



BSI Standards Publication

Ergonomics — Accessible design

Part 2: Colour combinations for people with colour deficiency and low vision

National foreword

This British Standard is the UK implementation of ISO 24505-2:2025.

The UK participation in its preparation was entrusted to Technical Committee PH/9/-/1, Ergonomics of the physical environment.

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

Contractual and legal considerations

This publication has been prepared in good faith, however no representation, warranty, assurance or undertaking (express or implied) is or will be made, and no responsibility or liability is or will be accepted by BSI in relation to the adequacy, accuracy, completeness or reasonableness of this publication. All and any such responsibility and liability is expressly disclaimed to the full extent permitted by the law.

This publication is provided as is, and is to be used at the recipient's own risk.

The recipient is advised to consider seeking professional guidance with respect to its use of this publication.

This publication is not intended to constitute a contract. Users are responsible for its correct application.

© The British Standards Institution 2025
Published by BSI Standards Limited 2025

ISBN 978 0 539 19012 0

ICS 13.180

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

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 October 2025.

Amendments/corrigenda issued since publication

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



**International
Standard**

ISO 24505-2

**Ergonomics — Accessible design —
Part 2:
Colour combinations for people with
colour deficiency and low vision**

Ergonomie — Conception accessible —

*Partie 2: Combinaisons de couleurs pour les personnes atteintes
de daltonisme et de malvoyance*

**First edition
2025-10**

Reference number
ISO 24505-2:2025(en)

Full document details: BS ISO 24505-2:2025

© ISO 2025  **Documents**
Document Sharing Hub



COPYRIGHT PROTECTED DOCUMENT

© ISO 2025

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
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 General	3
4.1 Application criteria for colour deficiency and low vision	3
4.2 Viewing modes and conditions	3
5 Colour combinations for people with protanopia and deuteranopia	3
5.1 General	3
5.2 Protanopia	3
5.2.1 Two-colour combinations and their conspicuity for people with protanopia	3
5.2.2 Spans of fundamental colours of protanopia (Span 1)	4
5.3 Deuteranopia	6
5.3.1 Two-colour combinations and their conspicuity for people with deuteranopia	6
5.3.2 Spans of fundamental colours for deuteranopia (Span 1)	7
6 Colour combinations for people with low vision	9
6.1 General	9
6.2 Two-colour combinations and their conspicuity for people with low vision	9
6.3 Spans of fundamental colours for people with low vision (Span 1)	10
7 Procedures to create a colour combination for people with colour deficiency and low vision	12
Annex A (informative) Description and classification of colour deficiency, and sources of data for the fundamental colour spans adopted in this document	13
Annex B (informative) Description of low vision and the sources of data for fundamental colour spans adopted in this document	15
Annex C (informative) Textual descriptions of figures and tables for accessibility	18
Bibliography	27

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).

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 not 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 159, *Ergonomics*, Subcommittee SC 5, *Ergonomics of the physical environment*.

A list of all parts in the ISO 24505 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

Among people with visual disabilities, a considerably large number of people, especially male people due to a genetic reason, have colour deficiency of various types, and have difficulties identifying and discriminating colours in their daily life. A number of people also suffer from low visual abilities, and are clinically classified as having "low vision". These people can also have deteriorated colour vision and can experience confusion around some colours. As such, they can have problems with obtaining important public information such as warning signs and displays that use mainly colour to convey the message.

ISO 24505-1 provides a method for creating conspicuous colour combinations that are discriminable or differentiated by people with no colour deficiency, but taking into account age-related changes in human colour vision with the aim of presenting better colour combinations to older people. Based on this methodology and basic colour vision data for people with visual disabilities, it is possible and required to establish a method to create colour combinations for people with colour deficiency and low vision to solve their problems in seeing coloured signs and displays.

Within this document, colours are consistently described using the Munsell Colour System. This is a colour order system recommended for use by the International Commission on Illumination.^[1]

The selection of colours and their combinations for the specific use for safety conform to ISO 3864-1.

This document adopts the guidance on accessibility presented in ISO/IEC Guide 71 and design guidelines presented in ISO/TR 22411.

This document is based on the method prescribed in ISO 24505-1, but focuses specifically on data concerning fundamental colours for people with visual disabilities.

Ergonomics — Accessible design —

Part 2:

Colour combinations for people with colour deficiency and low vision

1 Scope

This document provides a method for creating conspicuous colour combinations for use in visual signs and displays in which multiple colours are used in various combinations to make them visible and conspicuous to people with colour deficiencies and low vision.

This document addresses protanopia and deuteranopia of dichromatic colour vision as typical cases of colour deficiency. This document does not cover tritanopia (another type of dichromatic colour vision) and anomalous trichromatic colour vision (protanomalous, deuteranomalous and tritanomalous) due to a lack of data.

This document covers low vision caused by various types of eye diseases, such as retinitis pigmentosa, macular degeneration, glaucoma, cataract, and others. It does not cover amblyopia, which also brings extremely low visual acuity but is classified differently in the medical field.

NOTE "Low vision" includes various types of permanent conditions of reduced visual abilities that cannot be rectified by optical refractive correction, and that are accompanied by extremely low visual acuity or limited visual field, central or peripheral.

