AEROSPACE RECOMMENDED PRACTICE

Submitted for recognition as an American National Standard

EMERGENCY PLACARDING - INTERNAL AND EXTERNAL

1. SCOPE:

This SAE Aerospace Recommended Practice (ARP) provides criteria for the development and standardization of placards containing easily understood signs, symbols, and/or instructions for locating and operating exits and emergency equipment which might be used or operated by cabin occupants and rescue personnel under emergency conditions. In addition, this ARP gives guidance in the selection and development of warning labels. The placards are intended to be seen and understood by occupants within and, in the case of external exit placards, by persons outside the airplane.

2. REFERENCES:

2.1 Applicable Documents:

The following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other documents shall be the issue in effect on the date of the purchase order.

2.1.1 SAE Publication: Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

2.1.1.1 ARP503   Emergency Evacuation Illumination

2.1.2 ANSI Publications: Available from American National Standards Institute, Inc., 11 West 42nd Street, New York, NY 10036.

2.1.2.1 ANSI Z535.1 through Z535.4 Standards having to do with Safety Signs and Colors, published by the American National Standards Institute, NYC, NY 1991

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2.1.3   AIA Publications: Available from Aerospace Industries Association, 1250 Eye Street NW, Washington, DC 20005.

Standards for Symbology and Graphic Signage Aboard Commercial Aircraft, TARC Project 211-1, 1982

2.1.4   Other Publications:

2.1.4.1   McCormick, E. J.: Human Factors in Engineering and Design, 4th ed. McGraw-Hill Book Company, New York, NY 1976

2.1.4.2   Miller, J., Frantz, J., and Rhoades, T.: A Model for Designing and Evaluating Product Information, published in the 1991 Proceedings of the Human Factors Society, pp. 1063-1067, P.O. Box 1369, Santa Monica, CA 90406

2.1.4.3   MIL-M-18012 - Markings for Aircrew Station Displays Design and Configuration Of, July 20, 1964

2.1.4.4   Murrell, K. F. H.: Ergonomics: Man in His Working Environment, Chapman and Hall, London, 1965

2.1.4.5   Van Cott, H. P., R. G. Kindcade (eds.): Human Engineering Guide to Equipment Design, rev. ed., U.S. Government Printing Office, Washington, DC, 1972

2.1.4.6   Woodson, W. E. and D. W. Conover: Human Engineering Guide for Equipment Designers, 2nd ed., University of California Press, Berkeley, 1964

3.   DEFINITION:

3.1   As used in this ARP, emergency placarding is any durable visual intelligence, fixed in place, which provides instructions for locating and/or operating airplane exits and emergency equipment. Emergency equipment includes slides and other escape devices, life rafts, fire extinguishers, life jackets, oxygen masks, and such other items as might be used or operated under emergency conditions.

Emergency equipment placards are comprised of locational placards which identify the location of emergency equipment, and instructional placards which provide instructions on emergency equipment operation.

A warning, within the context of this ARP, is any placard which alerts a user to the presence of a hazard, thereby triggering the processing of additional information regarding the nature, probability, and magnitude of the hazard. This additional information may be within the user's memory or may be provided by other sources, such as written or pictorial instructions or instructions from a crew member.

4.   INFORMATION PRESENTATION:

4.1   When possible, pictorial presentations shall be used to convey information on equipment location and operation.

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4.2   A written message shall be used if pictures alone are inadequate to provide the information, or if the words increase the understanding of the placard. Unnecessary words shall be avoided.

4.3   Emergency placards shall be conspicuous either by:

   a.   Making the color of the placards different from the background
   b.   Lighting the placard
   c.   Placing a border around the placard

   Letters, characters, and pictures shall appear upright to the intended user.

4.4   Illumination of placards shall be in accordance with Reference 2.1.1.1.

5.   WRITTEN INSTRUCTIONS:

5.1   Written instructions shall be aligned such that they are read in the correct order. When phrases are separated then some method, such as the use of numbers or arrows, shall be used to indicate reading order.

