
**Robotics — Performance criteria
and related test methods for service
robots —**

**Part 4:
Lower-back support robots**

*Robotique — Critères de performance et méthodes d'essai
correspondantes pour robots de service —*

Partie 4: Robots de soutien du bas du dos



This document is a preview generated by EKO



COPYRIGHT PROTECTED DOCUMENT

© ISO 2021

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Test conditions	3
4.1 General.....	3
4.2 Environmental conditions.....	3
4.3 Operating conditions.....	4
5 Test method for assistive torque index and lumbar compression reduction	4
5.1 Purpose.....	4
5.2 Relevant characteristics.....	4
5.2.1 General.....	4
5.2.2 Assistive torque index (ATI).....	4
5.2.3 Lumbar compression reduction (LCR).....	5
5.3 Test facility.....	7
5.3.1 Test apparatus.....	7
5.3.2 Reference movement and target trajectory.....	8
5.4 Test procedure.....	10
5.5 Test result.....	11
6 Test method for rate of assistance	11
6.1 Purpose.....	11
6.2 Relevant characteristics.....	11
6.3 Test facility.....	12
6.4 Test procedure.....	15
6.5 Test result.....	18
Annex A (informative) Time range of ATI and LCR	19
Annex B (informative) Example of lower-back support robots	23
Annex C (informative) Example table of test results	25
Annex D (informative) Example implementation of a test apparatus	26
Bibliography	29

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 299, *Robotics*.

A list of all parts in the ISO 18646 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

This document is intended to facilitate understanding of performance of lower-back support robots (see [Annex B](#)). This document defines the important performance characteristics and describes how to specify them and how to test them.

The characteristics for which test methods are given in this document are those considered to affect robot performance significantly. The user of this document selects which performance characteristics to test, in accordance with the specific requirements.

The performance criteria specified in this document are not intended to be interpreted as the verification or validation of safety requirements. The verification and validation of safety requirements are specified in other standards developed by ISO TC 299.

The International Organization for Standardization (ISO) draws attention to the fact that it is claimed that compliance with this document may involve the use of patents concerning the test apparatuses of the performance of wearable robots for lower-back support referred to throughout the document.

ISO takes no position concerning the evidence, validity and scope of these patent rights.

The holders of these patent rights have assured ISO that they are willing to negotiate licences under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, the statements of the holders of these patent rights are registered with ISO. Information may be obtained from the patent database available at www.iso.org/patents.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights other than those in the patent database. ISO shall not be held responsible for identifying any or all such patent rights.

Robotics — Performance criteria and related test methods for service robots —

Part 4: Lower-back support robots

1 Scope

This document describes methods of specifying and evaluating the performance of lower-back support robots.

This document applies regardless of the purpose and application of lower-back support robots and the driving methods (e.g. electric, hydraulic and pneumatic). This document does not apply to medical robots, although the test methods specified in this document can be utilized for medical robots.

This document is not intended for the verification or validation of safety requirements.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 8373, *Robots and robotic devices — Vocabulary*

ISO 13482, *Robots and robotic devices — Safety requirements for personal care robots*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 8373, ISO 13482 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

3.1

robot

programmed actuated mechanism with a degree of autonomy, moving within its environment, to perform intended tasks

Note 1 to entry: A robot includes the control system and interface of the control system.

Note 2 to entry: The classification of robot into industrial robot or service robot is done according to its intended application.

[SOURCE: ISO 8373:2012, 2.6, modified — The words “actuated mechanism programmable in two or more axes” have been replaced with “programmed actuated mechanism”.]