

# IIEEJ Color Test Chart

The IIEEJ Color Test Charts offer a mean of assessing the reproduction quality of the image transfer systems. Because colorimetric values of solid areas in these charts are specified, these charts can be used as color references.

## IIEEJ Color Test Chart No.11

### 1. Preamble

The IIEEJ Color Test Chart No.11 was designed to provide a means of assessing the performance in color facsimile communications, regardless of the reproduction system of the image on reception site.

The Color Test Chart No.11 has the portrait and the synthetic patterns printed on the photographic copy paper, and allows for investigation of the following characteristics:

- Image rendering: in particular favorite color rendering of photograph and gray balance.
- Image quality: in particular, colorimetric values of reproduced color, reproduction of fine lines, readability of color characters, graininess, etc.

### 2. Special Features of the Color Test Chart No.11

#### 2.1 Dimensions of the Color Test Chart No.11

Paper size: 297mm(Length) × 257 mm(Width)

Tolerance : ± 4% (relative humidity: 60 ± 5 %)

#### 2.2 Specifications of photographic copy paper

Weight: 230 ± 5 g/mm<sup>2</sup>

Thickness: 220 ± 10 μm

Smoothness: more than 300sec. (Bekk smoothness tester)

Gloss: 95 ± 5% (Gloss meter)

Extensional ratio: Vertical: 0.05 % (Relative humidity changes from 40% to 80%.)

Horizontal: 0.02 % (Relative humidity changes from 40% to 80%.)

Relative reflectance of dyes: Detailed characteristics are shown by figure.

#### 2.3 Density and reflectance

Measured densities (reflectance) of a referential sample are shown below:

(1) Whiteness of paper	Filter	V (# 106)	0.12	( 75.9 %)
		R (# 25)	0.11	( 77.6 %)
		G (# 58)	0.12	( 75.9 %)
		B (# 47)	0.10	( 79.4 %)
(2) Maximum density of gray		V (# 106)	more than 2.0	( 1.0%)

### 3 . Explanation of pattern

The Color Test Chart No.11 is composed of the following elements:

- Test image (portrait)
- Resolution targets

- Japanese characters
- Primary and secondary color patches
- Neutral patches

### 3.1 Elements in the frame area

In the upper region of chart, there are letters and image elements which show the chart number, Japanese name of IIEEJ, position marks and identification logos.

### 3.2 Image contents

#### [1] Black/white periodic repetition pattern

Size of each rectangle: 5.0mm × 5.0mm

#### [2] Black/white periodic repetition pattern

Size of each rectangle: 5.0mm × 0.5mm

Pattern [1] and pattern [2] serve to detect the judder phenomena in the imaging system.

#### [3] 8 Blocks of 5 colored lines pattern

This pattern consists with 8 blocks of 5 lines colored by C, M, Y or Bk.

Widths of each 5 colored lines are 1.0, 0.5, 0.333, 0.25, 0.2, 0.166, 0.125 and 0.1 in mm.

#### [4] Resolution pattern

Two types of Bk patterns are arranged in 70mm × 70mm area.

Radial gratings (Siemens-stars) with marked rings 14, 28, 42, 56 and 70 mm in diameter and hook-shaped variable width pattern serve to find the resolution limit at which reproduction is entirely black or white. Attached values 1,2,3,4 and 5 to hook-shaped lines (upper left) show widths of lines and spaces in mm.

Values of 0.1, 0.2, 0.3, 0.4, 0.5 0.6, 0.8, and 1.0 on the vertical axis show widths of the black line or white spaces in mm on circular rings.

Values of 0.1, 0.2, 0.3, 0.4, and 0.5 on the horizontal axis (lower right) show widths in mm of hook-shaped lines and spaces.

#### [5] & [6] Wedge-shaped pattern

The limit of isolated black and white lines (the width of the lines are given in mm at six positions) can be assessed by the Wedge-shaped pattern.

#### [7] Japanese characters

Characters of four colors C, M, Y and Bk in four sizes offer the assessment of the readability of printed texts. Depending on the resolution and the color, the degradation of readability appears.

