
**Internal combustion engines —
Piston rings —**

**Part 1:
Vocabulary**

*Moteurs à combustion interne — Segments de piston —
Partie 1: Vocabulaire*

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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).

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

This document was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 34, *Propulsion, powertrain and powertrain fluids*.

This third edition cancels and replaces the second edition (ISO 6626-1:2007), which has been technically revised. The main changes compared to the previous edition are as follows:

- Annex A was updated with improved translations in Portuguese, Japanese and Russian and a new term “witness line” was added; and
- Figure quality was improved.

Introduction

ISO 6621 is one of the series of International Standards dealing with piston rings for reciprocating internal combustion engines. Others are ISO 6622[6][7], ISO 6623:2013[8] , ISO 6624[9][10][11][12], ISO 6625:1986[13], ISO 6626[14][15][16][17] and ISO 6627:2011[18].

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Internal combustion engines — Piston rings —

Part 1: Vocabulary

1 Scope

This document defines the most commonly used terms for piston rings. These terms designate either types of piston rings or certain characteristics and phenomena of piston rings.

The terms and definitions in this document apply to piston rings for reciprocating internal combustion engines. They may also be used for piston rings of compressors working under analogous conditions.

NOTE 1 Further terms and definitions covering measuring principles are given in ISO 6621-2:2003.

NOTE 2 This document gives the equivalent terms in the Chinese, English, French, German, Italian, Japanese, Portuguese, Russian and Spanish language.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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

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

3.1 Types of piston ring

3.1.1

piston ring

outward expanding annular ferrous spring, fitting into a piston groove, sealing against pressure differential of gases or liquids between the peripheral and side faces of the ring and the bore and piston groove respectively

3.1.2

single-piece ring

piston ring (3.1.1) formed from only one part that is intended for installation in a single ring groove

3.1.3

multi-piece ring

piston ring (3.1.1) comprising two or more component parts that are intended for installation in a single ring groove

3.1.4

compression ring

piston ring (3.1.1) whose primary purpose is to prevent leakage of gas past the piston

3.1.5

oil control ring

piston ring (3.1.1) with oil return slots or an equivalent whose primary purpose is to scrape oil from the cylinder wall

3.1.6

rectangular ring

compression ring (3.1.4) with a rectangular cross-section whose geometrically simple form provides an adequate seal under normal engine operating conditions

3.1.7

keystone ring

compression ring (3.1.4) with both sides tapered

Note 1 to entry: The keystone ring is used in those cases when the ring sticking can be expected. Due to its wedge shape, any radial movement of the ring will alter its axial clearance and thus minimize the build-up of combustion residues.

3.1.8

half keystone ring

compression ring (3.1.4) with one side face tapered

Note 1 to entry: Usually, the tapered side face is the one that faces the combustion chamber.

3.1.9

scraper ring

ring with a rectangular shaped step on the lower peripheral edge to scrape oil from the cylinder wall

Note 1 to entry: It can also act as a lower *compression ring* (3.1.4).

3.1.10

Napier ring

scraper ring (3.1.9) with a radiused undercut step

3.1.11

slotted oil control ring

oil control ring (3.1.5) with parallel side faces and two contact lands

Note 1 to entry: Due to the narrow lands of this type of ring, a high unit pressure is achieved.

3.1.12

bevelled-edge oil control ring

slotted oil control ring (3.1.11) with lands that are chamfered on their outer edges

Note 1 to entry: The peripheral edges of both lands are chamfered in order to achieve a further increase in unit pressure and thereby a better oil scraping effect.

3.1.13

double-bevelled oil control ring

slotted oil control ring (3.1.11) with lands that are chamfered on their upward facing edges

Note 1 to entry: By chamfering the edges of both lands in the same direction, the oil scraping effect is even further improved.

3.1.14

coil-spring-loaded slotted oil control ring

slotted oil control ring (3.1.11) whose radial pressure is increased by means of a cylindrical coil spring

Note 1 to entry: This spring acts equally in all directions against the inside of the ring.

3.1.15

coil-spring-loaded bevelled-edge oil control ring

coil-spring-loaded slotted oil control ring (3.1.14) with lands that are chamfered on their outer edges

3.1.16**coil-spring-loaded double-bevelled oil control ring**

coil-spring-loaded slotted oil control ring (3.1.14) with lands that are chamfered on their upward facing edges

3.1.17**coil-spring-loaded bevelled-edge chromium-plated oil control ring**

coil-spring-loaded slotted oil control ring (3.1.14) with lands that are chromium-plated and chamfered on their inner and outer edges

Note 1 to entry: May or may not be profile ground.

3.1.18**expander/segment oil control ring**

multi-piece (3.1.3) oil control ring comprised of an expander-spacer and two segments

Note 1 to entry: Expander-spacer design will vary with manufacturer.

3.2 Physical characteristics of rings**3.2.1****nominal ring diameter**

nominal diameter, d_1 , identical to the nominal cylinder bore, in accordance with ISO 286-1

3.2.2**witness line**

narrow continuous line of contact lapped on the peripheral surface of the ring which can be seen around the circumference with normal vision

3.2.3**joint**

location on a *piston ring* (3.1.1) where the butt ends come together

3.2.4**butting**

touching of the two ring gap faces

3.2.5**effective free gap**

free gap, m , minus the measured closed gap, s_1

Note 1 to entry: See [Figure 2](#) for m ; see [Figure 3](#) for s_1 .

Note 2 to entry: Free gap used in the formulae for calculation of E value, tangential force, F_t , diametral force, F_d , and stresses.

3.2.6**pressure pattern**

contact pressure distribution around the circumference of the ring when closed in its nominal cylinder bore

3.2.7**contact pressure**

pressure that a ring exerts radially against the cylinder wall

Note 1 to entry: Pressure is expressed in N/mm².

3.2.8

pin point

burry light

intermittent pinpoints of bright light or hazy light, but not bright direct light, observed in the test for light-tightness

3.3 Piston part

3.3.1

ring groove

groove in the piston in which the *piston ring* ([3.1.1](#)) is fitted

3.4 Measuring devices

3.4.1

ring gauge

solid annular gauge having an inside diameter of the nominal cylinder bore

3.4.2

reference plane (datum surface)

plane on which the *piston ring* ([3.1.1](#)) is placed for measurements, except where otherwise specified

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4 Piston ring classification

See [Figure 1](#) for piston ring classification.

