Engineering Standard

SAES-B-067   30 November, 2003

Safety Identification and Safety Colors

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Saudi Aramco DeskTop Standards

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1   Scope

This Standard governs the minimum mandatory safety identification and use of safety colors in Saudi Aramco facilities in order to identify potential hazards and alleviate fire and safety concerns.

Exception:

Cross-country pipelines, trunklines, flowlines, onshore wellheads, and marine vessels are excluded from this Standard.

2   Conflicts and Deviations

2.1   Any conflicts between this Standard and other applicable Saudi Aramco Engineering Standards (SAESs), Saudi Aramco Materials System Specifications (SAMSSs), Saudi Aramco Standard Drawings (SASDs), or industry standards, codes, and forms shall be resolved in writing by the Company or Buyer Representative through the Manager, Loss Prevention Department of Saudi Aramco, Dhahran.

2.2   Direct all requests to deviate from the Standard in writing to the Company or Buyer Representative, who shall follow internal company procedure SAEP-302 and forward such requests to the Manager, Loss Prevention Department of Saudi Aramco, Dhahran.

3   References

The selection of material and equipment and the design, construction, maintenance, and repair of equipment and facilities covered by this Standard shall comply with the latest edition of referenced Specifications, Standards, Codes, Forms, Drawings, and similar material (including all revisions, addenda, and supplements) unless stated otherwise.

3.1   Saudi Aramco References

Saudi Aramco Engineering Procedures

SAEP-302   *Instructions for Obtaining a Waiver of a Mandatory Saudi Aramco Engineering Requirement*

SAEP-319   *Pressure Relief Valves - Routine Test, Quality Assurance and Regulation*

Saudi Aramco Engineering Standards

SAES-B-014   *Safety Requirements for Plant and Operations Support Buildings*

SAES-B-018	*Air Foam Systems for Storage Tanks*
SAES-B-069	*Emergency Eyewashes and Showers*
SAES-H-001	*Selection Requirements for Industrial Coatings*
SAES-J-600	*Pressure Relief Devices*
SAES-J-601	*Emergency Shutdown and Isolation Systems*
SAES-L-310	*Design of Plant Piping*
SAES-M-008	*Design Criteria for Lifting Equipment*
SAES-M-100	*Aramco Building Code*
SAES-T-481	*Powered In-Plant Communications*
SAES-T-911	*Communication Conduit System Design*
SAES-T-928	*Telecommunications - OSP Buried Plant*

Saudi Aramco Materials System Specification

04-SAMSS-003	*Additional Requirements for Low Temperature Valves*

Saudi Aramco General Instruction

GI-0150.003	*Ionizing Radiation Protection*

Saudi Aramco Materials Instruction Manual

Saudi Aramco Standard Drawing

AA-036248	*Helidecks Offshore: Types 1 & 2 Plans & Elevation*

3.2   Industry Codes and Standards

American National Standards Institute

ANSI Z535.1	*Safety Color Code*
ANSI Z535.2	*Environmental and Facility Safety Signs*
ANSI Z535.3	*Standard for Criteria for Safety Symbols*
ANSI Z535.4	*Product Safety Signs and Labels*
ANSI Z535.5	*Standard for Accident Prevention Tags (for Temporary Hazards)*

American Petroleum Institute

API STD 1542	*Airport Equipment Marking for Fuel Identification*

American National Standards Institute - Compressed Gas Association, Inc.

ANSI/CGA C-4   Method of Marking Portable Compressed Gas
                     Containers to Identify the Material Contained

ANSI/CGA C-7   Precautionary Labeling and Marking of
                     Compressed Gas Containers

British Standards Institution

BS 381C   Colours for Identification, Coding and Special
                     Purposes

German Standard

RAL   German Specification for Colors (RAL)

U.S. Federal Standard

FS 595B   Colors Used in Government Procurement

National Fire Protection Association

NFPA 55   Storage, Use and Handling of Compressed and
                     Liquefied Gases in Portable Cylinders

4   Requirements

4.1   General

4.1.1   Pipes, vessels, valves, and related structural supports shall be painted a
        neutral background color such as aluminum, gray, or black, which will
        not detract from the high visibility of the safety colors set out in this
        specification. For coating selection, see SAES-H-001.

