



SURFACE VEHICLE STANDARD

J2275™

FEB2024

Issued 1996-07
Reaffirmed 2018-05
Revised 2024-02

Superseding J2275 MAY2018

Internal Combustion Engines - Piston Ring-Grooves

RATIONALE

This revision includes clarifications and corrections for numerous areas. Also included is a new method for specifying piston ring and groove width tolerances for rectangular and oil rings.

1. SCOPE

There is no ISO standard equivalent to this SAE Standard.

This SAE Standard identifies and defines the most commonly used terms for piston ring-groove characteristics, specifies dimensioning for groove widths, and demonstrates the methodology for calculation of piston groove root diameter.

The requirements of this document apply to pistons and rings of reciprocating internal combustion engines and compressors working under analogous conditions, up to and including 200 mm diameter and 4.5 mm width for compression rings and 8.0 mm width for oil rings.

The specifications in this document assume that components are measured at an ambient temperature of 20 °C (68 °F).

Tolerances specified in this document represent practical functional limits and do not imply process capabilities.

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this specification to the extent specified herein.

2.1.1 ISO Publications

Copies of these documents are available online at <https://webstore.ansi.org/>.

ISO 6621-2 Internal combustion engines—Piston rings—Part 2: Inspection measuring principles

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Documents

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2.2 Related Publications

The following publications are provided for information purposes only and are not a required part of this SAE Technical Report.

2.2.1 ISO Publications

Copies of these documents are available online at <https://webstore.ansi.org/>.

NOTE: "TR" refers to Technical Report.

ISO 6621-1	Internal combustion engines—Piston rings—Part 1: Vocabulary
ISO 6621-3	Internal combustion engines—Piston rings—Part 3: Material specifications
ISO 6621-4	Internal combustion engines—Piston rings—Part 4: General specifications
ISO 6621-5	Internal combustion engines—Piston rings—Part 5: Quality requirements
ISO 6622-1	Internal combustion engines—Piston rings—Part 1: Rectangular rings made of cast iron
ISO/TR 6622-2	Internal combustion engines—Piston rings—Part 2: Rectangular rings with narrow ring width
ISO 6623	Internal combustion engines—Piston rings—Scraper rings made of cast iron
ISO 6624-1	Internal combustion engines—Piston rings—Part 1: Keystone rings made of cast iron
ISO 6624-3	Internal combustion engines – Piston rings – Part 3: Keystone rings made of steel
ISO/TR 6624-2	Internal combustion engines—Piston rings—Part 2: Half keystone rings
ISO 6625	Internal combustion engines—Piston rings—Oil control rings
ISO 6626	Internal combustion engines—Piston rings—Coil-spring-loaded oil control rings
ISO 6626-2	Internal combustion engines—Piston rings—Part 2: Coil-spring-loaded oil control rings of narrow width made of cast iron
ISO/TR 6627	Internal combustion engines—Piston rings—Expander/segment oil control rings
ISO 6507-3	Metallic materials—Vickers hardness test—Part 3: Calibration of reference blocks

3. PISTON GROOVE NOMENCLATURE

See Figure 1.