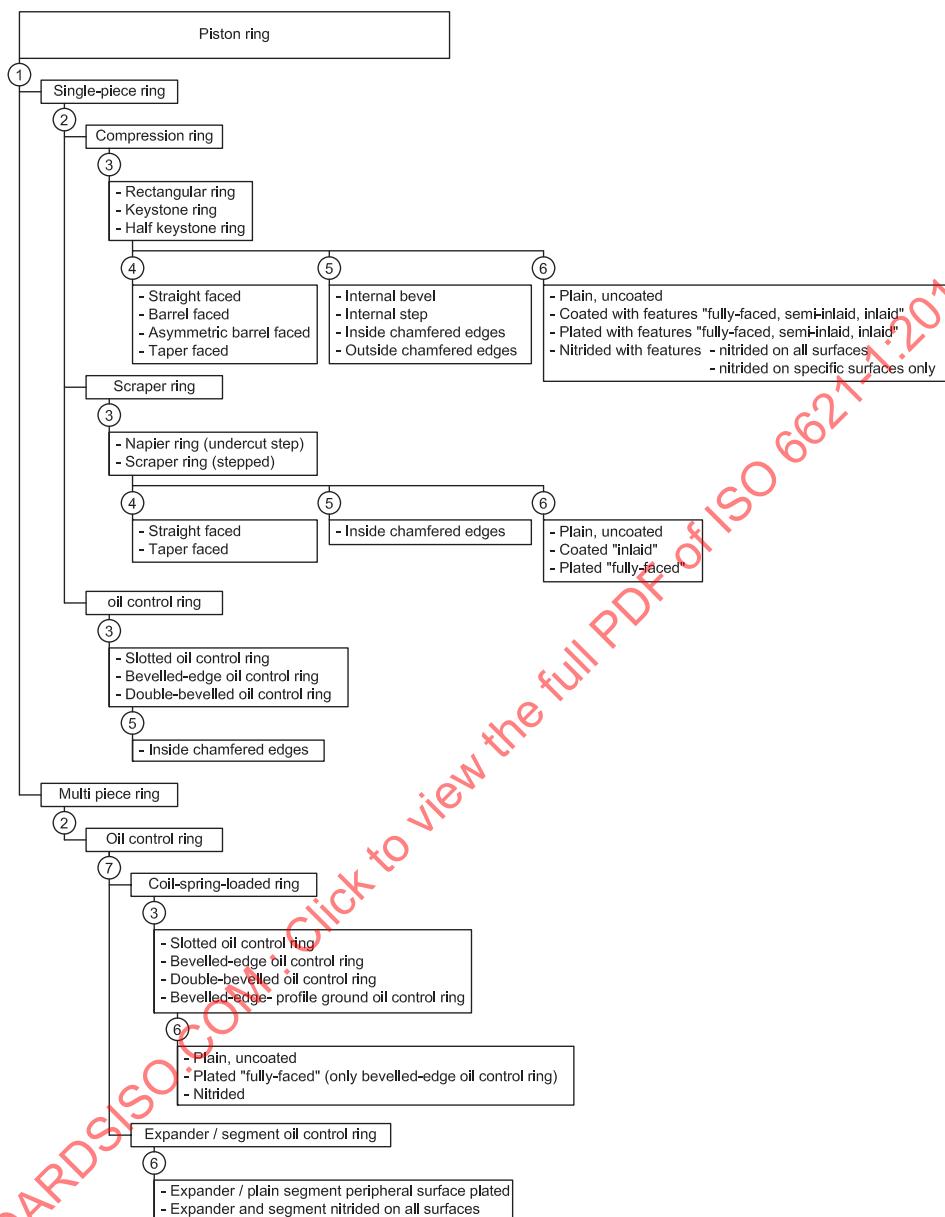


Figure 1 — Piston ring classification

Key

- 1 construction
- 2 function
- 3 cross-section configuration
- 4 peripheral surface configuration
- 5 edge configuration
- 6 surface layer configuration
- 7 spring type

5 Piston ring types

5.1 Cross-section configuration

The more common cross-section configurations in general use are shown in [Table 1](#). Combinations of configurations listed in [Tables 2 to 5](#) along with those in [Table 1](#) are shown as “common features” in the relevant International Standards referenced in each table.

Table 1 — Cross-section configuration

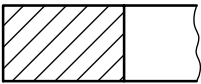
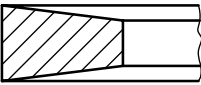
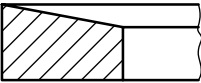
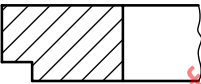
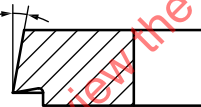
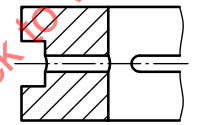
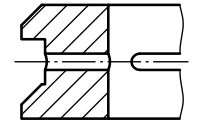
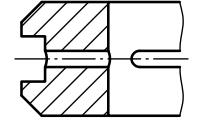
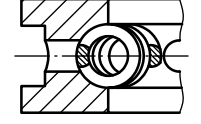
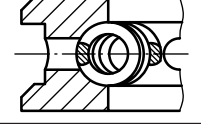
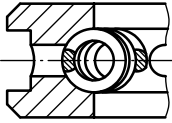
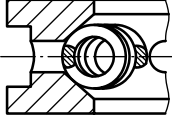
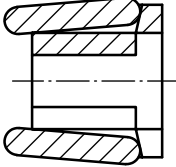
Type	Cross-section	Relevant International Standards
Rectangular ring		ISO 6622-1:2003 ISO 6622-2:2013
Keystone ring		ISO 6624-1:2017, ISO 6624-3:2017
Half keystone ring		ISO 6624-2:2016 ISO 6624-4:2016
Scraper ring (stepped)		ISO 6623:2013
Napier ring (undercut stepped)		ISO 6623:2013
Slotted oil control ring		ISO 6625:1986
Double-bevelled-edge oil control ring		ISO 6625:1986
Bevelled-edge oil control ring		ISO 6625:1986
Coil-spring-loaded slotted oil control ring		ISO 6626-1, ISO 6626-2
Coil-spring-loaded double-bevelled-edge oil control ring		ISO 6626-1, ISO 6626-2

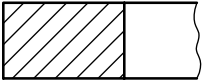
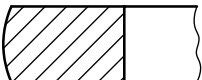
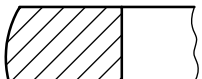
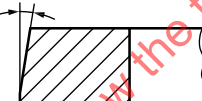
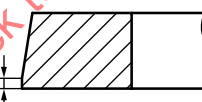
Table 1 (continued)

Type	Cross-section	Relevant International Standards
Coil-spring-loaded bevelled-edge oil control ring		ISO 6626-1, ISO 6626-2
Steel oil control ring with V-groove		ISO 6626-3:2008
Expander/segment oil control ring		ISO 6627:2011

5.2 Peripheral surface configuration

The more common peripheral surface configurations in general use are shown in [Table 2](#).

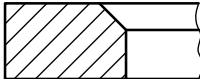
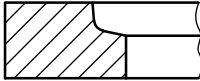
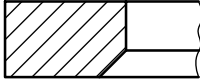
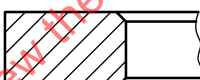
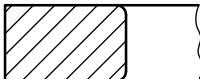
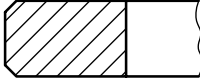
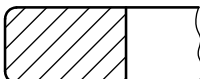
Table 2 — Peripheral surface configuration

Configuration	Cross-section	Relevant International Standards
Peripheral surface straight-faced		ISO 6622-1:2003/ ISO 6622-2:2013, ISO 6623:2013, ISO 6624-1:2017/ ISO 6624-2:2016, ISO 6624-3:2017/ ISO 6624-4:2016
Peripheral surface symmetric barrel-faced		ISO 6622-1:2003/ ISO 6622-2:2013, ISO 6624-1:2017/ ISO 6624-2:2016, ISO 6624-3:2017/ ISO 6624-4:2016
Peripheral surface asymmetric barrel-faced		ISO 6622-1:2003/ ISO 6622-2:2013, ISO 6624-1:2017/ ISO 6624-3:2017,
Peripheral surface-taper-faced		ISO 6622-1:2003 ISO 6622-2:2013, ISO 6623:2013/ ISO 6624-1:2017, ISO 6624-3:2017
Peripheral surface-taper-faced partially cylindrical-machined or -lapped		ISO 6622-1:2003/ ISO 6622-2:2013, ISO 6623/ ISO 6624-1:2017, ISO 6624-3:2017

5.3 Edge configuration

The more common edge configurations in general use are shown in [Table 3](#).

