INTERNATIONAL STANDARD

ISO 6622-1

Second edition
2003-12-01

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

Reference number
ISO 6622-1:2003(E)

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Published in Switzerland

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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 2.

The main task of technical committees is to prepare International Standards. 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 document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 6622-1 was prepared by Technical Committee ISO/TC 22, *Road vehicles*.

This second edition cancels and replaces the first edition (ISO 6622-1:1986), which has been technically revised.

ISO 6622 consists of the following parts, under the general title *Internal combustion engines — Piston rings*:

— *Part 1: Rectangular rings made of cast iron*

— *Part 2: Rectangular rings made of steel*

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.

Internal combustion engines — Piston rings —

Part 1: Rectangular rings made of cast iron

1 Scope

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

3 Overview

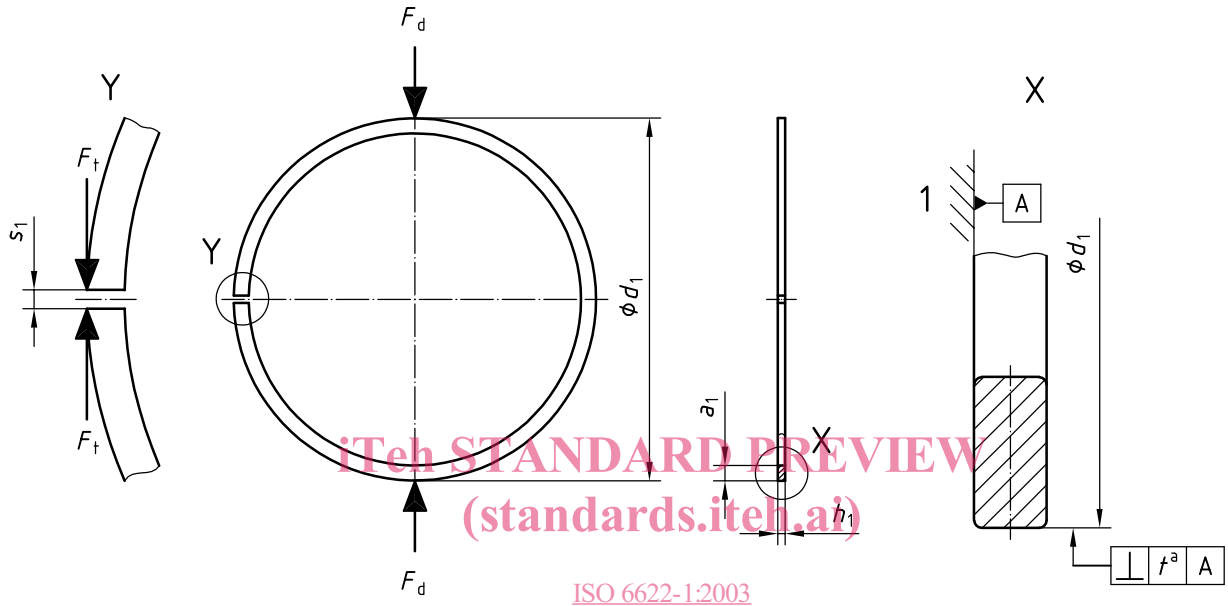
The rectangular ring types are specified in Tables 1 to 3 and Figures 1 to 4. Their common features and the dimensions of those features are specified in Tables 4 to 8 and Figures 5 to 31. Tables 9 and 10 give the force factors for the different ring types, while Tables 11 and 12 give the dimensions and forces of rectangular rings of radial wall thickness *regular* and *D/22*, respectively.

4 Ring types and designation examples

4.1 Type R — Straight faced rectangular ring

4.1.1 General features

See Table 11 or 12 for dimensions and forces.



Key

1 reference plane

a $t = 0{,}005 \times h_1$.

