

Abstract

Static seals are the most important elements of bolted flange joint, because the reliability and safe operation of the installation depends on their properties. One type of static seal is the spiral wound gasket. Its basic design consists of an inner ring, an outer ring and a spiral element made of alternately wound steel tape and soft filler material. The proper shape of the tape allows operation under varying load conditions. This gasket has applications in high-energy installations and in the transportation of chemically aggressive media.

The current state of knowledge regarding the properties of spiral wound gaskets in relation to their cross-section presents these issues fragmentarily. The least developed area of research concerns designs where a low-compressibility tape is used as the soft filler material. As a result, the solutions currently in use increasingly exhibit limitations when faced with increasing requirements and stringent criteria defined in sealing technology.

The present study analyzed the influence of the shape of the steel and soft filler tapes on the mechanical strength and tightness of spiral wound gaskets. The research problem was solved using an experimental plan and numerical simulations, which were verified by experimental results. Based on a literature review, preliminary research and main investigation, cognitive and utilitarian conclusions were formulated. A design with an asymmetric profile was proposed, which compared to the standard “V”-type gasket, provides a wider range of safe operation and a higher level of tightness.