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The Standardization of Graphic Technology

✧ Printing Color Standards for Offset Printing

- ISO/Japan Color Series

✧ ISO/TC 130 Activities and ISO Standards

Japan Printing Machinery Association
Japan National Committee for ISO/TC130
The Japanese Society of Printing Science and Technology

Contents

Printing Color Standards for Offset Printing

1. Why are Printing Color Standards Necessary?

Information recorded onto paper using ink is called "hard copy". Since most color hard copy is comprised of printing ink and paper (that is, press prints), the majorities of color reproduction criteria can be found in printing colors. While the color information seems to be supported by the technologies that convert the original into color prints, in fact, it is opposite. Printed colors, expressed with paper and ink, control those technologies. In other words, technology and information flows are configured based on target printing colors.

Printing colors are the basis of graphic technology and the main component of commercial color prints. What happens if there is no universal standard for printing colors? Let’s start thinking of it, assuming we print an apple. First, an image of apple is captured and converted into RGB digital signal. Then various sizes of halftone dots determined by experience are formed out of the photo resist coated on an offset printing plate. This enables conversion of the RGB signal into suitable ink amounts for each CMYK color. Now, ten sets of four positive-acting offset printing plates are made and given, without a print sample of the apple, to ten different printers. Each printer then prints on a four-color offset press using his/her own in-house standard with the same ink and paper. It is presumed that you probably get ten different color prints of apple, based on our experiences during research on printing solid color conducted in 1992. If a print sample were supplied, you would probably get only two or three different color prints of apple.

ISO/Japan Color (referred to as Japan Color hereafter) is a print color standard corresponding to such a print sample. Even without the print sample, if each press were adjusted to the same conditions that the Japan Color standard print, a typical press print of Japan graphic arts industry, was produced, the ten companies would reproduce approximately the same color print of apple. The print color standard such as Japan Color provides the sweet spot of colors on a press.

Furthermore, when sending CMYK digital data via communication lines for remote printing, the sender and receiver (printer) have to recognize the common printing colors for both sides. Otherwise this system cannot work. Japan Color is a print color standard that can be used widely in digital color hardcopy industry.

Any criteria can be a standard if it is universally recognized. Japan Color is such a standard for print colors. According to international agreement, one standard is allowed for each country. Japan Color is that standard for Japan.

2. The Progress and Importance of Standardization

Color standards for offset printing such as SWOP (USA) and Euro (Europe) exist for some time and they are well known in Japan. However, Japan itself had no such standard in the 1990's. The digitalization of the graphic arts industry highlighted the importance of international standardization and the necessity for standardization of graphic technology in Japan.

With this background, Japan National Committee for ISO/TC130 (graphic technology) (hereafter referred to as JNC for ISO/TC130) was organized. Since TC130's activation in its present form as an international organization in 1989, Japan has participated actively as a P-member (main participating member), contributing to the establishment of international (ISO) standards covering the entire range of graphic technologies.

As part of the process of establishing the international print color standards, JNC for ISO/TC130 worked jointly with related industry organizations to establish Japan Color Ink, Japan Paper and Japan Color Solid Value as color standards for sheet-fed offset printing in Japan. The international standards include ISO 2846-1 (offset ink), ISO 12647-1 (color printing, process control, parameters, measuring), and ISO 12647-2 (color printing, process control, offset printing). The industry organizations are Japan Printing Ink Makers Association (JPIMA), Japan Paper Association (JPA), Japan Federation of Printing Industries (JFPI). JNC for ISO/TC130 has also proposed the related standards established in Japan to ISO/TC130 for inclusion in international standards.

Furthermore, through the actualization of ISO 12647-2, JNC for ISO/TC130 has promoted the standardization of graphic technologies in Japan with the aim of improving industrial productivity and strengthening international competitiveness. It also produced 70cm^{-1}(175 lpi) Japan Color Standard Printing 1997 (1998 distribution) with Art paper (ISO standard paper type 1, Japan Paper) that matched average domestic prints. These inks, papers, solid colors, and halftone prints form a single entity, called Japan Color, which served as a standard print color tool.

Accelerating color standardization in graphic arts industry with Japan Color, standard print color samples for papers besides Art paper were required. Moreover, in order to achieve global use of the ISO standard Japan Color as Japanese color standard, the standard print color sample, Japan Color Standard Printing 2001, was produced using four of the five paper types stipulated in ISO 12647-2. These four types — Art (type 1), matte coated (type 2), coated (type 3), and uncoated (type 4) — were selected because they were the types mainly used on sheet-fed offset presses.

Like Japan Color Standard Printing 1997, this sample was produced with the cooperation of JNC for ISO/TC130 and the Japanese Society of Printing Science and Technology, Standardization Committee. It was based on Japan Color, which conformed to Japan Color Standard Printing 1997, and was produced with the purpose of serving as a Japan Color standard tool for sheet-fed offset printing in Japan, including a $70cm^{-1}$ (175 lpi) press print sample and various data.

In addition to the fields of color separation, proofing (Direct Digital Color Proof a.k.a. DDCP, remote proof), and printing (analog offset plate, CTP, DI, on-demand), Japan Color Standard Printing 2001 can easily serve as a color standard in data exchange, color management, and other related fields. It can also serve printer customers, regardless of country, as a common quality gauge. In conjunction with emerging digital technology, color standardization become much more important than ever and the significance of Japan Color increases. In cooperation with related Japanese industry organizations, JNC for ISO/TC130 has also developed a series of print color standards, being compliance with ISO standards, such as Japan Color 2002 for Newspapers for coldset offset lithography and Japan Color 2003 for web offset printing.

3. Japan Color Series

3.1 Japan Color Configuration

A series of Japan Color, being compliant with ISO standards and representing standards of print color in Japan, consists of the followings:

(1) Japan Color 2000 Solid Color Value and Solid Color Patch Sample
(2) Japan Color 2001 for Sheet-fed Offset Printing
(3) Japan Color 2002 for Newspapers
(4) Japan Color 2003 for Web Offset Printing

Japan Color 2000 provides solid color colorimetric values of primary colors (cyan, magenta, yellow), secondary colors (red, green, blue), black and paper white. In order to obtain these values, patch samples were produced with Japan Color compliant ink and standard paper specified by JPIMA with the method described in ISO 2846-1 and with ink film thickness conditions which was originally specified when the solid color colorimetric values of primary and secondary colors were determined in 1993. Colorimetric measurements of these samples were conducted to obtain average values that were then designated as Japan Color 2000 Solid Color Value. Japan Color 2000 also provides Solid Color Patch Sample, which was produced with standard ink and paper embodying the Japan Color 2000 Solid Color Value.

