ASME A13.1-2015

[Revision of ASME A13.1-2007 (R2013)]

Scheme for the Identification of Piping Systems

AN AMERICAN NATIONAL STANDARD

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The American Society of Mechanical Engineers
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FOREWORD

This is a revision of the Scheme for the Identification of Piping Systems, originally affirmed in 1928; reaffirmed in 1945; revised in 1956, 1975, and 1981; reaffirmed in 1985 and 1993; revised in 1996; reaffirmed in 2002; revised in 2007; and reaffirmed in 2013.

Shortly after the turn of the twentieth century, with the resultant industrial expansion, it became apparent that some scheme should be devised to identify piping. In 1908, an article on "Identification of Power House Piping by Colors" was read at a meeting of The American Society of Mechanical Engineers. In 1909, an article called "Standard Colors for Power Station Piping" was read at the meeting of the Association of Edison Illuminating Companies.

In 1920, the National Safety News pointed out the need for a color scheme for pipelines, and the following year several papers were published and reports made to various committees, notably the Prime Movers Committee of the National Electric Light Association, The American Society of Mechanical Engineers, and the U.S. Navy Department.

In the meantime, many large companies compiled their own scheme with no thought to standardization of pipe colors, even in their own plants. When personnel were shifted, accidents could and did happen.

The organization of the Sectional Committee on the Identification of Piping Systems, under the procedure of the American Standards Association (now called the American National Standards Institute), took place on June 14, 1922, resulting in the 1928 publication.

On August 23, 1950, the committee was reorganized to investigate the possibility of a revision to the Standard. It was felt that a revision was necessary because of the tremendous number of different materials being carried in pipes. After many meetings and much discussion, a revision of American Standard, Scheme for Identification of Piping Systems, was approved by the sectional committee and sponsors. It was then presented to the American Standards Association (now called the American National Standards Institute) for approval and designation as an American Standard. This was granted on January 27, 1956.

In the late 1960s, the committee began discussions on the possibility of revising the 1956 Standard. These discussions continued for a number of years, eventually resulting in approval by the American National Standards Institute (ANSI), and designation as an American National Standard was obtained on June 13, 1975.

In accordance with the policy of ANSI, the committee began a review of the 1975 Standard for a possible revision in the late 1970s, which resulted in approval by ANSI and designation as an American National Standard on November 16, 1981.

The 1996 edition of A13.1 was approved by ANSI and designated an American National Standard on August 13, 1996.

The 2007 edition of A13.1, which was approved by the A13 Committee and ASME, was approved by ANSI on February 12, 2007.

This edition incorporates the GHS pictograms and adds a definition for oxidizing. ASME A13.1-2015 was approved by ANSI on October 30, 2015.

ASME A13.1 COMMITTEE
Scheme for the Identification of Piping Systems

(The following is the roster of the Committee at the time of approval of this Standard.)

STANDARDS COMMITTEE OFFICERS

J. A. Ciba, Jr., *Chair*
R. Mohamed, *Secretary*

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INTRODUCTION

PURPOSES OF STANDARDIZATION

Schemes for identification of the contents of piping systems have been developed in the past by a large number of industrial plants and organizations of various kinds. Generally speaking, the standards arrived at in individual cases may have given satisfaction to those using them but they also may have suffered from a lack of uniformity. Numerous injuries to personnel and damage to property have occurred because of mistakes made in turning valves on, or disconnecting pipes at the wrong time or place, particularly when outside agencies, such as municipal fire departments, were called in to assist. Furthermore, there has been considerable confusion in the minds of those who change employment from one plant to another.

In order to promote greater safety and lessen the chances of error, confusion, or inaction, especially in times of emergency, a uniform system for the identification of piping contents has been established to warn personnel when the piping contents are inherently hazardous. Therefore, while this Standard has been prepared to specify the identification of the contents of piping systems on the basis of legends, it also suggests the use of color as a supplementary means of identifying the type of hazard of the material contained in the system.

METRIC CONVERSIONS

This Standard contains SI (Metric) units and U.S. Customary units. Either system may be used to meet the standard.

ASME A13.1-2015
SUMMARY OF CHANGES

Following approval by the ASME A13 Standards Committee, and after public review, ASME A13.1-2015 was approved by the American National Standards Institute on October 30, 2015.

ASME A13.1-2015 contains editorial changes, revisions, and corrections identified by a margin note, **(15)**, placed next to the affected area.

Page	*Location*	*Change*
1	2.2	New para. 2.2.3 added and subsequent paragraphs renumbered
2	3.1	Final two paragraphs added
	3.3	Cross reference to figure updated
	3.4	Revised
	3.5	Revised
3	Figure 1	Added
4	Table 2	Under “Fluid Service,” third entry updated

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SCHEME FOR THE IDENTIFICATION OF PIPING SYSTEMS

1 OBJECT AND SCOPE

This Standard is intended to establish a common system to assist in identification of hazardous materials conveyed in piping systems and their hazards when released in the environment.

This scheme concerns identification of contents of piping systems. It is recommended for the identification of piping systems used in industrial, commercial, and institutional installations, and in buildings used for public assembly. It does not apply to buried pipelines nor to electrical conduits.

