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Colour Coding Standard for Piping Systems



Canadian Coast Guard
Standard

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COLOUR CODING STANDARD FOR PIPING SYSTEMS

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2	December 08, 2003	Second Edition: Revision and creation of a standard by its own.	
3	September 27, 2007	Revision 1: replaced piping diagrams for exact identification, updated word-marks and titles.	A.D.
4	26 February, 2009	Revision 2: added FM 200 and Nitrogen to Annex A Primary and Secondary Colour Table.	G.I.
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Office of Primary Interest (OPI)	Gary Ivany	Approved:	GARY IVANY
		Date:	September 16, 2010
Acting Manager, Hull Mechanical Electrical (HME)	Anne-Marie Sekerka	Approved:	ANNE-MARIE SEKERKA
		Date:	September 27, 2010
Director, Marine Engineering	Mario Pelletier	Approved:	MARIO PELLETIER
		Date:	September 27, 2010
Director General, Integrated Technical Services	Robert Wight	Approved:	ROBERT WIGHT
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Document Management

1. Authority

This document is issued under the authority of the Director General, Integrated Technical Services, under delegation from the Deputy Minister, Fisheries and Oceans and the Commissioner of the Canadian Coast Guard.

2. Responsibility

- a) The Director, Engineering Services is responsible for:
 - i) the creation and promulgation of the document; and
 - ii) the identification of an Office of Primary Interest (OPI) who is responsible for the coordination and the content of the document.

- b) The OPI is responsible for:
 - i) the validity and accuracy of the content;
 - ii) the availability of this information;
 - iii) the update as needed;
 - iv) the periodical revision; and
 - v) the follow-up of all requests, comments and/or suggestions received by the originator.

3. Inquiries and/or Revision Requests

All inquiries regarding this document, including suggestions for revision and requests for interpretation shall be addressed to:

Position Title:	Manager, Engineering and Maintenance (HME)
Address:	Fisheries and Oceans – Canadian Coast Guard 200 Kent Street, 7 th Floor Ottawa, Ontario K1A 0E6

All requests should:

- i) be clear and concise; and
- ii) reference the specific Chapter, Section, Figure or Table.

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Chapter 1 INTRODUCTION

1.1 PURPOSE

The purpose of this standard is to implement the policy for the management of a piping colour coding standard.

1.2 POLICY

It is the policy of the Canadian Coast Guard, Integrated Technical Services to ensure that the colour coding of piping systems is standardised and managed effectively to provide optimum safety of all Coast Guard Fleet units.

1.3 APPLICATION

This standard shall apply to all Canadian Coast Guard Fleet units, new construction and units undergoing, and mid-life modernization, to the extent that compliance is reasonable and practical.

1.4 REFERENCE

This standard is issued in accordance with:

- Fleet Safety Manual DFO5737

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Chapter 2 ROLES AND RESPONSIBILITIES

2.1 THE DIRECTOR, MARINE ENGINEERING

The Director, Marine Engineering, is responsible for:

- Developing the Colour Coding Standard for Piping Systems (Chapter 3);
- Ensuring that the standard is available to the Coast Guard Fleet Managers; and
- Ensuring that the Coast Guard Fleet Managers are applying the standard.

2.2 THE REGIONAL DIRECTOR, ENGINEERING SERVICES

The Regional Director, Engineering Services is responsible for:

- Ensuring that the standard is available to the Commanding Officers; and
- Ensuring that the Commanding Officers are applying the standard.

2.3 COMMANDING OFFICER

Commanding Officer is responsible for:

- Ensuring that the standard is available to the vessel's officers and crew; and
- Ensuring the vessel's officers and crew are applying the standard.

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Chapter 3 STANDARD

3.1 PURPOSE

The purpose of this standard is to establish a Colour Coding for Piping Systems for use on CCG vessels, together with written identification, for fluids conveyed in piping systems.