#### [8] Color ring

This pattern serves to check subjective color reproduction characteristics of imaging system. Densities of fan-shaped patches of primary color C, M, Y and secondary color R, G, B are shown in Table 1. The density of paper is 0.00.

**Table 1. Densities of color patches**

**Primary colors**

Filter	C1	C2	C3	M1	M2	M3	Y1	Y2	Y3
V	0.85	0.71	0.41	0.66	0.54	0.31	0.19	0.15	0.13
R	1.68	1.33	0.70	0.18	0.16	0.11	0.08	0.06	0.06
G	0.63	0.51	0.29	1.53	1.13	0.54	0.27	0.22	0.17
B	0.39	0.32	0.22	0.51	0.43	0.38	1.29	1.02	0.64

**Secondary colors**

Filter	R1	R2	R3	G1	G2	G3	B1	B2	B3
V	0.73	0.59	0.39	0.98	0.81	0.49	1.73	1.37	0.43
R	0.22	0.18	0.14	1.64	1.33	0.75	2.20	1.67	0.46
G	1.71	1.23	0.70	0.71	0.58	0.35	1.84	1.42	0.49
B	1.80	1.36	0.74	1.58	1.24	0.74	0.72	0.62	0.30

**[9] Inclined fine line pattern**

Four color inclined fine line pattern is arranged in 85mm × 85mm area. Width of color lines is 0.22mm. This pattern serves to check the reproduction characteristics of C, M, Y, Bk inclined fine lines.

**[10] 15-steps gray scale**

The size of each gray patch is 12mm × 14mm. Density of step No.1 patch is equal to that of paper and density of step No.15 corresponds to maximum density of black.

Gray scale pattern is used to assess the reproduction characteristics of gradations, graininess and gray balance of color communication systems.

Aim densities are specified as follows:

**Table 2. Aim densities ( $D_n$ ) of 15 steps gray scale**

No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
$D_n$	0.00	0.02	0.03	0.06	0.12	0.20	0.32	0.47	0.67	0.88	1.18	1.37	1.59	1.85	2.08

**[11] Portrait**

This color picture contains close-up image of model, flowers, glass products, fruits, metal goods, ceramic cup, color patches, etc. and is used to assess the reproduction of colors.

Especially, the reproduction of human skin tone is important for subjective evaluation.

## IIEEJ Color Test Chart No.21 1996

### 1. Preamble

The IIEEJ Color Test Charts No.21 1996 was designed in 1996 to provide a means of assessing the performance of color image communication devices.

The pertinent patterns are arranged on the cast-coated paper by the offset printing process.

The IIEEJ Color Chart No.21 allows for investigation of the following characteristics:

- Image rendering: in particular radial grating rendering, color rendering and gray balance.
- Image quality: in particular, reproduced color characters, colorimetric values of reproduced color, resolution, improper gray balance, graininess, etc.

### 2. Special Features of the Color Test Chart No.21 1996

Arrows[14] and marks[15,16] in the outer frame region indicate cutting positions for specified sizes and center positions respectively.

#### 2.1 Dimensions of the Color Test Chart No.21

Paper size: 297mm(Length) × 257 mm(Width)

Image area: 297mm(Length) × 257 mm(Width)

Tolerance : | 1% + 0.91 mm | (relative humidity: 60 ± 5 %)

#### 2.2 Specifications of cast-coated paper

Weight: 127.9 ± 6 g/mm<sup>2</sup>

Thickness: 114 ± 6 μm

Smoothness: 6.0 (cmHg) (by Smoother)

Gloss: 71%

Extensional ratio: Vertical: 0.30 % (Relative humidity changes from 40% to 80%.)

Horizontal: 0.15 % (Relative humidity changes from 40% to 80%.)

#### 2.3 Characteristics of printing ink and paper

A set of inks comprises Cyan, Magenta, Yellow, Red, Green Blue and Black.

These colors on patches having maximum densities have colorimetric values specified by the ISO 12647-2 "Graphic technology - Process control for the manufacture of half-tone colour separation, proof and production prints - Part2: Offset processes"

Referential spectral characteristics of these fundamental colors are shown in Figure 1.

- Density of paper: 0.05 ~ 0.07
- Densities and colorimetric values of solid regions are tabulated in Table-1.

