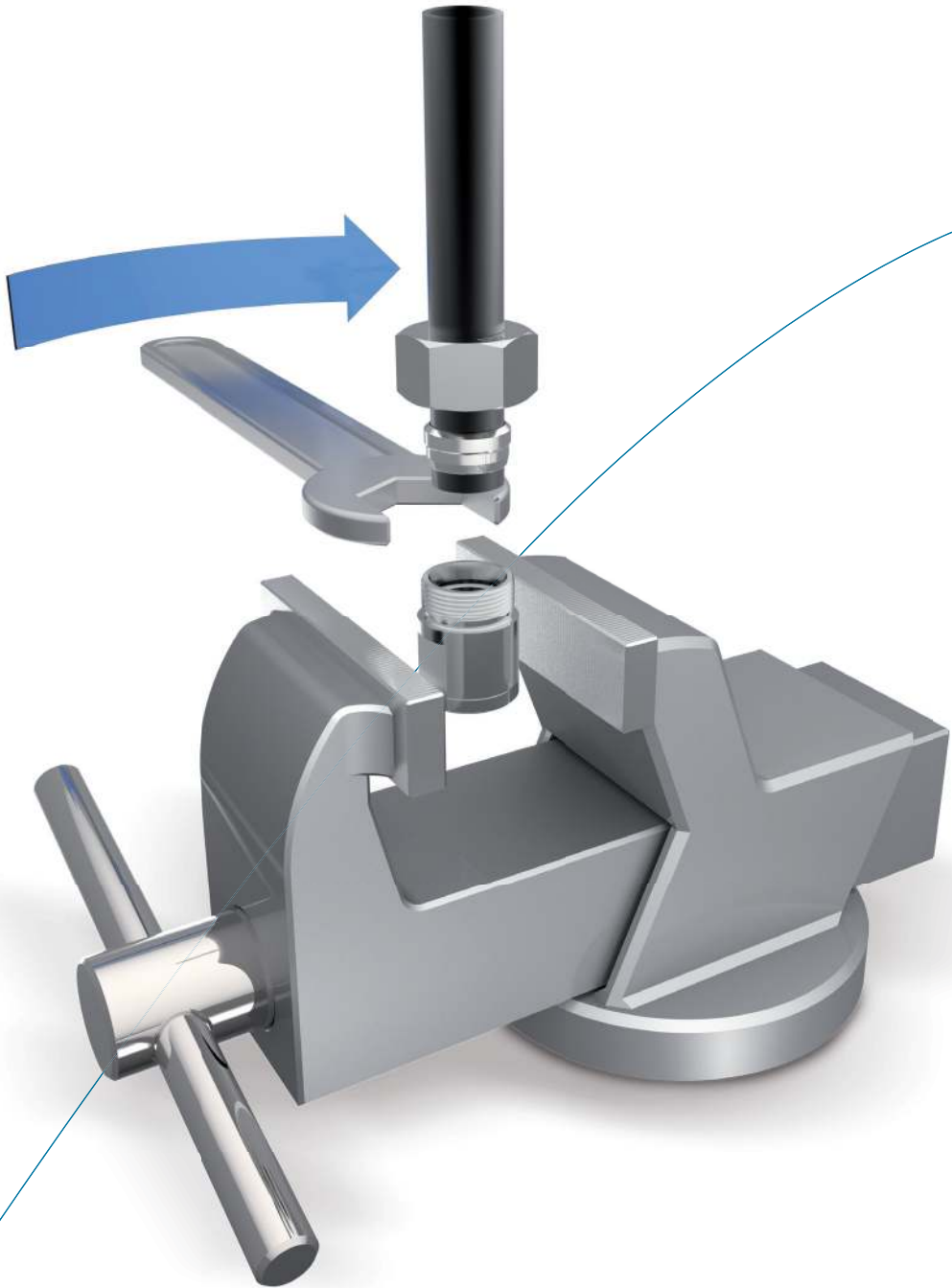


Assembly instructions



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Important notes on VOSS assembly instructions

In order to ensure maximum performance and functional reliability of VOSS products, the respective assembly instructions, operating conditions and tube recommendations have to be adhered to.

We recommend that you use VOSS pre-assembly devices at all times. It is absolutely essential to follow the operating instructions for the respective pre-assembly device used.

Do not start with assembly until you are absolutely sure that you have understood the operating and assembly instructions for each VOSS pre-assembly device or machine, tool and product. Incorrect handling leads to risks regarding safety and leak-tightness and can result in failure of the entire connection.

It is impossible for the manufacturer to monitor whether the user is adhering to the operating and assembly instructions for individual pre-assembly devices or machines, tools and products, as well as what conditions prevail and what methods are used for installation, operation, application and maintenance of the individual products. Improper workmanship can lead to material damage, which in turn may pose a danger to life and limb. This means that VOSS Fluid GmbH can accept no responsibility or liability for loss, damage or costs incurred due to faulty installation, improper operation or incorrect application and maintenance or from any related issue. Failure to heed this warning will lead to loss of guarantee.

VOSS Fluid GmbH reserves the right to make changes or additions to the information provided without prior notification. Customers can obtain the latest version of the operating and assembly instructions upon request, or from our download area at: www.voss.net

General notes on VOSS assembly instructions

Make sure that all components, including the tubes, are clean before assembly is started and that they remain clean during the entire assembly process. Soiled components may lead to failure of the system.

Before starting assembly, make sure that you have carried out all preparatory work in accordance with the respective instructions.

Specifications concerning permissible steel tubes:

seamless, cold-drawn and normalized precision steel tubes as specified in DIN EN 10305-4, material E235+N, mat. no. 1.0308+N or E355, mat. no. 1.0580. The tubes must be ordered by specifying the outer diameter and the inner diameter.

Specifications concerning permissible stainless steel tubes:

seamless, cold-drawn and solution-annealed, scale-free stainless steel tubes in CFA or CFD delivery condition of dimensions and tolerances according to DIN EN 10305-1 and all other delivery conditions as specified in DIN EN 10216-5, material X6CrNiMoTi17-12-2, mat. no. 1.4571. The tubes must be ordered by specifying the outer diameter and the inner diameter.

The tubes should be prepared with the same thoroughness as pre-assembly and final assembly of the connection. Especially when using long tubes, check the end sections for damage or distortion.

We recommend that pre-assembled tubes which are not to be finally assembled yet should be fitted with protective caps.

Marking a stroke on the union nut and the tube makes it easier to achieve the correct number of turns when tightening the coupling.

Before starting to assemble VOSS components with elastomer seals, always check that:

- the nut and the seal surfaces are clean and undamaged and/or
- the elastomer sealing is clean and undamaged

Determining the tightening torque for screw couplings

The tightening torques specified in the catalogue apply under the following conditions:

- steel fittings with VOSS coat surface coating
- the specified nominal pressure ranges assume that the mating material has a tensile strength of $\geq 600 \text{ N/mm}^2$
- our recommendations on lubrication of the threaded studs are observed

If other values for strength, modulus of elasticity and friction-surface combinations are used, the user has to adapt the tightening torque empirically.

The recommended tightening torques have to be adhered to if the pressure range is to be fully utilized and the appropriate safety level is to be maintained.

The recommended tightening torques for the threads are given in the tables for the respective type of thread.

Explanation of symbols and other notes



Visual inspection



Use the tool to tighten the coupling according to the instructions



Turn until hand-tight or carry out another manual activity



Oil and lubricate at the point marked with an arrow

All dimensions in millimetres [mm]

Assembly instructions for 2S tube couplings

1

Notes

Before starting the assembly work, read the general notes in the latest VOSS catalogue and check that your assembly instructions are up to date.

These assembly instructions describe the possible assembly options provided for in the German standard DIN 3859 Part 2.

We recommend that VOSS pre-assembly devices and tools are used for assembly at all times.

For use with steel tubes in accordance with VOSS specifications (see introduction to assembly instructions).

Attention!

Please note the recommendation on the use of tube supports for thin-walled steel tubes and soft tubes made of non-ferrous metals.

This cutting ring is not suitable for stainless-steel tube assemblies. For these, cutting rings of types 2S *plus*, 2SVA or ES-4VA must be used!



2

Tube preparation

2.1 The minimum dimensions of the straight tube ends must be taken into account for determining the tube lengths.

Series	Tube OD [mm]	H [mm]	L [mm]
L	6/8	31	39
L	10/12	33	42
L	15	36	45
L	18	38	48
L	22/28	42	53
L	35/42	48	60

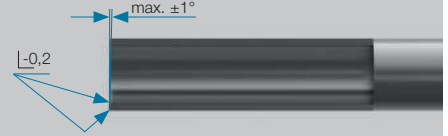
Series	Tube OD [mm]	H [mm]	L [mm]
S	6/8	35	44
S	10/12	37	47
S	14/16	43	54
S	20	50	63
S	25	54	68
S	30	58	72
S	38	65	82

With machine pre-assembly, the minimum lengths are contained in the respective operating instructions of the pre-assembly devices.



2S

2.2 Saw tube off at right angles. An angle tolerance of $\pm 1^\circ$ is permissible. Do not use a rotary grinder or tube cutter.



2.3 Slightly deburr tube ends inside and outside. Clean the tubes.

Attention!

Tubes cut crooked or improperly deburred reduce the service life and freedom from leaks of the connection.

2.4 Assembly of VOSS reinforcing sleeves

1. Lubricate all around the outside of the sleeve slightly (e.g. using mineral-oil based hydraulic fluid HLP32). Then insert the sleeve into the tube up to the knurled section.



Sleeve inserted

2. Use a hammer (plastic or hard rubber) to drive the sleeve in totally. In doing so, the knurled section is pressed against the inner wall of the tube and prevents the sleeve from being displaced or falling out.



Sleeve driven in firmly

Series	Tube OD [mm]	Wall thickness [mm]						
		0.5	0.75	1	1.5	2	2.5	3
L	6	•	•					
L	8	•	•					
L	10	•	•					
L	12	•	•	•				
L	15	•	•	•				
L	18	•	•	•	•			
L	22	•	•	•	•	•		
L	28	•	•	•	•	•		
L	35	•	•	•	•	•	•	
L	42	•	•	•	•	•	•	
S	6	•	•					
S	8	•	•					
S	10	•	•					
S	12	•	•	•				
S	14	•	•	•				
S	16	•	•	•	•			
S	20	•	•	•	•	•		
S	25	•	•	•	•	•	•	
S	30	•	•	•	•	•	•	•
S	38	•	•	•	•	•	•	•

3

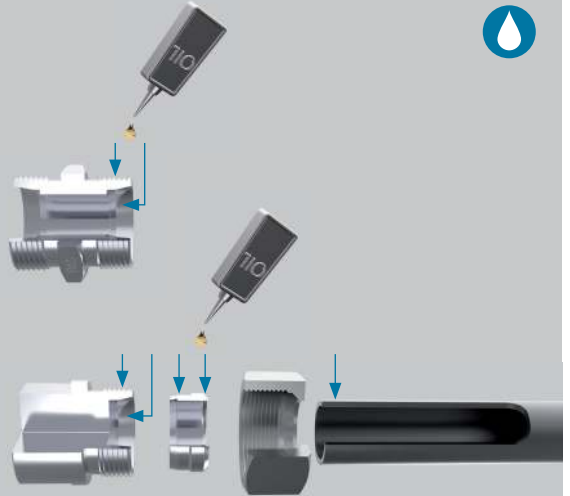
Assembly preparation

3.1 Lubricate the thread, the cutting ring, the tube end and the taper of the coupling connecting piece and/or of the manual pre-assembly stud lightly (e.g. using mineral-oil based hydraulic fluid HLP32).

3.2 Put the union nut and the 2S cutting ring onto the tube end, consecutively. The cutting edges of the 2S cutting ring face the tube end.

Attention!

Make sure that the 2S cutting ring is in the right position.



4

Assembly instructions

VOSS 2S cutting rings can be pre-assembled directly in the coupling connecting piece or using a hardened pre-assembly stud.

Hardened pre-assembly dies are wear-resistant, thus achieving consistent pre-assembly results. They have to be checked after approx. every 50 pre-assemblies for trueness of gauge.

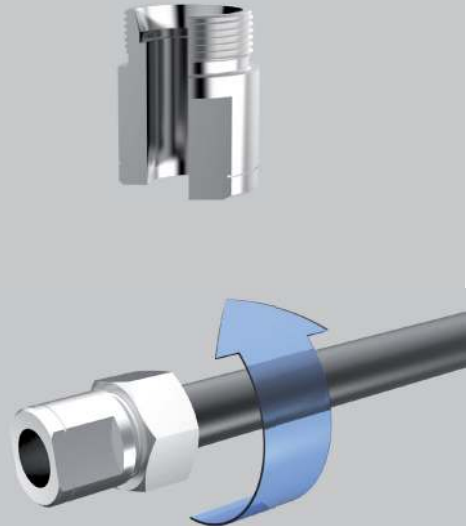
Attention!

Pre-assembly studs that are not true to gauge or that are damaged in the tapered section must be replaced on all accounts. When mounting these directly in the coupling connecting piece, this may be used only once for pre-assembly.

All specified assembly distances and number of turns must be adhered to. Otherwise there is a danger that the coupling will leak or that the tube will tear out of the coupling.

4.1 Insert the tube end into the 24° taper as far as it will go and press on it. The tube must be held in as far as it will go during the entire assembly process in order to avoid faulty assembly.

4.2 Turn the union nut until it is hand-tight.



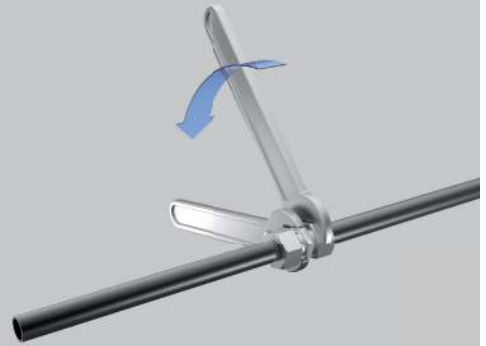
2S

4.3 Use a spanner to tighten the union nut.

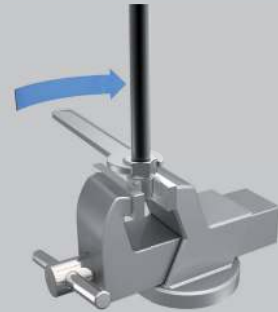
- up to tube OD 18 mm:
1 1/2 turns
- from tube OD 20 mm:
1 1/4 turns

Notes:

For assembly within the tube, tighten the coupling connecting piece with a spanner. To comply with the specified number of turns, it is recommended that marking lines be applied to the union nut and the tube.



up to tube OD 18 mm: 1 1/2 turns
from tube OD 20 mm: 1 1/4 turns



up to tube OD 18 mm: 1 1/2 turns
from tube OD 20 mm: 1 1/4 turns

5

Check results

Unscrew the union nut and check the shoulder throw-up. The shoulder throw-up must cover at least 80 % of the cutting-edge front face.

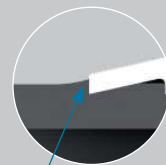
In this position, it is still permissible for the cutting ring to turn on the tube. Any dirt must be removed.

Attention!

If not enough tube material has been raised, the procedure must be repeated by using more force. The result must be rechecked.

Note:

We recommend the use of the VOSS gauge to check the correct axial position of the cutting ring.



Approx. 80 % material raised



6

Final assembly

6.1 Lubricate the thread, the pre-assembled tube end and the taper of the coupling connecting piece lightly (e.g. using mineral-oil based hydraulic fluid HLP32).

6.2 Insert the pre-assembled tube end carefully into the coupling connecting piece. Then turn the union nut until it is hand-tight.

Attention!

If the cutting ring was pre-assembled in the coupling connecting piece, the same coupling connecting piece used to pre-assemble the tube and cutting ring must be used again for the final assembly.

6.3 Use a spanner to tighten the union nut until there is a noticeable force increase.

6.4 Tighten up further by approximately **1/4 turn**.

Attention!

When finally tightening up the coupling connecting piece, always hold it in a spanner or clamp it in a vise.



7

Repeated assembly

For repeated assembly, the union nut must be tightened using the same force as for the original assembly.



Assembly instructions for 2SVA tube couplings

1 Notes

Before starting the assembly work, read the general notes in the latest VOSS catalogue and check that your assembly instructions are up to date

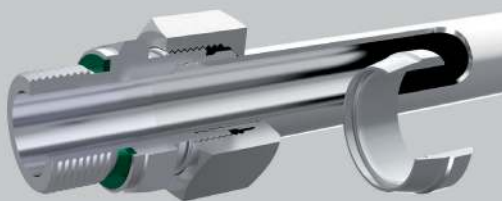

VOSS 2SVA cutting rings have to be pre-assembled in hardened tools.

These assembly instructions describe the pre-assembly in hardened pre-assembly studs.

We recommend that VOSS pre-assembly devices and tools are used for assembly at all times.

