

NUMBER 108-5003  
 AMP SECURITY CLASSIFICATION Release

**DESIGN OBJECTIVES**

The product described in this document has not been finally tested to insure conformance to the requirements outlined below. Therefore, AMP Incorporated makes no representation or warranty, express or implied, that the product will comply with these requirements. Further, AMP Incorporated may change these requirements based on the results of additional testing and evaluation. Contact AMP Engineering for further details.

**5 $\phi$  SHUR Plugs and 5 $\phi$  SHUR Plug Receptacles**

Catalog Nos.	170002-4, -5, -8	170034-1	Plug Contact (Strip Form)
	170020-2, -3		" " (Loose Piece)
	170003-4, -5, -8		Receptacle Contact (Strip Form)
	170021-2, -3		" " (Loose Piece)

**1. SCOPE:**

In case when "product specification" is referred to in this document, it should be read as "design objectives" for all times as applicable.

**1.1 SCOPE**

This specification covers the requirements for 5 $\phi$  SHUR Plugs and 5 $\phi$  SHUR Plug Receptacles.

**1.2 CONSTRUCTION**

This plug is a ball-tip type male contact and is mated with a receptacle (female contact) that has an inner diameter appropriate to the plug.

**1.3. APPLICABLE WIRE RANGE**

The wire range for the plugs and the receptacles shall be as specified on the applicable product drawings.

**2. APPLICABLE DOCUMENTS:**

2.1	ASTM B36 Copper Alloy No. 260	Brass
2.2	MIL-C-50 Copper Alloy	"
2.3	JIS C 3406	Low-Voltage Cables for Automobile

**3. REQUIREMENTS:**

**3.1 TERMINAL MATERIALS**

The materials of the terminals shall be as specified on the applicable product drawings.

**3.2 DESIGN AND CONSTRUCTION**

Design, construction and dimensions of each contact shall be as specified on the applicable drawings.

PRINT DIST	D	Revised RFA-1863	8/20/70	DR	T. Iwakayama	<b>AMP</b>	AMP (Japan), Ltd.		⊕
	C	Added 170002-8 & 170003-8 RFA-1018	7/16/70	CHK	7-67-70		TOKYO, JAPAN		
	B	Added 170020 & 21314 RFA-	8-26-77	APP	7/1/70	LOC	NO	REV	
	A	Prepared				J	A	108-5003	
	LTR	REVISION RECORD	DR	CHK	DATE	SHEET		NAME	

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### 3.3 ELECTRICAL CHARACTERISTICS

#### 3.3.1 MILLIVOLT DROP

When tested as specified in Paragraph 4.3.1, the millivolt drop measured from crimped portion of the plug to crimped portion of the receptacle across the mating portion shall not exceed the applicable value of Table 1.

TABLE 1

MILLIVOLT DROP

<u>WIRE SIZE</u> (AWG)	<u>TEST CURRENT</u> (AMPERES)	<u>VOLTAGE DROP</u> (mV)	<u>TEMPERATURE RISE</u> (°C)
20 (0.50 mm <sup>2</sup> )	4	15	20
18 (0.85 mm <sup>2</sup> )	7	20	20
16 (1.25 mm <sup>2</sup> )	10	25	30
14 (2.00 mm <sup>2</sup> )	15	35	30

#### 3.3.2 CONTACT RESISTANCE

When tested in accordance with the test method described in Paragraph 4.3.1, the contact resistance of the mated pair of plug and receptacle shall be less than two milliohms (mΩ).

#### 3.3.3 TEMPERATURE RISE

When tested in accordance with Paragraph 4.3.1, the temperature rise shall not exceed the applicable values shown in Table 1.

### 3.4 MECHANICAL PERFORMANCE

#### 3.4.1 TENSILE STRENGTH

When tested in accordance with the test method described in Paragraph 4.3.2, the strength of wire crimp joints of plugs or receptacles shall not be less than the applicable values shown in Table 2.

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TABLE 2

<u>WIRE SIZE (AWG)</u>	<u>CRIMP TENSILE (kg)</u>
20 (0.50 mm <sup>2</sup> )	8
18 (0.85 mm <sup>2</sup> )	15
16 (1.25 mm <sup>2</sup> )	20
14 (2.00 mm <sup>2</sup> )	25

3.4.2 EXTRACTION FORCE

When tested in accordance with Paragraph 4.3.3, the extraction force shall be within the range specified in Table 3.

TABLE 3

<u>PLUG</u>	<u>RECEPTACLE</u>	<u>EXTRACTION FORCE (kg)</u>	
		<u>Minimum</u>	<u>Maximum</u>
170002-8 170002-4 170020-2	170003-8 170003-4 170021-2	1.5	7.5
170002-5 170020-3	170003-5 170021-3	2.0	8.0

4. QUALITY ASSURANCE REQUIREMENTS:

4.1 TESTING ENVIRONMENTS

Unless otherwise specified, tests and examinations shall be conducted under any combination of conditions within the following ranges.

Temperature . . . . . 20 to 30°C

Relative Humidity . . . . . 30 to 80 %

Barometric Pressure . . . . . 610 to 790 mm Hg  
(24 to 31 inches of mercury)

4.2 TESTING

4.2.1 TEST SAMPLES

The terminal samples used for this test shall be assembled and

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crimped with recommended crimp heights to the wire specified in Table 4.

#### 4.2.2 WIRE

The wire used for this test shall conform to JIS-C-3406 (Low-Voltage Cables for Automobile) as specified in Table 4.