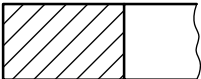
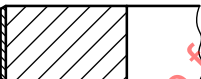
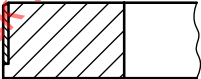
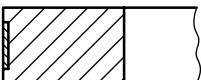
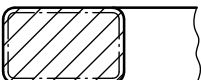
Table 3 — Edge configuration

Configuration	Cross-section	Relevant International Standard
Internal bevel top side (positive twist type)		ISO 6622-1:2003/ ISO 6622-2:2013, ISO 6624-1:2017/ ISO 6624-3:2017,
Internal step top side (positive twist type)		ISO 6622-1:2003, ISO 6624-1:2017
Internal bevel bottom side (negative twist type)		ISO 6622-1:2003, ISO 6622-2:2013
Internal step bottom side (negative twist type)		ISO 6622-1:2003
Inside edges chamfered		ISO 6622-1:2003/ ISO 6623, ISO 6624-1:2017/ ISO 6624-2:2016, ISO 6625:1986
Inside edges rounded		ISO 6622-2:2013, ISO 6624-3:2017/ ISO 6624-4:2016
Outside edges chamfered		ISO 6622-1:2003, ISO 6624-2:2016
Outside edges rounded		ISO 6622-2:2013, ISO 6624-3:2017/ ISO 6624-4:2016

5.4 Coated, plated and nitrided surfaces configuration

The more common coated, plated and nitrided surface configurations in general use are shown in [Table 4](#).

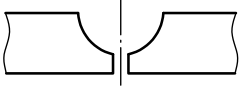
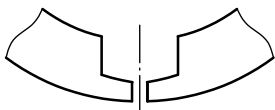
Table 4 — Surface layer configuration

Configuration	Cross-section	Relevant International Standards
Peripheral surface plain, i.e. uncoated, unplated and not nitrided		ISO 6622-1:2003/ ISO 6623, ISO 6624-1:2017/ ISO 6624-2:2016, ISO 6625:1986, ISO 6626-1/ISO 6626-2
Peripheral surface-coated or -plated “fully-faced configuration”		ISO 6622-1:2003/ ISO 6622-2:2013, ISO 6623/ ISO 6624-1:2017, ISO 6624-2:2016/ ISO 6624-3:2017, ISO 6624-4:2016/ ISO 6626-1, ISO 6626-2/ ISO 6627:2011
Peripheral surface-coated or -plated “semi-inlaid configuration”		ISO 6622-1:2003, ISO 6624-1:2017/ ISO 6624-2:2016
Peripheral surface-coated or -plated “inlaid configuration”		ISO 6622-1:2003/ ISO 6622-2:2013, ISO 6623/ ISO 6624-1:2017, ISO 6624-2:2016/ ISO 6624-3:2017, ISO 6624-4:2016
Piston-ring-nitrided on all surfaces		ISO 6622-2:2013/ ISO 6624-3:2017, ISO 6624-4:2016/ ISO 6627:2011/ ISO 6626-3:2008
Piston-ring-nitrided on specific surfaces only (e.g. “peripheral surface only”)		ISO 6624-3:2017/ ISO 6624-4:2016

5.5 Joint configuration

The more common joint configurations in general use are shown in [Table 5](#).

Table 5 — Joint configuration

Configuration	Joint configuration	Relevant International Standards
Joint with side notch		ISO 6621-4:2015
Joint with internal notch		ISO 6621-4:2015

6 Piston ring nomenclature

6.1 Free (unstressed) ring

Terms commonly used to describe free (unstressed) rings are shown in [Figure 2](#).

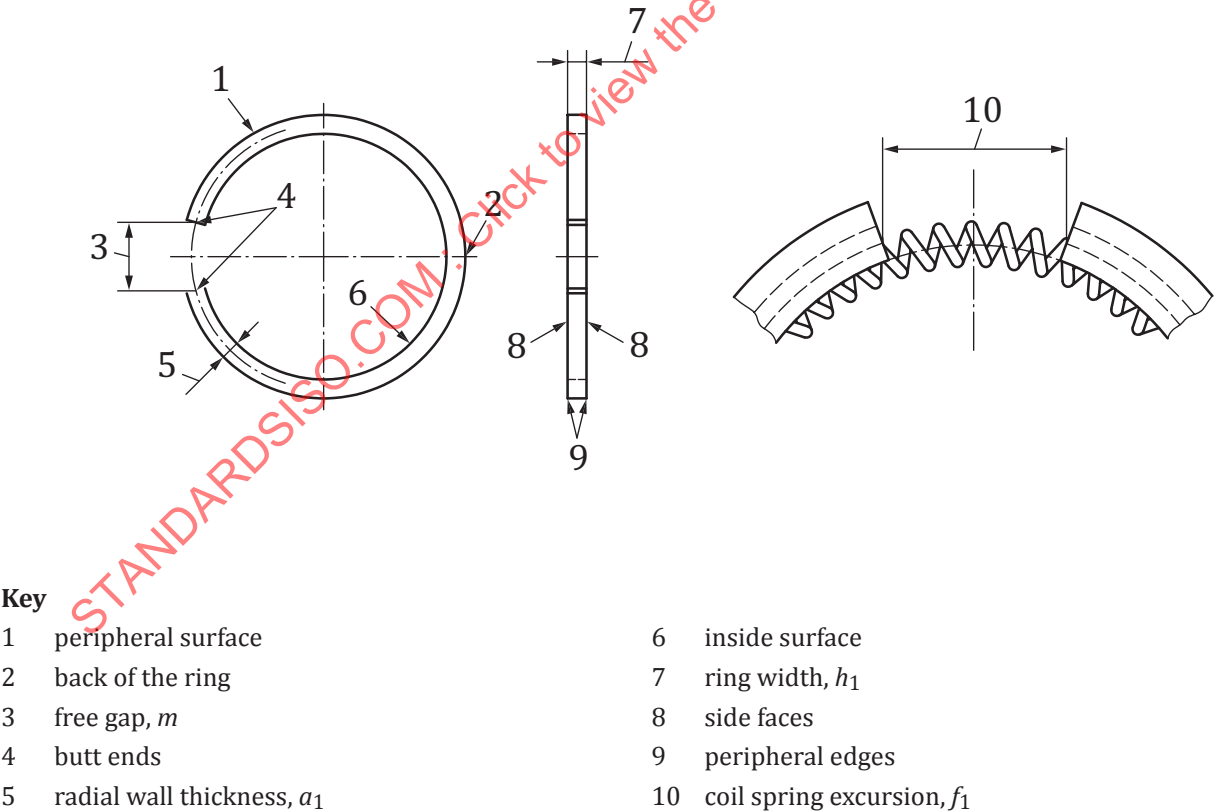
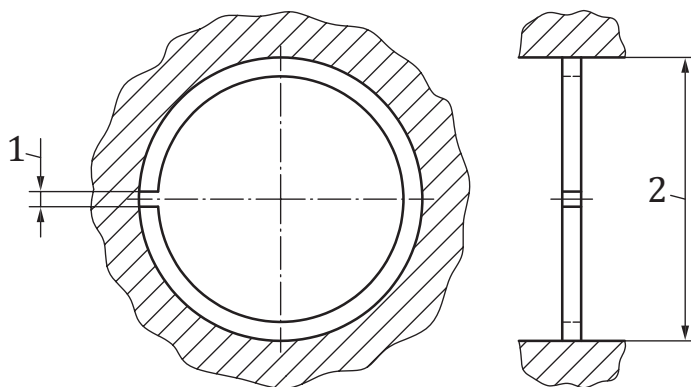


Figure 2 — (Unstressed) ring

6.2 Closed ring

Additional terms commonly used to describe closed rings are shown in [Figure 3](#).



