IS 5 (2007): Colors for Ready Mixed Paints and Enamels [CHD 20: Paints, Varnishes and Related Products]

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भारतीय मानक

तैयार मिश्रित रोगन और इनैमल के लिए रंग

(छठा पुनरीक्षण)

Indian Standard

COLOURS FOR READY MIXED PAINTS AND ENAMELS

(Sixth Revision)

ICS 25.220.50; 87.040

BUREAU OF INDIAN STANDARDS
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NEW DELHI 110002

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FOREWORD

This Indian Standard (Sixth Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Paints, Varnishes and Related Products Sectional Committee had been approved by the Chemical Division Council.

This standard was first published in 1949 and since then it has been revised five times in 1955, 1961 (and also reprinted in 1969), 1978 (also reprinted in 1984), 1994 and 2004. Considering the likelihood of variation in the instrumental values with the earlier version, the Committee decided that new version of IS 5 shall be sixth revision and to print fresh instrumental values in this version. The approximate 'Munsell' values in terms of hue, lightness value graduation (value) and chroma are given in Table 1. The colourimetric values in terms of trichromatic system are also given in Table 1.

An explanation of the 'Munsell' system of colour references and glossary of colour terms is given in Annex A. The definition 'L', 'a' and 'b' – three dimensions of Uniform CIE colour space have been given in Annex A. 'L' stands for lightness, 'a' denotes redness/greenness and 'b' indicates yellowness/ blueness.

The composition of the Committee responsible for the formulation of this standard is given in Annex B.

In the preparation of this revised standard substantial assistance was provided in the measurement and checking of colour values by M/s Jay Instruments and Systems Pvt Ltd, Mumbai and active collaboration of the panel of referees comprising of experts from National Test House, Kolkata; M/s Berger Paints India Ltd, Kolkata; M/s Shalimar Paints Ltd, Kolkata; M/s Asian Paints Ltd, Mumbai and M/s Kansai Nerolac Paints Ltd, Mumbai in matching of colour shades, which are thankfully acknowledged.

Indian Standard

COLOURS FOR READY MIXED PAINTS AND ENAMELS

(Sixth Revision)

1 SCOPE

This standard covers 104 colours for ready mixed paints and enamels grouped under Blue; Green; Yellow, Cream and Buff; Brown and Pink; Red and Orange; Grey; and Violet.

2 TERMINOLOGY

For the purpose of this standard, the definitions of colour terms given in Annex A of this standard shall apply.

3 NUMBERING SYSTEM

3.1 Three digit numbers have been given to the colours, of which the first digit indicates the group of colours according to the seven broad colour divisions mentioned in **1**, each group having a range of numbers allotted, namely:

Blue	.....	100-199
Green	.....	200-299
Yellow, Cream and Buff	.....	300-399
Brown and Pink	.....	400-499
Red and Orange	.....	500-599
Grey	.....	600-699
Violet	.....	700-799

3.1.1 Whenever new colours are required to be added in the above ranges, these will be assigned numbers which do not overlap the existing numbers.

4 'MUNSELL' REFERENCES AND COLOURIMETRIC VALUES

Approximate 'Munsell' references for each colour are given in Table 1 quoted by the respective reference number. The Indian Standard Colour (ISC) number shall always be used for identifying a colour, and 'Munsell' references are given for guidance and as an aid in comparing individual properties in terms

of hue, value and chroma. The colourimetric values (chromaticity co-ordinates and luminance factor) expressed in terms of the trichromatic system for colourimetry, which constitute a permanent record of the standard colours obtained from spectrophotometric measurements are also given in Table 1 for guidance. The 'Munsell' system of colours is briefly explained in Annex A.

ANNEX A

(*Foreword, Clauses* 2 *and* 4)

GLOSSARY OF COLOUR TERMS AND THE 'MUNSELL' SYSTEM

A-1 DEFINITIONS

A-1.1 Achromatic Sensations — Visual sensations devoid of the attribute of hue.

A-1.2 Additive Mixture — The mixture of light stimuli in such a manner that they enter the eye simultaneously or in rapid succession and are incident on the same area of the retina, or enter in the form of a mosaic which the eye cannot resolve.

A-1.3 Black

A-1.3.1 A visual sensation arising from some portion of a luminous field of extremely low luminosity.

A-1.3.2 As defined in **A-1.3.1**, but applied to a secondary source which is completely absorbing at all visible wavelengths.

NOTE — The terms 'white' and 'black' are not always used in the strict sense defined above. It is usual to apply them to greys and neutrals, the luminance factor of which is nearly unity or nearly zero respectively.

A-1.4 Black Content — The subjectively estimated amount of blackness seen in the visual sensation arising from a surface colour.