The use of this standard is intended to promote greater safety through user familiarization and to reduce the incidence of error or confusion in the operation of these systems.

This standard does not define the manner or conditions under which these fluids may be used.

3.2 GENERAL

The standard establishes, defines, and assigns a colour for recognition of fluids in a piping system, and through the use of secondary colour codes the different uses for the fluid. It requires the application of the colour code in a distinctive manner, as a visual aid to the written identification.

3.3 GENERAL REQUIREMENTS

3.3.1 Colours

The colours assigned in the standard are detailed in Annex A. No change shall be made in the assigned colours without the approval from the Director, Marine Engineering.

The paint colours are to be semi gloss or gloss type and shall conform to the most current standard of the Canadian Guard Standards Board (CGSB).

The colours offered by manufacturers are acceptable for manufactured tapes and markers.

3.3.2 Primary Colour Code

A primary colour code is the colour assigned to a fluid conveyed in a piping system taking into account its function, e.g. for compressed air the primary colour code will be orange. These colours appear as bands on piping systems.

3.3.3 Secondary Colour Code

A secondary colour code is the colour assigned to identify a system taking into account its functions and safety requirements, e.g. if compressed air is used for control systems the secondary colour code is white, if used for service air the secondary colour code is yellow, if used for starting engines the secondary colour code is black. The colours appear as bands and arrows on piping systems.

3.3.4 Finished Surfaces

The finished surfaces of all piping systems shall normally be painted white, unless specified otherwise and fire protection systems shall be painted red, prior to the application of the piping system identification.

3.3.5 Method of Application

Identification of piping systems shall be carried out either by the application of paint or by manufacturers colour code tapes and title markers or combination thereof.

Paints for colour code and title markers shall be in accordance with the most current standards of the Canadian Guard Standards Board (CGSB).

Manufactured colour code tapes and title markers shall be a pressure sensitive material with protective overcoating and having conformability and dead stretch properties. The tapes and markers shall be suitable for temperature ranges from -40°C (-40°F) to 150°C (300°F); be resistant to abrasion and wear; be waterproof, fungus and weather-resistant; and be in accordance with the detailed requirements of this standard.

3.4 DETAILED REQUIREMENTS

3.4.1 Piping Systems Identification

Piping systems consist of any pipe line or conduit used for the transport of fluids. Valves, fittings, operating accessories, pipe coverings, and pipe installations shall also be considered as part of a piping system. Supports, brackets or other accessories are not considered parts for application of colour codes.

3.4.2 Exact Identification

Exact identification of fluids in any piping system is mandatory and shall be made by means of titled lettering in black and white. These titles shall be prominently displayed adjacent to the colour coding. It is recommended, where the view is unobstructed, that titles be lettered on the two lower quarters of the pipe covering. Lettering in this position is unlikely to be obscured by dirt collection or mechanical damage. Titles shall be clearly visible from operating positions, especially those adjacent to control valves. The use of stencils with standard size letters specified in Table 1 is recommended. For pipe lines smaller than 3" in diameter, securely fastened non-corrosive metal tags, with lettering etched or filled in with enamel, or waterproof and heat resistant plastic tags are to be used. It is recommended that titles be applied by use of upper case letters and Arabic numerals whenever applicable.

Table 1 Size of stencil letters

Outside Diameter (O.D.) of Pipe or Covering	Size of Stencil Letters
76mm (3") to 152mm (6")	25mm (1")

Over 152mm (6")	50mm (2")
-----------------	-----------

A title is any lettered identification required on a piping system and shall identify the contents by complete names or by abbreviations, symbols, letters, numerals, or combination thereof detailed in Annex A of this standard.

Titles shall be white on fire protection systems and black or white on all other systems, whichever is appropriate.

3.4.3 Primary Colour Code

A primary colour code shall appear on all piping systems in any installation that is colour-coded in accordance with this standard. Primary colour codes shall consist of a single colour applied as a band that completely encircles the pipe. Colour bands shall be applied in conformance with Annex A and dimensional information shown on Figure 1.