For use with stainless-steel tubes in accordance with VOSS specifications (see introduction to assembly instructions).

Attention!
Please note the recommendation on the use of tube supports made of material 1.4571 for thin-walled steel tubes.

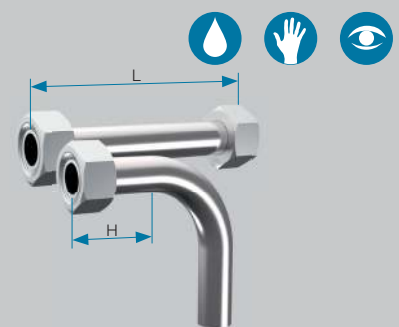





2 Tube preparation

2.1 The minimum dimensions of the straight tube ends must be taken into account for determining the tube lengths.

Series	Tube OD [mm]	H [mm]	L [mm]
L	6/8	31	39
L	10/12	33	42
L	15	36	45
L	18	38	48
L	22/28	42	53
L	35/42	48	60

Series	Tube OD [mm]	H [mm]	L [mm]
S	6/8	35	44
S	10/12	37	47
S	14/16	43	54
S	20	50	63
S	25	54	68
S	30	58	72
S	38	65	82

With machine pre-assembly, the minimum lengths are contained in the respective operating instructions of the pre-assembly devices.

2SVA

2.2 Saw tube off at right angles. An angle tolerance of $\pm 1^\circ$ is permissible. Do not use a rotary grinder or tube cutter.

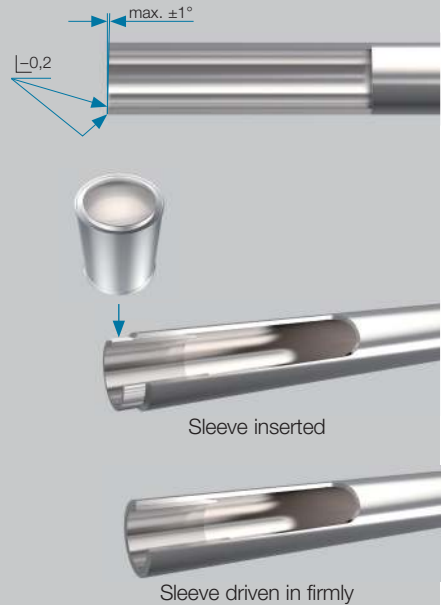
2.3 Slightly deburr tube ends inside and outside. Clean the tube.

Attention!

If tubes are not cut off squarely or are not properly deburred, this may reduce the service life and leak-tightness of the couplings.

2.4 Assembly of VOSS reinforcing sleeves

1. Lubricate the outside surface the sleeve lightly using assembly paste (e.g. MPE assembly paste). Then insert the sleeve into the tube up to the knurled section.
2. Use a hammer (plastic or hard rubber) to drive the sleeve in totally. In doing so, the knurled section is pressed against the inner wall of the tube and prevents the sleeve from being displaced or falling out.



Series	Tube OD [mm]	Wall thickness [mm]						
		0.5	0.75	1	1.5	2	2.5	3
L	6	•	•					
L	8	•	•					
L	10	•	•					
L	12	•	•	•				
L	15	•	•	•				
L	18	•	•	•	•			
L	22	•	•	•	•	•		
L	28	•	•	•	•	•		
L	35	•	•	•	•	•	•	
L	42	•	•	•	•	•	•	
S	6	•	•					
S	8	•	•					
S	10	•	•					
S	12	•	•	•				
S	14	•	•	•				
S	16	•	•	•	•			
S	20	•	•	•	•	•		
S	25	•	•	•	•	•		
S	30	•	•	•	•	•	•	
S	38	•	•	•	•	•	•	•

2SVA

3

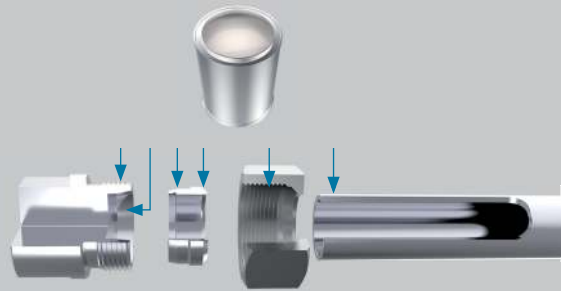
Assembly preparation

3.1 In order to carry out pre-assembly correctly, the thread of the coupling connecting piece, the tube end, the cutting ring, the union nut and the taper surfaces have to be lubricated with assembly paste (e.g. MPE assembly paste).

3.2 Put the union nut and the 2SVA cutting ring on the tube end.

Attention!

Make sure that the 2SVA cutting ring is in the right position.



4

Assembly instructions

Hardened pre-assembly studs are wear-resistant, thus achieving consistent pre-assembly results. They have to be checked after approx. every 50 pre-assemblies for trueness of gauge.

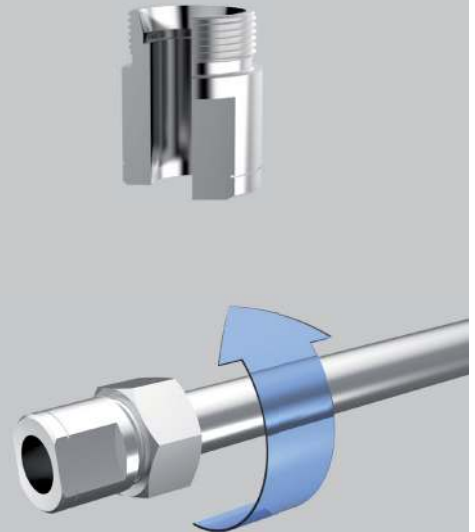
Attention!

Pre-assembly studs that are not true to gauge or that are damaged in the taper section must be replaced immediately.

All specified assembly distances (number of turns) must be adhered to. Otherwise there is a danger that the coupling will leak or that the tube will tear out of the coupling.

4.1 Insert the tube end into the 24° taper as far as it will go and press on it. The tube must be held in as far as it will go during the entire assembly process in order to avoid faulty assembly.

4.2 Turn union nut until it is hand-tight.

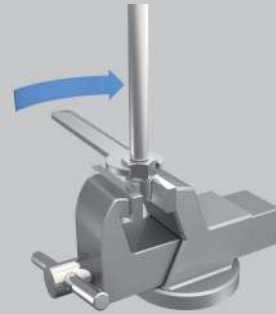


2SVA

4.3 Tighten union nut with approx. $1 \frac{1}{4}$ – $1 \frac{1}{2}$ turns.

Note:

Marking a stroke on the union nut and the tube makes it easier to achieve the correct number of turns.



approx. $1 \frac{1}{4}$ – $1 \frac{1}{2}$ turns

5

Check results

Unscrew the union nut, check how much material has been pushed up. It is not possible to cut and raise as much material of stainless-steel tubes as on normal steel tubes. However, a certain amount of raised material must be visible.

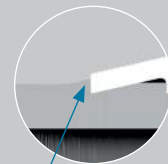
On this position, it is still permissible for the cutting ring to turn on the tube.

Attention!

If not enough tube material has been raised, the procedure must be repeated using more force. The result must be rechecked.

Note:

We recommend the use of the VOSS gauge to check the correct axial position of the cutting ring.



Visibly raised material



2SVA

6

Final assembly

6.1 Lubricate the thread, the pre-assembled tube end, the union nut and the taper lightly with assembly paste (e.g. MPE assembly paste).

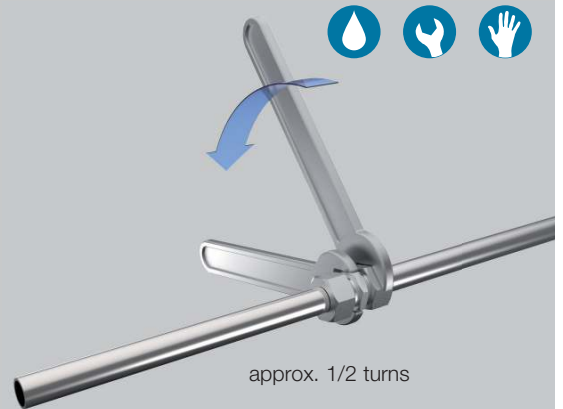
6.2 Insert the pre-assembled tube end carefully into the coupling connecting piece. Then turn the union nut until it is hand-tight.

6.3 Use a spanner to tighten the union nut until there is a noticeable force increase.

6.4 Tighten up further by approximately **1/2 turns**.

Attention!

When finally tightening up the coupling connecting piece, always hold it in a spanner or clamp it in a vise.



7

Repeat assembly

For repeat assembly, the union nut must be tightened by using the same force as for the original assembly.



Assembly instructions for 2S *plus* tube couplings

1

Notes

Before starting the assembly work, read the general notes in the latest VOSS catalogue and check that your assembly instructions are up to date.

These assembly instructions describe the possible assembly options provided for in the German standard DIN 3859 Part 2.

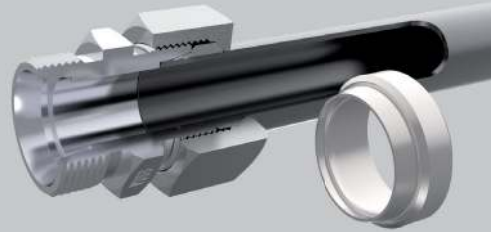
We recommend that VOSS pre-assembly devices and tools are used for assembly at all times.

Note on the use of the 2S *plus* with stainless steel tubes:

- Assembly procedure is always the same as for normal steel tubes.
- MPE assembly paste must be used instead of assembly oil.
- It is not possible to cut and raise as much material of stainless-steel tubes as on normal steel tubes. However, a certain amount of raised material must be visible.

Attention!

Please note the recommendation on the use of tube supports for thin-walled steel tubes and soft tubes made of non-ferrous metals



2

Tube preparation

2.1 The minimum dimensions of the straight tube ends must be taken account for determining the tube lengths.

Series	Tube OD [mm]	H [mm]	L [mm]
L	6/8	31	39
L	10/12	33	42
L	15	36	45
L	18	38	48
L	22/28	42	53
L	35/42	48	60

Series	Tube OD [mm]	H [mm]	L [mm]
S	6/8	35	44
S	10/12	37	47
S	14/16	43	54
S	20	50	63
S	25	54	68
S	30	58	72
S	38	65	82

With machine pre-assembly, the minimum lengths are contained in the respective operating instructions of the pre-assembly devices.



2S plus

2.2 Saw tube off at right angles. An angle tolerance of $\pm 1^\circ$ is permissible. Do not use a rotary grinder or tube cutter.

2.3 Slightly deburr tube ends inside and outside. Clean the tube.

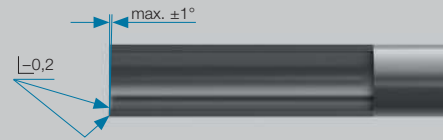
Attention!

If tubes are not cut off squarely or are not properly deburred, this may reduce the service life and leak-tightness of the couplings.

2.4 Assembly of VOSS reinforcing sleeves

1. Lubricate the outside surface the sleeve lightly using lubricant (e.g. using mineral-oil based hydraulic fluid HLP32). Then insert the sleeve into the tube up to the knurled section.

2. Use a hammer (plastic or hard rubber) to drive the sleeve in totally. In doing so, the knurled section is pressed against the inner wall of the tube and prevents the sleeve from being displayed or falling out.



Sleeve inserted



Sleeve driven in firmly

Series	Tube OD [mm]	Wall thickness [mm]						
		0.5	0.75	1	1.5	2	2.5	3
L	6	•	•					
L	8	•	•					
L	10	•	•					
L	12	•	•	•				
L	15	•	•	•				
L	18	•	•	•	•			
L	22	•	•	•	•	•		
L	28	•	•	•	•	•		
L	35	•	•	•	•	•	•	
L	42	•	•	•	•	•	•	
S	6	•	•					
S	8	•	•					
S	10	•	•					
S	12	•	•	•				
S	14	•	•	•				
S	16	•	•	•	•			
S	20	•	•	•	•	•		
S	25	•	•	•	•	•		
S	30	•	•	•	•	•	•	
S	38	•	•	•	•	•	•	•

2S plus

3

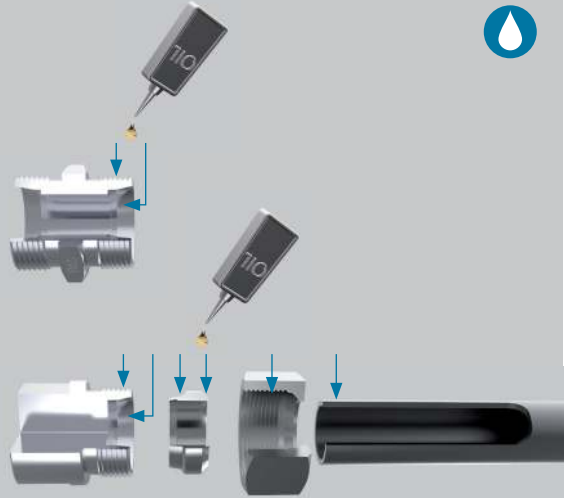
Assembly preparation

3.1 Lubricate the thread, the cutting ring, the tube end and the taper of the coupling connecting piece and/or of the manual pre-assembly stud lightly (e.g. using mineral-oil based hydraulic fluid HLP32).

3.2 Put the union nut and the 2S plus cutting ring on the tube end, one after the other. The cutting edges of the 2S plus cutting ring point towards the tube end.

Attention!

Make sure that the 2S plus cutting ring is in the right position.



4

Assembly instructions

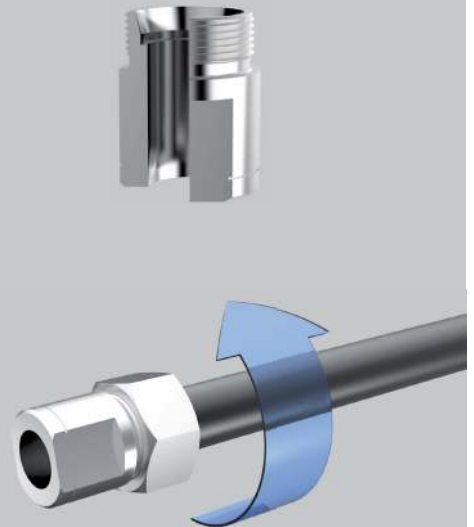
VOSS 2S plus cutting rings can be pre-assembled directly in the coupling connecting piece or using a hardened pre-assembly stud.

Hardened pre-assembly studs are wear-resistant, thus achieving consistent pre-assembly results. They have to be checked after approx. every 50 pre-assemblies for trueness of gauge.

Attention!

Pre-assembly studs that are not true to gauge or that are damaged in the tapered section must be replaced on all accounts. When mounting these directly in the coupling connecting piece, this may be used only once for pre-assembly.

All specified assembly distances must be adhered to. Otherwise there is a danger that the coupling will leak or that the tube will tear out of the coupling.



2S plus

4.1 Insert the tube end into the 24° taper as far as it will go and press on it. The tube must be held in as far as it will go during the entire assembly process in order to avoid faulty assembly.

4.2 Turn the union nut until it is hand-tight.

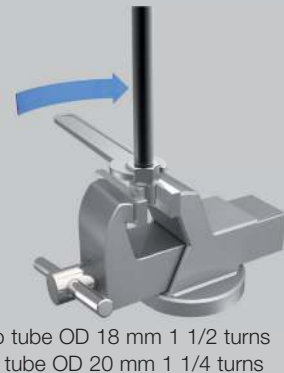
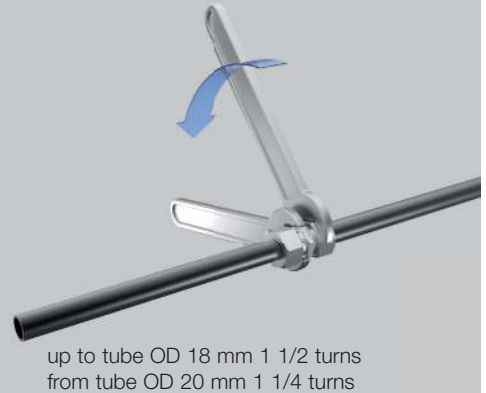
4.3 Use a spanner to tighten the union nut.

■ up to tube OD 18 mm
1 1/2 turns

■ from tube OD 20 mm
1 1/4 turns

Notes:

When installing couplings in piping systems, always hold the coupling connecting piece in a spanner. Marking a stroke on the union nut and the tube makes it easier to achieve the correct number of turns.



5

Check results

Unscrew the union nut and check how much material has been pushed up. The raised material must cover about 80% of the cutting-edge face (raised material must be visible on all accounts when stainless-steel tubes are used).

In this position, it is still permissible for the cutting ring to turn on the tube. Any dirt must be removed.

Attention!

If not enough tube material has been raised, the procedure must be repeated by using more force. The result must be rechecked.

