



Flange assembly guide

Kroll & Ziller GmbH & Co. KG



July 2023

Contact

Kroll und Ziller GmbH & Co. KG

Reisholzstraße 15, 40724 Hilden, Germany

www.kroll-ziller.de

Carlo Borns, Head of Sales and Operations

+49 2103 951 513, carlo.borns@kroll-ziller.de



Table of content	Page
1. Storage recommendation Kroll und Ziller gaskets	3
2. Use of washers.....	3
3. Visual inspection before assembly.....	4
4. Lubrication.....	4
5. Installation and centring of the gasket	5
6. Tightening the bolts.....	6
7. Tightening procedure	7
8. Documentation	7



Disclaimer

These instructions are intended as a general guide for our customers. Please consider the standards and regulations that apply to you. We also recommend that the flange installation is only carried out by specialists with valid training in accordance with DIN EN 1591-4, (Flanges and their joints - Part 4: Qualification of personnel competency in the assembly of the bolted connections of critical service pressurized systems)

These instructions are based on the *VCI Guideline for the assembly of flange connections in process plants* and *Guide for a secure sealing connection on flanges (ESA and FSA)*.

1. Storage recommendation Kroll und Ziller gaskets

The storage rooms should be cool, dry, as dust-free as possible and only moderately ventilated. Outdoor storage without adequate protection from the weather is not permitted. For rubber products, the temperature should be between - 10 °C and + 15 °C. In individual cases and for short-term storage, the upper temperature limit may be as high as + 25 °C or more. Storage of products in damp rooms must be avoided and no condensation should form. Ideally, the humidity in the storage room should be below 65%. Light can damage the products. Therefore, the products should be protected especially from direct sunlight and strong artificial light with a high ultraviolet content. Lighting with normal incandescent bulbs is preferable. Pressure, tension or other factors may cause stresses that result in cracks or permanent deformation of the products. Therefore, the products must be stored in such a way that they are not exposed to any stresses or mechanical influences.

2. Use of washers

The advantages of using hardened washers (at least 200 HV) are:

- defined friction surface during assembly,
- defined roughness during calculation and thus
- Reduction of the spread of the tightening torque, whereby a greater bolt force can be achieved mathematically.



In principle, there is the possibility of contact corrosion in austenite-ferrite connections. DIN EN ISO 7089 describes washers made of steel and stainless steel in hardness class 200 HV. The material of the washer should match the material of the flange connection. For the combination. When using plastic flanges, please contact the flange manufacturer!

3. Visual inspection before assembly

After loosening the flange connection, remove the old gasket. Often the sealing surfaces of the flange are contaminated with the with the remains of the old gasket. These must be carefully removed before a new gasket can be reliably installed. Make sure that the flange sealing surfaces are clean, not damaged and even. There must be no radial surface damage such as scoring or impact marks. If in doubt, the damage must be inspected by an expert on site and the flange replaced or reworked if necessary.

Bolts, nuts and washers must be clean and undamaged. Special attention must be paid to the thread and the contact surfaces.

Bolts, nuts and, if necessary, washers removed during assembly work must be replaced with new ones in accordance with the risk assessment or after inspection if damaged. Used bolts, nuts and washers may only be reassembled in "as new" condition.

The gasket must be clean, undamaged, and dry. The use of adhesives and assembly pastes is not permitted for gaskets. Used gaskets must not be reused

4. Lubrication

To minimise friction forces, the sliding surfaces of bolts, nuts and washers should be treated with suitable lubricants before tightening. Optimum lubrication is achieved when all sliding surfaces such as the thread, the nut contact surface and, if necessary, the head contact surface are lubricated when the bolt head is in motion. Only in this way can the required bolt pretensioning force be achieved at the prescribed tightening torque and can the bolted connections be loosened without problems after exposure to temperature.



5. Installation and centring of the gasket

The correct assembly of flange connections requires parallel aligned flange sheets without centre offset, which allow the gasket to be inserted in the correct position without damage. The sealing surfaces are to be pressed far enough apart so that the gasket can be inserted without force and undamaged. The gap (non-parallelism of the sealing surfaces) must be avoided! To achieve the tightness class of L0.01, tightening torques were determined according to DIN EN 1591-1. These can be requested from Kroll and Ziller.

Installation and centring of the gasket:

1. Carefully insert the new gasket between the two flange surfaces to avoid damaging the gasket surfaces to avoid damage to the gasket surfaces.
2. Make sure the gasket is centred on the flange (Due to the large manufacturing tolerances of plastic flanges, special care must be taken here.)
3. Do not use sealing pastes or release agents.
4. Adjust all gasket components and inspect for acceptable fit.
5. When tightening the flanges, be careful not to jam or otherwise damage the gasket or damaged in any other way.

