Safety information for the content of piping systems and tanks —

Part 1:
Piping systems

Informations de sécurité relatives au contenu des systèmes de tuyauteries et des reservoirs —

Partie 1: Systèmes de tuyauteries

FDIS stage

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by Technical Committee ISO/TC 145, *Graphical symbols*, Subcommittee SC 2, *Safety identification, signs, shapes, symbols and colours*.

This second edition cancels and replaces the first edition (ISO 20560-1:2020), which has been technically revised.

The main changes are as follows:

— ~~change of~~the colour values for yellow in ~~Table 2~~Table 2 have been modified;

— ~~change of~~the colour values for maroon and yellow in ~~Table 5~~Table 5 have been modified;

— ~~change of~~the colour values in ~~Table A.1~~Table A.1 have been modified.

A list of all parts in the ISO 20560 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at ~~www.iso.org/members.html~~www.iso.org/members.html.

Introduction

Continuous growth in mobility of labour has resulted in a need to standardize safety information and form a coherent system for non-verbal exchange of information that consists of distinct elements to identify hazards related to the content of piping systems and tanks. Every element of the safety information system defined in this document communicates specific information. When combined on a pipe marking, these elements inform the viewer, in a unique and simplified way, of potential hazards so that accidents can be prevented and an appropriate response to emergency situations can be efficiently accomplished.

The use of this document is expected to reduce risk by providing a means of improved training and education to reduce possible confusion for people working with and near piping systems in both normal and emergency situations.

The use of a standardized safety information system does not replace proper work methods, instructions or accident prevention training and measures. Education is an essential part of any system that provides safety information.

~~Many different countries'~~The national pipe marking standards of many different countries were reviewed during the development of this document. Important design concepts contained in these standards were incorporated into this document.

NOTE ~~Some countries'~~The statutory regulations ~~could~~of some countries can differ in some respect from the requirements given in this document.

Safety information for the content of piping systems and tanks — Part 1: Piping systems —

Part 1:
Piping systems

IMPORTANT— — The colours represented in the electronic file of this document can be neither viewed on screen nor printed as true representations. For the purposes of colour matching, see ~~Table 2~~Table 2 and ~~Table 5~~,Table 5, which provide colorimetric and photometric properties, and ~~Annex A,~~Annex A, which provides references from colour order systems.

1   Scope

This document specifies safety information for overground piping systems related to the content of the piping system and associated hazards for the purposes of accident prevention, reducing risks to health and providing information for use in case of an emergency.

This document does not cover piping that is buried.

Safety signing of the hazards in an area is not part of this document.

This document does not cover ~~the~~ risk assessment.

This document can also be used for marine structures and ships.

2   Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

ISO 7010, *Graphical symbols — Safety colours and safety signs — Registered safety signs*

3   Terms and definitions

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ——ISO Online browsing platform: available at ~~https://www.iso.org/obp~~https://www.iso.org/obp

— ——IEC Electropedia: available at ~~https://www.electropedia.org/~~https://www.electropedia.org/

3.1
additional safety information
information typically presented in the form of text, numbers or both to indicate details related to the *safety information system* ~~(3.8)~~(3.8)

~~EXAMPLES~~EXAMPLE   Pressure or temperature.

3.2
additional technical information
technical information that is additional to the *safety information system* ~~(3.8)~~(3.8) to indicate technical details

~~EXAMPLES~~EXAMPLE   Pipe identification codes or from–to information.

3.3
basic identification colour
colour used to indicate a group of similar media

3.4
content of the pipe
medium which is transported in the pipe

~~EXAMPLES~~EXAMPLE   Gasses, liquids or solids as powder or granulate.

3.5
flow direction indicator
arrow to indicate the flow direction of the *content of the pipe* ~~(3.4)~~(3.4)

3.6
GHS hazard pictogram
graphical composition defined by the Globally harmonized system of classification and labelling of chemicals (GHS) that can include a symbol plus other graphic elements, such as a border, background pattern or colour, intended to convey specific information as given by the GHS

3.7
safety data sheet
SDS
standardized information template for a medium which identifies the medium and contains information about its potential health, physical and chemical hazards, and emergency and firefighting procedures

3.8
safety information system
series of markings that consistently uses standardized elements to visually communicate information necessary for the reliable recognition, identification and understanding of hazards

3.9
supplementary identification colour
colour used in combination with the *basic identification colour* ~~(3.3)~~(3.3) to indicate a specific purpose

3.10
warning sign
safety sign that indicates a specific source of potential harm

[SOURCE: ISO 3864-1:2011, 3.16]

4   General requirements

A safety information system for piping visually communicates information necessary for the reliable recognition, identification and understanding of any hazard related to the type and character of the content of

a pipe. This safety information system shall be installed on site and near any place that potentially requires operation, maintenance or manipulation of a pipe's contents.

This safety information system provides critical information that serves to assist in:

— ——the correct operation and use of the piping system;

— ——the safe maintenance of the piping system;

— ——conveying critical information to trained personnel in emergency situations.

The safety information system shall, in a comprehensive and uniform manner, accurately identify the contents and hazards associated with the content of all piping and material transport systems in conformity with the contents' safety data sheets (SDSs). In some cases, the safety information system shall provide, in an integrated, coherent visual manner, specific hazard information related to the pipe contents. Examples of this information include the exact nature of the substance, temperature, toxicity and the risk of asphyxiation if a release of the pipe contents occurs.

