

INCH-POUND

MIL-DTL-24640/16D

22 August 2002

SUPERSEDING

MIL-C-24640/16C

26 June 1995

## DETAIL SPECIFICATION SHEET

### CABLE, ELECTRIC, 600 VOLTS, LIGHT-WEIGHT, MULTI-PAIR, AWG 18, TYPE 2XSW (INCLUDING VARIATION TYPE 2XSOW)

This specification is approved for use by all Departments and Agencies of the Department of Defense.

The requirements for acquiring the product described herein shall consist of this specification sheet and the issue of MIL-DTL-24640 listed in that issue of the Department of Defense Index of Specifications and Standards (DoDISS) specified in the solicitation.

#### Construction (Watertight)

- First - 7-strand, tin-coated copper conductor, AWG size and dimensions in accordance with Table I.
- Second - Insulation material and basic construction requirements shall be in accordance with MIL-W-81044/12 and tested in accordance with the component wire ratings and requirements listed on this slash sheet. Quality conformance testing shall be in accordance with MIL-W-81044, prior to cabling.
- Third - Two conductors, one black and one white, twisted together. The pitch shall be  $1 \pm \frac{1}{4}$  inch.
- Fourth - Binder tape applied helically with overlap, at manufacturer's option.
- Fifth - Braided shield of # 38 AWG tin coated copper strands. Braid coverage shall be no less than 90 percent determined in accordance with WC-27500
- Sixth - Shield insulation of two polyester tapes or polyester tape and extruded jacket. Identification codes applied using Method 2. (NOTE: This step is not required for type 2XSW1)
- Seventh - The required number of shielded, twisted pairs shall be cabled together. Cabling sequence shall be consecutive, starting with number 1 from center outward. Fillers may be used as necessary, to form a round cable.
- Eighth - Binder tape applied helically with overlap.

CONSTRUCTION VARIANT FOR TYPE 2XSW

Ninth - Crosslinked polyolefin jacket. (See Table II for thickness).

CONSTRUCTION VARIANT FOR TYPE 2XSOW

Ninth - Braided shield, tin coated copper strands. Braid must be constructed to meet Surface Transfer Impedance requirements as listed herein.

Tenth - Binder tape applied helically with overlap.

Eleventh - Cross-linked polyolefin jacket. (See Table III for thickness).

TABLE I. Component wire details.

Watertight conductor			Finished wire			
Wire size (AWG)	Stranding (no. x AWG)	Diameter nominal (inches)	Diameter (inches)	Test load life cycle accelerated aging tests (lbs. $\pm$ 3%)	Low temp. at -40° C	
					Mandrel diameter (inches)	Test load (lbs)
18	7 x 26	0.048	0.065 $\pm$ 0.003	0.250	1.0	1.0

TABLE II. Construction details.

PIN M24640/16	Type number	Number of pairs	Jacket thickness (inch) (min)	Cable diameter (inch)		Cable weight (pounds per 1000 feet) (max)
				(min)	(max)	
-01UN	2XSW-1	1	0.034	0.240	0.258	52.9
-02UN	2XSW-3	3	.041	.436	.470	175.0
-03UN	2XSW-7	7	.044	.573	.617	330.0

TABLE III. Construction details - overall shield.

PIN M24640/16	Type number	Number of pairs	Diameter over shield (inch) (nom)	Jacket thickness (inch) (min)	Cable diameter (inch)		Cable weight (pounds per 1000 feet) (max)
					(min)	(max)	
-01UO	2XSOW-3	3	0.374	0.041	0.487	0.525	227.0
-02UO	2XSOW-7	7	.514	.044	.608	.656	401.0
-03UO	2XSOW-12	12	.702	.047	.802	.864	665.0
-04UO	2XSOW-19	19	.844	.050	.938	1.010	950.0
-05UO	2XSOW-30	30	1.080	.057	1.180	1.270	1442.0

REQUIREMENTS:

Qualification required.

Construction details: See Tables I, II, and III.

Component wire: The component wire shall be per MIL-W-81044 and shall be tested in accordance with the following wire ratings and additional requirements.

Temperature rating: 135°C (275°F) maximum conductor temperature

Voltage rating: 600 volts (rms) at sea level.

Accelerated aging: Oven temperature, 250 ± 2°C (482 ± 3.6°F) for 6 hours.

Low temp.-cold bend: -40°C (-40°F) for 4 hours

Blocking: 150 ± 2°C (302 ± 3.6°F)

Color: In accordance with MIL-STD-104, class 1; white preferred

Flammability: 30 seconds (max); 3.0 inches (max); no flaming of tissue paper.

Humidity resistance: 5000 megohms for 1000 feet, minimum insulation resistance after humidity exposure.

Identification, striping or banding durability: 125 cycles (250 strokes) (min), 500 gram weight.

