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STANDARD**

**Goddard Space Flight Center
Greenbelt, MD 20771**

GSFC-STD-8006

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**Safety Standard for Ground Piping Systems Color Coding and
Identification**

MEASUREMENT SYSTEM IDENTIFICATION: US Customary Units

**THIS STANDARD HAS BEEN REVIEWED FOR EXPORT CONTROL RESTRICTIONS;
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GSFC-STD-8006 Safety Standard for Ground Piping Systems Color Coding and Identification

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GSFC-STD-8006 Safety Standard for Ground Piping Systems Color Coding and Identification

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GSFC-STD-8006 Safety Standard for Ground Piping Systems Color Coding and Identification

FOREWORD

This standard is published by the Goddard Space Flight Center (GSFC) to provide uniform engineering and technical requirements for processes, procedures, practices, and methods that have been endorsed as standard for NASA programs and projects, including requirements for selection, application, and design criteria of an item.

This standard establishes a common color code and identification system for visual warnings to accompany the written identification of materials in piping systems.

Requests for information, corrections, or additions to this standard should be submitted via “Contact Us” on the GSFC Technical Standards website at <http://standards.gsfc.nasa.gov>.

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1. SCOPE

1.1 Purpose

The purpose of this standard is to establish a common color code and identification system for visual warnings to accompany the written identification of materials in piping systems. The use of this standard will promote greater safety and will lessen the chances of error, confusion, or inaction in times of emergency by providing a uniform color code to quickly warn personnel of outstanding hazards inherent in the materials involved. However, this standard does not define the manner or conditions under which these materials may be used safely.

1.2 Applicability

This standard is applicable to all ground based piping systems installed in all areas under the jurisdiction of GSFC – Greenbelt, Wallops Flight Facility and its remote facilities, White Sands Complex, Goddard Institute for Space Sciences, and Independent Validation and Verification Facility - including the systems located in floor trenches and above suspended ceilings. Sections of piping that are concealed underground, in floor slabs, or in walls or partitions are not subject to the requirements of this standard.

The standard does not apply to piping systems on ground support equipment (GSE) that is required to be designed, labeled, and color-coded in accordance with NASA-STD-5005, Standard for the Design and Fabrication of Ground Support Equipment. This standard does apply to equipment used solely during the manufacturing of flight hardware, ground support systems (GSS) that interface with GSE, facilities, and tools; unless otherwise specified by a program, project, or Center; and approved by Code 360 Safety Division or the Code 803 Wallops Safety Office.

This standard is not applicable to electrical conduits; ventilation ducts; or pipelines in missiles, spacecraft, other airborne equipment, or storage vessels. This standard is also not applicable to pipes and lines only used for non-continuous transfer or fill operations; or for short runs of piping between the source and the point of use when the source material is readily and easily identifiable.

Existing or alternate schemes for hazard identification may be considered as equivalent or otherwise meeting the requirements of this Standard if

- (a) Such schemes are described in writing,
- (b) The schemes are consistently applied throughout the installation,
- (c) Employees are trained as to the hazards of the piping systems, and
- (d) The schemes are approved by the local safety office; Code 360 Safety Division or the Code 803 Wallops Safety Office.

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Existing piping systems shall be brought into compliance with this Standard within two years after the initial release. Additions, modifications, and repairs to existing systems shall comply with this standard. This Standard is not required to be applied retroactively to existing piping systems or modifications to existing piping systems containing potable water, sanitary wastewater, heating water, chilled water, storm water, compressed air below 150 pounds per square inch gage (psig), or non-hazardous fire quenching fluids; until more than 50% of such systems are modified or replaced on a single story of a facility.

The system owner is required to comply with this standard and include this standard as part of requirements documentation provided to the system installers. This standard may be cited in contract, program, and other Agency documents as a technical requirement. Mandatory requirements are indicated by the word “shall.” Tailoring of this standard for application to a specific program or project shall be approved by the local safety office.

2. APPLICABLE DOCUMENTS

2.1 General

The documents listed in this section contain provisions that constitute requirements of this standard as cited in the text of section 4. The latest issuances of cited documents shall be used unless otherwise approved by the assigned Technical Authority. The applicable documents are accessible via the NASA Technical Standards System at <http://standards.nasa.gov>, directly from the Standards Developing Organizations, or from other document distributors.

