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## Dentistry — Guidance on colour measurement

*Médecine bucco-dentaire — Directives relatives au mesurage de la  
couleur*



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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.

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## Introduction

The colour appearance of teeth and other dentistry-related tissues needs to be matched and reproduced in order to achieve acceptable aesthetics in an efficient manner. Three major groups of issues, related to colour compatibility, colour stability and colour interactions, are identified and considered in this Technical Report. Interpretation of colour differences associated with these three groups through 50:50 % perceptibility and acceptability visual thresholds is suggested. Colour is a psychophysical phenomenon that is assessed by both visual and instrumental methods. Other elements of appearance, including gloss and translucency, affect aesthetics and may influence the characterization of colour appearance.

The International Commission on Illumination (CIE) colour difference formulae and resources, in particular CIE Pub No 15.3, were used in this Technical Report.



# Dentistry — Guidance on colour measurement

## 1 Scope

This Technical Report identifies three types of topics related to shade conformity and interconvertibility of monochromatic and polychromatic tissues and materials related to the discipline of dentistry; it describes visual and instrumental methods for assessment of these topics.

This Technical Report suggests interpretation of the findings through colour difference thresholds, and provides guidelines for future standardization related to dental shade conformity and interconvertibility. It also includes guidelines related to colour vision of persons undertaking visual colour assessments and instructions for reporting of colour and colour difference assessments.

## 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 1942, *Dentistry — Vocabulary*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 1942 and the following apply.

### 3.1

#### **colour difference**

single number or metric expressing the distance from complete match in colour or shade

NOTE 1 A colour distance metric defined by the International Commission on Illumination (CIE) is called delta E ( $\Delta E$ ).

NOTE 2 Two formulae for calculating  $\Delta E$  are recommended in this Technical Report: CIE76 (denoted  $\Delta E^*_{ab}$ ) and CIEDE2000 (denoted  $\Delta E_{00}$ ).

### 3.2

#### **50:50 % perceptibility threshold of colour difference**

##### **PT**

difference in colour that can be detected by 50 % of observers, with the other 50 % of observers noticing no difference in colour between the compared objects

NOTE A nearly perfect colour match in dentistry is a colour difference at or below the 50:50 % perceptibility threshold.

### 3.3

#### **50:50 % acceptability threshold of colour difference**

##### **AT**

difference in colour that is considered acceptable by 50 % of observers, with the other 50 % of observers replacing or correcting the restoration