**Table-1 Required specifications of solid regions**

	Density	CIE L*/a*/b*
C	1.50 ± 0.10	54/-37/-50
M	1.45 ± 0.10	47/ 75/ -6
Y	1.00 ± 0.10	88/ -6/ 95
R	1.25 ± 0.10	48/ 65/ 45
G	1.30 ± 0.10	49/-65/ 30
B	1.50 ± 0.10	26/ 22/-45
K	1.55 ± 0.10	18/ 0 / -1
Paper	0.07	93/ 0 / -3

Measurement conditions: Black backing, D50 illuminant, 2 ° observer, 0/45 ° or 45/0 ° geometry. Measurement apparatus: X-rite 938 Spectrophotometer

### 3. Explanation of Pattern

#### 3.1 Images in the upper area

Solid 8 color patches, the IIEEJ identification code and the test chart number are described in the upper area. Solid color patches have specified colorimetric values shown in Table 1.

#### 3.2 Contents numbered from [1] to [13]

On the Color Test Chart No.21, Synthetic images for resolution check and color reproduction characteristics, character images, color lines for registration and gray patches are arranged. The detail of each pattern from [1] to [13] is explained as follows:

##### [1] [2]: 7 colors resolution pattern

Colored bars and white spaces are repeated alternatively and the relationship of number of bars, resolutions and widths of bar and space are shown in Table 2.

**Table-2 The relationship between resolutions and numbers of bars**

Resolution	Number of bars	Width of bar& space
1 line/mm	5	10 mm
2 lines/mm	6	6 mm
4 lines/mm	8	4 mm
6 lines/mm	12	4 mm
8 lines/mm	16	4 mm
10 lines/mm	20	4 mm
12 lines/mm	24	4 mm
14 lines/mm	28	4 mm
16 lines/mm	32	4 mm
18 lines/mm	36	4 mm
20 lines/mm	40	4 mm

Overall width: 52 mm

[2] is the rotated pattern of 90 degrees for the pattern [1].

**[3] Radial Gratings (Siemens-stars):**

Radial grating in the combination of C-W, M-W, Y-W, Bk-W, R-W, G-W, B-W, Bk-W with marked rings 20, 30, 40 and 50 mm in diameter.

Rings correspond to positions of 0.2, 0.3, 0.4 and 0.5 line/mm respectively.

This chart serves for the judgment of resolution in reproduction systems.

**[4] Synthetic images of 7 colors rectangular resolution charts**

This chart consists of 7 colored rectangles. Size of rectangle C,M,Y,R,G, or B is 5.0mm × 81.5 mm and that of Bk is 5.0mm × 165mm.

In each rectangle, periodic alignment of R-W, G-W, B-W, C-W, M-W, Y-W or Bk-W are arranged. The width of colored line in each rectangle is 0.125 mm and the pitch is 0.25 mm. This chart serves to assess the resolution in the reproduction system.

**[5] Synthetic images of 7 colors rectangular resolution charts**

This chart consists of 7 colored rectangles. Size of rectangle C,M,Y,R,G, or B is 144mm × 5.0 mm and that of Bk is 290mm × 5.0mm.

In each rectangle, periodic alignment of R-W, G-W, B-W, C-W, M-W, Y-W or Bk-W are arranged.

The width of colored line in each rectangle is 0.125 mm and the pitch is 0.25 mm.

This chart serves for the judgment of focal characteristics in the horizontal direction.

**[6] Colored characters**

Both positive and negative images of 3 size characters:

This picture contains 7 blocks of positive character images and 7 blocks of negative character images in colors of C, M, Y, R, G, B and Bk. Sizes of Japanese and alphabetic character in each block are 8, 6.5 and 5 point.

**[7] Honeycomb pattern:**

This pattern shown in Figure-2 serves to investigate the reproduction of colors and wedge-shaped portions between hexagons and to evaluate the distinguishing characteristics of hexagons having specified color values. When the density of paper is equal to 0.0, then densities of hexagonal color patches are as follows:

$D_{\max}$  = Densities corresponding to the colorimetric values of C, M, Y, R, G, B and Bk specified in the ISO 12647-2: 1996. (Refer to Table 1)

$$D_2 = (2 / 4) \cdot (D_{\max} - 0.25) + 0.25 \pm 0.1$$

$$D_3 = 0.25 \pm 0.1$$

The wedge-shaped white or overlapped color areas in border region of hexagonal shapes are used for judgment of detailed reproduction characteristics.

