



Standard Test Method for Impingement of Acetabular Prostheses¹

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1. Scope

1.1 This test method covers a procedure to evaluate acetabular component fatigue, deformation, and wear and femoral head assembly dislocation under dynamic impingement conditions.

1.2 This test method can be used to evaluate single-piece acetabular prostheses, modular prostheses, and constrained prostheses manufactured from polymeric, metallic, or ceramic materials.

1.3 The values stated in SI units are regarded as the standard.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*²

- E4 Practices for Force Verification of Testing Machines
- E467 Practice for Verification of Constant Amplitude Dynamic Forces in an Axial Fatigue Testing System
- F2003 Practice for Accelerated Aging of Ultra-High Molecular Weight Polyethylene after Gamma Irradiation in Air
- F2033 Specification for Total Hip Joint Prosthesis and Hip Endoprosthesis Bearing Surfaces Made of Metallic, Ceramic, and Polymeric Materials
- F2091 Specification for Acetabular Prostheses

¹ This test method is under the jurisdiction of ASTM Committee F04 on Medical and Surgical Materials and Devices and is the direct responsibility of Subcommittee F04.22 on Arthroplasty.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

2.2 *ISO Standards:*³

- ISO 7206-1 Implants for Surgery – Partial and Total Hip Joint Prostheses – Part 1: Classification and Designation of Dimensions
- ISO 14242-1 Implants for Surgery – Wear of Total Hip-Joint Prostheses – Part 1: Loading and Displacement Parameters for Wear-Testing Machines and Corresponding Environmental Conditions for Test
- ISO 14242-2 Implants for Surgery – Wear of Total Hip-Joint Prostheses – Part 2: Methods of Measurement
- ISO 21535 Non-Active Surgical Implants – Joint Replacement Implants – Specific Requirements for Hip-Joint Replacement Implants

3. Terminology

3.1 *Definitions:*

3.1.1 *component separation*—the disruption of a connection between components. May be stable or unstable.

3.1.2 *dislocation*—the loss of normal physical contact between opposing components, usually indicated by large separation and a loss of stability.

3.1.3 *femoral head*—convex spherical bearing member for articulation with the natural acetabulum or prosthetic acetabulum.

3.1.4 *impingement*—the point at which two opposing components collide to restrict motion.

3.1.5 *joint reaction force*—the force directed normal to the entry diameter of the acetabular prosthesis (see ISO 7206-1).

3.1.6 *locking mechanism*—the pieces of various components that contribute to the fixing of one component to another.

3.1.7 *range of motion*—the effective pattern of motion limited by impingement. In one plane this is measured from one impingement point to the opposite impingement point.

3.1.8 *subluxation*—partial dislocation.

³ Available from International Organization for Standardization (ISO), 1, ch. de la Voie-Creuse, CP 56, CH-1211 Geneva 20, Switzerland, <http://www.iso.org>.