भारतीय मानक

Indian Standard

IS 2379 : 2024

पाइपलाइन की पहचान के लिए रंग-संकेत — रीति संहिता

(दूसरा पुनरीक्षण)

Colour Code for Pipeline Identification — Code of Practice

(Second Revision)

ICS 01.070; 47.020.30

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Chemical Engineering Plants and Related Equipment Sectional Committee, MED 17

FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Chemical Engineering Plants and Related Equipment Sectional Committee had been approved by the Mechanical Engineering Divisional Council.

This standard was first published in 1963 and revised in 1990. This revision has been taken up with a view incorporating the modification found necessary as a result of experience gained in the use of this standard. Also, in this revision, the standard has been brought into the latest style and format of Indian Standards, and references to Indian Standards, wherever applicable have been updated.

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

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 2022 ‘Rules for rounding off numerical values (*second revision*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

COLOUR CODE FOR PIPELINE IDENTIFICATION — CODE OF PRACTICE

(Second Revision)

1 SCOPE

1.1 This standard covers the colour scheme for the identification of the contents of pipelines carrying fluids in domestic and public buildings and such industrial installations where a specific colour code does not exist.

1.2 For the purpose of this standard, piping systems shall include pipes of any kind and in addition fittings, valves, and pipe coverings. Supports, brackets or other accessories are specifically excluded from application of this standard.

1.3 This standard is not applicable to pipelines buried underground or used for electrical services.

2 REFERENCES

The standard given below contains provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent edition of these standards.

IS No.	*Title*
IS 5 : 2007	Colours for ready mixed paints and enamels (*sixth revision*)
IS 2339 : 2013	Aluminium paints for general purposes — Specification (*first revision*)

3 TERMINOLOGY

For the purpose of this standard, the following definitions shall apply.

3.1 Hazard — Risk involved to life, health, or property due to the poisonous nature of combustibility or other causes of dangerous substances.

3.2 Lettering — Painting, labelling, stenciling, or otherwise indicating the contents of a pipeline.

3.3 Identification of Pipelines — A scheme consisting of a colour code or lettering or a combination of both intended for the identification of the contents of tile pipelines.

3.4 Combustible — The material classification for fluids that can burn, but that are not flammable.

3.5 Fire Quenching — The material classification including water, foam, and carbon dioxide used in sprinkler systems and fire-fighting piping systems.

3.6 Flammable — The material classification for fluids that, under ambient or expected operating conditions, are a vapour or produce vapours that can be ignited and continue to burn in air. The term thus may apply, depending on service conditions, to fluids defined for other purposes as flammable or combustible.

3.7 Oxidizing — The material classification for fluids that may, generally by providing oxygen, cause or contribute to the combustion of other material more than air does.

3.8 Piping — Conduits used to convey, distribute, mix, separate, discharge, meter, control, or snub fluid flows.

3.9 Piping Systems — Piping of any kind, including fittings, valves, and pipe coverings. Supports, brackets, or other accessories are specifically excluded from applications of this standard.

3.10 Toxic and Corrosive — The material classification for fluids that are toxic or corrosive, or that will produce toxic or corrosive substances when released.

4 PAINTS

4.1 Appropriate quality of paints conforming to relevant Indian Standards, shall be used for colour marking.

4.2 It is recommended that the paints used should produce a glossy finish.

5 COLOURS

In order to identify the contents of the pipelines, a large number of colour shades are required.

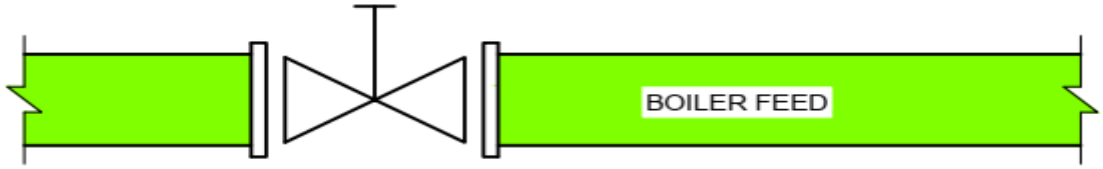
Recommendation regarding shades of colours that may be used are given in IS 5.

6 IDENTIFICATION

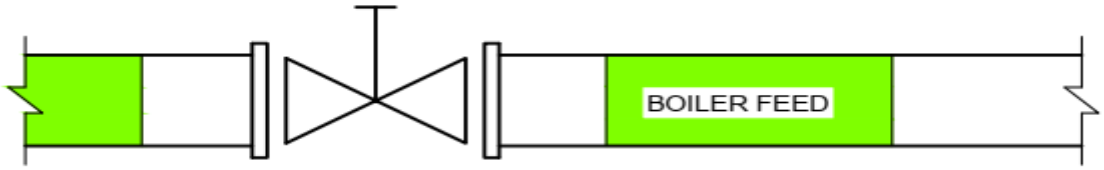
The system of colour coding consists of a ground colour and colour bands superimposed on it.

