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Orthotics — Method for testing the reliability of microprocessor-controlled ankle moment units of ankle-foot orthoses

National foreword

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Foreword

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This document was prepared by Technical Committee ISO/TC 168, *Prosthetics and orthotics*.

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Introduction

Orthoses of the lower limb are used to treat a wide variety of pathologies. To partly compensate functional deficits, orthoses are used, which provide appropriate functions. The more functionality is provided by orthoses, the more important their functional reliability is.

Structural strength of orthoses, supporting the limb by stabilizing its joints against motion, is as important as stabilisation of movement of joints between limb segments, when mobility is aimed in rehabilitation.

Testing reliability of the controlled ankle moment units of orthoses, which stabilise joint movement, requires to introduce motion into the strength test.

The reliability of microprocessor-controlled ankle moment units of orthosis, supporting the anatomical ankle joint in plantar- and dorsiflexion motion, can be tested by repetitively loading and driving the ankle joint in an appropriate angular and force profile, resulting in the moment profile to test.

Current technologies for acquiring loading and motion-data of orthotic ankle joints in real use are the basis to derive test conditions, which simulate repetitive loading for the microprocessor-controlled ankle moment units in a laboratory environment.

Orthoses of the lower limb are operating aside the leg of the orthosis user. For testing the reliability of microprocessor-controlled ankle moment units in a laboratory test, it is essential to mimic the orthosis user's extremity in such a way, that the orthosis shows its functional capabilities and its reliability. The chapter "leg dummy" in this document describes essential properties of the leg dummy, mimicking the orthosis user's leg.

Covering high loading events during intended use, to be generated by the control elements repetitively in the test, provides a safety factor also for lower loading scenarios of less demanding pathologies.

The Osaka Electro-Communication University in Japan has developed a system of miniaturised sensors with associated data acquisition and data analysis, which can be integrated into an ankle-foot orthosis to measure the multi-axial loading and angular movement of orthotic ankle joints. This system has been used by 50 ankle-foot orthosis users to explore the assessment processes for the reliability of microprocessor-controlled ankle moment elements provided in this document.

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