KSC-STD-E-0015
Revision B, Change 2

MARKING OF GROUND SUPPORT EQUIPMENT,

STANDARD FOR

October 20, 2020

Engineering Directorate

National Aeronautics and
Space Administration

John F. Kennedy Space Center

KSC FORM 16-12 (REV. 6/95) PREVIOUS EDITIONS ARE OBSOLETE (CG 11/95)
KDP-KSC-T-5407 Rev Basic

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Approved by:

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October 20, 2020

JOHN F. KENNEDY SPACE CENTER, NASA

RECORD OF REVISIONS/CHANGES

REV LTR	CHG NO.	DESCRIPTION	DATE
		Basic issue.	
A		General revision.	March 5, 1990
B		General revision.	July 24, 1992
	B-1	Administrative changes.	November 25, 1992
	B-2	Updated section 2, Applicable Documents.	October 20, 2020

CONTENTS

FIGURES

1. SCOPE

This standard establishes the requirements and methods for marking ground system used at the John F. Kennedy Space Center (KSC).

2. APPLICABLE DOCUMENTS

The following documents of the issue in effect on date of invitation for bids or requests for proposal form a part of the standard to the extent specified herein. In the event of conflict between the documents referenced herein and the contents of this standard, the contents of this standard shall be considered a superseding requirement.

Copies of the documents are available from the NASA Technical Standards website (http://standards.nasa.gov), any NASA installation library or documentation repository, or from the procuring activity.

The following documents form a part of this document to the extent specified herein.

A-A-00208	Commercial Item Description, Ink, Marking, Stencil, Opaque (Porous and Non-Porous Surfaces)
A-A-56032	Commercial Item Description, Ink, Marking, Epoxy Base
ASTM B121/B121M	Standard Specification for Leaded Brass Plate, Sheet, Strip, and Rolled Bar
GG-P-455	Plates and Foils, Photographic (Photosensitive Anodized Aluminum)
IPC CC-830	Qualification and Performance of Electrical Insulating Compound for Printed Wiring Assemblies
KSC-DE-512-SM	Ground Systems Development Standard
SAE AMS-T-21595	Tapes, Pressure-Sensitive Adhesive, Masking, Non-Staining – for Aircraft Painting Applications

3. REQUIREMENTS

3.1 General Requirements

3.1.1 Character Style

a. Unless otherwise approved by the design activity, all characters shall be uppercase Gothic, straight line (i.e., sans serif) as shown in Figure 1.

b. Roman numerals shall be uppercase serif as shown in Figure 1.

c. Lowercase characters and Roman numerals shall not be used except in cases where uppercase nomenclature would be ambiguous.

3.1.2 Character Spacing

The spacing between straight line characters shall be visually balanced.

3.1.3 Character Line Width

The character line width (i.e., the width of the individual marks forming the character) shall be 1/16 to 1/8 of the character height, with the exception of 12.70 millimeter (0.50 inch) characters, which shall be 1/12 to 1/10 of the character height.

3.1.4 Character Height

Character height shall be selected from Figure 1 and shall be in accordance with the character heights specified in Figure 2.

3.1.5 Word Spacing

The spacing between words or groups of characters shall be 5/8 to 3/4 of the character height.

3.1.6 Tolerances

Tolerances shall be ±0.25 millimeter (±0.01 inch) on three-place decimals and ±0.76 millimeter (±0.03 inch) on two-place decimals.

3.1.7 Colors

a. Unless otherwise specified, character color shall be black on light colored backgrounds and white on dark colored backgrounds.

b. Warnings for personnel safety shall be red.

c. For legend lights, black filler shall be used on white and amber lenses and white filler shall be used on red and green lenses.

3.1.8 Permanency and Legibility

a. The marking shall be as permanent as the normal life expectancy of the item to which it is applied.

b. The marking shall be capable of withstanding the natural or artificial environment of the item to which it is applied, in accordance with KSC-DE-512-SM.

c. Legibility shall be of the quality required for ready readability and identification.

