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Ships and marine technology — Identification colours for the content of piping systems

Navires et technologie maritime — Couleurs pour l'identification du contenu des systèmes de tuyauterie

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Foreword

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The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 14726 was prepared by Technical Committee ISO/TC 8, *Ships and marine technology*, Subcommittee SC 3, *Piping and machinery*.

This first edition cancels and replaces ISO 14726-1:1999 and ISO 14726-2:2002, which have been technically revised.

Ships and marine technology — Identification colours for the content of piping systems

1 Scope

This International Standard specifies main colours and additional colours for identifying piping systems in accordance with the content or function on board ships and marine structures.

These colours can also be used for piping systems on drawings and diagrams.

This International Standard does not apply to piping systems for medical gases, industrial gases and cargo.

This International Standard can also be used for land installations.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60757, *Code for designation of colours*

CIE 015, *Colorimetry*

3 Terms and definitions

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

3.1
main colour
colour used to indicate a group of similar media

3.2
additional colour
colour used in combination with the main colour to indicate a specific medium

4 Colours

The main colours represented in the electronic file of this International Standard are reference colours; colours of a similar shade and tone may also be used for marking pipes (see Table 1).

Table 1 — Chromaticity

Main colour	Letter code [a]	Co-ordinate points of chromaticity areas [b]								Luminance factor	Example
		1		2		3		4			
		x	y	x	y	x	y	x	y	β	
Black	BK	0,385	0,355	0,300	0,270	0,260	0,310	0,345	0,395	$\leqslant$ 0,03	
Blue	BU	0,078	0,171	0,196	0,250	0,225	0,184	0,137	0,038	$\geqslant$ 0,05	
Brown	BN	0,510	0,370	0,427	0,353	0,407	0,373	0,475	0,405	$\geqslant$ 0,04	
Green	GN	0,313	0,682	0,313	0,453	0,209	0,383	0,013	0,486	$\geqslant$ 0,10	
Grey	GY	0,350	0,360	0,300	0,310	0,290	0,320	0,340	0,370	0,15 $\leqslant \beta \leqslant$ 0,50	
Maroon	MN	0,302	0,064	0,307	0,203	0,374	0,247	0,457	0,136	$\geqslant$ 0,10	
Orange	OG	0,610	0,390	0,535	0,375	0,506	0,404	0,570	0,429	$\geqslant$ 0,25	
Silver	SR	Luminance factor $\beta >$ 0,50									
Red	RD	0,690	0,310	0,595	0,315	0,569	0,341	0,655	0,345	$\geqslant$ 0,07	
Violet	VT	0,250	0,160	0,286	0,146	0,293	0,273	0,304	0,275	0,10 $\leqslant \beta \leqslant$ 0,36	
White	WH	0,350	0,360	0,300	0,310	0,290	0,320	0,340	0,370	$\geqslant$ 0,75	
Yellow	YE	0,522	0,477	0,470	0,440	0,427	0,483	0,465	0,534	$\geqslant$ 0,45	

[a] As given in IEC 60757.

[b] CIE 1931 chromaticity co-ordinates for standard illuminant D65 and 45/0 or d/8 measurement geometry in accordance with CIE 015.

Table 2 — Main colours and media

Main colour	Medium
Black	Waste media [a]
Blue	Fresh water
Brown	Fuel
Green	Sea water [b]
Grey	Non-flammable gases
Maroon	Air and sounding pipes
Orange	Oils other than fuels
Silver	Steam
Red	Fire fighting
Violet	Acids, alkalis
White	Air in ventilation systems
Yellow	Flammable gases

[a] Examples: black water, grey water, waste oil, exhaust gas.

[b] For ships with mixed navigation (sea-river ships): all outside waters.

