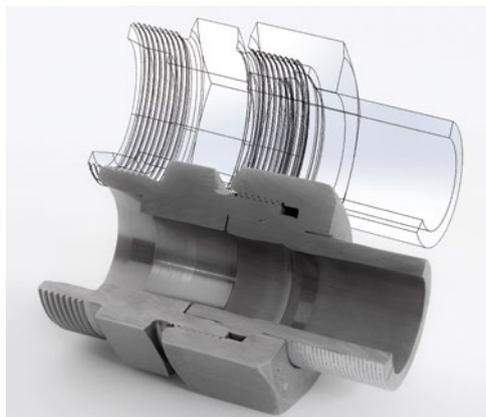
24° cone connectors manufactured by HANSA-FLEX have been used successfully in practical applications for many years. These components from our range of hydraulic connecting equipment are standardised in accordance with ISO 8434-1 and DIN 2353, and their geometrical shape serves to seal hydraulic pipes and fittings simply, reliably and safely.

They can be fitted either into threaded connectors or into specially made pre-assembly sockets. In either case, the cutting ring and its edges are moved axially as the union nut is tightened. As the cutting ring moves along an assembly path defined by the thread, its cutting edges are forced into the surface of the hydraulic pipe. The pipe material raised in front of the cutting edges is cold-hardened. An over-tightening protection developed in-house prevents over-tightening.

The outer surfaces of the cutting ring transfer the active forces evenly over the entire sealing cone of the fitting. The internal contour is shaped so that the cutting ring is wedged between the union nut and the threaded connector and serves as a spring-loaded element. This spring effect damps vibrations and increases the resistance of the fitting to alternating bending loads and surge pressures.

When the assembly instructions are followed, repeat assemblies can be carried out safely and reliably. Cutting rings with an elastomer seal work according to the same functional principle, but they are furnished with additional elastomer seals to further increase operating reliability.

1.2 HF-Form



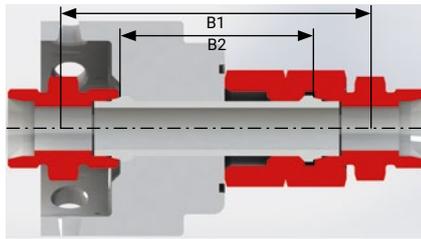
In addition to the above method of connecting pipes, HANSA-FLEX has successfully marketed an in-house developed pipe-forming system. Using this system, 24° threaded component bodies can be permanently and reliably connected to hydraulic pipes, without the need to use cutting rings or special functional parts.

The connection system has three sealing zones with designed-in redundancy to provide long-term protection against leaks. In addition to an elastomer seal in the form of an O-ring, two metallic sealing surfaces ensure a highly safe and reliable connection. Even if the O-ring is inadvertently “forgotten”, this would have no detrimental effect on the sealing performance.

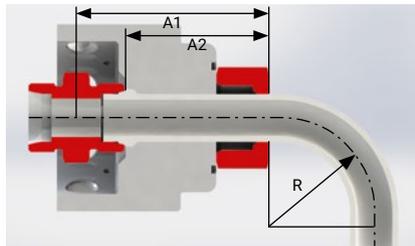
The new HF-Form system can form pipes and tubes in all commonly available grades of ordinary and stainless steel. In addition, with the O-ring being available in many materials, e.g. NBR and Viton, it can be made compatible with the transported medium, which means the pipes can not only carry typical hydraulic oils, but also highly unusual or special media. The O-ring is not available in all forming sizes. For more information, refer to the table in point 1.2.1.

1.2.1 Pipe length determination for HF-Form

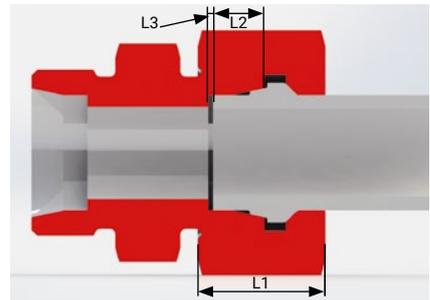
Observe the following minimum lengths for straight and bent pipelines when determining pipe lengths for HF-Form.



Minimum length for clamping straight pipes



Minimum length for clamping bent pipes
($R \geq 2 \times \text{pipe OD}$)