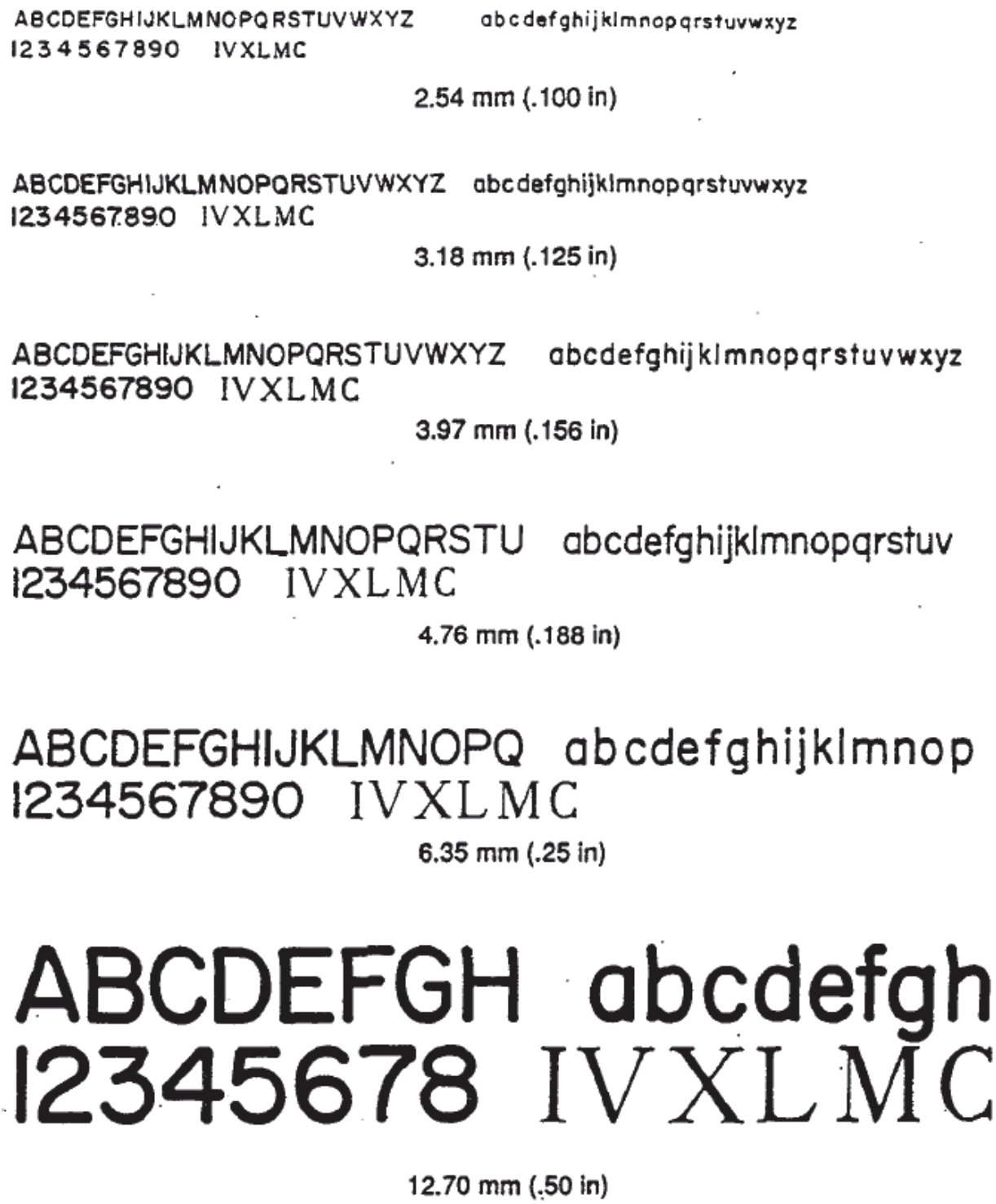

Figure 1. Letter Style and Sizes

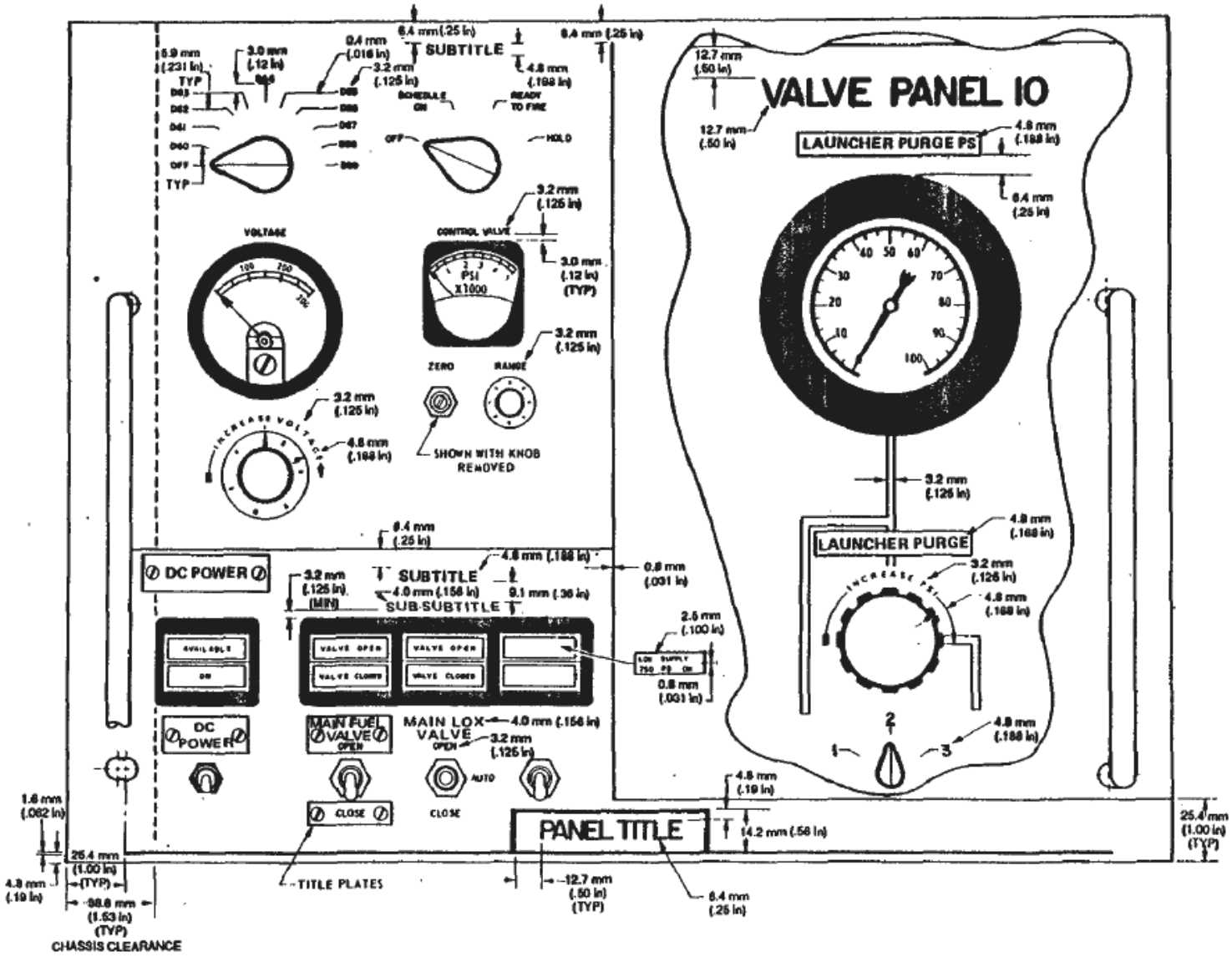

Figure 2. Sample Panel

3.2 Detailed Requirements

3.2.1 Silk Screening

The silk screening process shall be in accordance with the fabricator's normal silk screening methods, provided that the methods used are approved by the procuring organization and in accordance with this standard.

3.2.1.1 Materials

a. Silk screening materials shall be compatible with the background surface, prepared so that legibility will be retained under normal conditions, and capable of being removed from the materials without damage to the surface finish.

b. When the surface is finished with enamel or lacquer, the silk screening paint shall be a synthetic, flexible, waterproof, baked enamel designed and prepared especially for silk screen applications (e.g., Nazdar 59000 series enamel screen ink).

c. Epoxy base materials shall be applied on epoxy-compatible surfaces only.

3.2.1.2 Adherence

Thoroughly cured markings shall not be removable by the application and stripping of masking tape as specified in SAE AMS-T-21595, but the markings shall be capable of being removed by other means without damage to the surface finish.

3.2.1.3 Coating of Characters

If specified on the individual design drawings, ink characters shall be covered with a clear, room drying compound in accordance with IPC CC-830.