All pipe and covering on entire fire protection systems, including all encircling or partially encircled or partially encircling straps, hangars, and supports shall be painted the primary colour code red.

If desired, operating accessories may also be painted with the primary colour code. Vents shall be colour coded with the primary colour code for the fluid in use (e.g. sea suction bay vents should be painted green or suitably identified).

3.4.4 Secondary Colour Code

A secondary colour code shall appear on all piping systems in any installation that is colour-coded in accordance with this standard. Secondary colour codes shall consist of a single colour applied as an arrow, and a band that completely encircles the pipe. When the entire piping system is painted with the primary colour code, the coloured bands and arrows shall appear in all locations specified in section 3.4.5. The arrows shall indicate the normal direction(s) of flow of fluids in the systems. A double-headed arrow shall be placed on lines subject to reverse flow. Colour bands and arrows shall be applied in conformance with Annex A and dimensional information shown on Figure 1.

3.4.5 Location on Piping Systems

Titles and colour codes on piping systems shall be located so that they can be easily seen. Piping systems are to be identified at least once in every space or compartment and are to be identified every 15 meters (50 feet) in open areas. Piping is to be identified on both sides of decks and bulkheads where penetrations occur. Where piping is concealed in a pipe case, tunnel or other confined space, it is to be identified at the point of entry and leaving, and at each access opening. Piping is to be identified at starting and ending points of runs, at each piece of equipment, space permitting, and at branch line junctures. Identify piping systems at major manual and automatic valves immediately upstream of the valves and where this is not possible, place the identification as close to the valve as possible.

3.5 NOTICES

Piping Systems Identification Chart

Annex A shall be posted for ready reference at the following locations:

- Motor Control Room or Station;
- Machinery Spaces;
- Wheelhouse;
- Fire Control Station (other than Wheelhouse); and
- Engineer's Office.

EXACT IDENTIFICATION

By name of the fluid and colour code

PRIMARY COLOUR CODE

Outside diameter of pipe or covering
 Less than 75mm (3")
 Over 75mm (3")

Width (W) of Band
 300mm (12")
 600mm (24")

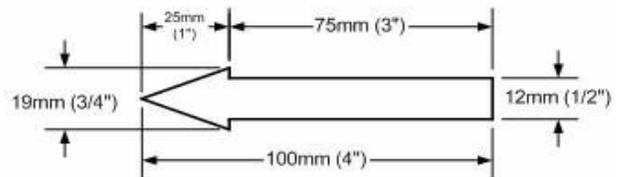
SECONDARY COLOUR CODE

Outside diameter of pipe or covering
 Less than 75mm (3")
 Over 75mm (3")

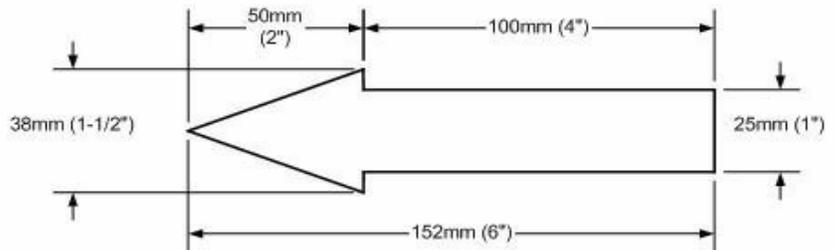
Width (W) of Band
 25mm (1")
 50mm (2")

ARROWS

Outside diameter of pipe or covering less than 3"



Outside diameter of pipe or covering over 3"