Note:

We recommend the use of the VOSS gauge to check the correct axial position of the cutting ring.



Approx. 80% material raised (on stainless-steel tubes: raised material must be visible)



6

Final assembly

6.1 Lubricate the thread, the pre-assembled tube end and the taper of the coupling connecting piece lightly (e.g. using mineral-oil based hydraulic fluid HLP32).

6.2 Insert the pre-assembled tube end carefully into the coupling connecting piece. Then turn the union nut until it is hand-tight.

Attention!

If the cutting ring was pre-assembled in the coupling connecting piece, the same coupling connecting piece used to pre-assemble the tube and cutting ring must be used again for the final assembly.

6.3 Use a spanner to tighten the union nut until there is a noticeable force increase

6.4 Tighten up further by approximately **1/4 turns**.

Attention!

When finally tightening up the coupling connecting piece, always hold it in a spanner or clamp it in a vise.



7

Repeat assembly

For repeat assembly, the union nut must be tightened using the same force as for the original assembly.



Assembly instructions for ES-4 tube couplings

1 Notes

Before starting the assembly work, read the general notes in the latest VOSS catalogue and check that your assembly instructions are up to date


These assembly instructions describe the possible assembly options provided for in the German standard DIN 3859 Part 2.

We recommend that VOSS pre-assembly devices and tools are used for assembly at all times.

For use with steel tubes in accordance with VOSS specifications (see introduction to assembly instructions).

Attention!
Please note the recommendation on the use of tube supports for thin-walled steel tubes and soft tubes made of non-ferrous metals.

This cutting ring is not suitable for stainless-steel tube assemblies. For these, cutting rings of types 2S *plus*, 2SVA or ES-4VA must be used!




2 Tube preparation

2.1 The minimum dimensions of the straight tube ends must be taken into account for determining the tube lengths.

Series	Tube OD [mm]	H [mm]	L [mm]
L	6/8	31	39
L	10/12	33	42
L	15	36	45
L	18	38	48
L	22/28	42	53
L	35/42	48	60

Series	Tube OD [mm]	H [mm]	L [mm]
S	6/8	35	44
S	10/12	37	47
S	14/16	43	54
S	20	50	63
S	25	54	68
S	30	58	72
S	38	65	82

With machine pre-assembly, the minimum lengths are contained in the respective operating instructions of the pre-assembly devices.



ES-4

2.2 Saw tube off at right angles. An angle tolerance of $\pm 1^\circ$ is permissible. Do not use a rotary grinder or tube cutter.

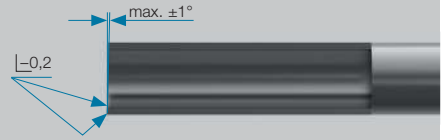
2.3 Slightly deburr tube ends inside and outside. Clean the tube.

Attention!

If tubes are not cut off squarely or are not properly deburred, this may reduce the service life and leak-tightness of the couplings. Burrs on the tube outer diameter can damage the inner O-ring.

2.4 Assembly of VOSS reinforcing sleeves

1. Lubricate the outside surface of the sleeve lightly (e.g. using mineral-oil based hydraulic fluid HLP32). Then insert the sleeve into the tube up to the knurled section.
2. Use a hammer (plastic or hard rubber) to drive the sleeve in totally. In doing so, the knurled section is pressed against the inner wall of the tube and prevents the sleeve from being displaced or from falling out.



Series	Tube OD [mm]	Wall thickness [mm]						
		0.5	0.75	1	1.5	2	2.5	3
L	6	•	•					
L	8	•	•					
L	10	•	•					
L	12	•	•	•				
L	15	•	•	•				
L	18	•	•	•	•			
L	22	•	•	•	•	•		
L	28	•	•	•	•	•	•	
L	35	•	•	•	•	•	•	•
L	42	•	•	•	•	•	•	•
S	6	•	•					
S	8	•	•					
S	10	•	•					
S	12	•	•	•				
S	14	•	•	•				
S	16	•	•	•	•			
S	20	•	•	•	•	•		
S	25	•	•	•	•	•	•	
S	30	•	•	•	•	•	•	•
S	38	•	•	•	•	•	•	•

ES-4

3

Assembly preparation

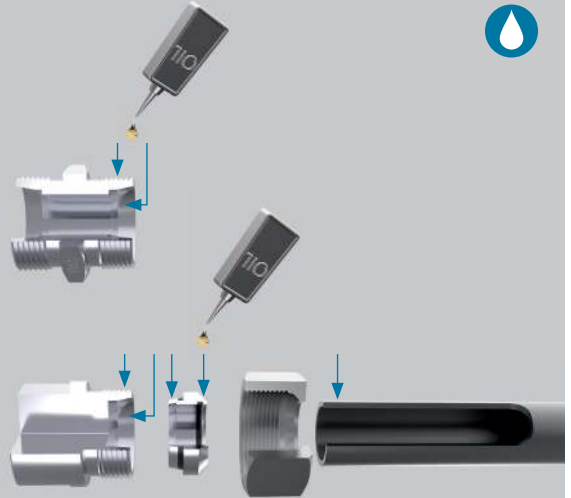
3.1 Lubricate the thread, the cutting ring, the tube end and the taper of the coupling connecting piece and/or of the manual pre-assembly stud lightly (e.g. using mineral-oil based hydraulic fluid HLP32).

Wetting the tube end with lubricant makes it easier to push the ES-4 cutting ring onto the tube.

3.2 Put the union nut and the ES-4 cutting ring on the tube end, one after the other. The cutting edges of the ES-4 cutting ring point towards the tube end.

Attention!

Make sure that the ES-4 cutting ring is in the right position.



4

Assembly instructions

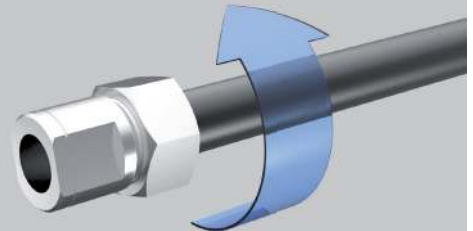
VOSS ES-4 cutting rings can be pre-assembled directly in the coupling connecting piece or using a hardened pre-assembly die.

Hardened pre-assembly dies are wear-resistant, thus achieving consistent pre-assembly results. They have to be checked after approx. every 50 pre-assemblies for trueness of gauge.

Attention!

Pre-assembly studs that are not true to gauge or that are damaged in the tapered section must be replaced on all accounts. When mounting them directly in the coupling connecting piece, this may be used only once for pre-assembly.

All specified assembly distances must be adhered to. Otherwise there is a danger that the coupling will leak or that the tube will tear out of the coupling.



7

ES-4

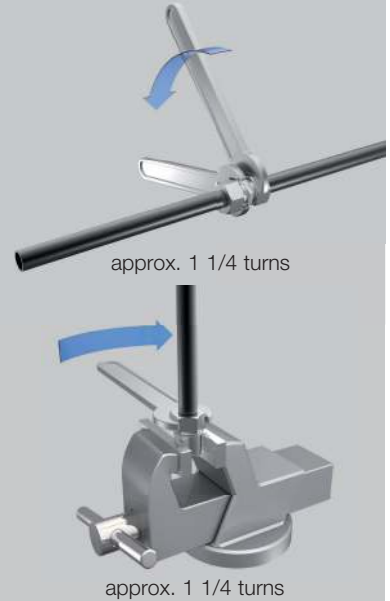
4.1 Insert the tube end into the 24° taper as far as it will go and press on it. The tube must be held in as far as it will go during the entire assembly process in order to avoid faulty assembly.

4.2 Turn the union nut until it is hand-tight.

4.3 Tighten the union nut by approx. **1 1/4 turns** (min. 1 to max. 1 1/2 turns). This pushes the ES-4 cutting ring against the end face of the stud.

Notes:

When installing couplings in piping systems, always hold the coupling connecting piece in a spanner. Marking a stroke on the union nut and the tube makes it easier to achieve the correct number of turns.



5

Check results

5.1 Unscrew the union nut, check the moulded seal, gap width and how much material has been pushed up. It is not possible to cut and raise as much material of stainless-steel tubes as on normal steel tubes. However, a certain amount of raised material must be visible.

In this position, it is still permissible for the cutting ring to turn on the tube.

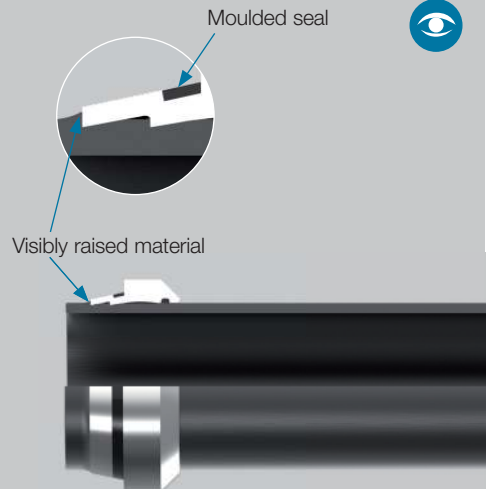
Attention!

The moulded seal must be undamaged. Remove possible soiling and replace the moulded seal if necessary.

If an inadequate amount of material is raised, repeat assembly with a higher torque. The results must be re-checked!

Note:

We recommend the use of the VOSS gauge to check the correct axial position of the cutting ring.



ES-4

6

Final assembly

6.1 Lubricate the thread, the pre-assembled tube end and the taper of the coupling connecting piece lightly (e.g. using mineral-oil based hydraulic fluid HLP32).

6.2 Insert the pre-assembled tube end carefully into the coupling connecting piece, making sure that the moulded seal is not damaged and is seated in the seal groove correctly. Then turn the union nut until it is hand-tight.

Attention!

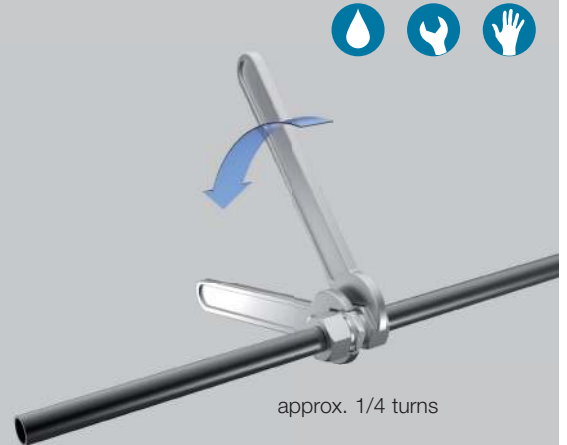
If the cutting ring was pre-assembled in the coupling connecting piece, the same coupling connecting piece used to pre-assemble the tube and cutting ring must be used again for final assembly.

6.3 Use a spanner to tighten the union nut until there is a noticeable force increase.

6.4 Tighten up further by approximately **1/4 turns**.

Attention!

When finally tightening up the coupling connecting piece, always hold it in a spanner or clamp it in a vise.



7

Repeat assembly

7.1 Each time the tube coupling is unscrewed, the moulded seal must be checked for damage and replaced if necessary.

7.2 For repeat assembly, the union nut must be tightened again with the same amount of force as during initial assembly.



7

Assembly instructions for ES-4VA tube couplings

1

Notes

Before starting the assembly work, read the general notes in the latest VOSS catalogue and check that your assembly instructions are up to date.

Toughened tools must be used to pre-assemble ES-4VA cutting rings.

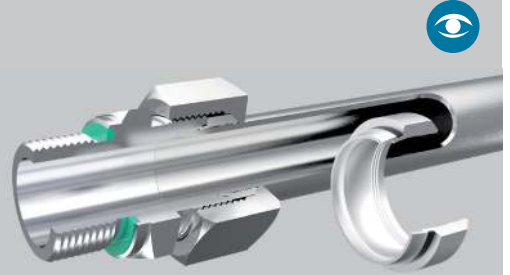
These assembly instructions describe the pre-assembly in hardened pre-assembly studs.

We recommend that VOSS pre-assembly devices and tools are used for assembly at all times.

For use with stainless-steel tubes in accordance with VOSS specifications (see introduction to assembly instructions).

Attention!

Please note the recommendation on the use of tube supports made of material 1.4571 for thin-walled steel tubes.



2

Tube preparation

2.1 The minimum dimensions of the straight tube ends must be taken into account for determining the tube lengths.

Series	Tube OD [mm]	H [mm]	L [mm]
L	6/8	31	39
L	10/12	33	42
L	15	36	45
L	18	38	48
L	22/28	42	53
L	35/42	48	60

Series	Tube OD [mm]	H [mm]	L [mm]
S	6/8	35	44
S	10/12	37	47
S	14/16	43	54
S	20	50	63
S	25	54	68
S	30	58	72
S	38	65	82

With machine pre-assembly, the minimum lengths are contained in the respective operating instructions of the pre-assembly devices.



ES-4VA

2.2 Saw tube off at right angles. An angle tolerance of $\pm 1^\circ$ is permissible. Do not use a rotary grinder or tube.

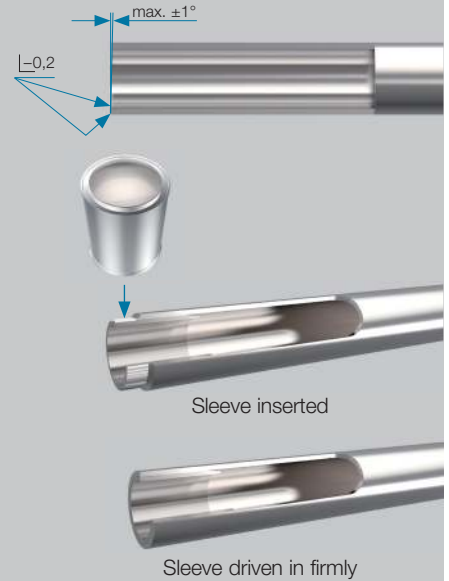
2.3 Slightly deburr tube ends inside and outside. Clean the tube.

Attention!

If tubes are not cut off squarely or are not properly deburred, this may reduce the service life and leak-tightness of the couplings.

2.4 Assembly of VOSS reinforcing sleeves

1. Lubricate the outside surface of the sleeve lightly using assembly paste (e.g. MPE assembly paste). Then insert the sleeve into the tube up to the knurled section.
2. Use a hammer (plastic or hard rubber) to drive the sleeve in totally. In doing so, the knurled section is pressed against the inner wall of the tube and prevents the sleeve from being displaced or falling out.



Series	Tube OD [mm]	Wall thickness [mm]						
		0.5	0.75	1	1.5	2	2.5	3
L	6	•	•					
L	8	•	•					
L	10	•	•					
L	12	•	•	•				
L	15	•	•	•				
L	18	•	•	•	•			
L	22	•	•	•	•	•		
L	28	•	•	•	•	•		
L	35	•	•	•	•	•	•	
L	42	•	•	•	•	•	•	
S	6	•	•					
S	8	•	•					
S	10	•	•					
S	12	•	•	•				
S	14	•	•	•				
S	16	•	•	•	•			
S	20	•	•	•	•	•		
S	25	•	•	•	•	•		
S	30	•	•	•	•	•	•	
S	38	•	•	•	•	•	•	•

ES-4VA

3

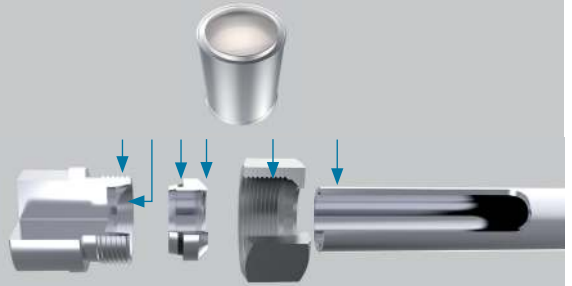
Assembly preparation

3.1 To ensure correct pre-assembly, lubricate the pre-assembly stud, tube end, cutting ring, union nut and the cone surface with assembly paste (e.g. MPE assembly paste).

3.2 Push the union nut and the ES-4VA cutting ring onto the tube end.

Attention!

Make sure that the ES-4VA cutting ring is in the right position.



4

Assembly instructions

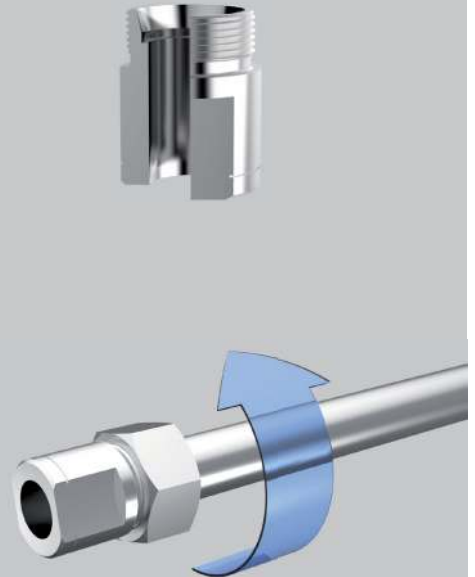
Hardened pre-assembly studs are wear-resistant, thus achieving consistent pre-assembly results. They have to be checked after approx. every 50 pre-assemblies for trueness of gauge.

