

**CONSTRUCTION AND MAINTENANCE PAINTING
USE OF PAINT COLORS IN SAFETY****PAGE 1****9-1 Plant Safety Color Code.**

9-1.1 General. The use of color to identify and emphasize danger spots and safety equipment locations in industrial plants has been widely accepted within the past few years. The use of color for identifying danger areas should not replace, however, the proper guarding or elimination of hazardous conditions. Instead, color should be considered a supplement to proper safety practices.

Color markings should be kept to a minimum, since overuse may defeat the purpose of the code. Proper use will result in more attention being given those locations marked in color.

See Alcoa Engineering Standard 16.1.1, "Identification of Piping Systems" in the Appendix.

In an attempt to provide a uniform system throughout industry, the American National Standards Institute, Inc., has adopted the safety color code prepared by the National Safety Council. This ANSI Standard Z53.1-1967 is entitled "Safety Color Code for Marking Physical Hazards and the Identification of Certain Equipment." It is available from the American National Standards Institute, Inc., 1430 Broadway, New York, New York 10018. The above standard has been adopted by Alcoa and is used in areas as designated by plant safety personnel. Some plants have their own safety color standards which will take precedence over these. A brief description of Alcoa's standard follows:

9-1.2 Safety Color Code.

Red. Red should be used as the basic color to identify:

1. Fire protection apparatus and equipment.
2. Danger areas.
3. Stop signals.

Orange. Orange should be used as the basic color for designating either dangerous parts of machines or energized equipment which may cut, crush, shock or otherwise injure personnel. It is also used to designate temporary hazards such as open enclosure doors, and removed guards from gears, belts, etc.

Yellow. Yellow should be the basic color for identifying caution areas and physical hazards which persons could strike against, fall or trip over or get caught between. Solid yellow, yellow and black stripes, or yellow and black checkers may be used.

Green. Green should be the basic color for identifying the location of safety and first-aid equipment (other than fire fighting equipment). Examples of areas where green should be used are:

1. Safety bulletin boards.
2. Gas masks.
3. First aid kits.
4. First aid dispensary.
5. Stretchers.
6. Safety deluge showers.

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Blue. Blue should be the basic color to identify equipment under repair or being worked on which may not be started, used or moved. Warnings, such as painted barriers, flags, signs, etc., should be located at the starting point, power source or at both locations.

Purple. Purple should be the basic color for designating radiation hazards. Yellow should be used in combination with purple for markers such as tags, labels, signs and floor markings.

Black and White or Combinations Thereof. Black, white or a combination thereof should be the basic color to designate traffic lanes and for housekeeping and sanitation areas. Solid white, solid black, single color stripping, alternate strips of black and white or black and white checkers may be used.

Paint Materials. The paint materials used for safety painting will depend on the surface to be painted and the type of exposure present. Generally, the underlying paint materials should be as indicated in the Painting Systems Chart (section 6-2) for the various surfaces and exposures. The safety paint should always be compatible with the paint system over which it is applied. The du Pont paints listed below are acceptable for normally dry, interior or exterior metal surfaces. In corrosive atmospheres use Aquapon (PPG). Any paints selected should have colors that will approximate those listed below.

Color	Paint Brand Name	du Pont Safety	Aquapon Stock Number
		Color Code Enamel Stock Number	
Orange	"Dulux" Safety Color Code Enamel	81-23662	UC-40064
Yellow	"Dulux" Safety Color Code Enamel	81-23663	UC-40072
Red	"Dulux" Safety Color Code Enamel	81-23664	UC-40063
Blue	"Dulux" Safety Color Code Enamel	81-23665	UC-40067
Green	"Dulux" Safety Color Code Enamel	81-23666	UC-40071
Purple	"Dulux" Safety Color Code Enamel	Equal parts of 81-23664 & 81-23665	Equal parts of UC-40067 and UC-40063
White	du Pont Traffic Paint	112-8065	-
Yellow	du Pont Traffic Paint	112-8049	-
Black	du Pont Black Paint	353-773	UC-40074

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9-1.3 Crane Safety Color Code.

Steel Cranes. All surfaces of steel cranes that can be painted should be painted a solid yellow as a finish coat. Black diagonal stripes should then be painted over the yellow finish coat in accordance with local plant requirements. When plant requirements have not been set, these stripes over aiseways should be four inches wide on eight-inch centers (both dimensions measured perpendicular to the centerline of the stripe). Although similar strips should be painted on the blocks, the width of these stripes will vary with the size of the block. Not less than three stripes should be painted on each face of the block. Hooks should be painted solid yellow.

The yellow paints used as finish coats should be as listed in the Painting Systems Chart (section 6-2). The black stripes should be painted with Aquapon enamel #UC-40074 (manufactured by PPG Industries, Inc.).

Aluminum Cranes. The main body of aluminum cranes is not normally painted. However, the blocks should be striped as indicated above for steel cranes and the hooks should be painted yellow. Paint materials should be as indicated above for steel cranes.

9-2 Aircraft Obstruction Marking and Lighting.