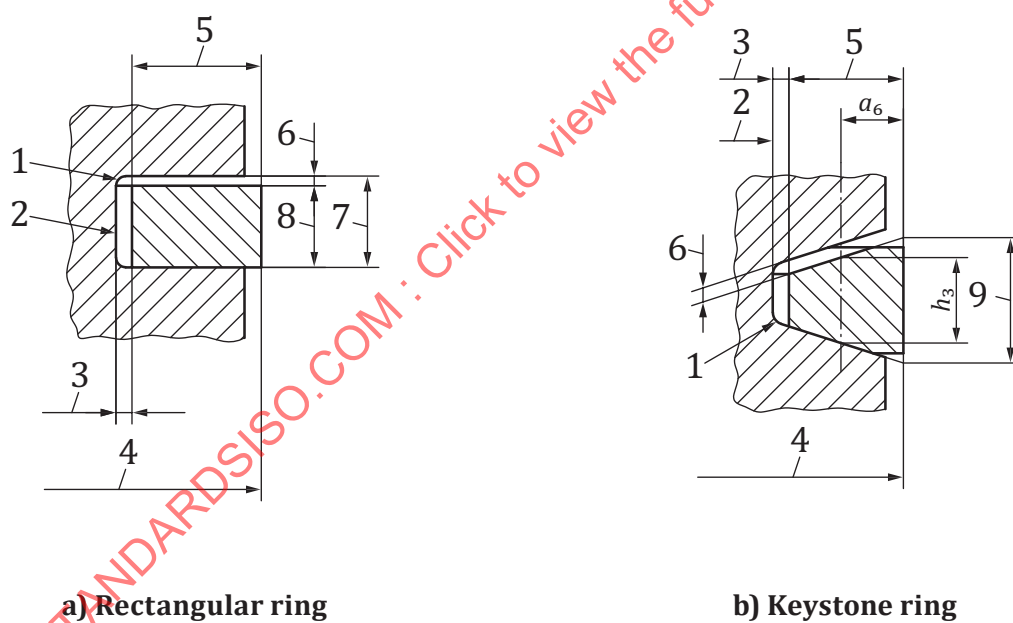
Key

- 1 closed gap, s_1
- 2 cylinder bore/nominal ring diameter, d_1

Figure 3 — Closed ring

6.3 Assembled ring in closed condition

Terms commonly used to describe piston rings assembled in the piston groove are shown in [Figure 4](#).



Key

- | | |
|--------------------------------|-----------------------------|
| 1 groove root radius | 6 side clearance |
| 2 groove root diameter | 7 groove width |
| 3 radial clearance | 8 ring width, h_1 |
| 4 nominal diameter, d_1 | 9 nominal ring width, h_1 |
| 5 radial wall thickness, a_1 | |

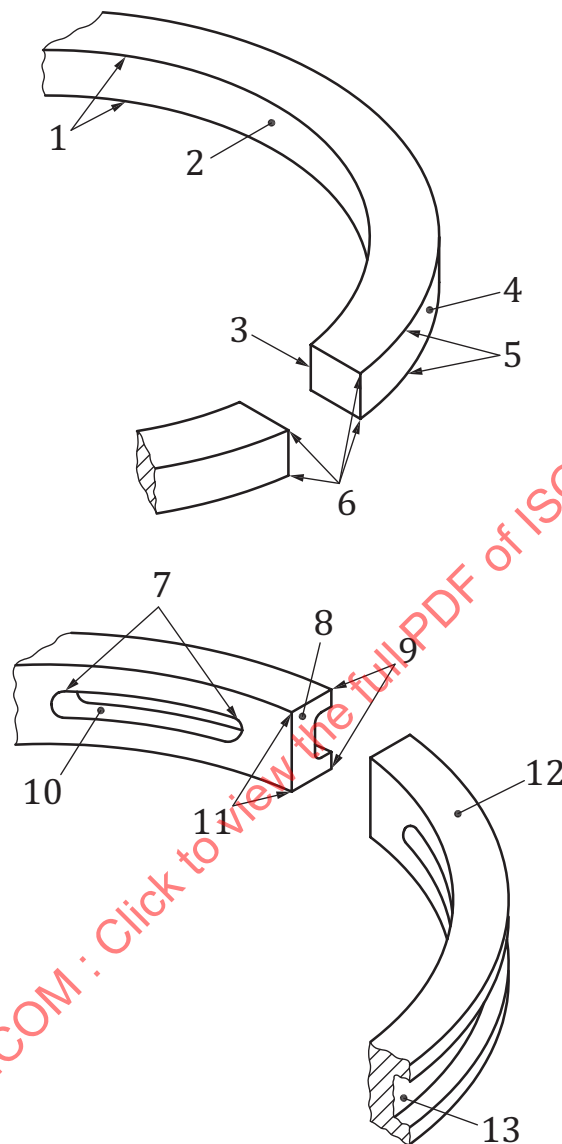
Method A: a_6 ref... h_3 measured

Method B: h_3 ref... a_6 measured

Figure 4 — Ring clearances

6.4 Edges, surfaces and faces

Terms commonly used to describe edges, surfaces and faces on the rings are shown in [Figure 5](#).



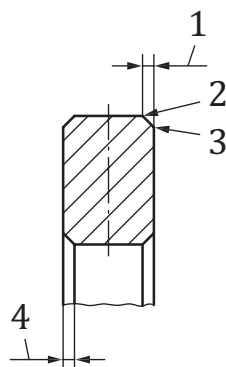
Key

1	inside edges	8	gap face
2	inside surface	9	outside gap corners
3	inside edge of gap	10	slot face
4	peripheral surface	11	inside gap corners
5	peripheral edges	12	side face
6	opposite gap corners	13	outside groove face
7	inside edge of slot		

Figure 5 — Edges, surfaces and faces

6.5 Chamfered edges

Terms commonly used to describe edge chamfers on rings are shown in [Figure 6](#).



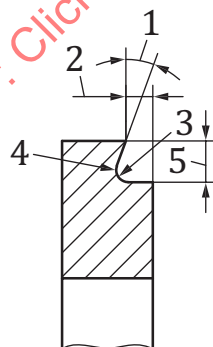
Key

- 1 outside-chamfered edge
- 2 peripheral edge
- 3 side face edge
- 4 inside-chamfered edge

Figure 6 — Chamfered edges

6.6 Scraper ring

Terms commonly used to describe scraper and Napier rings are shown in [Figure 7](#).



