INCH-POUND

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DETAIL SPECIFICATION

CRIMPING TOOLS, WIRE TERMINATION, GENERAL SPECIFICATION FOR

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

1. SCOPE

1.1 Scope. This specification covers the general requirements for crimping tools, accessories and inspection gages used for connecting removable contacts (such as; signal, power, coaxial, shielded, thermocouple, and filter pin contacts) coaxial connectors, shielded connectors, ferrules, terminals, end caps and splices to wire conductors for use in electric connectors, terminal junction systems, and other electric or electronic components. The crimping tools and accessories covered by this specification are for use by the military and are the only connector assembly devices to be qualified, procured and issued for military maintenance use.

1.2 Classification. Crimping tools covered by this specification are of the following types: (see 6.2)

Type I	-	Tools that produce an indent termination.
Type II	-	Tools that produce a formed termination.
Type III	-	Tools that produce a compression termination.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Naval Air Warfare Center Aircraft Division, Code 414100B120-3, Highway 547, Lakehurst, NJ 08733-5100, by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A FSC 5120

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements documents cited in sections 3 and 4 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications and standards. The following specifications and standards form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATIONS

FEDERAL

QQ-W-343	-	Wire, Electrical, Copper (Uninsulated)

DEPARTMENT OF DEFENSE

MIL-T-7928	-	Terminals, Lug Splices, Conductor; Crimp Style, Copper, General Specification for
MIL-A-8625	-	Anodic Coatings for Aluminum and Aluminum Alloys
MIL-F-21608	-	Ferrule, Shield Terminating, Crimp Style
MIL-W-22759	-	Wire, Electric, Fluoropolymer-Insulated, Copper or Copper Alloy
MIL-PRF-39012	-	Connectors, Coaxial, Radio Frequency, General Specification For
MIL-C-39029	-	Contacts, Electrical Connector, General Specification For
MIL-W-81044	-	Wire, Electric, Crosslinked Polyalkene, Crosslinked Alkane-Imide Polymer, or Polyarlene Insulated, Copper or Copper Alloy
MIL-S-81824	-	Splice, Electric, Permanent, Crimp Style, Copper, Insulated, Environment Resistant
MIL-W-16878	-	Wire, Electrical, Insulated, General Specification For

(See supplement 1 for list of specification sheets.)

STANDARDS

DEPARTMENT OF DEFENSE

MIL-STD-130	-	Identification Marking of U.S. Military Property
MIL-STD-202	-	Test Methods for Electronic and Electrical Component Parts
MIL-STD-889	-	Dissimilar Metals

(Unless otherwise indicated, copies of the above specifications and standards are available from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of the DoDISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DoDISS are the issues of the documents cited in the solicitation (see 6.2).

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME-Y14.5	-	Dimensioning and Tolerancing

(Application for copies should be addressed to American Society of Mechanical Engineers, 345 East 47th Street, New York, NY 10017-2392.)

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI-Z540.1	-	Laboratories, Calibration and Measuring Test Equipment

(Application for copies should be addressed to American National Standards Institute, 11 West 42nd Street, New York, NY 10036.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM-B16	-	Rod, Brass, Bar, and Shapes for Use in Screw Machines (Metric). (DoD Adopted)
ASTM-B133	-	Copper, Rod, Bar, and Shapes (Metric). (DoD Adopted)
ASTM-B272	-	Copper Flat Products with finished (Rolled or Drawn) Edges (Flat Wire and Strip). (DoD Adopted)

(Application for copies should be addressed to American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, Pa. 19428-2950.)

AMERICAN SOCIETY FOR QUALITY CONTROL (ASQC)

ASQC-Z1.4 - Procedures, Sampling and Tables for Inspection By Attributes. (DoD Adopted)

(Application for copies should be addressed to the American Society For Quality Control P.O. Box 3005, 611 E. Wisconsin Avenue, Milwaukee, Wisconsin 53201-4606.)