        Color-coding shall not be used as a substitute for mandatory labeling in
        paragraphs 4.3 and 4.4.

4.1.2   Safety signs for gas cylinder storage areas, gas cylinder labeling and
        marking requirements, including lettering in Arabic and English for gas
        cylinders, shall meet CU 15.4 of the Saudi Aramco Materials Instruction
        Manual, ANSI/CGA C-4, ANSI/CGA C-7, and NFPA 55. This includes
        all industrial, medical, laboratory, and aviation bottled gases.

4.1.3   Utility Stations in Plants: The water, steam, air, and nitrogen lines shall
        be marked and color-coded as specified in SAES-L-310.

4.1.4   Aviation Fuel Systems: Color identification for aviation fuel system
        piping and accessories including valves, fittings, pumps and switches

shall be per API STD 1542. Specific requirements are as follows (refer to Table 1, API STD 1542):

a)   The color-coding for system piping shall be in the form of bands of the identifying color printed or taped around the piping. Jet A-1 and JP-8 piping shall be marked by an aluminum stripe on a black band. JP-8 is the military equivalent of Jet A-1 with certain additives. For JP-4 (Jet B), piping shall be with three yellow bands. JP-4 is the military equivalent of Jet B with certain additives. The bands shall be at least 100 mm wide and shall be placed at intervals of no more than 6 m.

b)   The color of jet fuel system accessories shall be gray for Jet A-1 (JP-8), yellow for JP-4 (Jet B).

c)   The labels for jet fuel grades shall be clearly printed in white letters and numbers on a black background.

4.1.5   Bulk Plant and air fuel terminal product identification for the transfer points at loading and unloading facilities such as unloading stations, loading and unloading racks, associated pumps and tank storage truck connections related to bulk plant operations shall use labeling in Arabic and English and color identification as listed in Table 1 in addition to the labeling requirements of this Standard.

a)   Markings should be as close as possible to the points of product transfer.

b)   Background colors shall be indicated by a 300 mm wide band per Table 1.

c)   The identifying color shall be indicated by a 50 mm wide stripe over the band per Table 1.

Commentary Note:

The background color band represents groups of materials with similar volatility. The identifying color stripe identifies the specific material as listed in Table 1 below. Also see Figure 1.

Table 1 – Colors for Marking Product Truck Transfer Points

	Base Color (Band)	Identifying Color (Stripe)
Gasoline (premium unleaded)	Orange	White
Gasoline (super premium unleaded)	Orange	Blue
LP Gas	Orange	Oxide Red
Kerosene	Oxide Red	Green
Diesel oil (white)	Oxide Red	White
Diesel oil (black)	Oxide Red	Black
Fuel oil	Black	Yellow
Asphalt	Black	Green
Stabilized Sweet Crude Oil	Gray	Aluminum
Jet A-1 Fuel	Black	Aluminum

4.1.6   Signs within buildings shall meet SAES-M-100 and SAES-B-014, where applicable.

4.1.7   New safety sign symbols and colors, shall meet ANSI Z535.1, ANSI Z535.2, ANSI Z535.3 and ANSI Z535.4. Together, these standards contain the information needed to specify formats, colors, and symbols for safety signs used in environmental and facility applications. New safety accident prevention tags for temporary hazards shall meet ANSI Z535.5.

4.2   The colors red, green, yellow, yellow and black, orange, blue, and white are reserved for safety uses described herein. The color criteria for safety colors shall meet ANSI Z535.1. In addition, the following safety color designations have been used in company facilities and shall continue to be acceptable for use as safety colors for existing and new facilities:

Safety Red	RAL[1] 3000 (BS[2] 538), 9006, 9010; FS[3] 11120, 17925
Safety Green	RAL 6016, 9010; FS 14120, 17925
Safety Yellow	RAL 1018, 1021, 1023, 9005; FS 13591, 14084, 23655
Safety Orange	RAL 2000, 9005; FS 12300, 14084
Safety Blue	RAL 5015; FS 15092
Safety Black	RAL 9005; FS 14084
Safety White	RAL 9010; FS 17925

[1]   RAL indicates a German Color Register "Ausschusz fur Lieferbedingungen and Gutesicherung" (German Organization for Specifications and Certification); originally "(R)eichs(A)usschuß für (L)ieferbedingungen in 1925.

