HANSA-FLEX

TECHNICAL INFORMATION
CONNECTION TECHNOLOGY ADAPTER

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Connection Technology: Technical Information for Adapters

Contents

Introduction

Adapters are required when hydraulic components with different connections need to be reliably joined in mobile or industrial hydraulics. Adapters create a reliable, sealed transition between different connector types and enable the cost-effective adaptation of hydraulic components of different designs or from different manufacturers.

The available adapter variants can be used in connections involving NPT, UNF, UNS, JIC, BSP and metric threads.

1. Adapters

1.1 General information

The adapters included in our catalogue are intended for applications in hydraulic connection equipment.

The HANSA-FLEX adapter product line includes a large number of adapter types that go beyond the variants given in the standards. In these special forms, e.g. adapters 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.

For information about surface protection, operating temperatures and materials, please refer to the relevant sections in Technical information Connection technology Pipe fittings.

1.2 Standardisation

HANSA-FLEX adapters comply with the following standards (among others):
- ISO 8434-2: Metallic tube connections for fluid power and general use – Part 2: 37° flared connectors
- ISO 8434-3: Metallic tube connections for fluid power and general use – Part 3: O-ring face seal connectors
- ISO 8434-6: Metallic tube connections for fluid power and general use – Part 6: 60° cone connectors with or without O-ring
- SAE J 514: Hydraulic Tube Fittings.
- JIS B 8363: 60° end fittings and adapters for hydraulic hose assemblies

2. HANSA-FLEX adapter designations

The designation of HANSA-FLEX adapters generally follows the logic set out below:
- If there is a screw-in thread / stud end, it is always named before the connection side.
- An “A” in the designation of a connection side means an internal (female) thread.
- An “H” in the designation of a connection side means an external (male) thread.
- A connection side designated with an “I” always indicates an internal thread (no nut).
- The size reference of HANSA-FLEX adapters relates to the connection and is given in the "Size" value.
- The reference of the metric stud ends is given in the thread value.
  Example:
  W90HMOK16HJ08
  => HMOK16 = M16x1.5
  => HJ08 Size 08

The designation variants listed under points 2.1 to 2.6.1 are only a selection from the HANSA-FLEX adapter range. You can find other variants in our catalogues – or ask us specifically about the article you require.

2.1 Construction – designation variants

HANSA-FLEX designation	Meaning
G	Straight connecting socket
GE	Straight screw-in socket
SV	Straight bulkhead connecting socket
W 45	45° connecting socket
SW 45	45° bulkhead connecting socket
W 90	90° connecting socket
SW 90	90° bulkhead connecting socket
W B	90° pipe bend

HANSA-FLEX designation	Meaning
T	Connecting socket, T form
S T	Bulkhead socket, T form
L	Socket, L form
S L	Bulkhead socket, L form
K	Socket, cruciform
VERSCHLUSS	Blanking plug, socket, nut
UEM	Union nut
Stützring	Support sleeve, ring

2.2 Connection form / stud end – designation variants

HANSA-FLEX designation	Meaning
H	Metric external thread (male) with 60° cone
M	Metric external thread (male) with sealing edge
AB	Union nut (female) with BSPP thread and 60° cone
HB	BSPP external thread (male) and 60° cone
AJ	Union nut (female) with UNF thread (JIC) 37° cone
HJ	UNF external thread (male) (JIC) 37° cone
AN	Union nut (female) with NPSM thread
HN	NPT/F screw-in thread (male)
AJF	Union nut (female) ORFS flat sealing
HJOF	UNF external thread (male) with ORFS sealing surface (flat sealing with O-ring fitted into the sealing surface)
HRO	BSPP screw-in thread with O-ring seal

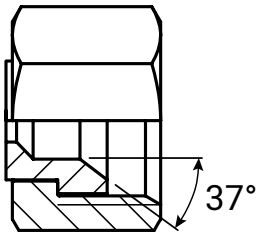
HANSA-FLEX designation	Meaning
HROK	BSPP screw-in thread with retaining ring, O-ring seal
HRED	BSPP stud end in accordance with ISO 1179-2 form E and elastomer seal (WD)
HRK	Tapered BSPT screw-in thread
HMO	Metric screw-in thread with O-ring seal
HMOK	Metric screw-in thread with retaining ring, O-ring seal
HMED	Metric screw-in thread in accordance with ISO 9974-2 form E and elastomer seal (WD)
GE O	UNF / UN screw-in thread ISO 11926-2 with O-ring
IN	NPT internal thread
IR	BSPP internal thread