A-1.5 Brightness — That colour quality, a decrease in which is associated with the residual degradation which would result from the addition of a small quantity of neutral grey to the colouring material when the strength of the mixture has been readjusted to the original strength (comparison brighter).

A-1.6 Colour

A-1.6.1 That characteristic of visual sensation which enables the observer to distinguish differences in the quality of the sensation of the kind which can be

caused by differences in the spectral composition of the light.

A-1.6.2 That characteristic of the light stimulus, light source or object, which gives rise to the visual sensation in a red light, a white light, a red face, etc.

A-1.6.3 As defined in **A-1.6.1** or **A-1.6.2,** but restricted to the appearance of redness, greenness, etc, or as distinct from whiteness, greyness or blackness; that is, chromatic colour in contra-distinction to achromatic colour.

A-1.7 Complementary Colours

A-1.7.1 *Additive* — Any two colours which, by additive mixture, can be made to match a specified achromatic colour.

A-1.7.2 *Subtractive* — Any two absorbing media which, by subtractive mixture, can be made to match specified achromatic colour.

A-1.8 Colour Content — The subjectively estimated amount of colourfulness seen in the visual sensation arising from a surface colour. Similar to chroma.

A-1.9 Cleaner — A difference apparently due to the presence of less black than in the original sample.

A-1.10 Cool Colours — Green or blue, or colours which exhibit a predominance of these.

A-1.11 Chromatic Sensations — Visual sensations possessing the attribute of hue.

A-1.12 Dichroism — A phenomenon in which a secondary source shows a marked change in hue with change in the observing conditions. Instances are: (a) change in colour temperature of the illuminant, (b) change in concentration of an absorbing material, (c) change in thickness of an absorbing layer, (d) change in direction of illumination or viewing, and (e) change in condition of polarization.

A-1.13 Dullness — That colour quality, an increase in which is associated with the residual degradation which would result from the addition of a small quantity of neutral grey to the colouring material when the strength of the mixture has been readjusted to the original strength (comparison duller).

A-1.14 Deeper — A difference apparently due to the presence of less white than in the original sample.

A-1.15 Dirtier/Duller — A difference apparently due to the presence of more black than in the original sample.

A-1.16 Full Colour— Surface colours which are produced with the maximum colourfulness obtainable.

A-1.17 Grey

A-1.17.1 Any achromatic sensation of luminosity intermediate between black and white.

A-1.17.2 As defined in **A-1.17.1,** but applied to a secondary source which is partially absorbing at some or all visible wavelengths but from which the reflected or transmitted light has the same colour as that of the incident light.

A-1.18 Hue — Attribute of visual sensation which has given rise to colour names, such as, blue, green, yellow, red and purple.

A-1.19 Light — Radiant power (energy flux) capable of stimulating the eye to produce visual sensation.

A-1.20 Minus Colours — Colours in which only the spectral components associated with the colour named are not present to any substantial extent, for example, minus red.

A-1.21 'Munsell' Chroma — The estimated pure chromatic colour content of a surface colour on a scale of equal sensation intervals extending from grey (Chroma = 0), as specified objectively by the sample of the 'Munsell' Atlas (*see* Note).

NOTE — The 'Munsell' System presents the closest attempt at representing the colour solid of surface colours by samples, spaced at equal sensation intervals and, therefore, the closest *correlation* with the subjective variable, which are chroma, lightness (called value) and hue.

A-1.22 'Munsell' Value — The estimated lightness of any surface colour on a scale of 10 equal sensation intervals extending from ideal black (value = 0) to ideal white (value = 10), as specified objectively for values from 1 to 9 in the 'Munsell' Atlas (*see* Note under **A-1.21**).

A-1.23 'Munsell' Hue — The hue of a surface colour on a scale of 100 equal sensation intervals round a colour circle of constant chroma, a specified objectively by the samples of the 'Munsell' Atlas (*see* Note under **A-1.21**).

A-1.24 Masstone — The colour by reflected light of a bulk of undiluted pigment.

A-1.25 Neutral Grey— Applied to a secondary source which is equally absorbing at all visible wavelengths.

A-1.26 Primary Light Source — A body or object emitting light by virtue of transformation of energy into radiant energy within itself.

A-1.27 Shade — A colour of the same hue and saturation but lower luminosity.

A-1.28 Shadow Series

A-1.28.1 *Subjective* — A series of colours of varying luminosity but constant hue and saturation.

A-1.28.2 *Objective* — A series of colours of varying luminance but constant chromaticity.

A-1.29 Strength — That colour quality, an increase in which is associated with an increase in the concentration of the colouring material present, all other conditions (viewing, etc) remaining the same (comparisons stronger, weaker).