SOCIETY OF AUTOMOTIVE ENGINEERS (SAE)

SAE-AIR1351 - Aerospace Electrical & Electronic Wiring, Devices and Accessories, Manufacturers' Identification of.

(Application for copies should be addressed to the Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, PA 15096.)

2.4 Order of precedence. In the event of any conflict between the text of this document and the references cited herein (except for related associated specification sheets), the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.l Specification sheets. The individual item requirements shall be as specified herein and in accordance with the applicable specification sheets. In the event of any conflict between the requirements of this specification and the associated specification sheets, the latter shall govern.

3.1.2 Dimensions and tolerances. Dimensioning and tolerancing used in this document and associated specification sheets shall be in accordance with ASME-Y14.5.

3.2 Qualification. Tools furnished under this specification shall be products that are authorized by the qualifying activity for listing on the applicable qualified products list before contract award (see 4.3 and 6.3).

3.2.1 Use of military part numbers. Military part numbers shall not be applied to a product, except for qualification test samples (see 6.3), until notification has been received from the activity responsible for qualification that the product has been approved for listing on the qualified products list.

3.3 Materials. Materials shall be as specified herein. However, when a definite material is not specified, a material shall be used which will enable the tools to meet the performance and interface requirements of this specification and the applicable specification sheets. Acceptance or approval of any constituent material shall not be construed as a guarantee of the acceptance of the finished product.

3.3.1 Finish. Aluminum parts shall be anodized in accordance with MIL-A-8625 or an anodizing process that meets the performance requirements specified in section 3.5 of this specification. All other metal parts shall be made of corrosion-resistant material or protected to meet the performance requirements of this specification. Color shall be as specified on the applicable specification sheet. Cadmium plating shall not be used.

3.3.2 Dissimilar metals. When dissimilar metals are employed in intimate contact with each other, protection against electrolytic corrosion shall be provided as specified in MIL-STD-889.

3.4 Design and construction. Tools and accessories shall be in accordance with the applicable specification sheet.

3.4.1 Crimping operation.

3.4.1.1 Type I tools. When the tool is in the fully opened position, the contacts shall pass freely between the indenters, both before and after being crimped. All indenters shall be designed to travel with equal and simultaneous movement. The motion and dimensional configuration shall be specified in the applicable specification sheets. The tool design shall provide for positive closed positioning for the indenters. The indenter closure selector shall have a positive detent at each setting. The tool shall be designed such that they can meet specified closure with or without positioners or turrets installed. All positioners and turrets shall provide positive location of wire barrels for crimping for specified contacts.

3.4.1.2 Type II tools. The crimping operation shall be accomplished by the closure of a set of dies with the specified configuration (see 3.1). The movement of the opposing crimp dies shall be perpendicular or radial to the mating die face, and the fully closed position shall be as specified on the applicable specification sheet.

3.4.1.2.1 Locator. When required (see 3.1), a locating device shall be incorporated on the crimping dies or crimping tools for positioning the item to be crimped in the proper location prior to the initiation of the crimp cycle.

3.4.1.3 Type III tools. Operation of the tool shall be in accordance with the individual specification sheet.

3.4.2 Tool malfunction. All tools shall be provided with a return mechanism and a full cycling mechanism that shall not jam or malfunction if operated with or without a contact or connector, and with or without a positioner, turret, or die. Any tool operation within the scope of this specification shall neither create a jammed mechanism nor impair the function of the tool. Metal particles from operation of the tool or the crimping operation shall not accumulate within the tool where they would contribute to or cause any malfunction of the tool mechanism.

3.4.2.1 Full cycle mechanism. The full cycle mechanism shall be tamperproof so that it cannot be disengaged prior to or during the crimp cycle.

3.4.3 Removal of crimped parts. The crimped assembly shall be removed from the tool without impediment upon completion of the crimping operation.

3.4.4 Calibration. Tool calibration adjustments shall be accessible only when the tool is disassembled. These adjustments shall be made only by the manufacturer or by an approved calibration laboratory as specified in ANSI-Z540.1.

