

# 3 CONNECTING PIECES



NORMAG - LABORATORY GLASSWARE



L 303 e.1

## CONICAL GROUND JOINTS

Besides a numerous of other types of connectors, conical ground joints are mostly used for laboratory glassware. They are suitable for use under vacuum or slight overpressure, in many cases even without clamps.

### Connecting pieces

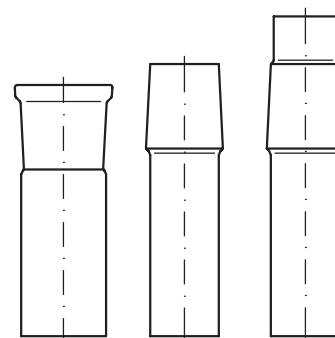
Cone and socket are made of Borosilicate glass 3.3 corresponding to DIN 12 242, part 1.

Our conical joints are manufactured to an accuracy of only 1/10 of the admitted taper angle deviation. They are interchangeable and perform a high tightness by use of grease, meeting the highest requirements.

Skirted cones can be also delivered in the same high quality.

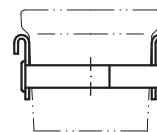
 Dimensions of conical ground joints please see catalogue part "Technical Information".

Nominal size NS	Pack unit	Catalogue No. socket	Catalogue No. cone	Catalogue No. skirted cone
5/13	10	KSG 01002 01	KSG 01003 01	-
7/16	10	KSG 01002 02	KSG 01003 02	-
10/19	10	KSG 01002 03	KSG 01003 03	KSG 01007 03
12/21	10	KSG 01002 04	KSG 01003 04	KSG 01007 04
14/23	10	KSG 01002 05	KSG 01003 05	KSG 01007 05
19/26	10	KSG 01002 06	KSG 01003 06	KSG 01007 06
24/29	10	KSG 01002 07	KSG 01003 07	KSG 01007 07
29/32	10	KSG 01002 08	KSG 01003 08	KSG 01007 08
34/35	5	KSG 01002 09	KSG 01003 09	KSG 01007 09
45/40	5	KSG 01002 10	KSG 01003 10	KSG 01007 10
60/46	1	KSG 01002 12	KSG 01003 12	KSG 01007 12
71/51	1	KSG 01002 13	KSG 01003 13	KSG 01007 13
85/55	1	KSG 01002 14	KSG 01003 14	KSG 01007 14
100/60	1	KSG 01002 15	KSG 01003 15	KSG 01007 15



## Metal safety hooks

Metal safety hooks are favourable used to secure pump stopcocks and conical ground joint connections on flasks. The necessary rubber stopcock securing and springs are described below.



Nominal size NS	Pack unit	Catalogue No.
5	10	ALH 00999 01
7	10	ALH 00999 02
10	10	ALH 00999 03
14	10	ALH 00999 05
19	10	ALH 00999 06
29	10	ALH 00999 08
34	10	ALH 00999 09
45	10	ALH 00999 10
60	10	ALH 00999 12
71	10	ALH 00999 13
85	10	ALH 00999 14

## Rubber stopcock securing

The securing of glass keys from pump stopcocks are made with those tapes together with the metal safety hooks, described before.

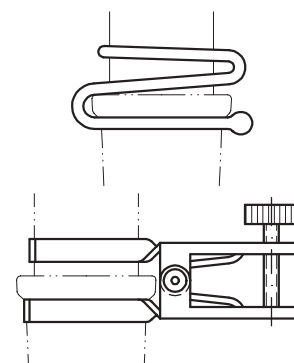


Nominal size pump cock	Pack unit	Catalogue No.
2 - 4	10	ALH 00995 01
6 - 10	10	ALH 00995 02

## Clips

Simple wire clips or 'fork' type clips are suitable for securing conical joints at slight overpressure. Both are made of stainless steel.

