

Assembly instructions VOSS Lok⁴⁰ tube forming system

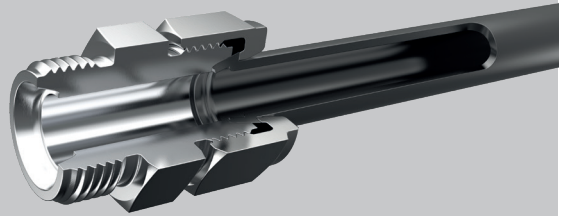
1

Notes

Follow the general information in the catalog before starting assembly and check that the assembly instructions are up to date!

These assembly instructions describe the tube forming and final assembly of VOSS Lok⁴⁰.

These assembly instructions do not replace the extensive user instructions of the forming machine used. Only significant steps for tube preparation, forming and final assembly are explained.

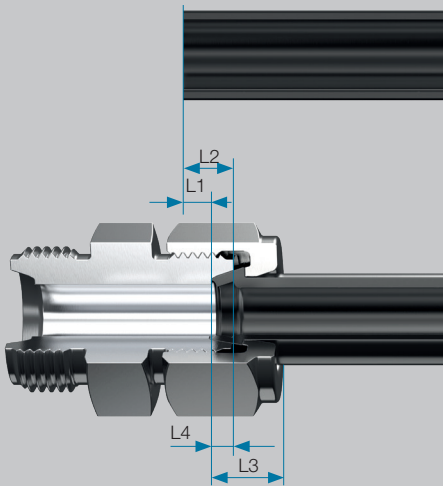


2

Tube preparation

2.1 When determining the tube lengths, dimensions L1 and L2 must be taken into account. The tube is compressed by dimension L1 during the forming process.

The minimum lengths for tube clamping A0, A1, A2 and B0, B1, B2 at the ends of the tubes need to be taken into account.



For metric tubes, stainless steel

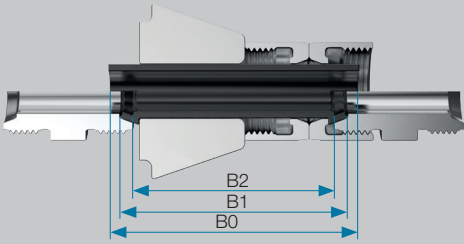


Tube	Forming lengths				Design dimensions		Straight clamping lengths					
	AD [mm]	S [mm]	L1 [mm]	L2 [mm]	L3 [mm]	L4 [mm]	A0 [mm]	A1 [mm]	A2 [mm]	B0 [mm]	B1 [mm]	B2 [mm]
6	1	1.5	3.3	5.9	7.1	2.6	39	36	33	51	44	39
	2	2	3.0	5.6								
	3	2.6	5.2									
8	1	1.5	3.5	6.2	7.8	2.7	42	38	35	56	49	44
	2	2	3.2	5.9								
	3	2.5	5.2									
10	1	1.5	3.9	6.9	8.5	3.0	46	42	39	61	53	47
	2	2	3.6	6.6								
	3	2.5	5.5									
12	1	1.5	4.1	7.2	9.2	3.1	49	45	42	65	57	51
	2	2	3.8	6.9								
	3	2.5	5.5									
14	1	1.5	4.0	7.2	9.3	3.2	51	47	44	70	62	56
	2	2	3.7	6.9								
	3	2.5	5.5									
15	1	1.5	4.2	7.5	9.4	3.3	52	48	45	72	64	57
	2	2	3.8	7.1								
	3	2.5	5.5									
16	1	1.5	4.4	7.9	9.6	3.5	53	49	46	75	66	59
	2	2	4.0	7.5								
	3	2.5	5.5									
18	1	1.5	4.6	8.2	9.7	3.6	57	52	48	79	70	63
	2	2	4.2	7.8								
	3	2.5	5.5									
20	1	1.5	4.8	8.5	9.8	3.7	59	54	50	85	75	68
	2	2	4.4	8.1								
	3	2.5	5.5									
22	1	1.5	5.1	9.1	10.1	4.0	61	56	52	89	79	71
	2	2	4.8	8.8								
	3	2.5	5.5									

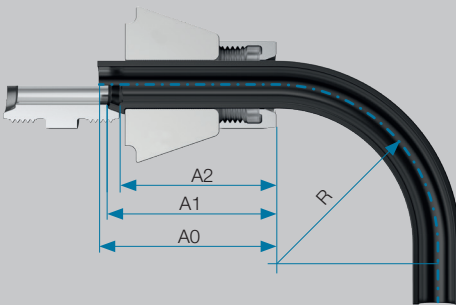


VOSS Lok⁴⁰ tube forming system

Minimum lengths for clamping straight tubes.



Minimum lengths for clamping bent tubes.



Attention!

The dimensions A0, A1 and A2 can be reduced by the measure of the union nut height h for bending radii $R \geq 2 \times AD$.

In this case, the union nut can be slid over the tube bend for forming.