Table 3 — Additional colours for different media or functions

Waste media	**BK** (main colour)
Black water	BK – **BU** – BK
Waste oil/used oil	BK – **BN** – BK
Bilge water	BK – **GN** – BK
Exhaust gas	BK – **GY** – BK
	BK – **MN** – BK
	BK – **OG** – BK
	BK – **SR** – BK
	BK – **RD** – BK
	BK – **VT** – BK
Grey water	BK – **WH** – BK
Sewage, contaminated	BK – **YE** – BK

Fresh water	**BU** (main colour)
	BU – **BK** – BU
Fresh water, sanitary	BU – **BN** – BU
Potable water	BU – **GN** – BU
Distillate	BU – **GY** – BU
	BU – **MN** – BU
Gas-turbine wash water	BU – **OG** – BU
Feed water	BU – **SR** – BU
	BU – **RD** – BU
Cooling fresh water	BU – **VT** – BU
Chilled water	BU – **WH** – BU
Condensate	BU – **YE** – BU

Fuel	**BN** (main colour)
Heavy fuel oil (HFO)	BN – **BK** – BN
Aviation fuel	BN – **BU** – BN
	BN – **GN** – BN
	BN – **GY** – BN
	BN – **MN** – BN
	BN – **OG** – BN
	BN – **SR** – BN
	BN – **RD** – BN
Biological fuel	BN – **VT** – BN
Gas-turbine fuel	BN – **WH** – BN
Marine diesel oil (MDO)	BN – **YE** – BN

Sea water	**GN** (main colour)
	GN – **BK** – GN
Decontamination water	GN – **BU** – GN
Sea water, sanitary	GN – **BN** – GN
	GN – **GY** – GN
	GN – **MN** – GN
	GN – **OG** – GN
	GN – **SR** – GN
	GN – **RD** – GN
Ballast water	GN – **VT** – GN
	GN – **WH** – GN
Cooling sea water	GN – **YE** – GN

Non-flammable gases	**GY** (main colour)
	GY – **BK** – GY
Oxygen	GY – **BU** – GY
Inert gas	GY – **BN** – GY
Nitrogen	GY – **GN** – GY
Refrigerant	GY – **MN** – GY
Compressed air LP (Low pressure)	GY – **OG** – GY
	GY – **SR** – GY
Compressed air HP (High pressure)	GY – **RD** – GY
Control air/regulating air	GY – **VT** – GY
Breathing air [a]	GY – **WH** – GY
Breathing gas [a]	GY – **YE** – GY

[a] This marking is used in submarines for distribution systems of breathing air from cylinders.

Air and sounding pipes	**MN** (main colour)
Waste media	MN – **BK** – MN
Fresh water	MN – **BU** – MN
Fuel	MN – **BN** – MN
Sea water	MN – **GN** – MN
Non-flammable gases	MN – **GY** – MN
Oil other than fuels	MN – **OG** – MN
Steam	MN – **SR** – MN
Fire fighting	MN – **RD** – MN
Acids, alkalis	MN – **VT** – MN
Ventilation system	MN – **WH** – MN
Flammable gases	MN – **YE** – MN

Table 3 (*continued*)

Oils other than fuels	**OG** (main colour)
	OG – **BK** – OG
Thermal fluid	OG – **BU** – OG
	OG – **BN** – OG
Lubrication oil for gas turbines	OG – **GN** – OG
Hydraulic fluid	OG – **GY** – OG
	OG – **MN** – OG
Lubrication oil for steam turbines	OG – **SR** – OG
	OG – **RD** – OG
Lubrication oil for gears	OG – **VT** – OG
	OG – **WH** – OG
Lubrication oil for internal combustion engines	OG – **YE** – OG

Steam	**SR** (main colour)
Steam for heating purposes	SR – **BK** – SR
	SR – **BU** – SR
	SR – **BN** – SR
Driving steam	SR – **GN** – SR
	SR – **GY** – SR
	SR – **MN** – SR
	SR – **OG** – SR
	SR – **RD** – SR
	SR – **VT** – SR
Exhaust steam	SR – **WH** – SR
Supply steam	SR – **YE** – SR