2.2 Government Documents

UNECE ST/SG/AC.10/30, Globally Harmonized System of Classification and Labelling of Chemicals (GHS).

2.3 Non-Government Documents

ANSI Z535.1, Safety Color Code, and

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

2.4 Order of Precedence

When this standard is applied as a requirement or imposed by contract on a program or project, the technical requirements of this standard take precedence, in the case of conflict, over the technical requirements cited in applicable documents or referenced guidance documents.

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3. ACRONYMS AND DEFINITIONS

3.1 Acronyms and Abbreviations

ANSI – American National Standards Institute

ASME – American Society of Mechanical Engineers

ASTM – American Society for Testing and Materials

GSFC – Goddard Space Flight Center

NFPA – National Fire Protection Association

UNECE – United Nations Economic Commission for Europe

WFF – Wallops Flight Facility

3.2 Definitions

Anesthetic Fluids – Fluids that by their nature can cause a loss of sensation, consciousness, and/or central nervous system depression at concentrations smaller than would be normally expected by oxygen deficiency standard effects.

Combustible Fluids – Fluids that can burn, but do not qualify as flammable. Any liquid that has a closed cup flash point at or above 100°F (37.8°C), as determined by the test procedures and apparatus set forth by NFPA 30.

Compressed Air – Mixtures of primarily nitrogen and oxygen composed of 19.5% to 22% oxygen by volume, not necessarily intended for breathing air but which poses no immediate or chronic exposure hazard.

Corrosive Fluids – Fluids that destroy or damage other materials that it contacts through chemical attack, especially those that chemically burn living tissue. Fluids that are classified or defined as corrosive by their safety data sheet, a national consensus standard, or federal regulation.

Fire Quenching Fluids – Fluids used specifically for the purposes of extinguishing, suppressing, or otherwise fighting fires. E.g. sprinkler or standpipe water, foam, carbon dioxide, and other special agents.

Flammable Fluids – Fluids that under ambient of expected operating conditions, are a vapor or produce vapors that can be ignited and continue to burn in air. May apply to fluids defined otherwise depending on service conditions. Any liquid that has a closed-cup flash point below 100°F (37.8°C), as determined by the test procedures and apparatus set forth by NFPA 30, and a Reid vapor pressure that does not exceed an absolute pressure of 40 psi (276 kPa) at 100°F (37.8°C), as determined by ASTM D 323, Standard Test Method for Vapor Pressure of Petroleum Products (Reid Method).

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Fluid – A substance that has no fixed shape and yields easily to external pressure. This definition is intended to include liquids; gases; supercritical substances; and slurries, slushes, and other multi-phase mixtures.

Harmful Fluids – Fluids not categorized as toxic or corrosive, but are otherwise dangerous or hazardous. E.g. irritating fluids, carcinogenic fluids, or liquids that are hazardous to life and property but do not normally produce dangerous quantities of fumes or vapors.

Legend – A legend is any lettered identification required on a piping system. Legends shall identify the contents by complete names, or by generally recognized abbreviations, symbols, letters, numerals, or combinations thereof.

Oxidizing Fluids – Any gas or liquid that may, generally by providing oxygen, cause or contribute to the combustion of other material more than that of air.

Physically Dangerous Fluids – All fluids that are not dangerous in themselves, but are asphyxiating in confined areas or are generally handled in a danger physical state of pressure and/or temperature, e.g. cryogenic fluids, nitrogen gas, and steam.

Piping Systems - Piping systems consist of any pipe line, tubing, or conduit used for the transport of gases, liquids, or semi-liquids, but not those used for carrying solids in air or gas. Valve, fittings, operating accessories, pipe coverings, and pipe installations of any kind (including submerged or buried pipe lines, their markers or buoys, and their points of tie-in with pumping stations and storage or dispensing facilities) shall be considered as parts of a piping system. Supports, brackets, or other non-operating accessories are not considered parts for application of warning colors.