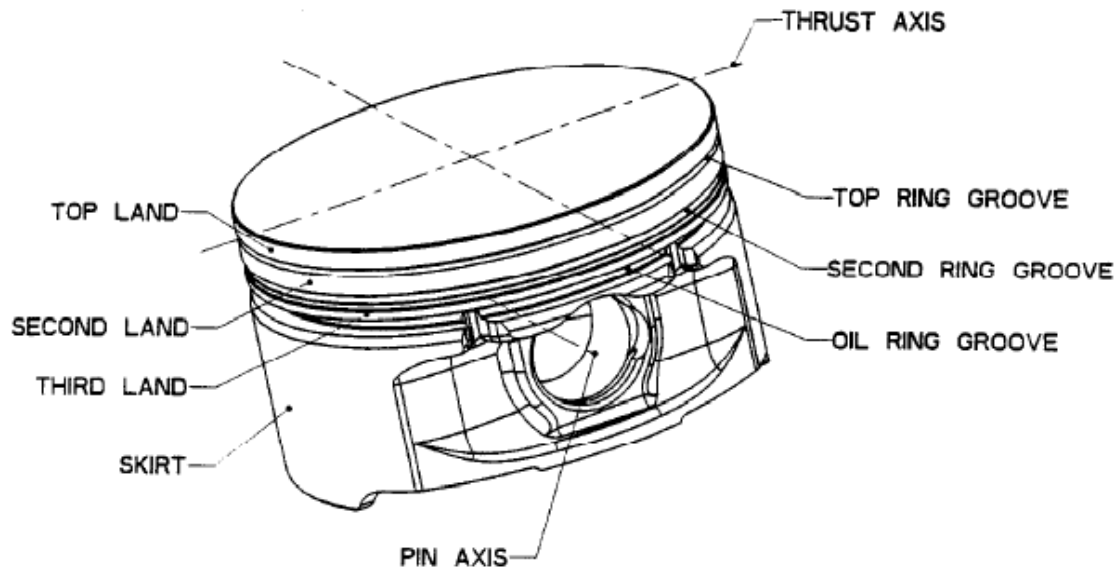


Figure 1A - Piston groove nomenclature

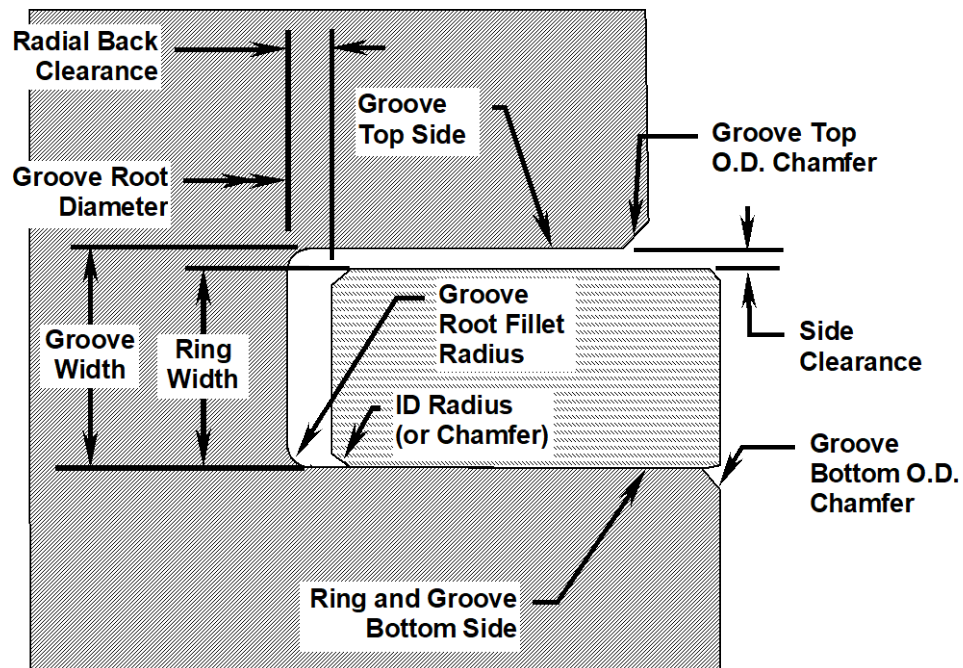


Figure 1B - Piston rectangular groove nomenclature

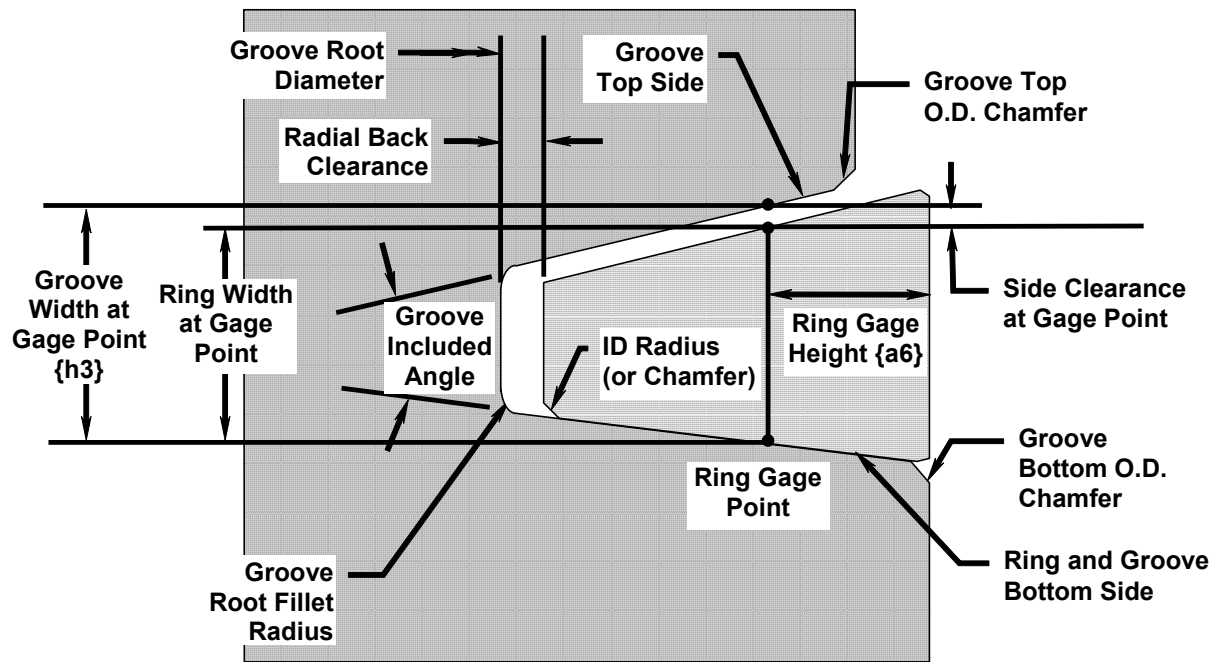


Figure 1C - Piston keystone groove nomenclature

4. PISTON GROOVE TERM DEFINITIONS

4.1 Piston Vertical Axis

The geometric axis of the piston skirt. To establish the piston vertical axis, it requires alignment of a minimum of eight points with four target points on each of two datum planes. See Figure 2.

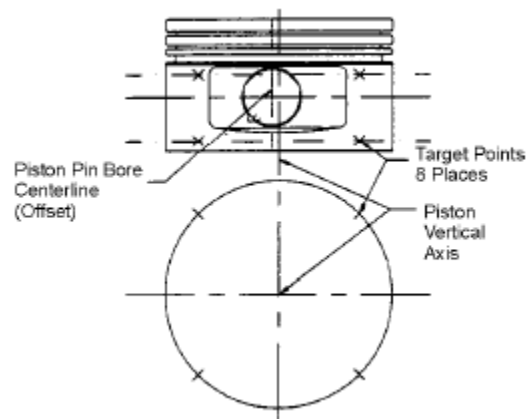


Figure 2 - Piston vertical axis

4.2 Wind (also “Winde”)

This term means the planar tilt of the ring groove sides to the piston vertical axis, or ring groove squareness over a given distance to the piston vertical axis. See Figure 3.

