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VERIFYING THE RELIABILITY OF HERMETICALLY SEALED
COMPRESSORS DURING THE DEVELOPMENT*

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ABSTRACT

A decisive criterion for the production stage of newly and further developed products is to verify the reliability during development, whereby predetermined reliability requirements must be confirmed by examinations and tests. Apart from the influence of the number of units tested, the assurance of the results essentially depends on the correlations of the stresses test conditions and actual operating conditions.

As hermetic compressors must be suitable for various applications with different requirements the selection of the testing conditions is of great importance. For reasons of acceptable test periods the reliability tests of hermetic compressors used at present are accelerated tests at increased stresses. The tests have been developed historically by continuously incorporating experiences made and scientific knowledge obtained.

The achieved level in regard to the evaluation of the test results is not satisfactory in particular with a view to the requirements of highly automated mass production of hermetic compressors.

The quantitative relationship between the test results and the live of the compressors has not been proofed sufficiently. Among others this can be found when comparing standardized test conditions for wear tests of hermetic compressors of various countries.

From the existing shortcomings requirements for the verification of the reliability during development are derived. They aim at a systematization, for example, of the tests, stresses and pattern of failures.

For the review of the reliability tests being aimed at an assured statement in regard to the actual failure behavior of the hermetic compressors testing procedures as well as groups of stresses to be assigned to are essential. In regard to testing procedures the tests are as follows:

1. long-time test at normal or increased stresses
(e.g. trial run by the customer)
2. accelerated test at increased stresses
(e.g. life test, wear test)
3. sequential test
(e.g. radioactive wear test)

The analysis is based on the physical and chemical changes observed or on the running hours of the specimens.

In order to qualify the stress level it is proposed to perform stress and failure analysis by means of sequential tests. The correlation factors ascertained between standard load and permissible overload are used for the selection of the testing conditions to verify the reliability during development, thereby having in mind a convenient combination of definite stresses and tests. The problems will be discussed by means of an example of wear stressing.

*Topic: Reliability and Maintenance