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Ergonomics of human-system interaction —

Part 300: Introduction to electronic visual display requirements

Ergonomie de l'interaction homme-système —

Partie 300: Introduction aux exigences relatives aux écrans de visualisation électroniques

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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 9241-300 was prepared by Technical Committee ISO/TC 159, *Ergonomics*, Subcommittee SC 4, *Ergonomics of human-system interaction*.

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*

— *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 110: Dialogue principles*

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

— *Part 171: Guidance on software accessibility*

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

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

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

For the other parts under preparation, see Annex A.

Ergonomics of human-system interaction —

Part 300:
Introduction to electronic visual display requirements

1 Scope

This part of ISO 9241 provides an introduction to the other parts in the ISO 9241 "300" subseries, and explains its modular structure. The ISO 9241 "300" subseries establishes requirements for the ergonomic design of electronic visual displays. These requirements are stated as performance specifications, aimed at ensuring effective and comfortable viewing conditions for users with normal or adjusted-to-normal eyesight. Test methods and metrology, yielding conformance measurements and criteria, are provided for design evaluation.

The ISO 9241 "300" subseries is applicable to the visual ergonomics design of electronic visual displays for a diversity of tasks in a wide variety of work environments.

2 Normative references

The following referenced documents are indispensable for the application 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 9241-302, *Ergonomics of human-system interaction — Part 302: Terminology for electronic visual displays*

ISO 9241-303, *Ergonomics of human-system interaction — Part 303: Requirements for electronic visual displays*

ISO 9241-304, *Ergonomics of human-system interaction — Part 304: User performance test methods for electronic visual displays*

ISO 9241-305, *Ergonomics of human-system interaction — Part 305: Optical laboratory test methods for electronic visual displays*

ISO 9241-306, *Ergonomics of human-system interaction — Part 306: Field assessment methods for electronic visual displays*

ISO 9241-307, *Ergonomics of human-system interaction — Part 307: Analysis and compliance test methods for electronic visual displays*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 9241-302 apply.

4 Conformance

Conformance shall be achieved by the use of an applicable compliance method according to ISO 9241-307, with consideration of the related test method or methods specified in ISO 9241-304, ISO 9241-305 and/or ISO 9241-306. If a compliance method cannot be established, ISO 9241-303 shall be used as a design guideline for applying ISO 9241-304, ISO 9241-305 or ISO 9241-306, as relevant to the devising question.

5 Overview of the ISO 9241 "300" subseries

The structure of the ISO 9241 "300" subseries (see Table 1) — itself part of the ISO 9241 series of ergonomics standards (see Annex A) — is intended to maximize the future extendibility of the subseries, allowing it to cover new technologies, tasks and environments, while at the same time minimizing that portion of its content that will be needed by a particular user.

— ISO 9241-302 defines terms that are common to the entire subseries.

— ISO 9241-303 presents the basic ergonomics guiding principles and performance requirements, independent of technology, task and environment, based on human performance criteria. These requirements cannot be assessed as such, since every requirement has to be assessed using a test method applicable to the particular technology, task and environment in question.

— ISO 9241-304 specifies test methods based on user tests that can be performed in usability laboratories meeting the quality criteria of ISO/IEC 17025.

— ISO 9241-305 includes test methods based on optical measurements, electrical measurements and observation which can be performed in optical labs meeting the quality criteria of ISO/IEC 17025.

— ISO 9241-306 includes test methods based on optical measurements and observation, which are suitable for field assessment in the actual workplace.

— ISO 9241-307 establishes compliance routes for different contexts of use (display technologies, tasks, environments and user groups).

— ISO/TR 9241-308 gives guidelines for surface-conduction electron-emitter displays (SED).

— ISO/TR 9241-309 gives guidelines for organic light-emitting diode (OLED) displays.

Future developments in science and technology are to be covered by frequent amendments to ISO 9241-304, ISO 9241-305, ISO 9241-306 and ISO 9241-307. In this manner, and whenever necessary, out-dated methods can be replaced by the state-of-the-art: the main core of information represented by the standards themselves will remain unchanged over an extended period of time; while amendments are used to cover new developments, their form and brevity making it quicker and easier to define internationally standardized methods and criteria for display ergonomics.