6.1 Ground Colours

The ground colour identifies the basic nature of the fluid carried (*see* Fig. 1) and also distinguishes one fluid from another, for example, water from oil. The various ground colours are indicated in Table 1.



1A GROUND COLOUR - APPLIED TO FULL SECTION



1B GROUND COLOUR - APPLIED TO A PORTION ONLY

FIG. 1 GROUND COLOUR

Table 1 Ground Colours

(*Clauses* 6.1 *and* 7.2)

Sl No.	Substance	Colour
(1)	(2)	(3)
i)	Water	Sea green
ii)	Steam	Aluminium to IS 2339
iii)	Mineral, vegetable and animal oils, combustible liquids	Light brown
iv)	Acids	Dark violet
v)	Air	Sky blue
vi)	Gases	Canary yellow
vii)	Alkalies	Smoke grey
viii)	Other liquids/gases which do not need identification	Black
ix)	Hydrocarbons/organic compounds	Dark admirality grey

6.1.1 Ground colour shall be applied throughout the entire length for uninsulated pipes, for insulated pipes, on the metal cladding or on the pipes of material such as non-ferrous metals, austenitic stainless steel, plastic, etc, ground colour coating of minimum 2 m length or of adequate length, not to be mistaken as colour band, shall be applied.

6.2 Colour Bands

Colour bands are superimposed on the ground colour (*see* Fig. 2) to distinguish:

a) One kind or condition of a fluid from another kind or condition of the same fluid; and

b) One fluid from another but belonging to the same group, for example, carbon monoxide from coke oven gas or diesel fuel from furnace fuel.

7 APPLICATION

7.1 General

The service identifier or any descriptor labels shall be applied using a material sufficiently durable and resistant to deterioration for its expected life and the environmental conditions or surroundings where they are to be used, particularly where used below ground. The service identifier may be applied using one of the following methods:

a) Painting;
b) Adhesive colour bands or labels;
c) Colour clips;
d) Wraps or coverings; and
e) Applied during manufacture.

NOTES

1 This list is not exhaustive and other appropriate methods may be used, subject to the environmental surroundings.

2 The use of paints or adhesives as a fixing agent for the labels/banding can affect plastics pipe/fittings or the quality of the fluids being transported through permeation (for example, adhesive labelling). In these cases, advice from the manufacturer of the plastics pipe should be sought to determine the suitability of any paint or adhesive compounds used. For below ground installations, along with colour identification a spiral of identification tape shall be continuously applied around the whole length of service pipe to ensure the service can be readily identified wherever it is exposed.

3 This is in addition to any trench marker tape that is used for the avoidance of damage to the pipeline. It should be marked with text to enable identification of the basic fluid being conveyed.

4 The biodegradable properties of some marker tapes should be taken into account to ensure it is fit for purpose.

7.2 Ground Colour

Colours as given in Table 1 shall be applied in one of the following ways:

a) Throughout the entire length (*see* Fig. 1A); and

b) As a colour coating of adequate length, (but in no case less than 300 mm) so that it is not mistaken for a colour band (*see* Fig. 1B).

7.3 Wherever the ground colour is not applied throughout the entire length, it shall be applied near valves, junctions, joints, service appliances, bulkheads, walls, etc. (*see* Fig. 3).

7.3.1 When colour bands are superimposed on the ground colour, the ground colour shall extend sufficiently on both sides of the colour bands to avoid confusion (*see* Fig. 2 and Fig.3).

