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**Internal combustion engines — Piston  
rings — Scraper rings made of cast iron**

*Moteurs à combustion interne — Segments de piston — Segments  
racleurs mixtes en fonte moulée*

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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. [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. [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.

The committee responsible for this document is ISO/TC 22, *Road vehicles*.

This third edition cancels and replaces the second edition (ISO 6623:2004), of which it constitutes a minor revision.

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## Introduction

ISO 6623 is one of a number of series of International Standards dealing with piston rings for reciprocating internal combustion engines. Others are ISO 6621,[\[2\]](#) [\[3\]](#) [\[4\]](#) [\[5\]](#) ISO 6622,[\[6\]](#) [\[7\]](#) ISO 6624,[\[8\]](#) [\[9\]](#) [\[10\]](#) [\[11\]](#) ISO 6625,[\[12\]](#) ISO 6626,[\[13\]](#) [\[14\]](#) [\[15\]](#) and ISO 6627[\[16\]](#) (see Bibliography for details).

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# Internal combustion engines — Piston rings — Scraper rings made of cast iron

## 1 Scope

This International Standard specifies the essential dimensional features of scraper rings made of cast iron, types N, NM, E, and EM, having diameters from 30 mm up to and including 200 mm, used in reciprocating internal combustion engines for road vehicles and other applications.

## 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 6621-4, *Internal combustion engines — Piston rings — Part 4: General specifications*

## 3 Overview

The scraper ring types are specified in [Tables 1](#) and [2](#) and [Figures 1](#) to [5](#). Their common features and the dimensions of those features are specified in [Tables 3](#) to [5](#) and [Figures 6](#) to [9](#). [Tables 6](#) and [7](#) give the force factors for the different ring types, while [Tables 8](#) and [9](#) give the dimensions and forces of the scraper rings.

[Tables 8](#) and [9](#), respectively, offer a choice between the following two radial wall thicknesses:

- radial wall thickness “regular”;
- radial wall thickness “D/22”.

The common features and dimensional tables presented in this International Standard constitute a broad range of variables and the designer, in selecting a particular ring type, shall bear in mind the conditions under which it will be required to operate.

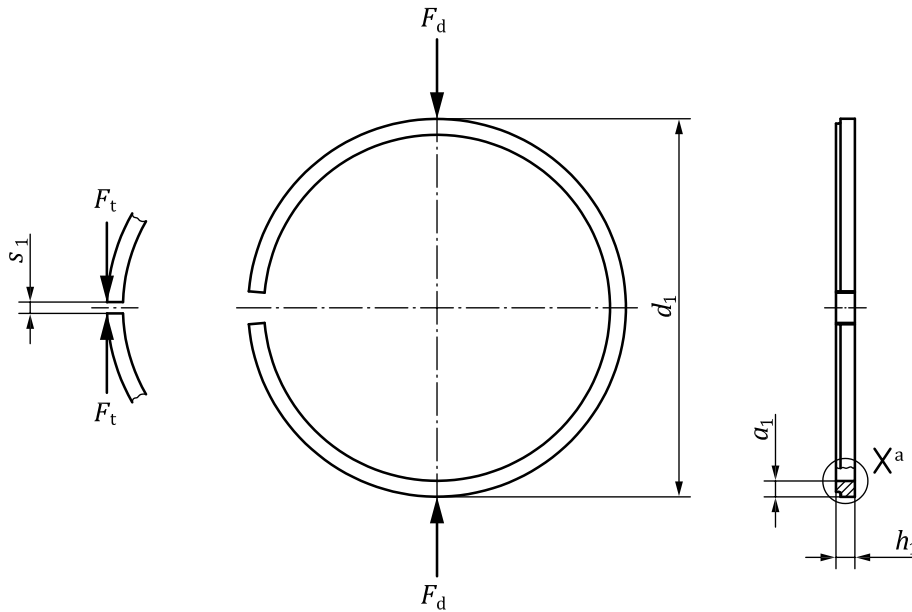
It is also essential that the designer refer to the specifications and requirements of ISO 6621-3<sup>[4]</sup> and ISO 6621-4 before completing his/her selection.

## 4 Ring types and designation examples

### 4.1 Types N, NM, E, and EM scraper rings — General features

The general features of types N, NM, E, and EM scraper rings are shown in [Figure 1](#).

NOTE See [Tables 8](#) and [9](#) for dimensions and forces.



**Key**

a See 4.2, 4.3, 4.4, and 4.5 and Figures 2, 3, 4, and 5 for detail X of N, NM, E, and EM, respectively.

**Figure 1 — Types N, NM, E, and EM**  
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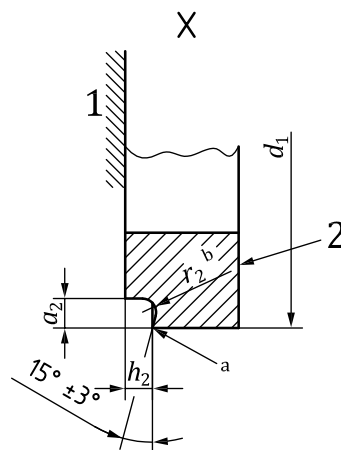
**4.2 Type N**

**4.2.1 Napier ring (undercut step)**

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The general features of type N Napier rings with an undercut step shall be in accordance with Figures 1 and 2, except for rings  $h_1 < 1,5$  mm.