EXAMPLE

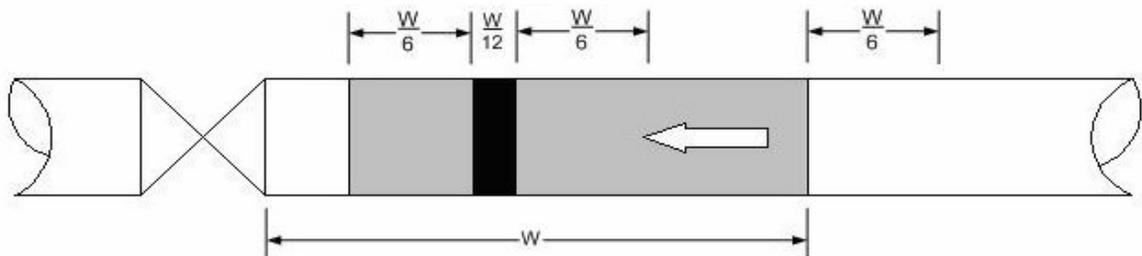


Figure 1 Identification of Piping Systems

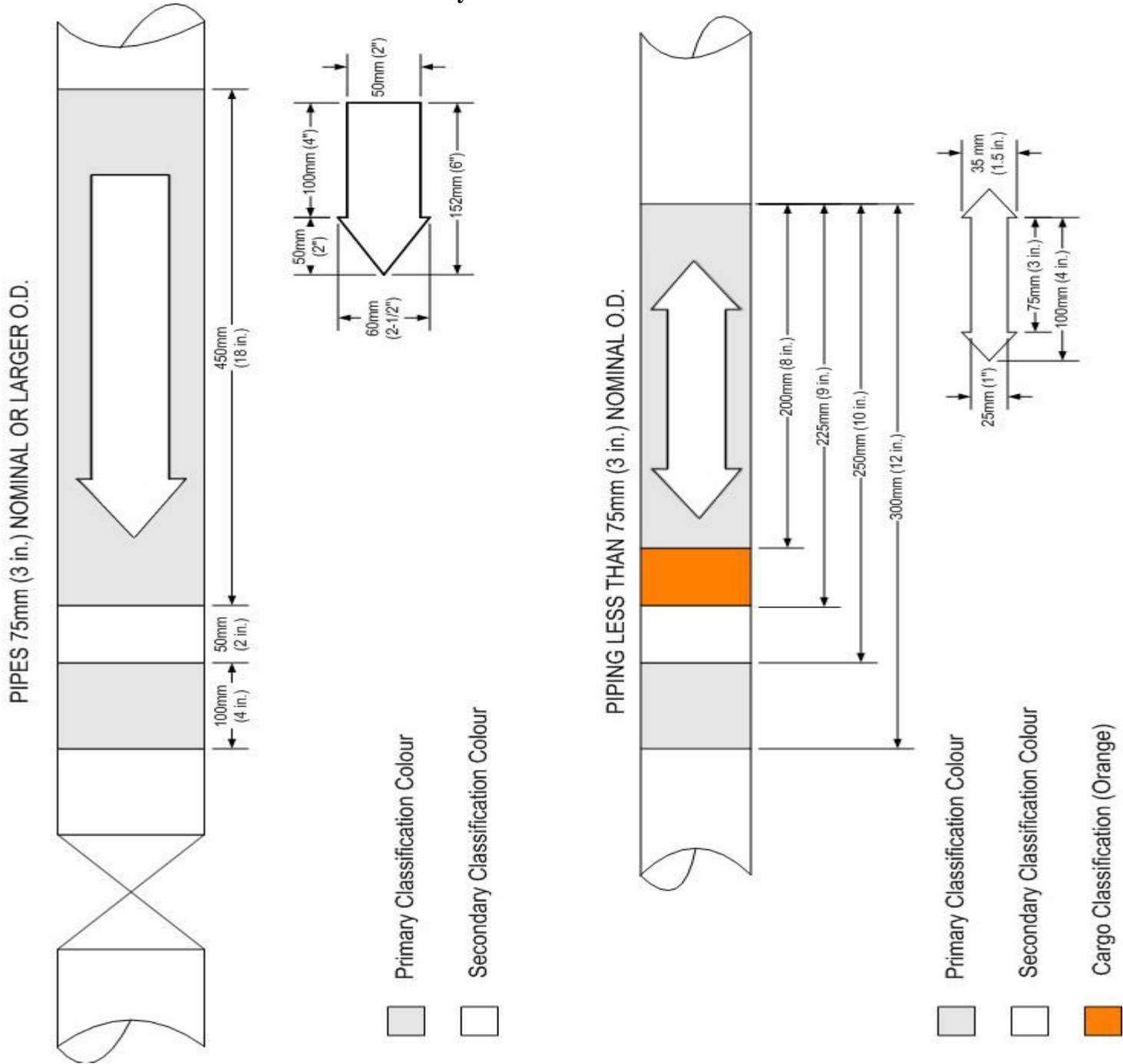


Figure 2 Piping Systems Identification Chart

Annex A PRIMARY AND SECONDARY COLOUR CHART

FLUID	Primary Colour Code	SYSTEM	TITLE ABBREVIATION	Secondary Colour Code	
CO ₂ Foam Halon 1301 FM 200 Nitrogen Steam Sea (Raw) Water Sea (Raw) Water Sea (Raw) Water	 RED	Fire Fire Fire Fire Fire Steam Smothering Fire Fire Main Fire Monitor Fire Sprinkler	CO ₂ FOAM HALON 1301 FM 200 NITROGEN STM SMOTH FIRE FIRE MN FIRE MONIT FIRE SPRINK	        	Yellow White Blue Orange Black Purple Green Green Green
Combustion Exhaust	 WHITE	Main Engine Ship Service Engine Emergency Service Engine Emergency Fire Pump Engine Emergency Compressor Engine Boiler Exhaust	# ___ M E EXH # ___ S S EXH E S EXH E F P EXH E C EXH BLR EXH	      	Red Red Red Red Red Red Red
Oils	 YELLOW	Lube Oil Transfer Lube Oil Service Dirty Oil Hydraulic Oil Transfer Hydraulic Oil Service Synthetic Oil	L O TRANS L O SERV D OIL HYD OIL TRANS HYD OIL SERV SYN OIL	     	White Green Black Blue Purple Red
