

DRAFT INTERNATIONAL STANDARD

ISO/DIS 6622-1

ISO/TC 22/SC 34

Secretariat: ANSI

Voting begins on:
2020-04-03

Voting terminates on:
2020-06-26

Internal combustion engines — Piston rings —

Part 1: Rectangular rings made of cast iron

Moteurs à combustion interne — Segments de piston —

Partie 1: Segments rectangulaires en fonte moulée

ICS: 27.020

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Reference number
ISO/DIS 6622-1:2020(E)

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Published in Switzerland

Contents

	Page
Foreword.....	iv
Introduction.....	v
1 Scope (mandatory).....	1
2 Normative references.....	1
3 Overview.....	1
4 Ring types and designation examples.....	1
4.1 Type R — Straight faced rectangular ring.....	1
4.1.1 General features.....	1
4.1.2 Designation.....	2
4.2 Type B — Barrel faced rectangular ring.....	2
4.2.1 General features.....	2
4.2.2 Designation.....	4
4.3 Type BA — Asymmetrical barrel faced rectangular ring $h_1 \geq 1,5$ mm.....	4
4.3.1 General features.....	4
4.3.2 Designation.....	5
4.4 Type M — Taper faced rectangular ring.....	6
4.4.1 General features.....	6
4.4.2 Designation.....	7
5 Common features.....	7
5.1 Face Coating Types.....	7
5.2 Face Shape Types.....	7
5.3 Piston Ring Twist Features.....	7
5.3.1 Taper faced rectangular ring with partly cylindrical machined (LM) or lapped (LP) peripheral surface.....	9
5.4 Chamfered edges.....	10
5.5 Type R, B, BA and M rings (fully faced, semi-inlaid and inlaid) — Plating/coating thickness.....	11
5.6 Type R, B, BA, and M rings — Nitrided case depth.....	12
6 Force factors.....	13
7 Dimensions.....	13
Bibliography.....	26

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).

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For an explanation on 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 the following URL: www.iso.org/iso/foreword.html.

The committee responsible for this document is Technical Committee [or Project Committee] ISO/TC [or ISO/PC] ###, [name of committee], Subcommittee SC ##, [name of subcommittee].

This second/third/... edition cancels and replaces the first/second/... edition (ISO #####:#####), which has been technically revised.

The main changes compared to the previous edition are as follows:

— xxx xxxxxxxx xxx xxx

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

Introduction

ISO 6622 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 6623 [6], ISO 6624 [7], [8], [9], [10], ISO 6625 [11], ISO 6626 [12], [13] and ISO 6627 [14].

The common features and dimensional tables presented in this part of ISO 6622 constitute a broad range of variables and, in selecting a particular ring type, the designer must 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 [4] and ISO 6621-4 before completing selection.

Identification of patent holders, if any.

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Internal combustion engines — Piston rings —

Part 1: Rectangular rings made of cast iron

1 Scope (*mandatory*)

This part of ISO 6622 specifies the essential dimensional features of rectangular rings made of cast iron, Types R, B, BA and M, having diameters up to and including 200 mm, used in reciprocating internal combustion piston engines. It is also applicable to piston rings of compressors working under similar conditions.

2 Normative references

The following referenced documents are indispensable for the application 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 6621-1, *Internal combustion engines — Piston rings — Part 1: Vocabulary*

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

3 Overview

ISO/DIS 6622-1

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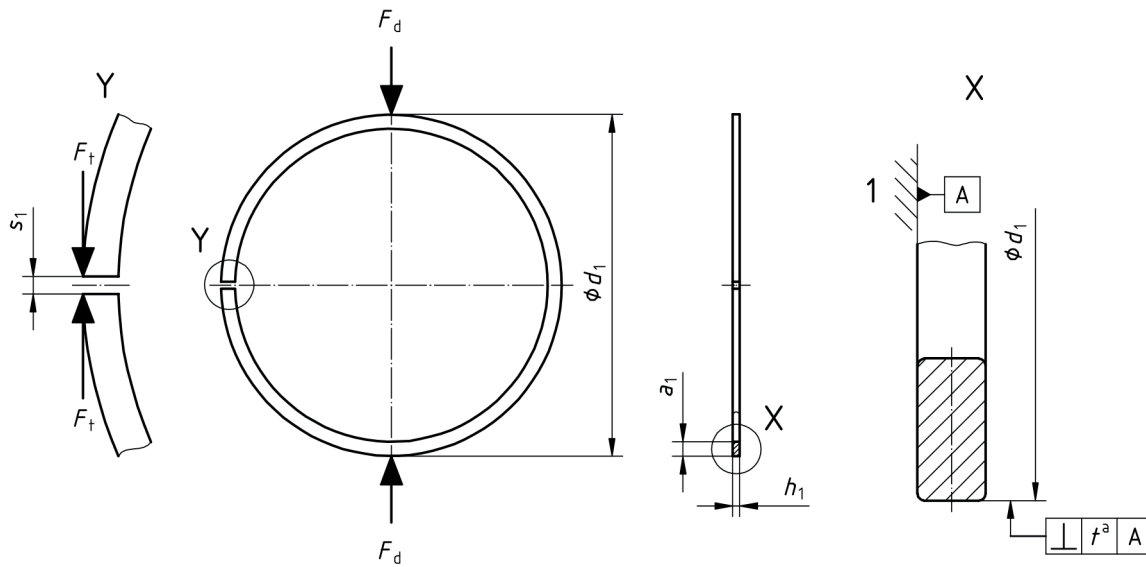
The rectangular ring types are specified in [Tables 1 to 3](#) and [Figures 1 to 4](#). Their common features and the dimensions of those features are specified in [Tables 4 to 9](#) and [Figures 5 to 11](#). [Tables 10](#) and [11](#) give the force factors for the different ring types, while [Tables 12](#) and [13](#) give the dimensions and forces of rectangular rings of radial wall thickness *regular* and thicker “D/22”, respectively.