Toxic Fluids – Fluids liable to cause death or severe injury or harm to health if swallowed or inhaled or absorbed by skin. Fluids that are classified or defined as toxic by a safety data sheet, national consensus standard, or federal regulation. E.g. Category M fluids per ASME B31.3, and toxic gases per NFPA 55.

Warning Color – A warning color is the color assigned to the class into which a material is classified in accordance with its primary hazard from a safety standpoint. These colors appear as a circular band on piping systems.

4. REQUIREMENTS

4.1 GENERAL

This standard establishes, defines, and assigns a color for recognition to several classes of fluids, their hazard when released. This standard requires the application of the color warnings and graphical pictographs in a distinctive manner, as a visual aid and supplement to written identification.

ASME A13.1, Scheme for the Identification of Piping Systems, forms the basis for this standard, and is incorporated by reference. The requirements of this standard further clarifies the requirements of ASME A13.1, extend its application to the unique fluid systems found at GSFC,

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address cases of multiple hazard categories, and aids in the adoption of a standardized color coding and identification system across the center.

4.1.1 WARNING COLORS

The colors assigned in this standard shall conform in hue and chroma to the requirements identified by ANSI Z535.1. No change shall be made in the assigned colors without prior approval of the local safety office, Code 803 Wallops Safety Office (WFF and WFF controlled facilities) or the Code 360 Safety Division (Greenbelt and other Goddard locations). The aforementioned offices may be contacted to obtain assistance with categorizing fluids.

Warning colors shall be based on the primary hazard of the fluid, as follows:

Anesthetic and Harmful Fluids – Safety Purple. Legend Color – White.

Combustible Fluids – Safety Brown. Legend Color – White.

Compressed Air – Safety Blue. Legend Color – White.

Fire Quenching Fluids – Safety Red. Legend Color – White.

Flammable and Oxidizing Fluids – Safety Yellow. Legend Color – Black.

Physically Dangerous Fluids – Safety Gray. Legend Color – White.

Potable, Cooling, Boiler Feed, and Other Water – Safety Green. Legend Color – White.

Toxic and Corrosive Fluids – Safety Orange. Legend Color – Black.

4.1.2 NONWARNING COLORS

Safety Black and Safety White. These colors are assigned, without significant meaning, for general use where specified in this standard.

4.2 LEGENDS

Exact identification of materials in any piping system for flammable, oxidizing, combustible, toxic, corrosive, physically dangerous, anesthetic, harmful, and fire quenching fluids is required and shall be made only by means of legends letters in black or white. These legends shall be prominently displayed within the color warning bands to obviate errors by personnel. Legends shall be brief, informative, pointed, and simple for greatest effectiveness.

Contents shall be identified by a legend with sufficient additional details, such as temperature, pressure, etc., as are necessary to identify the hazard. Abbreviated forms are permitted if they are industry standard, widely known, and unambiguous. Minimum required letters sizes shall be as specified in Table 4-1. For pipe lines smaller than 3/4 inch in diameter, legend on a simple pipe label wrapped around the pipe may not be legible and alternative means shall be utilized to ensure legends can be easily read. The use of securely fastened metal tags, with lettering etched or filled in with enamel, attaching labels as flags, or the use of pressure sensitive tape is suggested. Legends shall use upper case letters, Arabic numerals, and appropriate punctuation

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marks. Arrows shall be used to indicate the direction of flow. Where flow can be in both directions, arrows in both directions shall be displayed.

Where is necessary to distinguish between flammable and oxidizing fluids, additional tags shall be provided such as flammable and oxidizer pictograms (see Section 4.2.3), or pair of legends stating "FUEL" and "OXID". The FUEL legend shall be black text on safety yellow, and the OXID legend shall be white text on safety green.

Table 4-1. Minimum Size of Legend Letters and Length of Block or Band Color Field.

