gasket material shall be selected to be consistent and compatible with the service requirements of the piping system.

(f) See Figures XXVI-4520-1 and XXVI-4520-2 for typical flange configurations.

(17) XXVI-4521 Bolt Torque

Flange joints shall be constructed to the requirements of XXVI-3134. The applied torques values for flange bolts shall be determined as follows:

(U.S. Customary Units)

\[ T_{b bolt} = \frac{K d_{bolts} A_f S_s}{12 n_b} \]

(SI Units)

\[ T_{b bolt} = \frac{K d_{bolts} A_f S_s}{1000 n_b} \]

where

- \( A_f \) = flange adapter contact area, in.\(^2\) (mm\(^2\))
- \( d_{bolts} \) = nominal bolt diameter, in. (mm)
- \( K \) = nut factor for flanged bolting accounting for friction, material, lubricants, and coatings
- \( n_b \) = number of bolts
- \( S_s \) = seating stress, psi (MPa). For PE to PE, the required seating stress is 1,800 + 200 / −0 psi (12.4 + 1.4 / −0 MPa). For PE to steel, the required seating stress is 2,000 + 200 / −0 psi (13.8 + 1.4 / −0 MPa).
- \( T_{b bolt} \) = bolt torque, ft-lb (N·m)

The value of \( K \) shall be provided in the Design Report along with the basis of how it was determined. The tolerance of the bolt torque shall be determined in accordance with the allowable variation in seating stress.

XXVI-4521.1 PE-to-PE Flange Joints.

(a) Bolts shall be tightened to a torque value calculated in XXVI-4521. After 24 hr, the bolts shall be retightened to the seating torque value. The bolts shall be tightened in accordance with (b) and (c). The torque shall be applied in increments as shown in Table XXVI-4521.1-1.

(b) The bolts are to be tightened in the following sequence. A bolt is selected and tightened, then the bolt 180 deg opposite the first bolt is tightened. Next the bolt 90 deg clockwise from the first bolt is tightened and then the bolt 180 deg opposite it. The four-bolt pattern is indexed one bolt clockwise from the first bolt, and the pattern is repeated. Refer to PPI TN-38.

(c) Once the requirements of (a) and (b) are met, torque does not require future verification.

XXVI-4521.2 PE-to-Steel Flange Joints.

(a) Bolts shall be tightened to a seating torque value calculated in XXVI-4521. After 4 hr, the bolts shall be retightened to the seating torque value. If necessary, the bolts may be tightened one additional time after 2 hr. The bolts shall be tightened in accordance with (b) and (c). The torque shall be applied in increments as shown in Table XXVI-4521.1-1.

(b) The bolts are to be tightened in the following sequence. A bolt is selected and tightened, then the bolt 180 deg opposite the first bolt is tightened. Next the bolt 90 deg clockwise from the first bolt is tightened and then the bolt 180 deg opposite it. The four-bolt pattern is indexed one bolt clockwise from the first bolt, and the pattern is repeated. Refer to PPI TN-38.

(c) Once the requirements of (a) and (b) are met, torque does not require future verification.