

INCH-POUND

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DEPARTMENT OF DEFENSE STANDARD PRACTICE

IDENTIFICATION CODING AND APPLICATION
OF HOOKUP AND LEAD WIRE



MIL-STD-681F

FOREWORD

1. This standard is approved for use by all Departments and Agencies of the Department of Defense.
2. Comments, suggestions, or questions on this document should be addressed to Commander, DLA Land and Maritime, ATTN: VAI, P.O. Box 3990, Columbus, Ohio, 43218-3990 or emailed to WireCable@dla.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at <https://assist.daps.dla.mil>.

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1. SCOPE

1.1 Scope. This standard establishes identification coding systems for all insulated hookup and lead wire used in electrical and electronic equipment by the Departments of the Army, Navy, and Air Force. These coding systems should also be used for identifying lead wires on Hall generators and ac and dc wire coding methods specified (see 4.9 and 4.10).

1.2 Classification. Identification of hookup wiring and lead wire should be limited to the following systems:

System I – Differentiation color coding for chassis wiring. This system should be employed in complex electronic equipment having numerous wiring points (terminations) and requiring different colored wires for identification. Functional coding (system II) would be inadequate for those complex equipments because of its limited scope of significant colors.

System II – Functional color coding of chassis wiring. This system should be employed in simple electronic equipments where it would be advantageous to identify a circuit function or a component part lead by its significant colored wire.

System III – Differentiation or functional coding of chassis wiring by printed markings. This system should be employed as an alternate for systems I and II and is preferred for maintaining or repairing equipments. White wires are used for replacement, and will be marked with the designated color or symbol to readily identify it in the equipment. Marking may be accomplished through the use of sleeving where the diameter of the wire is so small as to make printing impracticable.

System IV – Coding of interconnecting wiring. This system should be employed to readily identify wiring between complete units of electronic or electrical systems by means of marking on white insulated wires or applying sleeves, tags, or pressure-sensitive tapes on the insulated wires.

System V – Direct wiring and open wiring. This system should be employed for direct, open chassis, and cabinet wiring. The hookup wire (see 3.1) need not be color coded; solid white is the preferred color. Permanently numbered sleeves can be used in conjunction with reference designations wherever practical; i.e., terminal boards, bus bars, capacitors, relays, etc.

System VI – Differential color coding of hookup wire for chassis and interconnection wiring. This system should be employed for identification of wiring in high density wired chassis units and the interconnection between them. Identification may be accomplished by use of solid color insulated wire, circumferential bands or spiral stripes on white insulated wire, or printed sleeve or tape markers. Short hookup wire, six inches or less between termination points, need not be marked if the path of the short wire can be easily and visually traced.

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2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3, 4, and 5 of this standard. This section does not include documents cited in other sections of this standard or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents cited in sections 3, 4, and 5 of this standard whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

FEDERAL SPECIFICATION

MIL-W-5088 – Wiring, Aerospace Vehicle.

FEDERAL STANDARD

MIL-STD-104 – Limits for Electrical Insulation Color.

(Copies of these documents are available online at <https://assist.daps.dla.mil> or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.2.2 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

ASME INTERNATIONAL

ASME Y14.38 – Abbreviations and Acronyms for Use on Drawings and Related Documents.

(Copies of these documents are available online at <http://www.asme.org> or from the ASME International, Three Park Avenue, New York, NY 10016-5990.)

2.3 Order of precedence. Unless otherwise noted herein or in the contract, in the event of a conflict between the text of this document and the 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.

3. DEFINITIONS

3.1 Definitions. For the purpose of this standard, the following definitions apply:

3.1.1 Hookup wire. Hookup wire refers to an insulated conductor free at both ends and used for chassis wiring and interconnecting wiring.

3.1.2 Lead wire. Lead wire refers to an insulated conductor forming an integral part of components such as motors, transformers, Hall generators, etc., and used for chassis wiring.

3.1.3 Chassis wiring. Chassis wiring may consist of hookup wire, lead wire, shielded cable, jacketed multiconductor cable, coaxial cable, or twisted multiconductor groups of wires or cables, or wires and cables, used to connect electrical or electronic elements within the same equipment.