OUTSIDE DIAMETER OF PIPE COVERING, IN. (MM)	LENGTH OF BLOCK OR BAND COLOR FIELD, IN. (MM)	MINIMUM LETTER SIZE, IN. (MM)
LESS THAN $\frac{3}{4}$ (19)	8 (200)	$\frac{1}{2}$ (13)
$\frac{3}{4}$ TO $1\frac{1}{4}$ (19 TO 32)	8 (200)	$\frac{1}{2}$ (13)
$1\frac{1}{2}$ TO 2 (38 TO 51)	8 (200)	$\frac{3}{4}$ (19)
$2\frac{1}{2}$ TO 6 (64 TO 150)	12 (300)	$1\frac{1}{4}$ (32)
8 TO 10 (200 TO 250)	24 (600)	$2\frac{1}{2}$ (64)
OVER 10 (OVER 250)	32 (800)	$3\frac{1}{2}$ (89)

4.2.1 USE OF COLORS

The appearance of any of the colors specified in paragraph 4.1.1 on a piping system shall provide a warning of danger from the hazard involved in the system according to the definitions for warning colors specified therein. The minimum length of the color band shall be as specified in Table 4-1. Piping systems that do not require warning colors may be painted to match surroundings, if not in conflict with other color designations in this standard, or such systems may be painted aluminum, black, or remain unpainted. This exception does not apply to any material, harmless or otherwise, specifically identified and listed in this standard.

4.2.2 EXECUTION

Color blocks or bands shall appear on all piping systems in any installation that is color coded in accordance with this Standard. Labels, paints, and other marking methods shall be resistant to the environmental exposure conditions (e.g. high or low pipe or ambient temperatures, moisture, UV/sunlight, radiation, etc.). Warning colors shall consist of a single color applied as a block or a band that completely encircles the piping. The piping system may be painted with the warning color.

Color blocks or bands shall be applied in conformance with dimensional information shown in Table 4-1. These blocks or bands may be made of pressure sensitive tape, vinyl or other plastic, or paint, within the environmental limits specified by the product manufacturer.

Color blocks or bands and legends shall be applied not less than 20 feet apart on straight pipe runs inside buildings and congested exterior areas, and 50 feet apart on long exterior runs. They shall also be applied immediately adjacent to and upstream of all operating accessories such as

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valves, regulators, flow-checks, strainers, cleanouts, pumps, dispensing points, and vents. Where multiple operating accessories are in close proximity, it is not intended to require additional color blocks or bands and legends for upstream component as long as a color block or band and legend is clearly visible from a person using the operating accessory. In addition, color bands and legends shall be applied where branch lines join the system, at changes in direction, where the system passes underground or through walls, at flanges, and at any other conspicuous places where warnings are required by the local safety office. These markings shall be clearly visible from floor level positions. If desired, piping and operating accessories may also be painted with the primary color warning provided this option is used throughout the system.

Where piping is located above or below the normal line of vision, legends shall be placed below or above the horizontal centerline of the pipe or covering, respectively. However, legends shall also be clearly visible from operating positions, especially those adjacent to control valves.

4.2.3 MULTIPLE AND SPECIAL HAZARD CLASSIFICATIONS

Fluids that fall under multiple hazard classifications or have special hazards not conveyed by the color coding shall also include, as part of the legend, all applicable GHS (Globally Harmonized System of Classification and Labelling of Chemicals) pictograms as shown on its safety data sheet. The gas cylinder pictogram is not required to be used. Consult the latest editions of ASME A13.1 or the GHS standard published by the United Nations. GHS pictographs in use at the time of drafting this standard are shown in Figure 4-1.

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GHS - Hazard Pictograms and Related Hazard Classes		
		
Exploding Bomb <ul style="list-style-type: none"> • Explosives • Self-reactives • Organic Peroxides 	Corrosion <ul style="list-style-type: none"> • Skin corrosion/burns • Eye damage • Corrosive to metals 	Flame Over Circle <ul style="list-style-type: none"> • Oxidizing gases • Oxidizing liquids • Oxidizing solids
		
Gas Cylinder <ul style="list-style-type: none"> • Gases under pressure 	Environment <ul style="list-style-type: none"> • Aquatic toxicity 	Skull & Crossbones <ul style="list-style-type: none"> • Acute toxicity (fatal or toxic)
		
Exclamation Mark <ul style="list-style-type: none"> • Irritant (eye & skin) • Skin sensitizer • Acute toxicity • Narcotic effects • Respiratory tract irritant • Hazardous to ozone layer (non-mandatory) 	Health Hazard <ul style="list-style-type: none"> • Carcinogen • Mutagenicity • Reproductive toxicity • Respiratory sensitizer • Target organ toxicity • Aspiration toxicity 	Flame <ul style="list-style-type: none"> • Flammables • Pyrophorics • Self-heating • Emits flammable gas • Self-reactives • Organic peroxides

Figure 4-1. GHS Pictograms.

