

This is a preview of "ISO 9241-420:2011". [Click here to purchase the full version from the ANSI store.](#)

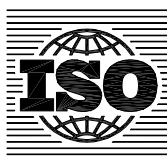
First edition
2011-07-15

Ergonomics of human-system interaction —

Part 420: Selection of physical input devices

Ergonomie de l'interaction homme-système —

Partie 420: Sélection des dispositifs d'entrée physiques



Reference number
ISO 9241-420:2011(E)

© ISO 2011

This is a preview of "ISO 9241-420:2011". [Click here to purchase the full version from the ANSI store.](#)



COPYRIGHT PROTECTED DOCUMENT

© ISO 2011

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

This is a preview of "ISO 9241-420:2011". Click here to purchase the full version from the ANSI store.

Contents

Page

Foreword	vii
Introduction.....	ix
1 Scope.....	1
2 Normative references.....	1
3 Terms and definitions	1
4 Procedures for selecting equipment — General considerations	11
4.1 Rationale.....	11
4.2 Objectives for selection procedures	13
5 Performance criterion	13
6 Methods and aids for selection of devices	14
6.1 Task analysis	14
6.2 Selection based on product description.....	14
6.3 User tests	14
6.4 Selection based on dominant task primitive(s) with overriding importance	15
6.5 Selecting a keyboard.....	17
7 Field assessment of input devices	18
7.1 Rationale.....	18
7.2 Methods.....	19
Annex A (informative) Overview of the ISO 9241 series	23
Annex B (informative) Tracing test	24
Annex C (informative) Dragging test.....	26
Annex D (informative) Assessment of comfort.....	28
Annex E (informative) One-direction tapping test	32
Annex F (informative) Multi-directional tapping test.....	35
Annex G (informative) Test for mobile text entry (hand-held keyboards).....	37
Annex H (normative) Tables for selecting devices in consideration of product description	40
Annex I (informative) Usability test for keyboards	93
Bibliography.....	94

Tables Annex H

Table H.1 — Correspondence with generic requirements on compact keyboards — Appropriateness	47
Table H.2 — Correspondence with generic requirements on compact keyboards — Operability	47
Table H.3 — Correspondence with generic requirements on compact keyboards — Controllability.....	47
Table H.4 — Correspondence with generic requirements on compact keyboards — Biomechanical load.....	48
Table H.5 — Functional properties of compact keyboards — Design of keys of compact keyboards — Design of keys	48
Table H.6 — Functional properties of compact keyboards — Design of keys — Key legends	48
Table H.7 — Functional properties of compact keyboards — Design of keyboard — Sections and zones.....	49

This is a preview of "ISO 9241-420:2011". [Click here to purchase the full version from the ANSI store.](#)