Japan Color 2001, 2002 and 2003 provides Japan Color standard ink - Japan Color Ink, Japan Color standard paper - Japan Paper and Japan Color standard print sample - Japan Color Standard Printing respectively.

Japan Color Ink is determined by referring to the results of identifying and examining the color characteristics of the most widely used representative color process inks supplied by domestic ink manufacturers. Using a printability tester, JPIMA makese solid color samples with inks supplied by member manufacturers and Japan Color standard paper under a couple of ink film thickness conditions. Then the colorimetric measurement of solid color and the analysis of the measurement determine the characteristics of the ink color.

Japan Paper is determined by characterizing with optical measurements on the papers from manufacturers. The values of the measurement are checked if the values of each paper are closed and compliant to ISO 12647-2. The papers characterized are most widely used papers that can be supplied over the long term in Japan.

Japan Color Standard Printing is press print samples of the Japan Color standard print color that correspond to actual domestic conditions using ISO compliant Japanese paper types and ink. This includes print patterns such as the ISO 12642 output target (hereafter referred to as the ISO 12642 Pattern) and halftone control strips with 10% intervals for primary and secondary colors (hereafter referred to as the ISO 12647 Pattern). Measurement values of the standard print color samples in Japan Color Standard Printing in relation with ISO 12647-2 are also provided.

3.2 Japan Color 2000 Solid Color Value and Solid Color Patch Sample

Japan Color Solid Value indicates standard values for solid patches. It was originally defined referring to solid color press proofs, which were submitted by twenty-one typical Japanese printing companies through the JFPI in 1993. Average values of colorimetric measurement of the press proof were considered as standard values for solid colors. Then solid color patch samples were printed with Japan Color Ink and Japan Paper using a printability tester, so as to minimize ΔE between the colorimetric values of the patch samples and the average values mentioned above. The colorimetric values of the patch samples were then designated as Japan Color Solid Value 1993. Later, the cyan LAB values were partly modified, resulting in the Japan Color Solid Value 1996 Revision. Then primary colors were revised in 2000. Japan Color 2000 Solid Color Value is shown in Table 3.2.1.

Table 3.2.1 Japan Color 2000 Solid Color Value (3rd Edition, 2000)

	L*	a*	b*		L*	a*	b*
Cyan	53.9	-37.0	-50.1	Red	46.5	68.5	48.0
Magenta	46.6	75.1	-4.4	Green	49.0	-73.5	25.0
Yellow	87.9	-7.5	91.5	Blue	21.0	20.0	-51.0
Black	13.2	1.3	1.9	Paper	93.0	0.5	0.4

Colorimetric measurement condition: 0/45 geometry, D50, 2° standard observer, black backing (measured according to ISO 13655); tolerance of color deviation: ⊿E <6

Japan Color Solid Patch Sample was produced with Japan Color Ink and Japan Paper so good as to embody the Japan Color 2000 Solid Color Values in Table 3.2.1. Note that all have a color deviation tolerance of ⊿E <3, thus this meets the ISO standard tolerance of ⊿E < 6. These samples represent Japanese standard solid print colors for paper type 1 (Art paper) meeting ISO 12647-2 conditions and are currently issued under the auspices of the Japanese Society of Printing Science and Technology, Standardization Committee. The sample values are shown in Table 3.2.2.

Table 3.2.2 Solid Color Patch Sample Colorimetric Values (3rd Edition, March 2000)

	L*	a*	b*	⊿E[1)]
Cyan	53.5±0.3	-36.3±0.1	-50.4±0.3	0.9(0.8-1.1)
Magenta	47.0±0.1	75.5±0.5	-4.5±0.5	0.6(0.5-1.1)
Yellow	88.0±0.3	-7.5±0.1	90.5±0.5	1.0(0.6-1.5)
Black	14.5±1.0	2.0±0.1	2.6±0.3	1.6(0.8-2.6)
Red	46.9±0.1	70.7±0.5	48.3±0.3	1.4(1.0-2.0)
Green	48.3±0.2	-72.5±0.5	25.5±0.5	1.3(1.0-1.8)
Blue	20.8±0.5	23.0±0.7	-51.9±0.1	3.0(2.5-4.0)
Paper	90.9±2.0	0.5±0.2	0.90±0.3	

1) ⊿E is the difference with respect to Japan Color 2000 Solid Color Value.

These color samples are standard criteria for comparing the solid colors of color hard copy (including press prints) with Japan Color standard colors. They can also be used for calibrating measuring devices.

3.3 Japan Color 2001 for Sheet-fed Offset Printing

This standard specifies printing colors and provides Japan Color Standard Printing 2001, standard print color samples, for sheet-fed offset printing that correspond to actual domestic conditions using Japan Color Ink and four ISO 12647-2 compliant Japanese paper types.

Process inks designated for the characteristics described in table 3.3.1 are ISO 2846-1 compliant and determined as Japan Color Ink.

Table 3.3.1 Japan Color Ink for Sheet-fed Offset Printing (JPIMA)

	L^*	a^*	b^*
Cyan	53.9	-37.0	-50.1
Magenta	46.6	75.1	-4.4
Yellow	87.9	-7.5	91.5
Black	13.2	1.3	1.9

Colorimetric measurement condition: 0/45 geometry, D50, 2˚ observer, black backing; tolerance of color deviation: ⊿E<6; Japan Paper Type 1

In order to determine Japan Paper, the colorimetric and optical characteristics of four paper types samples from three paper manufacturers were measured. The measurement values of each paper in the same type are nearly equal regardless of manufacturer. The values also indicate that these kinds of paper are ISO 12467-2 compliant. Table 3.3.2 shows ISO specifications and the average values of paper characteristics from three manufactures.

Table 3.3.2 Japan Paper for Sheet-fed Offset Printing (Four Paper Types)

ISO Paper Type	L*/a*/b*	Brightness (%)	Mass per area (g/m^2)
Type 1 (Gloss-coated, wood-free)	**93/0/-3** 91/0/-2	**85** 80	**115** 104.7
Type 2 (Matte-coated, wood-free)	**92/0/-3** 93/1/-1	**83** 82	**115** 104.7
Type 3 (Gloss-coated, web)	**87/-1/3** 91/0/-2	**70** 80	**70** 104.7
Type 4 (Uncoated, white)	**92/0/-3** 92/0/0	**85** 83	**115** 104.7

Note: Upper bold values in columns indicate ISO specification and lower values in columns are the average values of paper characteristics from three manufactures. In Japan, domestically produced ISO type 3 compliant paper is generally used for web offset printing and called A3 grade coated paper. The values of type 3 paper in Table 3.3.2 are based on A2 grade coated paper, which is generally used on sheet-fed presses. The grade classifications for the A2 and A3 types depend on the amount of coating on the surface of uncoated paper. A1 type paper has the greatest amount of coating. Art paper, so called, is available in A1 type while coated paper is available in A2 and A3 types. The deviation tolerance for the ISO standard is the same for all papers: L*± 3, a*± 2, b*± 2

Measurement values of Japan Color Standard Printing 2001 are shown in Tables 3.3.3 in relation with ISO 12647-2.