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4.3 CLASSIFICATION

The classification of materials in a piping system shall be in accordance with Table 5-1. Classifications for materials not listed shall be approved by the local safety office prior to installation.

4.4 IDENTIFICATION

4.4.1 PRESSURE AND TEMPERATURE

Working pressures that exceed 150 pounds per square inch gage (psig) shall be identified in units of psig on all piping systems containing compressed air; chilled, heating, sanitary, storm potable, and fire quenching water; and gases that are not hazardous beyond their potential to displace oxygen. Physically dangerous fluids (except simple asphyxiants), flammable fluids, combustible fluids, toxic or corrosive fluids, oxidizing fluids, anesthetic or harmful fluids, and fire quenching fluids other than water shall have their working pressure identified when they may exceed 15 psig. Identify the maximum normal working pressure or maximum operating pressure (MOP), whichever is larger. Maximum or minimum nominal fluid temperatures above 140°F (60°C) or below -20°F (-30°C), respectively, shall be identified in Fahrenheit units. Temperature or pressure labels are not required for existing piping systems until their labels or markings are replaced.

On tags and legends, the pressure and/or temperature shall be given immediately beneath or after the contents, using the same letter size and color. Where function is identified with tapes or decals, the pressure and/or temperature may also be given with either tapes or decals, provided that they are not less than 1/2 inch wide and the letters and figures they contain are the same size as those appearing on associated tapes and decals.

4.4.2 TAGS

Where conventional markings are likely to be damaged by extreme temperatures or hidden by a covering of frost or ice, identification tags shall be securely fastened at the same locations given for color bands in paragraph 4.2.2. These tags shall be at least 1-1/2 inches in length and width with engraved or stamped markings at least 1/4 inch high. Such tags shall be secured by the standoff attachments. Where piping is too small or not readily accessible, identification tags may be hung from the pipe in lieu of paint or tape. Tagging materials shall be compatible with conveying fluids to prevent hazardous chemical reaction in case of leakage.

4.4.3 PANEL MARKING & IDENTIFICATION

All panel-mounted components and interface connections shall be identified on the face of the panel by a label or plate mounted adjacent to the component (beneath the component if practicable). The legend on this plate or label shall provide clear, concise, and positive component or connection identification, based on the specific unique identifier provided on the engineering drawings and other diagrams). Working fluid material identification legends shall also be provided where not visible at their point of connection to the panel. Where a panel has only one working fluid, a single material identification legend is acceptable. The plate or label

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shall be permanently affixed and resistant to degradation by the surrounding exposures and environmental conditions. Each complete panel assembly shall be identified by a plate or label that clearly defines the purpose of the panel with a functionally descriptive title (3/16-inch minimum letter size or larger recommended). This title shall be assigned by the design documentation and be prominently displayed on the panel front. Where component and interconnecting lines are hidden behind the panel, locations of the component(s) and line(s) shall be marked on the front of the panel with striped lines and component schematic symbols. The markings shall be of contrasting color to the background of the panel. Symbols, abbreviations, and component identifiers shall be in accordance with the local standards of the local safety office and the local technical approving authority for facility projects in the local engineering office of the Facilities Management Division.

5. GUIDANCE

5.1 Reference Documents

ASTM D 323, Standard Test Method for Vapor Pressure of Petroleum Products

ASME B31.3, Process Piping

GPR 8710.3, Certification and Recertification of Ground-Based Pressure Vessels and Pressurized Systems

NFPA 30, Flammable and Combustible Liquids Code



NFPA 55, Compressed Gases and Cryogenic Fluids Code

5.2 Key Word Listing

Pipe, piping, label, mark, identification, hazard, material, fluid, liquid, gas, ASME, PVS, cryogen, color, legend, flammable, combustible, corrosive, toxic, anesthetizing, harmful, steam, facility, utility, service, water, compressed, air, fire, quench, suppression.