Existing schemes for identification shall be considered as meeting the requirements of this Standard if

(a) such schemes are described in writing

(b) employees are trained as to the operation and hazards of the piping systems

2 DEFINITIONS AND REFERENCE

2.1 Piping Systems

For the purpose of this Standard, piping systems shall include piping of any kind including fittings, valves, and pipe coverings. Supports, brackets, or other accessories are specifically excluded from applications of this Standard. Piping is defined as conduits used to convey, distribute, mix, separate, discharge, meter, control, or snub fluid flows.

(15) ### 2.2 Materials

2.2.1 Flammable. This classification includes fluids, which, under ambient or expected operating conditions, are a vapor or produce vapors 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*.

2.2.2 Combustible. This classification includes fluids that can burn, but are not flammable.

2.2.3 Oxidizing. Oxidizing fluid is any gas or liquid that may, generally by providing oxygen, cause or contribute to the combustion of other material more than air does.

2.2.4 Toxic and Corrosive. This classification includes fluids that are corrosive or toxic, or will produce corrosive or toxic substances when released.

Table 1 Examples of Content Descriptions Appearing in a Legend

"HOT WATER"	"HYDRAULIC OIL"
"SLURRY"	"FOAM"
"AIR 100 PSIG"	"CARBON TETRACHLORIDE"
"ARGON 500 PSIG"	"CAUSTIC"
"PROPANE"	"SULFURIC ACID"
"H. P. RETURN"	"STEAM 100 PSIG"

2.2.5 Fire Quenching. This classification includes water, foam, and CO_2 used in sprinkler systems and fire fighting piping systems.

2.3 Reference

The latest edition of the following standard shall, to the extent specified herein, form a part of this Standard:

ANSI Z535.1, Safety Color Code

Publisher: American National Standards Institute (ANSI), 25 West 43rd Street, New York, NY 10036 (www.ansi.org)

3 METHOD OF IDENTIFICATION

3.1 Legend (15)

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 Table 1). Arrows shall be used to indicate direction of flow. Where flow can be in both directions, arrows in both directions shall be displayed. Contents shall be identified by a legend with sufficient additional details such as temperature, pressure, etc., as are necessary to identify the hazard.

Legends shall be brief, informative, pointed, and simple for greatest effectiveness. Legends shall be applied close to valves or flanges and adjacent to changes in direction, branches, and where pipes pass through walls or floors; and at intervals on straight pipe runs sufficient for identification. Identification may be accomplished by stenciling, the use of tape, or markers. In any situation, the number and location of identification markers shall be based on the particular piping system.

The applicable GHS[1] pictogram as illustrated in Fig. 1 may be included as part of the legend.

Where piping is connected to containers that are labeled in accordance with GHS requirements, a corresponding label on the piping may be provided. The corresponding label should contain at least the product name or identifier, the pictogram, the signal word, and the physical, health, and environmental hazard statement(s).

3.2 Color

Color should be used to identify the characteristic hazards of the contents. Color should be displayed on, or contiguous to, the piping by any physical means, but its use shall be in combination with legend. Color may be used in continuous, total length coverage or in intermittent displays. Colors preceded by the word "Safety" shall meet the requirements of ANSI Z535.1 (see Table 2).

(15) ### 3.3 Visibility

Attention shall be given to visibility with reference to pipe markings. Where pipelines are located above or below the normal line of vision, the lettering shall be placed below or above the horizontal centerline of the pipe (see Fig. 2).

3.4 Type and Size of Letters (15)

Contrast shall be provided between color field and legend for readability. Use of letters of standard style,[2] in sizes ½ in. (13 mm) and larger, is recommended. See Table 3 for specific size recommendations. For identification of materials in piping with an outside cover diameter less than ¾ in. (19 mm), and for valve and fitting identification, the use of a permanently legible tag is recommended.

3.5 Unusual or Extreme Situations (15)

Piping layouts that are in a limited area of inaccessibility or of extreme complexity may require substitute techniques to achieve positive identification. Use of substitute techniques shall be limited to such segments and shall not deviate from the concept of identification described in paras. 3.1, 3.2, and 3.3.

[1] Globally Harmonized System of Classification and Labelling of Chemicals (GHS), latest edition, published by the United Nations.

[2] Sans serif gothic bold lettering provides high readability.