3.1.4 Interconnecting wiring. Interconnecting wiring consists of wires cables, groups or harnesses used to connect complete units of electrical or electronic systems.

3.1.5 Harness. An assembly of wires or cables, or wires and cables arranged so it may be installed or removed as a unit in the same electronic or electrical equipment.

3.1.6 Homogenous cable. Cable composed of identical insulated conductors.

3.1.7 Jacketed cable. A jacketed cable is a bundle of insulated wires encased in a common sheath.

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4. GENERAL REQUIREMENTS

- 4.1 Coding of hookup wire. All hookup wire shall be coded by one or more of the systems listed in 1.2.
- 4.2 Coding of interconnecting wiring. Coding of interconnecting wiring (system IV) need not apply to jacketed cables.
- 4.3 Abbreviations. Abbreviations shall be in accordance with ASME Y14.38.
- 4.4 Shielded and unshielded wires. All requirements for all systems shall apply to both shielded and unshielded wires.
- 4.5 Color limits. Unless otherwise specified, all colors on the finished wire shall conform to class 1 colors of MIL-STD-104.
- 4.5.1 White, clear, and neutral insulations. The term "white" shall apply only to colors meeting the requirements of "white" in MIL-STD-104. Clear or translucent uncolored (unpigmented) insulation shall be designated "clear". Natural or neutral colored insulations shall be designated "neutral" (see 4.6).
- 4.6 Clear and neutral colored insulations. Clear and neutral colored insulations shall be used on wires in lieu of white insulation only when specified by the applicable wire specification.
- 4.7 Lead wires. Lead wires used for motor leads, transformer leads, and similar applications shall be color coded in accordance with table I, where no conflict would be created with another component color-code standard.
- 4.8 Hall generator leads. Hall generator lead wires shall be color coded in accordance with table II.
- 4.9 DC power wiring for chassis and interconnecting systems. DC power wiring for chassis and interconnecting wiring shall be color coded in accordance with table II or table III.
- 4.10 AC power wiring in assembled units. AC power wiring in assembled units shall be color coded in accordance with table IV.

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TABLE I. Preferred color sequence for single wires: ^{1/} ^{2/}

| Base color | First stripe or band | Second stripe or band | Third stripe or band | Identification number |
|------------|----------------------|-----------------------|----------------------|-----------------------|
| Black | | | | 0 |
| Brown | | | | 1 |
| Red | | | | 2 |
| Orange | | | | 3 |
| Yellow | | | | 4 |
| Green | | | | 5 |
| Blue | | | | 6 |
| Violet | | | | 7 |
| Gray | | | | 8 |
| White | | | | 9 |
| White | Black | | | 90 |
| White | Brown | | | 91 |
| White | Red | | | 92 |
| White | Orange | | | 93 |
| White | Yellow | | | 94 |
| White | Green | | | 95 |
| White | Blue | | | 96 |
| White | Violet | | | 97 |
| White | Gray | | | 98 |
| White | Black | Brown | | 901 |
| White | Black | Red | | 902 |
| White | Black | Orange | | 903 |
| White | Black | Yellow | | 904 |
| White | Black | Green | | 905 |
| White | Black | Blue | | 906 |
| White | Black | Violet | | 907 |
| White | Black | Gray | | 908 |
| White | Brown | Red | | 912 |
| White | Brown | Orange | | 913 |
| White | Brown | Yellow | | 914 |
| White | Brown | Green | | 915 |
| White | Brown | Blue | | 916 |
| White | Brown | Violet | | 917 |
| White | Brown | Gray | | 918 |
| White | Red | Orange | | 923 |
| White | Red | Yellow | | 924 |
| White | Red | Green | | 925 |
| White | Red | Blue | | 926 |
| White | Red | Violet | | 927 |
| White | Red | Gray | | 928 |
| White | Orange | Yellow | | 934 |
| White | Orange | Green | | 935 |
| White | Orange | Blue | | 936 |

See footnotes at end of table.