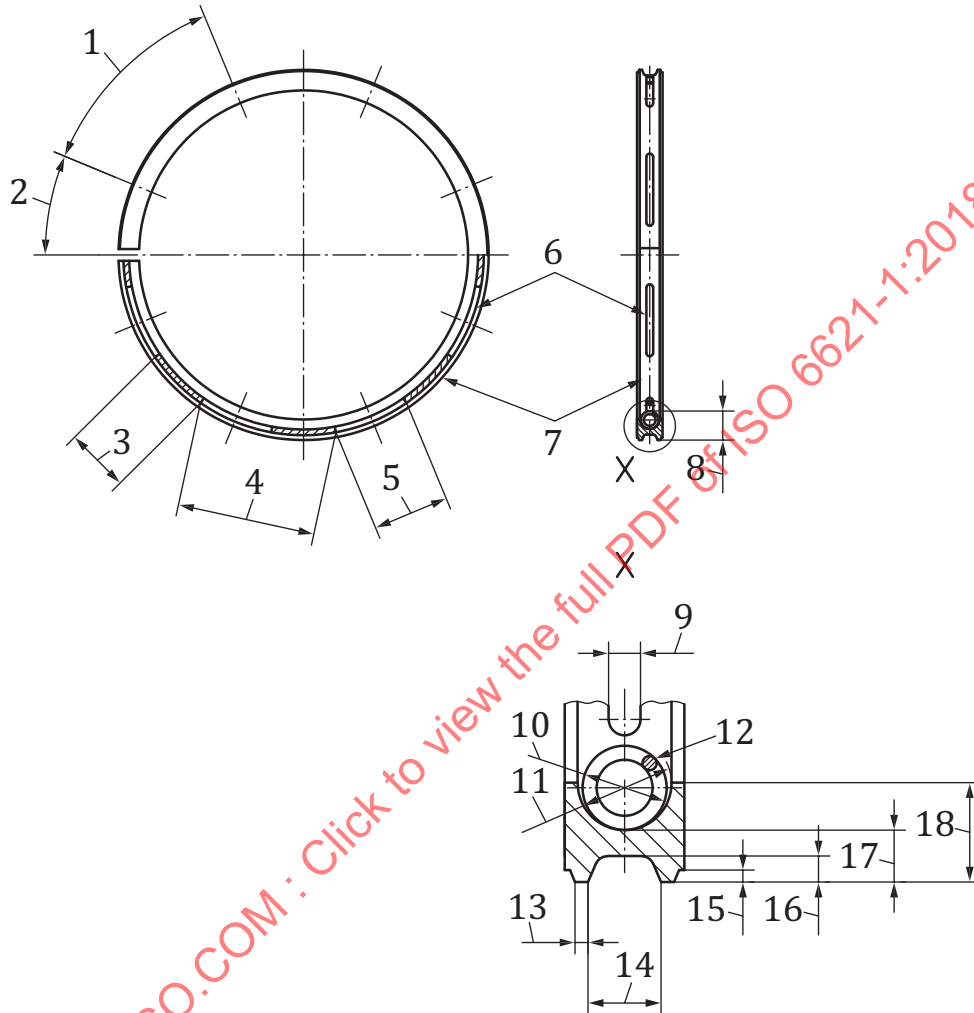
Key

- 1 Napier angle
- 2 step width, h_2
- 3 undercut radius, r_2
- 4 Napier undercut and step
- 5 step depth, a_2

Figure 7 — Section of Napier ring

6.7 Oil control ring

Terms commonly used to describe coil-spring-loaded slotted oil control rings are shown in [Figure 8](#).

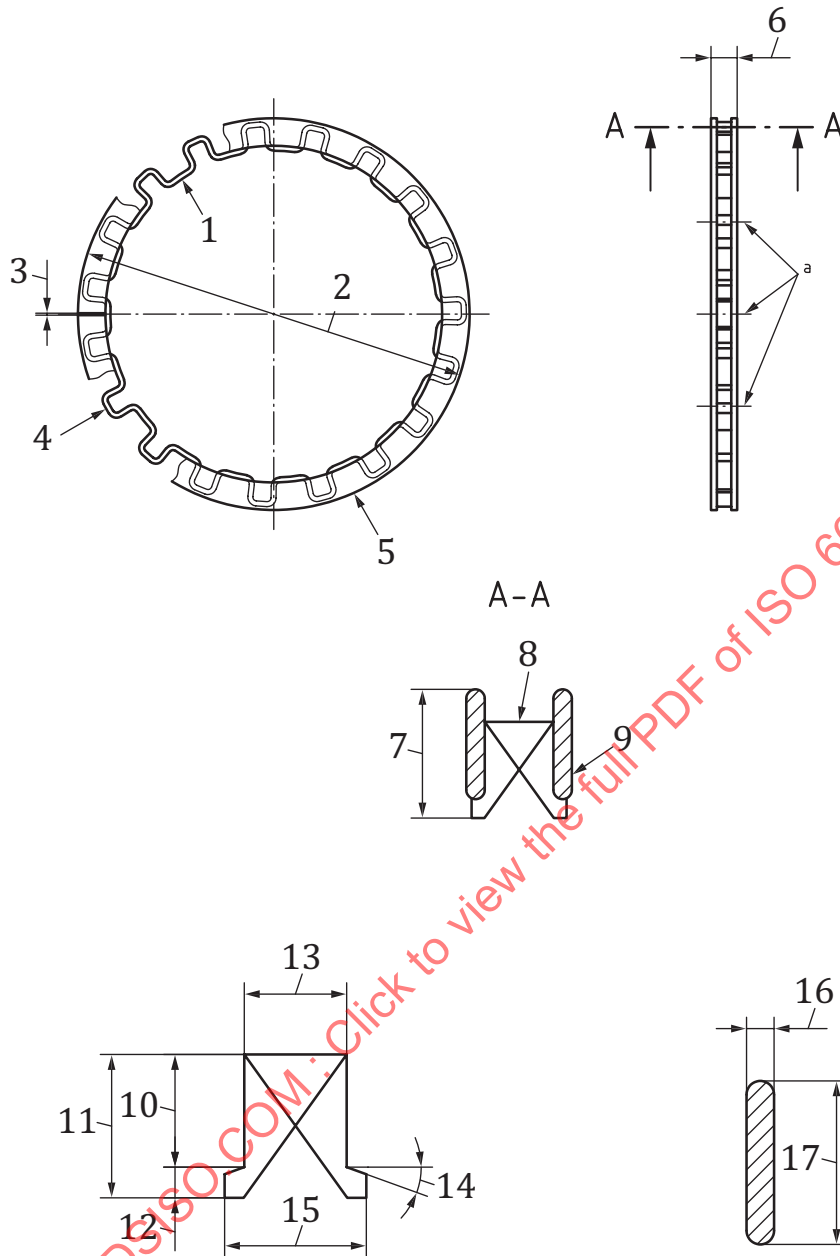


Key

- | | | | |
|---|---|----|---------------------------------------|
| 1 | angular slot spacing | 10 | coil spring diameter, d_7 |
| 2 | angular pitch at gap | 11 | coil spring groove diameter, d_{14} |
| 3 | bridge length, w_2 | 12 | coil spring |
| 4 | slot spacing, w_3 | 13 | land width, h_5 |
| 5 | slot length, w_1 | 14 | land spacing, B_3 |
| 6 | slot | 15 | external land depth, a_{17} |
| 7 | bridge | 16 | groove depth, a_4 |
| 8 | radial thickness with coil spring, a_{12} | 17 | groove depth and bridge, a_{13} |
| 9 | slot width, c_1 | 18 | radial wall thickness, a_1 |

Figure 8 — Coil-spring-loaded slotted oil control ring

Terms commonly used to describe expander/segment oil control rings are shown in [Figure 9](#).