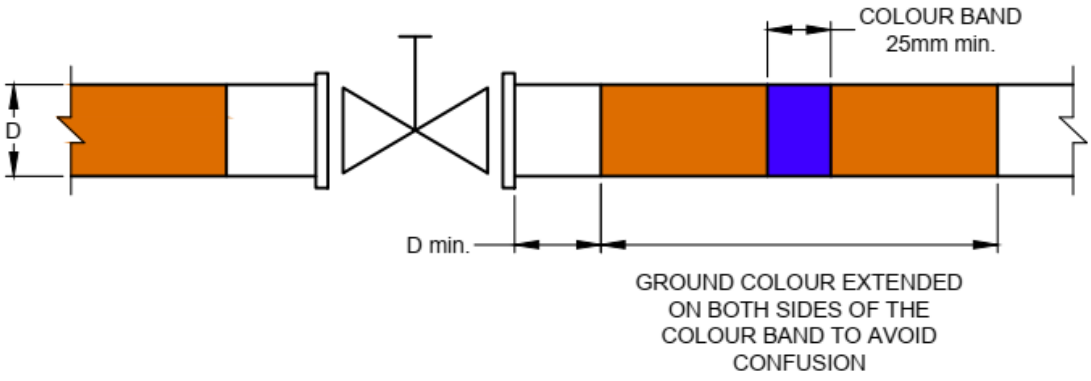


FIG. 2 COLOUR BAND SUPERIMPOSED ON GROUND COLOUR

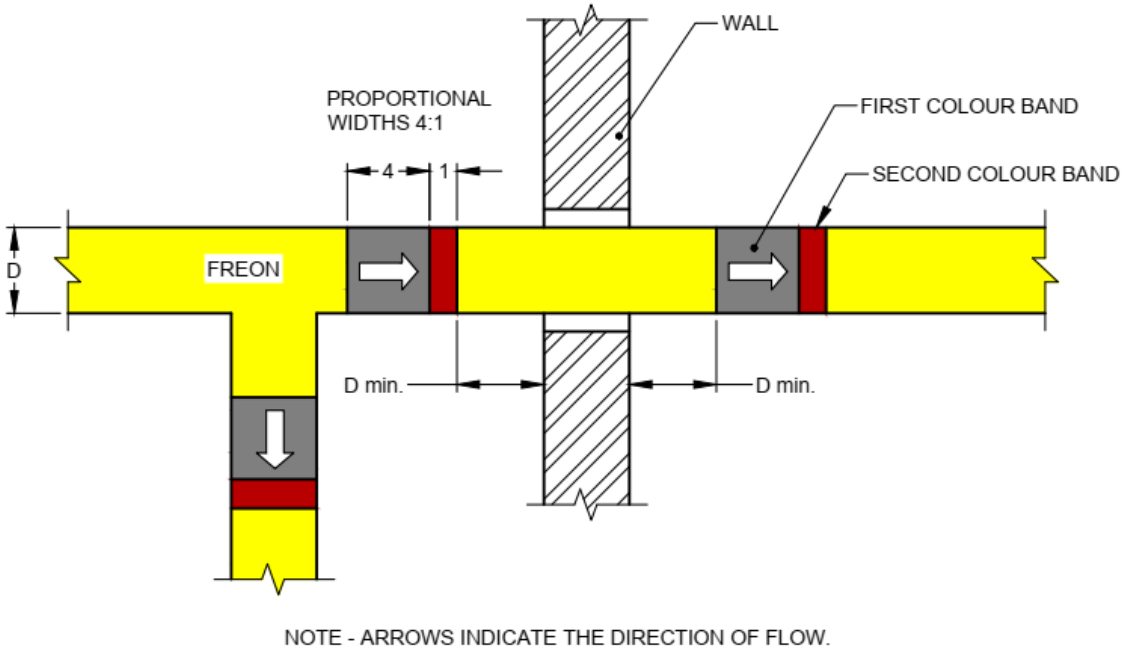


FIG. 3 COLOUR BANDS ON GROUND COLOUR–FLUID CARRIED, FREON

7.4 Colour Bands

They shall be superimposed on ground colour at the following location:

a) At battery limits points;
b) Intersection points and change of direction points in piping ways;
c) Other points such as midway of each piping way, near valves, junction joints of service appliances, walls, on either sides of pipe culverts;
d) For long stretch yard piping at 50 m interval; and
e) At start and terminating points.

7.4.1 Colour bands shall be arranged in the sequence shown in Table 2 to Table 5, and the sequence follows the direction of flow (*see* Fig. 3). For example, Fig. 3 shows the colour code for a pipe carrying freon where the light grey and dark violet colour bands have sequence numbers 1 and 2.

7.4.2 The relative proportional widths of the first colour band to the subsequent bands shall be 4 : 1 (*see* Fig. 3).

7.4.3 As a rule minimum width of colour band shall confirm to the following table:

Sl No.	*Nominal Pipe Size*	*Width, L* mm
(1)	(2)	(3)
i)	80 NB and below	25
ii)	Over 100 NB up to 150 NB	50
iii)	Over 200 NB up to 300 NB	75
iv)	Over 350 NB	100

For insulated pipes, nominal pipe size means outside diameter of insulation.

7.5 Valves shall be painted with the same colour as the main pipelines except when the pipeline has been provided with the safety colour, the valves shall be painted red, for fire-fighting, yellow, with black diagonal stripes for warning of danger; and French blue in conjunction with green basic colour, to denote pipes carrying fresh water, either potable or non-potable.

7.6 The colour coding as prescribed in this standard and as applicable to pipelines for general services,

pipelines conveying industrial gases hydrocarbons and naptha and pipelines conveying medical gases are given in Tables 2, 3, 4, and 5 respectively.

7.7 All uninsulated pipes having temperatures above 100 °C (Heat resistant Aluminium painted) need not be identified with colour bands. As special case if required, colour bands may be applied using Teflon Tape.