Fig. 1 GHS Pictograms (15)

 • Oxidizers	 • Flammable • Self-reactives • Pyrophorics • Self-heating • Emits flammable gas • Organic peroxides	 • Explosives • Self-reactives • Organic peroxides
 • Acute toxicity (severe)	 • Corrosives	 • Gases under pressure
 • Carcinogen • Respiratory sensitizer • Reproductive toxicity • Target organ toxicity • Mutagenicity • Aspiration toxicity	 • Environmental toxicity	 • Irritant • Dermal sensitizer • Acute toxicity (harmful) • Narcotic effects • Respiratory tract irritation

(15)

Table 2 Designation of Colors

Fluid Service	Background Color	Letter Color	Color and Letter Sample
Fire quenching fluids	Safety red	White	Letters
Toxic and corrosive fluids	Safety orange	Black	Letters
Flammable and oxidizing fluids	Safety yellow	Black	Letters
Combustible fluids	Safety brown	White	Letters
Potable, cooling, boiler feed, and other water	Safety green	White	Letters
Compressed air	Safety blue	White	Letters
To be defined by the user	Safety purple	White	Letters
To be defined by the user	Safety white	Black	Letters
To be defined by the user	Safety gray	White	Letters
To be defined by the user	Safety black	White	Letters

Fig. 2 Location of Identification Markers

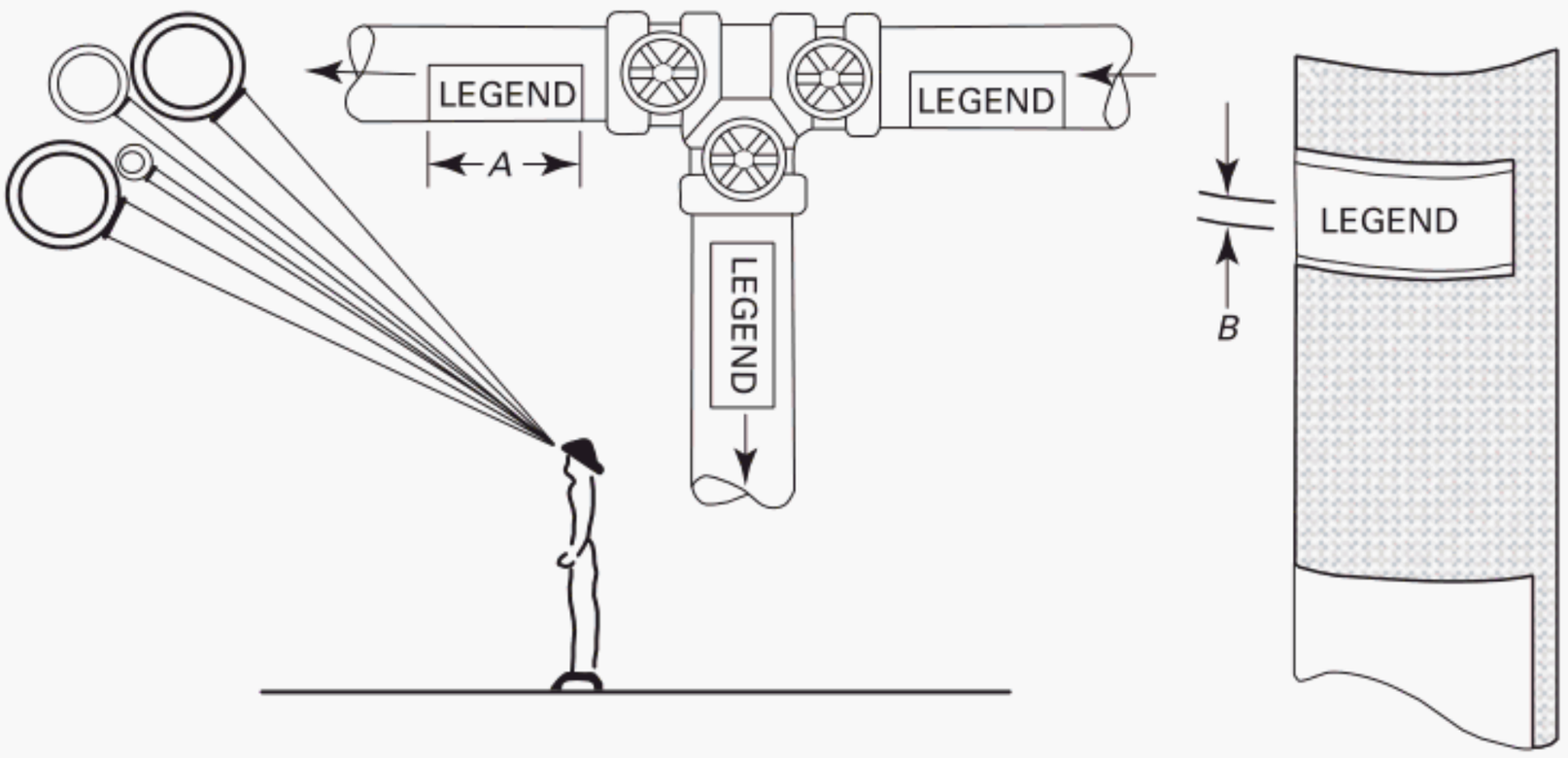

Table 3 Size of Legend Letters

Outside Diameter of Pipe Covering, in. (mm)	Length of Color Field, *A*, in. (mm)	Size of Letters, *B*, in. (mm)
3/4 to 1 1/4 (19 to 32)	8 (200)	1/2 (13)
1 1/2 to 2 (38 to 51)	8 (200)	3/4 (19)
2 1/2 to 6 (64 to 150)	12 (300)	1 1/4 (32)
8 to 10 (200 to 250)	24 (600)	2 1/2 (64)
Over 10 (over 250)	32 (800)	3 1/2 (89)

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