Table H.8 — Functional properties of compact keyboards — Design of keyboard — Mechanical design	49
Table H.9 — Other considerations for compact keyboards — Electrical properties	50
Table H.10 — Other considerations for compact keyboards — Maintainability-related properties	50
Table H.11 — Other considerations for compact keyboards — Interdependencies	50
Table H.12 — Other considerations for compact keyboards — Documentation	50
Table H.13 — Correspondence with generic requirements on full-size keyboards — Appropriateness	51
Table H.14 — Correspondence with generic requirements on full-size keyboards — Operability	51
Table H.15 — Correspondence with generic requirements on full-size keyboards — Controllability	51
Table H.16 — Correspondence with generic requirements on full-size keyboards — Biomechanical load	52
Table H.17 — Functional properties of full-size keyboards — Design of keys — Design of keys	52
Table H.18 — Functional properties of full-size keyboards — Design of keys — Key legends	52
Table H.19 — Functional properties of full-size keyboards — Design of keyboard — Sections and zones	53
Table H.20 — Functional properties of full-size keyboards — Design of keyboard — Mechanical design	53
Table H.21 — Other considerations for full-size keyboards — Electrical properties	53
Table H.22 — Other considerations for full-size keyboards — Maintainability-related properties	54
Table H.23 — Other considerations for full-size keyboards — Interdependencies	54
Table H.24 — Other considerations for full-size keyboards — Documentation	54
Table H.25 — Correspondence with generic requirements on mice — Appropriateness	55
Table H.26 — Correspondence with generic requirements on mice — Operability	55
Table H.27 — Correspondence with generic requirements on mice — Controllability	55
Table H.28 — Correspondence with generic requirements on mice — Biomechanical load	56
Table H.29 — Functional properties of mice — Functional properties	56
Table H.30 — Functional properties of mice — Button design	56
Table H.31 — Functional properties of mice — Considerations of handedness	57
Table H.32 — Functional properties of mice — Resolution consistency	57
Table H.33 — Other properties of mice — Mechanical properties	57
Table H.34 — Other properties of mice — Electrical properties	57
Table H.35 — Other properties of mice — Maintainability-related properties	57
Table H.36 — Other properties of mice — Health- and safety-related properties	58
Table H.37 — Interdependencies and documentation of mice — Interdependency with software	58
Table H.38 — Interdependencies and documentation of mice — Interdependency with use environment	58
Table H.39 — Interdependencies and documentation of mice — Documentation	59
Table H.40 — Correspondence with generic requirements on pucks — Appropriateness	59
Table H.41 — Correspondence with generic requirements on pucks — Operability	60
Table H.42 — Correspondence with generic requirements on pucks — Controllability	60
Table H.43 — Correspondence with generic requirements on pucks — Biomechanical load	60
Table H.44 — Functional properties of pucks — Functional properties	61
Table H.45 — Functional properties of pucks — Button design	61
Table H.46 — Functional properties of pucks — Consideration of handedness	61
Table H.47 — Functional properties of pucks — Resolution consistency	62
Table H.48 — Other properties of pucks — Mechanical properties	62
Table H.49 — Other properties of pucks — Electrical properties	62
Table H.50 — Other properties of pucks — Maintainability-related properties	62
Table H.51 — Other properties of pucks — Health- and safety-related properties	63
Table H.52 — Interdependencies and documentation of pucks — Interdependency with software	63
Table H.53 — Interdependencies and documentation of pucks — Interdependency with use environment	63
Table H.54 — Interdependencies and documentation of pucks — Documentation	64
Table H.55 — Correspondence with generic requirements on joysticks — Appropriateness	64
Table H.56 — Correspondence with generic requirements on joysticks — Operability	65
Table H.57 — Correspondence with generic requirements on joysticks — Controllability	65
Table H.58 — Correspondence with generic requirements on joysticks — Biomechanical load	65
Table H.59 — Functional properties of joysticks — Functional properties	66

This is a preview of "ISO 9241-420:2011". [Click here to purchase the full version from the ANSI store.](#)

Table H.60 — Functional properties of joysticks — Button design	66
Table H.61 — Functional properties of joysticks — Consideration of handedness.....	66
Table H.62 — Functional properties of joysticks — Resolution consistency.....	67
Table H.63 — Other properties of joysticks — Mechanical properties	67
Table H.64 — Other properties of joysticks — Electrical properties	67
Table H.65 — Other properties of joysticks — Maintainability-related properties	67
Table H.66 — Other properties of joysticks — Health- and safety-related properties	68
Table H.67 — Interdependencies and documentation of joysticks — Interdependency with software.....	68
Table H.68 — Interdependencies and documentation of joysticks — Interdependency with use environment	68
Table H.69 — Interdependencies and documentation of joysticks — Documentation.....	68
Table H.70 — Correspondence with generic requirements on trackballs — Appropriateness	69
Table H.71 — Correspondence with generic requirements on trackballs — Operability	69
Table H.72 — Correspondence with generic requirements on trackballs — Controllability.....	70
Table H.73 — Correspondence with generic requirements on trackballs — Biomechanical load	70
Table H.74 — Functional properties of trackballs — Functional properties	70
Table H.75 — Functional properties of trackballs — Button design.....	71
Table H.76 — Functional properties of trackballs — Consideration of handedness	71
Table H.77 — Functional properties of trackballs — Resolution consistency	71
Table H.78 — Other properties of trackballs — Mechanical properties	72
Table H.79 — Other properties of trackballs — Electrical properties	72
Table H.80 — Other properties of trackballs — Maintainability-related properties.....	72
Table H.81 — Other properties of trackballs — Health- and safety-related properties.....	72
Table H.82 — Interdependencies and documentation of trackballs — Interdependency with software.....	73
Table H.83 — Interdependencies and documentation of trackballs — Interdependency with use environment	73
Table H.84 — Interdependencies and documentation of trackballs — Documentation	73
Table H.85 — Correspondence with generic requirements on touchpads — Appropriateness	74
Table H.86 — Correspondence with generic requirements on touchpads — Operability.....	74
Table H.87 — Correspondence with generic requirements on touchpads — Controllability	75
Table H.88 — Correspondence with generic requirements on touchpads — Biomechanical load.....	75
Table H.89 — Functional properties of touchpads — Functional properties.....	75
Table H.90 — Functional properties of touchpads — Button design	76
Table H.91 — Functional properties of touchpads — Consideration of handedness.....	76
Table H.92 — Functional properties of touchpads — Resolution consistency	76
Table H.93 — Other properties of touchpads — Mechanical properties	77
Table H.94 — Other properties of touchpads — Electrical properties.....	77
Table H.95 — Other properties of touchpads — Maintainability-related properties	77
Table H.96 — Other properties of touchpads — Health- and safety-related properties	77
Table H.97 — Interdependencies and documentation of touchpads — Interdependency with software.....	78
Table H.98 — Interdependencies and documentation of touchpads — Interdependency with use environment	78
Table H.99 — Interdependencies and documentation of touchpads — Documentation.....	78
Table H.100 — Correspondence with generic requirements on tablets/overlays — Appropriateness	79
Table H.101 — Correspondence with generic requirements on tablets/overlays — Operability.....	79
Table H.102 — Correspondence with generic requirements on tablets/overlays — Controllability	80
Table H.103 — Correspondence with generic requirements on tablets/overlays — Biomechanical load	80
Table H.104 — Functional properties of tablets/overlays — Functional properties.....	80
Table H.105 — Functional properties of tablets/overlays — Button design	81
Table H.106 — Functional properties of tablets/overlays — Consideration of handedness.....	81
Table H.107 — Functional properties of tablets/overlays — Resolution consistency	81
Table H.108 — Other properties of tablets/overlays — Mechanical properties	82
Table H.109 — Other properties of tablets/overlays — Legibility and visibility of legends and graphical symbols	82
Table H.110 — Other properties of tablets/overlays — Electrical properties	83