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TABLE I. Preferred color sequence for single wires – Continued. ^{1/ 2/}

| Base color | First stripe or band | Second stripe or band | Third stripe or band | Identification number |
|------------|----------------------|-----------------------|----------------------|-----------------------|
| White | Orange | Violet | | 937 |
| White | Orange | Gray | | 938 |
| White | Yellow | Green | | 945 |
| White | Yellow | Blue | | 946 |
| White | Yellow | Violet | | 947 |
| White | Yellow | Gray | | 948 |
| White | Green | Blue | | 956 |
| White | Green | Violet | | 957 |
| White | Green | Gray | | 958 |
| White | Blue | Violet | | 967 |
| White | Blue | Gray | | 968 |
| White | Violet | Gray | | 978 |
| White | Black | Brown | Red | 9012 |
| White | Black | Brown | Orange | 9013 |
| White | Black | Brown | Yellow | 9014 |
| White | Black | Brown | Green | 9015 |
| White | Black | Brown | Blue | 9016 |
| White | Black | Brown | Violet | 9017 |
| White | Black | Brown | Gray | 9018 |
| White | Black | Red | Orange | 9023 |
| White | Black | Red | Yellow | 9024 |
| White | Black | Red | Green | 9025 |
| White | Black | Red | Blue | 9026 |
| White | Black | Red | Violet | 9027 |
| White | Black | Red | Gray | 9028 |
| White | Black | Orange | Yellow | 9034 |
| White | Black | Orange | Green | 9035 |
| White | Black | Orange | Blue | 9036 |
| White | Black | Orange | Violet | 9037 |
| White | Black | Orange | Gray | 9038 |
| White | Black | Yellow | Green | 9045 |
| White | Black | Yellow | Blue | 9046 |
| White | Black | Yellow | Violet | 9047 |
| White | Black | Yellow | Gray | 9048 |
| White | Black | Green | Blue | 9056 |
| White | Black | Green | Violet | 9057 |
| White | Black | Green | Gray | 9058 |
| White | Black | Blue | Violet | 9067 |
| White | Black | Blue | Gray | 9068 |
| White | Black | Violet | Gray | 9078 |
| White | Black | Red | Orange | 9123 |
| White | Black | Red | Yellow | 9124 |
| White | Black | Red | Green | 9125 |
| White | Black | Red | Blue | 9126 |
| White | Black | Red | Violet | 9127 |

See footnotes at end of table.

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TABLE I. Preferred color sequence for single wires – Continued. ^{1/ 2/}

| Base color | First stripe or band | Second stripe or band | Third stripe or band | Identification number |
|------------|----------------------|-----------------------|----------------------|-----------------------|
| White | Brown | Red | Gray | 9128 |
| White | Brown | Orange | Yellow | 9134 |
| White | Brown | Orange | Green | 9135 |
| White | Brown | Orange | Blue | 9136 |
| White | Brown | Orange | Violet | 9137 |
| White | Brown | Orange | Gray | 9138 |
| White | Brown | Yellow | Green | 9145 |
| White | Brown | Yellow | Blue | 9146 |
| White | Brown | Yellow | Violet | 9147 |
| White | Brown | Yellow | Gray | 9148 |
| White | Brown | Green | Blue | 9156 |
| White | Brown | Green | Violet | 9157 |
| White | Brown | Green | Gray | 9158 |
| White | Brown | Blue | Violet | 9167 |
| White | Brown | Blue | Gray | 9168 |
| White | Brown | Violet | Gray | 9178 |
| White | Red | Orange | Yellow | 9234 |
| White | Red | Orange | Green | 9235 |
| White | Red | Orange | Blue | 9236 |
| White | Red | Orange | Violet | 9237 |
| White | Red | Orange | Gray | 9238 |
| White | Red | Yellow | Green | 9245 |
| White | Red | Yellow | Blue | 9246 |
| White | Red | Yellow | Violet | 9247 |
| White | Red | Yellow | Gray | 9248 |
| White | Red | Green | Blue | 9256 |
| White | Red | Green | Violet | 9257 |
| White | Red | Green | Gray | 9258 |
| White | Red | Blue | Violet | 9267 |
| White | Red | Blue | Gray | 9268 |
| White | Red | Violet | Gray | 9278 |
| White | Orange | Yellow | Green | 9345 |
| White | Orange | Yellow | Blue | 9346 |
| White | Orange | Yellow | Violet | 9347 |
| White | Orange | Yellow | Gray | 9348 |
| White | Orange | Green | Blue | 9356 |
| White | Orange | Green | Violet | 9357 |
| White | Orange | Green | Gray | 9358 |
| White | Orange | Blue | Violet | 9367 |
| White | Orange | Blue | Gray | 9368 |
| White | Orange | Violet | Gray | 9378 |
| White | Yellow | Green | Blue | 9456 |
| White | Yellow | Green | Violet | 9457 |
| White | Yellow | Green | Gray | 9458 |

