SAE International™ SURFACE VEHICLE STANDARD

SAE J1588

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Superseding J1588 APR1998

Internal Combustion Engines—Piston Rings—Vocabulary

This SAE Standard is equivalent to ISO Standard 6621-1.

1. ***Scope***—Differences, where they exist, are shown in Appendix A with associated rationale.

This SAE Standard 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 apply to piston rings for reciprocating internal combustion engines and compressors working under analogous conditions.

Appendix B is included which lists equivalent terms in English, French, Russian, German, Spanish, Portuguese, Italian, and Japanese.

1.1 Rationale—SAE J1588 is being discontinued because the content of this standard is also contained in ISO 6621-1. Therefore, to eliminate duplication and confusion in coordinating the standards between ISO and SAE, this document will be discontinued. The SAE Piston and Ring Standards Committee will now continue to support ISO in updating the standards as appropriate.

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2. References

2.1 Applicable Publications—The following publications form a part of the specification to the extent specified herein. Unless otherwise indicated the latest revision of SAE publications shall apply.

2.1.1 SAE PUBLICATIONS—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE DESIGNATION	ISO[1] EQUIVALENT	
		INTERNAL COMBUSTION ENGINES—PISTON RINGS
J1588	6621/1	Vocabulary
J1589	6621/2	Measuring principles
J1590	6621/3	Material specifications
J1591	6621/4	General specifications
J1996	6621/5	Quality requirements
		INTERNAL COMBUSTION ENGINES—PISTON RINGS
J1997	6622/1	Rectangular rings
J1998	6622/2 TR	Rectangular rings with narrow ring width
J1999	6623	INTERNAL COMBUSTION ENGINES—PISTON RINGS—SCRAPER RINGS
J2000	6624/1	Keystone rings
J2001	6624/2 TR	Half keystone rings
J2002	6625	INTERNAL COMBUSTION ENGINES—PISTON RINGS—OIL CONTROL RINGS
J2003	6626	INTERNAL COMBUSTION ENGINES—PISTON RINGS—COIL SPRING LOADED OIL CONTROL RINGS
J2004	6627 TR	INTERNAL COMBUSTION ENGINES—PISTONRINGS—EXPANDER/SEGMENT OIL CONTROL RINGS
J2226		INTERNAL COMBUSTION ENGINES—PISTON RINGS—STEEL RECTANGULAR RINGS
	ISO 286	ISO SYSTEM OF LIMITS AND FITS