2.3 HANSA-FLEX AJ/HJ (ISO 8434-2)

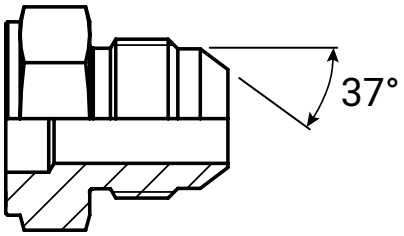
Series AJ/HJ HANSA-FLEX adapters are the familiar flare adapters with a 37° cone and UNF/UN thread. These adapters are also described as JIC adapters, which were originally standardised as "Joint Industrial Council". They are often used for mobile applications with medium operating pressures. AJ/HJ connections achieve their seal through metallic sealing surfaces.

The design and function of the flare is explained in more detail in Technical information Connection technology Pipelines. Using an additional HANSA-FLEX ZROO spacer ring in accordance with DIN 3949, UEM B union nut and DRD pressure ring (full designation: BOOK), a form-fitting (i.e. positive) connection to a 24° pipe fitting in accordance with ISO 8434-1 can be achieved.

An AJ connection (DKJ) consists of a sealing surface in the form of a 37° inner cone with a union nut (female) with a UNF/UN internal thread.



The HJ connection (AGJ) with its sealing surface in the form of a 37° outer cone and the UNF external thread (male) form the counterpart to the AJ connection.



2.3.1 Size reference of HANSA-FLEX adapters with connection form AJ/HJ

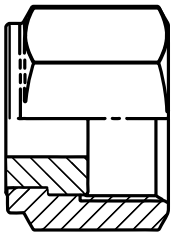
	Connection thread	
Size	**AJ (DKJ)**	**HJ (AGJ)**
4	7/16-20 UNF	
5	1/2-20 UNF	
6	9/16-18 UNF	
8	3/4-16 UNF	
10	7/8-14 UNF	
12	1 1/16-12 UN	
14	1 3/16-12 UN	
16	1 5/16-12 UN	
20	1 5/8-12 UN	
24	1 7/8-12 UN	
32	2 1/2-12 UN	

2.4 HANSA-FLEX AJF/ HJOF (ISO 8434-3)

HANSA-FLEX series AJF/HJOF adapters are also known as ORFS (O-Ring Face Seal) adapters. They are sealed at the end with an O-ring with both flat faces of the adapter screwed up to one another. The connection threads are UNF/UN (UNS).

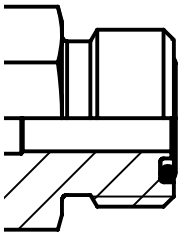
They are often used for mobile applications with high operating pressures. The use of the O-ring in the HJOF connections makes them absolutely reliable and tight.

The sealing surface of an AJF connection (DK ORFS) is metallic and flat. The union (female) nut has a UNF internal thread for attachment.



Flat sealing

The HJOF connection (AG ORFS) has a UNF external thread (male) and achieves a seal with an O-ring fitted into the groove of the flat metallic sealing surface of the AJF connection.



Flat sealing with O-ring

2.4.1 Size reference of HANSA-FLEX adapters with connection form AJF/HJOF

	Connection thread	
Size	**AJF (DK ORFS)**	**HJOF (AG ORFS)**
4	9/16 -18 UNF	
5	5/8-18 UNF	
6	11/16-16 UN	
8	13/16-16 UN	
10	1-14 UNS	
12	1 3/16-12 UN	
14	1 5/16-12 UN	
16	1 7/16-12 UN	
20	1 11/16-12 UN	
24	2-12 UN	
32	2 1/2-12 UN	

2.5 HANSA-FLEX AB/ HB (ISO 8434-6)

HANSA-FLEX series AB/HB adapters have a 59°/60° sealing cone and a BSPP thread (British Standard Pipe Thread Parallel). The seal is fully metallic through the 60° sealing cone.