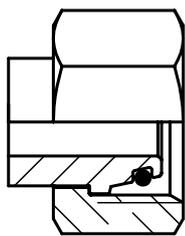


Series	Pipe size	Material	Union nut (UEM)	O-ring	Length of UEM			Upset length	Straight pipes		Bent pipes	
					L1	L2	L3		B1	B2	A1	A2
L	6x1.5	Steel	UEMNW04L	none	15	2.0	5.0	5.5	70	55	47	39.5
L	6x1.5	S/Steel	UEMNW04LVA	none	15	2.0	5.0	7.5	74	55	49	39.5
L	8x1.5	Steel	UEMNW06L	none	15	5.9	1.1	8.5	87	58	57.5	43
L	8x1.5	S/Steel	UEMNW06LVA	none	15	5.9	1.1	8.5	87	58	57.5	43
L	10x1.5	Steel	UEMNW08L	none	16	5.9	1.1	8.5	86	57	61.5	47
L	10x1.5	S/Steel	UEMNW08LVA	none	16	5.9	1.1	7.5	84	57	60.5	47
L	10x2	Steel	UEMNW08L	none	16	5.9	1.1	6.5	82	57	59.5	47
L	10x2	S/Steel	UEMNW08LVA	none	16	5.9	1.1	6.0	81	57	59	47
L	12x1.5	Steel	UEMNW10L	none	16	5.9	1.1	5.5	82	59	60.5	49
L	12x1.5	S/Steel	UEMNW10LVA	none	16	5.9	1.1	8.0	87	59	63	49
L	12x2	Steel	UEMNW10L	none	16	5.9	1.1	5.5	82	59	60.5	49
L	12x2	S/Steel	UEMNW10LVA	none	16	5.9	1.1	6.0	83	59	61	49
L	12x3	Steel	UEMNW10L	none	16	5.9	1.1	5.5	82	59	60.5	49
L	12x3	S/Steel	UEMNW10LVA	none	16	5.9	1.1	6.0	83	59	61	49
L	15x1.5	Steel	UEMNW13L	none	17.5	6.0	1.0	6.0	95	71	71.5	59.5
L	15x1.5	S/Steel	UEMNW13LVA	none	17.5	6.0	1.0	6.5	96	71	72	59.5
L	15x2	Steel	UEMNW13L	none	17.5	6.0	1.0	6.5	96	71	72	59.5
L	15x2	S/Steel	UEMNW13LVA	none	17.5	6.0	1.0	7.0	97	71	72.5	59.5
L	18x2	Steel	UEMNW16L	none	18.5	6.1	1.4	6.0	105	80.5	74	61.5
L	18x2	S/Steel	UEMNW16LVA	none	18.5	6.1	1.4	6.5	105.5	80	74.5	61.5
S	10x2	Steel	UEMNW06S	none	18	5.9	1.6	6.5	86	61	61.5	49
S	10x2	S/Steel	UEMNW06SVA	none	18	5.9	1.6	6.0	85	61	61	49
S	12x2	Steel	UEMNW08S	none	18	5.9	1.6	5.5	82	59	60.5	49
S	12x2	S/Steel	UEMNW08SVA	none	18	5.9	1.6	6.0	83	59	61	49
S	12x3	Steel	UEMNW08S	none	18	5.9	1.6	5.5	82	59	60.5	49
S	12x3	S/Steel	UEMNW08SVA	none	18	5.9	1.6	6.0	83	59	61	49
S	14x2	Steel	UEMNW10S	none	21	6.5	1.5	6.5	99	73	71.5	58.5
S	14x2	S/Steel	UEMNW10SVA	none	21	6.5	1.5	7.5	101	73	72.5	58.5
S	16x2	Steel	UEMNW13S	none	21	7.5	1.0	6.0	104	77	77	63.5
S	16x2	S/Steel	UEMNW13SVA	none	21	7.5	1.0	7.0	106	77	78	63.5
S	16x2.5	Steel	UEMNW13S	none	21	7.5	1.0	6.0	104	77	77	63.5
S	16x2.5	S/Steel	UEMNW13SVA	none	21	7.5	1.0	7.0	106	77	78	63.5
S	25x3	Steel	UEMNW20S	none	27.5	11.0	1.0	7.5	125.5	88.5	90.5	72
S	25x3	S/Steel	UEMNW20SVA	none	27.5	11.0	1.0	8.0	126.5	88.5	91	72
S	25x4	Steel	UEMNW20S	25x1	27.5	11.0	1.0	7.0	124.5	88.5	90	72
S	25x4	S/Steel	UEMNW20SVA	25x1	27.5	11.0	1.0	7.5	125.5	88.5	90.5	72
S	30x3	Steel	UEMNW25S	25x1	29.5	12.5	1.0	7.5	138	98	101	81
S	30x3	S/Steel	UEMNW25SVA	25x1	29.5	12.5	1.0	8.0	139	98	101.5	81
S	30x4	Steel	UEMNW25S	30x1	29.5	12.5	1.0	8.0	139	98	101.5	81
S	30x4	S/Steel	UEMNW25SVA	30x1	29.5	12.5	1.0	8.5	140	98	102	81
S	30x5	Steel	UEMNW25S	30x1	29.5	12.5	1.0	7.0	137	98	100.5	81
S	30x5	S/Steel	UEMNW25SVA	30x1	29.5	12.5	1.0	6.0	135	98	100	81.5
S	38x5	Steel	UEMNW32S	38x1	33	14.9	1.1	9.5	150	101	107.5	83
S	38x5	S/Steel	UEMNW32SVA	none	33	14.9	1.1	10.0	151	101	108	83

HANSA-FLEX takes into account these required minimum lengths and may amend any customer-supplied drawings if necessary.

HF-Form is continuously developed and extended for use on other pipe sizes. If you have any questions about missing pipe sizes, please contact our HANSA-FLEX Technical Department in Bremen.

1.3 Design and function of 24° sealing cone and welded cone fittings



HANSA-FLEX 24° sealing cone fittings (DKOL/DKOS) provide another option for connecting standardised hydraulic pipes and threaded connectors.

The sealing cone is fitted with an O-ring and is shaped so as to fit precisely inside the mating part of the threaded connector. HANSA-FLEX 24° sealing cone fittings have over-tightening protection which prevents further tightening after full assembly, which could otherwise seriously damage the threaded components.

In addition, the HANSA-FLEX sealing cone fittings achieve a metallic and elastomeric seal, even if disassembled and reassembled.

Welded connections of hydraulic pipes and HANSA-FLEX pipe fittings can be made using HANSA-FLEX welded cone fittings.

However, the O-ring must be removed before welding, and any weld splatter must be removed from the O-ring groove and the fitting bore.

1.4 General information

All of the pipe fittings listed in our catalogue are manufactured in conformance with DIN 2353 or ISO 8434-1 and are intended for applications in hydraulic connection equipment.