Table 1 — Structure of ISO 9241 "300" subseries

ISO 9241-													
300	302	303	304		305		306		307		308	309
Introduction	Terminology	Ergonomics requirements	User performance test methods		Optical laboratory test methods		Field assessment methods		Analysis and compliance test methods		SED	OLED
			1	Method 1	1	Method 1	1	Method 1	1	Method 1	a	a
			2	Method 2	2	Method 2	2	Method 2	2	Method 2		
			…	…	…	…	…	…	…	…		
			n	Method *n*	*n*	Method *n*	*n*	Method *n*	*n*	Method *n*		

[a] As Technical Reports ISO/TR 9241-308 and ISO/TR 9241-309 are entirely informative in nature and do not have to be reviewed until the data they provide are considered to be no longer valid or useful.

6 Integrated vs. modular products

Display products are not always single integrated products (e.g. PDA, cellular phones, ATM), but can also comprise a system of independent modules (system units, monitors, graphic cards) that will need to be separately type tested individually. There are cases where product features having ergonomic impact can be tested independently of the other modules in the same system. A part of the ISO 9241-300 subseries might well contain an analysis and compliance testing method for that particular type of product.

In other cases, modules cannot be type-tested independently — either because they affect one another's behaviour, or because the image quality depends on the behaviour of the user. Here, ISO 9241-307 is unable to provide a complete analysis or compliance (see, for example, ISO/IEC 17025) testing methods, and a section of the analysis and compliance evaluation will instead have to be performed as field assessment at the workplace.

See Table 2.

Table 2 — Example of analysis and compliance testing approach for a modular system — Office PC

Some features covered by type testing	Modules affecting a particular feature					
	Display monitor	Display adapter	Software	User	Task	Lighting
Number of display characters on screen	X	X	X		X	
Viewing distance	X			X		
Addressable screen size	X					
Addressable display resolution	X	X	X		X	
Type of character font and font size		X	X		X	
Number of display colours	X	X	X		X	X
Number of grey steps	X	X	X		X	X
Refresh rate, flicker	X	X	X	X		X
Reflection characteristics	X	X		X		X

NOTE 1 The analysis and compliance testing of the individual modules was made for a specified set of intended usage, which included a specification of the range of other modules the particular module needed to be used with.

NOTE 2 The test reports included a statement on the intended uses and other kinds of module the analysis and compliance testing covered.

NOTE 3 When a large system was purchased, the customer verified from the analysis and compliance testing reports that the modules were intended to be able to work together.

NOTE 4 Final ergonomics quality was verified as field assessment at the workplace.

7 Work environments

Some of the ergonomics aspects of human–display interaction are affected by the environment (see Table 3). By using the guidance provided in ISO 9241-303 and the methods specified in ISO 9241-304, ISO 9241-305 and ISO 9241-306, it is usually possible to derive a good understanding of how to analyse a work environment for which a specific analysis and compliance method does not exist in ISO 9241-307.

Table 3 — Examples of work environments

Task	Work environment						
	Office environment	**Medical environment**	**Control room**	**Production environment**	**Counter**	**Mobile environment**	**Airport/railway station**
Reading, recognizing details	Text editing (news, TV) Data processing Electronic data management CAD imaging Stock broker applications	Medical imaging applications	Administrative applications Process controlling applications Air-traffic control Building control room applications	CNC data processing CNC programming	Counter Cashier applications	Stock-broking applications Field service Wireless communication Car-navigation systems (taxi driver, police, etc.)	Public information Scheduling
Monitoring	—	Medical imaging applications	Process control applications Air-traffic control	CNC machinery monitoring	—	Police applications	—
Controlling	—	—	Process control applications Air-traffic control	CNC machinery controlling	—	Car navigation systems (taxi driver, police, etc.)	—
Observing moving images	Video editing	—	Process control applications Watching industrial work cycles	Video-cutting	—	—	—
Colour recognition	Graphic advertising applications Graphic Internet applications Advertising applications Internet applications	—	Process control applications	—	—	Car navigation systems (taxi driver, police, etc.)	—

Annex A
(informative)

Overview of the ISO 9241 series

This annex presents an overview of ISO 9241: its structure, subject areas and the current status of both published and projected parts, at the time of publication of this part of ISO 9241. For the latest information on the series, see: http://isotc.iso.org/livelink/livelink?func=ll&objId=651393&objAction=browse&sort=name.