A-1.30 Stronger — A difference apparently due to the presence of more colour than in the original sample.

A-1.31 Subtractive Mixture — The mixture of absorbing media or the superposition of filters so that the composition of the light stimulus passing through the combination is determined by the simultaneous or successive absorption of parts of the spectrum by each medium present.

A-1.32 Secondary Light Source — A body or object transmitting or reflecting light falling on it from any other source, whether primary or secondary.

A-1.33 Tint — The weak colour resulting from the addition to white of a small amount of colouring matter.

A-1.34 Tings — A trace of added colour.

A-1.35 Tone — A slight variant of a colour.

A-1.36 Undertone — The colour of a pigment when it is used in very thin layers or greatly extended with white, the hue of which may often differ from that of the masstone.

A-1.37 Warm Colour — Red, orange or yellow, or colours which exhibit a predominance of these.

A-1.38 Weaker — A difference apparently due to the presence of less colour than in the original sample.

A-1.39 White

A-1.39.1 An achromatic sensation of relatively high luminosity.

A-1.39.2 As defined in **A-1.39.1,** but applied to a secondary source which is non-absorbing at all visible wavelengths.

A-1.40 White Content — The subjectively estimated amount of whiteness seen in the visual sensation arising from a surface colour.

A-1.41 Whiter — A difference apparently due to the presence of more white than in the original sample.

A-2 THE 'MUNSELL' SYSTEM

A-2.1 In the 'Munsell' system, the colours are specified in terms of hue, value and chroma.

A-2.1.1 *Hue* — It distinguishes red from blue, green from yellow, etc and is denoted by letter (for example, R for red, BG for blue-green) with prefix numbers, namely, 2.5,7.5, or 10. If, for example, the R (red) number is greater than 5, the colour inclines, to the yellow-red (YR), and if the R number is less than 5, the colour inclines to red-purple (RP), and so on round the hue circle.

A-2.1.2 *Value* — It is related to lightness or darkness of a colour and is quoted as ranging from 0 to 10; the low figures represent the darker colours and finally black (0), the high figures represent the light colours and finally white (10). A rough estimate of the reflectance as a percentage is given by the formula $V(V\text{-}1)$, where V is the 'value'. Thus, colours of similar values have similar reflectance.

A-2.1.3 *Chroma* — Attribute of a visual sensation which permits a judgement to be made in the amount of pure chromatic colour present, irrespective of the amount of a chromatic colour.

It is strength of colour and is based on a scale from neutral grey (—/0) towards full strength at any given 'value' level. Steps are denoted numerically at even intervals.

A-2.1.4 *Chromaticity Coordinates* — Ratio of each of the three tristimulus values to their sum. It indicates the colour quality of the sample and recommended symbols are x, y and z in the CIE 1931 standard Colourimetric System and x10, y10 and z10 in the CIE 1964 Supplementary Colourimetric System.

$$x = \frac{X}{X+Y+Z} \qquad x10 = \frac{X10}{X10+Y10+Z10}$$

$$y = \frac{Y}{X+Y+Z} \qquad y10 = \frac{Y10}{X10+Y10+Z10}$$

$$z = \frac{Z}{X+Y+Z} \qquad z10 = \frac{Z10}{X10+Y10+Z10}$$

X, Y and Z are the tristimulus values in the CIE 1931 Standard Colourimetric System and X10, Y10 and Z10 in the CIE 1964 Supplementary Colourimetric System.

$$x + y + z = 1 \text{ and } x10 + y10 + z10 = 1$$

Illuminant D65—Average north sky daylight with colour temperature 6 500 K.

'L', 'a', 'b', — Three dimensions of uniform CIE colour space, 'L' stands for lightness, 'a' denotes redness/greenness and 'b' indicates yellowness/blueness.

10 degree observer — Standard CIE observer recommended wherever colour matching conditions exceeds 4 Deg. Field of view.

A-2.1.5 *Tristimulus Value* — Amounts of the three reference or matching stimuli required to give a match with the colour stimulus considered, in a given trichromatic system.

The symbols recommended for the tristimulus values are X, Y and Z in the CIE 1931 Standard Colourimetric System and X10, Y10 and Z10 in the CIE 1964 Standard Colourimetric System.

A-2.1.6 *Luminance Value* — The emission by matter of electromagnetic radiation which for certain wavelengths or restricted regions of the spectrum is in excess of that due to the thermal radiation from the material at the same temperature is defined as Luminance.

The ratio of the luminance of a body while illuminated and observed under certain conditions to that of perfect defuser under the same conditions.

A-2.1.7 *Method of Determination of Chromaticity Coordinates* — The value of reflectance is measured for the sample over a circular area of 8 mm in dia over a wavelength range of 360 to 740 nm at 10 nm interval. The "Minolta CM 3220 D" colour matching system is used for determining the reflectance values.