The HANSA-FLEX pipe fitting product line includes a large number of fitting types that surpass the requirements of these standards. In these special forms, e.g. pipe fittings available in a series of sizes which reduce or step-down hose or pipeline diameters, the connector dimensions have been adapted to the pertinent standard, so that they can be replaced at any time. Stepped bores are used in some of these fittings to optimise flow rates.

All fittings are designed to withstand the operating pressures specified in the standards, in many cases the requirements of the standard are exceeded by a considerable margin.

However, in order to function properly, our fittings must be assembled in strict compliance with our assembly instructions.

1.5 Materials

HANSA-FLEX 24° cone connectors are manufactured from cold-drawn or forged materials and conform to the technical conditions of delivery of pipe fittings in accordance with DIN 3859-1 and the requirements of ISO 8434-1. All materials are inspected for cracks.

	Component	Designation	Material	Standard
Steel	Straight screw-in fittings			
	Connecting and reducing fittings			
	Bulkhead fittings	11SMnPb30+C	1.0718+C	EN 10277
	Screw-in sockets	11SMn30+C	1.0715+C	EN 10277
	Flange fittings	C45	1.0503	EN 10277
	Hollow screws			
	Union nuts	11SMnPb30+C	1.0718+C	EN 10277
		11SMn30+C	1.0715+C	EN 10277
		C10C	1.0214	EN 10263
	Angle, T and L screw-in fittings	C22	1.0402	EN 10250
	Banjo fittings	C45	1.0503	EN 10277
	Welded sockets	S355J2G3 Q235A	1.0570	EN 10250-2 GB/T 700
Cutting rings	Depends on manufacturer's choice			
Stainless steel	Bar stock	X2CrNiMo17-12-2	1.4404	EN 10088
		X6CrNiMoTi 17-12-2	1.4571	EN 10088
	Forged blank	X2CrNiMo17-12-2	1.4404	EN 10088
		X6CrNiMoTi 17-12-2	1.4571	EN 10088
		X5CrNiMo17-12-2	1.4401	EN 10088
Brass	CuZn35Ni2	2.0540	DIN 17660	
			ISO 17672	

Steels of comparable quality may be used depending on availability.

1.6 Surface protection

The surfaces of steel fitting bodies, union nuts and cutting rings are protected from corrosion as standard with a zinc-nickel coating conforming to ISO 19589. Articles that are deformed after they have been galvanised have protection against red rust for 1200 h. Articles that are not deformed after they have been galvanised have protection against red rust for 1500 h. The number of hours relates to a salt spray test in accordance with ISO 9227. The surfaces of HANSA-FLEX welded sockets are phosphated and oiled.

1.7 Standardisation

HANSA-FLEX pipe fittings are components for use in hydraulic connection equipment and are standardised in accordance with DIN 2353 and ISO 8434 Part 1. Their standard designations are often used to order them. The following list shows a selection of the various designations:

HANSA-FLEX designation	Designation in the standard
XVM NW...HL	Pipe fitting ISO 8434-1 – SDS – L...xM... – B
XVM NW...HS	Pipe fitting ISO 8434-1 – SDS – S...xM... – B
XVR NW...HL	Pipe fitting ISO 8434-1 – SDS – L...xG... – B
XVR NW...HS	Pipe fitting ISO 8434-1 – SDS – S...xG... – B
XVM NW...HL ED	Pipe fitting ISO 8434-1 – SDS – L...xM... – E
XVM NW...HS ED	Pipe fitting ISO 8434-1 – SDS – S...xM... – E
XVR NW...HL ED	Pipe fitting ISO 8434-1 – SDS – L...xG... – E
XVR NW...HS ED	Pipe fitting ISO 8434-1 – SDS – S...xG... – E
XV NW...HL	Pipe fitting ISO 8434-1 – S – L...
XV NW...HS	Pipe fitting ISO 8434-1 – S – S...
XWM NW...HL	Fitting DIN 2353 – HL...B – St
XWM NW...HS	Fitting DIN 2353 – HS...B – St
XWR NW...HL	Fitting DIN 2353 – JL...B – St
XWR NW...HS	Fitting DIN 2353 – JS...B – St
XW NW...HL	Pipe fitting ISO 8434-1 – E – L...
XW NW...HS	Pipe fitting ISO 8434-1 – E – S...
XTM NW...HL	Fitting DIN 2353 – OL...B – St
XTM NW...HS	Fitting DIN 2353 – OS...B – St
XTR NW...HL	Fitting DIN 2353 – PL...B – St
XTR NW...HS	Fitting DIN 2353 – PS...B – St

HANSA-FLEX designation	Designation in the standard
XT NW...HL	Pipe fitting ISO 8434-1 – T – L... – B
XT NW...HS	Pipe fitting ISO 8434-1 – T – S... – B
XSA NW...HS	Pipe fitting ISO 8434-1 – WDS – S... – B
XSA NW...HL	Pipe fitting ISO 8434-1 – WDS – L... – B
XSV NW...HS	Pipe fitting ISO 8434-1 – BH – S... – B
XSV NW...HL	Pipe fitting ISO 8434-1 – BH – L... – B
XSW NW...HS	Pipe fitting ISO 8434-1 – BHE – S... – B
XSW NW...HL	Pipe fitting ISO 8434-1 – BHE – L... – B
XSE NW...HS	Pipe fitting ISO 8434-1 – WDBHS – S... – B
XSE NW...HL	Pipe fitting ISO 8434-1 – WDBHS – L... – B
UEM NW...L	Pipe fitting ISO 8434-1 – N – L...
UEM NW...S	Pipe fitting ISO 8434-1 – N – S...
SR D...	Pipe fitting ISO 8434-1 – CR – L... – B
SR D...	Pipe fitting ISO 8434-1 – CR – S... – B

