

## Taper Pins

### PRE-INSULATED DIAMOND GRIP TAPER PIN CONTACTS PART NUMBERS - 66171, 66172 and 66173

#### 1. SCOPE:

1.1 SCOPE - The purpose of this specification is to establish the requirements for pre-insulated diamond grip taper pin contacts listed above.

#### 2. APPLICABLE DOCUMENTS:

2.1 REFERENCES - The following specifications and/or documents form a part of this specification to the extent specified herein:

MIL-T-7928	Terminals, Crimp Style
MIL-G-45204	Gold Plating; Electrodeposited
MIL-M-20693A	Plastics, Molding, Polyamide
QQ-B-626B	Brass - Leaded and Non-Leaded
QQ-N-290	Nickel Plating; Electrodeposited
QQ-C-576B	Copper Products

#### 3. REQUIREMENTS:

3.1 CONTACTS - The taper pin contacts furnished to this specification shall be a product that has successfully met all the requirements of this specification.

3.2 MATERIALS - The materials used to fabricate this product shall be as specified herein. When a substitute material is used, it must meet all the performance requirements of this specification.

3.2.1 PIN BODY MATERIAL - The material used for the body shall be a copper alloy conforming to QQ-B-626B. The plating of this contact shall be as specified by the applicable product drawing.

3.2.2 INSULATING MATERIAL - The material used for the plastic sleeve shall be polyamide conforming to MIL-M-20693A.

3.2.3 SLEEVE MATERIAL - The material used for the diamond grip sleeve shall be a copper alloy conforming to QQ-C-576A. The sleeve shall be plated gold over nickel in accordance with MIL-G-45204 and QQ-N-290 to a thickness specified on the applicable product drawing.

3.3 DESIGN AND CONSTRUCTION - The taper pin contacts shall be of the design, construction, and physical dimensions specified on the applicable product drawing.

3.4 CURRENT RATING - These taper pin contacts shall have a maximum current rating equivalent to that of the conductor onto which it is crimped, but not to exceed the maximum operating temperature.

3.5 OPERATING TEMPERATURE - Taper pin contacts shall have a maximum operating temperature of +105°C. and a minimum operating temperature of -40°C.

3.6 TEST SAMPLES - Sufficient samples to satisfy the quantities specified for each group in Table III or IV shall be selected from current production. Each group shall be tested for the assigned characteristics specified in Table III and IV. The samples shall represent each Part No. (66171, 66172, and 66173). The pins shall be crimped to wire which conforms to the requirements of MIL-W-16878, Type B with Hand Tool 90153-1. One 12 inch sample of the insulating tubing representing each part number used to insulate the sleeves assembled to the pins that are being qualified. See Tables III and IV for wire and tubing lengths required.

3.7 PERFORMANCE AND TEST REQUIREMENTS -

3.7.1 TEST CONDITIONS - Unless otherwise specified herein, tests and examinations required by this specification shall be made under any combination of conditions within the range below. Any specified condition shall not affect the other two ambient ranges.

- Temperature: 20° to 30°C.
- Relative Humidity: 30 to 80 percent
- Barometric Pressure: 24 to 31 inches of mercury

3.7.2 EXAMINATION OF PRODUCT - The taper pin contacts shall meet the dimensional requirements as indicated on the applicable product drawing. There shall be no evidence of faulty assembly, peeling or chipping of the plating and finish. See Paragraph 3.7.2.1 for equipment required to measure parts.

3.7.2.1 EXAMINATION OF PRODUCT - The taper pins shall be measured using standard shop tools such as optical comparator, micrometer, plug gages and etc. The measured parts shall conform to Paragraph 3.7.2.

3.7.3 TERMINATION RESISTANCE - When tested in accordance with Paragraph 3.7.3.1 the potential drop shall not exceed the values shown in Table I when measured as shown in Figure I.

TABLE I  
CRIMP RESISTANCE.

WIRE SIZE	TEST CURRENT	VOLTAGE DROP (In Millivolts)	AFTER TEST Voltage Drop (In Millivolts)
24	4.5	8.0	13.0
22	9.0	7.0	12.0
20	11.0	6.0	10.0
18	16.0	5.0	7.0
16	22.0	7.0	10.0

3.7.3.1 TERMINATION RESISTANCE - The test current specified in Table I shall be applied to the taper pins subjected to this test. The millivolt drop shall be measured at the points shown in Figure I. Measurements shall be made after the temperature of the wire has stabilized. The millivolt drop shall not exceed the values specified in Table I and the applicable paragraph.