A-2.2 A complete 'Munsell' reference for a colour, for example, 7.5 R, 9/2 means:

a) Hue of 7.5 R denoting a red inclined towards yellow-red,
b) Value 9 denoting a very light colour, and
c) Chroma 2 indicating that the strength of the colour is low.

A broad description of the colour would, therefore, be 'pale-pink'.

A-2.3 It should be noted, however, that neutral greys, having no hue or chroma, are denoted by the value figure prefixed by 'N', for example, 'N6' or 'N8'

A-2.4 In the design of the colour range 'Munsell' references provide the means of defining the various categories of colour required.

Table 1 Approximate 'Munsell' References and Colourimetric Values

(*Foreword* and *Clause* 4)

Sl No.	Indian Standard Colour (ISC) No.	Name of Colour Shade	Chromaticity Coordinates		Approximate Munsell Value		Luminance Value		
			X	Y	Hue	Value/ Chroma	L	a	b
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1.	101	Sky Blue	0.2949	0.3567	8.3G	6.09/2.86	62.69	-15.16	4.19
2.	102	Turquoise Blue	0.2655	0.3494	4.5BG	5.26/4.22	54.79	-21.69	-1.08
3.	103	Peacock Blue	0.2544	0.3231	0.8B	3.96/3.28	41.47	-14.86	-6.76
4.	104	Azure Blue	0.2388	0.2674	3.8PB	3.47/4.48	36.7	-4.5	-18.02
5.	105	Oxford Blue	0.2644	0.2804	5.7PB	2.82/2.56	29.5	-0.37	-11.61
6.	106	Navy Blue	0.2933	0.3083	6.2PB	2.61/0.95	26.91	0.22	-4.73
7.	108	Aircraft Blue	0.2349	0.2564	5.0PB	3.28/4.82	34.77	-2.47	-19.91
8.	166	French Blue	0.2279	0.2569	3.8PB	4/6.13	42.45	-5.52	-23.37
9.	169	Traffic Blue	0.25	0.31	4.7B	3.96/3.4	41.65	-13.04	-9.71
10.	174	Oriental Blue	0.2513	0.3357	8.1BG	5.48/4.9	57.3	-23.92	-5.88
11.	176	Phirozi	0.2112	0.2748	8.5B	4.92/7.38	52.54	-19.95	-24.04
12.	177	Satin Blue	0.2789	0.3274	2.8B	7.4/3.17	76.04	-13.9	-6.15
13.	216	Eau-de-Nil	0.3499	0.4035	5.7GY	6.89/4.22	69.71	-10.83	25.29
14.	217	Sea Green	0.3615	0.4445	6.2GY	6.12/6.15	61.93	-16.75	34.83
15.	218	Grass Green	0.3393	0.4442	8.2GY	4.65/5.52	47.41	-19.01	25.28
16.	219	Sage Green	0.3604	0.4083	3.5GY	4.58/3.37	46.64	-6.36	20.72
17.	220	Olive Green	0.3349	0.3828	6.0GY	3.44/2.17	35.05	-5.83	10.35
18.	221	Brilliant Green	0.3164	0.4421	0.3G	4.16/5.42	42.71	-22.66	20.41
19.	222	Light Bronze Green	0.3698	0.4072	1.3GY	4.18/3.09	42.43	-3.58	20.23
20.	223	Middle Bronze Green	0.3332	0.3709	5.3GY	3.29/1.66	33.54	-3.81	8.03
21.	224	Deep Bronze Green	0.3205	0.3606	7.7GY	3.11/1.36	31.87	-4.4	5.15
22.	225	Light Brunswick Green	0.3211	0.414	9.8GY	3.88/4.01	39.66	-15.55	15.19
23.	226	Middle Brunswick Green	0.304	0.3911	1.8G	3.21/3.13	32.99	-13.54	8.53
24.	227	Deep Brunswick Green	0.3042	0.3585	3.8G	2.9/1.74	29.81	-7.16	3.38
25.	267	Traffic Green	0.2985	0.3951	2.5G	3.73/3.79	38.37	-17.07	9.61
26.	275	Opaline Green	0.3183	0.3886	0.5G	6.43/4	65.6	-16.73	15.59
27.	276	Lincoln Green	0.3159	0.3863	0.3G	3.53/2.81	36.18	-10.82	9.39
28.	277	Cypress Green	0.3319	0.4048	7.7GY	3.64/3.22	37.13	-10.81	14.08
29.	278	Light Olive Green	0.3533	0.407	4.9GY	5.07/3.6	51.77	-8.47	21.19
30.	279	Steel Furniture Green	0.3314	0.3546	9.9Y	3.16/0.85	32.31	-1.01	5.17