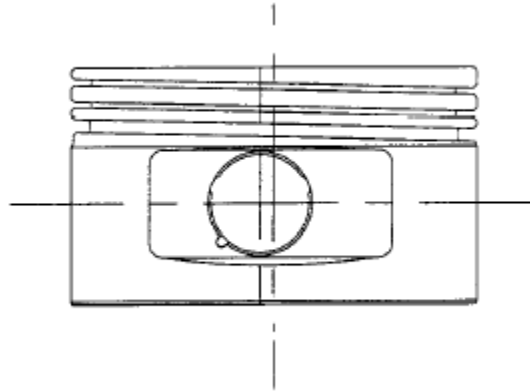


Figure 3 - Wind (also “winde”)

4.3 Circumferential Groove Waviness (also “Wave”)

Ring groove axial undulations are measured circumferentially over 360 degrees of the ring groove and frequently specified over shorter defined intervals. See Figure 4.

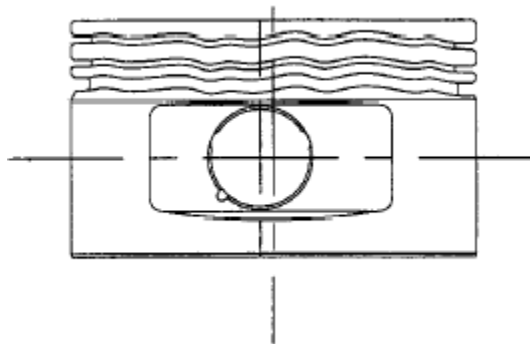


Figure 4 - Circumferential groove waviness (also “wave”)

4.4 Ring Groove Chatter (also “Chatter”)

Tool marks in the surface of the groove sides. These are of a higher frequency than waviness yet lower than surface roughness. See Figure 5.

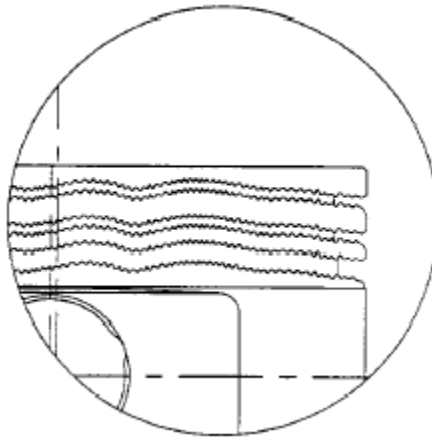


Figure 5 - Ring groove chatter (also “chatter”)

4.5 Groove Side Surface Finish (also “Roughness”)

The surface texture of the top and bottom sides of the ring grooves. Generally measured radially in the ring groove to factor out wave and chatter contribution. See Figure 6.

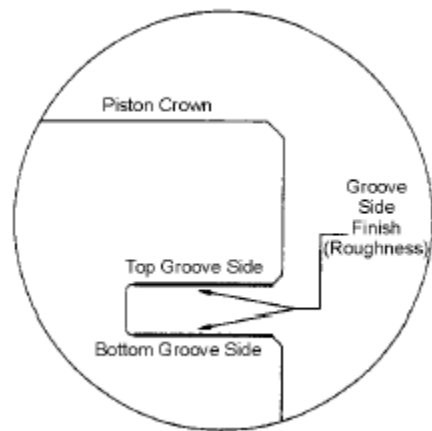


Figure 6 - Groove side surface finish (also “roughness”)

4.6 Groove Radial Profile (also “Groove Profile”)

This refers to the radial straightness of the ring groove sides usually measured over a minimum of two-thirds of the radial depth of the ring groove side. See Figure 7.

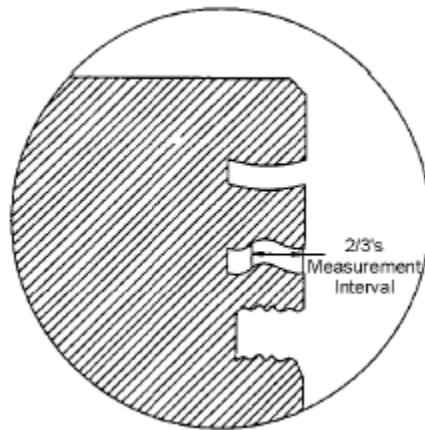
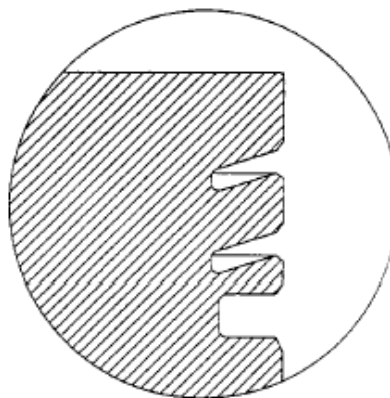