Attention!

Pre-assembly studs that are not true to gauge or that are damaged in the taper section must be replaced immediately. All specified assembly distances must be adhered to. Otherwise there is a danger that the coupling will leak or that the tube will tear out of the coupling.

4.1 Insert the tube end into the 24° taper as far as it will go and press on it. The tube must be held in as far as it will go during the entire assembly process in order to avoid faulty assembly.

4.2 Push the pre-assembled tube end into the taper of the hardened manual pre-assembly die and turn the union nut until it is hand-tight.

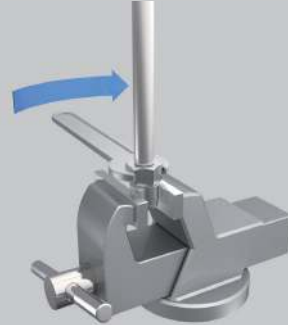


ES-4VA

4.3 Tighten union nut with approx. **1 1/4 turns** (min. 1 to max. 1 1/2 turns). This pushes the ES-4 cutting ring against the end face of the stud.

Note:

Marking a stroke on the union nut and the tube makes it easier to achieve the correct number of turns.



approx. 1 1/4 turns

5

Check results

5.1 Unscrew the union nut, check the moulded seal, gap width and how much material has been pushed up. It is not possible to cut and raise as much material of stainless-steel tubes as on normal steel tubes. However, a certain amount of raised material must be visible.

In this position, it is still permissible for the cutting ring to turn on the tube.

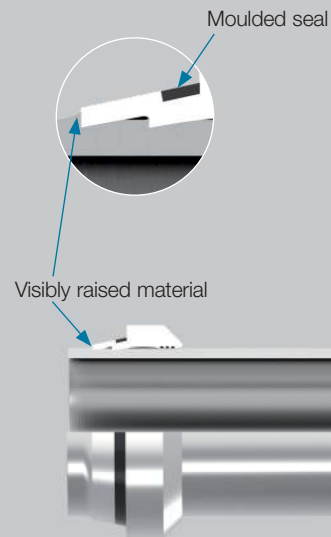
Attention!

The moulded seal must be undamaged. Remove possible soiling and replace the moulded seal if necessary.

If an inadequate amount of material is raised, repeat assembly with a higher torque. The results must be re-checked!

Note:

We recommend the use of the VOSS gauge to check the correct axial position of the cutting ring.



ES-4VA

6

Final assembly

6.1 Lubricate the thread, the pre-assembled tube end, the union nut and the taper lightly with assembly paste (e.g. MPE assembly paste).

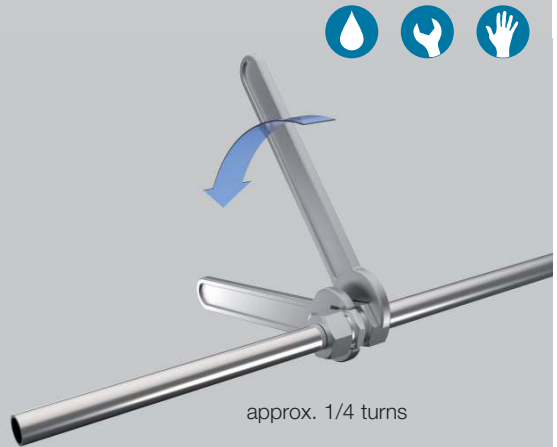
6.2 Insert the pre-assembled tube end carefully into the coupling connecting piece. When fitting the parts together, take care not to damage the moulded seal and ensure that it is seated in the seal groove correctly. Then turn the union nut until it is hand-tight.

6.3 Use a spanner to tighten the union nut until there is a noticeable force increase.

6.4 Tighten up further by approximately **1/4 turns**.

Attention!

When finally tightening up the coupling connecting piece, always hold it in a spanner or clamp it in a vise.

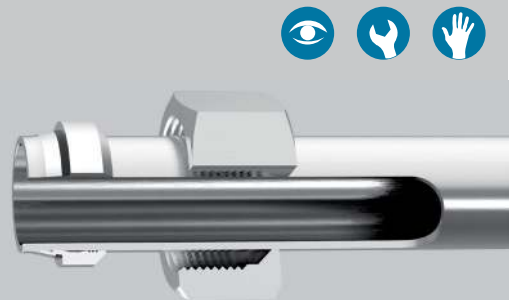


7

Repeat assembly

7.1 Each time the tube coupling is unscrewed, the moulded seal must be checked for damage and replaced if necessary.

7.2 For repeat assembly, the union nut must be tightened using the same force as for the original assembly.



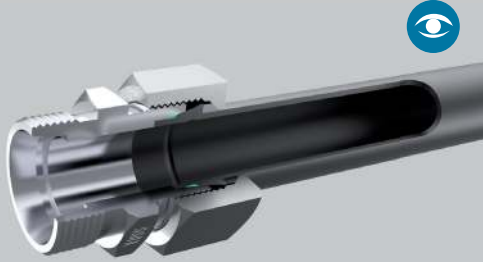
Assembly instructions for VOSSForm^{SQR} tube couplings

1 Notes

Before starting the assembly work, read and observe the general notes in the up-to-date VOSS catalogue and check that your assembly instructions are up to date.

These assembly instructions describe the tube forming and the final assembly of VOSSForm^{SQR}.

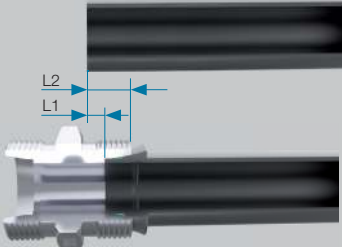
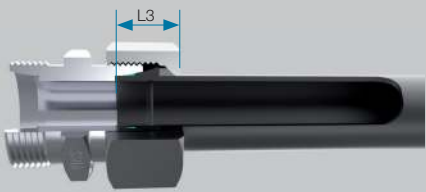
These assembly instructions are not a substitute for the detailed operating instructions of the forming device used. They only describe the basic tube preparation, forming and final assembly steps.



2 Tube preparation

2.1 When determining the tube lengths to be used, dimensions L1 and L2 have to be taken into consideration. The forming process compresses the tube and shortens it by the length L1.

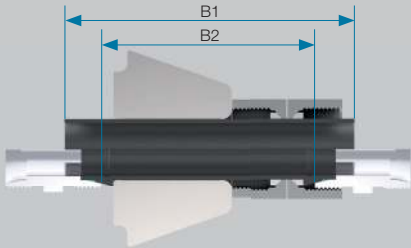
In addition, the minimum lengths A1, A2 and B1, B2 required for clamping the tube ends have to be taken into consideration.

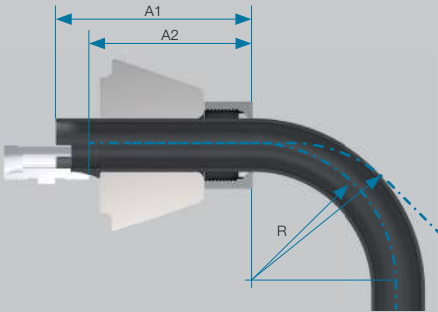
Series	Tube OD [mm]	s [mm]	L1 [mm]	L2 [mm]	L3 approx [mm]	A1 [mm]		A2 [mm]		B1 [mm]	B2 [mm]
						$\alpha \leq 45^\circ$	$\alpha \leq 90^\circ$	$Rz \leq 3 \mu m$	$Rz \leq 3 \mu m$		
L	6	1	5.6	12.6	15.5	60	69	47	56	82	56
		1.5	6.0	13.0	16.0						
		2	5.3	12.3	16.0						
L	8	1	5.0	12.0	15.5	60	64	47	51	82	56
		1.5	5.7	12.7	16.0						
		2	5.2	12.2	16.0						
		2.5	4.4	11.4	16.0						
L	10	1	5.2	12.2	15.5	60	60	47	47	83	57
		1.5	5.8	12.8	16.0						
		2	5.1	12.1	16.0						
L	12	1	5.1	12.1	15.5	60	60	47	47	83	57
		1.5	5.8	12.8	16.0						
		2	4.9	11.9	16.0						
L	15	1.5	6.0	13.0	17.5	70	70	56	56	96	68
		2	5.6	12.6	17.5						
		2.5	5.3	12.3	17.5						
L	18	1.5	5.9	13.4	18.5	75	75	61	61	101	73
		2	5.3	12.8	18.5						
		2.5	5.1	12.6	18.5						
		3	5.1	12.6	18.5						
L	22	1.5	6.5	14.0	20.0	85	85	70	70	113	83
		2	5.6	13.1	20.0						
		2.5	5.4	12.9	20.0						
		3	5.3	12.8	20.0						
L	28	2	5.6	13.1	20.0	93	93	79	79	120	92
		2.5	5.4	12.9	20.0						
		3	5.5	13.0	20.0						
L	35	2	7.6	18.1	24.0	107	107	87	87	142	102
		2.5	7.0	17.5	24.0						
		3	7.5	18.0	25.0						
		4	7.2	17.7	25.0						
L	42	2	7.6	18.6	24.5	117	117	97	97	152	112
		2.5	7.0	18.0	24.5						
		3	7.4	18.4	25.5						
		4	7.0	18.0	25.5						

7

Minimum lengths for clamping in straight tubes.

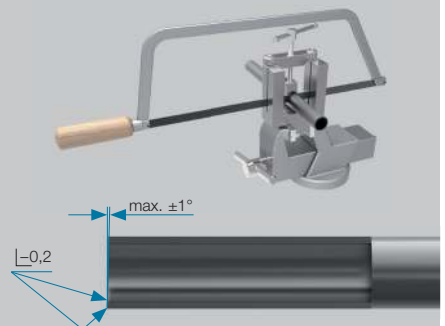


Minimum lengths for clamping in curved tubes ($R \geq 3x$ Tube OD).



Series	Tube OD [mm]	s [mm]	L1 [mm]	L2 [mm]	L3 approx. [mm]	A1 [mm]		A2 [mm]		B1 [mm]	B2 [mm]
						$R \geq 3x DN$	$\alpha \leq 90^\circ$	$R \geq 3x DN$	$\alpha \leq 90^\circ$		
S	6	1	5.6	12.6	16.0	62	69	49	56	85	59
		1.5	6.0	13.0	16.5						
		2	5.3	12.3	16.5						
S	8	1	5.0	12.0	16.0	62	64	49	51	85	59
		1.5	5.7	12.7	16.5						
		2	5.2	12.2	16.5						
		2.5	4.4	11.4	16.5						
S	10	1.5	6.5	14.0	18.5	64	64	50	50	90	62
		2	5.9	13.4	18.5						
		2.5	5.2	12.7	18.5						
S	12	1.5	6.4	13.9	18.5	64	64	50	50	90	62
		2	5.7	13.2	18.5						
		2.5	5.2	12.7	18.5						
		3	4.9	12.4	18.5						
S	14	1.5	6.7	14.7	20.5	72	72	57	57	101	71
		2	6.3	14.3	20.5						
		2.5	5.8	13.8	20.5						
		3	5.7	13.7	20.5						
S	16	1.5	6.9	15.4	21.0	77	77	61	61	107	75
		2	6.1	14.6	21.0						
		2.5	5.7	14.2	21.0						
		3	5.5	14.0	21.0						
		4	5.2	13.7	21.5						
S	20	2	8.1	18.6	25.0	88	88	69	69	122	84
		2.5	7.2	17.7	25.0						
		3	6.8	17.3	25.0						
		3.5	6.6	17.1	25.0						
		4	6.4	16.9	25.0						
S	25	2	7.7	19.7	28.0	103	103	82	82	140	98
		2.5	7.3	19.3	28.0						
		3	7.0	19.0	28.0						
		4	6.6	18.6	28.0						
S	30	2	7.9	21.4	30.5	114	114	92	92	155	111
		2.5	7.3	20.8	30.5						
		3	8.1	21.6	31.5						
		4	7.6	21.1	31.5						
		5	7.3	20.8	31.5						
		6	7.0	20.5	32.0						
S	38	2.5	10.4	26.4	34.5	134	134	108	108	180	128
		3	9.1	25.1	34.5						
		4	9.2	25.2	35.5						
		5	9.1	25.1	35.5						
		6	9.0	25.0	35.5						
		6	9.0	25.0	35.5						
		7	9.0	25.0	36.0						

2.2 Cut tubes at right angles. An angle tolerance of $\pm 1^\circ$ is permissible. Do not use tube cutters or angle grinders to cut tubes.



2.3 Slightly deburr tube ends inside and outside.
Clean the tube.

Attention!

Burrs on the outer and inner edges of the tube end can impair the forming process. Tubes which are not cut off squarely and correctly deburred reduce the service life and leak-tightness of the couplings.



3

Lubricating tools and steel tubes

After every tool change and after roughly 100 forming procedures, the outer surfaces of the clamping jaws at the tapered section should be lightly lubricated using hydraulic fluid or a non-resinous lubricant containing MoS₂.

Attention!

Ensure that no oil is applied to the teeth of the clamping jaw, otherwise the gripping function may be impaired.

Lubricating phosphate-treated steel tubes:

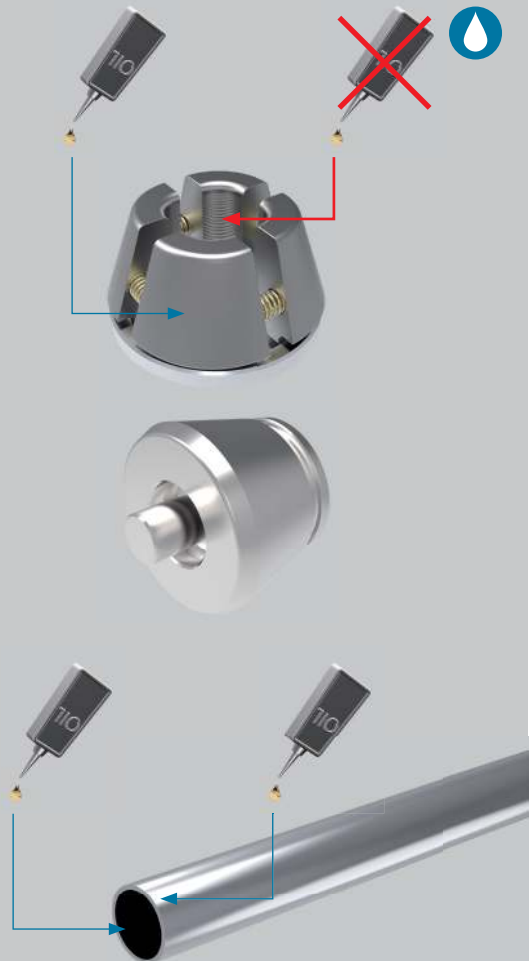
in order to reduce tool wear, on every tenth tube being processed, apply a thin film of hydraulic fluid to the internal and external surfaces of the tube section to be formed.

Lubricating zinc-plated steel tubes:

in order to reduce tool wear, on every tenth tube being processed, apply a thin film of hydraulic fluid to the internal and external surfaces of the tube section to be formed.

Attention!

If the lubricant film on the outer perimeter of the tubing is too thick, it will be trapped by the forming process and lead to inaccurate contours.



4

Notes on tube forming

4.1 Prepare the tube forming device as described in the operating instructions and insert the tools.

4.2 Push the SQR-function nut onto the prepared tube end.

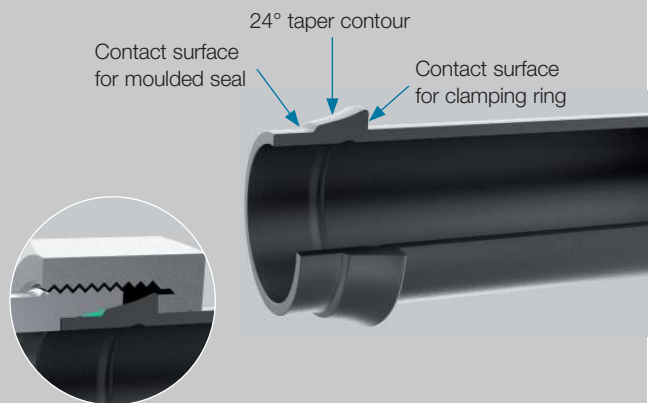
4.3 Form the tube as described in the operating instructions.



5

Check the results

It is adequate to visually inspect the quality of the three characteristic VOSSForm^{SQR} features.



VOSSForm^{SQR}

6

Final assembly

6.1 Install the moulded seal, ensuring that it is not twisted or damaged.

Push the pre-assembled tube end straight into the taper of the coupling connecting piece.