Table 3.3.3 Characteristics of Japan Color for Sheet-fed Offset Printing Standard Print Color

		Type 1	Type 2	Type 3	Type 4
		L*/a*/b*	L*/a*/b*	L*/a*/b*	L*/a*/b*
Solid Color [1)]	Cyan	54/-36/-49	56/-34/-47	54/-36/-49	59/-24/-41
	Magenta	45/72/-5	48/69/-5	46/72/-5	54/55/-1
	Yellow	86/-7/92	88/-7/89	86/-7/90	89/-7/71
	Black	13/1/3	20/1/2	17/1/3	39/1/3
	Red (M+Y)	45/66/49	48/63/43	45/66/46	53/52/22
	Green (C+Y)	49/-70/26	51/-63/22	49/-69/25	53/-44/12
	Blue (C+M)	24/16/-49	28/15/-45	21/22/-47	37/7/-28
Colorimetric value at 50% patch [1)]	Cyan	72/-17/-26	73/-17/-26	72/-17/-26	72/-16/-26
	Magenta	68/32/-6	70/32/-6	67/34/-7	68/35/-4
	Yellow	88/-6/42	90/-5/44	88/-5/41	91/-6/43
	Black	60/0/-1	64/0/-1	60/0/-2	61/0/1
Tone value increase [2)] at 50% patch	Cyan	18 %	17 %	17 %	24 %
	Magenta	15 %	15 %	17 %	25 %
	Yellow	15 %	17 %	15 %	23 %
	Black	16 %	15 %	16 %	25 %

Spectrophotometer: X-Rite 938; colorimetric measurement condition: 0/45 geometry, D_{50}, 2° standard observer, black backing

1) These values were measured based on definitions and measurement methods specified by ISO 12647-1. These colorimetric values are shown as representative measurement data of standard print color samples in Japan Color Standard Printing 2001.

2) Difference between tone value on the print and the tone value on the halftone film. These values are shown just for information purpose.

Japan Color 2001 also provides standard color tool kit, Japan Color Standard Printing 2001, including the follow items:

1. Manual
2. Japan Color standard press print sample of four paper types (total four sheets)
3. CD-ROM
   (1) Colorimetric values (L*a*b* and XYZ) of the ISO 12642 Pattern (928 colors) for four paper types.
   (2) ICC profiles for four paper types
   (3) Digital image data of the sample

The manual also contains appendices with the following technical data of the standard print color samples for each of the four paper types:

1. ISO 12647 Pattern
   (1) Dot gain of each step
   (2) Dot gain characteristics

(3) Colorimetric values (L*a*b*) of each steps
(4) Color gamut projected to a*-b* plane

2. ISO 12642 Pattern
(1) Colorimetric values (L*a*b*)

This kit contains digital data corresponding to four-color halftone positives and standard color press print samples of four paper types. Tables 3.3.3 lists the printing aim points for obtaining the same finish as these samples. An additional and highly useful benefit of this kit is that the colorimetric values of ISO 12642 and 12647 Pattern in the skit offer Japan Color standard profiles for the four paper types.

3.4 Japan Color 2002 for Newspapers

This standard is designated to specify printing color characteristics of coldset offset lithography for newspapers and provides standard color profile of the printing color with considering actual domestic conditions and ISO standards.

Japan Color Ink for newspapers was determined by referring to the results of identifying and analyzing the color characteristics of the most widely used color process inks supplied by six domestic ink manufacturers. Using a printability tester, JPIMA made solid color samples with inks supplied by member manufacturers and Japan Color standard paper for newspapers under a couple of ink film thickness conditions. The colorimetric measurement of solid color and the analysis of the measurement concluded that colorimetric characteristics of each ink were almost identical regardless manufacture or ink type. The average values are shown in table 3.4.1. The tolerance was determined for practical condition.

Table 3.4.1 Japan Color Ink for Newspapers

	Standard Values				Density (Informative)
	L^*	a^*	b*	Tolerance	
Cyan	57.8	-25.1	-26.8	⊿E≦2.0	0.67
Magenta	51.0	48.0	-0.7	⊿E≦2.5	0.73
Yellow	78.0	-3.9	61.8	⊿E≦2.0	0.61
Black	40.2	1.1	4.2	L*≦40.2 a*±1.0 b*±1.5	0.71

GretagMacbeth SpectroEye; colorimetric measurement condition: 45/0 geometry, D50, 2˚ observer, substrate backing (7 sheets layer); status T density

In order to determine Japan Paper for newspapers, JPA chose ten kinds of popular papers for newspapers and conducted the colorimetric and optical characteristics measurement for them. The average measurement values were considered so that they represented the characteristics

of most papers for newspapers. The values shown in table 3.4.2 are slightly modified referring to the average values since recycled paper content in the paper for newspapers is increasing.

Table 3.4.2 Japan Paper for Newspapers

Standard Values				Informative	
L^*	a^*	B*	Tolerance	Density	Brightness
81.1	-0.2	5.2	⊿E≦2.5	0.23	53.0%

GretagMacbeth SpectroEye; colorimetric measurement condition: 45/0 geometry, D50, 2˚ observer, substrate backing (7 sheets layer); status T density; brightness: ISO 2470

Aim values for solid color density and tone value increase at 50% were determined from 42 test print samples conducted at 30 newspaper companies. Then standard print color samples were produced with Japan Color Ink for newspapers and Japan Paper for newspapers at one of the newspaper company. The values in table 3.4.3 were derived from the measurement of these samples.