See footnotes at end of table.

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TABLE I. Preferred color sequence for single wires – Continued. ^{1/ 2/}

| Base color | First stripe or band | Second stripe or band | Third stripe or band | Identification number |
|------------|----------------------|-----------------------|----------------------|-----------------------|
| White | Yellow | Blue | Violet | 9467 |
| White | Yellow | Blue | Gray | 9468 |
| White | Yellow | Violet | Gray | 9478 |
| White | Green | Blue | Violet | 9567 |
| White | Green | Blue | Gray | 9568 |
| White | Green | Violet | Gray | 9578 |
| White | Blue | Violet | Gray | 9678 |

^{1/} For bundles composed of more than 139 wires, the above color designations shall be repeated in sequence with appropriate subgroupings to the extent necessary to provide identification of all conductors (see 5.1.3).

^{2/} The code designation "N" shall be applied to unpigmented clear or neutral insulations (see 4.6) to indicate nonstandard color coding. These insulations may be used only if the color of these insulations do not fall within the requirements for the gray or the chromatic colors of MIL-STD-104.

TABLE II. Colors for chassis and interconnecting wiring system by function.

| Function | Base color | Identification number | Alternate color code (see 5.2.1) | Alternate identification number |
|--|---------------------|-----------------------|----------------------------------|---------------------------------|
| Grounds, grounded elements ^{1/ 2/} | Green ^{2/} | 5 | White/green ^{2/} | 95 |
| Heaters or filaments | Brown | 1 | White/brown | 91 |
| Power supply, B+ ^{3/} | Red | 2 | White/red | 92 |
| Screen grids clock | Orange | 3 | White/orange | 93 |
| Cathodes and transistor emitters, high logic ^{4/ 5/ 6/} | Yellow | 4 | White/yellow | 94 |
| Control grids and transistor bases, low logic ^{5/} | Black ^{7/} | 0 | White/black ^{7/} | 90 |
| Anodes (plates) and transistor collectors, control ^{4/ 5/ 8/} | Blue | 6 | White/blue | 96 |
| Power supply, minus | Violet (purple) | 7 | White/violet | 97 |

^{1/} Negative side of Hall generator control current.

^{2/} Inactive for new design. For new design, use green for base color (white/green for alternate), and identification number 5 (95 for alternate).

^{3/} Positive side of Hall generator control current.

^{4/} Applies to diodes, semiconductor elements, photoelectric cells, mercury-arc rectifiers, and other elements with operation similar to vacuum tubes and transistors.

^{5/} Applies to all types of gas tubes with operation similar to vacuum tubes.

^{6/} Negative side of Hall generator output voltage.

^{7/} Inactive for new design. For new design, use black for base color (white/black for alternate), and identification number 0 (90 for alternate).

^{8/} Positive side of Hall generator output voltage.

