ASME A13.1-2020

(Revision of ASME A13.1-2015)

Scheme for the Identification of Piping Systems

AN AMERICAN NATIONAL STANDARD

The American Society of Mechanical Engineers

ASME A13.1-2020
(Revision of ASME A13.1-2015)

Scheme for the Identification of Piping Systems

AN AMERICAN NATIONAL STANDARD

The American Society of Mechanical Engineers
Two Park Avenue • New York, NY • 10016 USA

Date of Issuance: October 7, 2020

The next edition of this Standard is scheduled for publication in 2025.

ASME issues written replies to inquiries concerning interpretations of technical aspects of this Standard. Periodically certain actions of the ASME A13 Committee may be published as Cases. Cases and interpretations are published on the ASME website under the Committee Pages at http://cstools.asme.org/ as they are issued.

Errata to codes and standards may be posted on the ASME website under the Committee Pages to provide corrections to incorrectly published items, or to correct typographical or grammatical errors in codes and standards. Such errata shall be used on the date posted.

The Committee Pages can be found at http://cstools.asme.org/. There is an option available to automatically receive an e-mail notification when errata are posted to a particular code or standard. This option can be found on the appropriate Committee Page after selecting “Errata” in the “Publication Information” section.

The American Society of Mechanical Engineers
Two Park Avenue, New York, NY 10016-5990

CONTENTS

FOREWORD

This is a revision of ASME 13.1, 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; reaffirmed in 2013; and revised in 2015. This Foreword provides a brief history of how this Standard 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 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 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.

This edition is a revision of ASME A13.1-2015. ASME A13.1-2020 was approved by ANSI on September 1, 2020.

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

A. Mukherjee, *Chair*
R. Mohamed, *Secretary*

STANDARDS COMMITTEE PERSONNEL

J. A. Ciba, Jr., Signode Industrial Group
P. D. Flenner, Flenner Engineering Services
D. R. Frikken, Becht Engineering Co.
J. A. Gruber, JA Gruber & Associates, LLC
R. M. Jimenez, Brimar Industries
R. Mohamed, The American Society of Mechanical Engineers
A. Mukherjee, Pieridae Energy

CORRESPONDENCE WITH THE A13 COMMITTEE

General. ASME Standards are developed and maintained with the intent to represent the consensus of concerned interests. As such, users of this Standard may interact with the Committee by requesting interpretations, proposing revisions or a case, and attending Committee meetings. Correspondence should be addressed to:

Secretary, A13 Standards Committee
The American Society of Mechanical Engineers
Two Park Avenue
New York, NY 10016-5990
http://go.asme.org/Inquiry

Proposing Revisions. Revisions are made periodically to the Standard to incorporate changes that appear necessary or desirable, as demonstrated by the experience gained from the application of the Standard. Approved revisions will be published periodically.

The Committee welcomes proposals for revisions to this Standard. 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 documentation.

Proposing a Case. Cases may be issued to provide alternative rules when justified, to permit early implementation of an approved revision when the need is urgent, or to provide rules not covered by existing provisions. Cases are effective immediately upon ASME approval and shall be posted on the ASME Committee web page.

Requests for Cases shall provide a Statement of Need and Background Information. The request should identify the Standard and the paragraph, figure, or table number(s), and be written as a Question and Reply in the same format as existing Cases. Requests for Cases should also indicate the applicable edition(s) of the Standard to which the proposed Case applies.

Interpretations. Upon request, the A13 Standards Committee will render an interpretation of any requirement of the Standard. Interpretations can only be rendered in response to a written request sent to the Secretary of the A13 Standards Committee.

Requests for interpretation should preferably be submitted through the online Interpretation Submittal Form. The form is accessible at http://go.asme.org/InterpretationRequest. Upon submittal of the form, the Inquirer will receive an automatic e-mail confirming receipt.

If the Inquirer is unable to use the online form, he/she may mail the request to the Secretary of the A13 Standards Committee at the above address. The request for an interpretation should be clear and unambiguous. It is further recommended that the Inquirer submit his/her request in the following format:

Subject:	Cite the applicable paragraph number(s) and the topic of the inquiry in one or two words.
Edition:	Cite the applicable edition of the Standard for which the interpretation is being requested.
Question:	Phrase the question as a request for an interpretation of a specific requirement suitable for general understanding and use, not as a request for an approval of a proprietary design or situation. Please provide a condensed and precise question, composed in such a way that a "yes" or "no" reply is acceptable.
Proposed Reply(ies):	Provide a proposed reply(ies) in the form of "Yes" or "No," with explanation as needed. If entering replies to more than one question, please number the questions and replies.
Background Information:	Provide the Committee with any background information that will assist the Committee in understanding the inquiry. The Inquirer may also include any plans or drawings that are necessary to explain the question; however, they should not contain proprietary names or information.