- 3.7.4 DIELECTRIC STRENGTH - When tested in accordance with Paragraph 3.7.4.1, there shall be no arcing or breakdown when the voltage of 1500 volts AC rms is applied for one minute.
  - 3.7.4.1 DIELECTRIC STRENGTH - The pin of the contact shall be dipped in hot beeswax, having a temperature not exceeding 154°C., to a depth sufficient to completely cover the metallic pin without covering the edge of the crimp. When the beeswax has hardened, the samples shall be immersed in a 5% salt water solution to a depth sufficient to cover the crimped areas of the wire and insulation barrel. The voltage specified in 3.7.4 shall then be applied for one minute between the test sample and salt water.
- 3.7.5 CRIMP TENSILE - When tested in accordance with Paragraph 3.7.5.1, all samples shall meet the minimum requirements as specified in Table II.

TABLE II  
CRIMP TENSILE

WIRE SIZE	MINIMUM TENSILE (Pounds)
24	10
22	15
20	20
18	38
16	40

- 3.7.5.1 TENSILE STRENGTH - Samples shall be placed in a standard tensile-testing machine and sufficient force applied to pull the wire out of the sample or break the wire. The mechanical connection of the wire and the sample shall not break or become distorted to the extent that it is unfit for further use before the minimum tensile strengths, as specified in Table II are reached. The test shall be made with a speed of head travel of 1 inch per minute.
- 3.7.6 VIBRATION - After being subjected to the vibration test specified in Paragraph 3.7.6.1, the terminals shall not exceed the "After Test" voltage drop requirements specified in Table I nor have a tensile strength less than that specified in Table II.
  - 3.7.6.1 VIBRATION - The crimped pins shall be inserted into a standard taper pin housing and secured to the vibration table by means of a mounting plate. The wires shall be secured to a stable support 12 inches away from the housing with all slack and tension removed from the wire. The samples shall then be vibrated in accordance with Method 201 of MIL-STD-202 for 18 hours on each of the perpendiculars to the axis of the wire at a total amplitude of 0.060 inch, at a cycling frequency of 10 to 55 to 10 CPS, the cycle frequency to be accomplished in 1 minute. Following this test the parts shall meet the requirements of Paragraph 3.7.6.

- 3.7.7 IMMERSION - After immersion in the fluids specified in Paragraph 3.7.7.1 the crimped pins shall conform to the dielectric strength requirements of Paragraph 3.7.4.
- 3.7.7.1 IMMERSION - The crimped taper pins shall be immersed in aviation hydraulic fluid (petroleum base) conforming to MIL-H-5606 and aircraft lubricating oil conforming to MIL-L-7808 at a temperature of 25°C for a period of 20 hours. Four terminals shall be immersed in each of the above specified fluids. Upon removal from the fluid, the terminals shall be air-dried for 1 hour at room temperature, after which time any remaining excess fluid may be wiped from the terminal. The terminals shall then meet the requirements of Paragraph 3.7.7.
- 3.7.8 FLAMMABILITY - The sample shall be self-extinguishing within 20 seconds after removal from the flame specified in Paragraph 3.7.8.1.
- 3.7.8.1 FLAMMABILITY - One twelve inch sample of tubing representing each part number used to insulate the sleeve assembled to the pins being qualified (See Paragraph 3.6) shall be tested as follows:
- A wing shaped, flame spreader having a 1/16 by 2 inch opening, shall be fitted to the top of a bunsen burner, having a 1/4 inch inlet, a nominal bore of 3/8 inch and a length of approximately 4 inches. The flame shall be adjusted to a height of 2 inches with an inter-cone approximately 1/3 its height. The burner shall be placed in an enclosure which permits a flow of sufficient air for complete combustion but be free from drafts.
- The sample shall be held in a horizontal position and the end of the tubing applied to the tip of the flame for a period of 10 seconds and then removed. The sample shall meet the requirements of Paragraph 3.7.8.
- 3.7.9 CORROSION RESISTANCE - After the exposure to the corrosive atmosphere specified in 3.7.9.1 the termination resistance shall conform to the "After Test" values specified in Table I. The termination resistance shall be measured in accordance with Paragraph 3.7.3. After completion of the test, there shall be no exposure of base material or under-plate.
- 3.7.9.1 CORROSION RESISTANCE - The samples shall be tested in accordance with Method 101 of MIL-STD-202 for 100 hours and meet the requirements of 3.7.9. The samples shall have been crimped to short lengths of wire and mounted in the salt spray chamber in a horizontal position. Adjacent samples shall be separated by at least 1/4 inch. During this test the samples shall not come in contact with metallic or wooden objects. The salt spray shall have free access to the samples. Before conducting the voltage drop test specified in 3.7.9, samples shall be washed with tap water, air dried for a minimum of 1 hour. Any oxide deposit on the taper portion of the pin shall be removed by use of a soft brush.