This is a preview of "ISO 9241-420:2011". [Click here to purchase the full version from the ANSI store.](#)

Table H.111 — Other properties of tablets/overlays — Maintainability-related properties.....	83
Table H.112 — Other properties of tablets/overlays — Health- and safety-related properties.....	83
Table H.113 — Interdependencies and documentation of tablets/overlays — Interdependency with software	84
Table H.114 — Interdependencies and documentation of tablets/overlays — Interdependency with use environment.....	84
Table H.115 — Interdependencies and documentation of tablets/overlays — Documentation	84
Table H.116 — Correspondence with generic requirements on styli and light pens — Appropriateness	85
Table H.117 — Correspondence with generic requirements on styli and light pens — Operability.....	85
Table H.118 — Correspondence with generic requirements on styli and light pens — Controllability.....	85
Table H.119 — Correspondence with generic requirements on styli and light pens — Biomechanical load	86
Table H.120 — Functional properties of styli and light pens — Functional properties	86
Table H.121 — Functional properties of styli and light pens — Button design	87
Table H.122 — Functional properties of styli and light pens — Consideration of handedness.....	87
Table H.123 — Functional properties of styli and light pens — Mechanical properties	88
Table H.124 — Other properties of styli and light pens — Electrical properties	88
Table H.125 — Other properties of styli and light pens — Maintainability-related properties	88
Table H.126 — Other properties of styli and light pens — Health- and safety-related properties	88
Table H.127 — Interdependencies and documentation of styli and light pens — Interdependency with software	88
Table H.128 — Interdependencies and documentation of styli and light pens — Interdependency with use environment.....	89
Table H.129 — Interdependencies and documentation of styli and light pens — Documentation.....	89
Table H.130 — Correspondence with generic requirements on touch-sensitive screens — Appropriateness	89
Table H.131 — Correspondence with generic requirements on touch-sensitive screens — Operability	89
Table H.132 — Correspondence with generic requirements on touch-sensitive screens — Controllability.....	90
Table H.133 — Correspondence with generic requirements on touch-sensitive screens — Biomechanical load	90
Table H.134 — Functional properties of touch-sensitive screens — Functional properties	91
Table H.135 — Functional properties of touch-sensitive screens — Mechanical properties.....	91
Table H.136 — Other properties of touch-sensitive screens — Electrical properties.....	91
Table H.137 — Other properties of touch-sensitive screens — Maintainability-related properties.....	92
Table H.138 — Other properties of touch-sensitive screen — Health- and safety-related properties.....	92
Table H.139 — Other properties of touch-sensitive screens — Interdependency with software.....	92
Table H.140 — Other properties of touch-sensitive screens — Interdependency with use environment	92
Table H.141 — Other properties of touch-sensitive screen — Mechanical properties	92

This is a preview of "ISO 9241-420:2011". [Click here to purchase the full version from the ANSI store.](#)

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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 9241-420 was prepared by Technical Committee ISO/TC 159, *Ergonomics*, Subcommittee SC 4, *Ergonomics of human-system interaction*.