Impulse dielectric test:

Primary insulation (when tested in lieu of spark test):

6.0 kilovolts (peak) 100 percent test.

Finished wire: 8.0 kilovolts (peak), or 3 kHz spark test

5.5 kV, 100 percent test.

Insulation resistance: 5000 megohms for 1000 feet (min).

Life cycle: Oven temperature, 200 ± 2°C (392 ± 3.6°F) for 120 hours.

Physical properties of primary insulation:

Tensile strength, 2500 lb/in<sup>2</sup> (min).

Elongation, 150 percent (min).

Shrinkage: 0.125 inch maximum at 250 ± 2°C (482 ± 2°F).

Spark test primary insulation: 1500 volts (rms), 60 Hz or 3 kHz, 100 percent test.

Surface resistance: 500 megohms inches (min), initial and final readings.

Thermal shock: Oven temperature, 150 ± 2°C (302 ± 3.6°F).

Maximum change in measurement: 0.060 inch.

Wet dielectric test: 2500 volts (rms).

Wrap test: Mandrel wrap test required.

EXAMINATION AND TESTS:

Basic electrical:

Requirements

Conductor Resistance - ohms/1000 feet at 25°C, maximum.....	7.11
Voltage withstand - volts, root mean square, minimum	
Conductor to conductor and shield .....	1000
Component Shield to Component Shield.....	200
Component Shield to overall shield (Type 2XSOW only).....	500
Insulation resistance – megohms-1000 feet, minimum	

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Conductor to conductor and shield .....	2500
Shield to shield (component shield only) .....	100
Shield to shield (component shield to overall shield) Type 2XSOW only....	100
Conductor and shield continuity .....	No failure
Jacket flaws (type 2XSOW only).....	No failure

Group A:

Visual and dimensional .....	No failure
Capacitance:	
Mutual capacitance - at 1 MHz, picofarads/foot (pF/ft), maximum..	60
Capacitance unbalance - percent, maximum .....	15
Characteristic impedance - at 1 MHz, ohms.....	30 min, 53 max
Watertightness (see Table IX of MIL-DTL-24640 for limits of water leakage).....	No failure
Weight .....	No failure

Group B:

Cold bending.....	No failure
Drip .....	No failure
Cross link proof test (percent maximum)	
Jacket .....	50
Tear - pounds per inch thickness, minimum.....	35
Physicals (unaged)	
Jacket	
Tensile strength - lb/in <sup>2</sup> , minimum .....	1300
Elongation - percent, minimum .....	160
Attenuation - at 3 MHz, dB/100 feet, maximum .....	Not applicable
Gas flame (1 hour) .....	Not applicable

Group C:

Physicals (aged)	
Jacket	
Air oven	
Tensile strength - percent of unaged, minimum .....	60
Elongation - percent of unaged, minimum .....	60
Permanence of printing (conductor) - cycles, minimum .....	Not applicable
Permanence of printing (jacket) - cycles, minimum.....	125
Shield - conformance to material, construction and coverage.....	No failure
Heat distortion - percent of unaged, maximum .....	30
Cable sealant removability.....	No failure
Shrinkage .....	No failure
Mutual inductance - dB/1000 feet, maximum .....	Not applicable
Surface transfer impedance (type 2XSOW only)	
Milliohms per meter, maximum .....	700
EMP response, dB, minimum .....	60
Pulse response time - ms/500 feet	

Rise time, maximum .....	Not applicable
Decay time, maximum .....	Not applicable

QUALIFICATION INSPECTION:

Qualification inspection shall include basic electrical, all of groups A, B, C and D, plus the following:

Flame propagation .....	No failure
Aging and compatibility (cable) .....	No failure
Acid gas equivalent - percent, maximum	
Jacket .....	2
Fillers .....	2
Insulation .....	18
Halogen content - percent, maximum	
Jacket .....	0.2
Fillers .....	0.2
Hot oil immersion	
Tensile strength - percent of unaged, minimum .....	50
Elongation - percent of unaged minimum .....	50
Smoke index, maximum	
Jacket .....	25
Fillers .....	45
Insulation .....	10
Toxicity index, maximum	
Jacket .....	5
Fillers .....	5
Insulation .....	1.5
Durometer (jacket) - (type A) hardness, minimum.....	80
Weathering (jacket).....	No failure
Fungus Resistance.....	No failure
Abrasion resistance.....	No failure
Gas Flame (3 hour) .....	Not applicable
Component wire .....	No failure

Unit ordering length:    3 - 12 500 feet nominal.  
                              19 & 30 250 feet nominal.

Custodians:

Army - MI

Navy - SH

Preparing Activity:

Navy - SH

(Project 6145-2307-016)

Review Activities:

Army - AR, AV, CR, CR4

Navy - CG, EC

DLA - IS