3.4.5 Gages.

3.4.5.1 Inspection gages. The required “GO” and “NO-GO” gages shall be made available by the tool manufacturer for performing the qualification and conformance inspection gaging tests specified herein. These gages shall conform to the gaging limits specified on the applicable tool specification sheet.

3.4.5.2 In-service gages. The gages to be supplied to the Government for maintenance use shall be in accordance with the gage specification sheet specified on the applicable tool specification sheet.

3.5 Performance. Tools shall meet the test requirements of this specification.

a. Type I tools. Type I tools shall crimp MIL-C-39029 wire barrels and other electrical connector contacts to wires as specified in the applicable component specification.

b. Type II tools. Type II tools shall crimp terminal splices, end caps conforming to MIL-T-7928 and MIL-S-81824, shielded or coaxial contacts, coaxial connectors conforming to MIL-PRF-39012, ferrules conforming to MIL-F-21608, and other connecting devices to wires or cables as specified in the applicable specification sheet.

c. Type III tools. Type III tools shall meet the requirements as specified in the applicable specification sheet.

3.5.1 Gaging. Tools shall meet the gaging limits specified in the applicable specification sheet when tested in accordance with 4.7.1.

3.5.2 Humidity (steady state). There shall be no damage to basic tools, turrets, positioners, or dies to impair operation when tested in accordance with 4.7.2.

3.5.3 Handle, indenter, and die return operation (full cycle). The return mechanism shall compel the handles, indenters, and dies to automatically return to the fully open position when tested in accordance with 4.7.3. This requirement shall apply regardless of the plane or position of the tool, with or without a wired assembly located in the tool.

3.5.4 Ratcheting mechanism.

3.5.4.1 Type I tools. The ratchet shall hold above the “NO-GO” limit of the applicable specification sheet when tested in accordance with 4.7.4.1.

3.5.4.2 Type II tools. When tested in accordance with 4.7.4.2, the opposing die faces shall meet and the dies shall fully close before the ratchet releases. The force required to release the ratchet mechanism shall be not less than 30 pounds and shall be not more than 50 pounds.

3.5.4.3 Type III tools. Type III tool operation shall be in accordance with the applicable specification sheets.

3.5.5 High compression force. Type I and type II tools shall conform to the gaging requirement of 3.5.1, after being subjected to a 150-pound compression force in accordance with 4.7.5. High compression force, if required, for type III tools shall be in accordance with the applicable specification sheets.

3.5.6 Compression force. The force required to complete the cycle of the tool shall not exceed the value specified on the applicable specification sheet when tested in accordance with 4.7.6.

3.5.7 Deformation of crimped connection.

3.5.7.1 Type I tools. The out-of-roundness of the crimped wire barrel shall be not greater than the specified maximum diameter of the barrel by more than 0.002 inch for sizes smaller than size 20 or by more than 0.006 inch for size 20 and larger wire barrels when measured as specified in 4.7.7.1.

3.5.7.2 Type II tools. The crimped connection shall be symmetrical to ensure that the component shall function as required when examined as specified in 4.7.7.2.

3.5.7.3 Type III tools. Deformation requirements shall be in accordance with applicable specification sheets, if applicable.

3.5.8 Cracking of crimped connection. There shall not be any cracks penetrating the plating (or insulation, if applicable) and exposing the basis metal as a result of crimping, when tested as specified in 4.7.8.

3.5.9 Concentricity (straightness).

3.5.9.1 Type I tools. The position of the outside diameter of the contact after being crimped shall be not greater than 0.012 inch (relative to measured contact diameter) of the OD as manufactured for sizes 12 and 16 contacts and 0.011 inch (relative to measured contact diameter) for size 20 and smaller contacts, when measured as specified in 4.7.9.1. This includes the

0.005 inch permitted during contact manufacturing. This test shall be waived for stamped and formed contacts or contacts whose configuration does not allow testing with measuring equipment (see figure 3).

