

Materials / Purchased Components

FNHA-2-L-001.00

SXL Wire Specification**1. SCOPE**

This standard covers wire with SXL type insulation. SXL is defined as special duty flame retardant thermosetting cross-linked polyethylene with a maximum service temperature of 125° C.

2. RELATED SPECIFICATIONS

SAE J1128 - Low-Tension Primary Cable.
MIL-T-5438 (Military Specification)- Instrument used for Abrasion Testing of Insulated Bare Cable.

3. REQUIREMENTS**3.1 WIRE SIZE**

The size is to be specified on the engineering drawing according to SAE wire size numbers which appear in Table 1.

3.2 COLOR

The color of the SXL insulated wire is to be specified on the engineering drawing with the recommendation taken from 86537990 (FNHA-3-E-005.00.)

3.3 WIRE QUALITY

The copper strands of the conductor will consist of the following properties that will define the chemical composition.

3.3.1 Electrical Resistivity

Must remain less than 875.20 ohm*lb/sqr mile
(0.15328 ohm*g/sqr m) 10.371 ohm*cmil/ft
(0.017241 ohm* sqr mm/m) @ 20° C. Resistance =
(Resitivity * Length) / Cross Section. Resistance will
be in ohms. Resistivity will be 10.371 (0.017241).

Length will be in feet / meter. Cross Section will be in circular mils(sqr mm).

3.3.2 Tensile Strength / Elongation

1-9 awg tensile strength of 37,000 psi (255 Mpa) and elongation in 10 in.(254cm) of 30%.
10-23 awg tensile strength of 38,500 psi (265 Mpa) and elongation of 25%.
24-29 awg same tensile strength as 10-23 and elongation of 20%.
30-40 awg same tensile strength as 10-23 and elongation of 15%.

3.3.3 Wire Finish

The finished wire will be free from all imperfections and consistent with the best commercial practice.

3.3.4 Joints

The wire should be on continuous length on each spool. There should be as few joints as possible in the copper and these joints are necessary to bring the wire up to the required spool weight should be made by brazing with silver solder or by welding. The diameter of the wire at the joint should be the same as any other point on the wire. The wire surface at these joints should be smooth. The tensile strength of the joint should be at least 80% of the tensile strength of the wire 3 to 4 feet from the joint.

3.4 CABLE CONSTRUCTION

For the cable construction see TABLES 1 and 2.

					NAME	STD SXL WIRE			
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								ENGINEERING SPECIFICATION	
ALL	D	BJF	114279	1/00				FRAME 1	OF 6
ALL	C	JDF	110925	10/97				PART NUMBER	
ALL	B	RE	110410	8/97					
FRAME NO.	REV	BY	ECN NO.	DATE					
APP.	DRAWN		JDF	7/97					
KHH 8/97	CHECKED								

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3.5 INSULATION QUALITY

3.5.1 The insulation should adhere closely to, but strip easily from the wires leaving them reasonably clean and in suitable condition for soldering.

3.5.2 Insulation Thickness (Table 2)

The thickness is measured by determining the diameter over the insulation and then removing the insulation and measuring the diameter of the copper wire. One half of the difference of the two measurements should be considered the average wall thickness. For any cross section taken, the minimum wall thickness should not be less than 70% of the maximum wall thickness.

3.5.3 Insulation Quality

The insulation should be a good grade of flame retardent cross-linked polyethylene which will pass the following test requirements.

3.5.3.1 Mechanical Properties

The test specimens that are to be used will have the wire removed. The wire may be stretched to allow for ease of removing. The specimens may be tested as tubes, slit tubes, or as dumbbells. The test specimen should then be stretched at a rate of 500 mm/min. The tensile strength should be measured on the original cross section of the specimen before stretching. The testing should be conducted at $25 \pm 3^\circ \text{C}$. The properties of the uniform cross section should be 10.4 MPa for Tensile Strength and have a minimum elongation of 200%.

3.5.3.2 High Temperature Resistance

A 25 mm sample of insulation should be removed from each end of a 610 mm sample of the finished cable. The sample should be suspended around a cylindrical mandrel with a diameter that will be specified in TABLE 3. Each end of the wire should have the weight listed in TABLE 3 suspended from it. This condition shall be maintained for 120 hours in a mechanical convection oven at a temperature of $163 \pm 3^\circ \text{C}$. Once cool the weight should be removed from the sample and it should be taken off the mandrel, bent in the opposite direction around a

mandrel of the specified (TABLE 3) diameter for the bend test at a rate that does not exceed 1 turn/minute. The sample is then subjected to the dielectric test (3.5.3.3)

3.5.3.3 Dielectric Test

A sample of cable 610 mm long shall be formed into a loop. A length of 25 mm of insulation should be removed from each end and the wire should be twisted together. The loop that is formed should be immersed in water with a concentration of 5% salt by weight at $22 \pm 3^\circ \text{C}$, so that no more than 152 mm of each end of the sample protrudes above the solution. After the sample has been immersed for 5 hours and is still immersed a charge of 1000 volts (rms) at 60 Hz is applied between the wire and the water for 1 minute. This should occur without a rupture of the insulation.

3.5.3.4 Oil Absorption Test

A sample of wire 600 mm is immersed in oil for a period of 20 hours with the oil temperature being $50 \pm 3^\circ \text{C}$. When the sample is removed the diameter of the wire measured may not have more than a 15% increase when measured 4 hours after removal from the oil. The sample will then be bent around a mandrel (TABLE 3) and checked for cracking. The next step is to subject this piece to the dielectric test 3.5.3.3.

3.5.3.5 Cold Bend Test

A straight sample of wire should be cooled to a temperature of $-40 \pm 3^\circ \text{C}$ at a rate that will not exceed $50^\circ \text{C}/\text{minute}$. When the sample has been at this temperature for a period of three hours and is still at the temperature the sample should be wrapped around a mandrel specified in TABLE 3. This is done by wrapping the sample 180° at the uniform rate of one turn in 10 seconds. The next step is to remove 25 mm of insulation from each end of the sample and perform the dielectric test 3.5.3.3.

3.5.3.6 Flame Test

A Bunsen burner with a 13 mm inlet, a nominal bore of 19 mm, a length of 102 mm above the primary inlets, equipped with a wing-top flame spreader having a 1.6 x 51mm opening fitted to the

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