Fire fighting/ fire protection	**RD** (main colour)
	RD – **BK** – RD
	RD – **BU** – RD
	RD – **BN** – RD
Fire-fighting water	RD – **GN** – RD
Fire-fighting gas	RD – **GY** – RD
	RD – **MN** – RD
Sprinkler water	RD – **OG** – RD
	RD – **SR** – RD
Spray water	RD – **VT** – RD
Fire-fighting powder	RD – **WH** – RD
Fire-fighting foam	RD – **YE** – RD

Acids, alkalis	**VT** (main colour)
	VT – **BK** – VT
	VT – **BU** – VT
	VT – **BN** – VT
	VT – **GN** – VT
	VT – **GY** – VT
	VT – **MN** – VT
	VT – **OG** – VT
	VT – **SR** – VT
	VT – **RD** – VT
	VT – **WH** – VT
	VT – **YE** – VT

Air in ventilation systems	**WH** (main colour)
Discharge air	WH – **BK** – WH
Mechanical supply air, cold	WH – **BU** – WH
Natural exhaust air	WH – **BN** – WH
Atmospheric air	WH – **GN** – WH
Mechanical exhaust air	WH – **GY** – WH
Decontaminated supply air	WH – **MN** – WH
Mechanical recirculated air	WH – **OG** – WH
Mechanical supply air, warm	WH – **SR** – WH
Smoke clearance	WH – **RD** – WH
Conditioned supply air	WH – **VT** – WH
Natural supply air	WH – **YE** – WH

Flammable gases	**YE** (main colour)
	YE – **BK** – YE
Hydrogen	YE – **BU** – YE
	YE – **BN** – YE
	YE – **GN** – YE
Acetylene	YE – **GY** – YE
	YE – **MN** – YE
	YE – **OG** – YE
	YE – **SR** – YE
	YE – **RD** – YE
Liquid gas	YE – **VT** – YE
	YE – **WH** – YE

5 Design

5.1 General

The colours may be

— applied to the pipeline as an adhesive tape or sign, or

— painted onto the pipeline in stripes.

Main colours may also be painted onto the pipeline on the total length.

The markings shall be so positioned that the colour stripes (tapes) are perpendicular to the axis of the pipe.

Additional colour markings may be added adjacent to a main colour marking on a pipe, when necessary, to distinguish between pipes marked with the same main colour listed in Table 2, but carrying different types of medium (for example, a pipe carrying marine diesel oil and another pipe carrying heavy fuel oil).

The area (or width) of additional colours shall be less than the area (or width) of main colours so that it is clearly apparent which are the main colours and which are additional colours.

The marking shall be readily visible. It shall be arranged in such a way that the additional colour is surrounded by the main colour.

Pipelines shall be marked as follows:

— once in each room, at least;

— at each penetration point in bulkheads, walls and decks;

— close to each valve;

— within a distance of 3 m to 5 m of the length of the pipeline, whereby the local conditions may require a more frequent marking due to pipe bends or the close proximity of pipes for different services.

Paints and adhesives of self-adhesive identification labels or coloured tapes shall neither attack nor damage the surface of the pipe components that are to be marked.

5.2 Marking of pipes with tapes

Pipes of up to 200 mm outer diameter:

— the tapes comprise the entire circumference of the pipes and are adhered at their ends by overlapping.

Pipes of more than 200 mm outer diameter:

— the tapes comprise about half the circumference of the pipes.

Pipes in bundles:

— shall be individually marked.

If the marking is not possible over the entire circumference, an abbreviation of the marking is admissible.

A common marking of several pipes with the same content or function is only admissible on collars.

5.3 Supplementary indications

Arrows to indicate the direction of flow in a pipe are recommended. Pipes with flow in opposite directions at different times may be marked with arrows pointing in opposite directions.

Additional marking by text is also recommended to signify unambiguously the content and/or function of the pipe. When additional markings by text are used, consideration should be given to the use of a language understood by the crew members whose responsibilities include being able to identify pipes and piping systems.

Annex A
(informative)

Explanations for some media/functions

A.1 Waste media

A.1.1 Description

This includes all media that contain dirt or other foreign substances.