1. TR refers to Technical Report

3. *Piston Ring Classification*

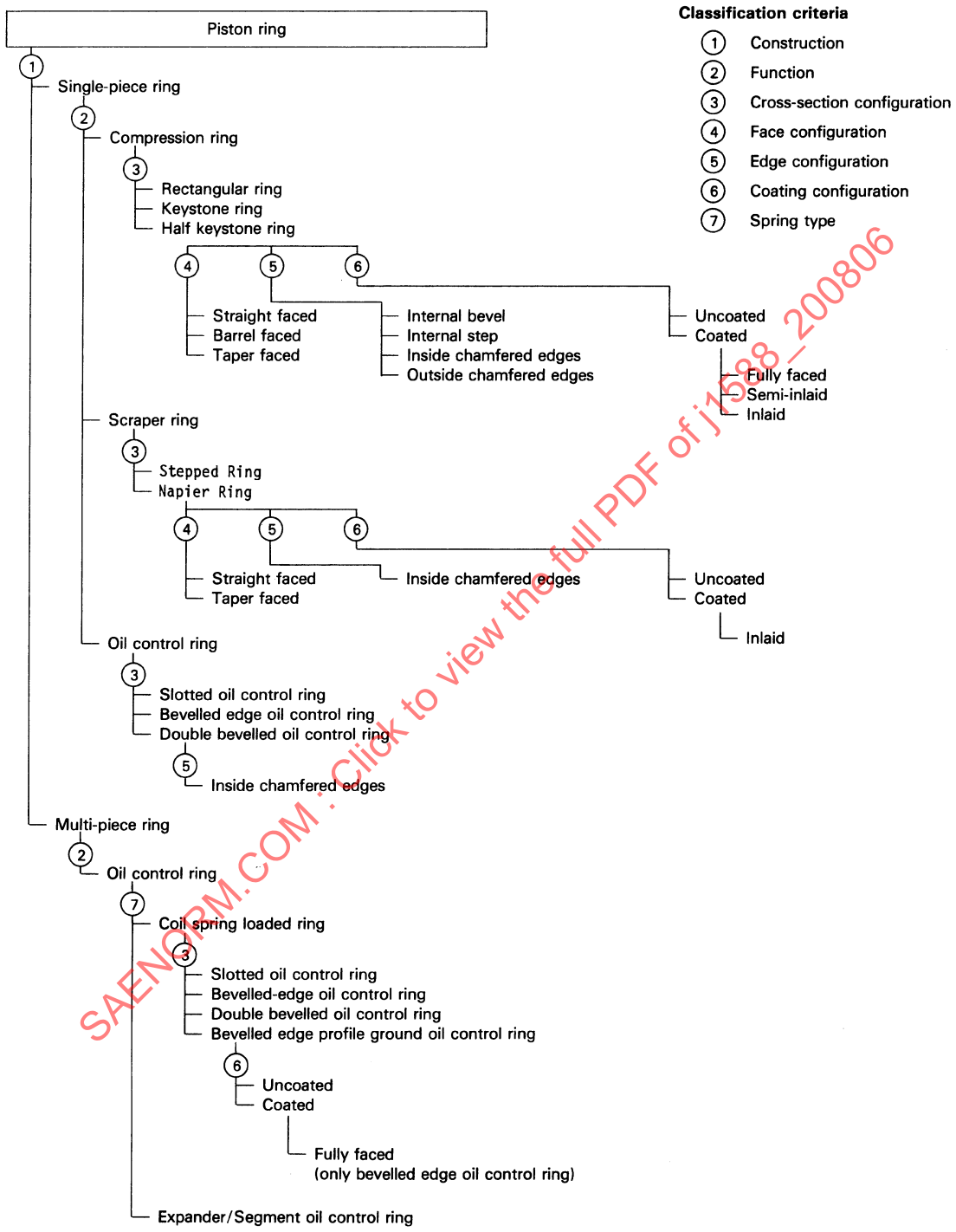


FIGURE 1—PISTON RING CLASSIFICATION

4. *Piston Ring Types*

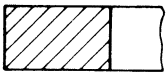
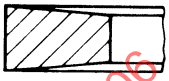
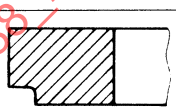
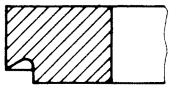
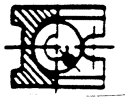
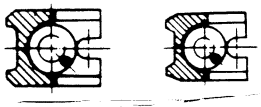
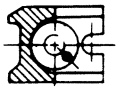
4.1 Cross section configuration	(These cross sections may be combined with the "common features" shown in 4.2, 4.3, 4.4 and 4.5)
Rectangular ring	
Keystone ring	
Half keystone ring	
Scraper ring (stepped)	
Scraper ring (Napier)	
Slotted oil control ring	
Bevelled edge oil control ring	
Coil spring loaded slotted oil control ring	
Coil spring loaded bevelled edge oil control ring	
Coil spring loaded double bevelled oil control ring	
Expander/Segment oil control ring	

FIGURE 2—PISTON RING TYPES

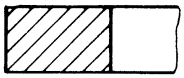
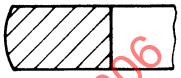
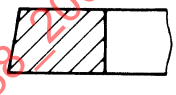
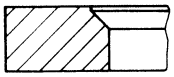
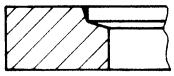
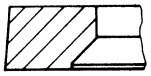
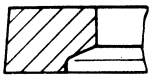
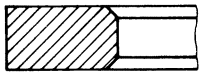
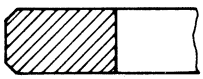
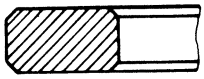
4.2 Face configuration	
Straight faced	
Barrel faced	
Taper faced	
4.3 Edge configuration	
Internal bevel top (positive twist type)	
Internal step top (positive twist type)	
Internal bevel bottom (negative twist type)	
Internal step bottom (negative twist type)	
Inside edges chamfered	
Outside edges chamfered	
Inside and outside edges chamfered	

FIGURE 2 (CONTINUED)