TABLE 4

WIRE SIZE (AWG)	SECTION AREA (mm <sup>2</sup> )	DIA. OF STRAND (mm)	STRAND NO. OF STRANDS	CMA
20	0.56	0.32	7	1.111
18	0.88	0.32	11	1.746
16	1.28	0.32	16	2.540
14	2.09	0.32	26	4.125

#### 4.3 TEST METHODS

##### 4.3.1 MILLIVOLT DROP (Refer to Fig. 1)

The millivolt drop and the contact resistance of the mated contacts shall be measured by the Millivolt Drop Method. As indicated in Fig. 1, connect a DC source to Points Z<sub>1</sub> and Z<sub>2</sub>, and apply to the circuit a test current applicable for the wire as shown in Table 1. Each lead wire shall be sufficiently long (more than 91.5 mm) for heat dissipation. Plug and receptacle which form a pair of sample terminals shall have wires of an identical size.

After the temperature of the circuit has been stabilized, the millivolt drop shall be measured by means of a DC voltmeter between Points Y<sub>1</sub> and Y<sub>2</sub> in which crimped portion of plug, mating portion and crimped portion of receptacle are connected in series. Since the measured value includes the millivolt drop of two-76.2 mm long wires for both plug and receptacle, the millivolt drop measured in the same manner for the 152.4 mm long wire must be subtracted. The contact resistance of the mated contacts shall be calculated from the millivolt drop value measured between mating Points X<sub>1</sub> and X<sub>2</sub> with a 4 A test current. The temperature rise shall be measured, after the temperature has been stabilized, by contacting a thermocouple to the point indicated in Fig. 1 with an applicable test current shown in Table 1.

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4.3.2 TENSILE STRENGTH

Place the sample contacts crimped to 152.4 mm long wires in a standard tensile testing machine and apply an axial load at a rate of 25.4 mm per minute. The tensile strength shall be measured when the wire is broken or pulled out of wire crimp of the contacts.

4.3.3 EXTRACTION FORCE

Correctly insert by fingers the samples crimped to 25.4 mm long wires, place the samples in Shopper Tension Tester, and extract the samples at a rate of 200 mm per minute. The extraction force shall be measured when the mated samples are pulled out.

5. TEST EQUIPMENT:

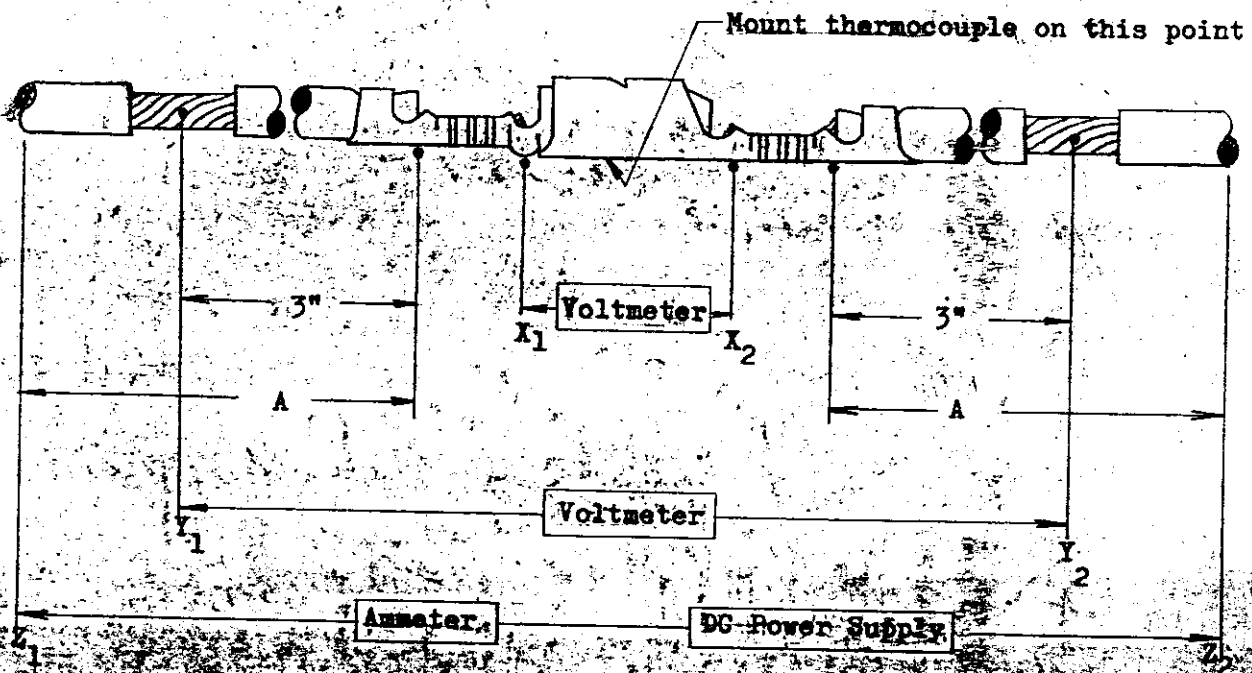
The following equipment and test instruments are to be used for the performance tests described in this specification.

<u>EQUIPMENT</u>	<u>MANUFACTURER</u>
(1) Shopper Tension Tester	Ueshima Seisakusho
(2) 300 kg Tension Tester	Tokyo Koki
(3) DC Ammeter	Yokogawa Electric Works
(4) DC Voltmeter	"
(5) Temperature Measuring Instrument	"
(6) Draft Free Chamber	AMP-Japan
(7) DC Source	"

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A: 91.5 cm minimum length of continuous lead (for heat dissipation).

... insulation, and solder uniformly the exposed portion of the wire to provide the probe area.

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