5.3 Standard Classifications

Table 5-1. Standard Classifications.

Fluid/Material	Warning Color	Additional Hazards	GHS Pictographs
Acetic Acid	Orange	Flammable	 

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Acetone	Yellow	Harmful	
Fluid/Material	Warning Color	Additional Hazards	GHS Pictographs
Acetylene	Yellow		
Aerozine 50 (UDMH/Hydrazine Mixture)	Orange	Flammable, Corrosive, Toxic, Targeted Organ Toxicity, Carcinogenic, Environmental Toxicity	
Air, (> 22% Oxygen, e.g. Nitrox)	Yellow	Oxidizer	
Air, (<19.5% Oxygen)	Gray		
Air, Compressed	Blue		
Air, Instrument	Blue		
Alcohol , Methyl	Orange	Toxic, Harmful	
Alcohol, Propyl	Yellow	Flammable, Irritant	
Alkaline Corrosive Liquids	Orange	Corrosive	
Ammonia, Anhydrous	Orange	Combustible, Corrosive, Irritant, Environmental Toxicity	
Argon	Gray	Physically Dangerous	

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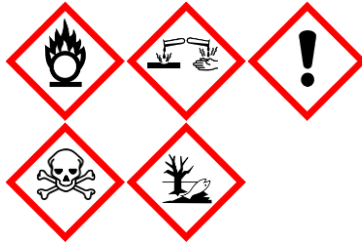




Argon – Oxygen Mixtures (> 19.5% Oxygen)	Yellow	Oxidizer	
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Fluid/Material	Warning Color	Additional Hazards	GHS Pictographs
Argon – Oxygen Mixtures (< 19.5% Oxygen)	Gray		
Benzene	Yellow	Irritant, Carcinogen	 
Bromochloro-difluoromethane, Halon 1211	Red	Anesthetizing	
Bromotrifluoro-methane, Halon 1301	Red	Anesthetizing	
Butadiene	Yellow	Flammable, Irritant, Carcinogen	  
Butane	Yellow	Flammable	
Carbon Disulfide	Yellow	Flammable, Irritant, Target Organ Toxicity	  
Carbon Dioxide	Gray	Physically Dangerous	
Carbon Dioxide (Fire)	Red	Physically Dangerous	
Carbon Monoxide	Orange	Flammable, Harmful, Toxic	  

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Carbon Tetrachloride	Orange	Toxic, Harmful, Carcinogenic	
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Fluid/Material	Warning Color	Additional Hazards	GHS Pictographs
Chlorine	Orange	Oxidizer, Corrosive, Irritant, Toxic, Environmental Toxicity	
Chlorodifluoromethane (R-22)	Gray	Physically Dangerous	
Chloropropane	Yellow	Flammable, Irritant, Targeted Organ Toxicity	
Cyclopropane	Yellow	Flammable, Irritant, Anesthetizing	
Dibromodifluoromethane (Halon 1202)	Red	Irritant	
Dichlorodifluoromethane (R-12)	Gray	Physically Dangerous	
Difluoromethane (R-410a)	Gray	Physically Dangerous	
Diesel, No. 2, Ultra Low Sulfur	Brown	Combustible, Irritant, Targeted Organ Damage, Environmental Toxicity	







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Dimethyl Ether	Yellow	Flammable, Anesthetizing	 
Ethane	Yellow	Flammable	
Fluid/Material	Warning Color	Additional Hazards	GHS Pictographs
Ethylene Glycol	Purple	Harmful, Targeted Organ Damage	
Ethylene Glycol – Water Mixtures	Purple	Harmful, Targeted Organ Damage	
Ethylene Oxide	Orange	Flammable, Carcinogenic, Irritant, Targeted Organ Damage, Teratogenic	   
Fuel Oil	Yellow	Flammable, Irritant, Carcinogenic, Anesthetizing	  
Gasoline	Yellow	Flammable, Irritant, Carcinogenic, Anesthetizing, Organ Toxicity	  
Helium, Gas	Gray	Physically Dangerous	
Helium, Liquid	Gray	Physically Dangerous	
Hydraulic Oil	Brown	Combustible	
Hydrazine	Orange	Flammable, Harmful, Environmental Toxin, Corrosive	    


















Check the GSFC Technical Standards Program website at <http://standards.gsfc.nasa.gov> or contact the Executive Secretary for the GSFC Technical Standards Program to verify that this is the correct version prior to use.

