SURF DESIGN STANDARD

PIPE MARKING/LABELS

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Version 1
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Version Control

Responsible Person	Document Control Number	Document Version	Publication Date	Description of Change
Andrew Brosnahan	Document-175363	1	3/1/2021	Initial release.

1. BASIS OF DESIGN

This section applies to the design and installation of pipe markers/labels for permanent installations in both surface and underground areas.
For this Sanford Underground Research Facility (SURF) standard: a permanent installation, requiring pipe marking is defined as 1) newly installed piping or exposed piping that is in use, 2) planned to be in place longer than 1 year*.

2. SCOPE

SURF Pipe Marking/Labeling may include:

A. Labeling existing piping that is currently unlabeled
B. Labeling new piping upon project completion

Pipe Marking/Labeling exclusions:

A. Piping that is buried or abandoned in place.
B. Piping that is installed behind or in finished walls, ceilings, or floors.

2.1. Applicable Codes/Standards

A. ASME A13.1 Standard for the Identification of Pipes
B. ASME B31.3 Process Piping
C. Ten States Standards for Wastewater Facilities
D. National Fire Protection Association (NFPA) Codes/Standards

** Pipe labeling for temporary piping (<1 year) will be handled by Job Hazard Analysis forms or other forms of communication.*

3. DESIGN CRITERIA

Each surface and underground permanent installation with exposed piping (as defined earlier) at SURF shall have markers applied to the piping that communicate its contents clearly. Pipe marking standards at SURF are location specific to 1) ***All Surface & Underground Areas (Excluding Section 3.2)*** 2) ***Surface Industrial Wastewater Treatment Plant***.

General Requirements:

3.1. All Surface & Underground Areas (Excluding Section 3.2)

A. Shall follow **General Pipe Marking Guide (ANSI/ASME A13.1)**. See reference chart below for specifics.
B. If a chemical is not listed on the reference chart:
    a. A color scheme can be proposed to the engineering department for approval.
    b. Upon approval, the color scheme will be added to the table below and used for all future installations.
    c. Chemicals not listed in the reference chart shall have labels consisting of 1) Chemical Content, 2) Gas or Liquid, 3) Flow Direction

Table 1. Surface and Underground Contents Not Listed in ANSI/ASME A13.1

Content	Background	Letter
Nitrogen	Black	White
Xenon	Purple	White
Helium	Grey	White
Sewage	White	Brown
Argon	White	Black

3.2. Surface Industrial Wastewater Treatment Plant

A. Shall follow **Water Treatment Pipe Marking Guide (Ten States Standards)**. See reference chart below for specifics.
B. If a chemical is not listed on the reference chart:
    a. A color scheme can be proposed to the engineering department for approval.
    b. Upon approval, the color scheme will be added to the table below and used for all future installations.
    c. Chemicals not listed in the reference chart shall have labels consisting of 1) Chemical Content, 2) Gas or Liquid, 3) Flow Direction

Table 2. Wastewater Treatment Plant Contents Not Listed in the Ten States Standards

Content	Background	Letter
None currently		

3.3. Label Font and Letter Sizing

A. Text shall be easy to read from a distance and conform to the pipe marker size chart shown in Figure 1.
B. Text shall use a bold sans-serif font such as Arial or Helvetica.

Pipe Marker Size Chart

Letter and label dimensions in accordance with pipe diameter

Outside Pipe Diameter Including Covering	Recommended Minimum Label Size	Text Height
.75" up to 1.25" (19–32 mm)	**1" x 8"** (25 x 203 mm)	**.5"** (13 mm)
GREATER THAN **1.25" up to 2"** (32–51 mm)	**1" x 8"** (25 x 203 mm)	**.75"** (19 mm)
GREATER THAN **2" up to 7"** (51–178 mm)	**2" x 12"** (51 x 305 mm)	**1.25"** (32 mm)
GREATER THAN **7" up to 10"** (178–254 mm)	**3" x 24"** (76 x 610 mm)	**2.5"** (64 mm)
GREATER THAN **10"** (over 254 mm)	**4" x 32"** (102 x 813 mm)	**3.5"** (89 mm)

NOTE: Pipes less than 0.75" in diameter shall be labeled with a permanent tag that follows the 0.75" up to 1.25" recommended minimum label size

Figure 1: Pipe Marker Size Chart

4. REFERENCE DOCUMENTS

4.1. GENERAL PIPE MARKING GUIDE (ANSI/ASME A13.1)

- The chart** on the following page lists the specific markers that shall be used to label ***all Surface & Underground Areas (Excluding Section 3.2)***.
- Additionally, all pipe markers shall also include a symbol that goes along with the material property color coding to help better communicate hazard information across language barriers (**Figure 2**).

Figure 2: Example of symbols to go along with material property color.

GENERAL PIPE MARKING GUIDE (based on ANSI/ASME A13.1)

The following Pipe Marking Guide, offered by Graphic Products to aid in properly customizing pipe markers, complies with the ANSI/ASME A13.1 - 2015 Standard for the Identification of Pipes.