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TABLE III. DC power color coding for chassis and interconnection wiring (optional method).

| Voltage (volts) | Color | Identification number |
|-----------------|---------------------|-----------------------|
| +151 to +500 | Red | 2 |
| + 61 to +150 | White/red | 92 |
| + 26 to + 60 | White/brown/red | 912 |
| + 7 to + 25 | White/red/orange | 923 |
| + 2 to + 6 | White/red/yellow | 924 |
| - 26 to - 60 | Violet | 7 |
| - 11 to - 25 | White/violet | 97 |
| - 2 to - 10 | White/violet/yellow | 47 |
| Ground | Green | 5 |

TABLE IV. Color coding for ac power wiring (100 V and greater) for single and three phase systems.

| Service (nominal) | | | | | |
|---|---------|---------|----------------|-----------------------|--------|
| | Phase A | Phase B | Phase C | ^{1/} Neutral | Ground |
| 115 V 60 Hz 1 ϕ | Black | --- | --- | White | Green |
| 208 V 60 Hz 3 ϕ "Y" ^{2/} | Black | Red | Orange or blue | White | Green |
| 230 V 60 Hz 3 ϕ delta ^{2/} | Black | Red | Orange or blue | --- | Green |
| 115 V 400 Hz 3 ϕ delta ^{2/} | Black | Red | Orange or blue | --- | Green |
| 208 V 400 Hz 3 ϕ "Y" ^{2/} | Black | Red | Orange or blue | White | Green |

^{1/} For all ac voltages below 100 V, gray wire is to be used, unless the optional color code is specified (see ^{2/}).

^{2/} Optional wire color insulations for phases A, B, C, and neutral shall be as follows:

Phase A – Gray
Phase B – White/gray
Phase C – White/brown/gray
Neutral – White

5. DETAIL REQUIREMENTS

5.1 System I – Differentiation color coding for wiring (see 1.2).

5.1.1 Standard color code for single wires. Single conductor chassis wires to be coded for differentiation only shall be identified by colors in table I, preferably in the order given. All the combinations listed in table I are made up of the first 10 colors.

5.1.1.1 Method of color coding. Color coding shall be accomplished by use of solid colored insulations, and by helical striping or circumferential banding on all-white insulation, in accordance with 5.7 except that system VI shall be used for circumferential banding (see 5.6). Longitudinal (nonhelical) color striping may be used if colored insulation material is used for striping. Materials or paints used for helical striping or circumferential banding shall not be electrically conductive.

5.1.1.2 Identification numbers. Identification numbers appearing in table I are a ready reference to color combinations. The first digit indicates the background color (color of insulation or braid), and the succeeding digit or digits, if any, indicate the colors of the helical stripes or circumferential bands. Therefore, the second and third digit indicates the color of the first and second stripe or band, respectively.

5.1.1.3 Color sequence of helical stripes or circumferential bands. Where stripes or bands are used, the first stripe or band shall be of the color with the lowest identification number, the second with the next higher number, and the third with the highest number.

5.1.2 Harness wiring. Unless the wiring is routed to the same terminal, two or more wires shall not be identically color coded if they break out of a harness and are routed in terminations in close proximity where they could be misconnected.

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5.1.3 Grouping of wires. Where it is not practical to use wires each of which is differently color coded, the wires may be divided into groups. (Typical instances are where many wires enter a connector, or connect to grouped terminal blocks, or multiple terminations in close proximity.) Within each group, each wire shall be differently color coded, and the groups shall be distinguished by colored metal bands, pressure-sensitive tapes, or other approved devices that hold each group of wires together. The wire color coding sequence may be repeated in different groups. This method shall be used only where a large number of wires is involved.

5.1.4 Termination points. Wires terminating where it would be difficult to distinguish one wire from another shall not be identically color coded unless the wiring is routed to the same termination point. For example, if three wires from one harness, three wires from another harness, and two point-to-point wires are all connected to a tube socket, different color coding shall be used on each wire to eliminate confusion.

5.2 System II – Functional color coding of chassis wiring. Simple electronic connections where it is advantageous to identify circuit function (see 1.2).

