

FACE MECHANICAL SEAL RINGS QUALITY IMPROVEMENT BY TECHNOLOGICAL METHODS

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The creation of reliable seal assemblies, that ensure tightness for a long time in a wide range of temperatures and pressures, is one of the major problems in the design of pump and compressor machines and units. One of the most common sealing elements used in pumps, compressors and various chemical apparatus (reactors, mixers, etc.) is a mechanical seal (MS). It is a sealing device consisting of two parts in the form of rings: one of which rotates with the shaft and the other is fixedly connected to the body. Seal performance is influenced by design, technological and operational factors. The most important ones are the properties of working environment, modes of operation, material properties of a sealed connection, limits on the leakage, the resource, the total period of use, toxicity and chemical environments. Seal rings are a friction pair, which serves as the main sealing element. Hence they are made of special materials, whose selection depends on the operating conditions. The properly selected material of the rings provides reliable, safe and trouble-free operation of the seal assembly and, therefore, the entire unit. The design choice is largely determined by the physical and chemical properties of the medium, its state of aggregation (gas, liquid), pressure, temperature, viscosity, content of suspended solid particles and salts, chemical aggressiveness, flammability (being heated in contact with the atmosphere), the degree of hazard to humans and the environment. It should be noted that the correct choice of material and its mechanical and physical characteristics plays the significant role in selecting design of the sealing rings. It is the combination of the materials for friction pairs what is more crucial rather than materials per se.

In the selection of the optimal sliding couples it has to be considered the corrosion resistance and durability of the materials, the possibility of heat removal from the zone of friction and materials compatibility i.e. the ability to work without setting and jams.

For each case the choice of the most suitable materials of rings can be made only by a careful comparison of their working conditions, raw material properties, the changes, which occur on the friction surfaces, etc.

In this work are presented the recommendations for material's selections of the mechanical seals rings and basic productive and operating requirements. The system of a directional selection of technology that ensures the required quality of working surfaces of the mechanical seals rings covers their entire life cycle. The mathematical frictional model is proposed as an instrument for calculating a linear and weighing abrasion of the mechanical seals rings and helps to improve selection's criteria and the most rational method of strengthening.