**Key**

- 1 reference plane
- 2 top side identification mark
- a When the ring is closed, this edge shall be in contact with the cylinder bore.
- b See Table 1.

**Figure 2 — Type N (Detail X of Figure 1)**



**Table 1 —  $r_2$  dimensions**

Dimensions in millimetres

| $d_1$                   | $r_2$<br>max. |
|-------------------------|---------------|
| $30 \leq d_1 < 175$     | 0,3           |
| $175 \leq d_1 \leq 200$ | 0,7           |

#### 4.2.2 Designation

EXAMPLE Designation of a piston ring complying with the requirements of ISO 6623, being a cast iron Napier ring with a straight-faced peripheral surface (N), of nominal diameter  $d_1 = 90$  mm (90), of radial wall thickness “regular”, of nominal ring width  $h_1 = 2,5$  mm (2,5), made of non-heat-treated grey cast iron subclass 12 (MC12), and with chamfered internal edges (KI):

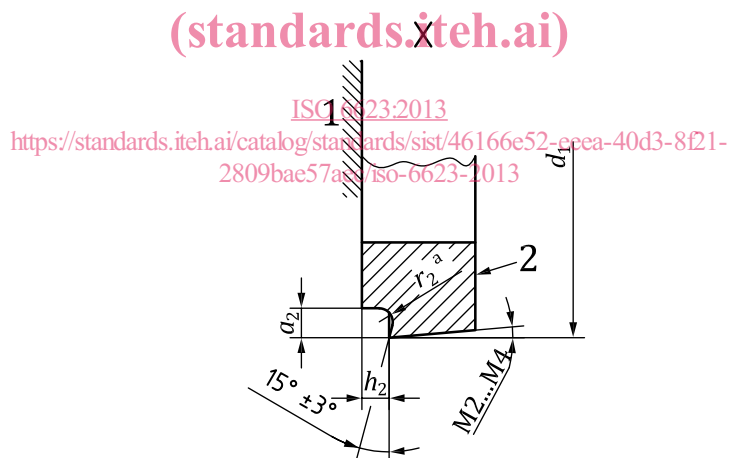
**Piston ring ISO 6623 N - 90 × 2,5 - MC12/KI**

NOTE Parameters in parentheses are used in the ISO ring designation.

#### 4.3 Type NM

##### 4.3.1 Napier ring (undercut step), taper faced

The general features of type NM Napier rings with an undercut step, taper faced, shall be in accordance with [Figures 1](#) and [3](#), except for rings  $h_1 < 1,5$  mm.



#### Key

- 1 reference plane
- 2 top side identification mark
- a See [Table 1](#).

**Figure 3 — Type NM (Detail X of [Figure 1](#))**

Table 2 — Taper

Dimensions in minutes

| Code | Uncoated rings and chromium-plated or spray-coated rings with peripheral surface ground |                        |
|------|---|------------------------|
|      | Taper   | Tolerance <sup>a</sup> |
| M2   | 30  | +60<br>0               |
| M3   | 60  |                        |
| M4   | 90  |                        |

<sup>a</sup> For chromium-plated rings with a tapered peripheral surface that is not ground, the tolerance shall be increased by 10 (e.g. M3 =  $60^{+70}_0$ ).

4.3.2 Designation

EXAMPLE Designation of a piston ring complying with the requirements of ISO 6623, being a cast iron Napier ring with a 90° taper-faced peripheral surface (NM4), of nominal diameter  $d_1 = 90$  mm (90), of radial wall thickness “regular”, of ring width  $h_1 = 2,5$  mm (2,5), made of heat-treated grey cast iron subclass 21 (MC21), and phosphated on all sides (PO):

**Piston ring ISO 6623 NM4 - 90 × 2,5 - MC21/PO**

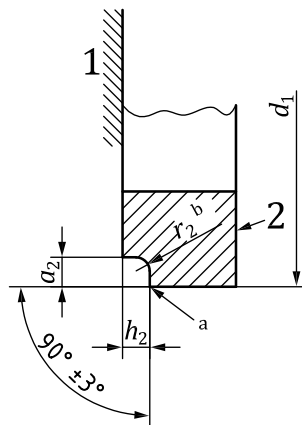
NOTE Parameters in parentheses are used in the ISO ring designation.

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4.4 Type E

4.4.1 Scraper ring (stepped)

The general features of type E stepped scraper rings shall be in accordance with Figures 1 and 4.



Key

- 1 reference plane
- 2 top side identification mark
- a When the ring is closed, this edge shall be in contact with the cylinder bore.
- b See Table 1.