Information on the tube range:

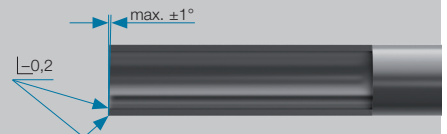
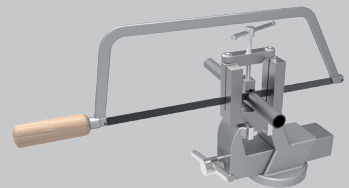
When using thin-walled tubes, particularly attention should be paid to ensure that the deburring on the inside is not excessive. Otherwise, there is a risk that the cone contour on the tube does not form neatly (inner shrink of the tube material).

In large tubes, the wall thickness is limited by the forming power of the machine. Therefore please always take the lower and upper limits of the tube wall thickness, according to the table, into account!

2.2 Saw the stainless steel tube at a right angle. An angular tolerance of $\pm 1^\circ$ is permissible. Do not use a tube separator or an angle grinder.

For inch tubes, stainless steel

Tube		s		Forming lengths		Design dimensions		Straight clamping lengths					
OD [inch]	OD [mm]	[BWG]	[mm]	L1 [mm]	L2 [mm]	L3 [mm]	L4 [mm]	A0 [mm]	A1 [mm]	A2 [mm]	B0 [mm]	B1 [mm]	B2 [mm]
3/16	4.76	20	0.89	3.2	5.7	7.0	2.5	37	34	32	48	42	37
		19	1.07	3.1	5.6								
		18	1.24	3.0	5.5								
1/4	6.35	18	1.24	3.2	5.8	7.2	2.6	38	35	32	50	44	39
		17	1.47	3.1	5.7								
		16	1.65	2.9	5.5								
		15	1.83	2.8	5.4								
		14	2.11	2.6	5.2								
		13	2.41	2.4	5.0								
5/16	7.94	18	1.24	3.4	6.1	7.8	2.7	41	38	35	56	49	44
		17	1.47	3.3	6.0								
		16	1.65	3.1	5.8								
		15	1.83	3.0	5.7								
		14	2.11	2.8	5.5								
		13	2.41	2.6	5.3								
3/8	9.53	18	1.24	3.6	6.5	8.5	2.9	45	41	38	60	53	47
		17	1.47	3.5	6.4								
		16	1.65	3.3	6.2								
		15	1.83	3.2	6.1								
		14	2.11	3.0	5.9								
		13	2.41	2.8	5.7								
1/2	12.70	18	1.24	4.0	7.1	9.2	3.1	50	46	43	67	59	53
		17	1.47	3.9	7.0								
		16	1.65	3.8	6.9								
		15	1.83	3.6	6.7								
		14	2.11	3.4	6.5								
		13	2.41	3.2	6.3								
5/8	15.88	16	1.65	4.2	7.6	9.5	3.4	53	49	46	74	66	59
		15	1.83	4.0	7.4								
		14	2.11	3.8	7.2								
		13	2.41	3.6	7.0								
		12	2.77	3.4	6.8								
		11	3.05	3.2	6.6								
3/4	19.05	16	1.65	4.6	8.3	9.8	3.7	58	53	49	82	73	66
		15	1.83	4.5	8.2								
		14	2.11	4.3	8.0								
		13	2.41	4.1	7.8								
		12	2.77	3.9	7.6								
		11	3.05	3.7	7.4								
7/8	22.23	16	1.65	5.0	8.9	10.1	3.9	61	56	52	89	79	71
		15	1.83	4.9	8.8								
		14	2.11	4.7	8.6								
		13	2.41	4.5	8.4								
		12	2.77	4.3	8.2								
		11	3.05	4.1	8.0								
1	25.40	16	1.65	5.4	9.6	11.9	4.2	65	60	56	95	84	76
		15	1.83	5.3	9.5								
		14	2.11	5.1	9.3								
		13	2.41	4.9	9.1								
		12	2.77	4.7	8.9								
		11	3.05	4.5	8.7								



VOSS Lok⁴⁰ tube forming system

2.3 Lightly deburr the inside and outside of the ends of the tube. Clean the tubing.

Attention!

Ridges on the outside and inside diameter can impair the forming procedure. Tubes which are sawn in a lopsided way or incorrectly deburred tubes reduce the service life and seal of the connection.



3

Lubrication of the tools and tube



3.1 Lubricating the tools

We recommend lightly lubricating the clamping elements, on the outside on the cone, with hydraulic oil and a non-gumming lubricant containing MoS₂, either every time the tool is changed or after around 100 forming operations. Other suitable lubricants should be selected depending on the sector and individual application!

VOSS recommends using a separated clamping die set if steel and stainless tubes are used at the same time.

Attention!

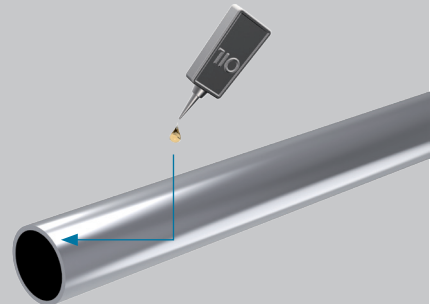
Ensure that no oil enters the clamping jaw toothing to prevent the holding function being impaired.

