



# SURFACE VEHICLE STANDARD



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## Performance Test Procedure - Ball Joints and Spherical Rod Ends

### RATIONALE

The committee cannot find users for the technical report.

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1. **Scope**—The purpose of this test procedure is to provide a uniform method of testing commercial spherical rod end bearings to determine their performance characteristics under specific application situations. This procedure is an extension of the dimensional requirements for spherical rod end bearings as set forth in SAE J1120 and J1259. The loads, number of cycles, definition of failure, etc., are to be agreed to by the user and supplier. This procedure can also be used as the basis for testing ball joints covered by SAE J490.
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 J490—Ball Joints
      - SAE J1120—Spherical Rod Ends
      - SAE J259—Metric Spherical Rod Ends
3. **Objective**—To provide a testing format for spherical rod end bearings.
4. **Performance Characteristics**—The test procedure covers the following characteristics:
  - 4.1 Ball-to-race diametral clearance per paragraph 5.1.
  - 4.2 Ball-to-race axial clearance per paragraph 5.2.
  - 4.3 Ball-to-race rotational torque per paragraph 5.3.
  - 4.4 Radial static limit load per paragraph 5.4.
  - 4.5 Axial static limit load per paragraph 5.5.
  - 4.6 Fatigue and wear test per paragraph 5.6.

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## 5. Test Objectives and Procedures

### 5.1 Ball-to-Race Diametral Clearance

5.1.1 OBJECTIVE—To determine the total diametral clearance of the ball within the race.

5.1.2 PROCEDURE—The following method shall be used to determine total diametral clearance. The ball shall be fastened to the fixture as shown in Figure 1. A reversing force of 20 N is applied to the body and the total movement of the body is measured. The tightening torques shown in Figure 1 shall be used for all tests.

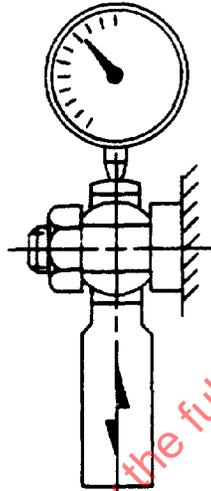


FIGURE 1—

Rod End Size		Nut Torque N·m
SAE J1120	SAE J1259	
3	5	0.9 ± 0.1
4	6	2.25 ± 0.25
5	8	3.4 ± 0.5
6	10	12 ± 4
7	12	25 ± 7
8	14	45 ± 7
10	16	100 ± 15
12	20	150 ± 20

### 5.2 Ball-to-Race Axial Clearance

5.2.1 OBJECTIVE—To determine the total axial clearance of the ball within the race.

5.2.2 PROCEDURE—The following method shall be used to determine total axial clearance. The body shall be clamped as shown in Figure 2. A nut and bolt shall be assembled to the ball. A reversing force of 20 N is applied to the bolt, and the total axial movement of the bolt is measured.

### 5.3 Ball-to-Race Rotational Torque

5.3.1 OBJECTIVE—To ensure desired rotating torque is obtained.

5.3.2 PROCEDURE—The following method shall be used to determine the breakaway and rotational torque of the ball. The rod end shall be mounted as shown in Figure 3.

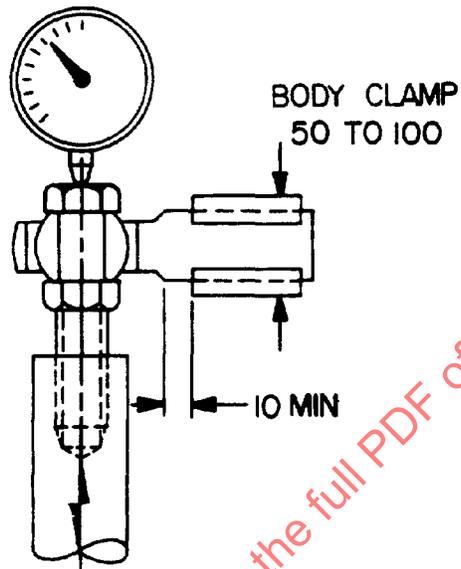


FIGURE 2—

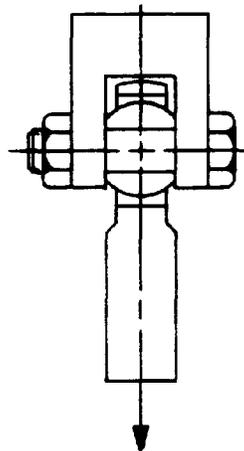


FIGURE 3—