8 HAZARDS

When it is desired to indicate that a pipeline carries a hazardous material, a panel of colour of suitable width (minimum 100 mm) as given below shall be superimposed on the ground colour at suitable intervals:

a) Slightly Radioactive Hazards — A base colour of jasmine yellow with black dots suitable superimposed (*see* Fig. 4A);
b) Highly Radioactive Hazards — A base colour of light orange with cross diagonal stripes of black colour, suitable superimposed (*see* Fig. 4B); and
c) Other Hazards — Equal diagonal stripes of black and golden yellow colours (*see* Fig. 4C). Different legends for various type of hazards other than radioactivity like that for flammable or explosive materials, chemically active or toxic materials, etc, may be indicated by lettering.

9 ABANDONED PIPING

Piping that has been abandoned in place should be identified. The recommended colour scheme is safety white background with black letters. A black border should be added to the identification. When the abandoned piping is protected from corrosion by the addition of a pressurized fluid or contains residual hazardous material, the legend should indicate that.

10 ADDITIONAL IDENTIFICATION

When further identification is required to supplement the colour code, this may be done by the particular industry for its own use.

10.1 Lettering

This standard considers a legend to be primary and explicit for identification of contents. Positive identification of the contents of a piping system shall be by lettered legend, giving the name of the contents in full or abbreviated form (*see* Fig. 3 and Fig.5). For steam, temperature and pressure shall be indicated after colour indication, by lettering. The recommended size of lettering for pipes of different is given below:

Sl No.	*Outside Diameter of Pipe or Covering* mm	*Size of Legend* mm
(1)	(2)	(3)
i)	20 to 30	10
ii)	Above 30 to 50	20
iii)	Above 50 to 80	30
iv)	Above 80 to 150	40
v)	Above 150 to 250	90
vi)	Above 250	90

10.2 Direction of Flow

Where fluids predominately flow in a single direction, a ‘single direction of flow arrow’ shall be used. Where fluids are able to flow in either direction (for example, in a ring main), a double headed arrow shall be painted near valves, junctions, walls etc, and at suitable intervals along the pipe, in a manner best suited to local conditions (*see* Fig. 3). These shall be black or white in colour and in contrast to the colour on which they are superimposed. If a label or badge with a codified indication is attached to the pipe, the direction of flow may be indicated by the pointed end of the label or badge. Size of arrow shall be as given in Fig. 6.

10.2.1 For central heating systems or other closed circuits where it is necessary to indicate separately, the flow and return pipes, the direction of flow arrows shall be supplemented by the use of the word ‘FLOW’ or the letter ‘F’ on the one pipe and the word ‘RETURN’ or the letter ‘R’ on the other.

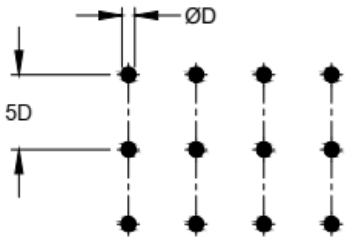
11 PLACEMENT OF MARKING

11.1 Attention shall be given to the visibility of colour marking and the letterings. Where the pipelines are located above the normal line of vision of the operator, the lettering shall be placed below the horizontal line of the pipes, as shown in Fig. 7.

11.2 Preferably colouring shall be all around the pipe wherever possible, if not, the extent of colouring along the circumference is to be decided by purchase engineer in charge depending upon direction of visibility at site.

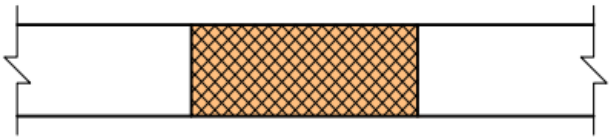
11.3 The electrical illumination of plant in the night should be such that the shades of colours are not affected to ensure proper visibility in the night, wherever legends and colour bands are indicated, their location should be such that they are easily visible from floor/ground level during day time and extra illumination should be provided over them for night time or wherever visibility is poor.