Nominal size	Pack unit wire clips	Pack unit fork clips	Catalogue No. wire clips	Catalogue No. fork clips
10	10	-	HAA 60092 01	-
14	10	1	HAA 60092 02	HAA 60093 02
19	10	1	HAA 60092 03	HAA 60093 03
29	10	1	HAA 60092 04	HAA 60093 04
45	10	1	HAA 60092 05	HAA 60093 05



# CONNECTING PIECES

## Holding springs

These stainless steel made springs, bore of the spring line 5 mm, are suitable for securing conical ground joints in general. The components must be fitted with glass cam on both sides, or the socket must be fitted with metal safety hooks and the cones with glass cam for securely linking of conical ground joints.

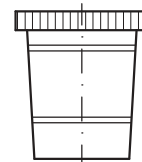
Length	Pack unit	Catalogue No.
10	10	ALH 00998 01
15	10	ALH 00998 02
20	10	ALH 00998 03
25	10	ALH 00998 04
30	10	ALH 00998 05
40	10	ALH 00998 06
50	10	ALH 00998 07
70	10	ALH 00998 08
100	10	ALH 00998 09



## Sleeves

Sleeves with groove and made of PTFE can be used instead of lubricating grease when slight or medium vacuum is required. They are set into the socket or put onto the cone. Available with knurled shoulder in all sizes.

Nominal size NS	Pack unit	Catalogue No.
10/19	2	HAA 60094 01
14/23	2	HAA 60094 02
19/26	2	HAA 60094 03
29/32	2	HAA 60094 04
45/40	1	HAA 60094 05
71/51	1	HAA 60094 06
85/55	1	HAA 60094 07



## SPHERICAL GROUND JOINTS

A long time, spherical connections in mm-sizes and inch-sizes had been used with equal at the same time. Now, the inch-sizes are more used in practice what has been considered in our delivery program.

### Connecting pieces

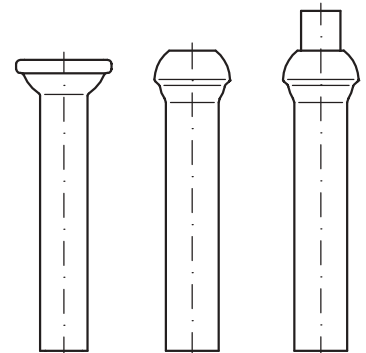
Cups and balls are made of Borosilicate glass 3.3 corresponding to DIN 12 244 part 1 and due to their high grinding quality interchangeable. Used with lubricating grease spherical joints provide a high tightness meeting the highest requirements.

Skirted balls are also available.



Dimensions of spherical ground joints, please see catalogue part "Technical Information".

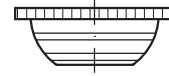
Nominal size S	Pack unit	Catalogue No. cup	Catalogue No. ball	Catalogue No. skirted ball
13/5	10	KSG 07007 02	KSG 07006 02	KSG 07006A 02
19/9	10	KSG 07007 03	KSG 07006 03	KSG 07006A 03
29/15	10	KSG 07007 04	KSG 07006 04	KSG 07006A 04
35/25	5	KSG 07007 05	KSG 07006 05	KSG 07006A 05
40/25	5	KSG 07007 06	KSG 07006 06	KSG 07006A 06
51/30	1	KSG 07007 07	KSG 07006 07	KSG 07006A 07
64/40	1	KSG 07007 08	KSG 07006 08	KSG 07006A 08



# CONNECTING PIECES

## Sleeves

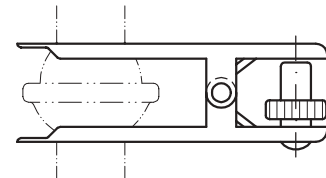
Sleeves with groove and made of PTFE can be used instead of lubricating grease when slight or medium vacuum is required. They are set between cup and ball. Available in all usual sizes.



Nominal size S	Pack unit	Catalogue No.
13	2	HAA 60091 01
19	2	HAA 60091 02
29	2	HAA 60091 03
35	1	HAA 60091 04
40	1	HAA 60091 05
51	1	HAA 60091 06
64	1	HAA 60091 07

## Joint Clips

These joint clips can be used for securing spherical ground joints and for setting of wanted operation angles. They are fitted with spring and screw. All parts are made of stainless steel.