3.2.1.4 Workmanship

The final markings shall be free from ragged edges, wrinkles, scratches, unbalance of characters, excess marking material, mesh markings, and air bubbles.

3.2.2 Engraving

Engraving of front panels and terminal boards is used where permanency of marking is required and changes are unlikely to occur.

3.2.2.1 Engraving Layout

a. Nomenclature, lines, and other markings shall be located in accordance with Figure 2 or the applicable design drawing.

b. Machine accuracy of location, centering (unless otherwise dimensioned on the drawing), and balance of characters shall be the criteria for good workmanship.

3.2.2.2 Reverse Engraving

Where transparent material is engraved on the rear side, reverse copy type shall be used.

3.2.2.3 Cutter

a. A 60-degree, V-type cutter or laser cutter shall be used to engrave nomenclature and thin lines.

b. To prevent excessive depth using the V-type cutter, broad lines shall be engraved with a truncated cutter (ground-off tip).

3.2.2.4 Engraving Depth

For the specified line width, the depth of the groove shall not exceed 1/2 of the material thickness.

3.2.2.5 Filler

After engraving, the grooves shall be filled with an approved oil-based monogram filler.

3.2.2.6 Workmanship

The final markings shall be free from sharp or ragged edges, unbalance of characters, non-uniform line width, double engraving, and smearing of the filler.