Table 3.4.3 Characteristics of Japan Color for Newspapers Standard Print Color

			Tolerance	
Colorimetric value at solid color < L*/a*/b*>	Cyan	58/-23/-26	⊿E≦6.0	Standard values
	Magenta	53/44/0		
	Yellow	77/-4/58		
	Black	32/1/3		
	Red (M+Y)	51/40/23	N/A	Informative values
	Green (C+Y)	54/-35/19		
	Blue (C+M)	42/7/-21		
Colorimetric value at 50% patch < L*/a*/b*>	Cyan	65/-15/-16		
	Magenta	61/30/-1		
	Yellow	78/-3/37		
	Black	48/1/3		
	Red (M+Y)	60/27/20		
	Green (C+Y)	63/-22/14		
	Blue (C+M)	52/9/-16		
Density at solid color <1>	Cyan	0.85		
	Magenta	0.89		
	Yellow	0.86		
	Black	1.14		
	White	Red filter 0.23 Green filter 0.23 Blue filter 0.27 Visual filter 0.23		
Tone value increase at 50% patch <%>	Cyan	26		
	Magenta	28		
	Yellow	21		
	Black	30		

GretagMacbeth Spectrolino; colorimetric measurement condition: 45/0 geometry, D50, 2˚

observer, substrate backing (7 sheets layer); status T density

Japan Color 2002 for newspapers standard color tool kit, Japan Color Standard Printing 2002 for newspapers, is prepared to distribute and would include the follow items:

1. Manual
2. CD-ROM
   (1) Colorimetric values of the ISO 12642 and 12647 Pattern
   (2) ICC profiles
   (3) Digital image data of the sample
3. Japan Color standard print sample (secondary standard print sample reproduced with DDCP)

Printing color of the actual press print samples for newspapers tends to change easily since the stability of paper color is not sufficient. So secondary standard print sample reproduced with DDCP, which has stable color, would be provided. The color of secondary standard is matched to the original press print sample's within delta E = 2.

3.5 Japan Color 2003 for Web Offset Printing

ISO 12647-2 is designated not only for sheet-fed offset printing but also for web offset printing. The standard for sheet-fed offset printing had already established as Japan Color 2001, so discussing print color standard for web offset printing began about two years ago. Japan Color 2003 for web offset printing has just released at IGAS 2003.

It is to specify printing color characteristics of web offset printing and provides standard color profile of the printing color with considering actual domestic conditions and ISO standards.

Japan Color Ink for web offset printing was determined by referring to the results of identifying and analyzing the color characteristics of the most widely used color process inks supplied by seven domestic ink manufacturers. The same method applied for establishing Japan Color Ink for newspapers concluded the characteristics of Japan Color Ink for web offset printing shown in table 3.5.1.

Table 3.5.1 Japan Color Ink for Web Offset Printing

	Standard Values				Density (Informative)
	L*	a*	B*	Tolerance	
Cyan	53.5	-34.2	-49.5	⊿E≦4.5	1.3
Magenta	47.6	73.3	-2.7	⊿E≦4.0	1.3
Yellow	87.4	-7.1	91.5	⊿E≦2.5	0.9
Black	13.0	1.9	2.7	L*≦18.0 a*=2.0±1.5 b*=3.0±3.0	1.7

X-Rite; colorimetric measurement condition: 0/45 geometry, D50, 2˚ observer, substrate backing; status T density

It is rather tough work to standardize print color for a couple of kinds of papers regarding web offset printing. Only light coated paper, which is very popular for web offset printing, was selected for determining Japan Paper for web offset printing. Colorimetric and optical characteristics measurement of four kinds of popular light coated papers from four paper companies were performed. Delta E between average measurement values and the measurement values of each paper is less than one, so the average values were determined as characteristics of Japan Paper for web offset printing shown in table 3.5.2.

Table 3.5.2 Japan Paper for Web Offset Printing

L* 1)	a* 1)	b* 1)	Gloss 2)	Brightness 3)
88(93)	0(1)	-3(-1)	60%	80%

1) GretagMacbeth SpectroEye; colorimetric measurement condition: 45/0 geometry, D50, 2˚ observer, black backing, numbers in brackets are substrate backing (5 sheets layer)

2) Murakami gloss meter GM-3D

3) Hunter brightness meter GM-20

Practical aim values for solid color density and tone value increase at 50%, described in table 3.5.3, were determined from the printers' answer to related questionnaire and proposed values from web offset printing machinery manufactures.

Table 3.5.3 Aim Values for Web Offset Printing

	Density at solid color<1>			Tone value increase at 50% patch <%>
	Aim	Min.	Max.	
Cyan	1.40	1.35	1.45	17±3
Magenta	1.40	1.38	1.45	17±3
Yellow	0.90	0.90	0.98	17±3
Black	1.60	1.55	1.65	17±3

Measurement condition: status T density, substrate backing

Standard print color samples were produced with Japan Color Ink for web offset printing and Japan Paper for web offset printing at one of the web offset printing machinery manufactures. The values in table 3.5.4 were derived from the measurement of these samples.

Table 3.5.4 Characteristics of Japan Color for Web Offset Printing Standard Print Color

			Tolerance	
Colorimetric value at solid color < L*/a*/b*>	Cyan	52/-36/-49	⊿E≦6.0	Standard values
	Magenta	47/75/-3		
	Yellow	87/-5/88		
	Black	16/1/2		
	Red (M+Y)	47/69/46	N/A	Informative values
	Green (C+Y)	47/-68/23		
	Blue (C+M)	21/22/-47		
Colorimetric value at 50% patch < L*/a*/b*>	Cyan	73/-17/-24		
	Magenta	69/35/-6		
	Yellow	89/-5/44		
	Black	61/0/-1		

GretagMacbeth Spectrolino; colorimetric measurement condition: 45/0 geometry, D50, 2˚ observer, substrate backing (7 sheets layer)

Japan Color 2003 for web offset printing standard color tool kit, Japan Color Standard Printing 2003 for web offset printing, is prepared to distribute and would include the follow items:

1. Manual
2. CD-ROM
   (1) Colorimetric values of the ISO 12642 and 12647 Pattern
   (2) ICC profiles
   (3) Digital image data of the sample
3. Japan Color standard press print sample

ISO/TC130 Activities and ISO Standards

4. Overview of ISO/TC130

4.1 History

Technical Committee 130 (TC130) was launched in 1969 in order to standardize graphic related technologies such as printing inks. However, without the active participation of Japan, Germany, the USA, and other nations with advanced graphic technologies, progress was limited. Activities were discontinued after the Lausanne Conference.

However, the advance of desktop publishing prompted the USA's ANSI into submitting a request to ISO headquarters for the reactivation of TC130. ANSI also proposed a new item, "graphic technology information processing field" (part of the current WG2 activities). Upon approval by the ISO Technical Advisory Group (TAG), the TC 130 conference was held in July 1989 at the DIN (Deutsches Institut für Normung) headquarters in Berlin. Japan participated as an observer there. The Berlin conference discussions resulted in the establishment of the current organization comprising five working groups (WG).

In 1989, JNC for ISO/TC130 was organized within Japan Printing Machinery Association (JPMA), then Japan formal participation as a P-member began.

The reactivation of TC130 has brought regular advances and success in developing and promoting standards. Whereas previously color standards did not even exist, the effects of standardization are now extending to fields outside of the graphic arts.