Standards relevant to pipe fittings:

Technical conditions of delivery	DIN 3859	Imperial cyl. stud ends and ports	DIN 3852-2
Assembly instructions	ISO 8434-1		DIN 3852-21
Testing	ISO 19879		ISO 1179-2
DIN fittings (24°)	DIN 2353		ISO 1179-3
	ISO 8434-1	Conical stud ends and ports with NPT threads	ANSI/ASME B1.20.1
Flare fittings (37°)	ISO 8434-2	Cyl. stud ends and ports with UN and/or UNF thread	ISO 11926-2
ORFS fittings	ISO 8434-3		ISO 11926-3
Cutting rings	DIN 3861		SAE J 1926-2
	ISO 8434-1		SAE J 1926-3
Seamless precision steel tubes	EN 10305-4		ISO 725
Cyl. metric stud ends and ports	DIN 3852-1	Metric fine threads	DIN 13, T5-T7
	ISO 9974-2	Imperial threads	ISO 228-1
	ISO 6149-1		
	ISO 6149-2		
	ISO 6149-3		

The technical conditions of delivery for 24° cone connectors are given in DIN 3859.

1.8 Operating temperatures of 24° cone connectors

The materials of HANSA-FLEX 24° cone connectors manufactured out of steel are designed for a temperature range of -40 °C to +200 °C. However, where fittings with additional elastomer seals are used, the temperature resistance of the seal materials must be taken into account.

When fittings made from ordinary or stainless steel are subjected to high operating temperatures, the following pressure reductions must always be observed:

Material	Pressure reductions for permissible operating temperatures [°C]						
	-40 °C	+20 °C	+50 °C	+100 °C	+120 °C	+150 °C	+200 °C
Steel	0 %	0 %	0 %	0 %	0 %	10 %	20 %
Stainless steel	-60 °C	+20 °C	+50 °C	+100 °C	+200 °C	250 °C	+400 °C
	0 %	0 %	4 %	11 %	20 %	20 %	30 %
NBR*	-40 °C	+120 °C					
	0 %	0 %					
FPM*	-15 °C	+200 °C					
	0 %	0 %					

* Temperature information applies only in connection with HANSA-FLEX pipe fittings and adapters made from ordinary steel and stainless steel

Example:

Stainless steel fitting

Pressure: 400 bar

Temperature: 200 °C

→ Pressure reduction of 20 %

→ Pressure reduction of 80 bar (400 × 20 %)

→ Operating pressure of the fitting = 400 – 80 = 320 bar

1.9 Operating pressure of 24° cone connectors

The HANSA-FLEX range of fittings is divided into three series according to pressure level and application:

- LL: very light series
- L: light series
- S: heavy series

PN is often used when giving information about the operating pressure for fittings. The designation PN is used internationally.

Instead of operating pressure, the term working pressure is also used. The terms operating pressure and working pressure can be used interchangeably.

The operating pressures PN given for HANSA-FLEX 24° cone connectors have a safety factor of 4. Flare fittings in accordance with ISO 8434-2 similarly have a safety factor of 4.

It should be noted that this safety factor is contingent on error-free installation of the fitting and correct routing of the pipeline system.

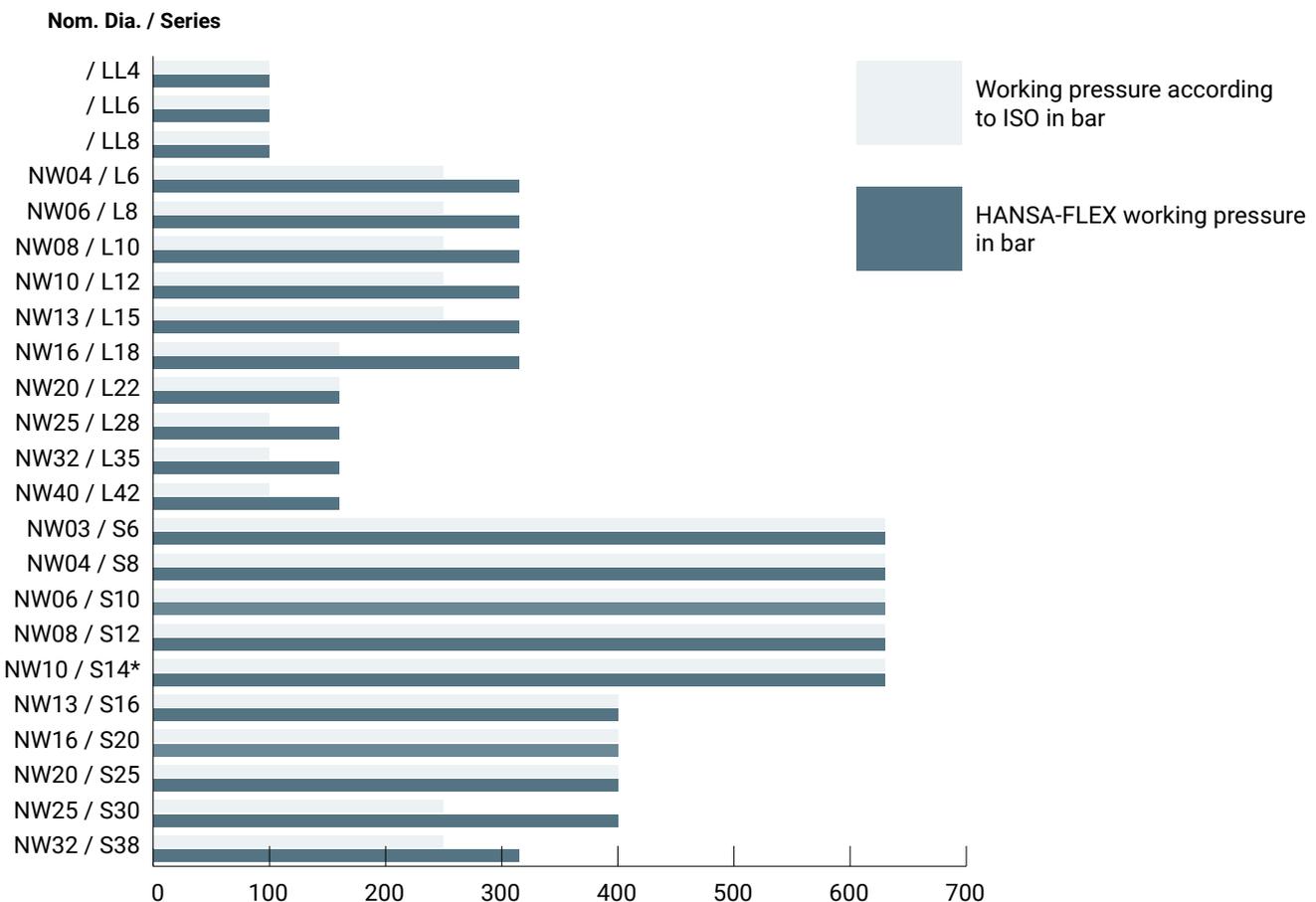
However, HANSA-FLEX 24° cone connectors are designed in such a way that the pressure values required according to ISO 8434-1 for most fittings are exceeded.