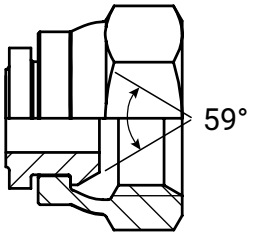
This type of adapter is used mainly in United Kingdom and was originally standardised only in BS 5200. Later it was included in ISO 8434-6 with a BSPP thread and 60° sealing cone.

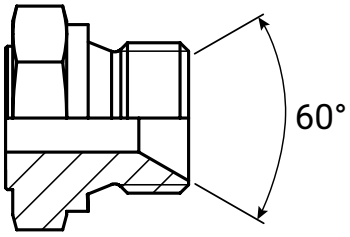
The operating pressures of AB/HB adapters are not very high and therefore they generally find use in simple hydraulic systems.

HB connections with BSPP external thread are primarily used for straight adapters or as screw-in variants as long as they have an additional seal, e.g. Usit rings (08BS).

The sealing surface of an AB connection (DKR female) is a 59° outer cone that makes a metallic seal when the BSPP nut thread is tightened. The difference between the 59° outer cone and the 60° inner cone creates a better seal.

The counterpart is the HB connection (AGR male), which has a sealing surface in the form of a 60° inner cone. The HB connection makes a metallic seal in combination with an AB connection.





2.5.1. Size reference of HANSA-FLEX adapters with connection form AB/HB

	Connection thread	
Size	**AB (DKR)**	**HB (AGR)**
2	G 1/8 A	
4	G 1/4 A	
6	G 3/8 A	
8	G 1/2 A	
10	G 5/8 A	
12	G 3/4 A	
16	G 1 A	
20	G 1 1/4 A	
24	G 1 1/2 A	
32	G 2 A	

2.6 HANSA-FLEX AN/HN (SAE J 514)

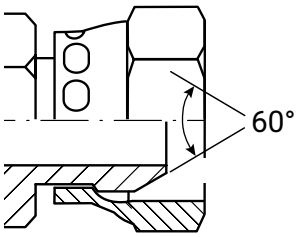
HANSA-FLEX series AN/HN adapters have an NPSM thread on the AN side and NPT/NPTF thread on the HN side.

The NPT thread is available as a tapered external or internal thread. This thread achieves its seal by the external thread flanks, which have a 60° angle between adjacent flank faces (thread angle). Achieving a seal on a screw-in variant requires an additional means of sealing (e.g. PTFE tape).

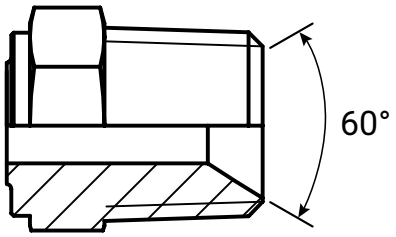
NPTF threads are interfering taper threads and achieve a leakproof seal when they are first assembled because their thread flanks deform. No additional means of sealing is required for leak-free assembly on a screw-in variant. NPTF threads are generally not used by HANSA-FLEX for adapters made from stainless steel.

HANSA-FLEX adapters with an NPT/NPTF external thread normally have a 60° inner cone so that they can be used as screw-in variants as well as in combination with an AN (NPSM) connection.

The AN connection (DKN female) consists of a 60° outer cone with an NPSM nut thread. Unlike NPT and NPTF threads, NPSM connections do not achieve a seal using the thread flanks.



The counterpart is the HN connection (AGN male), which has a sealing surface in the form of a 60° inner cone. The HN connection makes a metallic seal in combination with an AN connection.



2.6.1. Size reference of HANSA-FLEX adapters with connection form AN/HN

	Connection thread	
Size	**AN**	**HN**
2		1/8" - 27
4		1/4" - 18
6		3/8" - 18
8		1/2" - 14
12		3/4" - 14
16		1" - 11.5
20		1 1/4" - 11.5
24		1 1/2" - 11.5
32		2" - 11.5

3. Operating pressure of HANSA-FLEX adapters

The adapters are designed for the operating pressures in the standards. Depending on the application, the adapters can be selected based on the operating pressure. The connection with the lowest operating pressure always determines the operating pressure of the whole adapter. The connection form and screw-in form must be taken into account in this. The values given relate to HANSA-FLEX ordinary steel and stainless steel adapters.