Color Code

MATERIAL PROPERTIES	LETTER COLOR ON FIELD COLOR	EXAMPLE
FLAMMABLE OR OXIDIZING Fluids with vapors that will burn in air, or fluids which cause other materials to burn	Black on Yellow	HYDROGEN
COMBUSTIBLE Fluids that may burn but are not flammable	White on Brown	CANOLA OIL
TOXIC OR CORROSIVE Fluids which are corrosive or toxic or will produce corrosive or toxic substances	Black on Orange	NITRIC ACID
FIRE QUENCHING Water and other substances used in fire-fighting systems	White on Red	SPRINKLER WATER
OTHER WATER Any other water, except for water used in fire-fighting systems	White on Green	BOILER WATER
COMPRESSED AIR Any vapor or gas under pressure that does not fit a category above	White on Blue	COMPRESSED AIR
DEFINED BY USER	White on Black	DEFINED BY USER
DEFINED BY USER	White on Purple	DEFINED BY USER
DEFINED BY USER	White on Gray	DEFINED BY USER
DEFINED BY USER	Black on White	DEFINED BY USER

Other color codes may also be acceptable, as long as your choices are consistent and documented, and the affected workers are trained to understand the system.

Pipe Marker Text

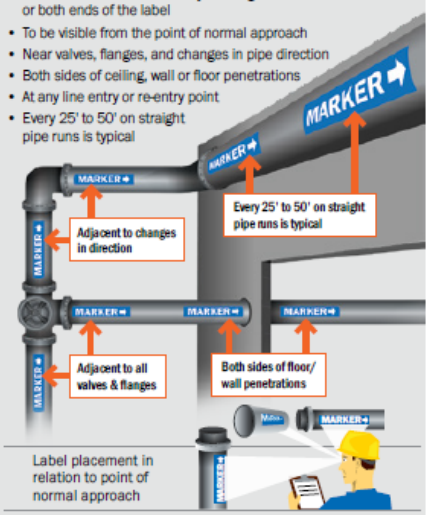
Use clear and simple terms to identify the contents of each pipe.

- Text should be easy to read from a distance
- Use a sans-serif font such as Arial or Helvetica

SPRINKLER WATER

Place Markers:

- To indicate direction of flow by labeling with arrows at one or both ends of the label
- To be visible from the point of normal approach
- Near valves, flanges, and changes in pipe direction
- Both sides of ceiling, wall or floor penetrations
- At any line entry or re-entry point
- Every 25' to 50' on straight pipe runs is typical



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Letter and label dimensions in accordance with pipe diameter

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GREATER THAN 1.25" up to 2" (32–51 mm)	1" x 8" (25 x 203 mm)	.75" (19 mm)
GREATER THAN 2" up to 7" (51–178 mm)	2" x 12" (51 x 305 mm)	1.25" (32 mm)
GREATER THAN 7" up to 10" (178–254 mm)	3" x 24" (76 x 610 mm)	2.5" (64 mm)
GREATER THAN 10" (over 254 mm)	4" x 32" (102 x 813 mm)	3.5" (89 mm)

NOTE: It is recommended that pipes less than .75" in diameter be labeled with a permanent tag.

4.2. WATER TREATMENT PIPE MARKING GUIDE (Ten States Standards)

- The chart** on the following page lists the specific markers that shall be used to label piping networks in and around the ***Surface Industrial Waste Water Treatment Plant***.

WATER TREATMENT PIPE MARKING GUIDE (based on the Ten States Standards)

This color code summarizes the Ten States Standards (*10statesstandards.com*), which have been adopted in several areas.

Water Treatment Plant Color Coding

Type/Use of Pipe	Color of Pipe
Water Lines	
Raw Water	Olive Green
Settled or clarified water	Aqua
Finished or potable water	Dark Blue
Chemical Lines	
Alum or primary coagulant	Orange
Ammonia	White
Carbon Slurry	Black
Caustic	Yellow w/ green band
Chlorine gas or solution	Yellow
Fluoride	Light Blue w/ red band
Lime Slurry	Light Green
Ozone	Yellow w/ orange band
Phosphate compounds	Light Green w/ red
Polymers or coagulant aids	Orange w/ green band
Potassium Permanganate	Violet
Soda Ash	Light Green w/ orange band
Sulfuric Acid	Yellow w/ red band
Sulfur Dioxide	Light Green w/ yellow band
Waste Lines	
Backwash Waste	Light Brown
Sludge	Dark Brown
Sewer (sanitary or other)	Dark Gray
Other Lines	
Compressed Air	Dark Green
Gas	Red
Other Pipes	Light Gray

Wastewater Treatment Plant Color Coding

Type/Use of Pipe	Color of Pipe
Sludge Lines	
Raw Sludge	Brown w/ black band
Sludge recirculation or suction	Brown w/ yellow band
Sludge draw off	Brown w/ orange band
Sludge recirculation discharge	Brown
Gas Lines	
Sludge Gas	Orange (or red)
Natural Gas	Orange (or red) w/ black band
Water Lines	
Nonpotable Water	Blue w/ black band
Potable Water	Blue
Water for heating digestors	Blue w/ 6" red band (150 mm) or buildings space 30" apart (760 mm)
Other Lines	
Chlorine	Yellow
Sulfur Dioxide	Yellow w/ red band
Sewage (wastewater)	Gray
Compressed Air	Green

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NOTE: It is recommended that pipes less than .75" in diameter be labeled with a permanent tag.

Marker Location

Pipe markers shall be placed:

- to indicate direction of flow by labeling with arrows at one or both ends of the label
- to be visible from the point of normal approach
- near valves, flanges & changes in pipe direction
- both sides of ceiling, wall or floor penetrations
- at any line entry or re-entry point
- on straight pipe runs in intervals sufficient for identification every 25 ft to 50 ft is typical

Place Markers:

Pipe Marker location and size chart are based on ANSI/ASME standards. This guide is for general information purposes only. It is not a substitute for review of applicable standards.

*** These charts are provided as visual examples only. Consult the latest ASME/Ten States Standards for the most recent information.*