
**Ergonomics of human-system
interaction —**

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

Ergonomie de l'interaction homme-système —

*Partie 305: Méthodes d'essai de laboratoire optique pour écrans
de visualisation électroniques*



PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

This document is a preview generated by EVS



COPYRIGHT PROTECTED DOCUMENT

© ISO 2008

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

Contents

Page

Foreword	iv
Introduction	vi
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 General	1
4.1 Measurements — Basic measurements and derived procedures	1
4.2 Structure	2
4.3 Matrix of measurement conditions methods and procedures	2
5 Measurement conditions	2
5.1 Preparations and procedures	2
5.2 Test accessories	7
5.3 Test patterns	13
5.4 Alignment — Measurement location and meter position	25
5.5 Light measuring device (LMD)	28
5.6 Measurement field	30
5.7 Angular aperture	30
5.8 Meter time response	31
5.9 Test illumination	31
5.10 Other ambient test conditions	43
6 Measurement methods	44
6.1 Basic light measurements	44
6.2 Luminance profile measurements	52
6.3 Directional light measurements	54
6.4 Temporal performance measurements	56
6.5 Reflection measurements	72
6.6 Luminance analysis	85
6.7 Contrast analysis	94
6.8 Colour analysis	105
6.9 Dimensions and geometries	113
6.10 Geometrics and defects	127
6.11 Alignment of virtual image displays	145
7 Conformance	159
Annex A (informative) Overview of the ISO 9241 series	160
Annex B (informative) Guidelines for measurement method types	164
Annex C (informative) Matrix of measurement procedures and their sources	166
Annex D (informative) Bidirectional reflectance distribution function (BRDF)	175
Annex E (informative) Uncertainty analysis guidelines	177
Annex F (informative) Reconstruction of luminance distribution by microstepping	182
Bibliography	183

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 9241-305 was prepared by Technical Committee ISO/TC 159, *Ergonomics*, Subcommittee SC 4, *Ergonomics of human-system interaction*.

This first edition of ISO 9241-305, together with ISO 9241-302, cancels and replaces ISO 13406-1:1999 and ISO 9241-8:1997. Together with ISO 9241-302, ISO 9241-303 and ISO 9241-307, it also cancels and replaces ISO 9241-7:1998 and ISO 13406-2:2001, and partially replaces ISO 9241-3:1992. The following has been technically revised:

- terms and definitions related to electronic visual displays have been transferred to, and collected in, ISO 9241-302;
- while the areas previously covered in ISO 9241 and by ISO 13406 remain essentially unchanged, test methods and requirements have been updated to account for advances in science and technology;
- all generic ergonomic requirements have been incorporated into ISO 9241-303;
- the application of those requirements to different display technologies, application areas and environmental conditions — including test methods and pass/fail criteria — is specified in ISO 9241-307;
- methods for the laboratory testing of those requirements are specified in ISO 9241-305.

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 tactile and haptic interactions

For the other parts under preparation, see Annex A.

Introduction

This part of ISO 9241 was prepared with the support of the flat panel display measurements (FPDM) task group of VESA (Video Electronics Standards Association, USA). Contributions from its FPDM standard ^[10] are identified in Annex C.

The methods specified in this part of ISO 9241 are provided to assist test laboratories (either suppliers' facilities or test institutes) in deciding whether a specific electronic display conforms to the other relevant parts of ISO 9241, insofar as such a decision can be made in a laboratory setting. This part of ISO 9241 does not specify how to select display adjustment parameters or software for making a test representative of intended actual use. That judgement has to be made by the test laboratory and described in the test report.

ISO 9241 was originally developed as a seventeen-part International Standard on the ergonomics requirements for office work with visual display terminals. As part of the standards review process, a major restructuring of ISO 9241 was agreed to broaden its scope, to incorporate other relevant standards and to make it more usable. The general title of the revised ISO 9241, "Ergonomics of human-system interaction", reflects these changes and aligns the standard with the overall title and scope of Technical Committee ISO/TC 159, *Ergonomics*, Subcommittee SC 4, *Ergonomics of human-system interaction*. The revised multipart standard is structured as series of standards numbered in the "hundreds": the 100 series deals with software interfaces, the 200 series with human-centred design, the 300 series with visual displays, the 400 series with physical input devices, and so on.

See Annex A for an overview of the entire ISO 9241 series.

Ergonomics of human-system interaction —

Part 305:

Optical laboratory test methods for electronic visual displays

1 Scope

This part of ISO 9241 establishes optical test and expert observation methods for use in predicting the performance of a display visual system vis the ergonomics requirements given in ISO 9241-303.

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 9241-307, *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 General

4.1 Measurements — Basic measurements and derived procedures

The collection of (optical) lab measurements necessary for the compliance evaluations given in this part of ISO 9241 are divided into *basic measurements* — identified by M and a measurement number — and *measurement procedures* — identified by P and a procedure number (and letter in the case of supplementary procedures) — briefly described below. Additional information, including decisions on developing the methods and their use for the definition of compliance procedures, can be found in Annex B.

4.1.1 Basic measurements (or evaluation) — Method M

Basic measurements should describe a fundamental method in as simple a form as possible. Most of the essential measurement parameters (such as screen location, viewing direction, test pattern) are not specified. The specified result is a physical quantity or some other directly measured property, and does not involve any processing of the collected data. These results are usually not directly used in a compliance procedure of the sort specified in ISO 9241-307. Rather, in a compound measurement procedure (see 4.1.2), a basic measurement will be used to achieve sets or collections of data.