6. Tightening torques

Kroll and Ziller GmbH & Co. KG recommends a maximum surface pressure of 15/10 MPa (Q_A) for the rubber-steel gaskets during assembly and a minimum surface pressure of 5 MPa ($Q_{smin(L)}$) during operation.

gasket characteristics according to DIN EN 13555 can be downloaded here:

[https://gasketdata.org/en/database/?manufacturer\[\]=Kroll+%2B+Ziller+GmbH+%26+Co.+KG](https://gasketdata.org/en/database/?manufacturer[]=Kroll+%2B+Ziller+GmbH+%26+Co.+KG)



7. Tightening the bolts

The assembly of the flange connections may only be carried out by qualified personnel! We would be happy to train your operators in our factory or on site. Please send your enquiries on this topic to carlo.borns@kroll-ziller.de.

The order in which the bolts and nuts are tightened has a significant influence on the distribution of forces acting on the gasket (surface pressure). Improper tightening leads to a high dispersion of the pretensioning forces and can result in falling short of the required minimum surface pressure to the point of leakage.

After tightening the nut, at least two but no more than five threads should be left over at the end of the bolt.

1. The (lubricated) bolts are to be preassembled by hand.
2. place hardened washers according to DIN EN ISO 7089 of at least hardness class 200 HV under the nuts (when using plastic flanges, please contact the flange manufacturer!)
3. the bolts are to be installed in such a way that all bolt heads are arranged on one flange side, in the case of horizontally arranged flanges, insert the bolts from above.
4. Replace bolts that are difficult to tighten with bolts that are easy to tighten.

8. Tightening procedure

1. tighten crosswise, as shown in Fig. 1, with 30 % of the nominal tightening torque,
2. tighten with 60 % of the nominal tightening torque, as in 1,
3. tighten with 100 % of the nominal tightening torque as in 1. and
4. retighten again with the full nominal tightening torque. Repeat this procedure until the nuts can no longer be turned when the full tightening torque is applied.

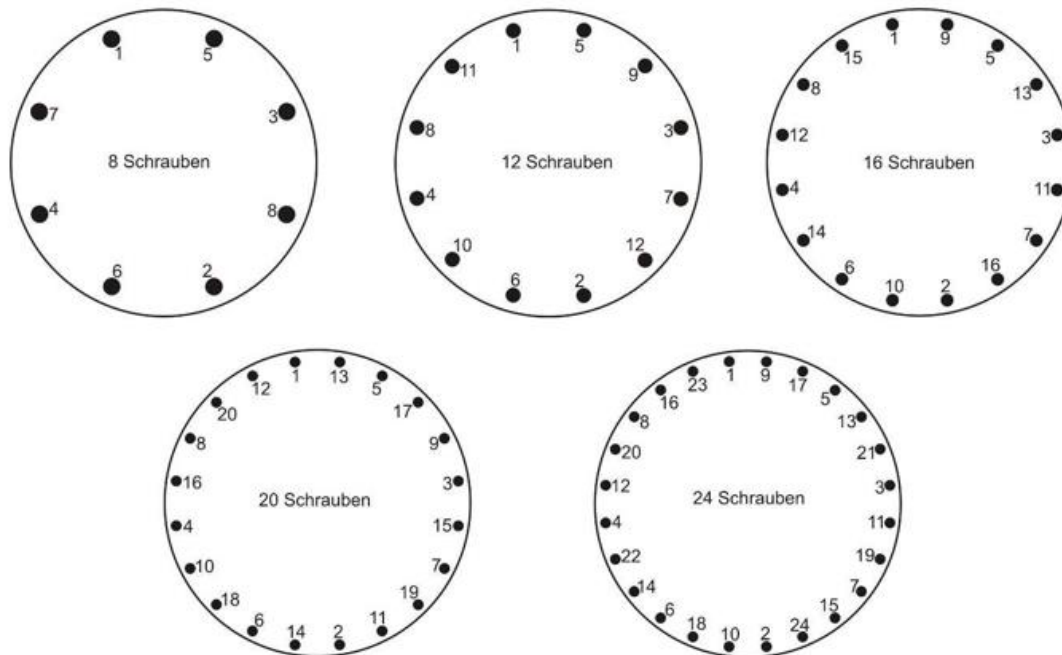


Figure 1: Tightening procedure (source: VCI on the assembly of flange connections in process plants)

Gasket materials based on elastomers continue to vulcanise during their use, especially during the initial heating after reaching the operating temperature. After these materials have fully cured, they can be brittle and fragile and therefore prone to cracking under excessive load. We do not recommend re-tightening the bolts intentionally. Only if leakages occur during operation, the bolts can be tightened carefully (with lower torque).

8. Documentation

You can use the attached test report to document the installation.