3.5.9.2 Type II tools. The crimped wire assembly shall be straight to ensure that the component shall function as required when examined as specified in 4.7.9.2.

3.5.9.3 Type III tools. Requirements for straightness shall be in accordance with the applicable specification sheets.

3.5.10 Voltage drop.

3.5.10.1 Type I tools. The voltage drop across the crimped joint shall be not greater than the value specified in table I, when tested as specified in 4.7.10.1.

3.5.10.2 Type II tools. The voltage drop shall meet the requirements of the specification to which the crimped item is qualified. If the component specification does not specify the voltage drop, the values specified in table III shall apply when tested as specified in 4.7.10.2.

3.5.10.3 Type III tools. Voltage drop shall be in accordance with the applicable specification sheets.

3.5.11 Tensile strength. When tested in accordance with 4.7.11, the wire shall not break at, or pull out of, the crimped joint. The connection shall not break or become distorted to the extent that it is unfit for further use before the minimum tensile strength is reached as specified in tables II and III.

3.5.12 Dielectric strength for Type II tools. When applicable (see 3.1), the insulation on terminals, splices, ferrules and end caps shall show no evidence of damage, arcing, or breakdown, when tested in accordance with 4.7.12.

3.5.13 Low temperature crimp. There shall be no binding of the tool handles, indenters, dies, or crimped wired assemblies when tested as specified in 4.7.13. The wired assemblies shall then meet the requirements of 3.5.10 and 3.5.11.

3.5.14 Shock. Crimping tools, turrets. positioners, or dies shall not be damaged as a result of the shock test of 4.7.14.

TABLE I. Voltage drop for type I tools.

Wire size range	Test current (amps)	Maximum voltage drop	
		Silver- or tin-plated copper wire (millivolts)	Nickel-plated copper wire (millivolts)
0000	225.0	6.0	N/A
00	185.0	8.0	N/A
0	150.0	3.0	N/A
2	N/A	N/A	N/A
4	80.0	4.0	N/A
6	60.0	4.5	N/A
8	46.0	5.0	N/A
10	33.0	4.0	N/A
12	23.0	3.0	14.0
14	17.0	3.5	13.5
16	13.0	3.5	16.0
20	7.5	4.0	15.5
22	5.0	4.0	22.5
24	3.0	4.0	15.5
26	2.0	4.0	17.0
28	1.5	5.0	18.5
30	1.0	6.0	21.0
32	0.5	8.0	19.0

TABLE II. Tensile strength for type I tools.

Wire size range	Minimum tensile strength (pounds)			
	Silver- or tin-plated copper wire		Nickel-plated copper wire	
	Initial	After low temp. crimp	Initial	After low temp. crimp
0000	875.0	787.5	785.0	706.5
00	750.0	675.0	675.0	607.5
0	700.0	630.0	630.0	567.0
1	650.0	585.0	585.0	526.5
2	550.0	495.0	495.0	445.5
4	400.0	360.0	360.0	324.0
6	300.0	270.0	270.0	243.0
8	220.0	198.0	200.0	180.0
10	150.0	135.0	135.0	121.5
12	110.0	93.0	100.0	85.0
14	70.0	61.0	60.0	53.0
16	50.0	45.0	37.0	33.0
20	20.0	14.0	19.0	13.0
22	12.0	7.0	8.0	5.0
24	8.0	5.0	6.0	4.0
26	5.0	4.0	3.0	2.5
28	3.0	1.5	2.0	1.0
30	1.5	0.8	1.5	0.8
32	1.0	0.5	1.0	0.5

TABLE III. Voltage drop and tensile strength for terminals and splices used with type II tools.

