ASME A13.1-2023

(Revision of ASME A13.1-2020)

Scheme for the Identification of Piping Systems

AN AMERICAN NATIONAL STANDARD

The American Society of Mechanical Engineers

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FOREWORD

This Foreword provides a brief history of how ASME A13.1, Scheme for the Identification of Piping Systems, came to be and how it has evolved over time.

Shortly after the turn of the twentieth century, in a time of rapid 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 piping, 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 as a result.

The American Standards Association [now called the American National Standards Institute (ANSI)] organized the Sectional Committee on the Identification of Piping Systems on June 14, 1922. This committee's efforts resulted in the initial publication of this Standard in 1928.

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 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 ANSI. The revision was designated as an American National Standard 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. This resulted in a revised edition, which was approved by ANSI and designated as an American National Standard on November 16, 1981.

Subsequent editions were approved by ANSI in 1996 and 2007.

The 2015 edition of ASME A13.1 incorporated the GHS pictograms and added a definition for *oxidizing*. ASME A13.1-2015 was approved by ANSI on October 30, 2015.

The 2020 edition of ASME A13.1 made a number of changes, including redesignating some paragraphs, revising most definitions, adding a reference to the GHS, *Globally Harmonized System of Classification and Labelling of Chemicals*, and adding a new paragraph to address abandoned piping. ASME A13.1-2020 was approved by ANSI on September 1, 2020.

The 2023 edition of ASME A13.1 makes significant changes, including revising the Scope, updating each of the definitions, expanding the Legend section, and revising both the Color section and Table 4.2-1, Designation of Colors. Also, ASME A13.1 was changed from a periodic-maintenance to a continuous-maintenance Standard. ASME A13.1-2023 was approved by ANSI on August 18, 2023.

ASME A13 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

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R. Mohamed, *Secretary*

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In addition, the committee may post errata on the committee web page. Errata become effective on the date posted. Users can register on the committee web page to receive e-mail notifications of posted errata.

This Standard is always open for comment, and the committee welcomes proposals for revisions. Such proposals should be as specific as possible, citing the paragraph number(s), the proposed wording, and a detailed description of the reasons for the proposal, including any pertinent background information and supporting documentation.

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ASME does not act as a consultant for specific engineering problems or for the general application or understanding of the Standard requirements. If, based on the information submitted, it is the opinion of the committee that the inquirer should seek assistance, the request will be returned with the recommendation that such assistance be obtained. Inquirers can track the status of their requests at https://go.asme.org/Interpretations.

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INTRODUCTION (23)

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 have given satisfaction to those using them but they also have suffered from a lack of uniformity. Mistakes made in turning valves on or disconnecting pipes at the wrong time or place have resulted in numerous injuries to personnel and damage to property. In particular, these sorts of mistakes have been made when outside agencies, such as municipal fire departments, were called in to assist. Furthermore, there has been considerable confusion for people 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 U.S. Customary and SI (metric) units. Either system may be used to meet the requirements of this Standard.

ASME A13.1-2023
SUMMARY OF CHANGES

Following approval by the ASME A13 Committee and ASME, and after public review, ASME A13.1-2023 was approved by the American National Standards Institute on August 18, 2023.

ASME A13.1-2023 includes the following changes identified by a margin note, **(23)**.

Page	*Location*	*Change*
vii	Introduction	Last sentence revised
1	1	Revised
1	2	Revised
1	3	Revised
1	4.1	Revised
2	Figure 4.1-1	Added
2	Figure 4.1-2	Added
2	Figure 4.1-3	Added
3	Figure 4.1-4	Former Figure 4.1-1 redesignated
2	4.2	Revised
4	Table 4.2-1	Revised
2	4.3	Revised
2	4.4	Revised

SCHEME FOR THE IDENTIFICATION OF PIPING SYSTEMS

(23) 1 SCOPE

This Standard establishes a common system to assist in identification of fluids conveyed in piping and their characteristics.

The Standard describes requirements for the identification of aboveground piping used in industrial, commercial, transmission, distribution, and institutional installations, and in buildings used for public assembly. It does not apply to electrical conduits.