[2]   FS indicates United States Federal Color Standard (FS 595B)

[3]   BS indicates British Standard for Colors (BS 381C)

For purposes of identification and accident prevention, equipment and facilities shall be safety color-coded in accordance ANSI Z535.1, Section 6 as modified by the following:

4.2.1   Safety red shall be used as the color indicator for fire protection equipment and piping, as well as emergency stop push button devices. Specific requirements are as follows:

a)   Fire water piping: all exposed aboveground fire water piping and fittings shall be painted red.

Exceptions:

1)   Runs of aboveground outdoor fire water piping longer than 65 meters may be painted an aluminum rather than a red color; however, all valves, tees, elbows, and connected piping within 3 meters of those valves and fittings shall be painted safety red. The piping shall have a safety red band at least every 30 m. Bands shall be 0.3 m (12 inches) long.

2)   Sprinkler and deluge piping may be painted an aluminum color. However, in the header/riser piping all valves, tees, elbows, strainers, and their connected piping within 3 meters shall be painted red.

3)   Block valves to safety relief valves. Refer to 4.2.4.

b)   Fire protection equipment: fire water pumps, fire water pump control panels, portable and fixed fire protection systems, the mounting background for fire extinguishers, portable fire-fighting equipment, and shelters for portable fire-fighting equipment shall be safety red.

Exception:

CO_2 pressure cylinders are not required to be safety red.

c)   Emergency stop pushbutton devices and switches shall be safety red, per SAES-J-601. The emergency panels or boxes containing these devices are not required to be red.

d)   Safety red shall be used for the background of "DANGER" and "STOP" signs, "EMERGENCY ROOM" signs and arrows, and "EMERGENCY SHUTDOWN" signs. The lettering shall be safety white.

4.2.2   Safety green shall be used as the background color indicator for locations of emergency safety equipment. Specific requirements are as follows:

a)   Locations of emergency safety equipment, such as first aid equipment, shall be identified by green backgrounds with 100 mm border beyond the equipment outline and with safety white lettering 50 mm high within the border where practicable. Refer to SAES-B-069 for emergency eyewash and shower requirements.

b)   Where wall mounting is used, locations of permanently installed boxes for emergency equipment such as field boxes for breathing apparatus shall be marked by a safety green border or background.

c)   Locations of safety instructions shall be marked by a safety green border or background.

d)   Bellows-type pressure relief valves shall have safety green bonnets to indicate that they must have vented bonnets. Refer to SAES-J-600 and SAEP-319. For relief valve isolation valves, see 4.2.4.

4.2.3   Safety yellow or yellow and black shall be the color indicator for physical and radioactive hazards. Specific requirements are as follows:

a)   Physical hazards such as stumbling and tripping hazards and outlines of traffic aisles in shops and warehouses shall be painted safety yellow. Where additional caution is required, such as concrete supports at the base of stairways or ladders, passageway pinch points, unguarded edges, tripping hazards, barricades including access road overpass railings in plant areas, and obstructions that present bump hazards, safety yellow-and-black stripes shall be used. The stripes shall be 100 mm wide.

b)   Manhole covers and any associated concrete structure that may protrude above grade (for communications manhole covers, see 4.2.4).

c)   Radioactive hazards shall be identified by signs in safety yellow and black in accordance with GI-0150.003.

d)   "Warning" and "Caution" signs shall have black lettering on safety yellow background.

e)   Locations of plant public address systems shall be marked by safety yellow stripes on a safety black background, per SAES-T-481.

f)   Unmanned offshore platforms' top coat color shall be safety yellow. This includes the entire platform as practicable including its jacket, structural supports, decks, boat landings, piping, valves, and other equipment above the elevation of the lowest astronomical tide.

g)   Manned offshore platforms shall have jackets, spider decks, and boat landings painted solid safety yellow. Piping, decks, and other areas of manned platforms shall be painted with colors typical for onshore facilities.