BACKGROUND OF NO. 397 JASMINE
YELLOW WITH BLACK DOTS

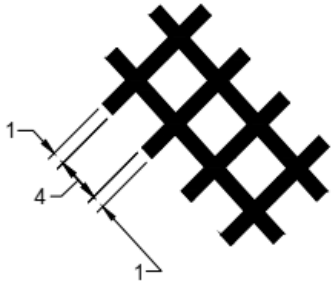


POSITIONING OF DOTS

4A HAZARD MARKING FOR SLIGHTLY RADIOACTIVE FLUIDS

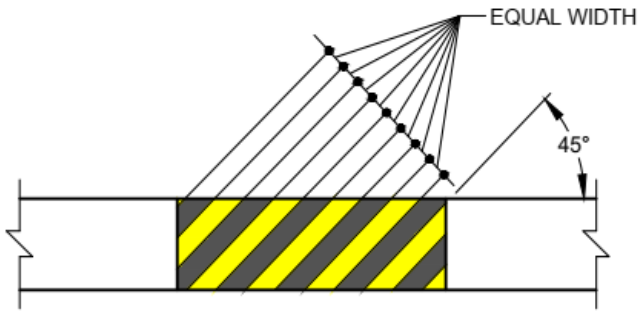


BACKGROUND OF NO. 557 LIGHT ORANGE
WITH BLACK CROSS STRIPES



PROPORTIONAL WIDTH 4 : 1
BLACK CROSS STRIPS

4B HAZARD MARKING FOR HIGHLY RADIOACTIVE FLUIDS



STRIPES OF BLACK AND NO. 356 GOLDEN YELLOW

4C HAZARD MARKING FOR OTHER KIND OF HAZARDS

FIG. 4 DETAILS OF HAZARD MARKING

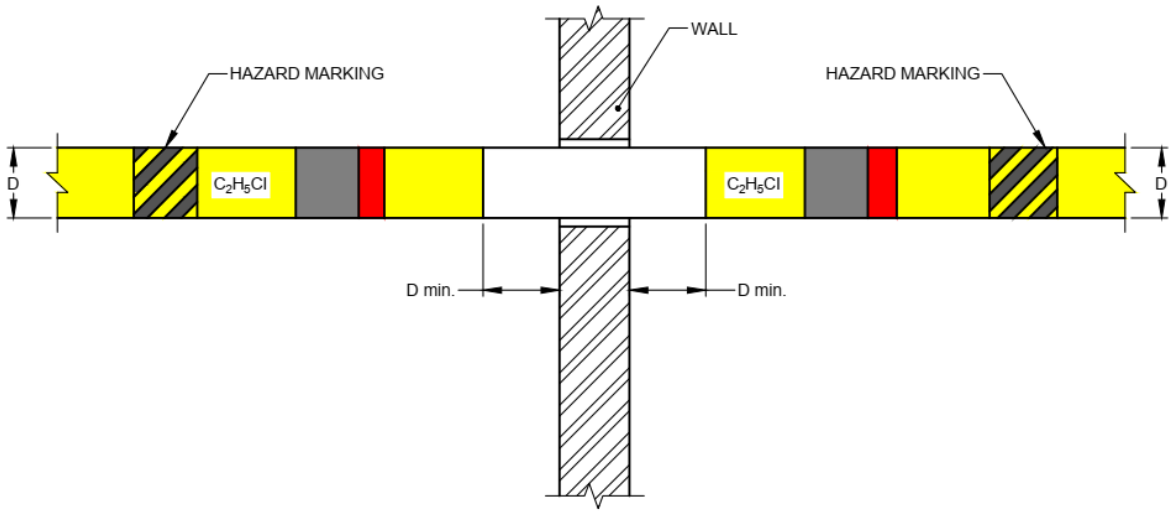


FIG. 5 HAZARD MARKING (FLUID CARRIED, ETHYL CHLORIDE)

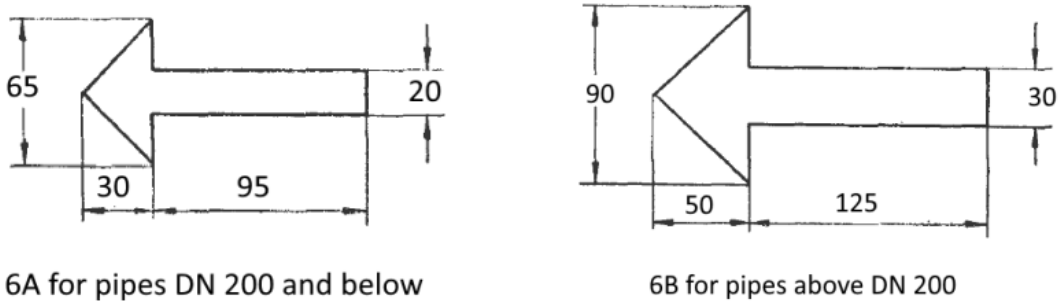


FIG. 6 SIZE OF ARROWS

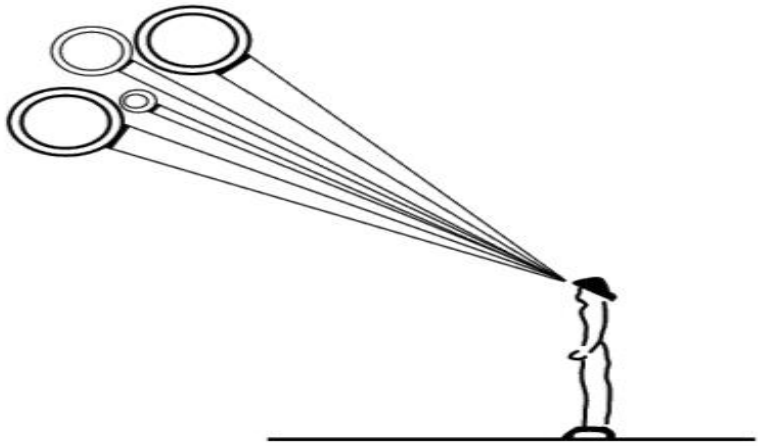


FIG. 7 PLACEMENT OF MARKING FOR VISIBILITY

Table 2 Colour Code for General Services

(*Clauses* 7.4.1 *and* 7.6)