The pressure ranges indicated are based on the connector form.

Some of the various screw-in forms may give rise to deviations from the above under certain circumstances. The form with the lowest operating pressure determines the operating pressure for the pipe fitting.

If you have any questions, please contact our Technical Department in Bremen.

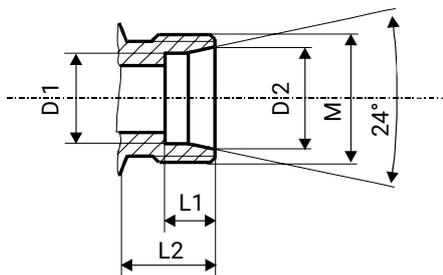
Maximum working pressure of 24° cone connectors



* Size S14 is not standardised

1.10 Pipe-side connection of 24° cone connectors

The pipe-side connection of HANSA-FLEX 24° cone connectors is standardised in accordance with DIN 3861, hole shape W and ISO 8434-1, and thus compatibility with metric fittings for hydraulic hose lines can be guaranteed:

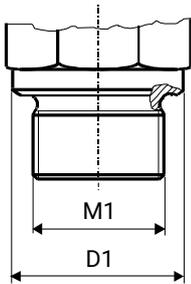


Series	External pipe Ø	Nominal pressure PN in bar	M	L1	L2	D1	D2
LL	4	100	M8x1	4	8	4	5
LL	5	100	M10x1	5.5	8	5	6.5
LL	6	100	M10x1	5.5	8	6	7.5
LL	8	100	M12x1	5.5	9	8	9.5
L	6	315	M12x1.5	7	10	6	8.1
L	8	315	M14x1.5	7	10	8	10.1
L	10	315	M16x1.5	7	11	10	12.3
L	12	315	M18x1.5	7	11	12	14.3
L	15	315	M22x1.5	7	12	15	17.3
L	18	315	M26x1.5	7.5	12	18	20.3
L	22	160	M30x2	7.5	14	22	24.3
L	28	160	M35x2	7.5	14	28	30.3
L	35	160	M45x2	10.5	16	35.3	38
L	42	160	M52x2	11	16	42.3	45
S	6	630	M14x1.5	7	12	6	8.1
S	8	630	M16x1.5	7	12	8	10.1
S	10	630	M18x1.5	7.5	12	10	12.3
S	12	630	M20x1.5	7.5	12	12	14.3
S	14	630	M22x1.5	8	14	14	16.3
S	16	400	M24x1.5	8.5	14	16	18.3
S	20	400	M30x2	10.5	16	20	22.9
S	25	400	M36x2	12	18	25	27.9
S	30	400	M42x2	13.5	20	30	33
S	38	315	M52x2	16	22	38.3	41

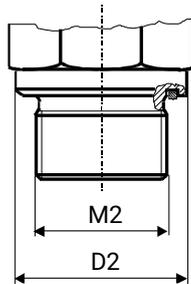
2. Stud ends and ports for HANSA-FLEX 24° cone connectors

HANSA-FLEX 24° cone connectors are available with a wide range of standardised screw-in threads, enabling them to be used for an enormous variety of applications.