Requests that are not in the format described above may be rewritten in the appropriate format by the Committee prior to being answered, which may inadvertently change the intent of the original request.

Moreover, 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 inquiry information submitted, it is the opinion of the Committee that the Inquirer should seek assistance, the inquiry will be returned with the recommendation that such assistance be obtained.

ASME procedures provide for reconsideration of any interpretation when or if additional information that might affect an interpretation is available. Further, persons aggrieved by an interpretation may appeal to the cognizant ASME Committee or Subcommittee. ASME does not "approve," "certify," "rate," or "endorse" any item, construction, proprietary device, or activity.

Attending Committee Meetings. The A13 Standards Committee regularly holds meetings and/or telephone conferences that are open to the public. Persons wishing to attend any meeting and/or telephone conference should contact the Secretary of the A13 Standards Committee.

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

ASME A13.1-2020
SUMMARY OF CHANGES

Following approval by the ASME A13 Committee and ASME, and after public review, ASME A13.1-2020 was approved by the American National Standards Institute on September 1, 2020.

In ASME A13.1-2020, the figures and tables have been redesignated based on their parent paragraph, and the cross-references have been updated accordingly. ASME A13.1-2020 includes the following additional changes identified by a margin note, **(20)**.

Page	*Location*	*Change*
1	2	Revised in its entirety and subsequent paragraphs redesignated
1	3	Former para. 2.3 revised
1	4.1	(1) Former para. 3.1 revised (2) Former Table 1 reformatted as subparas. (a) through (l)
2	4.3	Former para. 3.3 revised
4	Table 4.4-1	Former Table 3 revised
2	4.5	Former para. 3.5 revised in its entirety

INTENTIONALLY LEFT BLANK

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 the materials' 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

(20) 2 DEFINITIONS

combustible: the material classification for fluids that can burn, but that are not flammable.

fire quenching: the material classification including water, foam, and carbon dioxide used in sprinkler systems and fire-fighting piping systems.

flammable: the material classification for fluids that, 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.

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

piping: conduits used to convey, distribute, mix, separate, discharge, meter, control, or snub fluid flows.

piping systems: piping of any kind, including fittings, valves, and pipe coverings. Supports, brackets, or other accessories are specifically excluded from applications of this Standard.

toxic and corrosive: the material classification for fluids that are toxic or corrosive, or that will produce toxic or corrosive substances when released.

3 REFERENCES (20)

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
Publisher: National Electrical Manufacturers Association (NEMA), 1300 North 17th Street, Suite 900, Rosslyn, VA 22209 (www.nema.org)

GHS, Globally Harmonized System of Classification and Labelling of Chemicals
Publisher: United Nations (UN), 405 East 42nd Street, New York, NY 10017 (www.un.org)

4 METHOD OF IDENTIFICATION

4.1 Legend (20)

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. The following are examples of content descriptions appearing in a legend:

(a) "HOT WATER"
(b) "SLURRY"
(c) "AIR 100 PSIG"
(d) "ARGON 500 PSIG"
(e) "PROPANE"
(f) "H.P. RETURN"
(g) "HYDRAULIC OIL"
(h) "FOAM"
(i) "CARBON TETRACHLORIDE"
(j) "CAUSTIC"
(k) "SULFURIC ACID"
(l) "STEAM 100 PSIG"

Legends shall use arrows 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 and pressure, as are necessary to identify the hazard.

Legends shall be brief, informative, pointed, and simple for greatest effectiveness. Identification 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[1] pictogram as illustrated in Figure 4.1-1 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).

4.2 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 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).

(20) 4.3 Placement

Attention shall be given to the visibility of the 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 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

Contrast shall be provided between the color field and legend for readability. Use of letters of standard style,[2] 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), and for valve and fitting identification, the use of a permanently legible tag is recommended.

4.5 Abandoned Piping (20)

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] 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.