**[8] Hook-shaped fine line pattern:**

This pattern contains hook-shaped fine colored lines of C, M, Y, R, G, B and Bk.

One can use this pattern as the register mark.

**[9] 5-step gray scales:**

This continuous tone pattern is used to check the quantisation level.

Specified reflectance values of respective gray patches are shown in Table 3.

**Table-3 Reflectance values of gray patches (Reflectance of paper = 100%)**

Number	1	2	3	4	5
Reflectance	30 ± 5 %	40 ± 5 %	50 ± 5 %	60 ± 5 %	70 ± 5 %

**[10] 16 visually equidistant half-tone gray steps**

This pattern contains 16 visually equidistant gray steps between white (paper) and black..

The tone values of these patches are realized by the 250 dpi halftoning technology.

Aim values of respective patches are tabulated as Table 4.

**Table-4 Tone densities of half-tone gray patches**

Step No.	1	2	3	4	5	6	7	8
Aim value of density	0.00	0.02	0.09	0.13	0.21	0.28	0.31	0.38
Step No.	9	10	11	12	13	14	15	16
Aim value of density	0.43	0.52	0.55	0.65	0.79	0.96	1.26	1.60

**[11] Black/white alternative pattern with phase shift**

This pattern contains 5 blocks of black/white alternative pattern and each block includes 10 kinds of line densities and phase shift of 90 degrees.

This pattern serves to detect the resolution difference caused by the relative relationship between scanning line position and black/white alternative line position.

Values described alongside patterns show line densities in line /mm.

**[12] 8 Color patches**

20mm × 24 mm color patches of R, Y, G, C, B, M, Bk, and W are aligned in turn.

Colorimetric values of these patches are specified and there values are shown in Table 1.

**[13] 6 rulings and 3 angles line screen pattern:**

These patterns contain 6 halftone patches produced by line screens.

The following screen rulings and screen angles are adopted.

Screen rulings : 85, 100, 135, 150, 175 and 200 lines/inch

Screen angles : C: 45 degree, Y: 105 degree and M: 165 degree.

This pattern serves to investigate conveniently the reproduction of color or inclined fine lines.

## IIEEJ Color Test Chart No.22 1996

### 1. Preamble

The IIEEJ Color Test Charts No.22 1996 was designed in 1996 to provide a means of assessing the performance of color image communication devices.

The pertinent patterns of 35 single colors are arranged on the cast-coated paper by the offset printing process.

The IIEEJ Color Chart No.22 allows for investigation of the following characteristics:

- Color reproduction: in particular colorimetric reproduction without moiré effect.
- Image quality: in particular, tonal expression of halftoning, improper gray balance, graininess, etc.

### 2. Special Features of the Color Test Chart No.22 1996

Arrows [5] indicate cutting positions for specified sizes.

Sizes of color patches with maximum densities are larger than other patches.

Upper side of the maximum density patch is usually cropped at the arrow line and stored before color reproduction tests. The stored color patch should be used in order to check the color fading effect by comparing colorimetric value with that of used patch.

#### 2.1 The dimensions of the Color Test Chart No.22

Paper size: 297mm(Length) × 257 mm(Width)

Image area: 297mm(Length) × 257 mm(Width)

Tolerance : | 1% + 0.91 mm | (relative humidity: 60 ± 5 %)

#### 2.2 The specifications of cast-coated paper

Weight: 127.9 ± 6 g/mm<sup>2</sup>

Thickness: 114 ± 6 μm

Smoothness: 6.0 (cm Hg) (by smoother)

Gloss: 71%

Extensional ratio: Vertical: 0.30 % (Relative humidity changes from 40% to 80%.)

Horizontal: 0.15 % (Relative humidity changes from 40% to 80%.)