Figure 4 — Type E (Detail X of Figure 1)

#### 4.4.2 Designation

EXAMPLE Designation of a piston ring complying with the requirements of ISO 6623, being a cast iron scraper ring with a straight-faced peripheral surface (E), of nominal diameter  $d_1 = 90$  mm (90), of nominal ring width  $h_1 = 2,5$  mm (2,5), of radial wall thickness “regular”, made of non-heat-treated grey cast iron subclass 12 (MC12), and with an inlaid spray coating on the peripheral surface, and minimum thickness 0,1 mm (SC2F):

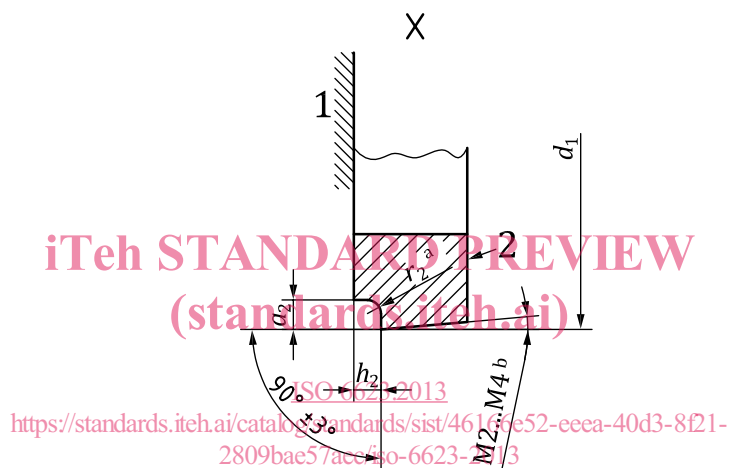
**Piston ring ISO 6623 E - 90 × 2,5 - MC12/SC2F**

NOTE Parameters in parentheses are used in the ISO ring designation.

#### 4.5 Type EM

##### 4.5.1 Scraper ring (stepped), taper faced

The general features of type EM scraper rings, stepped and taper faced, shall be in accordance with [Figures 1](#) and [5](#).



#### Key

- 1 reference plane
- 2 top side identification mark
- a See [Table 1](#).
- b See [Table 2](#).

**Figure 5 — Type EM (Detail X of [Figure 1](#))**

#### 4.5.2 Designation

EXAMPLE Designation of a piston ring complying with the requirements of ISO 6623, being a cast iron scraper ring with a 30° taper-faced peripheral surface (EM2), of nominal diameter  $d_1 = 90$  mm (90), of nominal ring width  $h_1 = 2,5$  mm (2,5), of radial wall thickness “regular”, made of heat-treated grey cast iron subclass 22 (MC22), and with inside chamfered edges (KI):

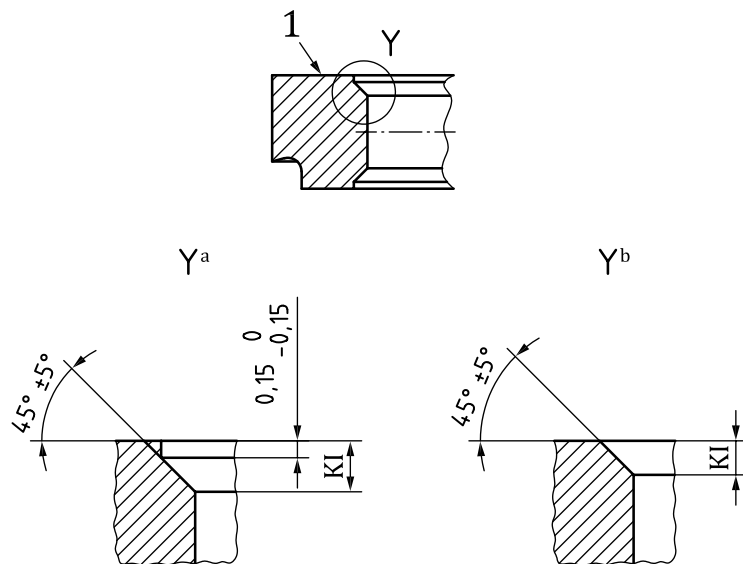
**Piston ring ISO 6623 EM2 - 90 × 2,5 - MC22/KI**

NOTE Parameters in parentheses are used in the ISO ring designation.

5 Common features

5.1 Type N, NM, E, and EM rings — Inside chamfered edges (KI)

Dimensions in millimetres



a) For nominal  $KI \geq 0,3$  b) For nominal  $KI < 0,3$

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Key

1 top side identification mark

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Figure 6 — Inside chamfered edges (KI)

Table 3 — KI dimensions

Dimensions in millimetres

| $d_1$  | KI               |
|--|------------------|
| $30 \leq d_1 < 50$   | 0,2 max.         |
| $50 \leq d_1 < 125$  | $0,3 \pm 0,15^a$ |
| $125 \leq d_1 < 175$   | $0,4 \pm 0,15$   |
| $175 \leq d_1 \leq 200$  | $0,6 \pm 0,2$    |
| <sup>a</sup> KI = 0,2 max. for rings $50 < d_1 < 60$ and $h_1 < 1,5$ |                  |