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Application Note

ASTM F1820 – Hip Cup Disassembly

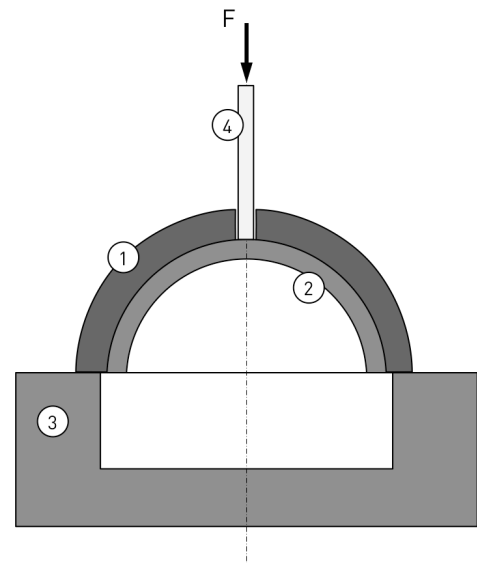


Background

Mechanical integrity of the liner in the acetabular shell of total hip replacements need to be assured. The axial disassembly force of the acetabular device can be assessed according to ASTM F1820, which specifies a test method applied for measuring the axial locking strength of the acetabular liners for modular acetabular devices and for comparing integrity of various locking mechanisms.

Test Setup and Environment

After the assembly of liner (2) and shell (1) according to the surgical procedure guidelines, the liner shell construct should be placed in a fixture facing away from the origin of the loading. The fixture (3) shall support the acetabular shell without distortion while allowing axial load to be applied to the liner. An axial load should be applied (coincident with the axes of the liner and shell) to the liner through a center hole in the shell at a rate of 5.1 cm/min. It may be necessary to create a hole in the shell at the apex in order to apply an axial load to the liner. A small diameter drill blank or plug could be used as a load applicator (4). The maximum load required to completely disengage the liner from the shell should be measured and recorded. The testing of samples shall be terminated when the disengagement force becomes negligible or, prior to detaching, the liner suffers excessive damage.



Equipment

Pushout testing according to ASTM F1820 can be easily, reliably, and safely performed by using the following equipment:

- [THELKIN Servo-Electric Load Frame](#) (e.g. SEL-M-010) – This system is in accordance with ISO 4965¹ and allows an easy and safe sample setup, profile and data acquisition programming, and test execution.
- [Pushout Specimen Holder](#) – for a quick and stable mounting of the test sample.
- [Fluid Bath](#) – implements the environmental simulation. The bath temperature can be controlled up to 50°C using an external temperature controller or connecting the heating plate directly to the THELKIN controller.

The system can be optionally equipped with an [Uninterrupted Power Supply](#) that is connected to the THELKIN testing software. This setup allows a continuous testing in case of a power outage or if necessary, a test stop followed by a shut down in a controlled manner in order to protect the sample.

¹ ISO 4965: ISO 4965-1 Metallic materials - Dynamic force calibration for uniaxial fatigue testing - Part 1: Testing system.