Sl No.	Contents	Ground Colour	First Colour Band	Second Colour Band
(1)	(2)	(3)	(4)	(5)
Water				
i)	Cooling	Sea green	French blue	—
ii)	Boiler feed water	Sea green	Gulf red	—
iii)	Condensate	Sea green	Light brown	—
iv)	Drinking	Sea green	French blue	Signal red
v)	Treated	Sea green	Light orange	—
vi)	Fire water	Fire red	Crimson red	—
vii)	Central heating below 60 °C	Sea green	Canary yellow	—
viii)	Central heating 60 °C to 100 °C	Sea green	Dark violet	—
ix)	Central heating above 100 °C	Sea green	Dark violet	Signal red
x)	Cold water down service from storage tanks	Sea green	French blue	Canary yellow
xi)	Domestic, hot	Sea green	Light grey	—
xii)	Hydraulic power	Sea green	Black	—
xiii)	Sea, river, untreated	Sea green	White	—
xiv)	Filtered water	Sea green	Light brown	—
xv)	Soft water	Sea green	Light brown	Signal red
xvi)	Warm water	Sea green	Light grey	Canary yellow
xvii)	Chilled water	Sea green	Black	Canary yellow
xviii)	Sprinkle and hydrant water	Sea green	White	Signal red
xix)	Waste water	Sea green	Canary yellow	Signal red
xx)	Demineralized water	Sea green	Gulf red	—
xxi)	Process water	Sea green	Oxide red	—
xxii)	Wash water	Sea green	Canary yellow	—
xxiii)	Quench water	Sea green	Dark grey	—
Air				
xxiv)	Compressed, up to and including 15 kg/cm^2	Sky blue	—	—
xxv)	Compressed to over 15 kg/cm^2	Sky blue	Signal red	—
xxvi)	Plant air	Sky blue	Silver grey	—
xxvii)	Instrument air	Sky blue	French blue	—
xxviii)	Dry vacuum	White	—	—
xxix)	Wet vacuum	White	Dark violet	—
xxx)	Very high pressure steam	Aluminium to IS 2339	Signal red	—

Table 2 (*Concluded*)

Sl No.	Contents	Ground Colour	First Colour Band	Second Colour Band
(1)	(2)	(3)	(4)	(5)
xxxi)	High pressure steam	Aluminium to IS 2339	French blue	—
xxxii)	Medium pressure steam	Aluminium to IS 2339	Gulf red	—
xxxiii)	Low pressure steam	Aluminium to IS 2339	Canary yellow	—
xxxiv)	Drainage	Black	—	—
xxxv)	Town gas	Canary yellow	—	—
Oils				
xxxvi)	Light diesel fuel	Light brown	Brilliant green	—
xxxvii)	High speed diesel fuel	Light brown	—	—
xxxviii)	Paraffin oil	Light brown	Signal red	—
xxxix)	Quenching oil	Light brown	Canary yellow	—
xl)	Furnace fuel	Light brown	French blue	—
xli)	Lubricating oil	Light brown	Light grey	—
xlii)	Hydraulic power	Light brown	Dark violet	—
xliii)	Transformer oil	Light brown	Light orange	—

Table 3 Colour Code for Industrial Gases

(*Clauses* 7.4.1 *and* 7.6)

Sl No.	Contents	Ground Colour	First Colour Band	Second Colour Band
(1)	(2)	(3)	(4)	(5)
i)	Ammonia	Canary yellow	Dark violet	—
ii)	Chlorine	Canary yellow	Dark violet	Light orange
iii)	Hydrocyanic acid	Canary yellow	Dark violet	Post office red
iv)	Phenol	Canary yellow	Dark violet	Smoke grey
v)	Sulphur dioxide	Canary yellow	Dark violet	Golden brown
vi)	Acetylene	Canary yellow	Service brown	—
vii)	Flare gases	Canary yellow	—	—
viii)	Hydrogen sulphide	Canary yellow	Gulf red	—
ix)	Argon	Canary yellow	French blue	—
x)	Benzol	Canary yellow	Dark violet	French blue
xi)	Blast furnace gas	Canary yellow	Signal red	Light grey
xii)	Butane	Canary yellow	Signal red	—
xiii)	Coal gas	Canary yellow	Signal red	Brilliant green
xiv)	Carbon dioxide (temperate)	Canary yellow	Light grey	—
xv)	Carbon monoxide	Canary yellow	Signal red	White
xvi)	Coke oven gas	Canary yellow	Signal red	Dark violet
xvii)	Ethylchloride (inflammable)	Canary yellow	Light grey	Signal red
xviii)	Ethylchloride (noninflammable)	Canary yellow	Light grey	White
xix)	Ethylene	Canary yellow	Dark violet	Signal red