3.2.3 Rubber Stamping

Rubber ink stamping shall only be used to identify detailed parts and components, and aid in the assembly and troubleshooting of equipment.

3.2.3.1 Character Location

a. Identifying drawings and dash numbers of detailed parts shall be stamped in the locations specified on drawings.

b. When no location is shown and for “short sign” identification of components, characters shall be placed on the part or on the mounting structure as near as possible to the component.

c. The marking shall be visible after assembly.

3.2.3.2 Cleaning

The surface to be stamped shall be thoroughly cleaned prior to stamping.

3.2.3.3 Characters

Unless otherwise specified, character height shall be 3.18 millimeters (0.125 inch).

3.2.3.4 Ink

Ink used for rubber stamping shall be in accordance with A-A-00208 or A-A-56032.

3.2.3.5 Coating of Characters

When ink is used in accordance with A-A-00208, characters shall be covered with a clear, room drying compound in accordance with IPC CC-830.

3.2.3.6 Workmanship

Rubber stamping shall be free from excessive ragged edges, closed or illegible characters, and excessive ink.

3.2.4 Stenciling

Stenciling shall only be used to identify detailed parts and components, or to identify jacks and plugs on the backsides of chassis or patch racks.

3.2.4.1 Character Location

a. Identifying drawings and dash numbers of detailed parts shall be stenciled in the locations specified on drawings.
b. When no location is shown and for “short sign” identification of components, characters shall be placed on the part or on the mounting structure as near as possible to the component.
c. The marking shall be visible after assembly.

3.2.4.2 Cleaning

The surface to be stenciled shall be thoroughly cleaned prior to stenciling.

3.2.4.3 Characters

Unless otherwise specified, character height shall be 3.18 millimeter (0.125 inch).

3.2.4.4 Ink

Ink used for stenciling shall be in accordance with A-A-56032.

3.2.4.5 Stencils

Marking stencils shall made from ASTM B121/B121M, alloy 4, half hard, brass sheet, 0.38 millimeter (0.015 inch) thick.

3.2.4.6 Spray Guns

Ink shall be sprayed with an air or airless spray gun or airbrush system.

3.2.4.7 Workmanship

Stenciling shall be free from ragged edges, closed or illegible characters, and excessive ink.

3.2.5 Die Stamping

Die stamping shall only be used to identify detailed parts and components that are not susceptible to deformation.

3.2.5.1 Filler

Filler is not required for die stamping, unless specified by the design activity.

3.2.5.2 Coating of Characters

When specified on drawings, characters shall be covered with a clear, room drying compound in accordance with IPC CC-830.

3.2.6 Photoetching

Photoetching is the preferred method for marking front panels and faceplates, and may be used for applications that are not required to use a specific marking method as specified in this standard.

Photoetch plates and foils shall be in accordance with GG-P-455.

3.2.7 Hot Stamping

a. Hot stamping shall only be used for marking plastic identification plates, tags, and tapes.
b. Unless otherwise specified, all characters shall be 3.18 millimeter (0.125 inch).

3.2.8 Identification Plates

a. Metal identification plates, as defined in 75M50393, shall be die stamped using a flat-type die with an impression depth not to exceed 0.25 millimeter (0.010 inch).

b. Adhesive-backed aluminum foil identification plates, as defined in 75M50393, shall be photoetched or stamped with a typewriter.

3.2.9 Welding

For large steel or aluminum structures where identification plates are not appropriate, welding shall be utilized for marking.

The identification characters shall be sized appropriately for each application, with a minimum character height of 6 millimeter (0.25 inch).

3.2.10 Castings and Forgings

a. Characters on castings and forgings shall be raised or depressed 0.25 millimeter (0.01 inch) to 3.18 millimeter (0.125 inch) on non-machined surfaces.

b. Character size shall be specified on the drawing.

4. QUALITY ASSURANCE PROVISIONS

a. The supplier is responsible for the performance of all inspection requirements specified herein.

b. Except as otherwise specified, the supplier may utilize its own or any other inspection facility or service acceptable to KSC that is covered by an inspection or quality control plan in accordance with the provisions of the contract or procuring document.

c. Inspection and test records shall be kept complete, and upon request, made available to the procuring activity or its designated representative in accordance with the provisions of the contract or procuring document.

d. The procuring activity or its designated representative reserves the right to perform any or all of the inspections set forth in this standard to ensure that the end item conforms to the prescribed requirements.

5. NOTES

5.1 Intended Use

This standard is intended to establish uniform engineering practices and methods of marking GSE for identification at KSC.

Contract documents should cite this specification by number, title, and date. Drawings should cite this specification by number in a general note.

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