4 Ring types and designation examples

4.1 Type R — Straight faced rectangular ring

4.1.1 General features

See [Table 12](#) or [13](#) for dimensions and forces.



Key

- 1 reference plane
- a $t = 0,005 \times h_1$.

Figure 1 — Type R
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4.1.2 Designation

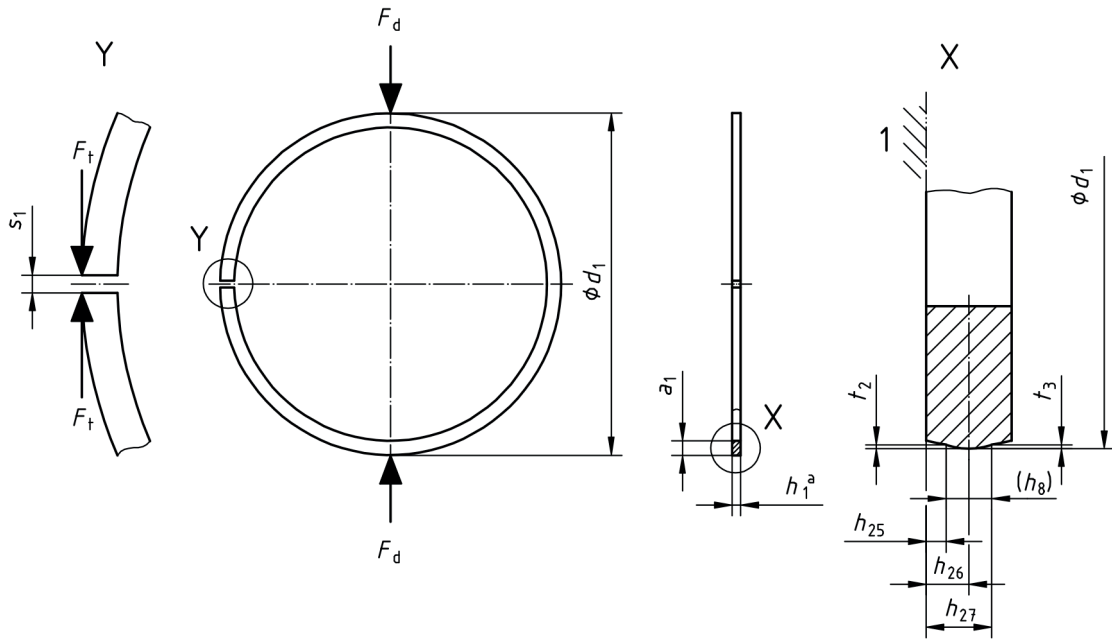
EXAMPLE Designation of a piston ring complying with the requirements of ISO 6622-1, being a rectangular ring made of cast iron, with a straight faced peripheral surface (R), of nominal diameter $d_1 = 90$ mm (90), of nominal ring width $h_1 = 2,5$ mm (2,5), made of non-heat treated grey cast iron, subclass 12 (MC12), phosphated on all sides (PO):

Piston ring ISO 6622-1 R 90 × 2,5 - MC12/PO

4.2 Type B — Barrel faced rectangular ring

4.2.1 General features

See [Table 12](#) or [13](#) for dimensions and forces.



Key

1 reference plane

a See [Table 1](#).