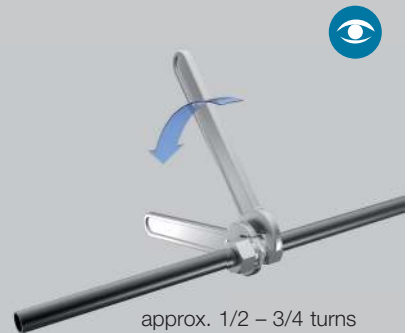
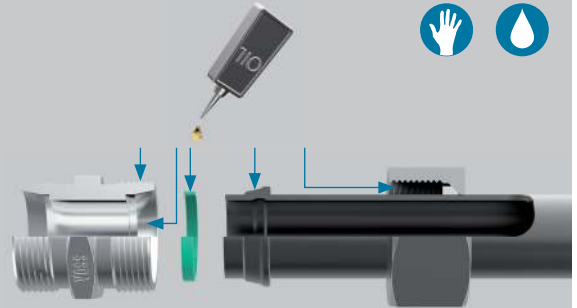
6.2 Lubricate the threads, the formed tube end and the moulded seal lightly (e.g. using mineral-oil based hydraulic fluid HLP32).

6.3 Turn union nut until it is hand-tight.

To achieve the final tightening torque, turn the SQR special function nut by approx. **1/2 to 3/4 of a turn**.

If the coupling is being installed on an already-installed piping system, hold the coupling connecting piece with a spanner when tightening the coupling.

Marking a stroke on the SQR special function nut and the tube makes it easier to achieve the correct number of turns when tightening the coupling.



7

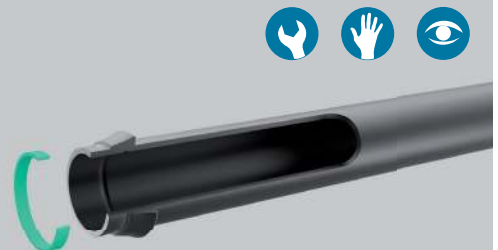
Re-assembly of couplings

7.1 Every time the coupling is taken apart, the moulded seal must be checked for damage and, if necessary, replaced.

7.2 For the second and all ensuing re-assembly processes, the SQR-function nut must be tightened by only **1/4 to 1/2 turns** after it has been hand-tightened.

Attention!

fore re-assembling the coupling, the 24° taper contour, the moulded seal contact surfaces and the clamping ring must be checked for damage (see 5: Checking results)



8

Tightening torques

8.1 As an alternative to achieving pre-assembly and final assembly states by distance dependent assembly, the tightening torques can be applied directly. The stated tightening torques are guideline values which have been determined under the following conditions:

- tube specifications as given in the general notes
- VOSS coat surface finish on all coupling components, and additional wax coating on the SQR-function nut.

Series	Tube OD [mm]	Tightening torque in Nm ± 5 %
L	6	20
L	8	30
L	10	40
L	12	50
L	15	70
L	18	90
L	22	120
L	28	160
L	35	250
L	42	380
S	6	25
S	8	40
S	10	50
S	12	60
S	14	75
S	16	85
S	20	140
S	25	190
S	30	270
S	38	400

Assembly instructions for VOSSForm^{SQR}VA tube couplings

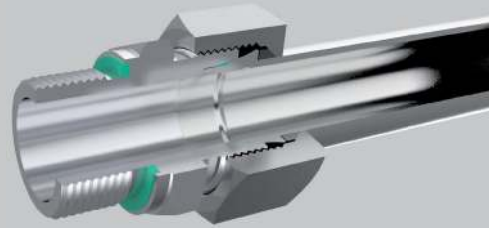
1

Notes

Before starting the assembly work, read and observe the general notes in the up-to-date VOSS catalogue and check that your assembly instructions are up to date.

These assembly instructions describe the tube forming and the final assembly of VOSSForm^{SQR}VA.

These assembly instructions are not a substitute for the detailed operating instructions of the forming device used. They only describe the basic tube preparation, forming and final assembly steps.

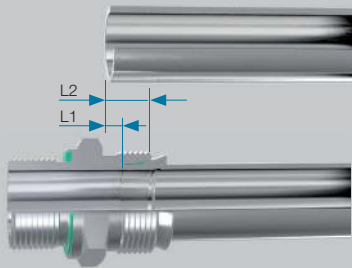


2

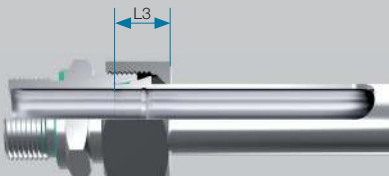
Tube preparation

2.1 When determining the tube lengths to be used, dimensions L1 and L2 have to be taken into consideration. The forming process compresses the tube and shortens it by the length L1.

In addition, the minimum lengths A1, A2 and B1, B2 required for clamping the tube ends have to be taken into consideration.

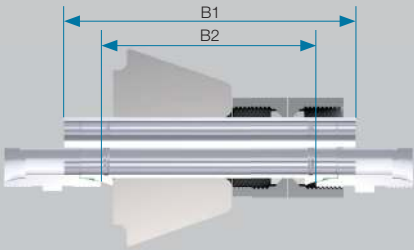


Height of the completely assembled VOSSForm^{SQR}VA connection.

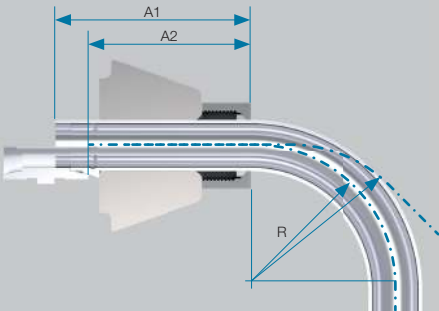


Series	Tube OD [mm]	s [mm]	L1 [mm]	L2 [mm]	L3 approx. [mm]	A1 [mm]		A2 [mm]		B1 [mm]	B2 [mm]
						Rz:3xDN α≤45°	Rz:3xDN α≤90°	Rz:3xDN α≤45°	Rz:3xDN α≤90°		
L	6	1	5.6	12.6	15.5	60	69	47	56	82	56
		1.5	6.1	13.1	16.0						
		2	5.5	12.5	16.0						
L	8	1	5.5	12.5	15.5	60	64	47	51	82	56
		1.5	5.7	12.7	16.0						
		2	5.2	12.2	16.0						
L	10	1	5.8	12.8	15.5	60	60	47	47	83	57
		1.5	6.0	13.0	16.0						
		2	5.2	12.2	16.0						
L	12	1	5.9	12.9	15.5	60	60	47	47	83	57
		1.5	5.7	12.7	16.0						
		2	5.1	12.1	16.0						
L	15	1.5	6.5	13.5	17.5	70	70	56	56	96	68
		2	5.8	12.8	17.5						
		2.5	5.6	12.6	17.5						
L	18	1.5	6.7	14.2	18.5	75	75	61	61	101	73
		2	5.8	13.3	18.5						
		2.5	5.5	13.0	18.5						
L	22	1.5	7.1	14.6	20.0	85	85	70	70	113	83
		2	6.6	14.1	20.0						
		2.5	6.2	13.7	19.5						
L	28	2	6.7	14.2	19.5	93	93	79	79	120	92
		2.5	6.2	13.7	19.5						
		3	6.3	13.8	19.5						
L	35	2	9.0	19.5	24.0	107	107	87	87	142	102
		2.5	8.1	18.6	24.0						
		3	8.6	19.1	25.0						
L	42	2	8.4	19.4	24.5	117	117	97	97	152	112
		2.5	8.4	19.4	24.5						
		3	8.6	19.6	25.5						

Minimum lengths for clamping in straight tubes.

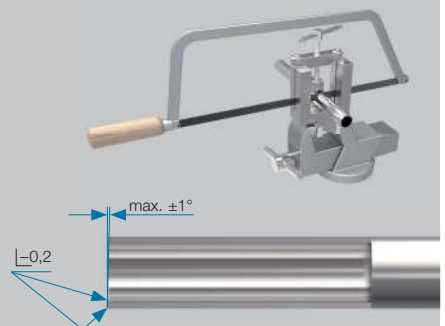


Minimum lengths for clamping in curved tubes ($R \geq 3x$ Tube OD).



Series	Tube OD [mm]	s [mm]	L1 [mm]	L2 [mm]	L3 approx. [mm]	A1 [mm]		A2 [mm]		B1 [mm]	B2 [mm]
						$\alpha \leq 45^\circ$	$\alpha \leq 90^\circ$	$R \geq 3x$ DN	$\alpha \leq 90^\circ$		
S	6	1	5.6	12.6	16.0	62	69	49	56	85	59
		1.5	6.1	13.1	16.5						
		2	5.5	12.5	16.5						
S	8	1	5.5	12.5	16.0	62	64	49	51	85	59
		1.5	5.7	12.7	16.5						
		2	5.2	12.2	16.5						
		2.5	4.7	11.7	16.5						
S	10	1.5	6.7	14.2	18.5	64	64	50	50	90	62
		2	5.9	13.4	18.5						
		2.5	5.5	13.0	18.5						
S	12	1.5	6.3	13.8	18.5	64	64	50	50	90	62
		2	5.7	13.2	18.5						
		2.5	5.3	12.8	18.5						
		3	5.0	12.5	18.5						
S	14	1.5	6.7	14.7	20.5	72	72	57	57	101	71
		2	6.3	14.3	20.5						
		2.5	5.7	13.7	20.5						
		3	5.7	13.7	20.5						
S	16	1.5	7.2	15.7	21.0	77	77	61	61	107	75
		2	6.2	14.7	21.0						
		2.5	6.0	14.5	21.0						
		3	5.8	14.3	21.0						
S	20	2	8.5	19.0	25.0	88	88	69	69	122	84
		2.5	7.7	18.2	25.0						
		3	7.3	17.8	25.0						
S	25	2	8.7	20.7	28.0	103	103	82	82	140	98
		2.5	8.0	20.0	28.0						
		3	7.6	19.6	28.0						
		4	7.6	19.6	28.0						
S	30	2.5	8.1	21.6	30.5	114	114	92	92	155	111
		3	8.7	22.2	31.5						
		4	8.4	21.9	31.5						
S	38	3	10.3	26.3	34.5	134	134	108	108	180	128
		4	10.2	26.2	35.5						
		5	9.8	25.8	35.5						

2.2 Cut off stainless-steel tubing at right angles. An angle tolerance of $\pm 1^\circ$ is permissible. Do not use tube cutters or angle grinders to cut tubes.



VOSSForm^{SQR}VA

2.3 Slightly deburr tube ends inside and outside.
Clean the tube.

Attention!

Burrs on the outer and inner edges of the tube end can impair the forming process. Tubes which are not cut off squarely and correctly deburred may reduce the service life and leak-tightness of the couplings.



3

Lubricating tools and stainless steel tubes

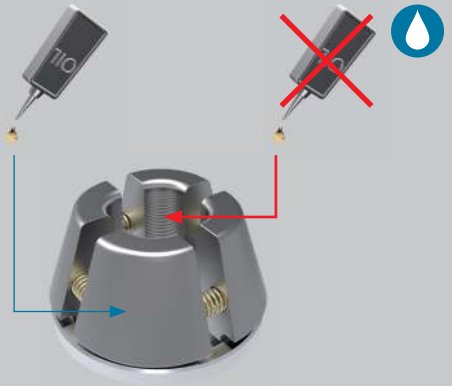
3.1 Lubricating the tools

Clamping jaws:

After every tool change and after roughly 100 forming procedures, the outer part of clamping jaw taper must be lightly lubricated using hydraulic fluid or a non-resinous lubricant containing MoS₂. VOSS recommends that separate sets of clamping jaws be used if steel and stainless steel tubes are being used both at the same time.

Attention!

Ensure that no oil is applied to the teeth of the clamping jaw, otherwise the gripping function may be impaired.

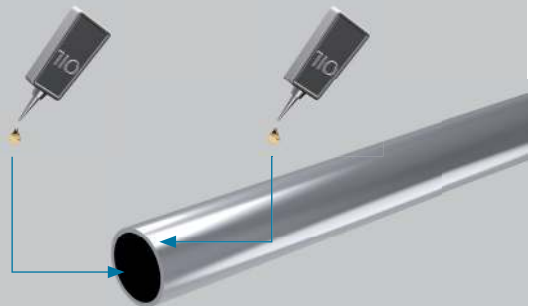


3.2 Lubricating the stainless steel tubes

To ensure fault-free forming, each tube must be lubricated on the inside and outside in the forming area with a thin film of oil. (VOSS forming oil FOE).

Attention!

If the lubricant film on the outer tubing surface is too thick, it will be trapped between the forming tool and the tube, thus leading to inaccurate contours. Always use VOSS forming oil FOE. (The use of normal hydraulic oil is not allowed).



4

Notes on tube forming

4.1 Prepare the tube forming device as described in the operating instructions and insert the tools.

4.2 Push the SQR-function nut onto the prepared tube end.

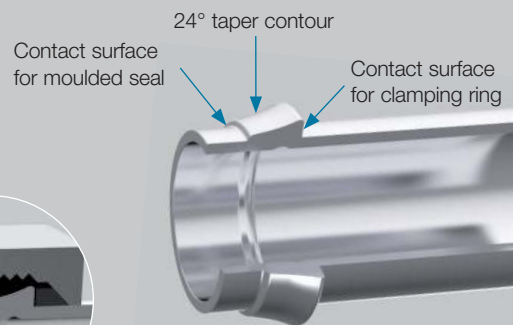
4.3 Form the tube as described in the operating instructions.



5

Checking the results

It is adequate to visually inspect the quality of the three characteristic VOSSForm^{SQR} features.



VOSSForm^{SQR}VA

6

Final assembly

6.1 Install the moulded seal, ensuring that it is not twisted or damaged.

Push the pre-assembled tube end straight into the taper of the coupling connecting piece.

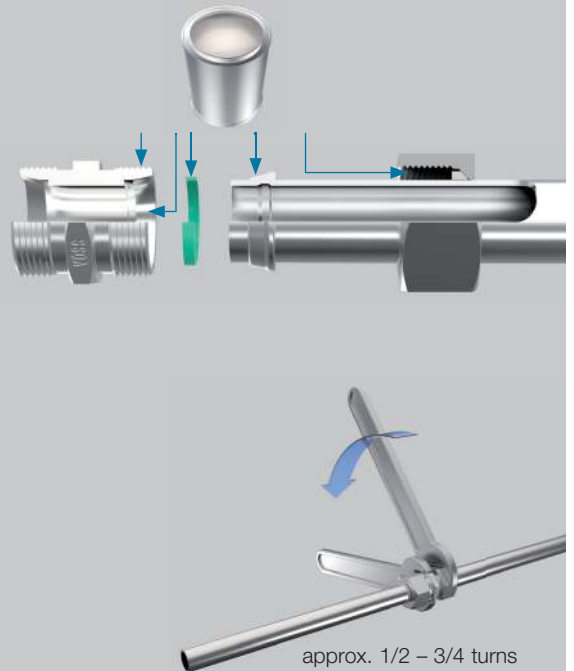
6.2 Apply a light film of assembly paste (e.g. MPE assembly paste) to the threads, the formed tube end, the SQR special function nut and the moulded seal.

6.3 Turn the SQR special function nut until it is hand-tight.

To achieve the final tightening torque, turn the SQR special function nut by approx. **1/2 to 3/4 of a turn**.

If the coupling is being installed on an already-installed piping system, hold the coupling connecting piece with a spanner when tightening the coupling.

Marking a stroke on the SQR-function nut and the tube makes it easier to achieve the correct number of turns when tightening the coupling.



7

Re-assembly of couplings

7.1 Every time the coupling is taken apart, the moulded seal must be checked for damage and, if necessary, replaced.

7.2 For second and all following re-assembly processes, the SQR-function nut must be tightened by only **1/4 to 1/2 turns** after it has been hand-tightened.

Attention!

Before re-assembling the coupling, the 24° taper contour, the moulded seal contact surfaces and the clamping ring must be checked for damage (see 5: Checking results).



7

8

Tightening torques

8.1 As an alternative to achieving pre-assembly and final assembly states by distance dependent assembly, the tightening torques are guideline values which have been determined using MPE assembly paste.

Tube specifications as given in the general notes.

Series	Tube OD [mm]	Tightening torque Nm ± 5 %
L	6	25
L	8	35
L	10	55
L	12	65
L	15	90
L	18	125
L	22	150
L	28	220
L	35	380
L	42	580
S	6	30
S	8	50
S	10	65
S	12	85
S	14	115
S	16	125
S	20	220
S	25	300
S	30	430
S	38	640

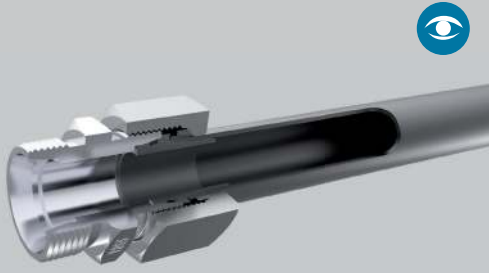
Assembly instructions for BV-10 flared couplings

1 Notes

Before starting the assembly work, read and observe the general notes in the up-to-date VOSS catalogue and check that your assembly instructions are up to date.

