



BSI Standards Publication

Robotics — Application of ISO 13482

Part 2: Application guidelines

National foreword

This Published Document is the UK implementation of ISO/TR 23482-2:2019.

The UK participation in its preparation was entrusted to Technical Committee AMT/10, Robotics.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© The British Standards Institution 2019
Published by BSI Standards Limited 2019

ISBN 978 0 580 94909 8

ICS 25.040.30

Compliance with a British Standard cannot confer immunity from legal obligations.

This Published Document was published under the authority of the Standards Policy and Strategy Committee on 31 March 2019.

Amendments/corrigenda issued since publication

Date	Text affected
------	---------------

TECHNICAL REPORT

ISO/TR
23482-2

First edition
2019-03-05

Robotics — Application of ISO 13482 —

Part 2: Application guidelines

*Robotique — Application de l'ISO 13482 —
Partie 2: Lignes directrices sur l'application*



Reference number
ISO/TR 23482-2:2019(E)

© ISO 2019



COPYRIGHT PROTECTED DOCUMENT

© ISO 2019, Published in Switzerland

All rights reserved. Unless otherwise specified, 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
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

Contents

Page

Foreword	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Guidance on the scope of ISO 13482 and gaps or overlaps with other standards	2
4.1 General	2
4.2 Guidance on the definition of service robots	2
4.3 Guidance on the definition of personal care robots	4
4.4 Guidance on the distinction between personal care robots and other robots	4
5 Concepts in ISO 13482	5
5.1 General	5
5.2 Interaction without guards	6
5.3 Intended physical contact	6
5.4 Autonomous functions	6
6 Methodology	7
6.1 Risk reduction methodology of ISO 13482 in the context of other safety standards	7
6.2 Approach adopted for the working examples	9
6.3 Application of wording examples to other robots	12
7 Working examples	12
7.1 Description policy	12
7.2 Example 1 — Mobile servant robot (high risk)	13
7.2.1 Overview	13
7.2.2 Risk assessment	13
7.2.3 Safety-related control system	22
7.3 Example 2 — Mobile servant robot (low risk)	23
7.3.1 Overview	23
7.3.2 Risk assessment	24
7.3.3 Safety-related control system	30
7.4 Example 3 — Restraint type physical assistant robot	31
7.4.1 Overview	31
7.4.2 Risk assessment	32
7.4.3 Safety-related control system	39
7.5 Example 4 — Person carrier robot	40
7.5.1 Overview	40
7.5.2 Risk assessment	41
7.5.3 Safety-related control functions	47
7.6 Example 5 — Restraint-free type physical assistant robot	48
7.6.1 Overview	48
7.6.2 Risk assessment	49
7.6.3 Safety-related control system	53
Bibliography	55

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 23482 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

ISO 13482 is the first safety standard developed for the area of service robots. It allows close human-robot interaction, including human-robot contact. Although ISO 13482 follows well-established principles and practices from standards for industrial robots and machines in general, additional guidance can facilitate its rapid and successful adoption by manufacturers and other stakeholders.

This document clarifies which robots fall under the definition of personal care robots and what distinguishes personal care robots from robots in other areas, such as medical robots or industrial robots. This document also provides further guidance on the risk assessment and risk reduction process to be conducted for a personal care robot. It contains examples of risk assessments for different types of personal care robots that can serve as an example for the user of ISO 13482 for their own risk assessment.

Robotics — Application of ISO 13482 —

Part 2: Application guidelines

1 Scope

This document provides guidance on the use of ISO 13482 and is intended to facilitate the design of personal care robots in conformity with ISO 13482. Additional guidance is provided for users with limited experience of risk assessment and risk reduction. This document provides clarification and guidance on new terms and safety requirements introduced to allow close human-robot interaction and human-robot contact in personal care robot applications, including mobile servant robots, physical assistant robots and person carrier robots. This document considers the application of ISO 13482 to all service robots and includes related examples.

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 8373:2012, *Robots and robotic devices — Vocabulary*

ISO 13482:2014, *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 8373:2012 and ISO 13482:2014 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 <http://www.electropedia.org/>

3.1

service robot

robot that performs useful tasks for humans or equipment excluding industrial automation applications

[SOURCE: ISO 8373:2012, 2.10, modified — Notes to entry have been deleted.]

3.2

personal care robot

service robot (3.1) that performs actions contributing directly towards improvement in the quality of life of humans, excluding medical applications

[SOURCE: ISO 13482:2014, 3.13, modified — Notes to entry have been deleted.]