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Figure 2 — Type B

ISO/DIS 6622-1

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Table 1 — Gauge width (h_g) and barrel dimensions for symmetrical barrel faced compression rings

Dimensions in millimetres

h_1	h_{25}^a	h_{26}	h_{26} tolerance	h_{27}	t_2, t_3^b	h_g^c
1,2	0,30	0,60	± 0,20	0,90	0,002...0,012	0,60
1,5	0,35	0,75	± 0,25	1,15	0,003...0,015	0,80
1,75	0,35	0,85	± 0,30	1,35		1,00
2,0	0,40	1,00	± 0,30	1,60		1,20
2,5	0,45	1,25	± 0,40	2,05		1,60
3,0	0,50	1,50	± 0,50	2,50	0,005...0,020	2,00
3,5	0,55	1,75	± 0,50	2,95		2,40
4,0	0,60	2,00	± 0,60	3,40	0,005...0,023	2,80
4,5	0,65	2,25	± 0,60	3,85		3,20

^a h_{25} may be lowered for rings with reduced edge dimensions.
^b t_2 and/or t_3 can be changed as agreed between edge dimensions.
^c Gauge width (h_g) only informative; may be used only if agreed between manufacturer and client.

4.2.2 Designation

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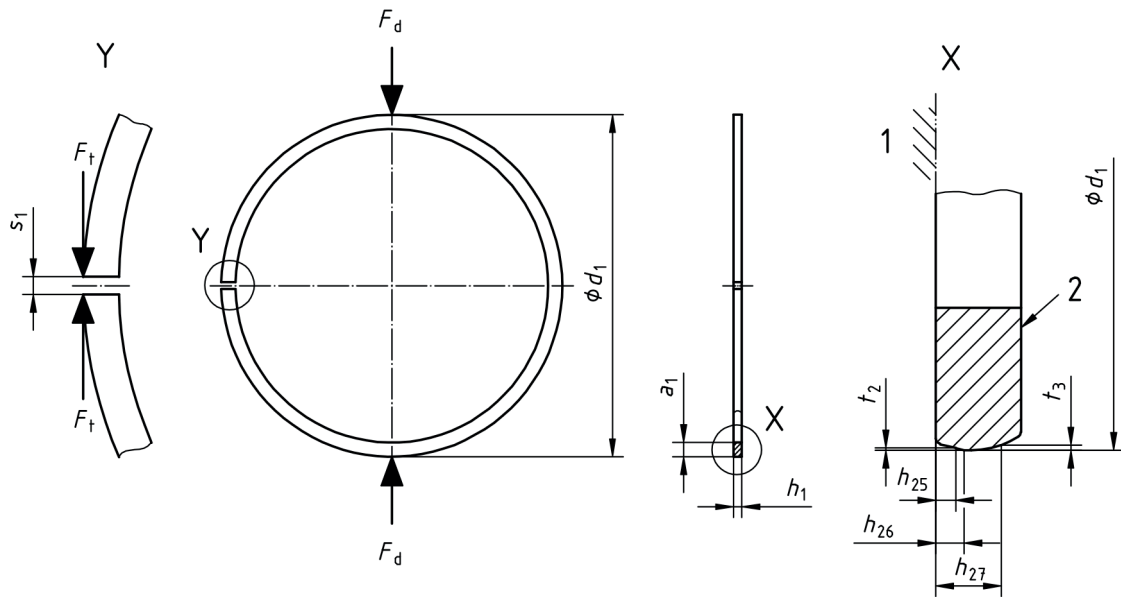
EXAMPLE Designation of a piston ring complying with the requirements of ISO 6622-1, being a rectangular ring made of cast iron, with a barrel faced peripheral surface (B), of nominal diameter $d_1 = 90$ mm (90), of nominal width $h_1 = 2,5$ mm (2,5), made of heat-treated martensitic spheroidal graphite cast iron, subclass 51 (MC51), with a chromium plated coating on the peripheral surface, and of minimum thickness 0,15 mm (CR3):

Piston ring ISO 6622-1 - B 90 × 2,5 - MC51/CR3

4.3 Type BA — Asymmetrical barrel faced rectangular ring $h_1 \geq 1,5$ mm

4.3.1 General features

See [Table 12](#) or [13](#) for dimensions and forces.

**Key**

- 1 reference plane
- 2 top side identification mark

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Figure 3 — Type BA
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Table 2 — Asymmetrical barrel dimensions

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Dimensions in millimetres

h_1	h_{25}^a	h_{26}	h_{26} tol.	h_{27}	t_2^b	t_3^b
1,2	0,20 ^c	0,35	± 0,15	0,80	0...0,005	0,005...0,016
	0,28	0,43				
1,5	0,35	0,50	± 0,15	1,15	0...0,007	0,007...0,022
1,75	0,35	0,55	± 0,20	1,35		0,008...0,025
2,0	0,40	0,60		1,50	0,009...0,030	
2,5	0,45	0,70	± 0,25	1,80	0...0,008	0,011...0,035
3,0	0,55	0,80		2,10		0,012...0,038
3,5	0,60	0,90	± 0,30	2,40	0...0,009	0,012...0,040
4,0	0,65	0,95		2,80		0,013... 0,045
4,5	0,70	1,05	± 0,35	3,20	0...0,010	0,015... 0,050

^a h_{25} may be lowered for rings with reduced edge dimensions.

