



AEROSPACE STANDARD

AS6896™

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Aircraft Markings for Ground Support Equipment Alignment

RATIONALE

Creation of a standard for aircraft markings that can be used by all ground support equipment that dock to aircraft doors.

AS6896 has been reaffirmed to comply with the SAE Five-Year Review policy.

INTRODUCTION

Damage to aircraft during ramp operations accounts for considerable costs and delays, as well as increasing the risk of in-flight failures. Equipment that docks to the aircraft is a major cause of this damage. Use of enhanced ground support equipment (GSE) reduces this damage and the use of the standardized alignment markings as described in this document is an industry initiative to further reduce the risk of GSE damaging the aircraft by improving the GSE docking and aircraft handling operations.

The design of the markings is being defined so that they can be used by a variety of technologies available for GSE: either as basic as simple visual aids for the human eye to manually dock the GSE, or for use by optical systems for operator assistance or even fully automated GSE docking.

1. SCOPE

The purpose of this document is to provide a standard for aircraft fuselage markings located at the doors used for ground servicing operations. These markings can be used by all GSE that will dock at the aircraft.

These markings may be used for one or several phases of the GSE positioning relative to the aircraft process: GSE alignment during approach, GSE final docking, and GSE auto leveling.

It is not the purpose of this standard to describe the different technologies, cameras, or other equipment that can be mounted on GSE to utilize these markings.

The aircraft that may use these markings will have a fuselage diameter of 3 m or more.

2. APPLICABLE DOCUMENTS

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

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Documents

Standard, visit Sharing Hub

2.1 ASTM Publications

Available from ASTM International, 100 Bar Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM E810 Standard Test Method for Coefficient of Retroreflection of Retroreflective Sheeting Utilizing the Coplanar Geometry

2.2 CIE Publications

Available from CIE Central Bureau, Babenbergerstrasse 9/9A, 1010 Vienna, Austria, Tel: 43 1 714 31 87, www.cie.co.at.

CIE Publication No. 54 Retroreflection - Definition and Measurement

2.3 Other Publications

Airbus Material Specifications AIMS 10-13-010

Boeing Material Specifications BMS 10-26

RAL colors: <https://www.ral-farben.de/en/home/>

3. MARKINGS - REQUIREMENTS

The markings shall be compliant with AIMS 04-16-002 and AIMS 10-13-010 (Airbus adhesive film markings and reflective adhesive films material specifications) or with BMS 10-26 (Boeing Material Specification).

The markings shall only utilize a black-white scheme:

- The black areas of the marking shall be RAL 9005 – JetBlack.
- The white areas of the marking shall be reflective and compliant with the requirements listed below.

3.1 Retro-Reflectivity

The coefficient of retro-reflection (for material reflectance) shall be tested according to ASTM E810:

- The samples used to confirm retro-reflectivity compliance shall be tested with all the surface treatments applied as if they were attached to the aircraft and fully compliant with the airframe manufacturers' specifications.
- Sample tested shall be only reflective with no pattern.
- Sample size shall be 100 x 100 mm.

The coefficient of retro-reflectance shall be at least of the value specified in Table 1.

- a. For blue ($455 \text{ nm} \pm 20 \text{ nm}$) and red ($660 \text{ nm} \pm 20 \text{ nm}$) wavelengths (visible light), the base value for the retro-reflectance is 300 candela per lux per square meter ($\text{cd} \cdot \text{lx}^{-1} \cdot \text{m}^{-2}$). The ratios depending on observation and entrance angles are described in Table 1.
- b. For Infrared (IR) range ($850 \text{ nm} \pm 20 \text{ nm}$ wavelength), the base value for the retro-reflectance (radiance) is 49 watt per steradian per square meter ($\text{W} \cdot \text{sr}^{-1} \cdot \text{m}^{-2}$). The ratios depending on observation and entrance angles are described in Table 1.

Table 1 - Requirements for successful sample test in blue and red wavelengths

Observation Angle Entrance Angle	0.2 degree	1 degree	2 degrees
5 degrees	Base value (visible or IR)	Base value/4.5	Base value/60
15 degrees	$\pm 15\%$	$\pm 15\%$	$\pm 15\%$
30 degrees	$\pm 15\%$	$\pm 15\%$	$\pm 15\%$
45 degrees	$\pm 15\%$	$\pm 15\%$	$\pm 15\%$

NOTE: The observation angle is a function of the distance between the light source and the detector, and the distance to the reflector patch. The entrance angle is the angle between the detector and the surface normal of the reflector patch. The IR test shall be done using a light source with a narrow spectral distribution.