This first edition of ISO 9241-420, together with ISO 9241-400, ISO 9241-410 and ISO/TS 9241-411, partially replaces ISO 9241-4 and ISO 9241-9, technically revised as follows:

- terms and definitions from ISO 9241-4 and ISO 9241-9 have been transferred to ISO 9241-400;
- guiding principles, collected in ISO 9241-400, have been incorporated and unified so that they correspond to the scope of the new ISO 9241 series;
- test methods taken from ISO 9241-4 and ISO 9241-9 have been reviewed and amended and new test methods introduced and collected in annexes for greater convenience.

ISO 9241 consists of the following parts, under the general title *Ergonomic requirements for office work with visual display terminals (VDTs)*:

- *Part 1: General introduction*
- *Part 2: Guidance on task requirements*
- *Part 4: Keyboard requirements*
- *Part 5: Workstation layout and postural requirements*
- *Part 6: Guidance on the work environment*
- *Part 9: Requirements for non-keyboard input devices*
- *Part 11: Guidance on usability*
- *Part 12: Presentation of information*
- *Part 13: User guidance*
- *Part 14: Menu dialogues*
- *Part 15: Command dialogues*

This is a preview of "ISO 9241-420:2011". [Click here to purchase the full version from the ANSI store.](#)

— *Part 16: Direct manipulation dialogues*

— *Part 17: Form filling dialogues*

ISO 9241 also consists of the following parts, under the general title *Ergonomics of human-system interaction*:

— *Part 20: Accessibility guidelines for information/communication technology (ICT) equipment and services*

— *Part 100: Introduction to standards related to software ergonomics* [Technical Report]

— *Part 110: Dialogue principles*

— *Part 129: Guidance on software individualization*

— *Part 143: Forms*

— *Part 151: Guidance on World Wide Web user interfaces*

— *Part 171: Guidance on software accessibility*

— *Part 210: Human-centred design for interactive systems*

— *Part 300: Introduction to electronic visual display requirements*

— *Part 302: Terminology for electronic visual displays*

— *Part 303: Requirements for electronic visual displays*

— *Part 304: User performance test methods for electronic visual displays*

— *Part 305: Optical laboratory test methods for electronic visual displays*

— *Part 306: Field assessment methods for electronic visual displays*

— *Part 307: Analysis and compliance test methods for electronic visual displays*

— *Part 308: Surface-conduction electron-emitter displays (SED)* [Technical Report]

— *Part 309: Organic light-emitting diode (OLED) displays* [Technical Report]

— *Part 310: Visibility, aesthetics and ergonomics of pixel defects* [Technical Report]

— *Part 400: Principles and requirements for physical input devices*

— *Part 410: Design criteria for physical input devices*

— *Part 411: Evaluation methods for the design of physical input devices* [Technical Specification]

— *Part 420: Selection of physical input devices*

— *Part 910: Framework for tactile and haptic interaction*

— *Part 920: Guidance on tactile and haptic interactions*

The following parts are under preparation:

— *Part 143: Form-based dialogues*

— *Part 154: Interactive voice response (IVR) applications*

Human-centred design and evaluation methods, optical characteristics of autostereoscopic displays, and requirements, analysis and compliance test methods for the reduction of photosensitive seizures are to form the subjects of future parts 230, 330 and 391.

This is a preview of "ISO 9241-420:2011". [Click here to purchase the full version from the ANSI store.](#)

Introduction

Input devices provide the means for users to enter data into interactive systems. Generally speaking, an input device is a sensor that can detect changes in user behaviour (gestures, moving fingers, etc.) and transform them into signals to be interpreted by the interactive system.

This part of ISO 9241 gives guidance for selecting products on the basis of the relevant properties of the input devices, as outlined in ISO 9241-400, and the design criteria for products, as given in ISO 9241-410. It also includes test and evaluation methods for use at the workplace level. To accelerate the future development of test and evaluation methods, these are treated in separate annexes according to the maturity of the test procedure.

This part of ISO 9241 includes test and evaluation methods for application by user organizations. These methods can also be applied by test houses.