#### 2.3 Characteristics of color inks and paper

A set of color inks comprises Cyan ( C ), Magenta(M), Yellow ( Y ), Red ( R ), Green ( G ), Blue ( B ) and Black ( K or Bk).

Colorimetric values of 7 patches arranged at step 5 are specified in Table 1.

These values are based on the ISO 12647-2 “Graphic technology-Process control for the manufacture of half-tone color separation proof and production prints- Part 2: Offset processes”.

**Table 1 Aim colorimetric values and resultant densities of step 5**

Color	Resultant Density ( $D_{max}$ )	Aim Colorimetric value ( $L^*/a^*/b^*$ )
Cyan(C)	$1.52 \pm 0.10$	54 / -38 / -50
Magenta(M)	$1.47 \pm 0.10$	46 / 74 / -5
Yellow(Y)	$1.07 \pm 0.10$	87 / -7 / 91
Red (R)	$1.67 \pm 0.10$	47 / 69 / 48
Green (G)	$1.57 \pm 0.10$	49 / -74 / 25
Blue (B)	$1.47 \pm 0.10$	21 / 20 / -51
Black (Bk)	$1.62 \pm 0.10$	13 / 1 / 1
Paper	0.07	93 / 1 / 0

Density of paper: 0.05 ~ 0.07

### 3. Explanation of color patches

The specified values of color patches are realized by diluting of pigments to prevent moiré phenomena. Every color in same row has almost same hue angle.

#### [1] Graduated 7 color patches with 4 steps

Size of step 1, 2, 3 and 4 color patches is 25mm × 30mm.

Densities and referential colorimetric values of these color matches are shown in Table 2 and Table 3. Pattern [1] and [4] serve for investigation of the subjective and colorimetric reproduction characteristics of graphic systems.

**Table 2 Density Specification of step 1, 2, 3, 4 and 5 color patches**

Step No.	Density specification
<b>1</b>	$0.25 \pm 0.1$
<b>2</b>	$(1/4) \cdot (D_{max} - 0.25) + 0.25 \pm 0.1$
<b>3</b>	$(2/4) \cdot (D_{max} - 0.25) + 0.25 \pm 0.1$
<b>4</b>	$(3/4) \cdot (D_{max} - 0.25) + 0.25 \pm 0.1$
<b>5</b>	$D_{max} \pm 0.1$ for each color
Paper	0.00

**Table 3 Referential colorimetric values from step 1 to step 4 patches under the specified condition of ISO 12647-2. Values are described by (L\*/a\*/b\*). 5 : Aim values**

Step No. / Color	1	2	3	4	5
C	83/-10/-11	71/-20/-27	63/-28/-37	59/ -33/-43	55/-37/-49
M	79/19/ -1	65/45/ -3	56/ 61/ -6	52/ 69/ -5	49/ 73/ -2
Y	89// -3/ 24	88/ -5/ 47	87/ -5/ 65	86/ -6/ 77	87/ -7/ 91
R	80/ 18/ 12	67/ 42/ 28	58/ 57/ 36	54/ 64/ 43	45/ 66/ 48
G	82/ -20/ 6	71/-40/ 13	61/ -57/ 19	56/ -64/ 22	47/ -73/ 24
B	72/ 7/ -18	51/ 16/ -34	40/ 19/ -42	29/ 22/-47	24/ 21/ -50
Bk	73/ 1/ 1	47/ 2/ 3	33/ 2/ 3	24/ 3/ 2	17/ 1/ 1
Paper					93/ 0/ -3

**[2] Color rectangles**

The size of each rectangle is 4mm × 125 mm.

The colorimetric values are same as those of step 5 patches of pattern [4].

**[3] Color bars**

The size of each color bar in the bottom of this chart is 4mm × 297mm.

The densities of color bars are same as those of step 1 patches in pattern [1].

**[4] Color patches with maximum densities**

The aim colorimetric values are specified in the ISO 12647-2 standard, and resultant densities of these patches are used to determine densities of other patches in pattern [1]

The upper half of step 5 region is cropped, stored and can be used to evaluate the light faded extent of chart.

**[5] Cutting mark**

Arrows [5] indicate cutting positions for specified sizes.

## How to order

### In Japan

Address order to:

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