9-2.1 General. Obstructions which present a hazard to air traffic are painted or marked to warn pilots during daylight hours. Such obstructions are either painted to make them visible from aircraft at any normal angle of approach or marked with flags or markers to indicate the general definition or location of the obstruction.

Although not a painting problem, it should be remembered that lights are necessary on obstructions during periods of limited visibility or complete darkness. Lights are used to accomplish the same task as markings. At least one light must be visible from an aircraft at any normal angle of approach unless otherwise noted. A light must be placed at the highest point or at the top of the obstruction.

The proper method of determining, marking and lighting obstructions to air navigation is provided in the Federal Aviation Administration (FAA) Advisory Circular AC70-7460-1 Change 3, or latest change, entitled "Obstruction Marking and Lighting" (available from Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402). When any planned Alcoa structure appears to be an obstruction as described in the paragraphs to follow, the FAA must be given notice. Such notification is normally handled through the Electrical Engineering Division. The FAA will then make an aeronautical study to determine what markings will be necessary. No detailed plans for either marking or lighting possible obstructions should be made until the FAA has completed their study and outlined the specific requirements for the case.

The following paragraphs describe the general procedures followed for determining the need for marking, along with the types of marking normally used. They are to be used as a general guideline only.

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9-2.2 Determination of Hazardous Conditions.

Notice must be given when structures are planned which will exceed the following heights at distances indicated from landing areas. (Heights are measured above highest natural surrounding ground or mean water level, whichever is the higher.)

- 1 mile - 60 foot height
- 2 miles - 110 foot height
- 3 miles - 150 foot height

In addition, the above heights may apply if the structure is in or near a natural airline or navigable water. A natural airline is any airline along which planes travel regularly or irregularly. Navigable water is any water suitable for landing or take-off of float aircraft.

9-2.3 Marking Standards.

1. Obstructions should be marked with markers when it is impractical to mark the obstructions by use of surface colors, or it has been determined that markers are required in addition to surface marking to properly define an obstruction. The shape of such markers should be distinctive enough to distinguish them from markers used for other purposes, and they must not increase the hazard of an obstruction.
2. Flags are used to mark obstructions when it has been determined that neither surface color marking nor markers are practicable. Flags should be rectangular in shape and have stiffeners to keep them from drooping during calms. Flag stakes should be of sufficient strength and height to support the flags above the ground, vegetation, or nearby surfaces.
3. Flags should be one of the following patterns:
 - A rectangle not less than two feet on a side colored a solid aviation orange.
 - Two triangular sections, one of aviation surface orange and the other of aviation surface white, combined to form a rectangle not less than two feet on a side.
4. Obstructions which project in a vertical plane and having both dimensions less than 5 feet should be colored aviation surface orange.

5. Colors shall be:

Aviation Surface Orange - Federal Color No. 12197

Aviation White - Federal Color No. 17875

6. Towers, poles, smokestacks, and similar obstructions, as well as buildings of certain shape and dimensions, may have essentially unbroken surfaces. If the projection of such an obstruction in any vertical plane is 5 feet or more in one dimension and less than 15 feet in the other dimension, or if any skeleton or smokestack-type obstruction has both dimensions 5 feet or more, it should be painted to show alternate bands of aviation surface orange and white. Bands should be perpendicular to the major axis of the obstruction with the bands on

each end painted orange. The widths of the bands should be equal and approximately $1/7$ of the length of the major axis of the obstruction, provided no band is wider than 40 ft. nor less than $1-1/2$ ft.

7. Water towers, grain elevators, gas holders, and similar obstructions, as well as buildings of certain shape and dimensions having essentially unbroken surfaces, the projection of which on any vertical plane is 15 ft. or more in both dimensions, should have their top and vertical surfaces painted to show a checkerboard pattern of alternate rectangles of aviation surface orange and white.
8. If any of the above painting systems is impracticable, normally one of the other painting systems is permitted in preference to marking with either markers or flags (as outlined above). Any painted surfaces should be cleaned in a satisfactory manner and/or repainted, as necessary, to maintain good visibility.

Paint systems should be selected from section 6-2. It should then be determined whether the paint selected for the intermediate and finish coats can be made in the aviation colors. If not, it must then be decided whether a less-enduring system of the required colors should be used or whether the aviation marking should be applied over the protective paint system. The following color-paints (alkyds), suitable for weather exposure only, not corrosive atmospheres, are readily available:

Orange - Aerox International Orange, Wyandotte Chemicals Corp.; High Gloss #559, Rust-Oleum Corp.; du Pont Dulux #526, E. I. du Pont de Nemours & Co.

White - Aerox International White, Wyandotte Chemicals Corp.; High Gloss #2766, Rust-Oleum Corp.; Exterior White #28-644, E. I. du Pont de Nemours & Co.

Two coats of orange should be applied. One intermediate coat of flat or semi-flat white should be applied prior to the use of the above white finish. White surfaces should be painted first and permitted to dry before application of the orange—to prevent bleeding at their junction.

Concrete stacks should be painted with the Re-New-Coat two-coat system No. 46 (Refer to section 6-2.2, Notes 16 and 32). Both International White and International Orange colors are available for special order in batches of 100 gallons or more.

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