These media are described in A.1.2 to A.1.7.

A.1.2 Black water

Black water includes the following:

a) sewage from all kinds of toilets, urinals and bidets;

b) sewage from all kinds of medical areas (hospital, pharmacy, etc.) and from all wash-basins, bathing tubes and scuppers located in these areas;

c) sewage from rooms with living animals;

d) sewage that is a mixture of the types listed from a) to c).

A.1.3 Waste oil/used oil

Oil drained after admissible working hours, exceeding admissible analysis values or containing dirt or other foreign substances.

A.1.4 Bilge water

Water from all kinds of ship bilges.

A.1.5 Exhaust gas

Exhaust from combustion engines, boilers and thermal-fluid heaters.

A.1.6 Grey water

All kinds of sewage from sanitation rooms, provision rooms, ventilation rooms, cargo holds and decks, excluding black water.

A.1.7 Sewage, contaminated

All contaminated sewage, excluding black water and grey water.

A.2 Fresh water

A.2.1 Description

This includes water used either for human consumption or for engineering technical purposes, e.g. fresh water for cooling engines.

A.2.2 Fresh water types

Fresh water types include the following.

a) Fresh water, sanitary: fresh water used in sanitation plants;

b) Cooling fresh water: fresh water, with additional substances used for cooling purposes;

c) Gas-turbine wash water: fresh water used for washing gas turbines;

d) Feed water: water to feed a boiler;

e) Distillate: chemically pure water;

f) Potable water: water used for human consumption;

g) Chilled water: water used as a heat carrier, e.g. in an air-conditioning plant;

h) Condensate: condensed steam.

A.3 Fuel

Types of fuel include the following.

a) Heavy fuel oil (HFO): e.g. fuel in accordance with ISO 8216-99, family R;

b) Aviation fuel: fuel used for aircraft;

c) Biological fuel: all fuels of biological origin;

d) Gas-turbine fuel: fuel used for gas turbines;

e) Marine diesel oil (MDO): e.g. fuel in accordance with ISO 8216-1, category DMC.

A.4 Sea water

A.4.1 Description

Sea water is water taken from outside the ship.

A.4.2 Sea-water types

Sea-water types include the following.

a) Decontamination water: sea water used for decontamination purposes;

b) Sea water, sanitary: sea water used for the sanitation plant;

c) Ballast water: sea water used for stability, trimming, anti-rolling and rigidity purposes;

d) Cooling sea water: sea water used for cooling purposes.

A.5 Non-flammable gases

Types of non-flammable gas include the following.

a) Compressed air: air under pressure that is greater than that of the atmosphere;

b) Refrigerant: substance used as a heat carrier for refrigeration purposes;

c) Control air/regulation air: air used for control and regulation purposes;

d) Breathing air: compressed air used in breathing-air cylinders;

e) Breathing gas: compressed gas used in breathing-gas cylinders.

A.6 Oils other than fuel

A.6.1 Description

This includes natural and synthetic oils other than fuel.

A.6.2 Types

Types of oil other than fuel include the following.

a) Thermal fluid: fluid used as a heat carrier in thermal-fluid heater systems;

b) Lubrication oil for gas turbines: oil used for lubricating purposes in a gas-turbine plant;

c) Hydraulic fluid: fluid used in hydraulic systems to transmit pressure or volumetric flow;

d) Lubricating oil for steam turbines: oil used for lubricating purposes in a steam-turbine plant;

e) Lubrication oil for gears: oil used for lubricating purposes in gears;

f) Lubricating oil for internal-combustion engines: oil used for lubricating purpose in internal-combustion engines.

A.7 Steam

A.7.1 Description

Steam is described here as the vapour into which water is converted when heated to boiling point.

A.7.2 Types

Types of steam include the following.

a) Steam for heating purposes: steam used for heating purposes;

b) Driving steam: steam for steam turbines;

c) Supply steam: steam that passes into an apparatus;

d) Exhaust steam: steam that is returning from an apparatus.