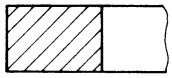
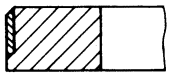
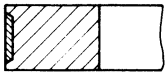
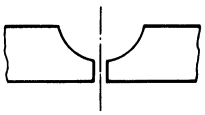
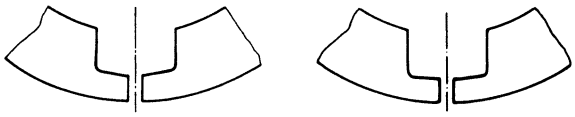
4.4 Coating configuration	
Uncoated	
Coated	
— Fully faced	
— Semi-inlaid	
— Inlaid	
4.5 Joint configuration	
Joint with side notch	
Joint with internal notch	

FIGURE 2 (CONTINUED)

5. Piston Ring Nomenclature

5.1 Free (Unstressed) Ring

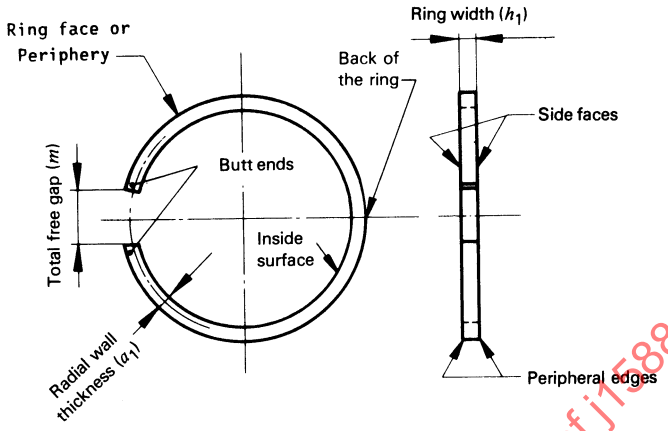


FIGURE 3—FREE (UNSTRESSED) RING

5.2 Closed Ring

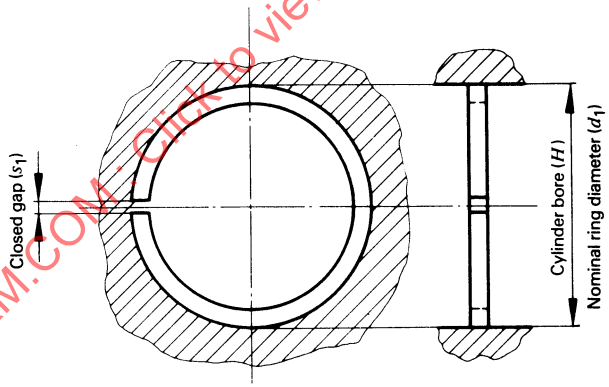


FIGURE 4—CLOSED RING

5.3 Ring Clearances

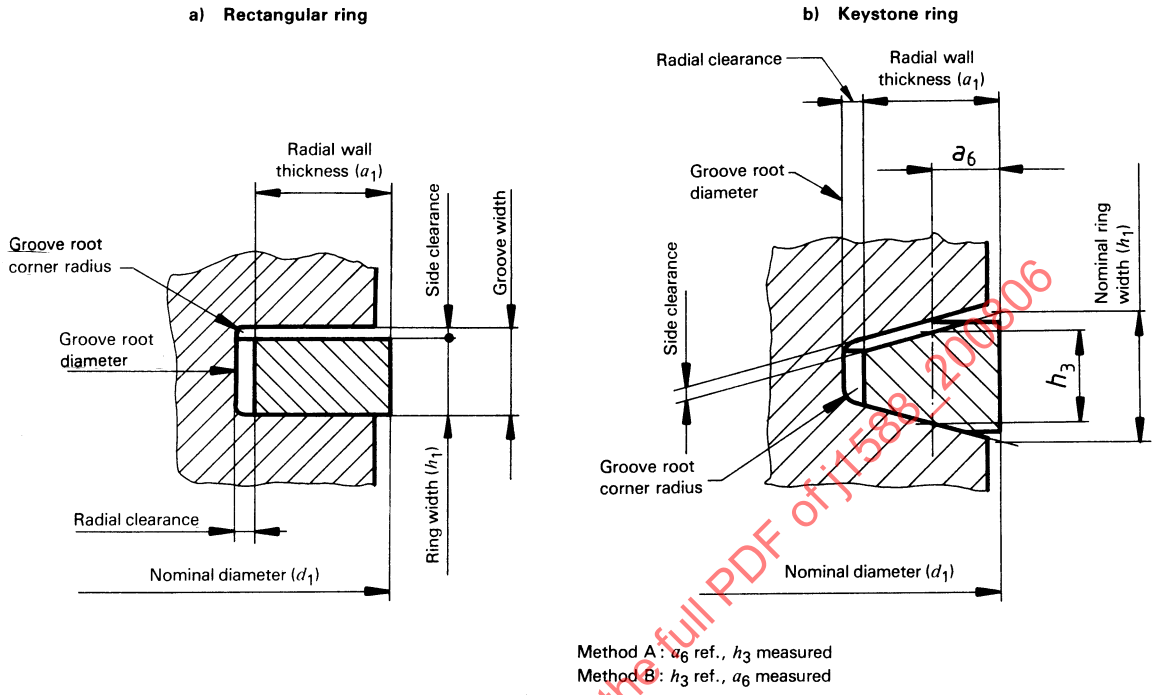


FIGURE 5—RING CLEARANCES

5.4 Edges, Surfaces, and Faces

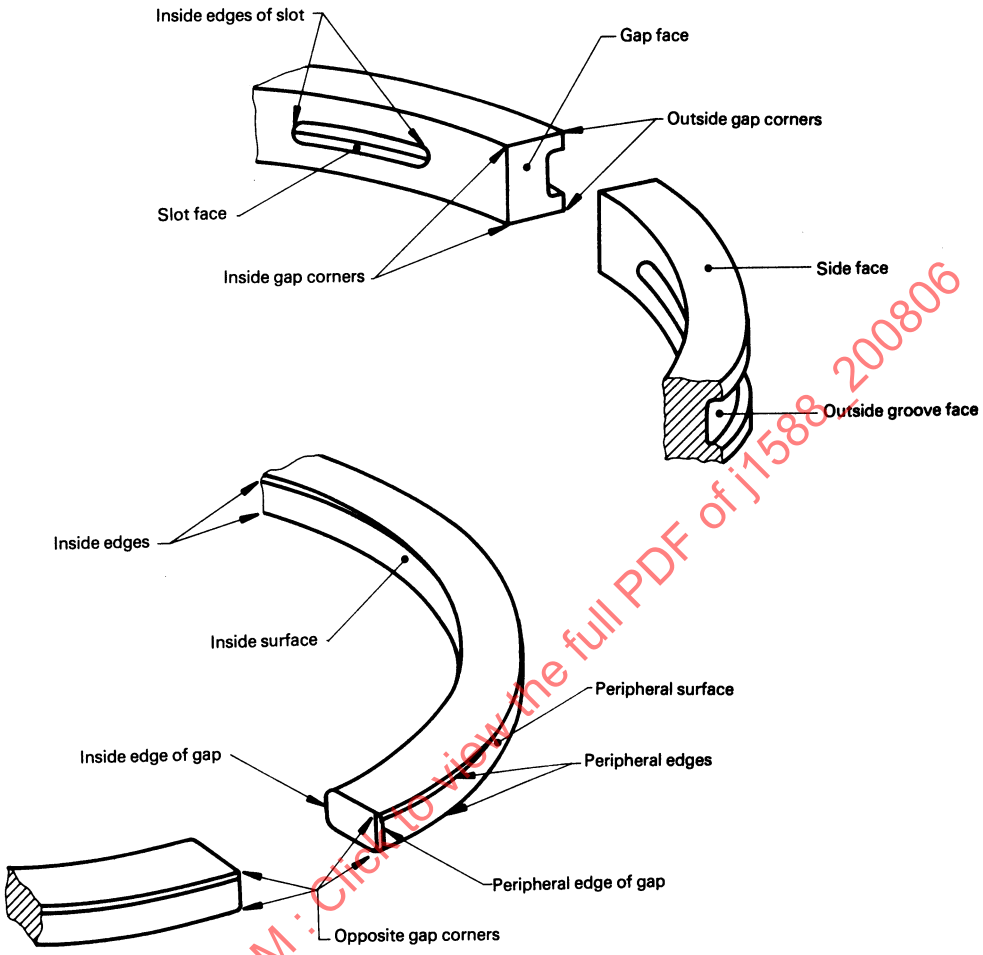


FIGURE 6—EDGES, SURFACES, AND FACES

5.5 Section of Straight-Faced Rectangular Ring

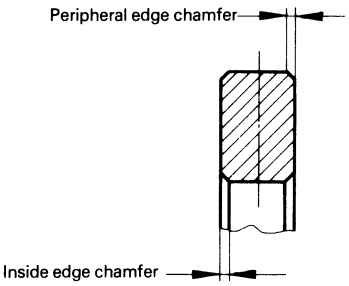


FIGURE 7—SECTION OF STRAIGHT-FACED RECTANGULAR RING

5.6 Section of Scraper Ring

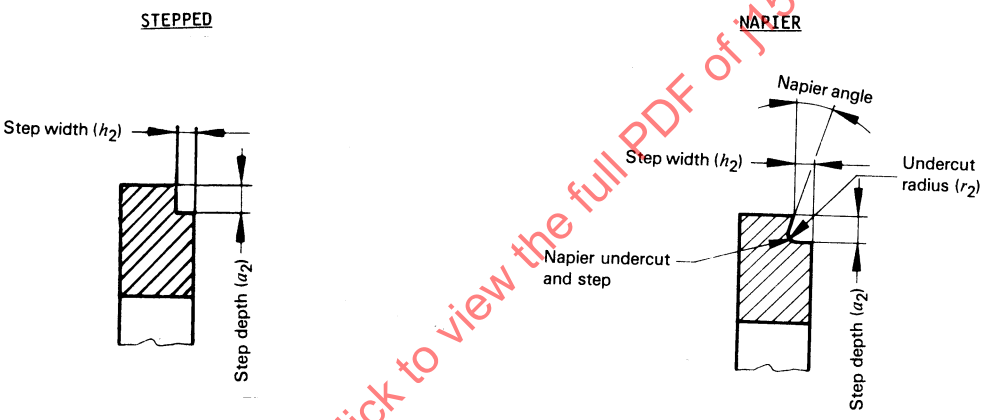


FIGURE 8—SECTION OF SCRAPER RING

5.7 Slotted Oil Control Ring

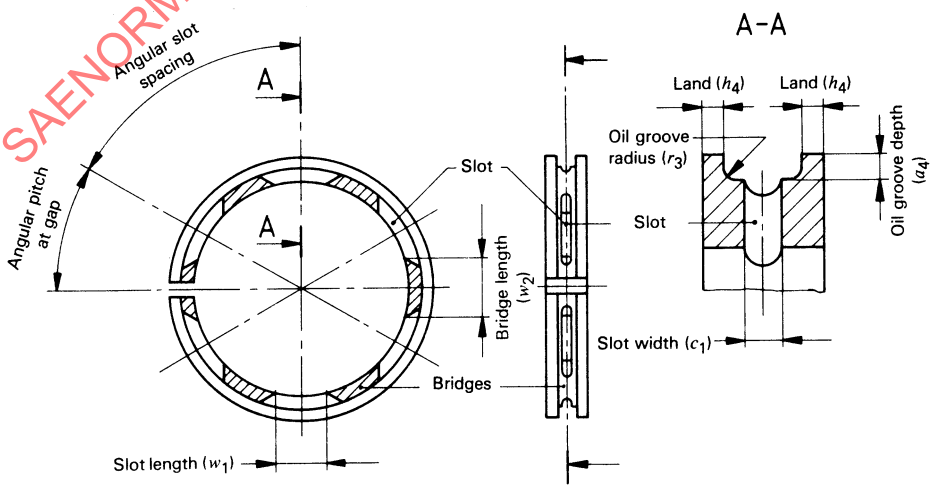


FIGURE 9—SLOTTED OIL CONTROL RING

6. Terms and Definitions

No.	Term	Definition
6.0	**piston ring**	A metallic circular spring with a high relative outward expanding strain. It fits into an annular groove that fits its section. The reciprocating and/or rotating piston ring seals against a pressure differential of gases or liquids between the ring face and a cylinder bore and one side of the ring and groove.
6.1	**Types of piston ring**	
6.1.1	**single-piece ring**	A ring formed from only one part which is intended for installation in a single ring groove.