5.2.1 Standard colors. Colors used to identify chassis wires by function shall be as specified in table II and 5.2.2 unless otherwise specified by the contracting activity. Color identification shall be accomplished by use of solid color insulation, or as an alternate method, by use of a single colored helical stripe or circumferential band over white insulation. For example, a white insulated wire having a blue helical stripe or a blue circumferential band would be considered an alternate equivalent to a solid blue wire. When more than one value of the same function must be identified, the alternative method may use a second stripe or band over white insulation as shown in table I.

5.2.2 Miscellaneous circuits. White insulation shall be used for all circuits not designated in tables II, III, and IV or 5.2.3.

5.2.3 Direct-coupled circuits. In direct-coupled circuits, connecting wires shall be white with appropriately colored helical stripes or circumferential bands at the ends of the insulated wire to identify the elements to differentiate from the method of marking described in 5.2.2. For example, if a plate is connected directly to a control grid, the wire shall be white with helical green and blue stripes, or have green and blue circumferential bands at both ends of the wire (green designates grid, and blue, the plate). This is in contrast to the coding of wires connecting plate and grid through a coupling capacitor; in such case the wire from the plate to the capacitor would be solid blue, or have a blue stripe or band on a white wire (for the plate), and the wire from the other end of the capacitor to the grid would be black, or have a black stripe or band on a white wire (for the grid). This method of identification will normally be applied by the equipment fabricator to white insulated wire, when required.

5.3 System III – Differentiation or functional coding of chassis wiring by printed markings. Chassis wiring shall be identified by printed characters (see table V) over white insulation or white insulation-braid. The printed characters shall represent differentiation or functional code marking (see 1.2).

5.3.1 Differentiation marking. Wires shall be differentiated by printing the name(s), abbreviation(s) in accordance with ASME Y14.38, or identification number(s) of the colors and combinations listed in table I. Random printed numbers for alpha numerical characters designating specific coded information may be used provided this specific coding is not intermixed with stripe or band identification. The marking shall appear either along the entire length of the wire at 2-inch intervals, at each end of the wire (for wire harnesses only), on sleeves, or in the manner prescribed in applicable specifications.

5.3.2 Functional markings. Functional information shall be as specified in table II or in the applicable equipment specification. Such information shall be printed either at the ends of the wire, on the sleeve, or in some other manner as prescribed in the applicable equipment specification.

5.4 System IV – Coding of interconnecting wiring.

5.4.1 Wire insulation color. White insulation shall be used for all interconnecting wires unless a particular color is prescribed in the equipment or system specification to identify a definite arrangement of elements, a specific function, or a hazardous condition.

5.4.2 Differentiation markings. Circuit identification, if required, shall be printed in black on the wire insulation, on the white sleeve, or on some other type of marker. Printed markings shall be legible and applied so that the wire type is readily identified.

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5.4.3 Interconnecting wiring on aircraft and guided missiles. The coding of interconnecting wiring on aircraft shall be in accordance with MIL-W-5088, and on guided missiles shall be in accordance with MIL-W-5088. In the event of conflict between the requirements of this standard and those of the referenced specifications, the requirements of the referenced specifications shall govern.

5.4.4 Flat, multiconductor, homogenous cable. When color coding is required, the base colors of table I shall be used, and shall be repeated in sequence for the required number of conductors by using solid colored insulation or striping on all-white insulation.

5.5 System V – Direct wiring and open wiring.

5.5.1 Wire insulation color. White insulation shall be used for all interconnecting wires, unless a particular color is prescribed in the equipment or system specification to identify a definite arrangement of elements, a specific function, or a hazardous condition.

5.5.2 Differentiation markings. Identification, if required, shall be printed in black on the wire insulation, on the white sleeve, or on some other type of marker. Printed markings shall be legible and applied so that the marking function is readily identified.

5.6 System VI – Differential color coding for high density chassis and interconnecting wiring (see 1.2).

5.6.1 Method of color coding. Color coding shall be accomplished by use of solid color insulations, circumferential banding on all-white insulation or numerically marked sleeve or tape markers. Materials or paints used for circumferential banding or numeric marking shall not be electrically conductive.

5.6.2 Circumferential banding.

5.6.2.1 Identification numbers. Identification numbers shall consist of not more than four digits, which may be either in sequential or ascending sequential order, deleting the digit 9 for white.