Nominal size S	Pack unit	Catalogue No.
13	1	HAA 60090 01
19	1	HAA 60090 02
29	1	HAA 60090 03
35	1	HAA 60090 04
40	1	HAA 60090 05

## ROTULEX SYSTEM

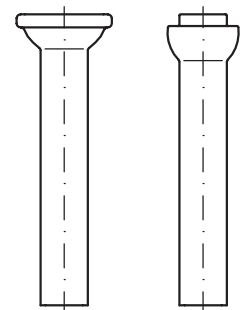
The Rotulex system offers an alternative for a grease-free connection of spherical ground joints and meeting the high requirements for tightness under vacuum and slight overpressure. The fire-polished cup corresponds in its sizes to DIN 12 244 part 1. The fire polished counterpart in ball shape has a groove to take a sealing.

Due to its shape, the Rotulex-System allows the same operation angles as described on page 3.5.

### Connecting pieces

Cup and ball are made of Borosilicate glass 3.3. They are interchangeable and available in the following sizes.

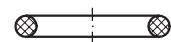
Nominal size RS	Pack unit	Catalogue No. cup	Catalogue No. ball
13/5	5	HAA 60088 01	HAA 60089 01
19/9	5	HAA 60088 02	HAA 60089 02
29/15	5	HAA 60088 03	HAA 60089 03
35/20	5	HAA 60088 04	HAA 60089 04
41/25	5	HAA 60088 05	HAA 60089 05
64/40	5	HAA 60088 06	HAA 60089 06



### Sealings

The O-rings are available both in Viton and in Silicone, PTFE-lined, fulfilling the different requirements for corrosion resistance.

Nominal size RS	Pack unit	Catalogue No. Silicone/PTFE	Catalogue No. Viton
13/5	10	HAA 60095 01	HAA 60096 01
19/9	10	HAA 60095 02	HAA 60096 02
29/15	10	HAA 60095 03	HAA 60096 03
35/20	10	HAA 60095 04	HAA 60096 04
41/25	10	HAA 60095 05	HAA 60096 05
64/40	10	HAA 60095 06	HAA 60096 06

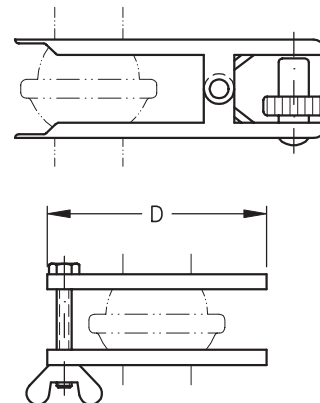


## Clamps, Flange connections

Clamps with spring and locking screw are suitable for small nominal sizes to secure the Rotulex connections and to set the wanted operation angles. Due to the similar of the tube ends, the same design as described in 3.6 for spherical ground joints can be used.

Special flange connectors for nominal sizes 29/15 and larger are available to improve the stability and to reach a higher tightness. The delivery consists of two flanges made of Aluminium, two PTFE sealing rings (put between flange and glass), three screws with loaded springs and butterfly nuts, made of stainless steel.

Nominal size RS	D flange	Pack unit	Catalogue No. clamp	Catalogue No. flange connection
13/5	-	1	HAA 60097 01	-
19/9	-	1	HAA 60097 02	-
29/15	58	1	HAA 60097 03	HAA 60098 03
35/20	-	1	HAA 60097 04	-
41/25	71	1	HAA 60097 05	HAA 60098 05
64/40	95	1	-	HAA 60098 06



## HIGH VACUUM FLAT FLANGES

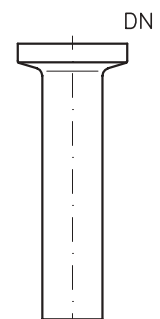
We recommend this connecting system for greaseless connection of glass and peripherals with metallic connector e.g. pumps. Due to its shape, the tube ends are very stable and they are able to bear relatively high tight strength. Used together with O-rings they have a very low leakage rate. An example for application of these flanges you can find in our catalogue part "Apparatus and Units".