An alternative system for identification is acceptable if

(a) the system is described in writing

(b) employees are trained to recognize the contents of the piping based on the system

(c) the system meets local jurisdictional requirements

(23) 2 DEFINITIONS

fluids: liquids, gases, slurries, pneumatically conveyed solids, and their mixtures.

combustible: a fluid that can burn, but that is not flammable.

corrosive: a fluid that causes visible destruction of, or irreversible alterations in, living tissue or materials by chemical action at the site of contact.

firefighting: water, foam, and CO_2, among other fluids, that are used to control, suppress, or extinguish fires.

flammable: a fluid that, under ambient or expected operating conditions, is a vapor or produces vapors that can be ignited and continue to burn in air. The term thus may apply, depending on service conditions, to a fluid defined for other purposes as flammable or combustible.

oxidizing: a fluid that may, generally by providing oxygen, cause or contribute to the combustion of other material more than air does.

toxic: a fluid that may constitute a hazard to life or health, either temporary or permanent, from exposure by contact, inhalation, or ingestion.

piping: conduits used to convey, distribute, mix, separate, discharge, meter, control, or snub fluid flows that are constructed from pipe, tube, fittings, valves, and their coverings. Supports, brackets, and other accessories are specifically excluded from applications of this Standard.

(23) 3 REFERENCES

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

ANSI/NEMA Z535.1. American National Standard for Safety Colors. National Electrical Manufacturers Association.

GHS. Globally Harmonized System of Classification and Labelling of Chemicals. United Nations.

4 METHOD OF IDENTIFICATION

4.1 Legend (23)

This Standard requires preparation of a legend that describes the contents of the piping system. Legends shall be brief, informative, pointed, and simple for greatest effectiveness. The following are examples of content descriptions appearing in a legend:

(a) "HOT WATER"
(b) "Phosphate Slurry"
(c) "Air 700 kPa"
(d) "ARGON 500 PSIG"
(e) "PROPANE"
(f) "Chilled Water"
(g) "HYDRAULIC OIL"
(h) "AFFF Foam"
(i) "CARBON TETRACHLORIDE"
(j) "Liquid CO_2"
(k) "SULFURIC ACID"
(l) "STEAM 100 PSIG"
(m) "Crude Oil"
(n) "Natural Gas"

In addition to the legend, arrows shall be used to indicate direction of flow. The direction shall be indicated by a single-headed arrow (see the example in Figure 4.1-1). Where flow can be in both directions, either a double-headed arrow (see Figure 4.1-2), or two arrows pointed in opposite directions (see Figure 4.1-3), shall be displayed. Contents shall be identified by a legend with sufficient additional details, such as temperature and pressure, as are necessary to identify the hazard.

Legends may be stenciled or taped on, or marked in ink. In any situation, the number and location of identification markers shall be based on the particular piping system.

The applicable GHS pictogram as illustrated in Figure 4.1-4 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

(23) **Figure 4.1-1**
Flow Direction to the Right

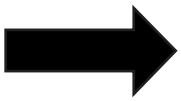

Figure 4.1-2
(23) **Flow in Both Directions (Double-Headed Arrow)**

Figure 4.1-3
(23) **Flow in Both Directions (Arrows Pointed in Opposite Directions)**

identifier, the pictogram, the signal word, and the physical, health, and environmental hazard statements.

(23) 4.2 Color

Color should be used to identify the characteristics of the contents. Color should be displayed on, or contiguous to, the piping by any physical means. Its use shall be in combination with a 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/NEMA Z535.1 (see Table 4.2-1).

4.3 Placement (23)

Attention shall be given to the visibility of the pipe markings. Where piping is located above or below the normal line of vision, the lettering shall be placed below or above the horizontal centerline of the pipe (see Figure 4.3-1).

Legends shall be applied close to valves or flanges; adjacent to changes in direction, branches, and where pipes pass through walls or floors; and at intervals on straight pipe runs sufficient for identification. For piping layouts where applying legends in this way is impractical, substitute techniques to achieve positive identification are acceptable. One such technique is placing the legends on plates that are attached to the piping.

4.4 Type and Size of Letters (23)

Contrast shall be provided between the color field and legend for readability. Use of letters of standard style,[1] in sizes 0.5 in. (13 mm) and larger, is recommended. See Table 4.4-1 for specific size recommendations. For identification of materials in piping with an outside cover diameter less than 0.75 in. (19 mm), the use of a permanently legible tag is recommended. The tag should follow the identification scheme described in this Standard except for the size of letters, which should be such that they can be easily read from a position along the typical line of vision.

4.5 Abandoned Piping

Piping that has been abandoned in place should be identified. The recommended color 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.

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