4. MARKINGS - PATTERN DESIGN

The pattern design of the markings shall be as follows:

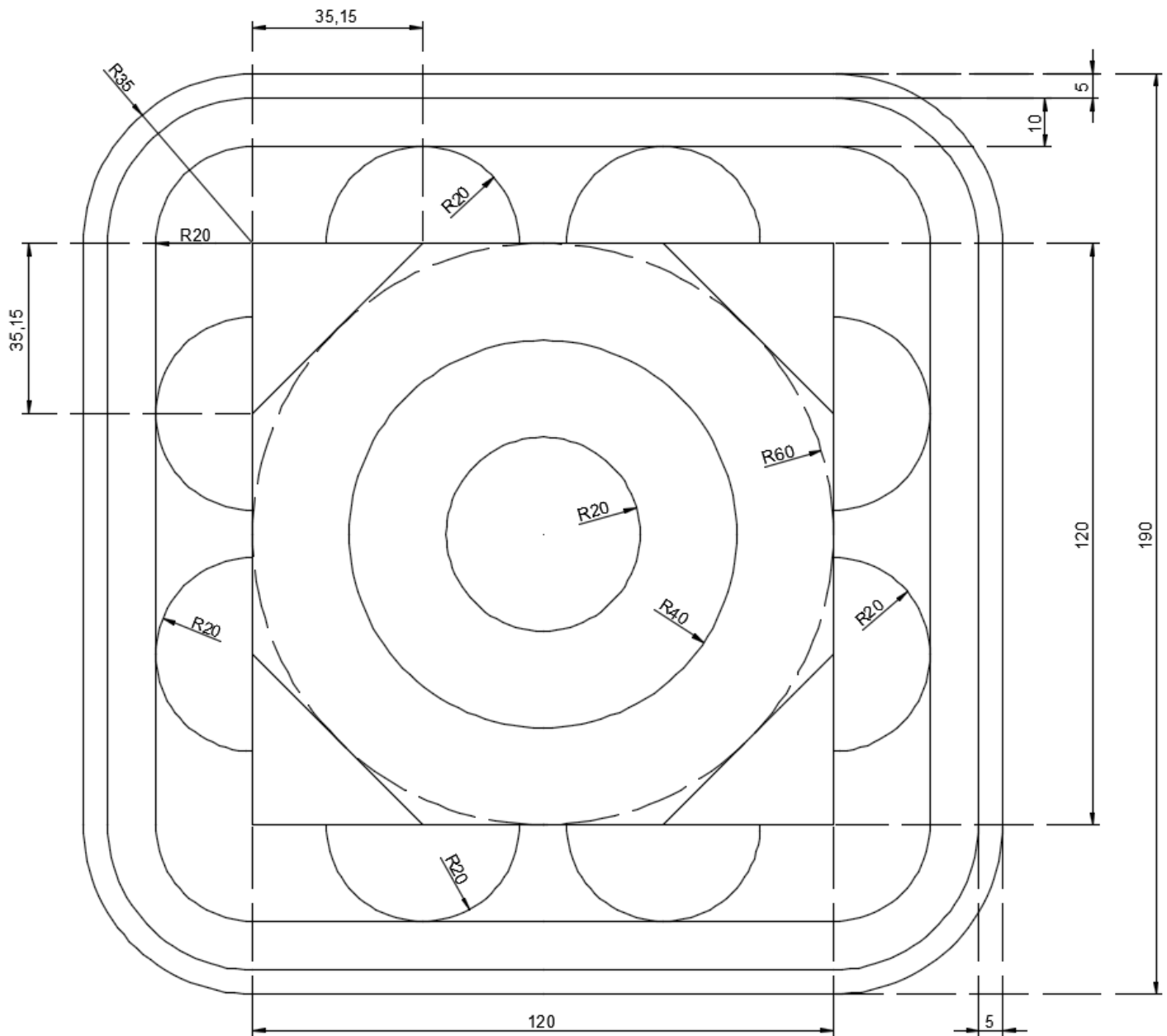


Figure 1 - Pattern design template (dimensions in mm)