Key

- | | | | |
|---|--|----|--------------------------------------|
| 1 | seating tab | 10 | spacer radial thickness, a_8 |
| 2 | nominal ring assembly diameter, d_1 | 11 | expander radial thickness, a_9 |
| 3 | segment closed gap, s_1 | 12 | seating tab thickness, a_{14} |
| 4 | expander-spacer ends | 13 | spacer width, h_{13} |
| 5 | peripheral surface | 14 | seating tab angle, |
| 6 | nominal assembly width, h_{11} | 15 | expander width, h_9 |
| 7 | assembly radial thickness, a_{11} | 16 | segment width, h_{12} |
| 8 | expander-spacer | 17 | segment radial wall thickness, a_1 |
| 9 | segment | | |
| a | Stagger segment gaps and expander ends (all three components). | | |

Figure 9 — Expander/segment oil control ring

Annex A
(informative)

**List of equivalent terms in English, French, Russian, German,
Spanish, Portuguese, Italian, Japanese and Chinese**

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Table A.1

English	French	Russian	German	Spanish	Portuguese	Italian	Japanese	Chinese
barrel-faced	face bombée	с бочкообразной рабочей поверхностью	Balligkeit	bombeado	Face abaulada	Bombatura	バレルフェース	桶面
barrel on peripheral surface	bombé sur la périphérie	бочкообразность по рабочей поверхности	ballige Lauffläche	periferia bombeada	Abaulado na face de contato	Bombatura sul diametro esterno	外周面バレル	外圓面桶面度
bevelled-edge oil control ring	segment racleur régulateur d'huile chanfreiné symétrique	маслосъёмное кольцо со встречной фаской	Dachfasen-Ölabstreifring	segmento de engrase de patines achaflanados simétricos	Anel de óleo de chanfros simétricos	Anello raccogliolio con smussi convergenti	ベベルオイルコントロールリング	异向倒角油环
butting	arc-boutement	смыкание замка	Berührung der Stoßflächen	contacto de las puntas	Toque das pontas	Contatto delle estremità dell'anello	合い口突き当たり	抵头
cam turned	tourné en forme suivant une came	обточенный по копиру	formgedreht	torneado de forma	Torneamento de forma	Tornito di forma (con camma)	カム旋削加工	凸轮仿形车削
closed gap	jeu à la coupe	тепловой зазор	Stoßspiel	ajuste de puntas	Folga entre pontas	Gioco al taglio	合い口すぎま	闭口间隙
coating layer thickness	épaisseur du revêtement	толщина покрытия	Schichtdicke	espesor del recubrimiento	Espessura da cobertura	Spessore rivestimento	コーティング厚さ	镀层厚度
coil-spring-loaded oil control ring	segment racleur d'huile à ressort hélicoïdale	маслосъёмное кольцо с витым расширителем	Ölabstreifring mit Schlauchfeder	segmento de engrase con expansor helicoidal	Anel de óleo com mola helicoidal	Anello raccogliolio caricato con molla elicoidale	コイルエキスパンダ付きオイルコントロールリング	螺旋弹簧油环
compression ring	segment de compression	компрессионное кольцо	Verdichtungsring	segmento de compresión	Anel de compressão	Anello di compressione	コンプレッションリング	气环
Chromium plating	revêtu de chrome	Хромирование	Chromschicht	Capa de Cromo/Cromación	Camada de cromo	rivestimento di cromo	クロムめっき	镀铬层
(datum surface) see reference plane	voir plan de référence	базовая поверхность (для измерений)	Messebene	(superficie de referencia) ver: plano de referencia	(Superfície de referência) Veja plano de referência	Piano di riferimento	データム面	基准面
diametral force	force diamétrale	диаметральная сила	Diametralkraft	carga diametral	Força diametral	Forza diametrale	直径張力	径向弹力

Table A.1 (continued)

English	French	Russian	German	Spanish	Portuguese	Italian	Japanese	Chinese
double-bevelled oil control ring	segment racleur régulateur d'huile chanfreiné parallèle	маслостыёмое кольцо с параллельными фасками	Gleichfasen-Ölabstreifring	segmento de engrase de patines achaflanados paralelos	Anel de óleo de chanfros paralelos	Anello raccogliolio con smussi paralleli	ダブルベベルオイルコントロールリング	同向倒角油环
effective free gap	ouverture libre effective	раствор замка минус тепловой зазор	tatsächliche Maulweite	abertura libre efectiva	Abertura livre efetiva	Apertura libera efficace	有効フリーギヤップ	有效自由开口尺寸
free flatness	planéité à l'état libre	отклонение от плоскости кольца в свободном состоянии	Ebenheit im unbelasteten Zustand	planicidad en estado libre	Planicidade no estado livre	Planarità dell'anello libero	平面ひずみ	挠曲度
fully-faced	sur toute la face	с покрытием рабочей поверхности	Laufflächen-beschichtung	totalmente recubierto	Face de contato totalmente revestida	Superficie periferica interamente rivestita	外周全面	全镀层
half keystone ring	segment semi-trapèze	кольцо трапецевидное одностороннее	einseitiger Trapezring	segmento semi-trapecial	Anel semi-trapezoidal	Anello semi-trapezoidale	ハーフキーストーンリング	楔形环
heat-formed	mis en forme à chaud	с горячей формовкой	thermisch gespannt	abertura térmica	Com formação térmica	Formatura a caldo	ヒート・フォーム	热成型
helix/wind	voilage	смещение стыкования	Stoßversatz	desalineación axial de las puntas	Desalinhamento axial das pontas	Elica / ondulazione	ひずみ	翘度
inlaid	encastré	с заполненной канавкой	Füllung	inserto/cajetin	Embutido	Rivestimento esterno in cava	インレイド	镶嵌
inside edges chamfered	arêtes intérieures chanfreinées	с внутренними фасками	Innenkantenbruch	cantos interiores biselados	Arestas internas chanfradas	Spigoli interni smussati	内周面取り	内棱边倒角
inside and peripheral edges chamfered	arêtes intérieures et périphériques chanfreinées	с фасками на внутренней и рабочей поверхностях	Innen- und Außenkantenbruch	cantos interiores y exteriores biselados	Arestas internas e externas chanfradas	Spigoli interni ed esterni smussati	内外周面取り	内・外圆面棱边倒角

Table A.1 (continued)

English	French	Russian	German	Spanish	Portuguese	Italian	Japanese	Chinese
internal bevel bottom (negative twist type)	chanfrein sur le diamètre intérieur, flanc inférieur (type torsion négative)	кольцо с внутренней нижней фаской (обратное скручивание)	Innenfase an Unterflanke (negative Vertwistung)	chaflán interior, inferior (torsional negativo)	Chanfro interno inferior (torção negativa)	Smusso sul diametro interno inferiore (tipo a torsione negativa)	下面インターナルベベル(逆ねじれタイプ)	下側面内倒角 (反扭曲)
internal bevel top (positive twist type)	chanfrein sur le diamètre intérieur, flanc supérieur (type torsion positive)	кольцо с внутренней верхней фаской (прямое скручивание)	Innenfase an Oberflanke (positive Vertwistung)	chaflán interior, superior (torsional positivo)	Chanfro interno superior (torção positiva)	Smusso sul diametro interno superiore (tipo a torsione positiva)	上面インターナルベベル(正ねじれタイプ)	上側面内倒角 (正扭曲)
internal step bottom (negative twist type)	embrèvement sur le diamètre intérieur, flanc inférieur (type torsion négative)	кольцо с внутренней нижней выточкой (обратное скручивание)	Innenwinkel an Unterflanke (negative Vertwistung)	escalón interior, inferior (torsional negativo)	Rebaixo interno inferior (torção negativa)	Gradino sul diametro interno inferiore (tipo a torsione negativa)	下面インターナルステップ(逆ねじれタイプ)	下側面内切台 (反扭曲)
internal step top (positive twist type)	embrèvement sur le diamètre intérieur, flanc supérieur (type torsion positive)	кольцо с внутренней верхней выточкой (прямое скручивание)	Innenwinkel an Oberflanke (positive Vertwistung)	escalón interior, superior (torsional positivo)	Rebaixo interno superior (torção positiva)	Gradino sul diametro interno superiore (tipo a torsione positiva)	上面インターナルステップ(正ねじれタイプ)	上側面内切台 (正扭曲)
joint	coupe	замок	Stoß	corte	Configuração da folga entre pontas	Estremità	回り止め形状	定位切口
joint with internal notch	coupe avec encoche intérieure	замок с внутренней фиксации	Stoß mit Innensicherung	entalla para fijo interior	Folga entre pontas com fenda interna	Gioco al taglio con arresto interno	内周回り止め	内圓面定位切口
joint with side notch	coupe avec encoche frontale	замок с боковой фиксации	Stoß mit Flankensicherung	entalla para fijo lateral	Folga entre pontas com fenda lateral	Gioco al taglio con arresto frontale	側面回り止め	側面定位切口
keystone angle	angle du trapèze	угол трапеции (трапецивидности)	Trapezwinkel	ángulo trapecial	Ângulo do trapézoidal	Angolo del trapezio	キーストン角度	梯形角

