

Issued 1989-10
Cancelled 2008-06

Superseding J1590 APR1998

Internal Combustion Engines—Piston Rings—Material Specifications

This SAE Standard is equivalent to ISO Standard 6621/3.

1. Scope and Field of Application—Differences, where they exist, are shown in Appendix A.

This SAE Standard establishes a classification of materials intended for the manufacture of piston rings based on mechanical properties and the stresses that these materials are capable of withstanding.

This document applies to the manufacture of piston rings up to and including 200 mm diameter for reciprocating internal combustion engines. It also applies to piston rings for compressors working under similar conditions.

1.1 Rationale—SAE J1590 is being discontinued because the content of this standard is also contained in ISO 6621-3. 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.

SAE Technical Standards Board Rules provide that: "This report is published by SAE to advance the state of technical and engineering sciences. The use of this report is entirely voluntary, and its applicability and suitability for any particular use, including any patent infringement arising therefrom, is the sole responsibility of the user."

SAE reviews each technical report at least every five years at which time it may be reaffirmed, revised, or cancelled. SAE invites your written comments and suggestions.

Copyright © 2008 SAE International

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of SAE.

TO PLACE A DOCUMENT ORDER:

Tel: 877-606-7323 (inside USA and Canada)
Tel: 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
<http://www.sae.org>

SAE WEB ADDRESS:

SAE J1590 Cancelled JUN2008

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
J199	66621/5	Quality requirements
		INTERNAL COMBUSTION ENGINES—PISTON RINGS
J1997	6622/1	Rectangular rings
J1998	6622/2 TR	Rectangular rings with narrow ring width
		INTERNAL COMBUSTION ENGINES—PISTON 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— COILSPRING LOADED OIL CONTROL RINGS
J2004	6627 TR	INTERNAL COMBUSTION ENGINES—PISTON RINGS— EXPANDER/SEGMENT OIL CONTROL RINGS
J2226		INTERNAL COMBUSTION ENGINES—PISTON RINGS— STEEL RECTANGULAR RINGS
	2859	SAMPLING PROCEDURES AND TABLES FOR INSPECTION BY ATTRIBUTES

SAENORM.COM : Click to view the full PDF of J1590_200806

1. TR refers to Technical Report

SAE J1590 Cancelled JUN2008

3. **Mechanical Properties**—See Table 1.

TABLE 1—MECHANICAL PROPERTIES

Class	Mechanical Properties MPa or N/mm ² Typical Modulus of Elasticity	Mechanical Properties MPa or N/mm ² Minimum Bending Strength	Materials Meeting the Required Mechanical Properties Type of Material	Materials Meeting the Required Mechanical Properties Minimum Hardness	Materials Meeting the Required Mechanical Properties Specific Details	Materials Meeting the Required Mechanical Properties Subclass	
10	90 000 100 000	300	Grey cast iron	93 HRB	Nonheat-treated	11	
		350		95 HRB		12	
		450		23 HRC		21	
20	115 000 130 000	450	Grey cast iron	28 HRC	Heat-treated	22	
		450		40 HRC		23	
		500		32 HRC		24	
		650		37 HRC		25	
30	145 000	550	Carbide cast iron	25 HRC	Heat-treated pearlitic	31	
		500		30 HRC		Heat-treated martensitic	32
		600		95 HRB		Heat-treated pearlitic	41
		600		22 HRC		Heat-treated martensitic	42
		600		30 HRC		Heat-treated martensitic	43
40	160 000	1000	Malleable cast iron	27 HRC	Heat-treated carbide	44	
		1100		23 HRC		Heat-treated martensitic	51
		1300		23 HRC		Heat-treated martensitic	52
		1300		28 HRC		Heat-treated martensitic	53
50	160 000	1300	Spheroidal graphite cast iron	28 HRC	Heat-treated martensitic	53	
		1300		95 HRB		Pearlitic	54
		—		97 HRB		Ferritic	55
60	200 000	—	Steel	38 HRC	CrMoV - alloyed	61	
		—		40 HRC		CrSi - alloyed	62
		—		48 HRC		CrSi - alloyed	63

NOTE—The hardness values are averages from three measurements on one ring, one being at the gap and one each 90 and 180 degrees around from the gap. HRB and HRC hardness testing is in accordance with ISO/R 80.

The application of the hardness measuring methods HRB and HRC is restricted, due to the geometry and the material of piston rings. The hardness values stated are used only for grouping the materials into the individual subclasses. Other hardness measuring methods and their equivalent values shall be agreed upon between customer and manufacturer.

PREPARED BY THE SAE PISTON RING STANDARDS COMMITTEE 7

CANCELLED BY THE SAE PISTON AND RING STANDARDS COMMITTEE