^b t_2 and/or t_3 may be varied as agreed between manufacturer and client.

^c Recommended for bottom edge smaller than 0,2 mm.

4.3.2 Designation

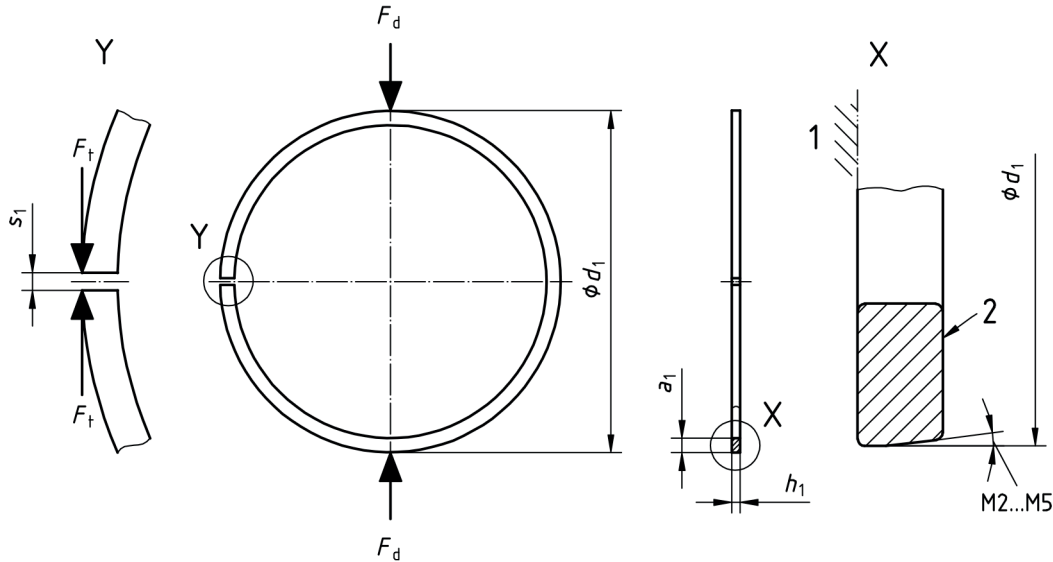
EXAMPLE Designation of a piston ring complying with the requirements of ISO 6622-1, being a rectangular ring made of cast iron, with an asymmetrical barrel faced peripheral surface (BA), of nominal diameter $d_1 = 90$ mm (90), of nominal width $h_1 = 2,5$ mm (2,5), made of heat-treated martensitic spheroidal graphite cast iron subclass 51 (MC51), and having a chromium plated coating on the peripheral surface with a minimum thickness of 0,15 mm (CR3):

Piston ring ISO 6622-1 BA 90 × 2,5 - MC51/CR3

4.4 Type M — Taper faced rectangular ring

4.4.1 General features

See Table 12 or 13 for dimensions and forces.



- Key
- 1 reference plane
- 2 top side identification mark

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Figure 4 — Type M
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Table 3 — Taper

Dimensions in minutes

Code	Uncoated rings with peripheral surface turned and chromium plated or spray coated rings with peripheral surface ground and chromium plated rings with surface not ground ^a					
	Taper	Tolerance	with IF or IW (top side) ^b		with IFU or IWU (bottom side) ^{b, c}	
			Taper	Tolerance	Taper	Tolerance ^d
M1 ^c	10	$\begin{matrix} +40 \\ 0 \end{matrix}$	10	$\begin{matrix} +60 \\ 0 \end{matrix}$	—	—
M2	30	$\begin{matrix} +50 \\ 0 \end{matrix}$	30		—	—
M3	60		60		60	$\begin{matrix} +60 \\ 0 \end{matrix}$
M4	90		90		90	
M5	120		120		120	

^a For chromium plated rings with tapered peripheral surface not ground, the tolerance shall be increased by 10 (e.g. M3 = 60: $\begin{matrix} +60 \\ 0 \end{matrix}$ for M rings or $\begin{matrix} +70 \\ 0 \end{matrix}$ for M rings (negative twist type) with IF or IW and IFU or IWU).

^b IF and IW, and IFU and IWU, are explained in Figures 10 to 13.

^c M1 should not be used for rings of width < 1,5 mm or for those with a partly cylindrical peripheral surface.

^d For M rings (negative twist type) M3, M4 and M5, the twist angle should not exceed 90 % of the minimum taper angle.