

Compliance – Resource Bulletin

Pipe Marker Labels & Signs

Overview:

Hazardous materials and chemicals are widely transported through piping systems in industrial, commercial, and governmental situations. Though these piping systems may be constructed to strict design standards, their operation and maintenance can be inherently hazardous to workers, the general public, and the environment. Mistakes made in turning on valves or disconnecting pipes at the wrong time or place can result in serious injuries or damage to property. ^[1]

In order to promote greater safety, lessen the chances of error, confusion, or inaction, especially in times of emergency, a uniform system for the identification of piping contents is important to warn personnel when the piping contents are inherently hazardous. ^[1] Though OSHA regulates safety standards for all piping systems, it relies on a number of identification standards, each of which addresses the labeling of a particular type of piping.

<u>PIPING TYPE</u>	<u>IDENTIFICATION STANDARD</u>
○ Chemical Piping	ASME A13.1-2015
○ Ammonia Refrigeration Piping	ASME A13.1-2015; IIAR Bulletin #114
○ Medical Gases Piping	NFPA 99C; CGA C-9-2013
○ Electrical Piping	ANSI Z535.1
○ HVAC Duct	ASME A13.1-2015

Resources:

ASME A13.1-2015: (\$\$\$)

<http://webstore.ansi.org/default.aspx>

NFPA 99C: (\$\$\$)

<http://www.nfpa.org/>

CGA C-9-2013: (\$\$\$)

<https://webstore.ansi.org/Standards/CGA/CGA2013-1504198>

IIAR Bulletin #114: (\$\$\$)

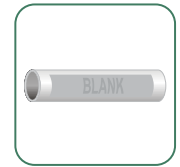
<https://www.iiar.org/iiar/itemdetail?iprodcode=03bul-en1404>

ANSI Z535.1: (\$\$\$)

<http://webstore.ansi.org/>

OSHA Ammonia Refrigeration: (Free)

<http://www.osha.gov/SLTC/ammoniarefrigeration/index.html>



Compliance – Resource Bulletin

(Pipe Marker Labels & Signs Continued)

Design of Pipe Marker Labels & Signs:

- CHEMICAL PIPING LABELS:** The ASME A13.1 Scheme for the Identification of Piping Systems identifies the contents and hazards associated with piping containing hazardous materials. The standard is applicable to chemical piping systems found in industrial, commercial, and public facilities, but does not apply to buried pipelines or electrical conduits. Two identification components appear on each label identifying a chemical; legend and color. The legend is the name of the chemical within the pipe along with an arrow indicating the direction of flow. The color of the label indicates the characteristic hazards the chemical presents. The colors used comply with the ANSI Z535.1 Safety Color Code. The standard also stipulates the label size and placement for maximum visibility. (ASME A13.1.1-3) **(See graphic aid 1 below)**

Color Combinations	Standard ASME A13.1-2015
White on Red	Fire quenching fluids
Black on Orange	Toxic and corrosive fluids
Black on Yellow	Flammable and oxidizing fluids
White on Brown	Combustible fluids
White on Green	Potable, cooling, boiler feed, and other water
White on Blue	Compressed air
White on Purple	User defined
Black on White	User defined
White on Gray	User defined
White on Black	User defined

Graphic Aid 1

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Compliance – Resource Bulletin


(Pipe Marker Labels & Signs Continued)

- AMMONIA REFRIGERATION PIPING LABELS:** Guidelines for Identification of Ammonia Refrigeration (IIAR Bulletin 114) is the accepted standard for the labeling of ammonia piping systems. Though it adopts the size, legend and color components stipulated by ASME A13.1, it also defines additional components ammonia labels should display:
 - Abbreviations indicating system components.
 - Colored bands with legend indicating the physical state of the refrigerant: liquid, vapor, or both.
 - A colored band with legend indicating the internal pipe pressure level. **(See graphic aid 2 below)**

1. AMMONIA PIPING ABBREVIATIONS
SEE BELOW ↓

3. MARKER BODY ↓

5. DIRECTIONAL
ARROWS ↓



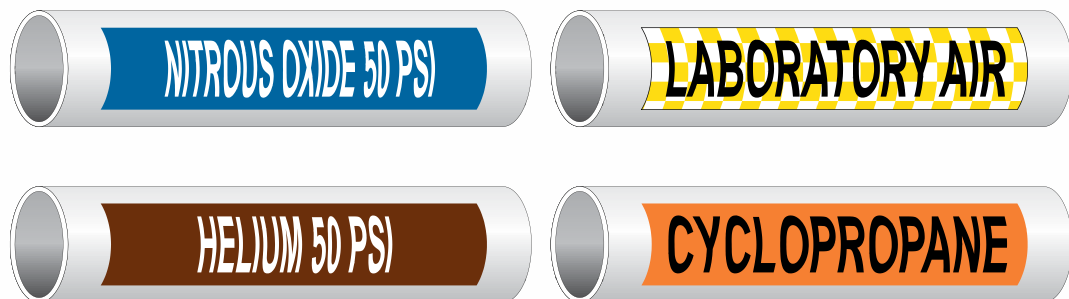
2. PHYSICAL STATE
YELLOW = LIQUID(LIQ) BLUE = VAPOR (VAP) ↑