Pressure values for screw-on connectors are derived from Table 1 (connection form):

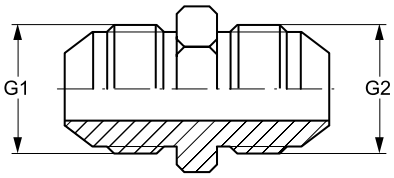
Table 1: Connection form

Maximum permissible operating pressure (bar) of adapters related to connection form

HANSA-FLEX designation	Standard	NW03	NW04	NW06	NW08	NW10	NW13	NW16	NW20	NW25	NW32	NW40	NW50	NW60
		1/8"		1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	1"	1 1/4"	1 1/2"	2"	2 3/8"
		Size 02	Size 03	Size 04	Size 05	Size 06	Size 08	Size 10	Size 12	Size 16	Size 20	Size 24	Size 32	Size 38
AB / IR	ISO 8434-6	350		350		350	315	315	250	200	160	125	80	
AOB / HB	ISO 8434-6 O-ring			400		400	350	350	315	250	200	160	125	
A	DIN 20078 **								63	63	63	63	40	40
AJ / AOJ / HJ	ISO 8434-2			350	350	350	310	240	240	210	170	140	105	
SF 3	SAE J 518 (3000 psi)						345		345	345	276	207	207	
SF 6	SAE J 518 (6000 psi)						414		414	414	414	414	414	
AJF / HJOF	ISO 8434-3			630		630	630	400	400	400	250	250		
AN / HN	J 514 C		345	345		276	241		155	138	112	86	78	

** DIN 20078 has been withdrawn without a replacement

Example: GHJ06HJ08



Connection form G1: Size HJ06 = 350 bar
Connection form G2: Size HJ08 = 310 bar

Result: Operating pressure GHJ06HJ08 = 310 bar

Pressure values for screw-in connectors must be selected by combining Table 1 and Table 2. When doing this, it is important to note that the screw-in forms for the relevant connection form are defined in different standards. Hence, for example, the HMO side for an HJOF adapter is defined in accordance with standard ISO 6149-2 S series (heavy series), while the HMO side for an HJ adapter is defined in accordance with standard ISO 6149-3 L series (light series).

For this reason, the relevant connection form must be observed in Table 2 (see following example).

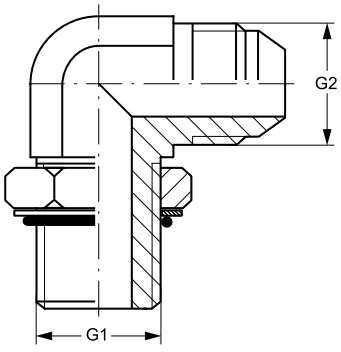
Table 2: Screw-in form

Maximum permissible operating pressure (bar) of adapters related to screw-in forms