Table A.1 (continued)

English	French	Russian	German	Spanish	Portuguese	Italian	Japanese	Chinese
keystone ring	segment trapèze	кольцо трапецевидное	Trapezring	segmento trapecial	Anel trapezoidal	Anello trapezoidale	ギーストレンギング	梯形环
land offset	décalage des lèvres	смещение перемычки	Laufstegversatz	desalineación de los patines	Desalinhamento das faces	Disassamento pattino	当たり面段差	刮油边径向偏移度
land width	hauteur de lèvre	высота перемычки	Laufsteghöhe	altura del patin de roce	Largura da face de contato	Altezza pattino	当たり幅	刮油边宽度或刮油边轴向高度
light tightness	étanchéité à la boîte lumière	плотность прилегания	Lichtspaltlichttheit	estancqueidad a la luz	Vedação à luz	Tenuta alla luce	非漏光度	光密封度
modulus of elasticity	module d'élasticité	модуль упругости	Elastizitätsmodul	módulo de elasticidad	Módulo de elasticidade	Modulo di elasticità	縦弾性係数	彈性模量
multi-piece ring	segment multi-pièces	составное кольцо (многоэлементное)	mehrteiliger Ring	segmento de varias piezas	Anel de múltiplas peças	Anello multipezzo	組合せリング	组合环
Napier ring	segment bec d'aigle	скребковое кольцо с подвнутренней канавкой	Abstreifring mit hinterstochener Eindrehung	segmento rascador de uña	Anel raspador ("Napier")	Anello raschiaolio (Napier)	ナピアリング	鼻形环
Napier ring, taper-faced	segment bec d'aigle, face conique	скребковое кольцо с подвнутренней канавкой и конической рабочей поверхностью	Abstreifring mit konischer Lauffläche und hinterstochener Eindrehung	Segmento rascador de uña con periferia cónica	Anel raspador ("Napier") com face de contato cônica	Anello raschiaolio (Napier) con superficie periferica conica	テーパフェースナピアリング	锥面鼻形环
Nitrided surface	surface nitrurée	Азотированный слой	Nitrierschicht	Superficie Nitruada	Superficie nitrurada	superficie nitrurata	窒化面	渗氮层
nominal ring diameter	diamètre nominal du segment	номинальный диаметр кольца	Nenndurchmesser	Diametro nominal del segmento	Diâmetro nominal do anel	Diametro nominale dell'anello	リング呼び径	环的公称直径
obliqueness	obliquité	коробление	Schiefelage	Inclinación	Obliquidade	Obliquità	傾き	偏移角
oil-control ring	segment racleur d'huile	маслосъёмное кольцо	Ölabstreifring	Segmento control de aceite	Anel de óleo	Anello raccogliolio	オイルコントロールリング	油环
ovality or circularity	ovalité	овальность	Ovalität oder Kreisförmigkeit	Ovalidad	Ovalização	Ovalità	オーバリティ又は真円度	橢圓度

Table A.1 (continued)

English	French	Russian	German	Spanish	Portuguese	Italian	Japanese	Chinese
peripheral edges chamfered	arêtes périphériques chanfreinées	с наружными фасками	Laufflächenkant-en-bruch	Canto exteriores biselados	Arestas externas chanfradas	Spigoli esterni smussati	外周面取り	外圓面倒角
peripheral surface (ring face)	surface périphériques (portée du segment)	рабочая поверхность кольца	Lauffläche	Face de Contacto	Face de contato	Superficie di scorrimento	外周面	外圓面
pin point or burry light	pointe d'épingle ou lumière irisée	мерцающий просвет	Lichtpunkte oder Lichtschimmer	Luz difusa	Passagem de luz intermitente ou luz "salpicada"	Trafilamento luce puntinato o sfumato	漏光	点状或毛刺漏光
piston ring	segment de piston	поршневое кольцо	Kolbenring	Segmento de pistón	Anel de pistão	Anello (segmento)	ピストンリング	活塞环
point deflection	protusion	прогиб стыкования	Stoßeinfall	Punto de flexion	Deflexão das pontas	Rientranza punte	合口部の沈み量	开口端内沉量
pressure pattern	répartition de pression	эпюра распределения давления	Radialdruckverteilung	Distribución de la presión	Distribuição da pressão	Distribuzione della pressione	面圧分布	压力分布图形
PVD (physical vapour deposition) coating	revêtement PVD	Вакуумное напыление	PVD (physical vapour deposition) Schicht	Recobrimento PVD (de vapor físico)	Camada PVD (deposição física à vapor)	riporto PVD	PVD(物理蒸着) 皮膜	物理气相沉积层
radial wall thickness	épaisseur radiale	радиальная толщина	radiale Wanddicke	Espesor radial	Espessura radial	Spessore radiale	厚さ	径向厚度
rectangular ring	segment rectangulaire	прямоугольное кольцо	Rechteckring	Segmento rectangular	Anel retangular	Anello rettangolare	レクタングュラリ ンゲ	矩形环
reference plane	plan de référence	базовая поверхность	Messebene	Plano de referencia	Plano de referência	Piano di riferimento	基準面	基准面
ring gauge	bague de contrôle	кольцевой калибр	Kontrollring	Calibre para segmento	Calibre do anel	Calibro circolare	リングゲージ	环规
ring groove	gorge de segment	поршневая канавка	Ringnut	Ranura de pistón	Canaleta / canaleta	Cava del pistone	リング溝	环槽
ring width	hauteur du segment	высота кольца	Ringhöhe	Altura de segmento	Altura do anel	Altezza dell'anello	リング幅	环高
scraper ring (stepped)	segment racleur mixte (épaulé droit)	скребковое кольцо (с канавкой)	Abstreifring	Segmento rasador	Anel raspador ("Stepped")	Anello raschiaolio (con gradino)	スクレーパー リング	外切扭曲环

Table A.1 (continued)