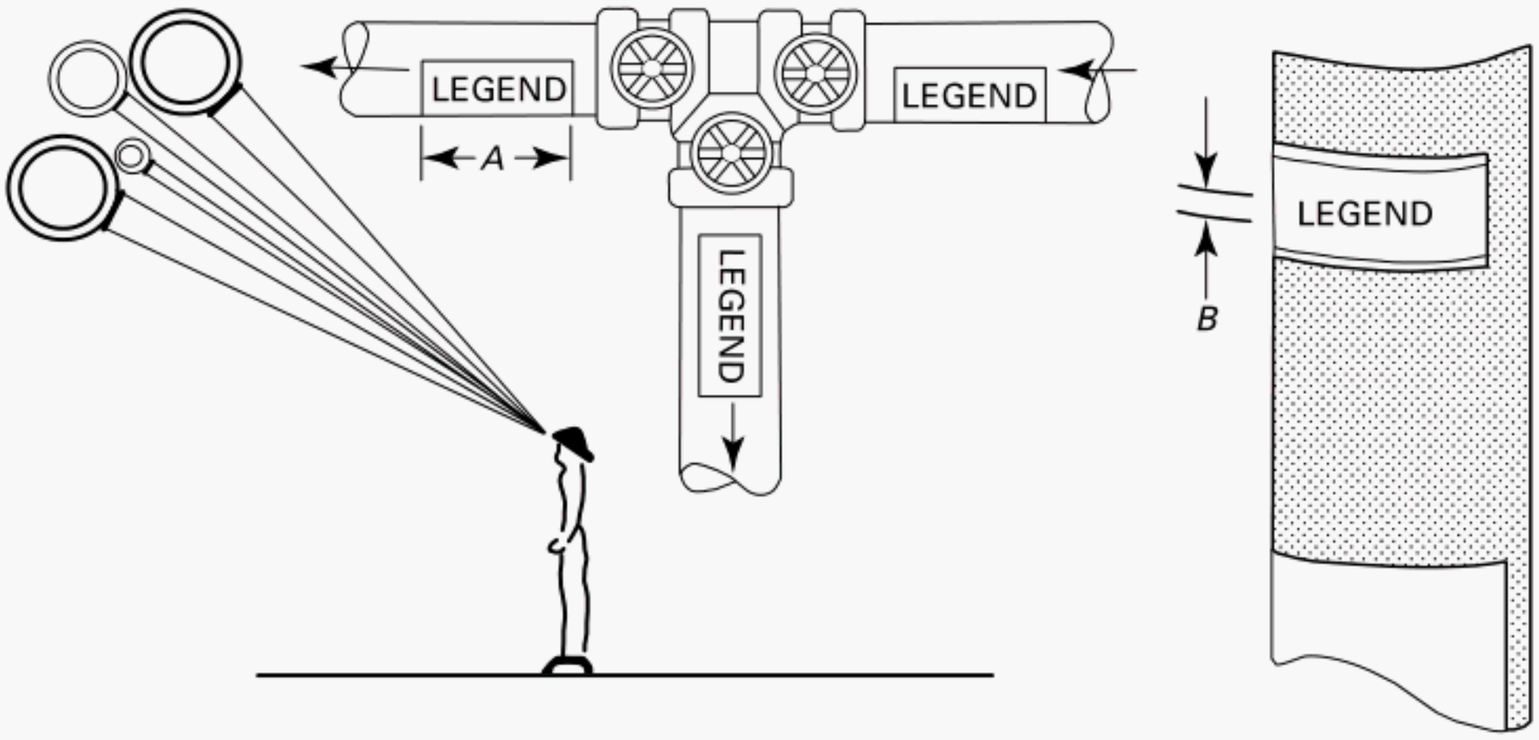
Figure 4.1-1 GHS Pictograms

 • 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

Table 4.2-1 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

Figure 4.3-1 Location of Identification Markers



(20)

Table 4.4-1 Size of Legend Letters

Outside Diameter of Pipe Covering, in. (mm)	Length of Color Field, *A*, in. (mm)	Size of Letters, *B*, in. (mm)
0.7 to 1.3 (18 to 33)	8 (200)	0.5 (13)
1.4 to 2.4 (34 to 61)	8 (200)	0.7 (19)
2.5 to 6.7 (62 to 170)	12 (300)	1.3 (32)
6.8 to 10 (171 to 254)	24 (600)	2.5 (64)
Over 10 (over 254)	32 (800)	3.5 (89)

ASME Services

ASME is committed to developing and delivering technical information. At ASME's Customer Care, we make every effort to answer your questions and expedite your orders. Our representatives are ready to assist you in the following areas:

ASME Press
Codes & Standards
Credit Card Orders
IMechE Publications
Meetings & Conferences
Member Dues Status
Member Services & Benefits
Other ASME Programs
Payment Inquiries
Professional Development
Short Courses
Publications
Public Information
Self-Study Courses
Shipping Information
Subscriptions/Journals/Magazines
Symposia Volumes
Technical Papers

How can you reach us? It's easier than ever!

There are four options for making inquiries* or placing orders. Simply mail, phone, fax, or E-mail us and a Customer Care representative will handle your request.

Mail
ASME
150 Clove Road, 6th Floor
Little Falls, New Jersey
07424-2139

Call Toll Free
US & Canada: 800-THE-ASME
(800-843-2763)
Mexico: 95-800-THE-ASME
(95-800-843-2763)

Fax—24 hours
973-882-1717
973-882-5155

E-Mail—24 hours
customercare@asme.org

*Customer Care staff are not permitted to answer inquiries about the technical content of this code or standard. Information as to whether or not technical inquiries are issued to this code or standard is shown on the copyright page. All technical inquiries must be submitted in writing to the staff secretary. Additional procedures for inquiries may be listed within.

ASME A13.1-2020

ISBN 978-0-7918-7369-4