6.1.2	**multi-piece ring**	A ring comprising two or more component parts which are intended for installation in a single ring groove.
6.1.3	**compression ring**	A ring intended primarily to prevent the leakage of gas past the piston.
6.1.4	**oil control ring**	A ring having oil return slots or an equivalent and intended to scrape oil from the cylinder wall.
6.1.5	**rectangular ring**	A compression ring with a rectangular cross-section; with its geometrically simple form, it provides an adequate seal under normal operating conditions.
6.1.6	**keystone ring**	A compression ring with both sides tapered; it is used in those cases when 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.
6.1.7	**half keystone ring**	A compression ring with one side tapered. Usually the tapered side is the one which faces the combustion chamber.
6.1.8	**scraper ring (stepped)**	A ring which has a step on the lower peripheral edge to scrape oil from the cylinder wall. It can also act as a lower compression ring.
6.1.9	**scraper ring (Napier)**	A scraper ring with an undercut step.
6.1.10	**slotted oil control ring**	A slotted oil control ring with parallel sides and two contact lands. Due to the narrow lands of this type of ring, a high unit pressure is achieved.
6.1.11	**bevelled-edge oil control ring**	A slotted oil control ring with parallel sides and two lands. 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.
6.1.12	**double-bevelled oil control ring**	A ring similar to type 6.1.11 except that both lands are chamfered on their upward facing edges. By chamfering the edges of both lands in the same direction, the oil scraping effect is even further improved.

No.	Term	Definition