Table 1 – *Continued*

Sl No.	Indian Standard Colour (ISC) No.	Name of Colour Shade	Chromaticity Coordinates		Approximate Munsell Value		Luminance Value		
			X	Y	Hue	Value/ Chroma	L	a	b
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
31.	280	Verdigris Green	0.2967	0.4053	2.9G	5.4/5.57	55.51	-25.47	14.6
32.	281	Apple Green	0.3266	0.4113	9.4GY	5.76/4.79	58.81	-18.52	20.56
33.	282	Forest Green	0.3116	0.392	0.9G	3.59/3.13	36.83	-12.99	10.03
34.	283	Aircraft Gery Green	0.3339	0.3741	5.8GY	5.07/2.16	51.92	-5.85	11.79
35.	284	India Green	0.2941	0.4114	2.4G	3.76/4.55	38.79	-21.22	11.93
36.	294	Scamic	0.3324	0.3643	3.8GY	3.55/1.33	36.37	-2.87	7.33
37.	298	Olive Drab	0.3393	0.3638	0.2GY	3.37/1.25	34.39	-1.2	7.58
38.	299	Bus Green	0.2734	0.4053	5.4G	3.6/4.86	37.38	-24.68	8.83
39.	309	Canary Yellow	0.462	0.4645	4.8Y	7.89/11.02	78.18	6.54	76.58
40.	352	Pale Cream	0.3895	0.4002	3.7Y	7.99/5.12	80.08	3.63	35.07
41.	353	Deep Cream	0.4144	0.4107	2.4Y	8.01/6.73	79.9	8.68	43.84
42.	354	Primrose	0.4261	0.4371	4.7Y	7.41/7.57	74.16	3.63	52.35
43.	355	Lemon	0.4824	0.4505	2.0Y	7.49/11.54	74.16	16.08	74.99
44.	356	Golden Yellow	0.4926	0.4376	9.9YR	7.06/11.42	70.04	21.83	69.78
45.	358	Light Buff	0.4191	0.3994	9.7YR	7/6.15	70.26	12.8	37.02
46.	359	Middle Buff	0.4379	0.4079	9.4YR	6.34/6.77	63.72	14.55	40.37
47.	360	Deep Buff	0.423	0.3871	7.2YR	5.7/5.43	57.63	15.37	29.15
48.	361	Light Stone	0.3894	0.3836	10.0YR	6.76/4.26	68.27	8.37	26.15
49.	362	Middle Stone	0.4176	0.3933	9.0YR	5.35/4.84	54.19	11.64	28.41
50.	363	Dark Stone	0.4119	0.3865	8.4YR	5.1/4.4	51.75	11.62	24.96
51.	364	Portland Stone	0.3627	0.3807	4.8Y	7.61/3.16	76.77	0.68	22.96
52.	365	Vellum	0.3553	0.3721	4.0Y	8.01/2.73	80.77	0.96	19.94
53.	368	Traffic Yellow	0.4928	0.3998	4.8YR	6.21/10.05	62.09	30.77	49.77
54.	384	Light Straw	0.3702	0.3811	3.1Y	7.46/3.49	75.22	3.21	24.02
55.	385	Light Biscuit	0.3866	0.395	2.9Y	8.15/4.9	81.71	4.47	33.4
56.	386	Champagne	0.3847	0.3839	0.8Y	7.61/4.4	76.5	7.44	27.91
57.	387	Sunshine	0.3735	0.3822	2.9Y	7.02/3.49	70.86	3.81	23.74
58.	388	Beige	0.3771	0.3783	0.9Y	7.2/3.73	72.61	6.43	23.76
59.	397	Jasmine Yellow	0.4177	0.4305	4.6Y	8.27/7.53	82.44	3.27	52.63
60.	410	Light Brown	0.4184	0.384	7.2YR	4.77/4.44	48.27	13.14	24.07
61.	411	Middle Brown	0.4018	0.3678	5.3YR	3.84/3.14	38.98	11.46	15.58
62.	412	Dark Brown	0.3646	0.3426	0.7YR	3.23/1.75	32.9	8.27	6.16
63.	413	Nut Brown	0.3425	0.3412	4.5YR	2.97/0.83	30.26	3.82	3.79
64.	414	Golden Brown	0.4413	0.38	4.6YR	4.54/5.41	45.88	18.68	25.64
65.	415	India Brown	0.3954	0.3565	2.7YR	3.76/3.02	38.18	12.54	12.55
66.	439	Orange Brown	0.4272	0.3512	9.7R	3.78/4.68	38.29	20.27	15.18
67.	442	Light Salmon Pink	0.3939	0.3799	8.1YR	7.71/5.09	77.48	12.23	28.72