Figure 1 — Type R

4.1.2 Designation

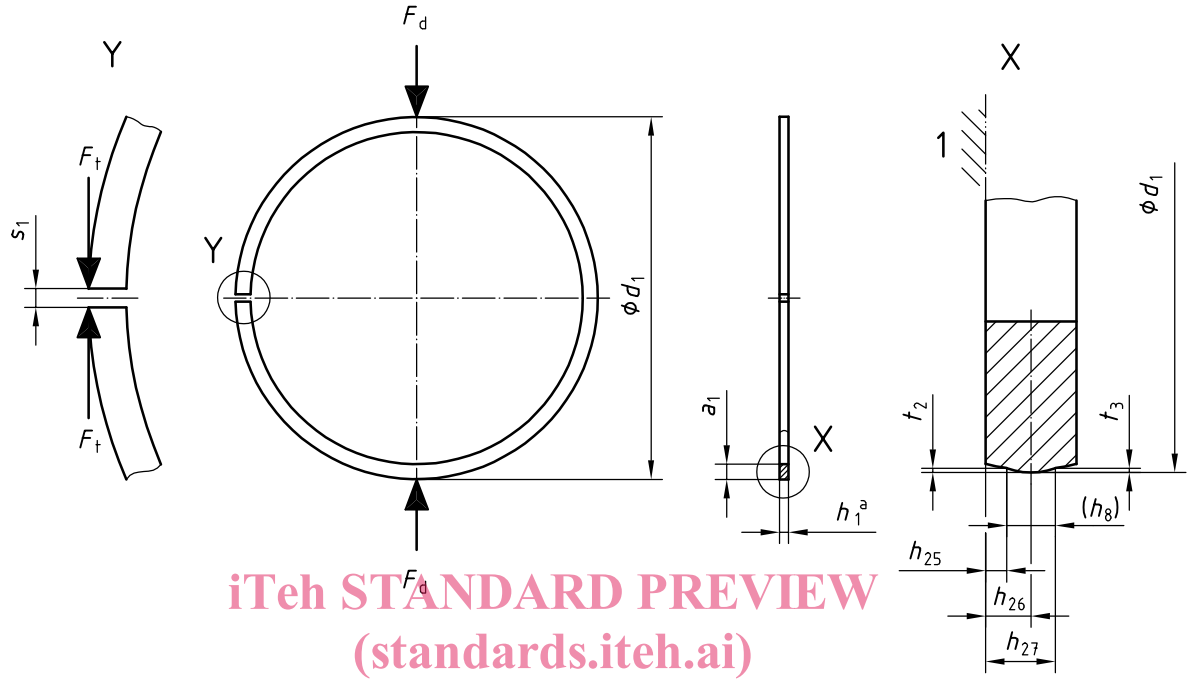
EXAMPLE Designation of a piston ring complying with the requirements of ISO 6622-1, being a rectangular ring made of cast iron, with a straight faced peripheral surface (R), of nominal diameter d_1 = 90 mm (90), of nominal ring width h_1 = 2,5 mm (2,5), made of non heat treated grey cast iron, subclass 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 11 or 12 for dimensions and forces.



Key

1 reference plane

a See Table 1.

Figure 2 — Type B

Table 1 — Gauge width (h_8) and barrel dimensions for symmetrical barrel faced compression rings

Dimensions in millimetres

h_1	h_{25} [a]	h_{26}	h_{26} tol.	h_{27}	t_2, t_3 [b]	h_8 [c]
1,2	0,30	0,60	± 0,20	0,90	0,003...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_8) only informative; may be used only if agreed between manufacturer and client.

4.2.2 Designation

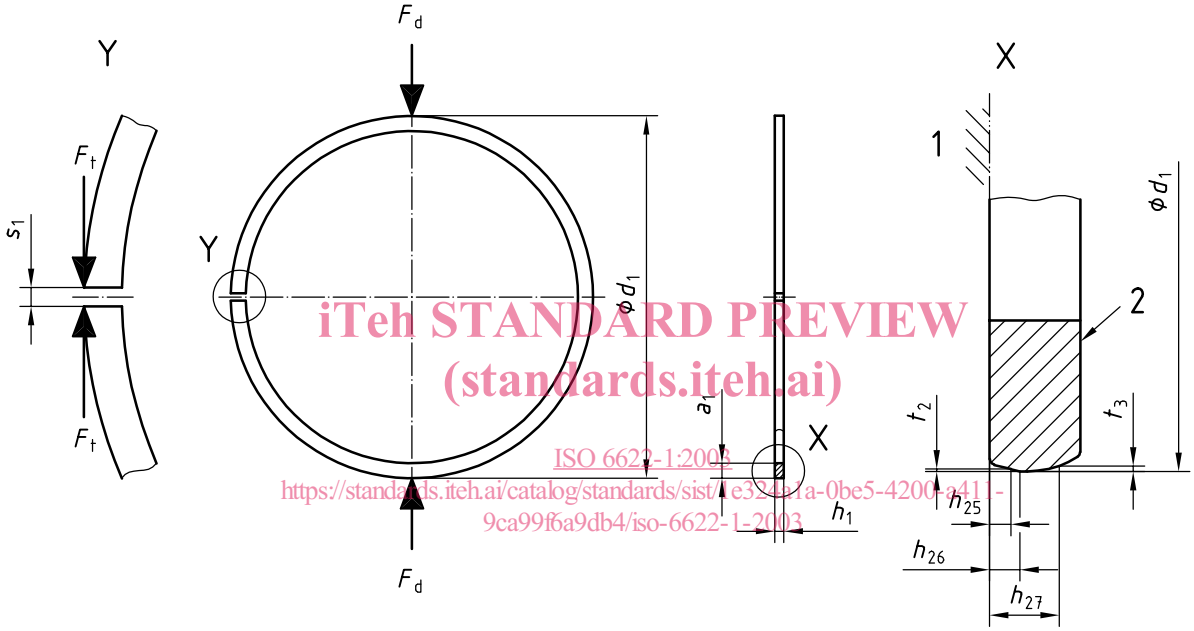
EXAMPLE Designation of a piston ring complying with the requirements of ISO 6622-1, being a rectangular ring made of cast iron, with a barrel faced peripheral surface (B), of nominal diameter d_1 = 90 mm (90), of nominal width h_1 = 2,5 mm (2,5), made of heat-treated martensitic spheroidal graphite cast 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 $h_1 \geqslant 1{,}5$ mm

4.3.1 General features

See Table 11 or 12 for dimensions and forces.