5.6.2.2 Color sequence of circumferential bands. The circumferential bands shall be parallel to each other, be clearly defined and, within and between repeated color groupings, consistent in width and spacing for the length of the wire, and essentially continuous except that discontinuities may be permitted provided the coded identity can be read by rotating the wire.

- a. Band width. The width of the bands shall be measured perpendicular to the centerline of the band. The width of all bands shall be not less than 0.031 inch when the diameter over the marked surface exceeds 0.047 inch; or not less than two-thirds the nominal diameter of the surface when the diameter over the marked surface is 0.047 inch or less.
- b. Band spacing. The spacing between bands in a group shall be not less than the individual band width, except that the spacing between the first band in a group of three or four shall be twice the spacing between the bands in the remainder of the group.
- c. Spacing between groups of bands. The spacing separating a group of bands from the next grouping shall be greater than the widest spacing between bands within a group, but not exceed 3 inches, and be repeated along the length of the wire.
- d. Sequence of reading. The wire number represented by the color banding is read by starting with the band further displaced from the remaining two or three bands.

5.6.3 Wire markers. Numerically marked sleeves, tapes or pressure sensitive tapes may be applied at the ends of the insulated wire or braided covering where wire diameter, cable concentricity or insulation type preclude the application of circumferential bands.

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TABLE V. Printing type size of identification marking. ^{1/}

| Insulation diameter ^{2/} | Printing type | | |
|---|---|---|-------------------|
| | Height of type face ^{3/ 4/} ($\pm .001$) | Radius of curvature of type face ($\pm .001$) ^{5/} | Reading direction |
| For insulating materials that are not flattened during the printing the operation, following curved and flat face type shall be used: | | | |
| .030 to .038 | .015 | .020 | Vertical |
| .039 to .048 | .020 | .025 | Vertical |
| .049 to .060 | .025 | .031 | Vertical |
| .061 to .090 | .025/.031 | .046 | Horiz or vert |
| .091 to .122 | .031/.046 | .062 | Horiz or vert |
| .123 to .154 | .046 | .078 | Horizontal |
| .155 to .184 | .062 | .093 | Horizontal |
| .185 to .248 | .078 | .125 | Horizontal |
| .249 to .310 | .093 | .156 | Horizontal |
| .311 to .374 | .093/.125 | .187 | Horizontal |
| .375 to .436 | .125 | .218 | Horizontal |
| .437 to .498 | .125 | .250 | Horizontal |
| .499 to .560 | .125 | .281 | Horizontal |
| .561 to 1.000 | .125 | Flat | Horizontal |
| Over 1.000 | .187 | Flat | Horizontal |
| For insulating tubings that are flattened during the printing operation, the following minimum flat face type shall be used: | | | |
| .035 to .060 | .065 | Flat face | Vertical |
| .052 to .068 | .050 | Flat face | Horizontal |
| .069 to .096 | .062 | Flat face | Horizontal |
| .097 to .166 | .078 | Flat face | Horizontal |
| .167 to .624 | .109 | Flat face | Horizontal |
| .625 to 1.000 | .125 | Flat face | Horizontal |
| Over 1.000 | .187 | Flat face | Horizontal |

^{1/} Dimensions are in inches.

^{2/} For heat shrinkable tubing, the height of the type face shall be governed by the "as supplied" insulation diameter.

^{3/} Other type face heights may be used only when approved by the contracting activity.

^{4/} For horizontal lettering, this quantity is the actual height. For vertical lettering, this quantity is the width of the letter. The letter height would be approximately 3 times this quantity.

^{5/} All industry standard sizes.

5.7 Striping or banding.

5.7.1 Colored helical stripes or circumferential bands. Colored helical stripes or circumferential bands shall be used only on all-white insulation wherever color combinations other than solid colored wires are necessary. Not more than three stripes or bands shall be used. Stripes and bands shall be applied in the same direction and shall conform to the color code designated in table I. Longitudinal (nonhelical) color striping may be used if colored insulation is used for striping.