4. PRESSURE LEVEL
GREEN = LOW RED = HIGH ↑

BD=BOOSTER DISCHARGE	LD=LIQUID DRAIN
CD=CONDENSER DRAIN	LIC=LIQUID INJECTION COOLING
DC=DEFROST CONDENSATE	LSS=LOW STAGE SUCTION
EQ=EQUALIZER	LT=LIQUID TRANSFER
ES=ECONOMIZER SUCTION	LTRL=LOW TEMPERATURE RECIRCULATED LIQUID
FG=FOUL GAS	LTRS=LOW TEMPERATURE RECIRCULATED SUCTION
HG=HOT GAS	LTS=LOW TEMPERATURE SUCTION
HGD=HOT GAS DEFROST	MTRL=MEDIUM TEMPERATURE RECIRCULATED LIQUID
HPL=HIGH PRESSURE LIQUID	MTRS=MEDIUM TEMPERATURE RECIRCULATED SUCTION
HSD=HIGH STAGE DISCHARGE	MTS=MEDIUM TEMPERATURE SUCTION
HSS=HIGH STAGE SUCTION	PO=PUMP OUT
HTRL=HIGH TEMPERATURE RECIRCULATED LIQUID	RV=RELIEF VENT
HTRS=HIGH TEMPERATURE RECIRCULATED SUCTION	TSR=THERMOSYPHON RETURN
HTS=HIGH TEMPERATURE SUCTION	TSS=THERMOSYPHON SUPPLY

Graphic Aid 2

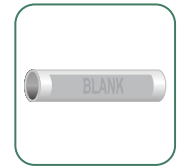
- MEDICAL GASES PIPING LABELS:** Gases used in medical facilities are stored in containers and delivered to medical equipment via piping systems. Collaboration between The National Fire Protection Association (NFPA 99C) and The Compressed Gas Association (CGA Pamphlet C-9) resulted in the accepted standard for the labeling of medical gases. NFPA 99C addresses which equipment should be labeled, where labels should be applied, label legend content, and adopt the CGA C-9 label color codes indicating a specific gas. (NFPA 99C 5.1.11) **(See graphic aid 3 below)**



Graphic Aid 3

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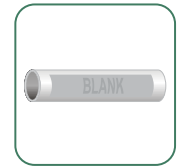
Compliance – Resource Bulletin

(Pipe Marker Labels & Signs Continued)

- **ELECTRICAL PIPING LABELS:** Electrical conduit, breaker panels, and equipment all pose the risk of electric shock or electrocution if handled incorrectly by workers. Conduit, and the devices they feed, should be labeled to provide important hazard information about their contents. These labels are formatted using the ANSI Z535.1 and OSHA safety orange color denoting a “warning” hazard level. Common legend information provided on conduit labels is:
 - Voltage (V)
 - Current level (AMP)
 - Current type (AC or DC)
 - Phase (single or three)
 - Main Disconnect
 - Contents (telephone, power, fiber optic, etc.)
- **HVAC DUCT LABELS:** HVAC is an acronym for heating, ventilating and air conditioning systems. The movement of air in facility HVAC systems occurs in galvanized metal or flexible plastic ducts. The labeling of ducts assists workers differentiate between different air systems. The accepted standard for duct labeling is based on the ASME A13.1 labeling system. The label consists of a legend describing the contents of the duct, a directional arrow indicating air flow, and a color coded background indicating physical properties of the air. The three colors used are: Green (cold air supply & exhaust); Yellow (warm air supply & exhaust); Blue (mixed air supply & exhaust). Some of the air types indicated in the legend are:
 - Intake Air
 - Supply Air
 - Relief Air
 - Exhaust Air
 - Return Air
 - Outside Air
- **UNDERGROUND UTILITY, PIPELINE, & CABLE LABELS:** Piping systems are widely used for the underground transport of petroleum products, natural gas, electrical and communication cabling, and municipal water and sewer utilities. Because these systems travel underground, they present the challenge of identifying their location both from the standpoint of system maintenance and accident prevention during excavation.

The Pipeline & Hazardous Materials Safety Administration (PHMSA) is an agency of The Department of Transportation (DOT) responsible for pipeline safety standards. Other entities such as The American Gas Association and American Public Works Association are also contributors to standards for underground location involving systems in their industries. Consequently, the variety of hazardous materials transported underground results in a number of identification standards.

The location and labeling of underground piping systems before excavation at construction sites is the responsibility of the contractor in charge but is performed by either the owner of the pipeline, the local municipality, or a locating service dispatched to the site by calling the national “Call Before You Dig” phone number, 811. The types of piping system utilities requiring location are:



Compliance – Resource Bulletin

(Pipe Marker Labels & Signs Continued)

- Buried cable: electric, telephone, fiber optics
- Gas pipeline: natural & chemical gases
- Water and sewer pipelines
- Petroleum pipelines

Widely used types of labeling systems are:

- Above ground color coded staked markers and labels.
- Detectable underground piping tapes. (allows electronic location)
- OSHA formatted safety signs warning of buried piping. **(See graphic aids 4 & 5 below)**

APWA (AMERICAN PUBLIC WORKS ASSOCIATION) UNIFORM COLOR CODES FOR TEMPORARY MARKING OF UNDERGROUND UTILITIES		
	RED	ELECTRIC POWER LINE, CABLES, CONDUIT AND LIGHTING CABLES
	YELLOW	GAS, OIL, STEAM, PETROLEUM OR GASEOUS MATERIAL
	ORANGE	COMMUNICATION, ALARM OR SIGNAL LINES, CABLE OR CONDUIT
	BLUE	POTABLE WATER
	GREEN	SEWERS AND DRAIN LINES
	WHITE	PROPOSED EXCAVATION LIMITS OR ROUTE
	PINK	TEMPORARY SURVEY MARKINGS, UNKNOWN/UNIDENTIFIED FACILITIES
	PURPLE	RECLAIMED WATER, IRRIGATION AND SLURRY LINES

Graphic Aid 4



Graphic Aid 5



For Pipe Marker labels & signs please visit our store:
<https://www.compliancesigns.com/Pipe-Markers-Chemical.shtml>

[1] ASME A13.1-2015