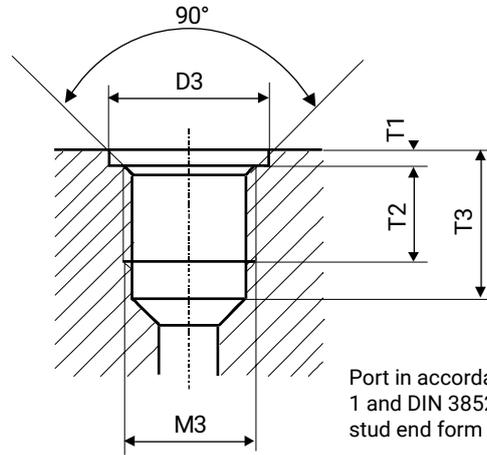
2.1 Metric stud ends and ports in accordance with DIN 3852 Part 1, form B, and ISO 9974-2 form E with the associated port form X



DIN 3852 Part 1 form B and ISO 9974-3 sealing by sealing edge



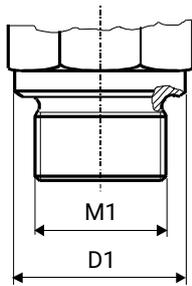
ISO 9974-2 form E sealing by elastomer seal



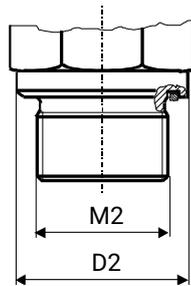
Port in accordance with ISO 9974-1 and DIN 3852 Part 1, form X for stud end form A, B, and E

Series	External pipe Ø	M1/M2	M3	D1	D2	D3	T1	T2	T3
LL	4	M8x1	M8x1	12	-	13	1	8	13.5
LL	6	M10x1	M10x1	14	13.9	15	1	8	13.5
LL	8	M10x1	M10x1	14	13.9	15	1	8	13.5
L	6	M10x1	M10x1	14	13.9	15	1	8	13.5
L	8	M12x1.5	M12x1.5	17	16.9	18	1.5	12	18.5
L	10	M14x1.5	M14x1.5	19	18.9	20	1.5	14	18.5
L	12	M16x1.5	M16x1.5	21	21.9	23	1.5	12	18.5
L	15	M18x1.5	M18x1.5	23	23.9	25	2	12	18.5
L	18	M22x1.5	M22x1.5	27	26.9	28	2.5	14	20.5
L	22	M26x1.5	M26x1.5	31	31.9	33	2.5	16	22.5
L	28	M33x2	M33x2	39	39.9	41	2.5	18	26
L	35	M42x2	M42x2	49	49.9	51	2.5	20	28
L	42	M48x2	M48x2	55	54.9	56	2.5	22	30
S	6	M12x1.5	M12x1.5	17	16.9	18	1.5	12	18.5
S	8	M14x1.5	M14x1.5	19	18.9	20	1.5	12	18.5
S	10	M16x1.5	M16x1.5	21	21.9	23	1.5	12	18.5
S	12	M18x1.5	M18x1.5	23	23.9	25	2	12	18.5
S	14	M20x1.5	M20x1.5	25	25.9	27	2	14	20.5
S	16	M22x1.5	M22x1.5	27	26.9	28	2.5	14	20.5
S	20	M27x2	M27x2	32	31.9	33	2.5	16	24
S	25	M33x2	M33x2	39	39.9	41	2.5	18	26
S	30	M42x2	M42x2	49	49.9	51	2.5	20	28
S	38	M48x2	M48x2	55	54.9	56	2.5	22	30

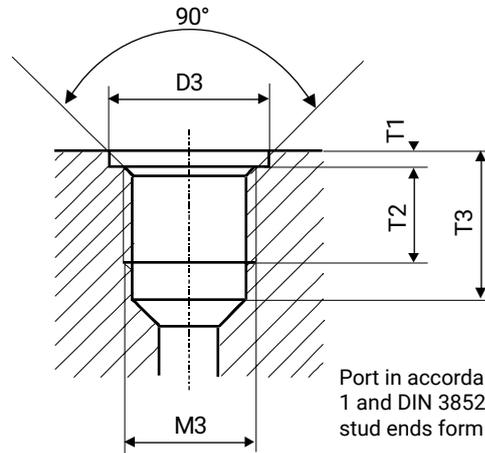
2.2 Imperial stud ends and ports according to DIN 3852 Part 2 ISO 9974-3 form B, and ISO 1179-2 form E with the associated port form X



DIN 3852 Part 2 form B and ISO 9974-3 sealing by sealing edge



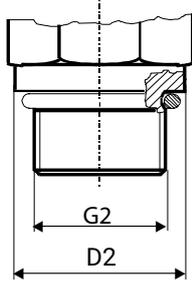
ISO 1179-2 form E sealing by elastomer seal



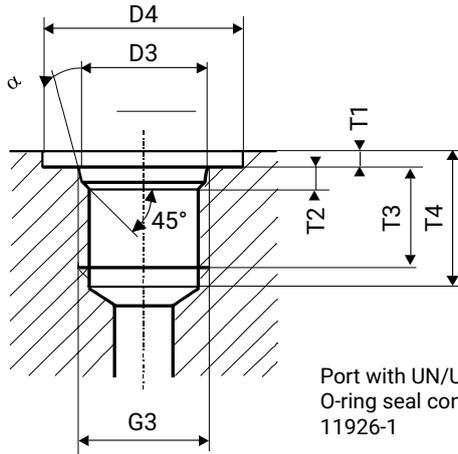
Port in accordance with ISO 9974-1 and DIN 3852 Part 2, form X for stud ends form A, B, and E