Table 1 – *Concluded*

Sl No.	Indian Standard Colour (ISC) No.	Name of Colour Shade	Chromaticity Coordinates		Approximate Munsell Value		Luminance Value		
			X	Y	Hue	Value/ Chroma	L	a	b
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
68.	443	Salmon Pink	0.3925	0.36	2.5YR	6.31/4.7	64	16.45	19.01
69.	444	Terra Cotta	0.4396	0.3416	7.0R	4.16/6.32	42.2	26.88	15.85
70.	445	Venetian Red	0.4294	0.3404	7.1R	3.63/5.15	36.78	22.72	12.96
71.	446	Red Oxide	0.4151	0.3409	7.6R	3.38/4.1	34.23	18.84	10.93
72.	448	Deep Indian Red	0.3748	0.3328	4.9R	3.17/2.59	32.31	12.29	5.38
73.	449	Light Purple Brown	0.3619	0.3285	3.2R	3.07/2.14	31.36	10.48	3.45
74.	451	Chocolate	0.3365	0.3385	3.5YR	2.82/0.67	28.77	3.07	2.8
75.	473	Gulf Red	0.3925	0.3317	4.8R	3.25/3.45	33.07	16.2	6.9
76.	489	Leaf Brown	0.4091	0.3639	3.3YR	4.02/3.65	40.79	14.29	16.19
77.	490	Beech Brown	0.3777	0.3492	2.3YR	3.31/2.15	33.65	9.61	8.56
78.	499	Service Brown	0.3516	0.3497	7.7YR	3.19/1.14	32.45	4.12	6.12
79.	536	Fire Red	0.5378	0.3402	7.0R	4.6/12.51	46.29	49.87	32.88
80.	537	Signal Red	0.512	0.3306	5.4R	4.23/11.16	42.76	45.02	24.04
81.	538	Post Office Red	0.4757	0.3231	4.2R	3.55/8.39	35.85	35.33	14.83
82.	540	Crimson	0.3975	0.3223	2.9R	2.95/3.96	29.87	18.1	5.36
83.	541	Maroon	0.3428	0.3257	1.3R	2.9/1.36	29.69	7	1.37
84.	557	Light Orange	0.5121	0.3822	1.9YR	5.69/10.83	56.99	38.43	45.76
85.	570	Traffic Red	0.4728	0.3504	8.1R	4.41/7.96	44.55	32.58	23.22
86.	574	Indian Saffron	0.4996	0.3537	8.2R	5.21/10.57	52.61	42.01	32.13
87.	591	Deep Orange	0.5076	0.3597	8.9R	5.04/10.38	50.84	40.85	34.52
88.	592	International Orange	0.5221	0.3485	7.8R	4.89/11.54	49.26	46.35	33.53
89.	628	Silver Grey	0.3369	0.364	1.5GY	5.96/1.59	60.95	-2.66	11.29
90.	629	Quaker Grey	0.347	0.366	6.2Y	5.52/1.73	56.38	-0.02	12.39
91.	630	French Grey	0.3341	0.3576	0.4GY	5.91/1.27	60.5	-1.61	9.29
92.	631	Light Grey	0.3129	0.3451	2.0G	5.71/0.96	58.72	-4.77	3.38
93.	632	Dark Admiralty Grey	0.2973	0.3232	8.1B	4.42/1.01	45.73	-2.65	-3.25
94.	633	AF Blue Grey	0.301	0.3252	7.3B	3.32/0.57	34.22	-1.74	-2.01
95.	634	Slate	0.3277	0.3557	4.1GY	4.34/1.11	44.54	-2.48	6.3
96.	635	Lead	0.3106	0.3453	2.8G	3.62/0.96	37.28	-3.98	2.23
97.	671	Middle Graphite	0.3037	0.3249	10.0B	3.66/0.52	37.75	-1.11	-1.97
98.	692	Smoke Grey	0.2773	0.3129	8.5B	5.51/2.78	57.23	-7.02	-8.67
99.	693	Aircraft Grey	0.3111	0.3394	4.7G	5.43/0.67	55.91	-3.45	1.69
100.	694	Dove Grey	0.3133	0.3376	2.3G	5.53/0.48	56.92	-2.23	1.54
101.	695	Dark Blue Grey	0.3073	0.3275	9.2B	2.82/0.25	28.96	-0.68	-1
102.	697	Light Admiralty Grey	0.3051	0.3419	9.4G	7.34/1.35	75.02	-7.84	2
103.	698	Steel Grey	0.3079	0.3309	8.2BG	3.03/0.31	31.16	-1.26	-0.47
104.	796	Dark Violet	0.2977	0.2662	6.1P	3.5/4.27	36.33	12.76	-13.67