Air	 ORANGE	Starting Air Service Air Control Air	START AIR SERV AIR CONT AIR	  	Black Yellow White
Bilge (BLACK)	 (BLACK)	Suction Discharge	BILGE SUCT BILGE DISCH	 	White Yellow
Sewage (BLACK)	 (BLACK)	Sewage Drains	SEW DRNS		Red
Grey Water (GREY)	 (GREY)	Grey Water Drains	G W DRNS		Black
Refrigerant	 WHITE	Domestic Cargo Air Conditioning	# ___ DOM R ___ # ___ CAR R ___ # ___ A C R ___	  	Orange Orange Orange
Sea (Raw) Water	 GREEN	Sea Water Cooling Sea Water Service Ballast	SWC SW SERV SWB	  	White Yellow Black
	 RED	Fire Main Fire Monitor Fire Sprinkler	FIRE MN FIRE MONIT FIRE SPRINK	  	Green Green Green
Fresh Water	 BLUE	Jacket Water Cooling	JWC		Red
		Hot Potable Water	H POT WAT		White
		Cold Potable Water	C POT WAT		White
		Hot Non-Potable Water	H NON-POT WAT		Green
		Cold Non-Potable Water	C NON-POT WAT		Green
		Condensate Return	COND RETN		Black
		Boiler Feed Water	BLR FD W		Yellow

Annex A

Steam	 PURPLE	Superheated Steam Saturated Steam Exhaust Steam Drains Steam	SUPER STM SAT STM EXH STM DRNS STM	   	Red Yellow White Black
	 RED	Steam Smothering Fire	STM SMOTH FIRE		Purple
Fuel Oil	 BROWN	Heavy Diesel Aviation	HFO DFO AFO	  	White Yellow Red