Series	External pipe Ø	G1/G2	G3	D1	D2	D3	T1	T2	T3
LL	4	G 1/8"A	G 1/8"	14	13.9	15	1	8	13
LL	6	G 1/8"A	G 1/8"	14	13.9	15	1	8	13
LL	8	G 1/8"A	G 1/8"	14	13.9	15	1	8	13
L	6	G 1/8"A	G 1/8"	14	13.9	15	1	8	13
L	8	G ¼"A	G ¼"	18	18.9	20	1.5	12	18.5
L	10	G ¼"A	G ¼"	18	18.9	20	1.5	12	18.5
L	12	G 3/8"A	G 3/8"	22	21.9	23	2	12	18.5
L	15	G ½"A	G ½"	26	26.9	28	2.5	14	22
L	18	G ½"A	G ½"	26	26.9	28	2.5	14	22
L	22	G 3/4"A	G 3/4"	32	31.9	33	2.5	16	24
L	28	G 1"A	G 1"	39	39.9	41	2.5	18	27
L	35	G 1 ¼"A	G 1 ¼"	49	49.9	51	2.5	20	29
L	42	G 1 1/2"A	G 1 1/2"	55	54.9	56	2.5	22	31
S	6	G ¼"A	G ¼"	18	18.9	20	1.5	12	18.5
S	8	G ¼"A	G ¼"	18	18.9	20	1.5	12	18.5
S	10	G 3/8"A	G 3/8"	22	21.9	23	2	12	18.5
S	12	G 3/8"A	G 3/8"	22	21.9	23	2	12	18.5
S	14	G ½"A	G ½"	26	26.9	28	2.5	14	22
S	16	G ½"A	G ½"	26	26.9	28	2.5	14	22
S	20	G 3/4"A	G 3/4"	32	31.9	33	2.5	16	24
S	25	G 1"A	G 1"	39	39.9	41	2.5	18	27
S	30	G 1 ¼"A	G 1 ¼"	49	49.9	51	2.5	20	29
S	38	G 1 1/2"A	G 1 1/2"	55	54.9	56	2.5	22	31

2.3 Stud ends and ports for pipe fittings with cylindrical US threaded connections conforming to ISO 11926-2/3



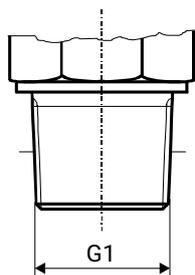
Stud end with UN-UNF-2A thread and O-ring seal conforming to ISO 11926-2 and 3



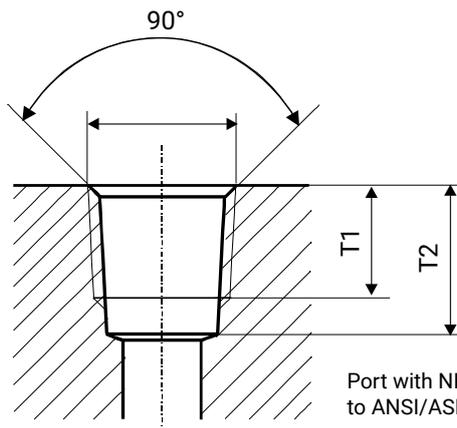
Port with UN/UNF 2B thread for O-ring seal conforming to ISO 11926-1

Series	External pipe Ø	G2/G3	D2	D3	D4	T1	T2	T3	T4	α	O-ring
L	6, 8, 10	7/16"-20 UNF	16	12.4	21	1.6	2.4	11.5	14	12°	8.92 x 1.83
L	8	1/2"-20 UNF	17	14	23	1.6	2.4	11.5	14	12°	10.52 x 1.83
L	6, 10, 12	9/16"-18 UNF	17.6	15.6	25	1.6	2.5	12.7	15.5	12°	11.89 x 1.98
L	12, 15, 18	3/4"-16 UNF	22.3	20.6	30	2.4	2.5	14.3	17.5	15°	16.36 x 2.2
L	12, 18, 22	7/8"-14 UNF	25.5	23.9	34	2.4	2.5	16.7	20	15°	19.18 x 2.46
L	22, 28	1 1/16"-12 UN	31.9	29.2	41	2.4	3.3	19	23	15°	23.47 x 2.95
L	22, 28, 35	1 5/16"-12 UN	38.2	35.5	49	3.2	3.3	19	23	15°	29.74 x 2.95
L	35, 42	1 5/8"-12 UN	48	43.5	58	3.2	3.3	19	23	15°	37.47 x 3
L	42	1 7/8"-12 UN	55	49.8	65	3.2	3.3	19	23	15°	43.69 x 3
S	6, 8	7/16"-20 UNF	16	12.4	21	1.6	2.4	11.5	14	15°	8.92 x 1.83
S	6	1/2"-20 UNF	17	14	23	1.6	2.4	11.5	14	15°	10.52 x 1.83
S	10, 12	9/16"-18 UNF	17.6	15.6	25	1.6	2.5	12.7	15.5	15°	11.89 x 1.98
S	12, 14	3/4"-16 UNF	22.3	20.6	30	2.4	2.5	14.3	17.5	15°	16.36 x 2.2
S	16, 20	3/4"-16 UNF	22.3	20.6	30	2.4	2.5	14.3	17.5	15°	16.36 x 2.2
S	16, 20	7/8"-14 UNF	25.5	23.9	34	2.4	2.5	16.7	20	15°	19.18 x 2.46
S	20, 25	1 1/16"-12 UN	31.9	29.2	41	2.4	3.3	19	23	15°	23.47 x 2.95
S	25, 30	1 5/16"-12 UN	38.2	35.5	49	3.2	3.3	19	23	15°	29.74 x 2.95
S	30, 38	1 5/8"-12 UN	48	43.5	58	3.2	3.3	19	23	15°	37.47 x 3
S	38	1 7/8"-12 UN	55	49.8	65	3.2	3.3	19	23	15°	43.69 x 3

