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Jewellery — Colours of gold alloys — Definition, range of colours and designation

Joaillerie, bijouterie — Couleurs des alliages d'or — Définition, gamme de couleurs et désignation

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Foreword

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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).

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For an explanation on 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 the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 174, *Jewellery*.

This second edition cancels and replaces the first edition (ISO 8654:1987) which has been technically revised with the following changes:

— add a new colour definition: dark red (6N);

— describe a detailed metallographic preparation for the colour measurement;

— add tables for nominal values and tolerances for $L^*a^*b^*$ and L^*C^*h;

— add figures representing de tolerances in different colour spaces;

— the document was editorially revised.

Introduction

In the manufacture and sale of articles made of or coated with gold alloys, the colour of the surface of the product is an important characteristic.

This document will enable the purchaser to define his requirements with precision by referring to the designations given within this document and so avoids the need for purchasing orders to be accompanied by colour samples.

Jewellery — Colours of gold alloys — Definition, range of colours and designation

1 Scope

This document specifies a limited number of colours of gold alloy and the method to measure colours.

It applies to objects made of gold alloys or coated by gold alloys.

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.

CIE Publication No. 15, *Colorimetry*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
colour
three-dimensional space represented by the chromaticity coordinates x and y and Y

Note 1 to entry: As defined in CIE Publication No. 15, the values of Y correspond to the percentage values of the luminous reflectance factor.

Note 2 to entry: When necessary for special purposes or in the field of national standardization, the chromaticity coordinates may be converted according to CIE Publication No. 15 to other nationally or internationally agreed systems (e.g. CIE 1976 $L^*a^*b^*$ colour space or CIE 1976 $L^*u^*v^*$ colour space).

4 Designation

Seven designations of colours according to chromaticity coordinates are defined in Table 1.

Table 1 — Designation of colours

Colour	Designation
0N	yellow green
1N	pale yellow
2N	light yellow
3N	yellow
4N	pink
5N	red
6N	dark red

5 Colour measurement

5.1 General

Two methods are available to determine the colour, a quantitative method (see 5.2) and a qualitative method by visual comparison (see 5.3).

5.2 Quantitative method

5.2.1 Preparation of the samples

5.2.1.1 General

The samples to be measured shall have a flat and polished surface to be used as a measurement area.

The measurement area shall be exempt of defect.

The finishing (polishing and washing) shall be (re)done until a mirror surface is achieved (Y reaches a constant value).

After polishing, the sample colour measurement shall be made within 120 min maximum.

NOTE Polishing, washing and environment conditions can greatly affect the colour.

5.2.1.2 Metallographic preparation

Metallographic preparation is made with a final polishing with broadcloth charged with an abrasive solution. The solution contains 1 µm sized abrasive particles.

5.2.1.3 Sample cleaning

The recommended sample cleaning is done by gently wiping the surface with a clean soft cloth (microfibre) and some isopropylalcohol (IPA).

5.2.2 Measurement apparatus

5.2.2.1 General

The measurement apparatus for the colour measurement of a gold alloy shall be in accordance to CIE Publication No. 15.

5.2.2.2 Reference apparatus

The reference apparatus for the colour measurement of a gold alloy is an integrating sphere spectrophotometer able to measure spectral reflectance, with a measurement geometry compatible with designation di:8° or 8°:di (specular component included).

NOTE Other measurement geometries can be used as long as they do not affect significantly the colour results compared to the described measurement geometry.

5.2.2.3 Spectrophotometer setup

Before making any measurement, the apparatus shall be set up with the following parameters:

— Specular Component Included (SCI);

— Standard illuminant D65;

— Standard observer 2°.

5.2.3 Measurement method

Measure the spectral reflectance.

The measured values in the xyY colour space shall be expressed with 4 significant digits for x and y and 1 significant digit for Y.

The measured or converted values in the $L^*a^*b^*$ colour space shall be indicated with 2 significant digits for a^* and b^* or C^* and h and 1 significant digit for L^*.

The colour measure is an average of 5 distinct measurements of the sample (after repositioning) ensuring to revolve it between each measurement.

5.3 Qualitative method

For (visual) comparison purposes of the sample, it is possible to use a range of polished colour slips.

A preparation of colour slips is described in Annex A.

6 Gold alloy colours

Nominal values and tolerances of colours are given in Table 2, 3 and 4 in accordance with 5.2.

Figures 1, 2, 3, 4 illustrate graphically nominal and tolerances values.

NOTE The eye of a trained person can see colour differences even within a tolerance range.