Part no.	Subject/title	Current status
1	General introduction	International Standard (intended to be replaced by ISO/TR 9241-1 and ISO 9241-130)
2	Guidance on task requirements	International Standard
3	Visual display requirements	Replaced by the ISO 9241 “300” subseries
4	Keyboard requirements	International Standard (intended to be replaced by the ISO 9241 “400” subseries)
5	Workstation layout and postural requirements	International Standard (intended to be replaced by ISO 9241-500)
6	Guidance on the work environment	International Standard (intended to be replaced by ISO 9241-600)
7	Requirements for display with reflections	Replaced by the ISO 9241 “300” subseries
8	Requirements for displayed colours	Replaced by the ISO 9241 “300” subseries
9	Requirements for non-keyboard input devices	International Standard (intended to be replaced by the ISO 9241 “400” subseries)
11	Guidance on usability	International Standard
12	Presentation of information	International Standard (intended to be replaced by ISO 9241-111 and ISO 9241-141)
13	User guidance	International Standard (intended to be replaced by ISO 9241-124)
14	Menu dialogues	International Standard (intended to be replaced by ISO 9241-131)
15	Command dialogues	International Standard (intended to be replaced by ISO 9241-132)
16	Direct-manipulation dialogues	International Standard (intended to be replaced by ISO 9241-133)
17	Form filling dialogues	International Standard (intended to be replaced by ISO 9241-134)
20	Accessibility guidelines for information/communication technology (ICT) equipment and services	International Standard

Part no.	Subject/title	Current status
Introduction		
100	Introduction to software ergonomics	Planned
General principles and framework		
110	Dialogue principles	International Standard
111	Presentation principles	Planned to partially revise and replace ISO 9241-12
112	Multimedia principles	Planned to revise and replace ISO 14915-1
113	GUI and controls principles	Planned
Presentation and support to users		
121	Presentation of information	Planned
122	Media selection and combination	Planned to revise and replace ISO 14915-3
123	Navigation	Planned to partially revise and replace ISO 14915-2
124	User guidance	Planned to revise and replace ISO 9241-13
129	Individualization	Planned
Dialogue techniques		
130	Selection and combination of dialogue techniques	Planned to incorporate and replace ISO 9241-1:1997/Amd 1:2001
131	Menu dialogues	Planned to replace ISO 9241-14
132	Command dialogues	Planned to replace ISO 9241-15
133	Direct-manipulation dialogues	Planned to replace ISO 9241-16
134	Form-based dialogues	Planned to replace ISO 9241-17
135	Natural language dialogues	Planned
Interface control components		
141	Controlling groups of information (including windows)	Planned to partially replace 9241-12
142	Lists	Planned
143	Media controls	Planned to partially revise and replace ISO 14915-2
Domain-specific guidance		
151	Guidance on World Wide Web user interfaces	International Standard
152	Interpersonal communication	Planned
153	Virtual reality	Planned

Part no.	Subject/title	Current status
Accessibility		
171	Guidance on software accessibility	International Standard
Human-centred design		
200	Introduction to human-centred design standards	Planned
210	Human-centred design of interactive systems	Planned to revise and replace ISO 13407
Process reference models		
220	Human-centred lifecycle processes	Planned to revise and replace ISO/PAS 18152
Methods		
230	Human-centred design methods	Planned to revise and replace ISO/TR 16982
Ergonomic requirements and measurement techniques for electronic visual displays		
300	Introduction to electronic visual display requirements	International Standard
302	Terminology for electronic visual displays	International Standard
303	Requirements for electronic visual displays	International Standard
304	User performance test methods for electronic visual displays	International Standard
305	Optical laboratory test methods for electronic visual displays	International Standard
306	Field assessment methods for electronic visual displays	International Standard
307	Analysis and compliance test methods for electronic visual displays	International Standard
308	Surface conduction electron-emitter displays (SED)	Technical Report
309	Organic light-emitting diode (OLED) displays	Technical Report
Physical input devices		
400	Principles and requirements for physical input devices	International Standard
410	Design criteria for physical input devices	International Standard
411	Laboratory test and evaluation methods for the design of physical input devices	Planned
420	Selection procedures for physical input devices	Under preparation
421	Workplace test and evaluation methods for the use of physical input devices	Planned
Workstation		
500	Workstation layout and postural requirements	Planned to revise and replace ISO 9241-5
Work environment		
600	Guidance on the work environment	Planned to revise and replace ISO 9241-6