These assembly instructions describe pre-assembly and final assembly of BV-10 flared couplings.

Attention!
Various VOSS pre-assembly devices are available for pre-assembly of the flared cone. The specifications in the respective operating instructions apply to the assembly procedures here.




2 Tube preparation

2.1 Determine the tubing dimensions using the following table of dimensions.

Series	Tube OD[mm]	t5 [mm]	x approx. [mm]	L1 approx. [mm]	L2 approx. [mm]
L	6	7	0.8	7.8	55
L	8	7	1.1	8.1	55
L	10	7	0.5	7.5	60
L	12	7	0.5	7.5	62
L	15	7	0.5	7.5	62
L	18	7.5	1.5	9	63
L	22	7.5	1.5	9	65
L	28	7.5	1.5	9	72
L	35	10.5	2.8	13.3	75
L	42	11	3	14	75
S	8	7	2.4	9.4	55
S	10	7.5	2.4	9.9	60
S	12	7.5	2.4	9.9	60
S	14	8	3.4	11.4	65
S	16	8.5	2.5	11	65
S	20	10.5	3.5	14	70
S	25	12	3.5	15.5	75
S	30	13.5	4.5	18	75
S	38	16	5	21	78

2.2 Cut tubes at right angles. An angle tolerance of $\pm 1^\circ$ is permissible. Do not use tube cutters or angle grinders to cut tubes. Slightly deburr tube end inside and outside. Clean the tube.

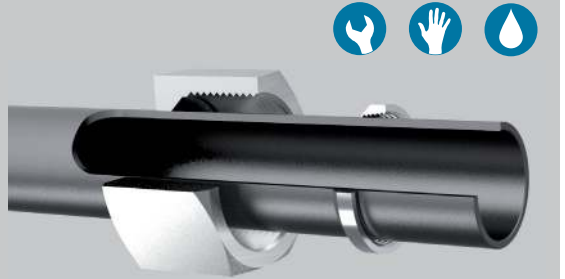


BV-10

3

Flared cone pre-assembly

3.1 Push the BV-10 union nut and the clamping ring onto the tube as shown in the diagram.



3.2 Pre-assembly principle

Only use a VOSS pre-assembly device for this process. During the pre-assembly the BV-10 flared cone is pressed into the tube.

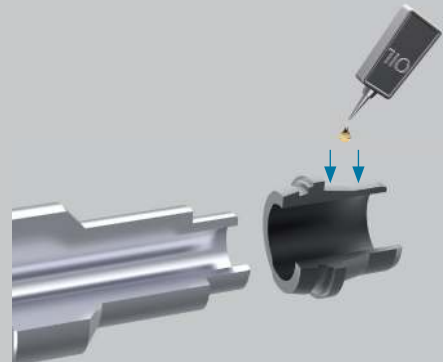
Attention!

Set up the pre-assembly device and tools as described in the corresponding operating instructions. The outer diameter and wall thickness of the tube must be observed when choosing which tools to use.



Pre-assemble the coupling as described in the operating instructions.

3.3 Apply a light film of lubricant (e.g. mineral-oil based hydraulic fluid HLP32) to toothed section and the cylindrical collar of the BV-10 flared cone and then push this onto the assembly mandrel.



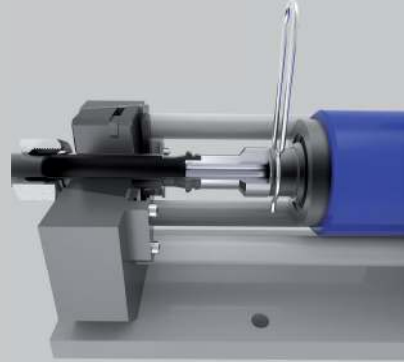
BV-10

3.4 Push the tube, with the BV-10 union nut and clamping ring on it, from the outside into the hole of the clamping jaws until it is centred on the BV-10 flared cone.

The BV-10 union nut and clamping ring must remain outside of the assembly area.

Attention!

Make sure the correct clamping jaw pressure is set. The tube must not be able to slip when the assembly process is started. Follow the relevant sections of the operating instructions for the respective pre-assembly device.

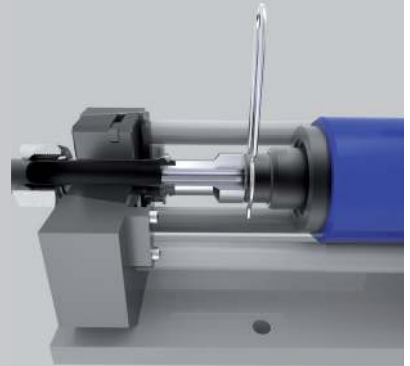


3.5 Press the BV-10 flared cone into the tube.

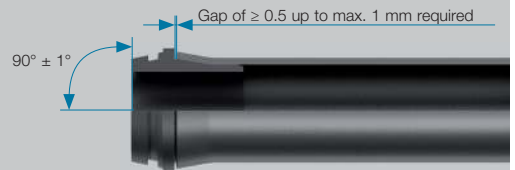
The optimum flared-cone assembly position is achieved when the remaining gap is ≥ 0.5 mm but not more than 1 mm.

Attention!

The BV-10 flared cone must not touch the flat surfaces of the tube end.



3.6 Check that the flared cone fits squarely.

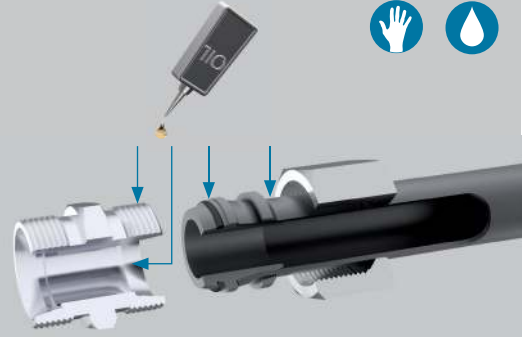


BV-10

4

Final assembly

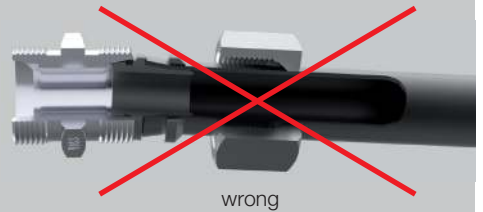
4.1 Push the O-ring on and check that it is bedded in the groove of the flared cone without being twisted. Lubricate the threads, the taper surface and the BV-10 union nut lightly (e.g. using mineral-oil based hydraulic fluid HLP32).



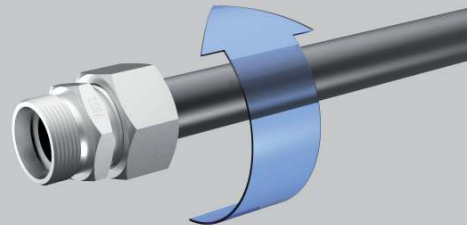
4.2 Insert the pre-assembled tube end into the cone of the coupling connecting piece at a straight angle.

Attention!

Make sure the O-ring is not damaged. Ensure a tension-free connection of the pre-assembled tube and the coupling connecting piece.



4.3 Turn the BV-10 union nut until it is hand-tight.



BV-10

4.4 Tighten up the coupling by turning the BV-10 union nut by approx. **3/4 – 1 full turns**.

If the coupling is being installed on an already-installed tubing system, hold the coupling connecting piece with a spanner when tightening the coupling.



5

Re-assembly

Each time the BV-10 flared cone is unscrewed, the O-ring must be checked for damage and replaced if necessary.

For the second and all ensuing re-assembly processes, the BV-10 union nut must be tightened by only **1/4 – 1/2 turns** after it has been hand-tightened.



Assembly instructions for taper (DKO) and weld nipple

1

Notes

Before starting the assembly work, read and observe the general notes in the up-to-date VOSS catalogue and check that your assembly instructions are up to date.

These assembly instructions describe the assembly of VOSS couplings and coupling parts with taper coupling (DKO) according to ISO-8434-1.

Attention!
When the tube coupling is being connected, the DKO coupling must always be held with a spanner to counter tightening torques.



2

Assembly of taper coupling

Assembly procedure

1. Check that the O-ring is not twisted and that is bedded correctly in the groove of the taper.
2. Lubricate the threads, the cone surface and the O-ring lightly (e.g. using mineral-oil based hydraulic fluid HLP32).
3. Keeping the taper aligned, insert it into the cone and press it in firmly.

Attention!
After this step, no further alignment correction is possible.

4. Turn the union nut until it is hand-tight.
5. Then use a spanner to finally tighten up the coupling by the required angle or number of turns.

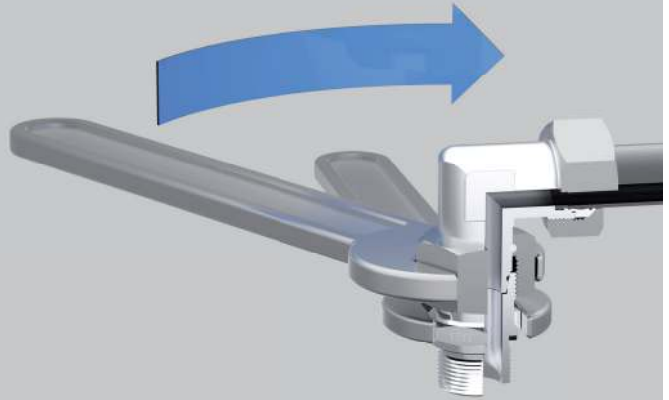
Marking a stroke on the DKO union nut and the coupling connecting piece makes it easier to achieve the correct number of turns when tightening the coupling.



DKO

Attention!

The DKO coupling must be tightened by turning the union nut, not the counter connecting piece.



3

Assembly parameters

As an alternative to achieving pre-assembly and final assembly states by distance dependent assembly, the tightening torques can be applied directly. The stated tightening torques are guideline values which have been determined under the following conditions:

Series	Tube OD [mm]	Union nut thread	Number of turns, first assembly	Number of turns, re-assembly	Tightening torque [Nm] ± 5 %
L	6	M 12 x 1.5	approx. 2/3	approx. 1/3	20
L	8	M 14 x 1.5	approx. 2/3	approx. 1/3	30
L	10	M 16 x 1.5	approx. 2/3	approx. 1/3	40
L	12	M 18 x 1.5	approx. 2/3	approx. 1/3	50
L	15	M 22 x 1.5	approx. 2/3	approx. 1/3	70
L	18	M 26 x 1.5	approx. 1/2	approx. 1/3	90
L	22	M 30 x 2	approx. 1/2	approx. 1/3	120
L	28	M 36 x 2	approx. 1/3	approx. 1/3	160
L	35	M 45 x 2	approx. 1/3	approx. 1/3	250
L	42	M 52 x 2	approx. 1/3	approx. 1/4	380
S	6	M 14 x 1.5	approx. 2/3	approx. 1/3	25
S	8	M 16 x 1.5	approx. 2/3	approx. 1/3	40
S	10	M 18 x 1.5	approx. 2/3	approx. 1/3	50
S	12	M 20 x 1.5	approx. 2/3	approx. 1/3	60
S	16	M 24 x 1.5	approx. 1/2	approx. 1/3	85
S	20	M 30 x 2	approx. 1/2	approx. 1/3	140
S	25	M 36 x 2	approx. 1/3	approx. 1/4	190
S	30	M 42 x 2	approx. 1/3	approx. 1/4	270
S	38	M 52 x 2	approx. 1/3	approx. 1/4	400

4

Assembly of weld nipple couplings

4.1 General notes

Weld nipples can be used with any tube coupling conforming to ISO 8434-1.

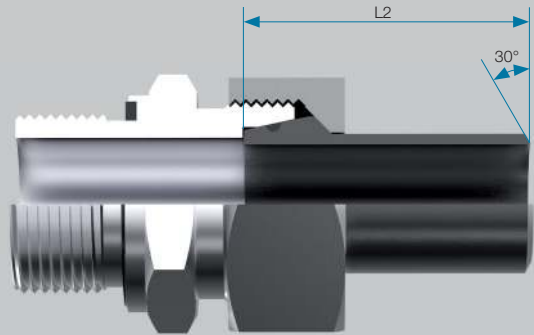
The weld nipples are phosphated and designed with a V-seam when delivered.

The weld nipples are welded on to the prepared tube end without the O-ring.

The user (installation company) is responsible for the welding work.

4.2 Determining the tube length

Series	Tube OD [mm]	L2
L	6	31.5
L	8	31.5
L	10	33.5
L	12	33.5
L	15	34.5
L	18	37
L	22	39.5
L	28	42.5
L	35	49.5
L	42	50
S	6	31.5
S	8	31.5
S	10	33.5
S	12	33.5
S	14	39.5
S	16	41
S	20	47
S	25	53.5
S	30	57
S	38	64

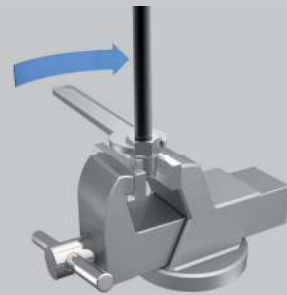
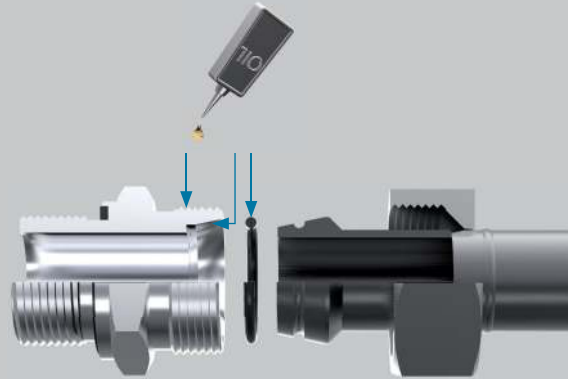


DKO

4.3 Assembly procedure

The principle of final assembly of weld nipple couplings is the same as for taper couplings.

1. Push the O-ring on and check that it is bedded in the groove of the taper without being twisted.
2. Lubricate the threads, the taper surface and the O-ring lightly (e.g. using mineral-oil based hydraulic fluid HLP32).
3. Insert the taper into the cone and press it in firmly. Turn the union nut until it is hand-tight.
4. To complete the assembly, turn the nut by approx. **1/4 turn.**



approx. 1/4 turns

Assembly instructions for flange couplings / ZAKO / ZAKO LP

1

Note

Before starting the assembly work, read and observe the general notes in the up-to-date VOSS catalogue and check that your assembly instructions are up to date.

The ZAKO flange coupling product range is designed for use in pipelines with outer diameters ranging from 16 mm to 114.3 mm. Flanges with a SAE hole pattern and square flanges can be used. For low-pressure applications, the ZAKO LP System can be used; this is available for thin-walled pipelines with tube ODs from 48.3 mm to 114.3 mm.

Different pre-assembly devices are available for the ZAKO ring assembly, depending on the tube and pipe dimensions. In each case, the descriptions given in the relevant individual operating instructions apply to the assembly procedures.



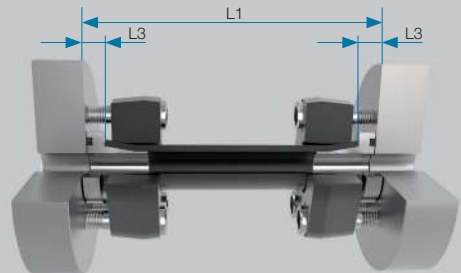
2

Tube preparation

2.1 Tube lengths for connecting flanges:

The first step in determining the required tube length is to calculate the theoretical total tube length L1. After this, the length L3 must be subtracted from the total tube length for each connection used (see table for length L3).

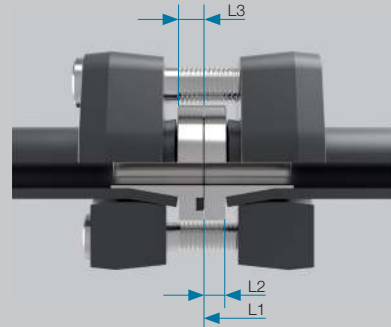
Tube OD [mm]	Connecting flange L3 approx. [mm]	Tube OD [mm]	Coupling flange L3 approx. [mm]	L2 approx. [mm]
ZAKO		ZAKO		
16	8	16	8	5.5
20	8	20	8	5.5
25	8.5	25	8.5	5.5
30	8.5	30	8.5	6
38/42	9	38	9	7
50	10	50	10	7
60	15	60	15	12
65	11	65	11	8
75	16	75	16	12
80	16	80	16	13
88	20	88	20	16
101.6	20	101.6	20	16
114.3	20	114.3	20	16
ZAKO LP		ZAKO LP		
48.3	10	48.3	10	7
60.3	15	60.3	15	12
76.1	16	76.1	16	12
88.9	20	88.9	20	16
114.3	20	114.3	20	16



ZAKO / ZAKO LP

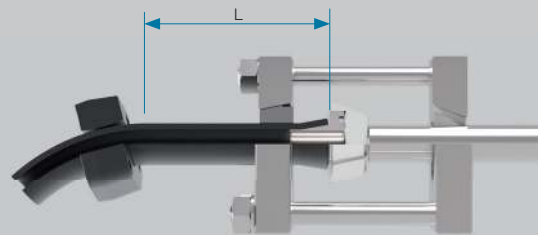
2.2 Tube lengths for coupling flanges:

To determine the tube lengths of coupling flanges the tube lengths L3 applies to the connecting surface of the ZAKO ring with O-ring. If the connecting surface of the ZAKO ring without O-ring is required, length L2 must be taken into account.