GSFC-STD-8006 Safety Standard for Ground Piping Systems Color Coding and Identification

Hydrochloric Acid	Orange	Targeted Organ Toxicity	
Hydrogen, Gas	Yellow	Flammable	
Fluid/Material	Warning Color	Additional Hazards	GHS Pictographs
Hydrogen, Liquid	Gray	Physically Dangerous, Flammable	
Krypton, Gas	Gray	Physically Dangerous	
Methane	Yellow	Flammable	
Neon, Gas	Gray	Physically Dangerous	
Nitric Acid	Orange	Oxidizer, Irritant, Corrosive	
Nitrogen, Gas	Gray	Physically Dangerous	
Nitrogen, Liquid	Gray	Physically Dangerous	
Nitrogen Dioxide	Orange	Oxidizer, Toxic, Corrosive	
(Di)nitrogen Tetroxide	Orange	Oxidizer, Toxic, Corrosive	
Nitrous Oxide	Yellow	Oxidizer, Irritant	
Oil, Lubricating	Brown	Combustible	
Oils (Fish, Vegetable, Edible)	Brown	Combustible	

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GSFC-STD-8006 Safety Standard for Ground Piping Systems Color Coding and Identification

Oxygen, Gas	Yellow	Oxidizer	
Oxygen, Liquid	Gray	Physically Dangerous, Oxidizer	
Fluid/Material	Warning Color	Additional Hazards	GHS Pictographs
Ozone	Yellow	Oxidizer, Irritant, Harmful, Targeted Organ Toxicity, Aquatic Toxicity	   
Pentane	Yellow	Irritant, Anesthetizing, Aquatic Toxicity, Harmful	   
Petroleum Gas, Natural, Landfill	Yellow	Flammable, Targeted Organ Toxicity	 
Rocket Propellant RP-1 (Kerosene K-1)	Brown	Combustible, Irritant, Health Hazard, Environmental Toxin	   
Silane	Yellow	Harmful, Flammable (Pyrophoric)	 
Steam	Gray	Physically Dangerous	
Steam, Condensate, Blowdown, Vent	Gray	Physically Dangerous	

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GSFC-STD-8006 Safety Standard for Ground Piping Systems Color Coding and Identification

Storm /Rain Drain	Green		
(1,1,1,2) Tetrafluoroethane (R-134a)	Gray	Physically Dangerous	

Fluid/Material	Warning Color	Additional Hazards	GHS Pictographs
Unsymmetrical Hydrazine (UMH)	Orange	Flammable, Harmful, Environmental Toxin, Corrosive	
Vacuum	Black		
Waste Acid	Orange	Corrosive, Irritant, Health Hazard	
Water, Boiler Feed or Non-Potable Make-Up Other Systems	Green		
Water, Condensate	Green		
Water, Chilled or Condenser	Green		
Water, Domestic, Hot, Cold	Green		
Water, Fire Sprinkler/Standpipe	Red		
Water, Heating or Secondary, Over 180°F	Gray	Physically Dangerous	
Water, Heating or Secondary, 180°F and Below	Green		

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GSFC-STD-8006 Safety Standard for Ground Piping Systems Color Coding and Identification

Water, High Purity	Green		
Water, Process	Green		

Fluid/Material	Warning Color	Additional Hazards	GHS Pictographs
Water, Sewage, Sanitary	Purple	Harmful	
Xenon	Gray	Physically Dangerous	

GSFC-STD-8006 Safety Standard for Ground Piping Systems Color Coding and Identification

5.4 Example Legends














ACETONE						
#2 FUEL OIL						
COMPRESSED AIR						
FIRE SPRINKLER WATER						
HYDRAZINE						
CHILLED WATER						
ETHYLENE GLYCOL						
LIQUID NITROGEN 50 PSIG -321F						
STEAM CONDENSATE 105 PSIG 200F						
HELIUM						
ACETYLENE	FUEL					
OXYGEN	OXID					

Figure 5-1. Example Legends.