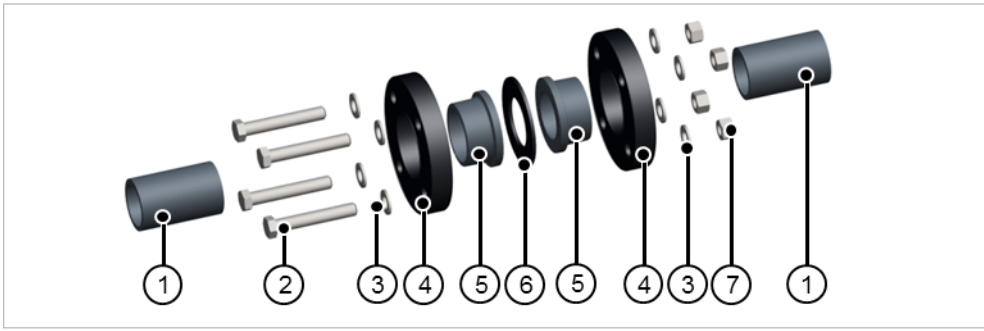
5.1.2 Flange connections

Flanges with sufficient thermal and mechanical stability must be used. The different flange types by GF Piping Systems fulfill these requirements. The gasket dimensions must match the outer and inner diameter of the flange adapter or valve end. Differences between the inner diameters of gasket and flange that are greater than 10 mm may result in malfunctioning flange connections.



① Pipe
② Bolt
③ Washer
④ Flange
⑤ Valve end/flange adapter
⑥ Flange seal
⑦ Nut

Comparison of flange connections

Flange connection	Properties
PP-V flange	• Corrosion-free all-plastic flange made of polypropylene PP-GF30 (fiber-glass reinforced) • High chemical resistance (hydrolysis-resistant) • Maximum possible break resistance due to elasticity (deforms if it is tightened too much) • Use for ambient temperatures up to 80 °C • The temperature of the medium is restricted by the material of the plastic piping system (ABS, PVC-U, PVC-C, PP or PE) • For PVDF up to 140 °C media temperature, the ambient temperature is limited to at most 40 °C • UV-stabilized • With integrated bolt-fixing • Self-centering aid for the flanges on the flange adapter • Symmetric design allows assembly on either side: A "reverse" installation is never possible. All important information is readable • V-groove (patented) • Even distribution of forces across the flange (preserves life expectancy of components) • Supports a longer-lasting torque for a safe joint
PP steel flange	• Very robust and stiff due to the steel inlay • Corrosion-free plastic flange made of polypropylene PP-GF30 (fiber-glass reinforced) with steel inlay • High chemical resistance (hydrolysis-resistant) • Maximum ambient temperature 80 °C • UV-stabilized
PVC flange	• PVC-U flanges may be used as long as the flow medium or the ambient temperature does not exceed a temperature of 45 °C. • At higher temperatures, the flanges could distort over time. • At temperatures above 45 °C, flanges with sufficient thermal and mechanical stability must be used. These requirements are met by the PP-V and PP steel flanges by GF Piping Systems.
Blind flange	• Combination of a backing flange and an end blank. The end blanks are available in PP-H and PE materials. • Combines end blanks in the dimensions d63 to d315 with the PP-V backing flange. • The dimensions d355 to d630 are combined with a backing flange made of PP with steel inlay. • With the blanking flange set, the piping system can be closed off using the same material. • If the piping system is extended, the backing flange can be used again, cutting down on additional costs. • Suitable for pressure piping • Easy assembly of the blank flange set: The end blank is centered on the inner diameter of the backing flange.

Creating flange connections

When making a flange connection, the following points have to be taken into account:

Usage information

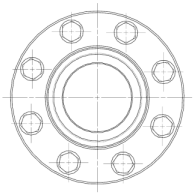
Backing flanges are identified with the following pictograms of the usable flanges:

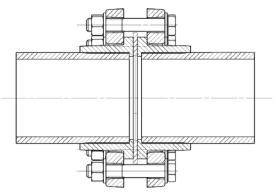
Socket fusion

Butt fusion

Orientation of bolts beyond the two main axes

- For horizontal piping systems, the orientation shown of the bolts beyond the main axes (see the following figure) is preferred since possible leaks at the flange connection do not cause the medium to run directly onto the bolts.





Flange with main axes (centered, crosswise)

- Flange adapter, valve end or fixed flange, gasket, as well as backing flange, must be aligned centered on the pipe axis.
- Before pre-tightening the bolts, the jointing faces must be flush with each other and must fit tightly against the gasket. Pulling badly aligned flanges together within the flange connection must to be strictly avoided because of the resulting tensile stress.

Selecting and handling bolts

- The length of the bolts should be selected in such a way that the bolt thread does not protrude more than 2 to 3 turns of the thread at the nut. Washers must be used at the bolt head as well as the nut.
  - To ensure that the connecting bolts can be easily tightened and removed after a lengthy period of use, the thread should be lubricated, e.g. with molybdenum sulphide.
  - Tightening the bolts by using a torque wrench
- The bolts must be tightened diagonally and evenly: First, tighten the bolts by hand so that the gasket is evenly contacting the jointing faces. Then tighten all bolts diagonally to 50 % of the required torque, followed by 100 % of the required torque. The recommended bolt tightening torques are listed in the table “Bolt tightening torque guidelines for ISO flange connections”, page 223. However, deviations may occur in practice, e.g. through the use of stiff bolts or pipe axes that are not aligned. The Shore hardness of the gasket can also influence the necessary tightening torque.
- We recommend checking the tightening torques 24 hours after assembly according to the specified values and, if necessary, retighten them. Always tighten diagonally here, as well.
- After the pressure test, the tightening torques must be checked in any case and, if necesary, retightened.

For more information on flange connections, see DVS 2210-1 Supplement 3.

Tightening the bolts using a torque wrench

However, deviations may occur in practice, e.g. through the use of stiff bolts or pipe axes that are not aligned. The Shore hardness of the gasket can also influence the necessary tightening torque.

In the area of flexible sections and expansion loops, no bolt connections or flange connections should be used since the bending stress may cause leaks.