## Connecting pieces

High vacuum flat flanges are available both in Borosilicate glass 3.3 and in Quartz glass.

 Dimensions please see catalogue part "Technical Information"

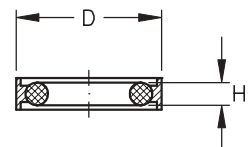
Nominal size DN	Pack unit	Catalogue No. Borosilicate glass	Catalogue No. Quartz glass
10	2	FVB 01006HV 01	FVB 01006HV 11
16	2	FVB 01006HV 02	FVB 01006HV 12
25	2	FVB 01006HV 03	FVB 01006HV 13
40	2	FVB 01006HV 04	FVB 01006HV 14
50	2	FVB 01006HV 05	FVB 01006HV 15



## Sealing

The O-ring sealing in Viton are fitted in a metal made centred ring (Aluminium, Nickel plated) to ease a safe and quick mounting of the connections.

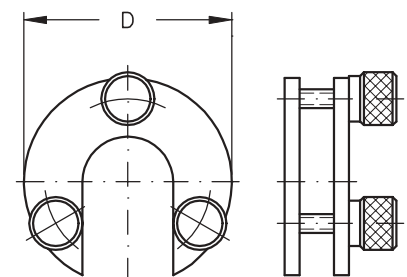
Nominal size DN	D	H	Pack unit	Catalogue No.
10	32	5	1	SZT 01006AL 11
16	32	5	1	SZT 01006AL 12
25	42	5	1	SZT 01006AL 13
40	57	5	1	SZT 01006AL 14
50	77	5	1	SZT 01006AL 15



## Flange connection

The design of these supports, made of PP, allows an easy mounting and their stability guarantees a fine transmission of the screw power, which is necessary for low leakage rates, onto the O-ring. Delivery consists of two flange supports and three screws and three knurled nuts, made of chrome-nickel-steel.

Nominal size DN	D	Pack unit	Catalogue No.
10	55	1	FVB 01012HV 01
16	55	1	FVB 01012HV 02
25	68	1	FVB 01012HV 03
40	85	1	FVB 01012HV 04
50	105	1	FVB 01012HV 05



## GL-SCREW THREADS

Screw thread connections offer some advantages, especially for connecting PTFE-hoses or impulse generators. GL-threads with narrow tube according to DIN 12 216 are the most employed connection.

Examples for employing GL-threads, please see catalogue part "Apparatus and Components".

On request, connecting pieces with Rd or metric thread are available.

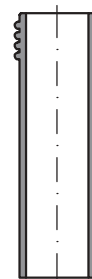
 Sizes of the thread, please see catalogue part "Technical Information".

We also supply tube ends and accessories with SVL thread.

## Threaded tubes for manipulators

They are made of Borosilicate glass 3.3. Due to the reinforced thread area, the diameter in this area is slightly narrower compared with tube diameter. But this enhances the stability of the thread what is an advantage when the threads are often used.

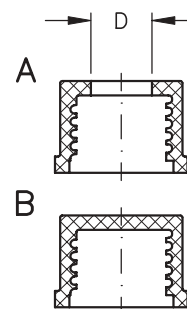
Nominal size GL	Pack unit	Catalogue No.
14	10	HAA 60100 01
18	10	HAA 60100 02
25	10	HAA 60100 03
32	10	HAA 60100 04
45	10	HAA 60100 05



## Screw caps


Made of the utmost corrosion resistant, red coloured material PBT (see catalogue part "Technical Information") and available in two different types. The cap with the bore are used as connecting cap and the cap without bore are used as sealing cap to close not engaged connections.