6.1.13	**coil spring loaded slotted oil control ring**	A ring similar to type 6.1.10, the radial pressure of which is increased by means of a cylindrical coil spring. This spring acts equally in all directions against the inside of the ring.
6.1.14	**coil spring loaded bevelled-edge oil control ring**	A ring similar to type 6.1.11 but coil spring loaded with both lands chamfered on their outer edges.
6.1.15	**coil spring loaded double-bevelled oil control ring**	A ring similar to type 6.1.12 but coil spring loaded with both lands chamfered in the same direction on their upward facing edges.
6.1.16	**coil spring loaded bevelled-edge chromium plated oil control ring**	A ring similar to type 6.1.14 but with both lands chromium plated and chamfered on their inner and outer edges. May or may not be profile ground.
6.1.17	**expander/segment oil control ring**	A three-piece oil control ring comprised of an expander-spacer and two segments. Expander-spacer design will vary with manufacturer.
6.2	**Physical characteristics of rings**	
6.2.1	**nominal ring diameter** (symbol d_1)	The nominal diameter is identical to the nominal cylinder bore (*H*),
6.2.2	**witness line**	A narrow continuous line of contact lapped on the periphery of the ring, which can be seen around the circumference with normal vision.
6.2.3	**joint**	The joint at the butt ends of the ring.
6.2.4	**butting**	An effect which occurs when the gap faces of the ring touch.
6.2.5	**effective free gap**	The total free gap, *m* (see figure in 5.1), minus the measured closed gap s_1 (see figure in 5.2); it is the free gap used in the formulae for the calculations of *E* value, tangential and diametral forces and stresses.
6.2.6	**pressure pattern**	The radial pressure distribution around the circumference of the ring when closed in its nominal cylinder bore.
