

## Safety factor of the bolted flange joints

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### Abstract

This paper investigates the load capacity of bolted flanged joints, which are a common type of mechanical joints used in machinery. Bolted joints offer several advantages, including easy maintenance and disassembly, sealing, reduction of vibrations and noise, and protection against pollution and moisture. However, they are also the weakest element in most structures, and their degradation can reduce the safety and reliability of the machine system. Using an analytical research method, the load capacity of two types shear-loaded bolted joints, fitted and clamped, was compared by varying the nominal thread diameter of the bolts, the number of bolts in a group joint, and the pitch diameter on which the bolts are mounted for torque transmission. The function that enables the reduction of the difference in load capacity between fitted and clamped bolted joints by varying their number and pitch diameter is derived in this paper. The research shows that with certain combinations of geometric characteristics and tightening conditions of clamped joints, the load capacity of clamped bolted joints can be improved. This study aims to provide the constructor with relevant practical data to make an appropriate choice of bolted joint type (fitted or clamped) by combining various influence parameters of group shear-loaded joint, and, at the same time, achieve the same desired load capacity or, in the case of different load capacities, to know the exact ratio of their safety factors.

**Keywords:** bolted joint; shear-loaded bolted joint; fitted bolts; clamped bolts; bolt safety factor