5.7.2 Sequence. In the sequence of applying helical stripes or circumferential bands on a wire, the first stripe or band shall be distinguishably wider than the second and third stripe or band within the group. Helical stripes shall run parallel to each other and shall be continuous, clearly defined, and constant in width and spacing throughout the length of the wire. Circumferential bands shall be parallel to each other around the circumference of the wire, shall be clearly defined, shall be constant in width and spacing, and shall be continuous in repeated color groupings for the length of the wire unless specified (see 5.2.3).

5.7.2.1 Stripe or band width. The width of the stripe or band shall be measured perpendicular to the centerline of the stripe or band. The width of the wide (first) stripe or band shall be not less than 0.031 inch when the diameter over the marked surface exceeds 0.047 inch; when the diameter over the surface on which the stripe or band shall be not less than two-thirds the nominal diameter of the surface. The narrow (second and third) stripe or band shall be not less than one-half nor more than three-quarters the width of the wide (first) stripe or band. The third stripe or band shall be of the same width as the second stripe or band.

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5.7.2.2 Stripe or band spacing. On single stripe or band coloring, the spacing between each stripe or band shall be not less than twice the width of the individual stripe or band. On multiple stripe or band coloring, the spacing between stripes or bands within a grouping shall be not less than the width of the narrow stripe or band.

5.7.2.3 Length of lay (spacing between groups). The spacing between groups of bands shall be at regular intervals along the wire. The spacing separating a group of bands from the next grouping shall be greater than the spacing between the bands within a group, but shall not exceed 3 inches.

NOTE: Length of lay is defined as the longitudinal distance along the wire from the starting point of one grouping of stripes to the starting point of the next repetition of the grouping. Also, length of lay required does not apply if stripes of colored insulation material are used.

5.7.2.4 Spacing between groups of bands. The spacing between groups of bands shall be at regular intervals along the wire. The spacing separating a group of bands from the next grouping shall be greater than the spacing between the bands within a group, but shall not exceed 3 inches.

5.8 Braided wire covering. When the wire covering includes a braided covering (of synthetic yarn or continuous filament glass yarn) over the insulation, with systems I and II color coding, the braided covering shall be the same base color; with systems III, IV, and VI color coding, the insulation and braided coverings shall be natural white. If color coded striping or banding is required on braided covering of systems I, II or IV color coded wires, the method described in 5.5 shall be adopted. If color coded banding is required on braided covering of system VI color coded wires, the method described in 5.6 shall be adopted. When helical stripes are used, colored carriers of suitable widths shall be used to form the coding stripes. The narrow (second and third) stripe, when applicable, shall be formed by using colored yarn in one carrier. The spacing between stripes in any group shall be formed by one base color carrier. The colored helical stripe, striping sequence, and length of lay shall be in accordance with 5.7.1, 5.7.2, 5.7.2.1, 5.7.2.2, and 5.7.2.3.

6. NOTES

(This section contains information of a general or explanatory nature which may be helpful, but is not mandatory).

6.1 Intended use. This standard identifies coding systems for all insulated hookup and lead wire used in electrical and electronic equipment.

6.2 Subject term (keyword) listing.

- AC power
- Chassis
- Circumferential banding
- DC power
- Hall generator
- Interconnecting
- Striping

6.3 International standardization agreement implementation. This standard implements STANAG 4093. When changes to, revision, or cancellation of this standard are proposed, the preparing activity must coordinate the action with the U.S. National Point of Contact for the international standardization agreement, as identified in the ASSIST Online database at <https://assist.daps.dla.mil>.

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6.4 Changes from previous issue. The margins of this standard are marked with vertical lines to indicate where changes from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous issue.

CONCLUDING MATERIAL

Custodians:
Army – CR
Navy – EC
Air Force – 85
DLA - CC

Preparing activity:
DLA – CC

Review activities:
Army – AR, AT, AV, CR4, MI
Navy – AS, MC, OS, SH
Air Force – 19

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NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at <https://assist.daps.dla.mil>.