English	French	Russian	German	Spanish	Portuguese	Italian	Japanese	Chinese
scraper ring (stepped), taper- faced	segment racleur mixte (épaulé droit) à portée conique	скребцовое кольцо с канавкой с конической рабочей поверхностью	Abstreifring mit konischer Lauf- fläche	Segmento cónico rascador	Anel raspador ("Stepped") com face de contato cônica	Anello raschiaolio (con gradino) a superficie periferica conica	テーパフェーススク レーパリング	锥面外切扭曲环
semi-inlaid	semi-encasté	с полузаполненной канавкой	einseitige Füllung	Semi inserto	Semi embutido	Riporto esterno in semi-cava	セミンレイド	半镶嵌
single-piece ring	segment mo- no-pièce	одноэлементное кольцо	einteiliger Ring	Segmento de una sola pieza	Anel de uma só peça	Anello monopezzo	シングルピースリ ング	单片式环
slotted oil-control ring	segment racleur d'huile avec lumières	маслосъёмное кольцо с прорезями	Ölschlitz-Ölab- streifring	Segmento de engrase con ventanas	Anel de óleo com fendas	Anello raccogli- olio con feritoie scarico olio	窓付きオイルコン ロールリング	回油孔式油环
straight-faced	cylindrique	С цилиндрической рабочей поверхностью	zylindrische Lauffläche	Cara recta	Face de contato plana	Superficie di con- tatto cilindrica	ストレートフェース	柱面
tangential force	force tangentielle	тангенциальная (касательная) сила	Tangentialkraft	Carga tangencial	Força tangencial	Carico tangen- ziale	接線張力	切向弾力
taper-faced keystone ring	segment trapèze à face conique	кольцо с трапецевидное двустороннее с конической рабочей поверхностью	Trapezring mit konischer Lauf- fläche	Segmento cónico trapezoidal	Anel trapezoidal com face de con- tacto cônica	Anello trapezoi- dale a superficie periferica conica	テーパフェースキ ーストリング	锥面梯形环
taper-faced ring	segment conique	кольцо с конической рабочей поверхностью	Rechteckring mit konischer Lauf- fläche (Minuten- ring)	Segmento cónico	Anel com face de contato cônica	Anello con conic- ità periferica	テーパフェースリ ング	锥面环
taper on periphery	cône sur la périphérie	конусность по рабочей поверхности	Winkligkeit (Zylindrizität, Konizität)	Perfil cónico	Ângulo da face de contato	Conicità sulla periferia	外周面テーパ	外圆面斜度

Table A.1 (continued)

English	French	Russian	German	Spanish	Portuguese	Italian	Japanese	Chinese
total free gap	ouverture libre totale	размер замка кольца в свободном состоянии	Maulweite	Abertura libre	Abertura livre total	Apertura totale anello libero	自由開口すきま	自由開口尺寸
twist	torsion	скручивание	Vertwistung	Torsión / torsional	Torção	Torsionale	ねじれ	扭曲度
uncoated ring	segment non-revêtu	кольцо без покрытия	unbeschichteter Ring	Segmento sin recubrimiento	Anel sem cobertura	Anello non rivestito	無処理リング	无镀层环
unevenness	inégalité	неровность	Unebenheit	Ondulación	Empenamento	Ondulazione	側面うねり	平度
wind	voilage	смещение стыкования	Stoßversatz (axial)	Giro	Desalinhamento axial das pontas (empeno)	Svergolamento assiale	合口部の軸方向ひずみ	翹度
witness line	ligne témoin	линия контакта	Tragspiegel	Linea de testimonio	Linha testemunha	Testimonio di contatto	当たり確認線	珩磨带

Alphabetical index

Characteristic/Term	Symbol	ISO Reference	Clause/Subclause
Assembly radial thickness	a_{11}	ISO 6627:2011	5.3
Asymmetric barrel-faced rings (see rectangular and keystone rings)	—	ISO 6622-1/ISO 6622-2 ISO 6624-1/ISO 6624-3	—
Barrel face (barrel on peripheral surface)	t_2, t_3	ISO 6621-2 ISO 6622-1/ISO 6622-2 ISO 6624-1 to ISO 6624-4	—
Barrel-faced rings, see rectangular, keystone and half keystone rings	—	ISO 6622-1/ISO 6622-2 ISO 6624-1 to ISO 6624-4	—
Bevelled-edge oil control ring	—	ISO 6625 ISO 6626	—
Bridge length	w_2	ISO 6626-1 ISO 6626-1/ ISO 6626-2/ ISO 6626-3:2008	4.1.2.1 4.2.1/5.2/5.5
Burrs	—	ISO 6621-5	—
Casting skin	—	ISO 6621-5:2013	4.5
Cavities	—	ISO 6621-5:2013	4.2
Chamfering	—	ISO 6621-4:2015	10
Chipping	—	ISO 6621-5:2013	4.4
Chromium beads (nodules)	—	ISO 6621-5:2013	4.5
Chromium plating	—	ISO 6621-4:2015	10.1
Chromium plating hardness	—	ISO 6621-4:2015	10.1
Classification of piston rings	—	ISO 6621-1	Clause 3
Closed gap	s_1	ISO 6621-1/ ISO 6621-4:2015	5.2 /7.3
Coating configurations	—	ISO 6621-1	5.4
Coating thickness	—	ISO 6621-4:2015/ ISO 6622 ff.	Clause 10
Coating thickness tolerance	—	ISO 6621-4:2015	Clause 10
Coil spring diameter	d_7	ISO 6621-1/ ISO 6626-1/ ISO 6626-2	5.7/5.1
Coil spring excursion	f_1	ISO 6621-1/ ISO 6626-1	5.1 /5.2
Coil spring groove diameter	d_{14}	ISO 6621-1/ ISO 6626-1/ ISO 6626-2	5.7/7
Coil-spring-loaded double-bevelled oil control rings	—	ISO 6626-1/ ISO 6626-2	3.4/4.5
Coil-spring-loaded oil control rings	—	ISO 6626/ISO 6626-2/ ISO 6626-3	—
Coil-spring-loaded slotted oil control rings	—	ISO 6626/ISO 6626-2	—
Coil spring types	—	ISO 6626-1	5.1
Coil spring wire diameter	d_8	ISO 6626-1, ISO 6626-2, ISO 6626-3	—

Alphabetical index (continued)

Characteristic/Term	Symbol	ISO Reference	Clause/Subclause
Contact pressure	P_0	ISO 6626-1/ ISO 6626-2/ ISO 6626-3:2008/ ISO 6627:2011	Clause 6/Clause 7/ 5.8/Clause 8
Contact pressure classes	—	ISO 6626-1989/ ISO 6626-2 ISO 6627:2011	6.4/7.4 8.2
Correction of F_t and F_d values	—	ISO 6621-4:2015	7.4
Cracks	—	ISO 6621-5:2013	4.3
Cross-sectional configuration	—	ISO 6621-1	Clause 4
Cutter diameter	d_5	ISO 6625:1986 ISO 6626-1/ ISO 6626-2	4.1, Table 1 4.1, Table 1/5.1
Cylinder bore	—	ISO 6621-1	5.2
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Discoloration	—	ISO 6621-5:2013	4.4.1
DLC coating (see PVD coating)	—	ISO 6621-4:2015	10.5, Table 24
Double-bevelled oil control ring	—	ISO 6625	—
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Edge chamfers (KA, KI)	—	ISO 6621-1/ISO 6622-5/ ISO 6623 ISO 6624-1/ISO 6624-2/ ISO 6625	—
Edge features/configurations	—	ISO 6621-1	5.3
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Edges (CR, SC, nitrided)	—	ISO 6621-4:2015	Clause 10
Edges (defects)	—	ISO 6621-5:2013	4.4
Expander/segment oil control rings	—	ISO 6627	—
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Expander width	h_9	ISO 6627:2011	5.7
External land depth	a_{17}	ISO 6627:2011	5.7
Ferro-oxide treatment	—	ISO 6621-4:2015	10.4
Flatness of side faces (unevenness)	—	ISO 6621-2:2003 ISO 6621-5:2013	4.2 7.3