

## Rolling bearings — Methods for calculating the modified reference rating life for universally loaded rolling bearings

*Roulements — Méthodes de calcul de la durée nominale de référence corrigée pour les roulements chargés universellement*

iTeh Standards  
(<https://standards.iteh.ai>)  
Document Preview

ISO 16281:2025

<https://standards.iteh.ai/catalog/standards/iso/7ccf91d6-1fc0-4e6d-82d8-c7e1e58d6774/iso-16281-2025>

© ISO ~~2024~~2025

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
CP 401 • Ch. de Blandonnet 8  
CH-1214 Vernier, Geneva  
Phone: + 41 22 749 01 11  
~~Email~~E-mail: [copyright@iso.org](mailto:copyright@iso.org)  
Website: [www.iso.org](http://www.iso.org)

Published in Switzerland

iTeh Standards  
(<https://standards.iteh.ai>)  
Document Preview

ISO 16281:2025

<https://standards.iteh.ai/catalog/standards/iso/7ccf91d6-1fc0-4e6d-82d8-c7e1e58d6774/iso-16281-2025>

## Contents

Foreword.....	iv
Introduction.....	vi
1 Scope.....	1
2 Normative references.....	1
3 Terms and definitions.....	1
4 Symbols.....	2
5 Rating life analysis.....	6
5.1 General.....	6
5.2 Ball bearings.....	7
5.3 Roller bearings.....	10
6 Elastic deflection of point- and line contact.....	14
6.1 General.....	14
6.2 Elastic deflection of point contact.....	14
6.3 Elastic deflection of line contact.....	15
Annex A (informative) Calculation of the bearing internal load distribution.....	19
Annex B (informative) Reference geometries.....	27
Annex C (informative) Consideration of edge stress for roller bearings.....	30
Annex D (informative) Life modification factor, $a_{ISO}$ , contamination factor, $e_c$ , and fatigue load limit, $C_w$ , and dynamic load ratings.....	32
Annex E (informative) Calculation of Hertzian parameters for point contact.....	33
Annex F (informative) Discontinuities in load ratings and rating life results.....	35
Bibliography.....	36

<https://standards.iteh.ai/catalog/standards/iso/7ccf91d6-1fc0-4e6d-82d8-e7e1e58d6774/iso-16281-2025>

## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at [www.iso.org/patents](http://www.iso.org/patents). ISO shall not be held responsible for identifying any or all such patent rights.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 4, *Rolling bearings*, Subcommittee SC 8, *Load ratings and life*.

This first edition of ISO 16281 cancels and replaces the first edition of ISO/TS 16281:2008, which has been technically revised. It also incorporates the Technical Corrigendum ISO/TS 16281:2008/Cor 1:2009.

The main changes are as follows:

- ~~the~~ the coordinate system used in drawings and derivation of formulae has been changed to a right-handed coordinate system;
- ~~the~~ the calculation of load distribution of cylindrical and tapered bearings has been described in greater detail and provisions for the calculation of load distribution and rating life of spherical roller bearings have been added;
- ~~additional~~ additional formulae have been given for the calculation of load distribution of hybrid bearings;
- ~~reference~~ reference geometries and the description of static equilibrium calculation for different bearing types have been moved to an informative annex.

This document is intended to be used in conjunction with ISO 281.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

This corrected version of ISO/TS 16281:2025 incorporates the following corrections:

- symbol " $d$ " was changed to " $a$ " in Clause 4 and a domain was included for each symbol " $a$ " to distinguish them;
- the introductory text before Formula (16) was modified and Formula (16) was corrected.

iTeh Standards  
(<https://standards.iteh.ai>)  
Document Preview

ISO 16281:2025


<https://standards.iteh.ai/catalog/standards/iso/7ccf91d6-1fc0-4e6d-82d8-c7e1e58d6774/iso-16281-2025>

## Introduction

Since publication of the first edition of ISO 281:1990, additional knowledge has been gained regarding the influence on bearing life of contamination, lubrication, internal stresses from mounting, stresses from hardening, fatigue load limit of the material etc. It is therefore now possible to consider factors that have influence on bearing life in a more complete way in the life calculation.

ISO 281 provides a method to put into practice this new knowledge in a consistent way when the modified rating life of a bearing is calculated. However, the calculation method given in ISO 281 cannot consider the influence on life of tilted or misaligned bearings and the influence on life of bearing clearance during operation. ISO/TS 16281:2008 already describes an advanced calculation method, which makes it possible to consider these influences, and in addition provides the most accurate method for estimating the influence of contamination and other factors.

In addition to the content of ISO/TS 16281:2008, this document also addresses the analysis of hybrid bearings with rolling elements made of silicon nitride.

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, e.g. as required per IEC 61400-4  for bearings in wind turbine gearboxes.

This document is intended to be used for computer programs and together with ISO 281 covers the information needed for life calculations. For accurate life calculations under the operating conditions specified above, this document or advanced computer calculations should be used for determining the dynamic equivalent reference load under different loading conditions.

This document 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.

<https://standards.iteh.ai/catalog/standards/iso/7ccf91d6-1fc0-4e6d-82d8-e7e1e58d6774/iso-16281-2025>

<https://standards.iteh.ai/catalog/standards/iso/7ccf91d6-1fc0-4e6d-82d8-e7e1e58d6774/iso-16281-2025>