6.2.7	**contact pressure**	Pressure, in newtons per square millimetre, which a ring exerts radially against the cylinder wall.
6.2.8	**pin point or burry light**	Intermittent pin points of bright light or hazy light, but not bright direct light, observed in the test for light-tightness.
6.3	**Piston part**	
6.3.1	**ring groove**	The groove in the piston in which the piston ring is fitted.
6.4	**Measuring devices**	
6.4.1	**ring gauge**	A solid annular gauge having an inside diameter of nominal (H) cylinder bore.
6.4.2	**datum surface**	The plane on which the ring lies for measurements, except where otherwise specified.

PREPARED BY THE SAE PISTON RING STANDARDS COMMITTEE 7

CANCELLED BY THE SAE PISTON AND RING STANDARDS COMMITTEE

APPENDIX A

A.1 This SAE Standard has been established to harmonize the ISO and SAE piston ring standards. The U.S. Technical Advisory Group, with the support of the National Engine Parts Manufacturers Association, has worked for the last 10 years with other national organizations on this worldwide standard. Some of the wording and phrasing may differ slightly from U.S. terminology for translation purposes.

In preparing this SAE Standard, the Scope and Field of Application and Reference sections of the ISO 6621-1 have been editorially revised and reorganized.

Paragraph numbering has been changed to reflect this reorganization.

In section 5.1 the label "Periphery" has been changed to "Ring Face or Periphery" to conform with wording elsewhere in the document.

Section 5.6 "Section of Scraper Ring" (original ISO section 6.6 "Section of Napier Ring") has been modified to include the scraper cross section which is predominant in North America.