Key

1 reference plane
2 mark

Figure 3 — Type BA

Table 2 — Barrel dimensions

Dimensions in millimetres

h_1	h_{25}[a]	h_{26}	h_{26} tol.	h_{27}	t_2[b]	t_3[b]
1,5	0,35	0,50	± 0,15	1,15	0…0,005	0,007…0,022
1,75	0,35	0,55	± 0,20	1,35	0…0,007	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.

4.3.2 Designation

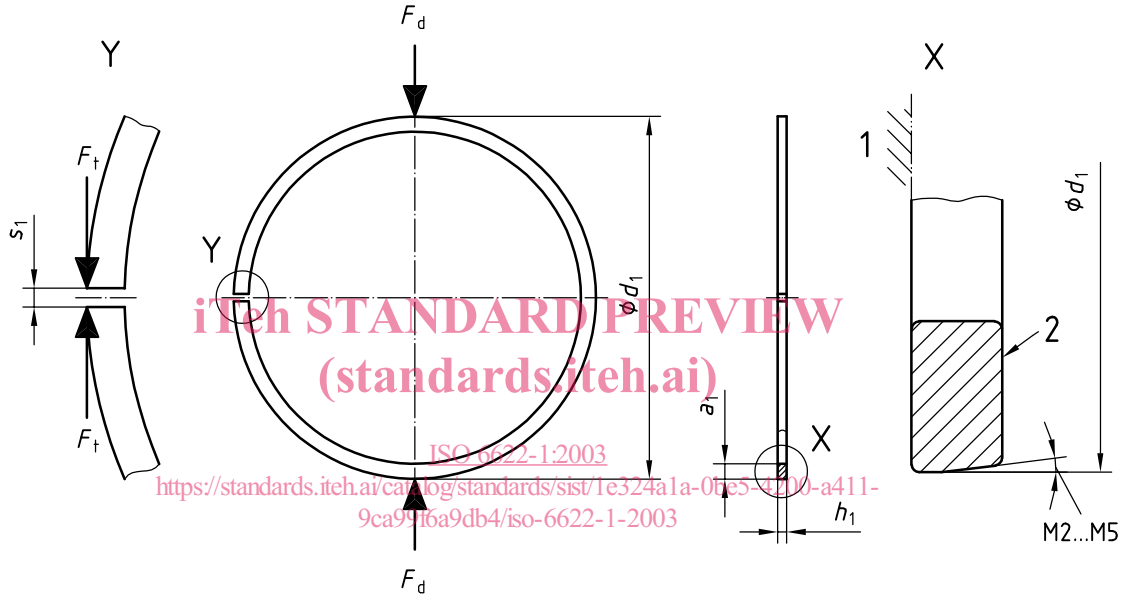
EXAMPLE Designation of a piston ring complying with the requirements of ISO 6622-1, being a rectangular ring made of cast iron, with an asymmetrical barrel faced peripheral surface (BA), of nominal diameter d_1 = 90 mm (90), of nominal width h_1 = 2,5 mm (2,5), made of heat-treated martensitic spheroidal 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 11 or 12 for dimensions and forces.



Key

1 reference plane
2 mark

Figure 4 — Type M

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	$^{+40}_{0}$	10	$^{+60}_{0}$	—	—
M2	30	$^{+50}_{0}$	30		—	—
M3	60		60		60	$^{+60}_{0}$
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: $^{+60}_{0}$ for M rings or $^{+70}_{0}$ for M rings with IF or IW and IFU or IWU).

[b] IF and IW, and IFU and IWU, are explained in Figures 22 to 25.

[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.

4.4.2 Designation

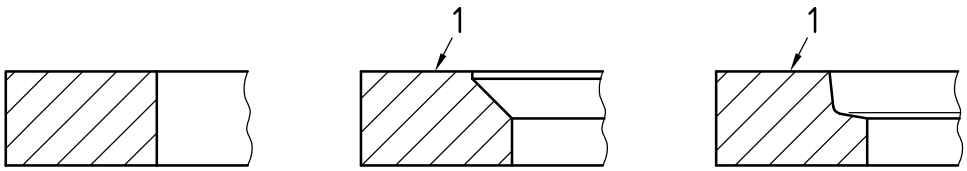
EXAMPLE Designation of a piston ring complying with the requirements of ISO 6622-1, being a rectangular ring made of cast iron, with a 10' taper faced peripheral surface (M1), of diameter d_1 = 90 mm (90), of nominal width h_1 = 2,5 mm (2,5), made of heat treated grey cast iron, subclass 23 (MC23) and having an inlaid spray coating on the peripheral surface with a minimum thickness of 0,1 mm (SC2F):

Piston ring ISO 6622-1 M1 90 × 2,5 - MC23/SC2F

5 Common features

5.1 Type R — Straight faced rectangular ring

5.1.1 Uncoated rings



Key

1 mark

Figure 5 — Uncoated Type R rings