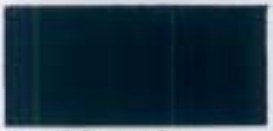
BLUE
100—


No. 101 Sky Blue


No. 108 Aircraft Blue


No. 102 Turquoise Blue


No. 166 French Blue


No. 103 Peacock Blue


No. 169 Traffic Blue


No. 104 Azure Blue


No. 174 Oriental Blue


No. 105 Oxford Blue


No. 176 Phirozi


No. 106 Navy Blue


No. 177 Satin Blue

GREEN
200—


No. 224 Deep Bronze Green


No. 279 Steel Furniture Green


No. 216 Eau-de-Nil


No. 225 Light Brunswick Green


No. 280 Verdigris Green


No. 217 Sea Green


No. 226 Middle Brunswick Green


No. 281 Apple Green


No. 218 Grass Green


No. 227 Deep Brunswick Green


No. 282 Forest Green


No. 219 Sage Green


No. 267 Traffic Green


No. 283 Aircraft Grey Green


No. 220 Olive Green


No. 275 Opaline Green


No. 284 India Green


No. 221 Brilliant Green


No. 276 Lincoln Green


No. 294 Scamic


No. 222 Light Bronze Green


No. 277 Cypress Green


No. 298 Olive Drab


No. 223 Middle Bronze Green


No. 278 Light Olive Green


No. 299 Bus Green

YELLOW, CREAM AND BUFF
300—


No. 309 Canary Yellow


No. 359 Middle Buff


No. 368 Traffic Yellow


No. 352 Pale Cream


No. 360 Deep Buff


No. 384 Light Straw


No. 353 Deep Cream


No. 361 Light Stone


No. 385 Light Biscuit


No. 354 Primrose


No. 362 Middle Stone


No. 386 Champagne


No. 355 Lemon


No. 363 Dark Stone


No. 387 Sunshine


No. 356 Golden Yellow


No. 364 Portland Stone


No. 388 Beige


No. 358 Light Buff


No. 365 Vellum


No. 397 Jasmine Yellow

BROWN AND PINK
400 —


No. 410 Light Brown

No. 442 Light Salmon Pink


No. 451 Chocolate


No. 411 Middle Brown


No. 443 Salmon Pink


No. 473 Gulf Red


No. 412 Dark Brown


No. 444 Terra Cotta


No. 489 Leaf Brown


No. 413 Nut Brown


No. 445 Venetian Red

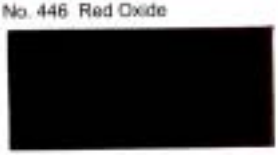

No. 490 Beach Brown


No. 414 Golden Brown

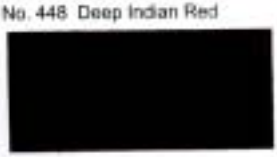

No. 446 Red Oxide


No. 499 Service Brown


No. 415 India Brown


No. 448 Deep Indian Red


No. 439 Orange Brown


No. 449 Light Purple Brown

RED AND ORANGE
500 —

No. 536 Fire Red

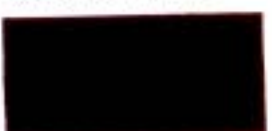
No. 557 Light Orange

No. 537 Signal Red

No. 570 Traffic Red

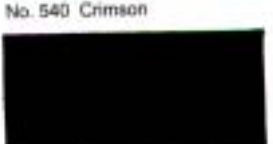
No. 538 Post Office Red

No. 574 India Saffron



No. 540 Crimson

No. 591 Deep Orange



No. 541 Maroon

No. 592 International Orange

GREY
600—

No. 628 Silver Grey

No. 629 Quaker Grey

No. 630 French Grey

No. 631 Light Grey

No. 632 Dark Admiralty Grey

No. 633 AF Blue-Grey

No. 634 Slate

No. 635 Lead

No. 671 Middle Graphite

No. 692 Smoke Grey

No. 693 Aircraft Grey

No. 694 Dove Grey

No. 695 Dark Blue-Grey

No. 697 Light Admiralty Grey

VIOLET
700—

No. 796 Dark Violet

No. 698 Steel Grey

ANNEX B

(*Foreword*)