Table 2 — Nominal values and tolerances for xyY

Colour	Chromaticity coordinates					
	Nominal values			Tolerances		
	x	y	Y	x	y	Y (max/min)
0N	0,346 3	0,371 4	84,9	0,351 3 0,344 8 0,341 5 0,347 4	0,373 6 0,366 0 0,368 9 0,377 0	88,6 81,2
1N	0,353 2	0,370 8	81,5	0,357 4 0,351 3 0,349 1 0,354 8	0,372 5 0,366 6 0,369 0 0,375 2	85,2 77,8
2N	0,361 0	0,376 9	78,8	0,365 0 0,359 3 0,357 1 0,362 4	0,378 2 0,372 9 0,375 4 0,381 0	82,5 75,0
3N	0,361 6	0,371 4	76,2	0,366 2 0,359 1 0,357 1 0,363 9	0,373 0 0,367 2 0,369 7 0,375 9	79,9 72,4

Table 2 *(continued)*

Colour	Chromaticity coordinates					
	Nominal values			Tolerances		
	x	y	Y	x	y	Y (max/min)
4N	0,361 4	0,365 2	74,0	0,365 7 0,358 8 0,357 2 0,363 8	0,366 3 0,361 4 0,363 9 0,369 2	77,7 70,2
5N	0,360 3	0,358 7	71,4	0,364 3 0,357 7 0,356 3 0,362 7	0,359 3 0,355 4 0,357 9 0,362 1	75,1 67,7
6N	0,357 9	0,351 8	68,6	0,361 9 0,355 0 0,353 9 0,360 7	0,352 2 0,348 9 0,351 2 0,354 9	72,3 64,9

Table 3 — Nominal values and tolerances for *L*a*b**

Colour	Chromaticity coordinates					
	Nominal values			Tolerances		
	*L**	*a**	*b**	*L** (max/min)	*a**	*b**
0N	93,8	−3,01	21,38	95,4 92,2	−1,68 −1,39 −4,13 −4,85	23,15 19,19 19,56 23,55
1N	92,4	0,35	22,24	94,0 90,7	1,48 1,28 −0,71 −0,78	23,67 20,41 20,81 24,09
2N	91,1	1,20	25,64	92,8 89,4	2,37 2,12 0,14 0,13	26,90 23,93 24,34 27,33
3N	90,0	3,69	23,61	91,6 88,2	4,97 4,37 2,47 2,81	25,07 21,68 22,14 25,60
4N	88,9	6,13	21,23	90,6 87,1	7,48 6,63 4,89 5,48	22,45 19,44 19,98 23,06
5N	87,7	8,32	18,58	89,4 85,9	9,74 8,62 6,96 7,89	19,55 16,97 17,55 20,19
NOTE Tolerances on *a** and b* are converted from xyY using the nominal value of Y.						

Table 3 *(continued)*

Colour	Chromaticity coordinates					
	Nominal values			Tolerances		
	L^*	a^*	b^*	L^* (max/min)	a^*	b^*
6N	86,3	10,12	15,57	88,1	11,62	16,45
					10,14	14,06
				84,4	8,69	14,63
					9,97	17,13
NOTE Tolerances on a^* and b* are converted from xyY using the nominal value of Y.						

Table 4 — Nominal values and tolerances for L^*C^*h

Colour	Chromaticity coordinates					
	Nominal values			Tolerances		
	L^*	C^*	h (deg)	L^* (max/min)	C^*	h (deg)
0N	93,8	21,59	98,00	95,4	23,21	94,15
					19,24	94,13
				92,2	19,99	101,93
					24,04	101,64
1N	92,4	22,25	89,10	94,0	23,72	86,42
					20,45	86,40
				90,7	20,82	91,95
					24,10	91,86
2N	91,1	25,67	87,33	92,8	27,01	84,97
					24,02	84,94
				89,4	24,35	89,68
					27,33	89,73
3N	90,0	23,89	81,12	91,6	25,56	78,79
					22,11	78,60
				88,2	22,28	83,63
					25,75	83,73
4N	88,9	22,10	73,89	90,6	23,67	71,57
					20,54	71,17
				87,1	20,57	76,24
					23,71	76,63
5N	87,7	20,36	65,88	89,4	21,84	63,51
					19,03	63,06
				85,9	18,88	68,36
					21,68	68,64
6N	86,3	18,57	56,98	88,1	20,14	54,75
					17,33	54,20
				84,4	17,02	59,30
					19,82	59,80
NOTE Tolerances on C^* and h are converted from xyY using the nominal value of Y.						