4.2 Committee Structure

TC130		Field	Convener / Assistant convener
Chairman: Dr. F. Dolezalek Secretariat: A. Weber DIN, Germany	WG1	Terminology	Barbara Horn(UK)
	WG2	Prepress data exchange	D. McDowell (USA) / Dr.H.Mishina (Japan)
	WG3	Process control and related metrology	Dr. F. Dolezalek (Germany) / L. Warter (USA)
	WG4	Media and materials	Uwe Bertholdt(Germany) / W. Zawacki (USA)
	WG5	Ergonomics/Safety	K. Smythe (USA)

(At 2005)

4.3 Activity Sphere

TC130 activity covers multilingual terminology, test methods, measurement methods and specifications, and graphic technologies from making the original to printing the finished product. The range of activities includes mainly the followings:

- Composition
- Prepress process

- Printing process
- Finishing (for example binding)
- Inks, substrates and other materials used in graphic technology
- Safety and ergonomics of machinery

Figure 4.3.1 shows a conceptual diagram of ISO/TC130 activities and ISO standards. Note that printing is defined here as a reproduction process that includes transfer of a medium (e.g. ink) to a substrate by means of a relief, planographic, intaglio, stencil or other imaging method.

4.4 Participating Nations

The following are current members:

P-members (nations participating in discussions): 14 nations

Austria, Belgium, Brazil, China, Germany, Israel, Italy, Japan, Russian Federation, Spain, Sweden, Switzerland, UK, USA.

O-members (observers): 26 nations

Argentina, Chile, Colombia, Cuba, Czech Republic, Denmark, Egypt, UAE, Finland, France, Hungary, India, Indonesia, Ireland, Rep. of Korea, Dem. People's Rep. of Korea, Mongolia, Netherlands, Norway, Poland, Portugal, South Africa, Tunisia, Turkey, Yugoslavia.

4.5 Conferences

Currently, Working Group conferences are held twice a year, with a plenary conference held once a year. In addition to the conferences, committee members (i.e., experts) also use fax machines, e-mail, and other means to exchange data and discuss ideas.

4.6 Liaisons with Other International Standards Groups (Information Exchange)

ISO/TC6:	Paper, board and pulps, ISO/TC35: Paints and varnishes
ISO/TC42:	Photography
ISO/TC171:	Document imaging application
ISO/IEC JTC1/SC24:	Computer graphics and image processing
ISO/IEC JTC1/SC29:	Coding of audio, picture, multimedia and hypermedia information
ISO/IEC TC100:	Multimedia

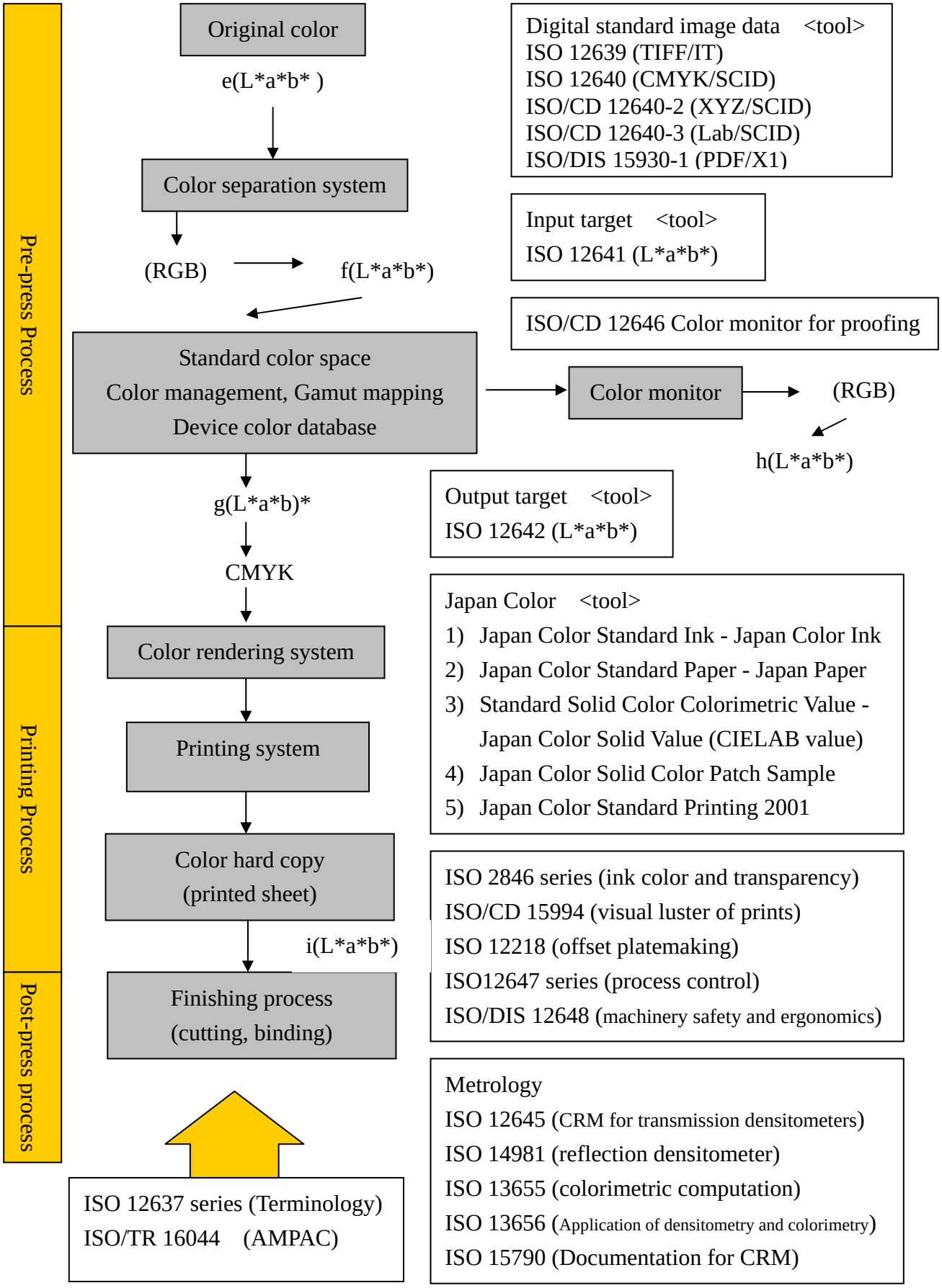

Figure 4.3.1 ISO standards with relation to color printing workflow

5. JNC for ISO/TC130

JNC for ISO/TC130, which serves as Japan's domestic discussion body, is organized with the JPMA as the parent organization. As shown in the organizational schematic below (Figure 5.1), it consists of working groups JWG1- 5 that correspond to ISO/TC130 WG1 - 5. The JWG1 secretariat is conducted by Japan Federation of Printing Industries (JFPI). JWG1 and JWG2 operations are conducted by the JFPI and Information Technology Research and Standardization Center (INSTAC), respectively.

