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**Plain bearings — Automotive  
engine bearing test rig using actual  
connecting rods —**

Part 1:  
**Test rig**



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## 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 documents 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)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

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 123, *Plain bearings*, Subcommittee SC 2, *Materials and lubricants, their properties, characteristics, test methods and testing conditions*.

A list of all parts in the ISO 21866 series can be found on the ISO website.

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).

## Introduction

Recently, the rigidity of automotive engine bearings and their housings have been lowered due to the demand for weight reduction, and they are getting easier to be deformed. On the other hand, for achieving clean combustion with high heat efficiency, combustion pressure and bearing oil film pressure have become higher. Also, the minimum oil film thickness for bearing has been made thinner by using low-viscosity oil to reduce friction loss. The plain bearings for automotive engines have a tough situation because of all these changes.

So far, the test rig used for plain bearings has been developed with the application of elasto-hydrodynamic lubrication theory (EHL). But the serious problem stated above remains: the rigidity of a connecting rod bearing for automotive engine is lowered in comparison with other machineries because of the especial requirement of weight reduction.

Based on the abovementioned background, it is essential to evaluate the bearings for each car, using the actual engines. Also, not only the magnitude and pattern of the load on a bearing but also the engine speed are different between gasoline engine bearings and diesel engine bearings, so the different bearings need to be developed accordingly. As a consequence, it has become essential to conduct a final test with the engine of an actual car because the conventional test rig could not meet such requirements.

The aim of this document is to shorten the time and reduce the costs needed on engine bearing testing in order to satisfy the requirements of automotive engine bearings at present and in future by using connecting rods of actual cars.



# Plain bearings — Automotive engine bearing test rig using actual connecting rods —

## Part 1: Test rig

### 1 Scope

This document specifies the requirements for an engine bearing test rig that uses an actual connecting rod to determine plain bearing performance in automotive engines, evaluating fundamental bearing properties such as seizure resistance, wear resistance, fatigue resistance and resistance to the impact of foreign material.

### 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 4378-1, *Plain bearings — Terms, definitions, classification and symbols — Part 1: Design, bearing materials and their properties*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 4378-1 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

### 4 Classification of bearing tests

Three stages of functional evaluation test methods of plain bearings using various kinds of test rigs are shown in [Table 1](#).

**Table 1 — Examples of stages for bearing evaluation tests**

Stage	Purpose	Bearing housing	Test method
Stage 1	screening of material properties	—	— pin on disc — block on ring — other
Stage 2	evaluation of the bearing function	high rigidity connecting rod connecting rod similar to the actual connecting rod	own test rig by bearing manufacturer
Stage 3	validation of the actual engine	actual connecting rod	— actual engine — actual car