Table 3 (*Concluded*)

Sl No.	Contents	Ground Colour	First Colour Band	Second Colour Band
(1)	(2)	(3)	(4)	(5)
xx)	Ethylene oxide	Canary yellow	Dark violet	Brilliant green
xxi)	Freon (chloro-fluoro derivative of methane and ethane)	Canary yellow	Light grey	Dark violet
xxii)	Helium	Canary yellow	Light brown	—
xxiii)	Hydrogen	Canary yellow	Signal red	French blue
xxiv)	Methane	Canary yellow	Signal red	Light brown
xxv)	Methylbromide	Canary yellow	French blue	Black
xxvi)	Methylchloride (inflammable)	Canary yellow	Brilliant green	Signal red
xxvii)	Methylchloride (non-inflammable)	Canary yellow	Brilliant green	French blue
xxviii)	Neon	Canary yellow	Light brown	Black
xxix)	Nitrogen	Canary yellow	Black	—
xxx)	Oxygen	Canary yellow	White	—
xxxi)	Propane	Canary yellow	Signal red	Black
xxxii)	Phosgene	Canary yellow	Black	White
xxxiii)	Fuel gas and sour gas	Canary yellow	Grey	Dark violet
xxxiv)	Sweet gas	Canary yellow	Grey	—
xxxv)	Residue gas, LPG	Canary yellow	Oxide red	White
xxxvi)	Charge gas	Canary yellow	Signal red	French blue
xxxvii)	Aromatic gasoline	Dark admirality grey	Brilliant green	Canary yellow
xxxviii)	Pyrolysis gasoline	Dark admirality grey	Brilliant green	Black

Table 4 Colour Code for Hydrocarbons and Naptha

(*Clauses* 7.4.1 *and* 7.6)

Sl No.	Contents	Ground Colour	First Colour Band	Second Colour Band
(1)	(2)	(3)	(4)	(5)
i)	Propylene F.P. (liquid)	Dark admirality grey	Brilliant green	—
ii)	Propylene (C.G.) (liquid)	Dark admirality grey	Brilliant green	Smoke grey
iii)	Ethylene glycol	Dark admirality grey	Brilliant green	Gulf red
iv)	Ethylene di-chloride	Dark admirality grey	Gulf red	—
v)	Benzene	Dark admirality grey	Canary yellow	—
vi)	Butadiene	Dark admirality grey	Black	—
vii)	Acetone	Dark admirality grey	Black	Canary yellow
viii)	Methanol	Dark admirality grey	Deep buff	—
ix)	Naptha	Dark admirality grey	Light brown	Black
x)	Ethane (liquid)	Dark admirality grey	Light grey	French blue
xi)	Propylene (liquid)	Dark admirality grey	Signal red	Black
xii)	Kerosene	Light Brown	Brilliant green	Dark violet

Table 4 (*Concluded*)

Sl No.	Contents	Ground Colour	First Colour Band	Second Colour Band
(1)	(2)	(3)	(4)	(5)
xiii)	LPG (liquid)	Dark admirality grey	Brilliant green	Dark violet
Acids				
xiv)	Phosphoric acid	Dark violet	Silver grey	—
xv)	Hydrofluoric acid	Dark violet	Signal red	French blue
xvi)	Sulphuric acid	Dark violet	Brilliant green	Light orange
xvii)	Nitric acid	Dark violet	French blue	Light orange
xviii)	Hydrochloric acid	Dark violet	Signal red	Light orange
xix)	Acetic acid	Dark violet	Silver grey	—
Chemical and Allied Products				
xx)	Brine	Black	White	—
xxi)	Caustic solution	Smoke grey	Light orange	—
xxii)	Classified	Black	Canary yellow	—
xxiii)	Spinbath concentrative sulphuric acid	Dark violet	Brilliant green	Canary yellow
xxiv)	Dissolving	—	Light orange	White
xxv)	Causted	Dark violet	Light orange	—
xxvi)	Evaporated spinbath	Black	Canary yellow	Brilliant green
xxvii)	Flocculant solution	Black	Brilliant green	—
xxviii)	Lime	Smoke grey	White	Canary yellow
xxix)	Mercury	Black	White	Brilliant green
xxx)	Rum-off caustic	Smoke grey	White	—
xxxi)	Recovered caustic	Smoke grey	Signal red	White
xxxii)	Carbon disulphide	Black	Light orange	—
xxxiii)	Strong caustic	Smoke grey	French blue	White
xxxiv)	Steeping caustic	Smoke grey	Golden yellow	—
xxxv)	Sodium sulfide	Black	Brilliant green	Canary yellow
xxxvi)	Soap solution	Black	Light orange	White
xxxvii)	Spinbath supply	Black	White	Canary yellow
xxxviii)	Spinbath return	Black	Golden yellow	—
xxxix)	Sodium carbonate solution	Dark violet	Jasmin yellow	—
xl)	Waste caustic	Dark violet	White	Canary yellow
xli)	Waste spinbath	Black	Jasmin yellow	—
xlii)	Viscose	Black	Golden yellow	Brilliant green