- 3.7.10 HEAT AGING** - The crimped taper pin leads shall be tested in accordance with Paragraph 3.7.10.1. After being subjected to the heat aging the insulation shall show no signs of being ruptured or cracked. The samples shall then be subjected to and comply with the dielectric strength test specified in 3.7.4.
- 3.7.10.1 HEAT AGING** - The crimped taper pin leads shall be maintained at a temperature of 120° to 122°C for a period of 120 hours. After removal from the chamber, the terminals shall be cooled to a temperature between 20° and 25°C within a period of 1 hour. Upon completion of the heat age test the crimped pins shall meet the requirements of 3.7.10.
- 3.7.11 LOW TEMPERATURE CRIMP** - The crimped taper pin leads shall be tested in accordance with Paragraph 3.7.11.1. After being subjected to the low temperature test the insulation shall show no signs of being ruptured or cracked. The samples shall then be subjected to and comply with the dielectric strength test specified in 3.7.4.
- 3.7.11.1 LOW TEMPERATURE CRIMP** - Uncrimped pins, wire, and the crimping tool shall be maintained at a temperature of -15°C for a period of 1 hour; the pins shall then be crimped to their proper size wire at -15°C. The leads shall then be exposed to -55°C and maintained at that temperature for 1 hour. The terminals shall then be exposed to room temperature (20° to 25°C) for 1 hour. Following this test the pins shall meet the requirements of Paragraph 3.7.11.
- 3.7.12 AXIAL LOAD** -
- 3.7.12.1 AXIAL LOAD CRIMPED** - The insulation and metal sleeve shall withstand a minimum axial force of 8 pounds in either direction without moving more than 1/32 inch on the barrel of the terminal when tested in accordance with 3.7.12.1.1.
- 3.7.12.1.1 AXIAL LOAD CRIMPED** - The crimped samples representing each wire size shall be tested by applying an 8 pound force axially with the centerline of the pin in both directions (toward the wire end and toward the contact end). See Figure 2. A measurement of sleeve displacement shall be made at the point indicated as "D" on Figure 2. The measurement shall be made prior to applying any load and after each force application and meet the requirements of Paragraph 3.7.12.1.
- 3.7.12.2 AXIAL LOAD UNCRIMPED** - The insulation and metal sleeve shall not pull from the terminal body when a three pound load is applied as specified in 3.7.12.2.1.

- 3.7.12.2.1 **AXIAL LOAD UNCRIMPED** - The uncrimped samples representing each wire size shall be tested by applying a three pound force to the insulating sleeve axially toward the wire end of this pin. (See Figure 3) The pin shall meet the requirements of Paragraph 3.7.12.2.
- 3.7.13 **CURRENT CYCLING** - When tested in accordance with 3.7.13.1 the crimped terminals shall meet the "After Test" voltage drop requirements in Table I.
  - 3.7.13.1 **CURRENT CYCLING** - Taper pins shall be crimped to 3 foot lengths of the appropriate wire and shall be subjected to 50 current cycles. Each cycle shall consist of 30 minutes at 125 percent of the test current specified in Table I, followed by 15 minutes at no load. Voltage drop measurements shall be made at test current specified in Table I after the test assembly has returned to room temperature and meet the requirements of Paragraph 3.7.13.
- 4. **QUALITY ASSURANCE PROVISIONS:**
  - 4.1 **PERIODIC REQUALIFICATION** - The tests specified in Table IV shall be performed on production parts each 18 months.