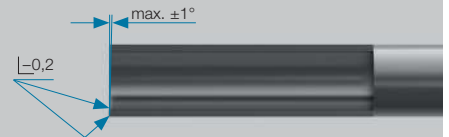
2.3 Compliance with straight tube length:

To assembly the ZAKO rings, a minimum tube length (L) of the straight tube end must be taken into account with curved tubing. Please observe the specifications listed here.



2.4 Preparing the tube ends:

Cut tubes at right angles. An angle tolerance of $\pm 1^\circ$ is permissible.



Do not use tube cutters or angle grinders to cut tubes.

Deburr the inner and outer edges of the tube ends. For the couplings to fulfil their function optimally, it is recommended that the outer edges of the tube ends be deburred only slightly and the inner edges more extensively.

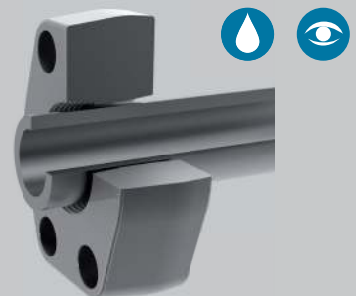
The tube ends must be undamaged both internally and externally and free of metal chips, dirt, rust and other contamination.



3

Principle of the ZAKO ring pre-assembly

3.1 Push the ZAKO flange onto the tube with the toothed conical section of the hole pointing towards the tube end.



ZAKO / ZAKO LP

3.2 Pre-assembly principle

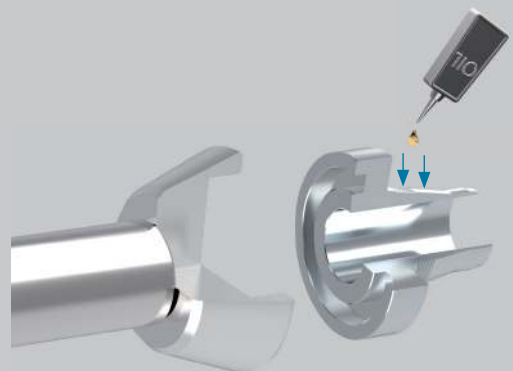
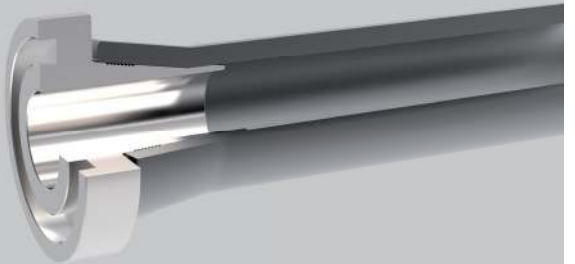
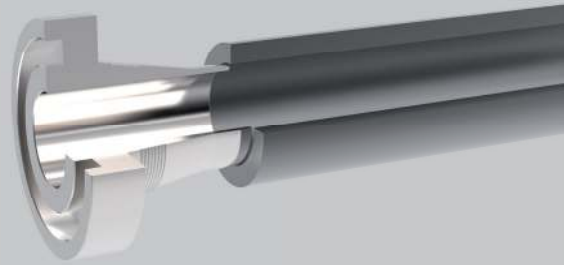
The pre-assembly procedure shown here is carried out using the VOSS pre-assembly device. Pre-assembly involves pressing the ZAKO ring into the tube.

Attention!

Set up the pre-assembly device and tools as described in the corresponding operating instructions. The tube's outer diameter and wall thickness must be taken into account when choosing what tools to use.

Pre-assemble the coupling as described in the operating instructions.

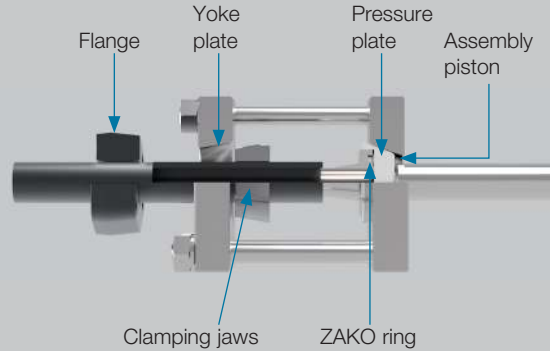
3.3 To reduce the assembly forces, lubricate the conical and cylindrical sections of the ZAKO ring generously (e.g. using mineral-oil based hydraulic fluid HLP32).



ZAKO / ZAKO LP

3.4 Push the tube through the opening of the yoke plate of the pre-assembly device and, while doing so, press the ZAKO ring against the pressure plate. Now clamp the clamping jaws around the tube. Push the clamping jaws along the tube until they are in the conical opening of the yoke plate.

The ZAKO ring must remain outside the assembly section of the tube.



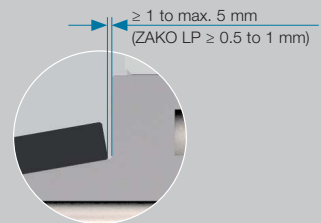
3.5 Start the assembly process as described in the pre-assembly device operating instructions. The piston stroke pushes the ZAKO ring into the tube until the remaining gap is between ≥ 1 mm and 5 mm wide (see table).



Attention!

During the pre-assembly process the tube end must not come into contact with the ZAKO ring. The remaining gap must adhere to the specified widths.

Tube wall thickness	Gap width
< 8 mm	≥ 1 to 1.5 mm
8 mm < 16 mm	max. 3 mm
16 mm	max. 5 mm



4

Final assembly of the flange connection

4.1 Clean the seal groove of the ZAKO ring and place the O-ring carefully into the groove, making sure it is not twisted.

4.2 Lubricate the threads of the screws. (e.g. using mineral-oil based hydraulic fluid HLP32).



ZAKO / ZAKO LP

4.3 Press the pre-assembled flange connection onto the surface to which it is to be bolted and screw it on hand-tight. The tube must be stress-free and at right angles to the screw on surface.

4.4 Then carefully tighten the securing screws diagonally and evenly in several steps using a wrench. The flange must be parallel to the connection surface. Should the deviation from parallel during checking (measure at all three points A, B and C) be greater than 0.5 mm, a correction must be made with reassembly.

Attention!

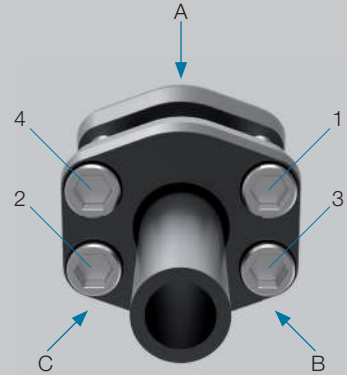
Do not use pneumatic wrenches.

4.5 The final assembly is concluded by alternately tightening up the diagonally opposed pairs of the 4 screws.

Attention!

Do not exceed the allowed tightening torques specified for the screws (see table).

In the course of final assembly, the collar ring may be pulled towards the tube end. It is possible that the gap will then be closed (see item 3.4).



Dimension [mm]	Screw tightening torque: 10.9 [Nm max.]*
ZAKO	
M 8	35
M 10	69
M 12	120
M 14	190
M 16	295
M 20	580
M 24	800
M 30	1.500
ZAKO LP	
M 8	14
M 10	28
M 12	49
M 16	135
M 20	275

* Nm = recommended final tightening torque for cylindrical screws M 8 – M 30 for a total coefficient of friction of 0.14.

ZAKO / ZAKO LP

5

Final assembly of the flange coupling

Note that one of the collar rings used must be a collar ring without a seal groove.

5.1 Clean the seal groove of the ZAKO ring and place the O-ring carefully into the groove, making sure it is not twisted.

5.2 Lubricate the threads of the screws (e.g. using mineral-oil based hydraulic fluid HLP32).

5.3 Align the tube ends with the pre-assembled rings, fit them together and screw in the connecting screws by hand. The tubes must be perfectly aligned and must not be under tension.

5.4 Then tighten up the screws manually, alternating diagonally opposed pairs, in several stages. Ensure that the flanges are parallel to one another. Correct the screw tension if measurements (to be taken at all three points A, B and C) show a deviation of more than 1 mm from the parallel.

Attention!

Do not use pneumatic wrenches.

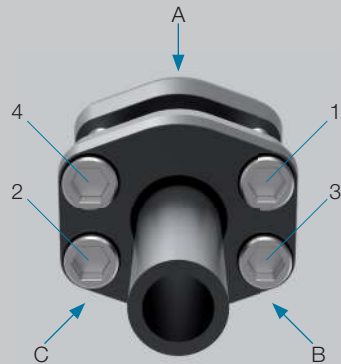
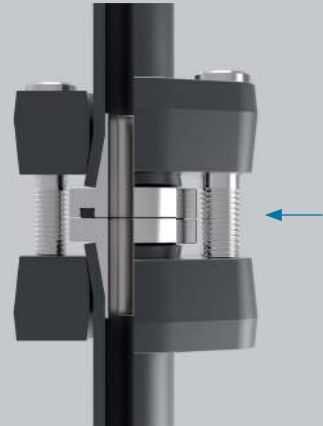
5.5 The final assembly is concluded by alternately tightening up the diagonally opposed pairs of the four screws.

Attention!

Do not exceed the allowed tightening torques specified for the screws (see table).

In the course of final assembly, the ZAKO ring may be pulled against the tube end. It is possible that the gap will be closed (see item 3.4).

5.6 The same notes also apply to the ZAKO flange couplings for SAE hose connections (see illustration).



7

ZAKO / ZAKO LP

6

Re-assembly

Clean the seal groove of the ZAKO ring, inspect the condition of the O-ring and then put it back into the groove carefully, making sure it is not twisted.

ZAKO flanges are easy to re-assemble. Follow all the final assembly instruction steps when re-assembling a flange connection or coupling.



7

Notes on subsequent inspections

Should setting make it necessary to retighten the screws, the flange plate can be pulled up to 1mm before the ZAKO ring while taking the parallel.




Assembly instructions for flange couplings with cutting ring connection

1

Notes

Before starting the assembly work, read and observe the general notes in the up-to-date VOSS catalogue and check that your assembly instructions are up to date.

Pre-assembly and tube assembly processes for cutting ring / flange connections are the same as described for tube couplings (see the instructions for the corresponding coupling variants).



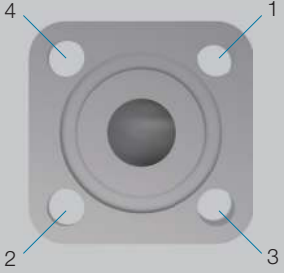
2

Assembly of square flange coupling with cutting ring or flared connection

Assembly of flange connecting pieces

Lubricate the O-ring and hexagon socket screws lightly (e.g. using mineral-oil based hydraulic fluid HLP32).

Clean the seal groove in the flange connecting piece and carefully place the O-ring into it, then use the four cylindrical screws and spring washers to join the flange by alternately tightening the diagonally opposed pairs of screws, taking care not to exceed the specified torque.



Flanges

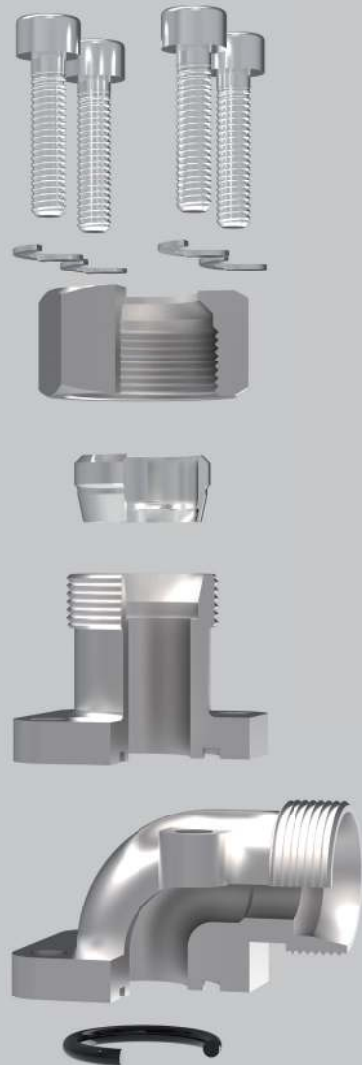
Tightening torques

Screw ISO 4762-8.8 ¹⁾	Tightening torque Nm* -10 %
M 6	10
M 8	25

* Nm = recommended final tightening torque for screws M 6 – M 8 for a total coefficient of friction of 0.14.

Assemble the tube connection as described in the corresponding VOSS assembly instructions.

¹⁾ ISO 4762-8.8 (formerly DIN 912-8.8)



Flanges

3

Assembly of SAE flange couplings

Assembly of flange connecting pieces

Lubricate the O-ring and hexagon socket screws lightly (e.g. using mineral-oil based hydraulic fluid HLP32).

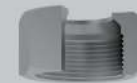
Clean the seal groove in the flange connecting piece and carefully place the O-ring into it, then use the four screws and spring washers to join the flange halves by alternatingly tightening the diagonally opposed pairs of screws, taking care not to exceed the specified torque.

Tightening torque

Screw ISO 4762-10.9 ²⁾	Tightening torque Nm* -10 %
M 8	25
M 10	50
M 12	85
M 14	135
M 16	210

* Nm = recommended final tightening torque for screws M 8 – M 16 for a total coefficient of friction of 0.14.

²⁾ ISO 4762-10.9 (formerly DIN 912-10.9)



7

Assembly instructions for adjustable couplings as specified in ISO 6149 / 11926-1

1

Notes

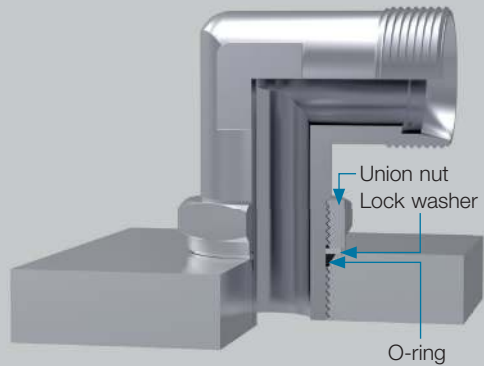
Before starting the assembly work, read and observe the general notes in the up-to-date VOSS catalogue and check that your assembly instructions are up to date.

These assembly instructions apply to adjustable couplings with lock nuts to be screwed into threaded couplings with holes as specified in:

- ISO 6149-1 metric fine thread and
- ISO 11926-1 UN/UNF-thread

Attention!

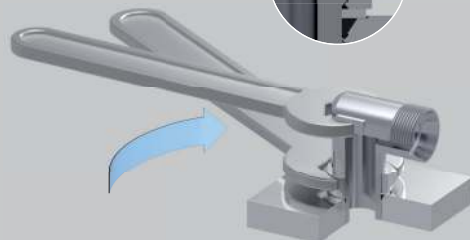
Before installing the coupling, check the thread and the soft seal.



2

Assembly procedure

- Back off the lock nut as shown.
- Push the O-ring and the lock washer up to the top end of the relieved section.
- Lubricate the O-ring and the threads lightly (e.g. using mineral-oil based hydraulic fluid HLP32).
- Screw the fitting in manually until the lock washer rests on the mating surface.
- Turn the screw-in coupling back until it points in the desired direction (but not by more than one turn).
- Hold the coupling with a spanner and tighten up the lock nut.



