International Standard

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Rolling bearings — Method for calculating the effective static safety factor for universally loaded rolling bearings

Roulements — Méthode de calcul du facteur de sécurité statique efficace pour les roulements chargés universellement

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Foreword

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Introduction

ISO 76 specifies a simplified method for the calculation of static safety factor of rolling bearings. However, this method cannot account for actual operating conditions like tilt, misalignment, moment load or for operating clearance.

The calculation method specified in this document is based on the detailed analysis of bearing internal load distribution, as described in ISO 16281[1]. It uses maximum ball or lamina loads for the calculation of the effective static safety factor, thus following the general principle of ISO 76. The calculation method yields no satisfactory results for rolling bearings subjected to considerable truncation of the area of contact between the rolling elements and the raceway.

The primary purpose of this document is to provide a unified and manufacturer-independent advanced calculation method that allows for the consideration of actual operating conditions, thus enabling the end user to compare different bearing solutions on the same calculation basis. It is also intended to serve as a manufacturer-independent neutral basis for certification purposes, for example, as required per IEC 61400-4[2] for bearings in wind turbine gearboxes.

It is not intended to supersede other advanced bearing analysis methods that are currently used in the design process as the primary tool for bearing design and selection.

The static load rating according to ISO 76 was originally based on a permanent plastic deformation under static load, i.e. a constant load on a non-rotating bearing. However, it is common practice in rolling bearing design and analysis to calculate the static safety factor also for rotating load cases. Therefore, it is recommended to calculate the effective static safety factor for the load situation where the maximum contact load occurs, independent of rotating or non-rotating condition.