International Standard

ISO 18646-6

First edition
2026-05

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

Part 6: Lower-limb wearable robots

Robots et composants robotiques — Critères de performance et méthodes d'essai correspondantes pour robots de service —

Partie 6: Robot portable pour les membres inférieurs

Reference number
ISO 18646-6:2026(en)

© ISO 2026



COPYRIGHT PROTECTED DOCUMENT

© ISO 2026

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**

1 Scope ... **1**

2 Normative references ... **1**

3 Terms and definitions ... **1**

4 Test conditions ... **2**
4.1 General ... 2
4.2 Wearable robot conditions ... 2
4.3 Environmental conditions ... 3
4.4 Operating conditions ... 3

5 Test device ... **3**
5.1 ATDR configuration requirements ... 3
5.2 ATDR size ... 4
5.3 ATDR signal measurement conditions ... 6
5.4 Safety considerations for the test setup ... 6

6 Preparation for the test ... **6**
6.1 Reference trajectory for ATDR walking ... 6
6.1.1 Configuration of the ATDR reference trajectory ... 6
6.1.2 Design of ATDR walking reference trajectory ... 7
6.2 ATDR half squat reference trajectory ... 8
6.2.1 Configuration of the ATDR reference trajectory ... 8
6.2.2 Design of ATDR half squat reference trajectory ... 9
6.3 ATDR control performance requirements ... 10
6.4 Wearable robot performance evaluation index ... 11
6.5 Ground reaction conditions ... 13

7 Test methods for walking test ... **13**
7.1 General ... 13
7.2 Test device ... 13
7.3 Test procedure ... 14
7.3.1 Test principle ... 14
7.3.2 No-load walking test ... 16
7.3.3 Loaded walking test ... 18

8 Test methods for half squat test ... **18**
8.1 General ... 18
8.2 Test device ... 18
8.3 Test procedure ... 19
8.3.1 Test principle ... 19
8.3.2 No-load half squat test ... 20
8.3.3 Loaded half squat test ... 21

9 Test report ... **21**

Bibliography ... **24**

© ISO 2026 – All rights reserved

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 document 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).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

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.

© ISO 2026 – All rights reserved

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

Part 6: Lower-limb wearable robots

1 Scope

This document specifies performance index and related test methods to evaluate the assistance and enhancement performance of lower-limb wearable robots by using an anthropomorphic test dummy robot (ATDR).

This document applies to wearable robots that are operated by being attached to lower limbs regardless of the purpose of use or the driving method (powered/non-powered, electric/hydraulic).

This document does not apply to lower-limb wearable robots that operate based on biosignals such as electromyography.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology 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
wearable robot
robot that supplements or augments physical capabilities by driving human body while attached to a human

Note 1 to entry: Wearable robots are referred to as restraint-type physical assistant robots in ISO 13482.

[SOURCE: ISO 18646-4:2021, 3.2, modified — The words “while attached to a human during use” have been replaced with “by driving human body while attached to a human”.]

3.2
lower-limb wearable robot
wearable robot attached to (part of) human lower-limbs

3.3
anthropomorphic test dummy robot
ATDR
robot that has a similar configuration to the lower-limb skeleton of a human and actively performs movements such as walking and half squats while wearing a lower-limb wearable robot

© ISO 2026 – All rights reserved