ISO 6149 / 11926-1

3

Tightening torques

Series	Thread	Tightening torque Nm -10 %
L	M 10 x 1	15
L	M 12 x 1.5	25
L	M 14 x 1.5	35
L	M 16 x 1.5	40
L	M 18 x 1.5	45
L	M 22 x 1.5	60
L	M 27 x 2	100
L	M 33 x 2	160
L	M 42 x 2	210
L	M 48 x 2	260
S	M 12 x 1.5	35
S	M 14 x 1.5	45
S	M 16 x 1.5	55
S	M 18 x 1.5	70
S	M 22 x 1.5	100
S	M 27 x 2	170
S	M 33 x 2	310
S	M 42 x 2	330
S	M 48 x 2	420

Series	Thread	Tightening torque Nm -10 %
L	7/16 - 20 UNF-2A	18
L	1/2 - 20 UNF-2A	28
L	9/16 - 18 UNF-2A	30
L	3/4 - 16 UNF-2A	50
L	7/8 - 14 UNF-2A	60
L	1 1/16 - 12 UN-2A	95
L	1 3/16 - 12 UN-2A	120
L	1 5/16 - 12 UN-2A	150
L	1 5/8 - 12 UN-2A	200
L	1 7/8 - 12 UN-2A	260
S	7/16 - 20 UNF-2A	20
S	1/2 - 20 UNF-2A	30
S	9/16 - 18 UNF-2A	35
S	3/4 - 16 UNF-2A	70
S	7/8 - 14 UNF-2A	100
S	1 1/16 - 12 UN-2A	170
S	1 5/16 - 12 UN-2A	270
S	1 5/8 - 12 UN-2A	285
S	1 7/8 - 12 UN-2A	325

Assembly instructions for adjustable elbow couplings with lock nut

1

Notes

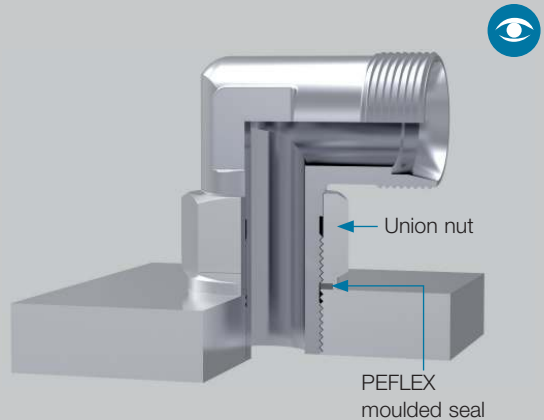
Before starting the assembly work, read and observe the general notes in the up-to-date VOSS catalogue and check that your assembly instructions are up to date.

These assembly instructions apply to adjustable couplings with lock nuts to be screwed into threaded couplings with holes as specified in:

- ISO 9974-1 metric fine thread, cylindrical
- ISO 1179-1 Whitworth pipe thread, cylindrical

Attention!

Before installing the coupling, check the thread and the soft seal.



2

Assembly procedure

- Lubricate the O-ring and threads lightly (e.g. using mineral-oil based hydraulic fluid HLP32).
- Screw the coupling into the threaded hole manually until the lock nut (with the PEFLEX moulded seal) is in contact with the mating surface.
- Turn the coupling (by not more than one turn in the opposite direction) until it points in the desired direction.
- Hold the stud with a spanner and tighten up the lock nut, taking care not to exceed the specified torque.



Elbow couplings

3

Tightening torques

Series	Thread	Tightening torque Nm -10 %
L	G 1/8	20
L	G 1/4	50
L	G 3/8	80
L	G 1/2	105
L	G 3/4	190
L	G 1	250
L	G 1 1/4	400
L	G 1 1/2	500

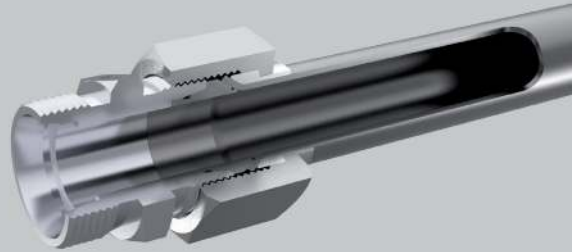
Series	Thread	Tightening torque Nm -10 %
S	G 1/4	50
S	G 3/8	80
S	G 1/2	110
S	G 3/4	220
S	G 1	280
S	G 1 1/4	400
S	G 1 1/2	500

Assembly instructions for 37° flared adapters

1

Notes

Before starting the assembly work, read and observe the general notes in the up-to-date VOSS catalogue and check that your assembly instructions are up to date.

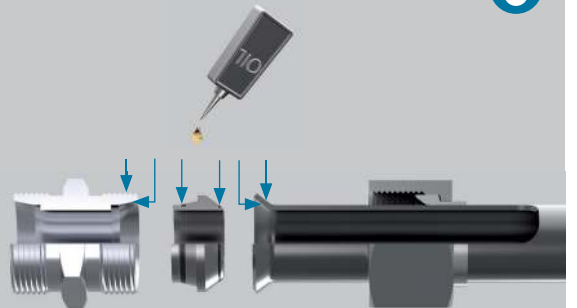


2

Assembly preparation of flared adapters

2.1 Lubricate the O-ring lightly (e.g. using mineral-oil based hydraulic fluid HLP32).

2.2 Preferably, the flare adapter should be pressed into the tube with the aid of a vice (when doing so, protect the threaded parts against damage). However, as an alternative, the flare adapter can be loosely inserted into the coupling stud.

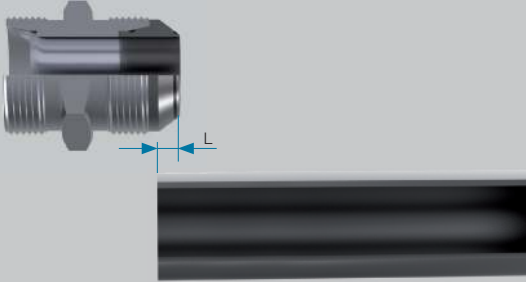


37° flared adapters

3

Tube preparation

3.1 Determine the tube dimensions with the aid of the dimension table (also refer to item 5).

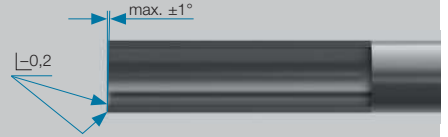


Series	Tube OD [mm]	s [mm]	L [mm]	D min. [mm]	D max. [mm]
L/S	6	1	3.5	9.1	10
		1.5	2.5		
L/S	8	1	4	11.3	12
		1.5	3		
		2	2.5		
L/S	10	1	4.5	13.1	14
		1.5	3.5		
		2	2.5		
L/S	12	1	4.5	15.3	16
		1.5	3.5		
		2	2.5		

Series	Tube OD [mm]	s [mm]	L [mm]	D min. [mm]	D max. [mm]
L	15	1.5	4.5	19.1	20
		2	3.5		
		2.5	2.5		
L	18	1.5	5.5	23.2	24
		2	4.5		
		2.5	4		
L	22	1.5	5.7	26.5	27.5
		2	4.7		
		2.5	3.7		
		3	3.2		
L	28	2	5.7	32.7	33.3
		2.5	4.7		
		3	4.2		
L	35	2	6.5	41.8	42.7
		2.5	6		
		3	5		
		4	3.5		
L	42	2	7	48.8	49.8
		3	6.5		
		4	5		
		5	4		
S	14	1.5	5.5	18.6	19.6
		2	5		
		2.5	4		
		3	3		
S	16	1.5	6.5	20.6	22
		2	5.5		
		2.5	5		
		3	4		
S	20	2	7	25.6	26.8
		2.5	6		
		3	5		
		3.5	4		
S	25	2	7	31.1	33
		2.5	6.5		
		3	5.5		
		4	4		
S	30	2	9	37	38.7
		2.5	8		
		3	7.5		
		4	5.5		
		5	4		
S	38	2.5	10	46	47.2
		3	9.5		
		4	8		
		5	6		
		6	7.5		

37° flared adapters

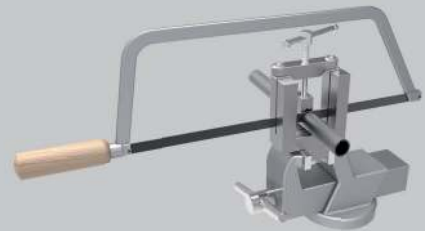
3.2 Cut tubes at right angles. An angle tolerance of $\pm 1^\circ$ is permissible. Do not use a rotary grinder or tube cutter.



3.3 Deburr the inner and outer edges of the tube ends slightly and clean the tubing.

Attention!

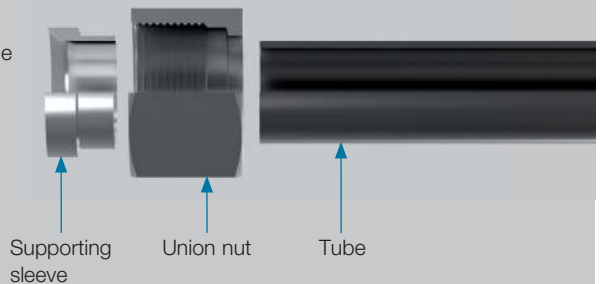
Burrs on the outside and inside tube diameter can impair the flaring process. Tubes which are not cut off squarely and correctly deburred may reduce the service life and leak-tightness of the couplings.



4

Pre-assembly of tube flare

Push the union nut and the supporting sleeve onto the tube. Use the standard pre-assembly devices to flare the tube end.



37° flared adapters

5

Checking the tube flare

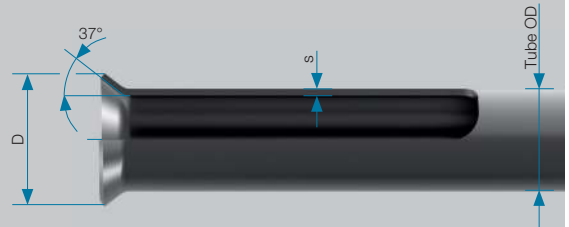
For the connection to fulfil its purpose sustainably, the tube flare must be smooth and free of fissures and scratches.

See the dimension table in item 3 for the respective outer diameter (D_{min} and D_{max}) of the flare bell.

Attention!

Failure to keep within the dimension tolerances will impair the connection considerably.

Check the diameter



6

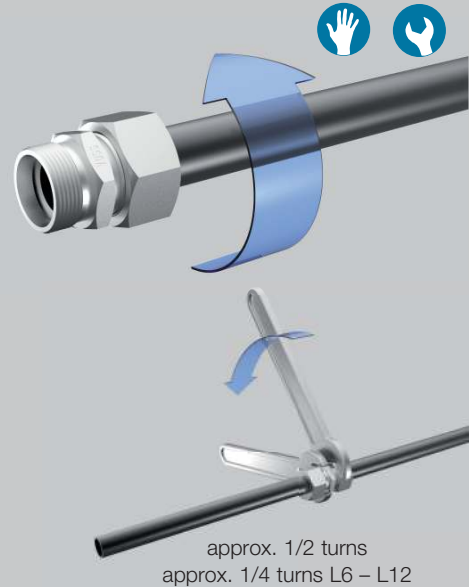
Final assembly

6.1 Turn the union nut until it is hand-tight.

6.2 Final assembly with pressed-in flare adapter:

Use a spanner to tighten up the union nut until a distinctly increased torque is felt.

Continue tightening by approximately **1/2 turns** (for **L6 – L12, only approx. 1/4 turns**).



7

37° flared adapters

6.3 Final assembly with flare adapter inserted in connecting piece:

Use the union nut and a spanner to press the flare adapter into the connecting piece until it rests against the stop.

6.4 Unscrew the connection and check whether the flare adapter has reached the stop.

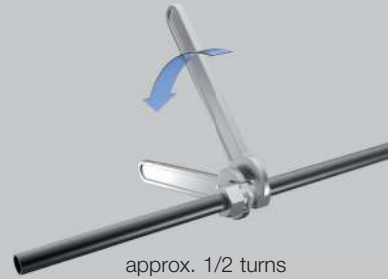
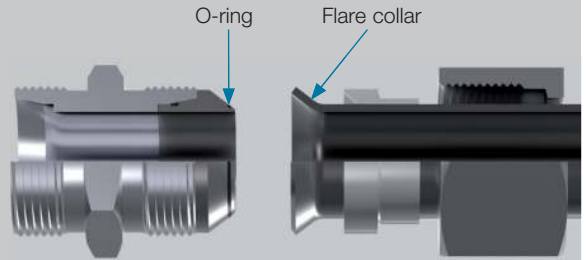
The re-tightening by approximately **1/2 turns** (for **L6 – L12, only approx. 1/4 turns**).

6.5 Turn the union nut until it is hand-tight.

Tighten the union nut with a spanner up to noticeable increase in force.

Then re-tighten by approximately **1/2 turns** (for **L6 – L12, only approx. 1/4 turns**).

Check the O-ring and the flare collar



37° flared adapters

6.6 Final assembly with tightening torque

As an alternative to achieving pre-assembly and final assembly states by distance dependent assembly, the tightening torques can be applied directly. The stated tightening torques are guideline values:

Series	Tube OD [mm]	Tightening torque	
		Steel Nm \pm 5 %	Stainless steel 1.4571 Nm \pm 5 %
L	6	20	30
L	8	40	55
L	10	45	65
L	12	55	110
L	15	70	190
L	18	120	250
L	22	200	400
L	28	300	550
L	35	600	900
L	42	800	900
S	6	30	85
S	8	45	100
S	10	55	130
S	12	80	190
S	14	90	260
S	16	130	330
S	20	250	350
S	25	400	700
S	30	500	900
S	38	800	900

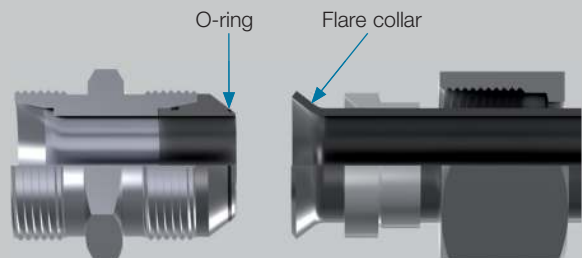
7

Re-assembly of connections

Every time the tube connection is taken apart, the O-ring must be carefully checked for damage and, if necessary, replaced. The tube flaring must also be cleaned and checked (see item 5).

To re-assemble the connection, tighten the union nut as described in item 6.

Check the O-ring and the flare collar



Assembly instructions for tube blanking screws – sealed with PEFLEX moulded seal rings

1

Notes

Before starting the assembly work, read and observe the general notes in the up-to-date VOSS catalogue and check that your assembly instructions are up to date.

These assembly instructions apply to the use of tube blanking screws (sealing plugs) for threaded holes as specified in:

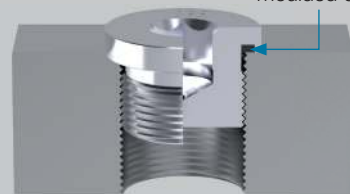
- DIN 3852-1 / ISO 9974-1
thread: Metric fine thread, cylindrical
- DIN 3852-2 / ISO 1179-1
thread: Whitworth pipe thread, cylindrical
- Identification feature: tube blanking screws (sealing plugs) of form N with Whitworth pipe threads have an identification groove.

If the blanking screws or connections are to fulfil their purpose, it is important to adhere exactly to the assembly instructions. Wrong handling creates risks with regard to safety and leakages and may lead to complete failure of the connection or seal.

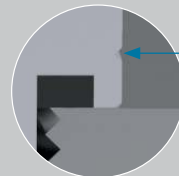
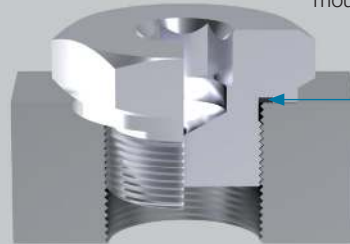
Attention!

Before application, check the thread and the soft seal.

Form N



Form V



Tube blanking screws (sealing plugs) of form N with Whitworth pipe threads have an identification groove.

2

Assembly procedure

- Set the torque wrench to the torque specified for the respective component design and size in the following table.
- Lubricate the seal ring and the threads lightly (e.g. using mineral-oil based hydraulic fluid HLP32).
- Check the threads for damage.
- Screw the blanking screw (sealing plug) by hand into the threaded hole until its head is on the mating surface.
- Tighten up the blanking screw (sealing plug) to the specified final torque.



Tube blanking screws

Attention!

The recommended tightening torques relate to steel couplings with VOSS coat surface coating and which are screwed into components made of steel with a tensile strength of $\geq 350 \text{ N/mm}^2$. If other values for tensile strength, modulus of elasticity and friction-surface combinations are used, the user must adapt the tightening torques empirically.

3

Tightening torques

Thread	Form	Tightening torque Nm -10 %
M 8 x 1	N	10
M 10 x 1	N	12
M 10 x 1	V	12
M 12 x 1,5	N	23
M 14 x 1,5	N	30
M 14 x 1,5	V	30
M 16 x 1,5	N	50
M 18 x 1,5	N	65
M 18 x 1,5	V	65
M 20 x 1,5	N	75
M 22 x 1,5	N	90
M 24 x 1,5	N	90
M 26 x 1,5	N	110
M 27 x 2	N	130
M 33 x 2	N	225
M 33 x 2	V	250
M 42 x 2	N	310
M 42 x 2	V	400
M 48 x 2	N	380
M 48 x 2	V	500

Thread	Form	Tightening torque Nm -10 %
G 1/8	N	12
G 1/4	N	25
G 3/8	N	50
G 1/2	N	70
G 3/4	N	120
G 1	N	200
G 1	V	250
G 1 1/4	N	320
G 1 1/4	V	400
G 1 1/2	N	400
G 1 1/2	V	500