HANSA-FLEX designation Screw-in form			HMED	HMO HMOK*	HMO HMOK*	HMO HMOK*	HMO HMOK*	HRED	HRO** HROK	HRO** HROK	GEO	W**O	GEO	W**O	HRK
HANSA-FLEX designation Connection form			HJ/ HJOF/ HB	HJOF	HJOF	HJ/HB	HJ/HB	HJ/ HJOF/ HB	HJ/ HJOF/ HB	HJ/ HJOF/ HB	HJ	HJ	HJOF	HJOF	
Thread screw-in side			Metric	Metric	Metric	Metric	Metric	BSPP	BSPP	BSPP	UNF/UN	UNF/UN	UNF/UN	UNF/UN	BSPT
BSPP/ BSPT	Metric	UNF/UN	ISO 9974-2 S (hd)	ISO 6149-2 S (hd)	ISO 6149-2 S (hd) RE	ISO 6149-3 L (ld))	ISO 6149-3 L (ld) RE	ISO 1179-2 S (hd)	ISO 1179-3 L (ld)	ISO 1179-3 L (ld) RE	ISO 11926-3 L (ld)	ISO 11926-3 L (ld) RE	ISO 11926-2 S (hd)	ISO 11926-2 S (hd) RE	Pressure values ISO 1179-3 L (ld)
1/8"		5/16 UNF							315	200	315				315
		3/8-24 UNF									315	315	630	400	
	M8x1			630	400	400	315								
1/4"	M10x1	7/16-20 UNF		630	400	400	315	630	315	200	315	315	630	400	315
5/16"	M12x1.5	1/2-20 UNF	630	630	400	400	315				315	315	630	400	
3/8"	M14x1.5	9/16-18 UNF	630	630	400	400	315	630	315	200	315	250	630	400	315
1/2"	M16x1.5	3/4-16 UNF	630	630	400	315	250	400	250	200	315	250	630	400	250
	M18x1.5		630	630	400	315	250								
	M20x1.5			400											
5/8"	M22x1.5	7/8-14 UNF	400	630	400	315	250				250	200	630	400	
	M26x1.5														
3/4"	M27x2	1 1/16-12 UN	400	400	400	200	160	400	250	200	200	200	400	400	250
		1 3/16-12 UN									200	160	400	400	
	M30x2			400	350	200	160								
1"	M33x2	1 5/16-12 UN	400	400	350	200	160	400	250	200	200	160	400	315	250
1 1/4"	M42x2	1 5/8-12 UN	250	250	250	200	160	250	160	160	160	125	250	250	160
1 1/2"	M48x2	1 7/8-12 UN	250	250	200	200	160	250	160	160	160	125	250	250	160
2"	M60x2	2 1/2-12 UN		250	160	160	100	250			160	100	210	(175)	

* The HMOK (retaining ring) connection is not defined in ISO 6149-2 / 3. Pressure values taken from ISO 6149-2 / 3
**The HRO connection is not defined in ISO 1179- 3. Pressure values taken from ISO 1179-3
S (hd) = heavy series (heavy duty)
L (ld) = light series (light duty)
RE = direction can be set

Example: W90HMO16HJ08



Connection form

Screw-in form

Connection form (HJ08): G2 = 3/4 - 16 UNF Size 08 (HJ)

Table 1: Connection form

Maximum permissible operating pressure (bar) of adapters related to connection form

HANSA-FLEX designation	Standard	NW03	NW04	NW06	NW08	NW10	NW13
		1/8"		1/4"	5/16"	3/8"	1/2"
		Size 02	Size 03	Size 04	Size 05	Size 06	Size 08
AB	ISO 8434-6	350		350		350	315
AOB / HB / IR	ISO 8434-6 O-ring			400		400	350
A	DIN 20078 **						
AJ / AOJ / HJ	ISO 8434-2			350	350	350	310

= 310 bar

Screw-in form (HMO16): G1 = M16 x 1.5

Table 2: Screw-in form

Maximum permissible operating pressure (bar) of adapters related to screw-in form.

HANSA-FLEX designation Screw-in form			HMED	HMO HMOK*	HMO HMOK*	HMO HMOK*	HMO HMOK*
HANSA-FLEX designation Connection form			HJ/ HJOF/ HB	HJOF	HJOF	HJ/HB	HJ/HB
Thread screw-in side			Metric	Metric	Metric	Metric	Metric
BSPP/ BSPT	Metric	UNF/UN	ISO 9974-2 S (hd)	ISO 6149-2 S (hd)	ISO 6149-2 S (hd) RE	ISO 6149-3 L (ld))	ISO 6149-3 L (ld) RE
1/8"		5/16 UNF					
		3/8-24 UNF					
	M8x1			630	400	400	315
1/4"	M10x1	7/16-20 UNF		630	400	400	315
5/16"	M12x1.5	1/2-20 UNF	630	630	400	400	315
3/8"	M14x1.5	9/16-18 UNF	630	630	400	400	315
1/2"	M16x1.5	3/4-16 UNF	630	630	400	315	250

= 250 bar

Result: Operating pressure W90HMO16HJ08 = 250 bar

This assumes correct installation of the adapter. Should you have any questions, please get in touch with your contact at HANSA-FLEX.

4. Tightening torques for various connection forms and threads of HANSA-FLEX adapters

The tightening torques in the following table apply to the connection forms of adapters made from stainless steel and ordinary steel with a HANSA-FLEX zinc nickel coating and to counter-bodies made from the same material.