Table 5 Colour Code for Medical Gases

(*Clauses* 7.4.1 *and* 7.6)

Sl No.	Contents	Ground Colour	First Colour Band	Second Colour Band
(1)	(2)	(3)	(4)	(5)
i)	Air	Sky blue	White	Black
ii)	Cyclopropane	Canary yellow	Light orange	—
iii)	Carbon dioxide	Canary yellow	Light grey	—
iv)	Ethylene	Canary yellow	Dark yellow	Signal red
v)	Helium	Canary yellow	Light brown	—
vi)	Oxygen	Canary yellow	White	—
vii)	Oxygen and carbon dioxide mixture	Canary yellow	White	Light grey
viii)	Oxygen and helium mixture	Canary yellow	White	Light brown
ix)	Nitrous oxide	Canary yellow	French blue	Signal red
x)	Nitrogen	Canary yellow	Black	—
xi)	Vacuum	Sky blue	Black	—

ANNEX A

(*Foreword*)

COMMITTEE COMPOSITION

Chemical Engineering Plants and Related Equipment Sectional Committee, MED 17

Organization	*Representative(s)*
CSIR - Indian Institute of Petroleum, Dehradun	DR MRITUNJAY KUMAR SHUKLA **(*Chairperson*)**
Advance Valves Global, Noida	SHRI PRANAY S. GARG SHRI CHANDRAKANT WADKAR (*Alternate*)
Auma India Private Limited, Bengaluru	SHRI YASHWANT M. JANNU
Bharat Heavy Electrical Limited, New Delhi	SHRI Y. SRINIVASA RAO SHRI ABHISHEK KUMAR PANDEY (*Alternate*)
Blast Carboblocks Private Limited, Mumbai	SHRI DHAWAL SAXENA
Central Power Research Institute, Bengaluru	DR P. THOMAS SHRI SADASIVA MURTHY P. (*Alternate* I) SHRI AJITH KUMAR N. (*Alternate* II)
Chemtrols Industries Private Limited, New Delhi	SHRI P. KRISHNA KUMAR
Confederation of Indian Industry, New Delhi	SHRI DUSHYANT SINGH
Directorate General Factory Advice Service and Labour Institutes, Mumbai	SHRI TANOJ CHANDAN SHRI KUNAL SHARMA (*Alternate*)
Engineers India Limited, Gurugram	SHRI HASMUKH K. PARMAR SHRI MRAGANG SHEAKHAR (*Alternate*)
GMM Pfaudler Limited, Anand	SHRI DHIRAN PANCHAL SHRI SATVIK PATEL (*Alternate*)
Hindustan Petroleum Corporation Limited, Mumbai	SHRI KRISHANU GHOSH SHRI N. K. RAI (*Alternate*)
Indian Oil Corporation Limited, New Delhi	SHRI KARAN AGRAWAL
Indian Rubber Manufacturers Research Association, Mumbai	DR K. RAJ KUMAR DR DEBDIPTA BASU (*Alternate*)
Indian Valve and Actuator Manufacturers Association (IVAMA), Coimbatore	SHRI R. MURUGANANTHAM SHRI JAY DOSHI (*Alternate*)
Kejriwal Casting Limited, Kolkata	SHRI SANDEEP KEJRIWAL
L&T Valves, Chennai	SHRI ROHIT SHARMA SHRI SURIYANARAYANAN (*Alternate*)
Lathia Rubber Manufacture Company Private Limited, Mumbai	SHRI SANJIV S. LATHIA
MECON Limited, Ranchi	SHRI YOGENDRA KUMAR SINGH SHRI ARVIND BHUSHAN (*Alternate*)
Plastics Machinery Manufacturers Association of India (PMMAI), New Delhi	SHRI NANDHA KUMAR T. SHRI PRADIP VANWANI (*Alternate*)

Organization	*Representative(s)*
Project and Development India Limited, Noida	SHRI SANJIV KUMAR MISHRA SHRI RAJEEV RANJAN KUMAR (*Alternate*)
Tata Consulting Engineers Limited, Navi Mumbai	SHRI SHIVNARAYAN PAREEK SHRI SHIREESH S. SWAMI (*Alternate*)
BIS Directorate General	SHRI, K. VENKATESWARA RAO SCIENTIST 'F'/SENIOR DIRECTOR AND HEAD (MECHANICAL ENGINEERING) [REPRESENTING DIRECTOR GENERAL (*Ex-officio*)]

Member Secretary
MS NEHA THAKUR
SCIENTIST 'C'/DEPUTY DIRECTOR
(MECHANICAL ENGINEERING), BIS

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