The safety information system shall consistently use multiple visual elements to accurately convey its information, including colours and colour combinations as a coding system, text, safety signs, GHS hazard pictograms and arrows. The information conveyed by the safety information system shall be consistent with the organization's risk assessment and its operation and safety plans.

All elements of a safety information system shall be distinguishable and contrasting from any neighbouring information and shall be visible from the observation distance intended for safe operation, intervention or manipulation. When the contents of pipes include hazardous substances (see Reference ~~[16]),~~[16]), the safety information system shall include distinctive, unambiguous elements and the corresponding warning signs, or GHS hazard pictograms or both.

To avoid confusion, the same safety information system elements shall be consistently used and installed throughout an organization's piping system, whether it is a single unit, multiple units on the same site or a multi-plant operation.

5 Elements of safety information systems for piping

5.1 General

The level of detail required to be displayed in a safety information system for piping will depend on many factors, such as the type of plant, the complexity of the operation, the availability of check lists and manuals and the competence and skills of operators. Organizations shall design safety information systems for piping in accordance with their operational and risk communication needs as identified by their risk assessment process.

A safety information system for piping shall consist of four key elements:

1) ~~1)~~ colour coding to identify the nature of the content in the piping;

2) ~~2)~~ content name;

3) ~~3)~~ flow direction indicators;

4) ~~4)~~ when applicable, warning signs, GHS pictograms or both.

5.2 Colour coding to identify the nature of the content in the piping

Safety information systems for piping shall incorporate colour coding that uses the basic identification colours and the safety colour yellow for hazardous substances.

Where there is no need to further differentiate hazardous substances, the safety colour yellow ~~maybe~~may be used alone, without the addition of a basic identification colour. ~~See Table 1.~~See Table 1.

Table 1 — Safety colour and basic identification colours

	Content of a pipe	Colour	
Safety colour	Hazardous substances	Yellow	
Basic identification colour	Gases in either gaseous or liquefied condition	Grey	
	Liquids and fixed materials (powder, granulates)	Black	
	Acids	Orange	
	Alkalis (leaches)	Violet	
	Firefighting medium	Red	

	Content of a pipe	Colour	
	Water	Green	
	Air	Blue	

The chromaticity coordinates of a basic identification colour shall fall within the relevant colour region specified in ~~Table 2.~~Table 2. The luminance factor for each colour shall be as specified in ~~Table 2.~~Table 2. To measure the chromaticity coordinates and luminance factor of pipe markings, the test method for ordinary materials specified in ISO 3864-4:2011, 5.2.1 can be used. The testing shall be carried out on finished markings or samples that are representative, with regard to the colour and surface texture, of the material used in the finished marking.

**Table 2 — Colour regions for safety colour and basic identification colours:
chromaticity coordinates and luminance factor for colours externally illuminated by CIE standard
illuminant D65**

Colour		Corner points of colour region CIE standard illuminant D65 CIE 2° standard colorimetric observer				Luminance factor β	
		1	2	3	4	Minimum	Maximum
Yellow	x	0,467	0,514 5	0,461	0,427	0,45	0,60
	y	0,516	0,472 5	0,434	0,472		
Grey	x	0,350	0,300	0,290	0,340	0,15	0,50
	y	0,360	0,310	0,320	0,370		
Black	x	0,385	0,300	0,260	0,345		0,03
	y	0,355	0,270	0,310	0,395		
Orange	x	0,590	0,538	0,508	0,550	0,25	0,4
	y	0,394	0,382	0,412	0,430		
Violet	x	0,320	0,319	0,329	0,340	0,1	0,2
	y	0,218	0,272	0,295	0,230		
Red	x	0,705	0,592	0,574	0,663	0,07	0,2
	y	0,295	0,291	0,351	0,337		
Green	x	0,250	0,330	0,330	0,287	0,25	0,35
	y	0,580	0,580	0,458	0,439		
Blue	x	0,160	0,196	0,218	0,205	0,15	0,25

Colour	Corner points of colour region CIE standard illuminant D65 CIE 2° standard colorimetric observer					Luminance factor β	
		1	2	3	4	Minimum	Maximum
	y	0,225	0,250	0,192	0,169		
NOTE 1 Measurement geometry 45°/0° or 0°/45°.							
NOTE 2 All colours except yellow and red are amended from ISO 14726. Yellow and red are safety sign colours from ISO 3864-4.							

NOTE   Examples of identification colours are given in ~~Annex A.~~Annex A.

5.3   Content name

The pipe's content name shall be displayed in text elements which can be either the content name or its chemical formula, or by numbers in accordance with national standards.

Longer words ~~maybe~~may be abbreviated using standard approved abbreviations known by operators, as found in the organization's operation safety manuals.

The content name shall be centred and placed within the basic identification colour or in the yellow safety colour using the contrast colours as defined in ~~Table 3.~~Table 3. Alternatively, the content name shall be the contrast colour black on a white background.

Table 3 — Contrast colours for content name to be displayed on the safety colour and basic identification colours

	Content of a pipe	Basic identification colour	Contrast colour	
Safety colour	Hazardous substances	Yellow	Black	Yellow Yellow
Basic identification colour	Gases in either gaseous or liquefied condition	Grey	Black	Grey Grey
	Liquids and fixed materials (powder, granulates)	Black	White	Black Black
	Acids	Orange	Black	Orange Orange
	Alkalis (leaches)	Violet	White	Violet Violet