TABLE III  
QUALIFICATION TESTS


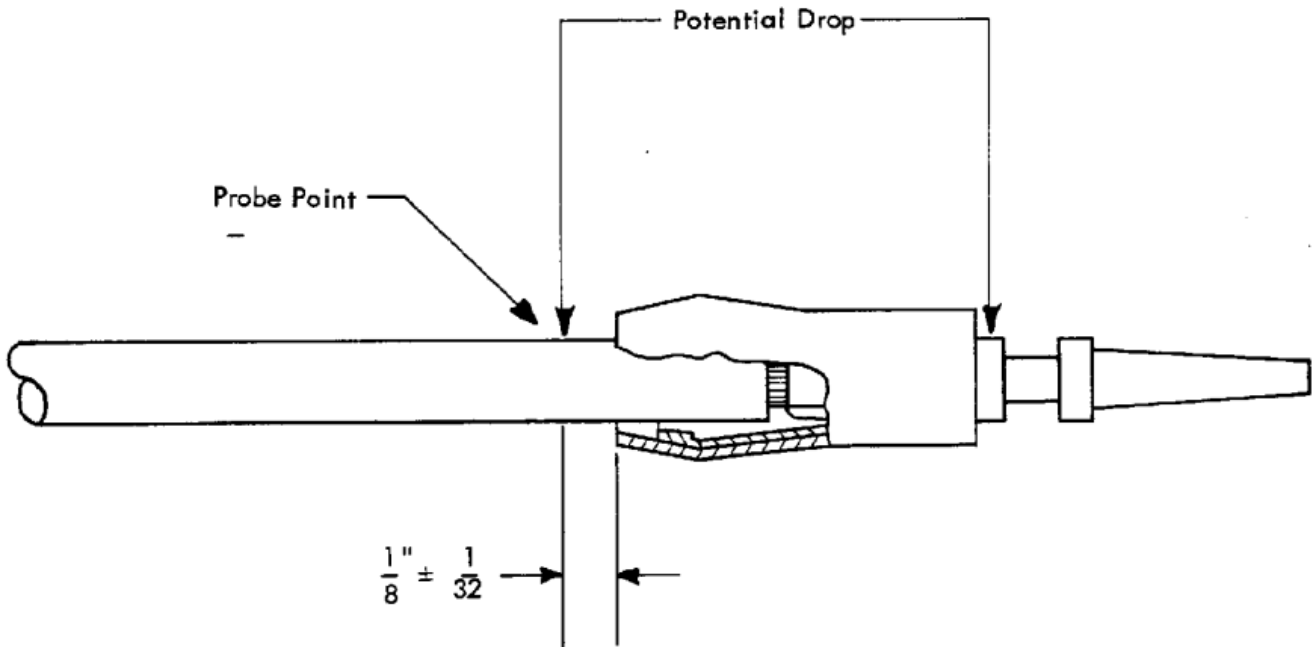
GROUP	EXAMINATION OR TEST	REQUIREMENT PARAGRAPH	NUMBER OF SAMPLES	WIRE LENGTH/INCH
I	Examination of Product	3.7.2	35	-
II	Termination Resistance Current Cycling Termination Resistance	3.7.3 3.7.13 3.7.3	4	36+
III	Termination Resistance Vibration Termination Resistance Tensile Strength	3.7.3 3.7.6 3.7.3 3.7.5	4	24
IV	Immersion Dielectric Strength	3.7.7 3.7.4	8	
V	Flammability	3.7.8	1 ea. P.N. (See 3.7.8)	12" Tubing
VI	Termination Resistance Corrosion Resistance Termination Resistance Tensile Strength	3.7.3 3.7.9 3.7.3 3.7.5	4	8
VII	Heat Aging Dielectric Strength	3.7.10 3.7.4	4	8
VIII	Low-temperature Crimp Dielectric Strength	3.7.11 3.7.4	4	8 (See 3.7.11.1)
IX	Axial Load (Crimped)	3.7.12.1	5	8
X	Axial Load (Uncrimped)	3.7.12.2	5	-