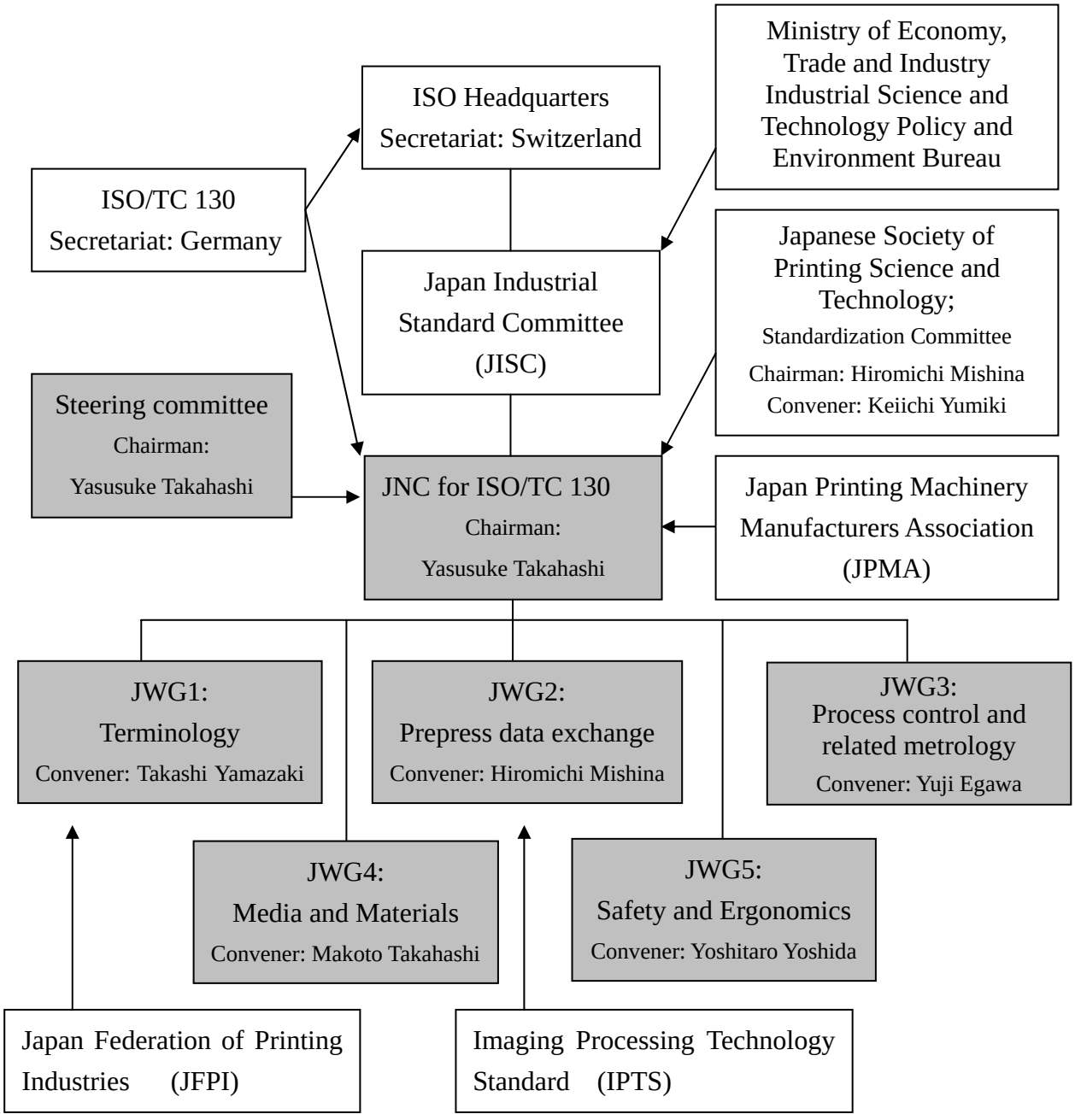

Figure 5.1 JNC for ISO/TC130 Organizational Structure

Currently, the following thirty-five member companies support the activities of the JNC for ISO/TC130.

・Akiyama International Corp.

・Ihara Electronic Industries, Co., Ltd.

・Kyodo Printing Co., Ltd.

・Kinyosha Co., LTD

・Canon Inc.

・Konica Minolta Technology Center , Inc.

・Goss Graphic Systems Japan Corp.

・Komori Corporation

・Sakata INX Corporation

・Sakurai Graphic Systems Corporation

・Shinohara Machinery Co., Ltd.

・Sha-Ken Co., Ltd.

・SRI Hybrid , Ltd.

・Dainichiseika Color & Chemicals Mfg. Co., Ltd.

・Dainippon Screen MFG. Co., Ltd.

・Dainippon Ink And Chemicals, Incorporated

・Dai Nippon Printing Co., Ltd.

・Taiyo Kikai Ltd.

・Toyo Ink Mfg. Co., Ltd.

・Tokyo Kikai Seisakusho, Ltd.

・Dentsu Inc.

・Toppan Printing Co., Ltd.

・Hakuhodo Inc.

・Hamada Printing Press Co., Ltd.

・Fuji Xerox Co., Ltd.

・Fuji Photo Film Co., Ltd.

・Fujikura Rubber Ltd.

・Horizon International, Inc.

・Mitsubishi Heavy Industries., Ltd.

・Konica Minolta Sensing , Inc.

・Miyakoshi Printing Machinery Co., Ltd.

・Meiji Rubber & Chemical Co., Ltd.

・Ricoh Co., Ltd.

・Ryobi Limited

・Yoshino Co., Ltd.

6. Working Group Tasks

WG1 deals with terminology. Its aim is to standardize terms in use to effect smooth multilingual communication. Terms are defined based on a hierarchical classification starting with basic terms and proceeding to more specific terms.

WG2 deals with data exchange in prepress operations. This includes standardization for digital information exchange related to character/image data, transmission/evaluation methods of color information, and integrated information with press and post-press processes.

TIFF/IT 1998, a basic printing format, was adopted by ISO (ISO 12639:1998) as a digital image exchange format. Extended versions that will support a broad range of data types are under discussion. Basic image parameters such as inclusion of finished page data, expression method of spot colors, compression inclusion range, and color expression and handling (including ICC profiles) are items under consideration. Besides, trapping, screening, and standard sub-sets (TIFF/IT P1, etc.) compatibility are also considered.