HANSA-FLEX generally recommends assembly path-dependent installation. The listed torques are provided purely as guidance values. Adapter installation is affected by various factors, such as:

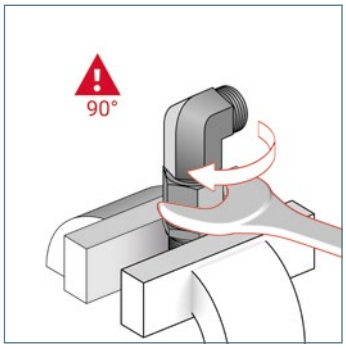
- Thread pitch
- Thread friction
- Plastic deformation of surfaces
- Component tolerances
- Component coatings

During every installation, the required assembly path after the noticeable increase in force* required for tightening must be observed. HANSA-FLEX recommends the components are assembled in a lightly oiled condition and HANSA-FLEX assembly paste applied in the case of stainless steel.

*** Definition of "noticeable increase in force":**
Tighten the union nut until the point at which it becomes noticeably more difficult to turn it. At this point, for example, the resistance due to minor damage on the thread caused by the union nut snagging slightly must be overcome. For adapters with O-rings, the pre-stressing of the O-ring must be bridged and the sealing cone must lie metallically flush against the cone of the connector.

4.1 Torques for connection form AJ/HJ

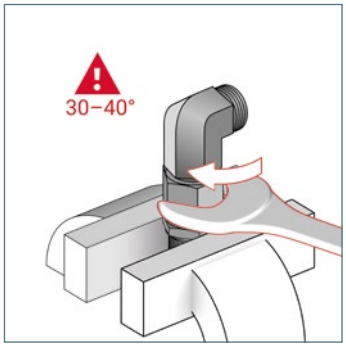
	Connection thread		Min. torque
Size	**AJ (DKJ)**	**HJ (AGJ)**	**Nm**
4	7/16-20 UNF		15
5	1/2-20 UNF		19
6	9/16-18 UNF		24
8	3/4-16 UNF		49
10	7/8-14 UNF		77
12	1 1/16-12 UN		107
16	1 5/16-12 UN		147
20	1 5/8-12 UN		172
24	1 7/8-12 UN		215
32	2 1/2-12 UN		332



In order to ensure correct installation, the recommended minimum torques should not be exceeded by more than 30 % during assembly.

4.2 Torques for connection form AJF/HJOF

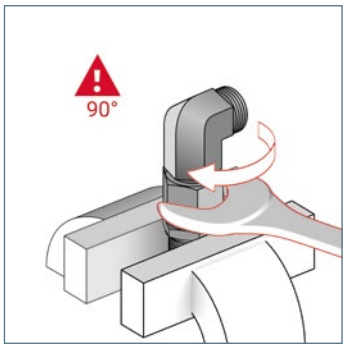
	Connection thread		Min. torque
Size	**AJF (DK ORFS)**	**HJOF (AG ORFS)**	**Nm**
4	9/16 -18 UNF		25
	5/8-18 UNF		30
6	11/16 - 16 UN		40
8	13/16 - 16 UN		55
10	1" - 14 UNS		60
12	1 3/16 - 12 UN		90
	1 5/16-12 UN		115
16	1 7/16 - 12 UN		125
20	1 11/16 - 12 UN		170
24	2 - 12 UN		200



In order to ensure correct installation, the recommended minimum torques should not be exceeded by more than 30 % during assembly.

4.3 Torques for connection form AB/HB

	Connection thread		Min. torque
Size	**AB (DKR)**	**HB (AGR)**	**Nm**
2	G 1/8 A		10
4	G 1/4 A		20
6	G 3/8 A		35
8	G 1/2 A		60
10	G 5/8 A		70
12	G 3/4 A		115
16	G 1 A		140
20	G 1 1/4 A		210
24	G 1 1/2 A		290
32	G 2 A		400



In order to ensure correct installation, the recommended minimum torques should not be exceeded by more than 10 % during assembly.

Tightening torques for the stud ends can be found in Technical information Connection technology Pipe fittings.