Exception for f) and g):

> *Electrical and instrumentation equipment are not required to be painted yellow.*

h)   Offshore Helidecks shall meet the marking requirements of Drawing AA-036248 and shall otherwise meet the requirements of the Helicopter Chief Pilot, Aviation Department.

i)   Lifting equipment and devices such as davits, monorails, and lifting beams (whether permanent or used only for construction) shall be painted safety yellow. In offshore locations where solid yellow is for the entire structure (see f and g above) bump hazards such as swing jibs, cantilever beams, and spreader/lifting devices safety shall be marked by yellow-and-black stripes. For labeling, see 4.4 below.

j)   Emergency exit gates through fences.

4.2.4   Safety orange shall be used as the color indicator for the following:

a)   Inlet and outlet maintenance block valves for pressure relief valves and other automated emergency isolation and depressuring valves shall be painted orange.

Commentary Note:

> *This applies only to the maintenance block valves. The pressure relief valve itself should not be painted orange.*

b)   Car-sealed valves of any type shall be painted safety orange.

Exception:

> *Car-sealed valves on firewater pump systems.*

c)   Break-away spools that are used to temporarily connect utilities to process systems to process equipment shall be painted safety orange with black stripes. For other requirements, see SAES-L-310.

d)   Marine-related life safety devices such as escape capsules and flotation work vests shall be orange in accordance with international convention.

e)   Orange paint, orange dye, and orange marker tape shall be used to identify buried concrete communications ducts and manhole covers, per SAES-T-911, and SAES-T-928.

f)   Low-temperature valves purchased under 04-SAMSS-003 shall be identified by safety orange stripes, as described by 04-SAMSS-003.

4.2.5   Safety blue shall be used as the color indicator for potable water (sweet water and domestic raw water). Specific requirements: Aboveground potable water piping in plant areas shall be painted blue. Also see 4.1.3.

Exception:

This does not apply to piping in plants producing potable water, i.e., Reverse Osmosis (RO) units.

4.3   Piping and valves shall be identified as follows:

4.3.1   A label in English shall be used as the primary and explicit means of identification for the contents of all aboveground piping. A lettered label shall give the name of the contents in full or abbreviated form. Arrows shall be used to indicate direction of flow. Additional details such as temperature or pressure shall be added as necessary to highlight the degree of hazard.

4.3.2   Labels shall be applied close to valves or flanges and adjacent to changes in direction, branches, and where pipes pass over or through walls, floors, fences, or roads, and on straight pipe runs, sufficient for identification.

4.3.3   Emergency isolation and depressuring valves shall be labeled with P&ID or OSPAS valve numbers or such descriptive labeling as needed to permit easy identification.

4.3.4   Fire water system sectionalizing block valves shall be identified by their fire water system identification number.

4.3.5   The size of the label letters shall not be less than 13 mm, nor greater than 89 mm, varying in size depending on the outside diameter of the pipe. For pipes 52 mm and smaller, use stamped metal tags or signs clamped to the pipe.

For piping 52 mm and smaller running between equipment where the total length is less than 15 meters, no labeling is necessary. For piping on pipe racks, labels shall be oriented so as to be visible from grade level as well as from any nearby platform.

4.3.6   Unless otherwise specified herein, the color of the label letters shall be safety black or white, whichever provides the greater contrast to the background color.

4.4   All lifting equipment and devices shall be clearly marked with the rated capacity of the equipment in Arabic and English in metric tons to meet SAES-M-008. All lifting equipment and devices shall be safety yellow to meet 4.2.3.

4.5   Tankage and equipment shall be identified in Arabic and English as follows:

Letters shall be at least 150 mm high. Labels or signs shall be painted at 90 degree intervals around the tanks or equipment at an elevation (line-of-sight and visible from outside the diked area). Letters shall be a size easy to read from normal approach directions and distance. Refer to ANSI Z535.2.

4.6   For tanks equipped with fixed foam protection, lateral terminals shall be labeled per SAES-B-018.

Revision Summary

30 November, 2003   Revised the "Next Planned Update". Reaffirmed the contents of the document, and reissued with minor changes.