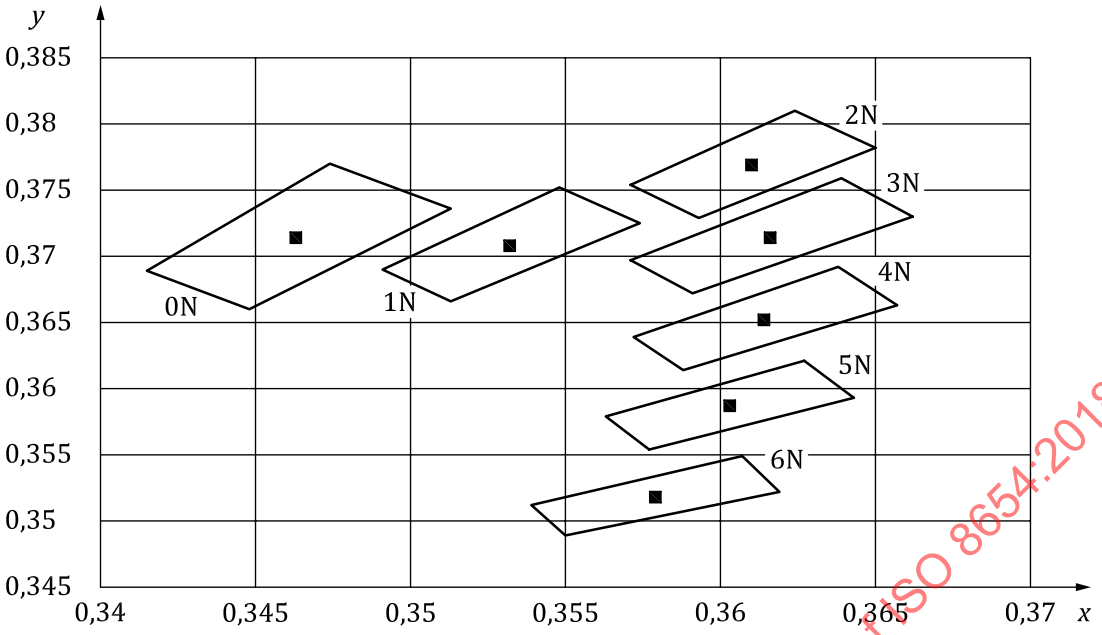

Figure 1 — xy tolerances according to Table 2

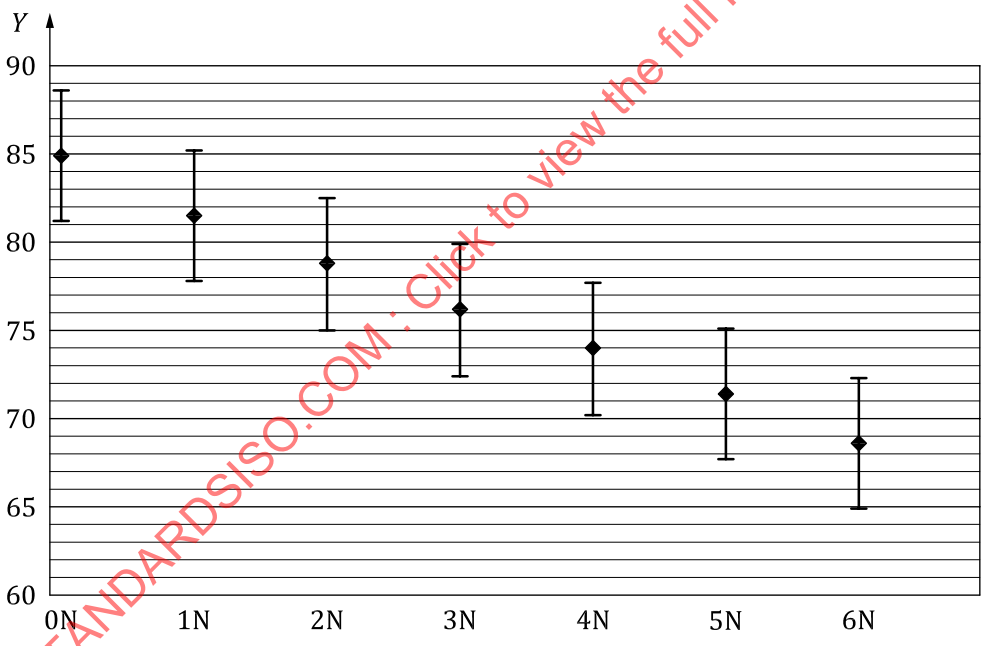

Figure 2 — Y tolerances according to Table 2