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**Internal combustion engines — Piston  
rings —**

**Part 3:  
Material specifications**

*Moteurs à combustion interne — Segments de piston —*

*Partie 3: Spécifications des matériaux*



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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this part of ISO 6621 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 6621-3 was prepared by Technical Committee ISO/TC 22, *Road vehicles*.

This second edition cancels and replaces the first edition (ISO 6621-3:1983), which has been technically revised.

ISO 6621 consists of the following parts, under the general title *Internal combustion engines — Piston rings*:

- *Part 1: Vocabulary*
- *Part 2: Inspection measuring principles*
- *Part 3: Material specifications*
- *Part 4: General specifications*
- *Part 5: Quality requirements*

## Introduction

ISO 6621 is one of a series of International Standards dealing with piston rings for reciprocating internal combustion engines. Others are ISO 6622-1 [5] and ISO 6622-2 [6], ISO 6623 [7], ISO 6624-1 [8], ISO 6624-2 [9], ISO 6624-3 [10] and ISO 6624-4 [11], ISO 6625 [12], ISO 6626 [13] [14], and ISO 6627 [15].

This part of ISO 6621 provides a user guide to the types of materials available for piston rings.

Many such materials are available, made by different manufacturers using different casting and machining techniques, with each suited to a particular application. In many instances, their chemical compositions differ, but the method of manufacture and the heat treatment, if any, result in materials from different manufacturers with similar mechanical properties. The performance of rings made from two different materials might be very similar; i.e. several subclasses of materials could meet a given requirement.

In ring manufacture it is convenient to group materials into classes according to their moduli, since for a ring of given dimensions, the pressure it exerts on the cylinder wall is determined only by the modulus. The material strength is also generally related to modulus, i.e. the higher the modulus, the greater the strength, although there are exceptions depending on the method of manufacture. Material hardness, on the other hand, is determined by both chemical composition and heat treatment; this is made clear by the division of classes into subclasses. Because of this, the final choice of material and subclass is to be agreed between manufacturer and client.

# Internal combustion engines — Piston rings —

## Part 3: Material specifications

### 1 Scope

This part of ISO 6621 classifies materials intended for the manufacture of piston rings, based on their mechanical properties and the stresses the materials are capable of withstanding.

This part of ISO 6621 is applicable to piston rings for reciprocating internal combustion engines up to and including those of 200 mm in diameter. It is also applicable to piston rings of compressors working under similar conditions.

### 2 Normative reference

The following normative document contains provisions which, through reference in this text, constitute provisions of this part of ISO 6621. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 6621 are encouraged to investigate the possibility of applying the most recent edition of the normative document indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 6507-1, *Metallic materials — Vickers hardness test — Part 1: Test method*.

### 3 Mechanical properties

The choice of material made in accordance with the mechanical strength criteria given in Table 1 shall also take into account the final coating of rings, engine characteristics (rating, liner surface, etc.) and microstructural features such as graphite, cementite and ferrite.