GASOLINE (PREMIUM UNLEADED)
Orange base stripe with white band

GASOLINE (SUPER PREMIUM UNLEADED)
Orange base stripe with blue band

LP GAS
Orange base stripe with oxide red

KEROSENE
Oxide red band with green stripe

DIESEL OIL (WHITE)
Oxide Red band with white stripe

DIESEL OIL (BLACK)
Oxide red band with black stripe

FUEL OIL
Black band with yellow stripe

ASPHALT
Black band with green stripe

STABILIZED SWEET CRUDE
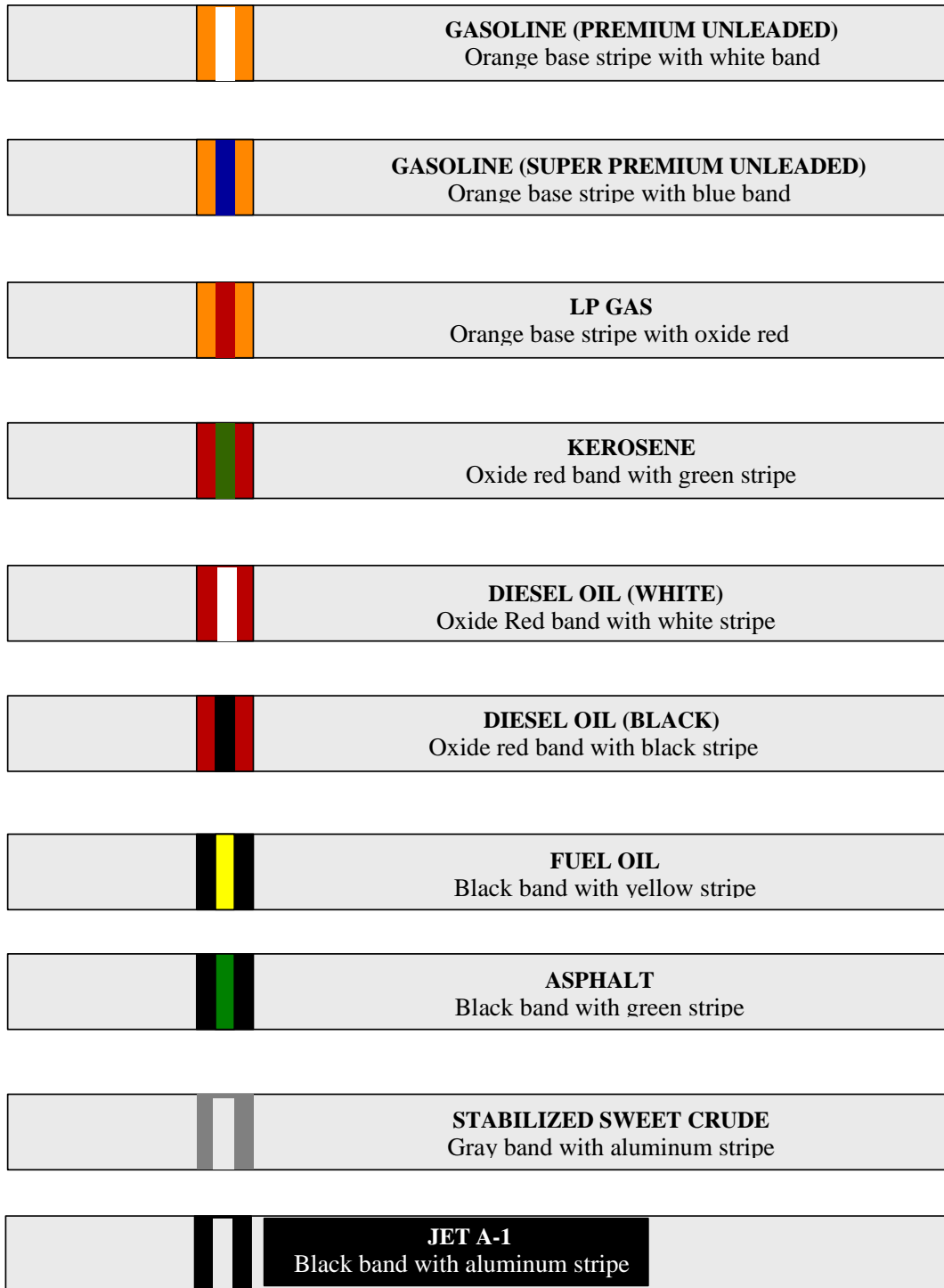Gray band with aluminum stripe

JET A-1
Black band with aluminum stripe

Figure 1 – Marking Product Truck Transfer Points (See Table 1)