TABLE IV  
PERIODIC REQUALIFICATION TESTS

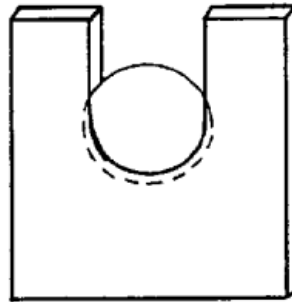
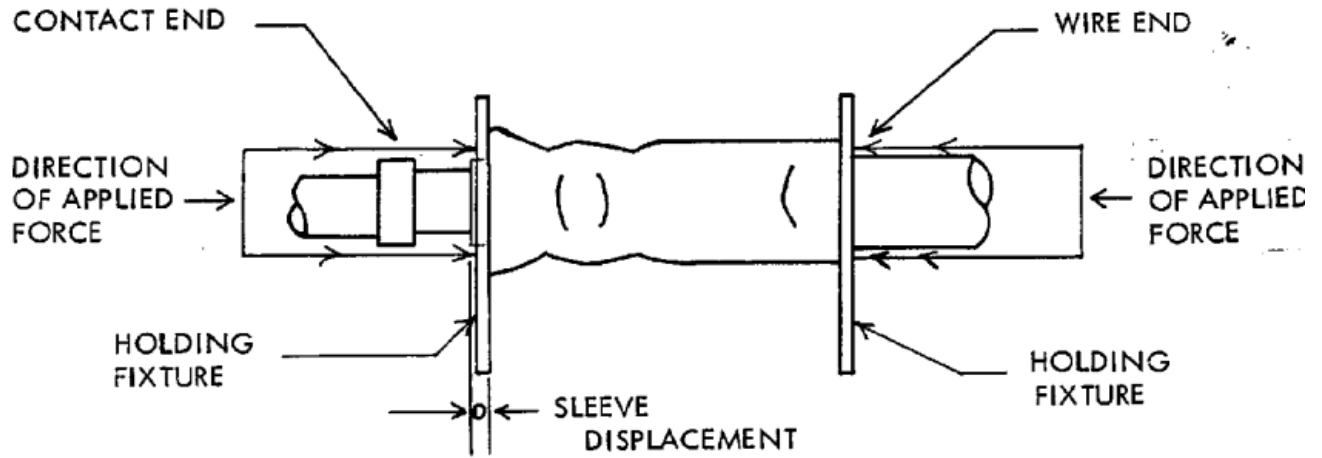
GROUP	EXAMINATION OR TEST	REQUIREMENT PARAGRAPH	NUMBER OF SAMPLES	WIRE LENGTH/INCH
I	Examination of Product	3.7.2	23	-
II	Immersion Dielectric Strength	3.7.7 3.7.4	8	8
III	Flammability	3.7.8	1 ea. P.N. (See 3.7.8)	12" Tubing
IV	Heat Aging Dielectric Strength	3.7.10 3.7.4	4	8
V	Low Temperature Crimp Dielectric Strength	3.7.11 3.7.4	4	8
VI	Axial Load (Uncrimped)	3.7.12.2	5	-





TERMINATION RESISTANCE

FIGURE 1

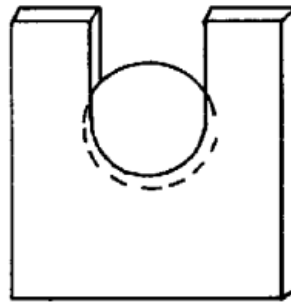
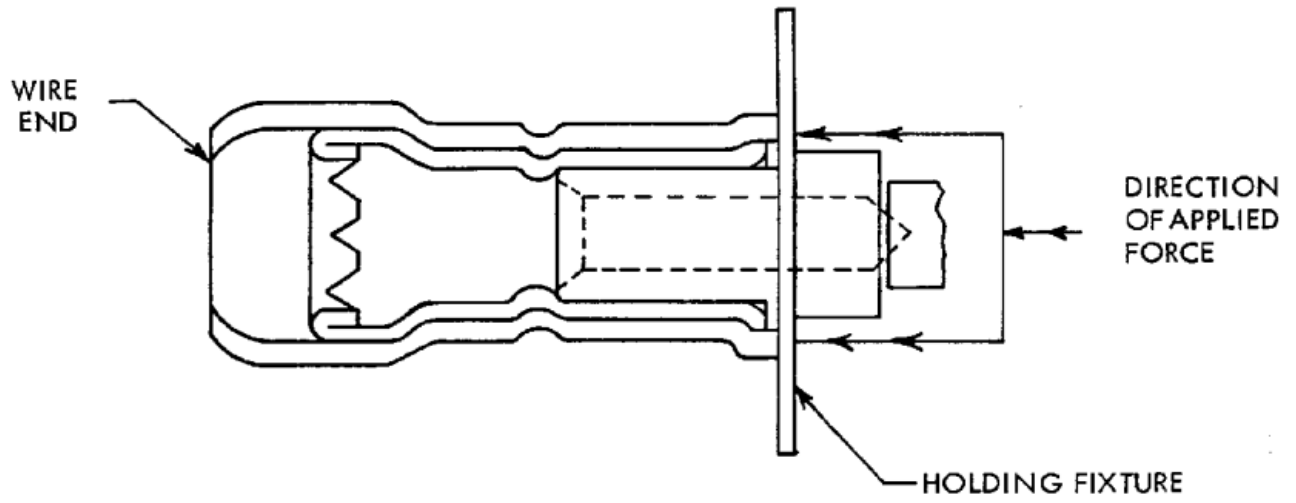


END VIEW OF HOLDING FIXTURE

FIGURE 2

METHOD FOR APPLYING AXIAL LOAD

(See Paragraph 3.7.12.1)



END VIEW OF HOLDING FIXTURE

FIGURE 3  
METHOD FOR APPLYING AXIAL LOAD  
(See Paragraph 3.7.12.2)