Nominal size GL	D	Pack unit	Catalogue No. type A	Catalogue No. type B
14	9.5	10	HAA 60110 01	HAA 60111 01
18	11	10	HAA 60110 02	HAA 60111 02
25	15	10	HAA 60110 03	HAA 60111 03
32	20	10	HAA 60110 04	HAA 60111 04
45	34	10	HAA 60110 05	HAA 60111 05

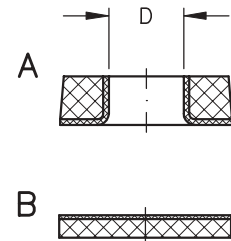


## Seals

Seals are made of silicone caoutchouc with or without bore and suitable for the caps described above. Available in two different types. Type A with vulcanised-on PTFE washers and type B PTFE protected.

 The diameter of the part to put through the bore can differ +/- 0.5 mm.

Nominal size GL	D	Pack unit	Catalogue No. type A	Catalogue No. type B
14	6	10	HAA 60112 01	HAA 60113 01
18	6	10	HAA 60112 02	HAA 60113 02
18	8	10	HAA 60112 03	-
18	10	10	HAA 60112 04	-
25	8	10	HAA 60112 05	HAA 60113 05
25	10	10	HAA 60112 06	-
25	12	10	HAA 60112 07	-
32	10	10	HAA 60112 08	HAA 60113 08
32	12	10	HAA 60112 09	-
32	14	10	HAA 60112 10	-
32	16	10	HAA 60112 11	-
32	18	10	HAA 60112 12	-
45	26	10	HAA 60112 13	HAA 60113 13
45	32	10	HAA 60112 14	-

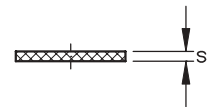


## Silicone rubber seals

These seals are for piercing and made of silicone rubber VMQ and are employed together with the screw caps type A.

Other sizes are available on request.

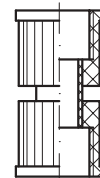
Nominal size GL	s	Pack unit	Catalogue No.
14	2	10	HAA 60116 01
18	2	10	HAA 60116 02



## Screw thread adapter

They allow a flexible connection of glass screw threads.

Nominal size GL	Pack unit	Catalogue No.
14	1	HAA 60120 01
18	1	HAA 60120 02
25	1	HAA 60120 03
32	1	HAA 60120 04

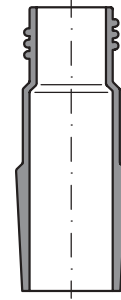


# CONNECTING PIECES

## Adapter

For connecting GL screw threads and conical ground joints and available in the following sizes.

Nominal size GL	Conical ground joint	Pack unit	Catalogue No.
14	14/23	10	HAA 60125 01
14	19/26	10	HAA 60125 02
14	29/32	10	HAA 60125 03
18	14/23	10	HAA 60125 04
18	19/26	10	HAA 60125 05
18	29/32	10	HAA 60125 06
25	19/26	10	HAA 60125 07
25	29/32	10	HAA 60125 08
32	29/32	10	HAA 60125 09

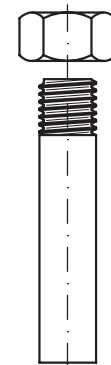


## Metric thread

Screws are often used to adapt glass and metal. To connect these two materials without an adapter connectors with a metric thread are suitable.

Connectors in larger metric sizes or other threads (inch size) are available on request.

Nominal size M	Pack unit	Catalogue No.
8	10	VBS 60170 01
10	10	VBS 60170 02
12	10	VBS 60170 03
16	10	VBS 60170 04
20	10	VBS 60170 05
24	10	VBS 60170 06

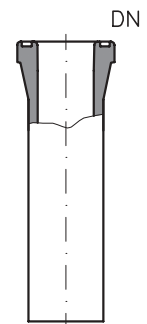


## SAFETY FLAT FLANGES / System "QVF"

This safety flat flange meets the highest requirements for glass connection and is especially suitable for direct connection to other pipe materials. We recommend the use as inlet or outlet connecting nipple at temperature jackets.