2.4 Stud ends and ports for pipe fittings with NPT thread conforming to ANSI/ASME B1.20.1



Stud end with NPT screw-in thread conforming to ANSI/ASME B1.20.1



Port with NPT thread conforming to ANSI/ASME B1.20.1

Series	External pipe Ø	G1/G2	T1	T2
L	6	1/8"-27 NPT	6.9	11.6
L	8	1/4"-18 NPT	10	16.4
L	10	1/4"-18 NPT	10	16.4
L	12	3/8"-18 NPT	10.3	17.4
L	15	1/2"-14 NPT	13.6	22.6
L	18	1/2"-14 NPT	13.6	22.6
L	22	3/4"-14 NPT	14.1	23.1
L	28	1"-11.5 NPT	16.8	27.8
L	35	1 1/4"-11.5 NPT	17.3	28.3
L	42	1 1/2"-11.5 NPT	17.3	28.3
S	6	1/4"-18 NPT	10	16.4
S	8	1/4"-18 NPT	10	16.4
S	10	3/8"-18 NPT	10.3	17.4
S	12	3/8"-18 NPT	10.3	17.4
S	14	1/2"-14 NPT	13.6	22.6
S	16	1/2"-14 NPT	13.6	22.6
S	20	3/4"-14 NPT	14.1	23.1
S	25	1"-11.5 NPT	16.8	27.8
S	30	1 1/4"-11.5 NPT	17.3	28.3
S	38	1 1/2"-11.5 NPT	17.3	28.3

3. Tightening torques for HANSA-FLEX 24° cone connectors with stud ends

The tightening torques in the following table apply to stud ends for fittings, blanking screws, and to banjo fittings made from stainless steel and ordinary steel with a HANSA-FLEX zinc nickel coating and to counter-bodies made from the same material.

We recommend reducing the torque by at least 30 % when installing fittings into aluminium bodies.

In order to achieve an optimum seal, conical screw-in threads must be provided with an additional sealing means, e.g. PTFE tape.

Series	Thread	Tightening torque in Nm ISO 1179-2 form E (elastomer soft seal (ED))	Tightening torque in Nm ISO 1179-4 form B (metal sealing edge)	Tightening torque in Nm ISO 1179-3 form G, H (O-ring retaining ring)	Tightening torque in Nm for screw plugs	Tightening torque in Nm for banjo fittings
L	G 1/8"	20	20	25	12	25
L	G 1/4"	50	40	50	18	40
L	G 3/8"	80	80	80	40	80
L	G 1/2"	100	150	105	75	120
L	G 3/4"	200	200	220	110	180
L	G 1"	380	380	370	190	300
L	G 1 1/4"	500	600	500	240	300
L	G 1 1/2"	600	700	600	300	600
S	G 1/8"				12	25
S	G 1/4"	60	60		18	40
S	G 3/8"	90	100		40	80
S	G 1/2"	130	170		75	120
S	G 3/4"	200	320		110	180
S	G 1"	380	380		190	300
S	G 1 1/4"	500	600		240	300
S	G 1 1/2"	600	800		300	600

NOTE: Tightening torques for assembly depend on many factors, including lubrication, coatings and surface treatments.

Series	Thread	Tightening torque in Nm ISO 9974-2 form E (elastomer soft seal (ED))	Tightening torque in Nm ISO 9974-3 form B (metal sealing edge)	Tightening torque in Nm ISO 6149-3 (O-ring seal)	Tightening torque in Nm ISO 6149-2 (O-ring seal)	Tightening torque in Nm for screw plugs	Tightening torque in Nm for banjo fittings
L	M8x1			8			
L	M10x1	20	20	15		12	25
L	M12x1.5	30	30	25		18	30
L	M14x1.5	50	50	35		20	50
L	M16x1.5	60	70	40		35	60
L	M18x1.5	80	90	45		50	70
L	M22x1.5	140	150	60		70	130
L	M26x1.5	200	210			85	140
L	M27x2			100			
L	M33x2	380	380	160		150	280
L	M42x2	500	550	210		260	280
L	M48x2	600	700	260		350	500
L	M60x2			315			
S	M8x1				10		
S	M10x1				20	12	25
S	M12x1.5	45	45		35	18	30
S	M14x1.5	60	60		45	20	50
S	M16x1.5	80	90		55	35	60
S	M18x1.5	100	120		70	50	70
S	M20x1.5	140	170		80	60	110
S	M22x1.5	150	190		100	70	130
S	M26x1.5					85	140
S	M27x2	200	320		170	100	150
S	M30x2				215		
S	M33x2	380	450		310	150	280
S	M42x2	500	600		330	260	280
S	M48x2	600	800		420	350	500
S	M60x2				500		

NOTE: Tightening torques for assembly depend on many factors, including lubrication, coatings and surface treatments.

Series	Thread	Tightening torque in Nm ISO 11926-2 (O-ring seal)	Tightening torque in Nm ISO 11926-3 (O-ring seal)
L	3/8-24 UNF	10	
L	7/16-20 UNF	18	
L	1/2-20 UNF	25	
L	9/16-18 UNF	30	
L	3/4-16 UNF	50	
L	7/8-14 UNF	60	
L	1 1/16-12 UN	95	
L	1 3/16-12 UN	125	
L	1 5/16-12 UN	150	
L	1 5/8-12 UN	200	
L	1 7/8-12 UN	210	
L	2 1/2-12 UN	300	
S	3/8-24 UNF		10
S	7/16-20 UNF		20
S	1/2-20 UNF		25
S	9/16-18 UNF		35
S	3/4-16 UNF		70
S	7/8-14 UNF		100
S	1 1/16-12 UN		170
S	1 3/16-12 UN		215
S	1 5/16-12 UN		270
S	1 5/8-12 UN		285
S	1 7/8-12 UN		370

NOTE: Tightening torques for assembly depend on many factors, including lubrication, coatings and surface treatments.

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