This document applies to the reflective or object-mode of colours, but can apply to the self-luminous-mode of colours if their colour coordinates are appropriately transferred to those of the object-mode of colours.

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 24505-1, *Ergonomics — Accessible design — Method for creating colour combinations taking account age-related changes in human colour vision*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 24505-1 and the following 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

anomalous trichromatism

form of trichromatism in which colour discrimination is less than normal

[SOURCE: CIE S 017:2020, 17-22-035, modified — Note 1 to entry has been deleted]

3.2

colour deficiency

anomaly of vision in which there is a reduced ability to discriminate between some or all colours

Note 1 to entry: Types of colour deficiency include:

- anomalous trichromatism: deuteranomaly, protanomaly and tritanomaly;
- dichromatism: deuteranopia, protanopia and tritanopia;
- monochromatism.

[SOURCE: CIE S 017:2020, 17-22-023, modified — "defective colour vision" has been changed to "colour deficiency" and Note 2 to entry and Note 3 to entry have been deleted.]

3.3

deuteranomaly

anomalous trichromatic colour deficiency in which discrimination of the reddish and greenish contents of colours is reduced, without any colours appearing abnormally dim

[SOURCE: CIE S 017:2020, 17-22-025, modified — "defective colour vision" has been changed to colour deficiency, and Note 1 to entry has been deleted.]

3.4

deuteranopia

dichromatic defective colour vision in which discrimination of the reddish and greenish contents of colours is absent, without any colours appearing abnormally dim

[SOURCE: CIE S 017:2020, 17-22-026, modified — "defective colour vision" has been changed to "colour deficiency" and Note 1 to entry has been deleted.]

3.5

dichromatism

colour deficiency in which all colours can be matched using additive mixtures of only two matching stimuli

[SOURCE: CIE S 017:2020, 17-22-027, modified — "defective colour vision" has been changed to "colour deficiency" and Note 1 to entry has been deleted.]

3.6

monochromatism

defective colour vision in which all colours can be matched using only a single matching stimulus

[SOURCE: CIE S 017:2020, 17-22-028, modified — "defective colour vision" has been changed to "colour deficiency" and Note 1 to entry has been deleted.]

3.7

protanomaly

anomalous trichromatic colour deficiency in which discrimination of the reddish and greenish contents of colours is reduced, with reddish colours appearing abnormally dim

[SOURCE: CIE S 017:2020, 17-22-030, modified — "defective colour vision" has been changed to "colour deficiency" and Note 1 to entry has been deleted.]

3.8

protanopia

dichromatic colour deficiency in which discrimination of the reddish and greenish contents of colours is absent, with reddish colours appearing abnormally dim

[SOURCE: CIE S 017:2020, 17-22-031, modified — "defective colour vision" has been changed to "colour deficiency" and Note 1 to entry has been deleted.]

3.9

tritanomaly

anomalous trichromatic colour deficiency in which discrimination of the bluish and yellowish contents of colours is reduced

[SOURCE: CIE S 017:2020, 17-22-033, modified — "defective colour vision" has been changed to "colour deficiency" and Note 1 to entry has been deleted.]

3.10

tritanopia

dichromatic colour deficiency in which discrimination of the bluish and yellowish contents of colours is absent

[SOURCE: CIE S 017:2020, 17-22-034, modified — "defective colour vision" has been changed to "colour deficiency" and Note 1 to entry has been deleted.]

3.11

low vision

impairment of visual function even after treatment or standard refractive correction or both that has a visual acuity of less than 0,3 or a reduced visual field

Note 1 to entry: According to the WHO definition, a reduced visual field is defined as 10° from the fixation point.^[6]

4 General

4.1 Application criteria for colour deficiency and low vision

This document is applicable to people with two types of colour deficiency, protanopia and deuteranopia. It is also applicable to people with low vision, excluding amblyopia. Protanopia and deuteranopia are defined in accordance with CIE S 017:2020. For a classification of colour deficiency, see [Annex A](#).

Low vision is defined in accordance with the WHO.^[6] For different types of low vision, see [Annex B](#).

4.2 Viewing modes and conditions

Viewing modes and conditions for applying the colour combination methods in this document shall follow those prescribed in ISO 24505-1.

5 Colour combinations for people with protanopia and deuteranopia

5.1 General

The definition of fundamental colours and their spans in a colour space, i.e. Span 1 and Span 2, as well as the levels of conspicuity of colour combinations shall follow those prescribed in ISO 24505-1 (see [Clause 5.1](#) and [Clause 5.2](#)).

5.2 Protanopia

5.2.1 Two-colour combinations and their conspicuity for people with protanopia

[Table 1](#), together with the colour span data in [Figure 1](#), presents the combinations of two fundamental colours and their conspicuity levels for people with protanopia at photopic vision. When creating a two colour combination of an intended level of conspicuity for people with protanopia, any two fundamental colours shall be selected from the low and the column of [Table 1](#) so that the corresponding cell of the table shows the intended level of conspicuity.

Clause C.2.1. provides textual descriptions of information of Table 1.