Furthermore, PDF/X1, a format for blind exchange of composite data, can handle vector fonts and the CMYK color space, has been accepted as draft International Standard (DIS) PDF/X1 (ISO/NP 15930-1). PDF/X2 and PDF/X3 are being discussed as standards for color spaces other than CMYK.

SCID (Standard Color Image Data) is a standard evaluation tool for color images consisting of high definition color images. CMYK/SCID, the CMYK version of SCID, has been standardized as ISO 12640:1997. XYZ-SCID (Japan proposal), created within the sRGB color space, and Lab-SCID (Europe and USA proposal), created within an unrestricted color space, are under consideration as extensions for evaluating images input from multimedia.

WG3 deals with printing process control and related metrology. ISO 12647 (Process control for the manufacture of half-tone color separations, proof and production prints) is divided into several parts according to printing method. Part 1 Parameters and measurement methods (applicable to all fields), Part 2 Offset lithographic processes, Part 3 Coldset offset lithography and letterpress on newsprint, and Part 5 Screen printing have been completed. Standards for publication gravure and flexographic printing are currently being considered. Standardization of printed color, image measurements such as densitometry are in progress.

WG4 deals with media and materials. A point of interest here is the standardization of inks according to each printing method. ISO 2846 Part 1 Sheet-fed and heat-set web offset lithographic printing, Part 2 Coldset offset lithographic printing, and Part 4 Screen printing have been completed. Gravure ink and flexographic ink are under discussion.

WG5 deals with safety and ergonomics and are therefore involved with symbols on labels. It also defines press system safety standards with the aim of creating worldwide standards that are compatible with EN 1010 and ANSI B56.

7. Published ISO Standards Relating to TC130

Published TC130 standards are shown in the table below. Note that because a review is conducted every five years, some caution is necessary before adopting a standard.

ISO number	Title	Corresponding JIS
2834:1999	Graphic technology - Test print preparation for offset and letterpress inks	
2835:1974	Graphic technology – Prints and printing inks – Assessment of light fastness	K 5701-1:2000
2836:1999	Graphic technology - Prints and printing inks – Assessment of resistance to various agents	
2837:1996	Graphic technology - Prints and printing inks – Assessment of resistance to solvents	
2846-1:1997	Graphic technology – Colour and transparency of ink sets for four-colour-printing – Part 1: Sheet-fed and heat-set web offset lithographic printing	K 5701-2:2000

2846-2:2000	- do - , but Part 2: Coldset offset lithographic printing	
2846-4:2000	- do - , but Part 4: Screen printing	
5737:1983	Graphic technology – Preparation of standard prints for optical tests	
5776:1983	Graphic technology – Symbols for text correction	
10755:1992	Graphic technology – Prepress digital data exchange – Colour picture data on magnetic tape	X 0651:1991
10756:1994	Graphic technology – Prepress digital data exchange – Colour line art data on magnetic tape	X 0652:1992
10758:1994	Graphic technology – Prepress digital data exchange – On line transfer from electronic prepress systems to colour hardcopy devices	
10759:1994	Graphic technology – Prepress digital data exchange – Monochrome image data on magnetic tape	X 0653:1993
11084-1:1993	Graphic technology – Register systems for photographic materials, foils and paper – Part 1: Three pin systems	
11628:1995	Graphic technology – Prints and printing inks – Determination of resistance of prints to acid	
12040:1997	Graphic technology – Prints and printing inks – Assessment of light fastness using filtered xenon arc light	
12218:1997	Graphic technology – Process control – Offset platemaking	B 9621:2000
12634:1996	Graphic technology – Determination of tack of paste inks and vehicles by a rotary tackmeter	
12635:1996	Graphic technology – Plates for offset printing – Dimensions	
12636:1998	Graphic technology – Blankets for offset printing	
12637-2:1997	Graphic technology – Multilingual terminology of printing arts – Part 2: Screen printing terms	
12637-5:2001	Graphic technology – Process control for the manufacture of half-tone colour separations, proof and production prints – Part 5: Screen printing	
12639:1998	Graphic technology – Prepress digital data exchange – Tag image file format for image technology (TIFF/IT)	
12640:1997	Graphic technology – Prepress digital data exchange – CMYK standard colour image data (CMYK/SCID)	X 9201:1995
12641:1997	Graphic technology – Prepress digital data exchange – Colour target for input scanner calibration	X 9203:1999
12642:1996	Graphic technology – Prepress digital data exchange – Input data for characterization of 4-colour process printing	
12644:1996	Graphic technology – Determination of rheological properties of paste inks and vehicles	
12645:1998	Graphic technology – Process control – certified reference material for opaque area calibration of transmission densitometers	

12647-1:1996	Graphic technology – Process control for the manufacture half-tone colour separations, proof and production prints – Part 1: Parameters and measurement methods	B 9620-1:2000
12647-2:1996	- do -, but Part 2: Offset printing	B 9620-2:2000
12647-3:1998	- do -, but Part 3: Coldset offset lithography and letterpress on newsprint	
12647-5:2001	- do -, but Part 5: Screen printing	
13655:1996	Graphic technology – Spectral measurements and colorimetric computation in graphic arts images	
13656:2000	Graphic technology – Application of reflection densitometry and colorimetry to process control or evaluation of prints and prints	B 9622:2000
TR13928:1994	Application guide for ISO10755, ISO10756, ISO10757, ISO10758 and ISO10759	
TR14672:2000	Graphic technology – Statistics of the natural SCID images defined in ISO12640	
14981:2000	Graphic technology – Process control – Optical, geometrical and metrological requirements for reflection densitometers for graphic arts use	B9623:2002
15930-1:2001	Graphic technology – Prepress digital data exchange – use of PDF-Part 1: Complete exchange using CMYK data (PDF/X-1 and PDF/X-1a)	
1524:2000	Paints, varnishes and printing inks – Determination of finesse of grind	K 5600-2-5
15929:2002	Graphic technology – Prepress digital data exchange – Guidelines and principles for the development of PDX/X standards	
TR16066:2003	Graphic technology –Standard object colour spectra database for colour reproduction evaluation(SOCS)	
12648:2003	Graphic technology –Safety requirements for printing press systems	
15930-4:2003 (PDF/X-1a)	Graphic technology – Prepress digital data exchange using PDF－Part 4: Complete exchange of CMYK and spot colour printing data using PDF 1.4 (PDF/X- 1a)	
15930-5:2003 (PDF/X-2)	Graphic technology – Prepress digital data exchange using PDF－Part 5: Partial exchange of printing data using PDF 1.4 (PDF/X-2)	
15930-6 :2003 (PDF/X-3)	Graphic technology – Prepress digital data exchange using PDF－Part 6: Complete exchanage of printing data suitable for colour-managed workflows using PDF 1.4 (PDF/X3)	
15790:2003	Graphic technology ＆ photography – Certified reference materials for reflection and transmission metrology－Documentation and procedures for use, including determination of combined standard uncertainty	
2836:2003	Graphic technology－Prints and printing inks－Assessment of resistance to various agents	