COMMITTEE COMPOSITION

Paints, Varnishes and Related Products Sectional Committee, CHD 20

Organizations	*Representative(s)*
In personal capacity, (*14 Orion, Oomer Park Bhulabhai Desai Road, Mumbai 400026*)	SHRI RAVI MARPHATIA (***Chairman***)
Akzo Nobel Coatings India Pvt Ltd, Bangalore	SHRI DEEPAK VERMA
Asian Paints Ltd, Mumbai	DR R. D. KHANOLKAR DR B. P. MALIK (*Alternate*)
Berger Paints India Ltd, Howrah	SHRI B. BERA SHRI N. K. RAY (*Alternate*)
Bharat Heavy Electricals Ltd, Tiruchirapalli	SHRI M. SOMU SHRI L. GRAGORI (*Alternate*)
Central Building Research Institute, Roorkee	DR L. K. AGARWAL DR K. K. ASTHANA (*Alternate*)
Central Public Works Department, New Delhi	SHRI VIJAY MOTWANI SHRI R. K. KANOJIA (*Alternate*)
Clariant Chemicals (India) Ltd, New Delhi	SHRI ASIT RAY
Consumer Unity & Turst Society (CUTS), Jaipur	SHRI R. K. SHARMA SHRI VIJAY SINGH (*Alternate*)
Directorate of Naval Architecture, New Delhi	REPRESENTATIVE
Engineers India Limited, New Delhi	DR G. SAHA SMT NIVEDITA BHATTACHARYA (*Alternate*)
Indian Institute of Chemical Technology, Hyderabad	DR K. V. S. N. RAJU
Indian Institute of Technology Bombay, Mumbai	DR A. S. KHANNA
Indian Paints Association, Kolkata	DR M. B. GUHA SHRI V. M. NATU (*Alternate*)
Kansai Nerolac Paints Ltd, Mumbai	SHRI S. V. PORWAL SHRI A. V. GADGIL (*Alternate*)
Kerala Minerals and Metals Ltd, Kolkata	SHRI E. J. ANTO
Maruti Udyog Ltd, Gurgaon	SHRI T. K. BANERJEE
Ministry of Defence (DGQA), Kanpur	DR A. K. MUKHOPADHYAY SHRI V. N. SOHANI (*Alternate*)
Ministry of Industry, New Delhi	SHRI P. K. JAIN SHRI N. C. TIWARI (*Alternate*)
National Test House (ER), Kolkata	DR SUNIL KUMAR SAHA SMT R. DEY SARKAR (*Alternate*)
Naval Materials Research Laboratory, Ambernath	SHRI DHIRENDRA KUMAR SHRI V. R. MORE (*Alternate*)
Office of the Development Commissioner (SSI), New Delhi	SHRI A. K. JAIN

Organizations	*Representative(s)*
Oil and Natural Gas Corporation Ltd, Mumbai	REPRESENTATIVE
Paint and Coating Technologists Association, Kanpur	DR DEVENDRA AGARWAL SHRI V. N. DUBEY (*Alternate*)
In personal capacity (*103 Mukta Apartment Om Datta Mandir Marg, Malad (West) Mumbai 400064*)	SHRI S. S. ANAKAIKAR
Punjab Paint Colour and Varnish Works, Kanpur	SHRI G. N. TIWARI
Reliance Industries Ltd, Mumbai	REPRESENTATIVE
Research Designs & Standards Organization, Lucknow	SHRI H. K. MITRA SHRI S. C. VERMA (*Alternate*)
Resins & Plastics Limited, Mumbai	SHRI M. C. CHOKSI
SGS India Pvt Ltd, Gurgaon	SHRI SUDARSHAN SHARMA SHRI DIPJYOTI BANERJEE (*Alternate*)
Shalimar Paints Ltd, Kolkata	DR S. K. MISRA SHRI A. K. DE (*Alternate*)
Shriram Institute for Industrial Research, Delhi	DR P. K. KAICKER SHRI A. K. MAJUMDAR (*Alternate*)
Tata Motors Limited, Jamshedpur	REPRESENTATIVE
The Shipping Corporation of India Ltd, Mumbai	SHRI R. SOOD SHRI P. V. SANDEEP (*Alternate*)
U. K. Paints Industries, New Delhi	SHRI V. K. NAYYAR
BIS Directorate General	SHRI E. DEVENDAR, Scientist-F & Head (Chemical) [Representing Director General (*Ex-officio*)]

Member Secretary
SHRI PARTHA S. MANDAL
Scientist-B (Chemical), BIS

Panel for Visual Examination of Shade Cards for Printing of IS 5 CHD 20: P1

National Test House (ER), Kolkata	DR SUNIL KUMAR SAHA (***Convener***) SMT R. DEY SARKAR (*Alternate*)
Asian Paints Ltd, Mumbai	SHRI AVINASH SARDESAI
Berger Paints India Ltd, Howrah	SHRI PRABIR CHATTERJEE
Kansai Nerolac Paints Ltd, Mumbai	SHRI ASHOK PANHALE
Shalimar Paints Ltd, Kolkata	SHRI SWAPAN MITRA

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