Figure 7 - Groove radial profile (also “groove profile”)

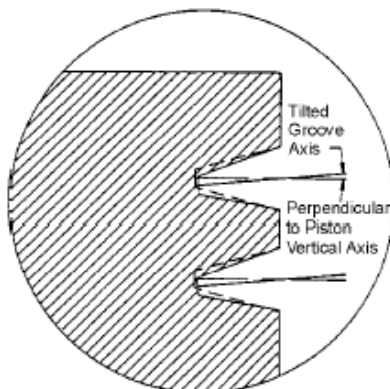
4.7 Radial Tilt (also “Inclination”)

The downward, zero, or upward slope of the ring grooves. This can be intentionally specified to enhance ring performance. Illustrated is upward tilt of compression grooves. See Figures 8 and 9.



Example of
Upward Tilt

Figure 8 - Example of radial upward tilt (also “inclination”)



Example of
Upward Tilt

Figure 9 - Example of upward radial tilt keystone grooves (also “inclination”)

4.8 Ring Groove Depth

The radial distance from the root of the ring groove to the largest adjacent land. Ring groove depth can vary with runout differences of the ring groove root and land diameters to the piston vertical axis, ring groove root or land roundness variation, or addition of land ovality. See Figure 10.

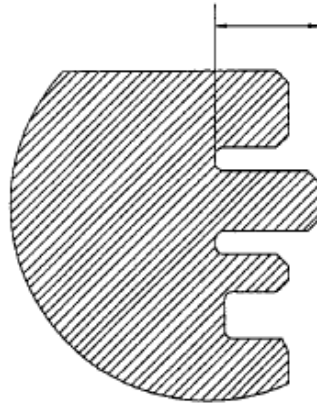


Figure 10 - Ring groove depth

4.9 Groove Root Runout

Relative to the piston vertical axis. See Figure 11.

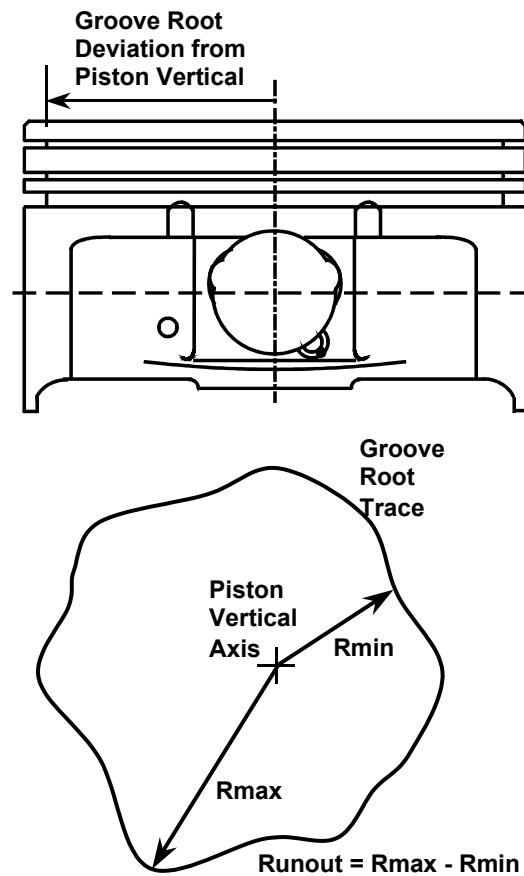


Figure 11 - Groove root runout