12646:2004	Graphic technology－Displays for colour proofing－Characteristics and viewing conditions	
12649:2004	Graphic technology－Safety requirements for binding and finishing systems and equipment	
12639:2004	Graphic technology－ Prepress digital data exchange － Tag image file format for image technology (TIFF/IT)	
TR16044:2004	Graphic technology－ Database architecture model and control parameter coding for process control and workflow (Database AMPAC)	
12640-2:2004	Graphic technology － Prepress digital data exchange － Part 2: XYZ/sRGB encoded standard colour image data (XYZ/SCID)	
12647-1:2004	Graphic technology － Process control for the production of half-tone colour separations, proof and production prints — Part 1: Parameters and measurement methods	
12647-2:2004	Graphic technology－Process control for the production of half-tone colour separations, proof and production prints — Part 2: Offset lithographic processes	
15994:2005	Graphic technology －Testing of prints — Visual lustre	
2846-5:2005	Graphic technology －Colour and transparency of printing ink sets for four-colour printing — Part 5: Flexographic printing	

8. Draft ISO Standards

Standards currently being drafted by each WG are shown in the table below.

Abbreviations:

NWI = New Work Item Proposal approved

WD = Working Draft (preparatory stage)

CD = Committee Draft (committee stage)

DIS = Draft International Standard (enquiry stage)

FDIS = Final Draft International Standard (approval stage)

(1) WG1

Document Number	Title
ISO/CD 5776	Graphic technology – Revision of ISO5776:1983, Symbols for text correction
ISO/DIS 12637-1	Graphic technology – Multi-lingual terminology – Part 1: Fundamental terms

ISO/CD 12637-2	- do -, but Part 2: Prepress terms
ISO/CD 12637-3	- do -, but Part 3: Printing terms
ISO/CD 12637-4	- do -, but Part 4: Postpress terms

(2) WG2

ISO/FDIS 15930-3	Graphic technology – Prepress digital data exchange – Use of PDF – Part 3: Blind exchange suitable for colour managed workflows (PDF/X-3)
ISO/FDIS 16612	Graphic technology –Variable printing data exchange using PPML and PDF(PPML/VDX)
ISO/CD 12639AMD1	Graphic technology –Prepress data exchange-Tag Image File Format for Image Technology(TIFF/IT) Amendment 1, Use of JBIG2-Amd2 compression in TIFF/IT
ISO/CD 12640-3	Graphic technology – Prepress digital data exchange – Standard colour image data - Prat3:CIELAB standard colour image data(CIELAB/SCID)
ISO/DIS 15076-1	Image technology colour management - Architecture, profile format,and data structure - Part1:Based on ICC.1:2004-10(ICC)
ISO/NWI17972	Graphic technology - Prepress data exchange - Colour data exchange format
ISO/PreDIS12642-2	Graphic technology –Input data for characterization of 4-colour printing-Part 2: Expanded data set

(3) WG3

ISO/NWI 12646	Graphic technology – Displays for colour proofing – Characteristics and viewing condition
ISO/DIS 12647-3	Graphic technology – Process control for the production of half-tone colour separations, proofs and production prints –Pt 3 Coldset offset
ISO/DIS 12647-4	Graphic technology – Process control for the manufacture of half-tone colour separations, proofs and production prints-pt4 Publication gravure
ISO/DIS 12647-6	Graphic technology – Process control for the manufacture of half-tone colour separations, proofs and production prints – pt.6 Flexographic printing
ISO/WD 13655	Graphic technology – Spectral measurement and colorimetric computation for graphic arts images

(4) WG4

ISO/DIS 2834-1	Graphic technology – Laboratory preparation of test prints – Pt 1:Paste printing inks (Revision of ISO2834:1999)
ISO/WD 2834-2	Graphic technology – Laboratory preparation of test prints-Part 2 Liquid printing inks (Revision of ISO2834:1999)
ISO/NWI 2834-3	Graphic technology – Laboratory preparation of test prints-Part 3 Screen printing inks (Revision of ISO2834:1999)
ISO/CD 2846-1	Graphic technology –Colour & transparency of ink sets for 4-colour printing-Pt 1:sheet-fed and heat-set web offset lithographic printing (revision of ISO 2846-1:1997)

ISO/NWI 2846-2	Graphic technology –Colour and transparency of printing ink sets for four colour printing – Part 2: Coldset offset lithographic printing
ISO/NWI 2846-3	Graphic technology – Colour and transparency of printing ink sets for four-colour-printing – Part 3: Publication gravure printing
ISO/ 2846-5	- do -, but Flexographic printing (Published March15,2005)
ISO/CD 11084-2	Graphic technology – Register systems for photographic materials, foils and paper – Part 2: Register pin systems for plate making
ISO/ 15994	Graphic technology – Testing of prints and printing paper – Determination of the Visual luster number (Published March 2, 2005)
ISO/WD 20101	Graphic technology –Process control –Cell volume measurement
ISO/NMI 12635	Graphic technology- Plates for offset- Dimentions

(5) WG5

ISO/FDIS 12648	Graphic technology – Safety requirements for printing press systems
ISO/DIS 15847	Graphic technology – Symbols for printing press systems and finishing systems, including related auxiliary equipment
ISO/WD 12634-1	Graphic technology – Safety requirements for graphic technology equipment and systems – Part1:General requirements
ISO/WD 12634-2	Graphic technology – Safety requirements for graphic technology equipment and systems – Part2:Press equipment and systems
ISO/WD 12634-3	Graphic technology – Safety requirements for graphic technology equipment and systems – Part3:Binding and finishing equipment and systems

Inquiries

Following ISO/Japan Color tool kits are available through JPMA office (Japan Printing Machinery Association).

- Japan Color Solid Color Patch Sample ¥5,000
- Japan Color Standard Printing 2001 ¥60,000
- Japan Color 2002 for Newspapers ¥30,000
- Japan Color 2003 for Web Offset Printing ¥34,000

Note: Tax and delivery cost will be added to the above-indicated price.

For those who want to use the name or the data of ISO/Japan Color for their business application purpose, exchanging of a contract and license fee of ¥800,000 are required.

Please contact JPMA office at following address for any inquiries.

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Office of JNC for ISO/TC130

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