MIL-STD-687A

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SUPERSEDING
MIL-STD-687
10 January 1962

MILITARY STANDARD

WIRE, THERMOCOUPLE; IDENTIFICATION MARKING AND COLOR CODE OF

FSC 6145

DEPARTMENT OF DEFENSE
WASHINGTON, D.C. 20301

Wire, Thermocouple; Identification Marking and Color Code of

MIL-STD-687A

1. This Military Standard is approved for use by all Departments and Agencies of the Department of Defense.

2. Recommended corrections, additions or deletions should be addressed to the US Army Electronics Command, ATTN: AMSEL-PE-EM-2, Fort Monmouth, N. J. 07701.

CONTENTS

TABLES

1. SCOPE

This standard establishes a uniform identification code for all insulated single and duplex thermocouple wires and all insulated thermocouple extension wires used by the Department of the Army, Navy, and Air Force.

2. APPLICABLE DOCUMENTS

2.1 The following documents form a part of this standard to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

STANDARDS

MILITARY

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

(Copies of specifications, standards, drawings, and publications required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

3. DEFINITIONS

3.1 Thermocouple. A thermocouple is a device used in the measurement of temperature. It consists of two dissimilar metals joined at one end (duplex). Metals so joined generate an electromotive force (emf) which varies with temperature. After the thermocouple and meter have been calibrated with respect to the emf-temperature relationship, the temperature of the junction of the thermocouple metals can be measured by the measuring emf of the thermocouple with an appropriate instrument.

3.2 Thermocouple extension wires. Thermocouple extension wires are wires used to connect the ends of thermocouples to the terminals of the measuring instruments.

4. GENERAL REQUIREMENTS

4.1 Color coding.

4.1.1 Insulation coding. The insulation of thermocouple wires shall be color coded to indicate the metallic composition and polarity of the wires.

4.1.2 Jacket coding. The jackets of all duplex thermocouples and extension wires shall be color coded to denote the specific metal combination of the thermocouple.

4.2 Identification coding. All duplex thermocouple and extension wire jackets shall be marked on one side with the government specification (if one exists), type designation, class, and wire gage, as applicable, in accordance with 4.2.1, 4.2.2, 4.2.3, and 4.2.4. If no government designation exists, the manufacturer's name and type number shall be used.

4.2.1 Types of marking. Unless otherwise specified, the applicable data shall be printed or stamped on the jacket surface.

4.2.2 Size of marking. The height of the marking characters shall be commensurate with the outside diameter of the jacket.

4.2.3 Color of marking. Characters shall be marked in either black or white to provide the best contrast to the color of the surface to which they are applied.

4.2.4 Data spacing. The identification data shall be applied on the surface of the jacket for its entire length and shall be evenly spaced, with the spacing between each group of markings not to exceed 6 inches.

4.2.5 Permanence and legibility. The marking shall be legible and durable and shall not rub off or become illegible after exposure to its environments or contact incident to normal handling, shipment, and storage. The marking shall remain legible after being subjected to the applicable specification tests covering marking of wires.

4.3 Color limits. All colors specified herein for color coding of insulation and jacketing shall conform to MIL-STD-104.

4.4 Transparent sheaths. If specified in the applicable detail specification, a transparent sheath may be applied over the color coded and marked duplex thermocouple or extension wire jacket.

5. DETAIL REQUIREMENTS

5.1 Color code.

5.1.1 Insulation color code. The insulation color code for single, duplex, and extension thermocouple wires shall be in accordance with table I.

5.1.2 Jacket color code for duplex thermocouple wires. The jacket color code for duplex thermocouple wires shall be in accordance with table II.

5.1.3 Jacket color code for thermocouple extension wires. The jacket color code for thermocouple extension wires shall be in accordance with table III.

5.2 Jacket marking of duplex thermocouples and extension wires. Jacket marking of duplex thermocouples and extension wires shall conform to the details specified in 4.2.

Custodians:
Army - EL
Air Force - 80

Review Activities:
Army - MU
Air Force - 11, 70
DSA - IS
NSA

User Activities:
Army - AT
Navy - AS, OS, MC

Preparing Activity:
Army - EL

(Project No. 6145-0640)

Table I. Insulation color code for single*, duplex, and extension thermocouple wires.

Metallic composition	Color code	
	Positive	Negative
Iron(+)-Constantan(-)	Black	Yellow
Copper(+)-Constantan(-)	Red	Yellow
Chromel(+)-Alumel(-)	White	Green

*For single thermocouple wires, the individual insulated wire shall be color coded as indicated above, based on the metallic composition and polarity specified, i.e., iron(+)=black, alumel(-)=green.

Table II. Jacket color code for duplex thermocouple wires.

Metallic composition	Color code	
	Overall	Tracers
Iron-constantan		
Type I - Solid or stranded conductors -		
Class C - Solid conductors, high accuracy EMF	Light blue	1-Red 1-Blue
Class E - Stranded conductors, high accuracy EMF	Light blue	1-Red 1-Blue
Class H - Stranded conductors, standard accuracy EMF	Light blue	2-Red 1-White
Class J - Stranded conductors, standard accuracy EMF	Light blue	2-Red 1-White
Copper-Constantan		
Type I - Solid or stranded conductors -		
Class C - Solid conductors	Black	-
Class E - Stranded conductors	Black	-
Chromel-Alumel		
Type I - Solid or stranded conductors -		
Class C - Solid conductors	White	-
Class E - Stranded conductors	White	-

Table III. Jacket color code for thermocouple extension wires.

Metallic composition	Color code	
	Overall	Tracers
Iron-constantan		
Type II - Stranded conductors (8 ohms per 100 foot length -		
Class A - Each strand of iron wire tinned. (120°C.)	Light blue	-
Class B - Each strand of iron wire tinned. (230°C.)	Light blue	1-Red
Class C - Iron wire not tinned.	Light blue	1-White
Type III - Stranded conductors (8 ohms per 200 foot length -		
Class A - Each strand of iron wire tinned. (120°C.)	Light blue	2-Black
Class B - Each strand of iron wire tinned. (230°C.)	Light blue	2-Red
Class C - Iron wire not tinned.	Light blue	2-White
Copper-constantan		
Type I - Stranded conductors -		
Class F - (120°C.)	Black	1-Yellow
Class G - (230°C.)	Black	2-Yellow
Type II - Stranded conductors (7 ohms per 200 foot length) -		
Class A - (120°C.)	Black	1-White
Class B - (230°C.)	Black	2-White
Type III - Stranded conductors (20 gage copper, 18 gage constantan) -		
Class A - (120°C.)	Black	1-Green
Class B - (230°C.)	Black	2-Green

Table III. Jacket color code for thermocouple extension wires. (Cont'd)

Metallic composition	Color code	
	Overall	Tracers
Type IV - Stranded conductors (20 gage copper, 16 gage constantan -		
Class A - (120°C.)	Black	1-Red
Class B - (230°C.)	Black	2-Red
Type V - Stranded conductors (18 gage copper, 14 gage constantan) -		
Class A - (120°C.)	Black	1-Yellow 1-Green
Class B - (230°C.)	Black	1-Yellow 2-Green
Chromel-alumel		
Type II - Stranded conductors (7 ohm per 25 foot length) -		
Class A - (315°C)	White	1-Green
Type III - Stranded conductors (7 ohms per 50 foot length) -		
Class A - (315°C.)	White	2-Green
Type IV - Stranded conductors (7 ohms per 100 foot length) -		
Class A - (315°C.)	White	3-Green

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No. 22-R255

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   B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES

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