3.2 Lubricating the stainless steel tube

We recommend moistening around each tenth tube in the forming area with a thin oil film on the outside (VOSS forming oil) to increase the service life of the tools.

Attention!

Other suitable lubricants should be selected depending on the sector and individual application!



VOSS Lok⁴⁰ tube forming system

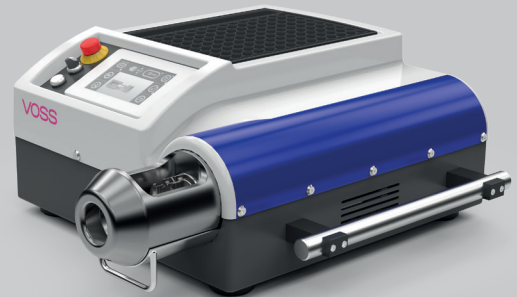
4

Tube forming

4.1 Prepare the tube forming machine in accordance with the user instructions.

4.2 Fit the VOSS Lok⁴⁰ union nut or retaining screw on the prepared end of the tube.

4.3 Perform the tube forming in accordance with the user instructions.



5

Control

A visual control is sufficient for checking the forming quality.

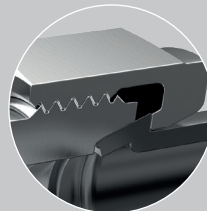
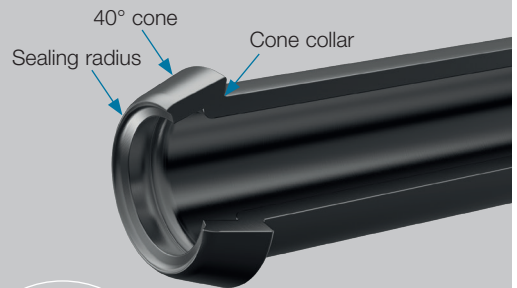
5.1 The formed tube end is not permitted to show damage or furrows.

5.2 The 40° cone must be evenly formed.

5.3 A smooth sealing radius must be visible over the whole circumference on the tube opening.

5.4 The cone collar must be formed at a right angle to the tube (contact surface of the VOSS Lok⁴⁰ union nut). Fine ridges due to the tool connection points are permitted.

5.5 The transition area between the 40° cone and the cone collar should be free from ridges and slightly rounded.



5

VOSS Lok⁴⁰ tube forming system

6

Final assembly



6.1 Insert the formed tube end into the cone of the screw socket.

6.2 Tighten the VOSS Lok⁴⁰ union nut by hand.

6.3 Assemble the union nut with torque in accordance with the table below.

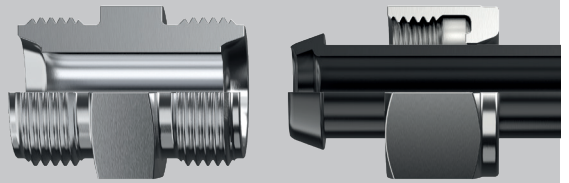
Note:

It must be assembled dry, since union nuts are silver-plated as standard and do not require any lubricant.

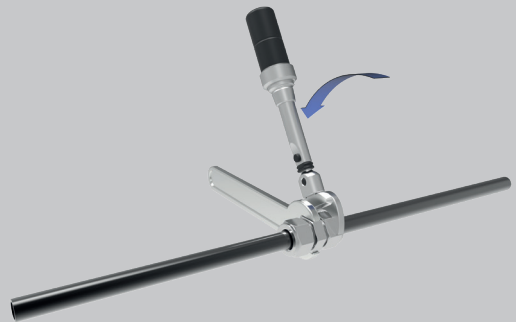
For assembly within tubing, hold the screw sockets with a wrench.

Information:

As an alternative to the recommended torque assembly, the travel path-dependent assembly can also be performed. The torque distances in the table below are guide values. A marking line on the VOSS Lok⁴⁰ union nut and tube facilities compliance with the torque distance for this.



Tube OD (metric)	Tightening torque* Nm \pm 5%	Torque distance* (after tightening by hand)
6	15	ca. 120°
8	22	ca. 120°
10	32	ca. 120°
12	50	ca. 120°
14	60	ca. 120°
15	70	ca. 120°
16	80	ca. 120°
18	95	ca. 120°
20	110	ca. 120°
22	125	ca. 120°



* Values for inch-based tube dimensions and retaining screws are available on request

VOSS Lok⁴⁰ tube forming system

7

Repeat assemblies

7.1 After each time the tube connection is released, check the sealing contour of the tube and coupling connectors for damage and cleanliness (see also 5. Control).

7.2 If re-assembled, the VOSSLok⁴⁰ union nut must be assembled with the same tightening torque after hand tightening as for the initial assembly. The alternative tightening distances are shortened after repeated assembly by around half to 60°.