5.2   Abbreviations shall be avoided.

5.3   Letters or numerals shall comply with the following recommendations (see Reference 2.1.4.1:

   a.   No flourishes shall be used
   b.   Critical details shall be simple and prominent
   c.   Character features such as openings and breaks shall be readily apparent
   d.   Stroke width-to-height for black letters on white background shall be between 1:6 and 1:8. When white letters on a black background are used, the stroke width-to-height shall be between 1:7 and 1:10.
   e.   Letter width-to-height shall be between 1:1 and 1:5
   f.   Numeral width-to-height shall be 3:5
   g.   The letter "I" and the numeral "1" shall be consistent with the stroke width-to-height ratio of the characters selected

   Suggested styles are NAMEL (see Figure 2), Gothic, Spartan, Futura, and Helvetica Medium.

5.4   Capital letters shall be used for locational placards. Either all capitals or capital and lowercase letters may be used on instructional placards.

5.5   Short sentences with short, easily understandable words shall be used.

6.   PICTORIAL INSTRUCTIONS:

6.1   The order in which pictorial instructions are to be read shall be indicated by numbers, arrows, etc.

6.2   Pictorial instructions shall display the intended information in a realistic rather than an abstract manner.

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6.3 Distortion of pictorial displays shall be used if necessary to increase understanding of the message.

6.4 If distortion of pictorial displays is necessary for space saving, the distortion shall not degrade the understanding of the message.

7. MINIMUM-SIZED PICTURES AND WORDS:

The minimum letter height and size of, or distance between, elements of a picture shall subtend at least 20 min of arc under favorable visual conditions, at least 37 min of arc under moderate visual conditions, and at least 50 min of arc under poor visual conditions (see Figure 1).

LETTER HEIGHT OR MINIMUM DISTANCE
BETWEEN ELEMENTS OF A PICTURE VIEWED AT 28 INCHES

LETTER	.40"		X
HEIGHT	.30"	X	
	.16" X		
MINUTES OF ARC =	20	37	50
VIEWING CONDITION =	FAVORABLE	MODERATE	POOR

FIGURE 1

For other viewing distances, letter heights (and distances between elements, in inches) can be calculated for the various viewing conditions using the formula:

$$Visual\ Angle\ (minutes\ of\ arc) = \frac{(3438)(Letter\ Size)}{Viewing\ Distance} \qquad (Eq.1)$$

A favorable visual condition is one in which the illumination is greater than 1 ft-c, the contrast between the words or pictures and background is high (such as black figures on white background), the reflectance of the background is high (85% or more), and the time allowed for seeing is adequate. Moderate or poor visual conditions occur when some or all of these conditions (illumination, contrast, reflectance, time) are degraded. Minimum letter size, placard illumination, and figure-to-background contrast are established in Reference 2.1.1.1.

8. COLOR OF PLACARD AND BACKGROUND:

To be legible the pictures or words must be of a different color than the background. Some color combinations are more legible than others. It is generally recommended that the picture or word be of a darker color than the background, since this combination is more legible than the reverse. However, light on dark may be used if other factors are considered more important than a minor loss in legibility. Table 1 lists a few common colors which have been rated for legibility when used with other colors.

TABLE 1 – Relative Legibility of Some
Color Combinations Under Reflective Light

Legibility Rating	Color Combination
Good	Black on white (best)
	Black on yellow
	White on black
	Dark blue on white
	Grass green on white
Fair	Red on white
	Red on yellow
Poor	Green on red
	Red on green
	Orange on black
	Orange on white

Note also that the different color shades and saturation could increase or decrease the legibility rating of some combinations.

9. LOCATION:

9.1 Locational Placards:

9.1.1 Locational placards shall be visible to those required to use them.

9.1.2 Locational placards shall be placed on any enclosure housing the equipment. The placards shall be visible from all normal directions of approach.

9.1.3 Locational placards situated away from equipment shall indicate the direction to the equipment.

9.1.4 Locational placards referring to two or more different pieces of equipment should not be placed close together. If such placards must be close together then presentation format of the placards shall be different.

9.2 Instructional Placards:

9.2.1 Instructional placards shall be located on or close to the equipment for which they are intended.