### Tube ends

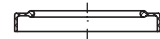
Nominal width DN	Pack unit	Catalogue No.
15	2	HAA 60130 01
25	2	HAA 60130 02
40	2	HAA 60130 03
50	2	HAA 60130 04
80	2	HAA 60130 05



### Seals

The universally utilisable seal ring is made of PTFE of best quality.

Nominal width DN	Pack unit	Catalogue No.
15	1	HAA 60131 01
25	1	HAA 60131 02
40	1	HAA 60131 03
50	1	HAA 60131 04
80	1	HAA 60131 05

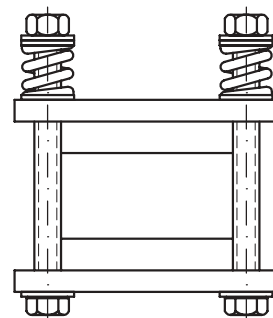


## Flange connections

This connection consists of flange rings, made of glass fibre reinforced thermosetting plastic, supports made of Polyamide and screws, washer, pressure springs and nuts, made of stainless steel.

☞ Plastic flange rings can be used up to an operation temperature of 200 °C. If the connection is insulated, the temperature must not exceed 150 °C. We recommend stainless steel made flange rings for higher temperatures.

Nominal width DN	Pack unit	Catalogue No.
15	1	HAA 60132 01
25	1	HAA 60132 02
40	1	HAA 60132 03
50	1	HAA 60132 04
80	1	HAA 60132 05



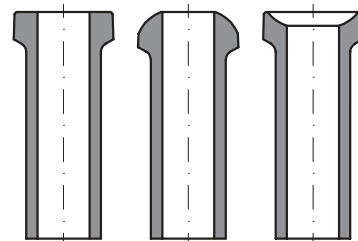
## TECH FLANGES / System "Schott"

The flange system of the Tech flange system "Schott" is a widely used system for components in units. Besides the safety flat flange system QVF, the "Schott" system is an alternative connecting system.

### Connecting pieces

The designs -flange, ball and cup- with a length of 100 mm are made of Borosilicate glass 3.3. They are interchangeable and available in the sizes listed below.

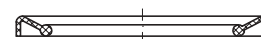
Nominal size DN	Pack unit	Catalogue No. flat	Catalogue No. ball	Catalogue No. cup
15	1	HAA 60140 01	HAA 60145 01	HAA 60150 01
25	1	HAA 60140 02	HAA 60145 02	HAA 60150 02
40	1	HAA 60140 03	HAA 60145 03	HAA 60150 03
50	1	HAA 60140 04	HAA 60145 04	HAA 60150 04
80	1	HAA 60140 05	HAA 60145 05	HAA 60150 05
100	1	HAA 60140 06	HAA 60145 06	HAA 60150 06
150	1	HAA 60140 07	HAA 60145 07	HAA 60150 07
200	1	HAA 60140 08	HAA 60145 08	HAA 60150 08



### PTFE seals

PTFE is the universal sealing material for glass flange connections. This seal, designed for spherical and cup grindings, has been provided very good for use at flat flanges too.

Nominal size DN	Pack unit	Catalogue No.
15	1	HAA 60141 01
25	1	HAA 60141 02
40	1	HAA 60141 03
50	1	HAA 60141 04
80	1	HAA 60141 05
100	1	HAA 60141 06
150	1	HAA 60141 07
200	1	HAA 60141 08



## Connecting supports, made of plastics

This connection support made of thermosetting plastic is corrosion resistant and of low weight. Additional measures for conduction of electrostatic charges are not necessary. Delivery consists of flange rings, interfacing, screws, washer and nuts.

Nominal size DN	Pack unit	Catalogue No.
15	1	HAA 60142 01
25	1	HAA 60142 02
40	1	HAA 60142 03
50	1	HAA 60142 04
80	1	HAA 60142 05
100	1	HAA 60142 06
150	1	HAA 60142 07
200	1	HAA 60142 08