Terminal and splice	Wire size range	Test current (amps)	Maximum voltage drop - millivolt drop of equivalent length of wire plus this value*		Minimum tensile strength (pounds)
			Terminal (mV)	Splice (mV)	
12-10	10	55.0	1.0	2.0	150.0
	12	41.0	1.0	2.0	110.0
16-14	14	32.0	1.0	2.0	70.0
	16	22.0	1.0	2.0	50.0
22-18	18	16.0	1.0	2.0	38.0
	22	9.0	1.0	2.0	19.0
24-20	20	11.0	1.0	2.0	15.0
	24	4.5	2.0	4.0	10.0
26-24	24	4.5	2.0	4.0	10.0
	26	3.0	3.0	6.0	7.0

*For silver and tin plated wire only.

3.5.15 Life requirements.

3.5.15.1 Type I tools. The tools shall be subjected to 200,000 crimping cycles in accordance with 4.7.15.1. The wired contacts crimped during the life test shall meet the requirements of 3.5.10 and 3.5.11. The tool shall meet the in-service requirements of 3.5.1 and the requirements of 3.5.3 and 3.5.4.

3.5.15.2 Type II tools. The tool shall be subjected to 25,000 crimping cycles in accordance with 4.7.15.2. The wired assemblies crimped during the life test shall meet the requirements of 3.5.10 and 3.5.11. The tool shall meet the in-service requirements of 3.5.1 and the requirements of 3.5.3 and 3.5.4.

3.5.15.3 Type III tools. The life requirements of type III tools shall be in accordance with the applicable specification sheets.

3.5.16 Salt spray (corrosion). There shall not be any damage to basic tools, turrets, positioners, or dies that impairs operation, or evidence of corrosion when tested in accordance with 4.7.16.

3.6 Marking. All marking shall be in accordance with MIL-STD-130 and shall be permanently legible using either nameplates, dataplates, or direct marking.

3.6.l Manufacturer’s identification. The manufacturer's name and symbol, or only the symbol shall be marked in the area specified on the specification sheet. The symbol alone shall be used when the available space does not allow for legible marking of the manufacturer's name. If a symbol is used, it shall be a symbol listed in SAE-AIR1351.

3.6.2 Nameplates and dataplates. Nameplates and dataplates on tools shall be marked with information in accordance with the applicable specification sheet. The material of the plates and the mounting of the plates shall be capable of withstanding the environmental tests specified for the item. Marking shall be permanent to the extent required for utilization of the item.

3.6.3 Direct markings. Basic tools, turrets, positioners, dies, and gages shall be directly marked with information in accordance with the applicable specification sheet. Military part numbers shall be permanently marked on the dies and gages.

3.7 Workmanship. Basic tools, turrets, positioners, dies, gages shall meet all design dimensions and requirements of this specification. The tools shall contain no sharp edges or burrs.

4. VERIFICATION

4.1 Classification of inspection. The inspection requirements herein are classified as follows:

a. Qualification inspection (see 4.3).

b. Conformance inspection (see 4.4).

4.2 Inspection conditions. Unless otherwise specified herein or in the applicable specification sheet, all inspections shall be performed in accordance with the test conditions specified as follows:

Temperature:	15 to 35 °C (59 to 95 °F).
Relative humidity:	20 to 80 percent.
Barometric pressure:	550 to 800 millimeters of mercury.

4.3 Qualification inspection. Qualification inspection shall consist of subjecting the qualification test samples specified in 4.3.1 to the applicable examinations and tests of table IV, in the sequence shown. The qualifying activity may require that the manufacturer provide additional samples for initial qualification testing or retention of qualification testing.

4.3.1 Qualification test samples. The test samples shall consist of the samples specified in 4.3.1.1 through 4.3.1.4.

4.3.1.1 Type I tools.

a. Two of the same part numbered basic tools and turrets or positioners for which qualification is required shall be tested, except only one basic tool shall be subjected to the life test (see 4.7.15.1). This signifies qualification approval of both the basic tool and the turret or positioner tested.

b. After approval of items in 4.3.1.1a, qualification approval of additional part numbered turrets or positioners shall be obtained by testing two of each additional turret or positioner with two previously qualified basic tools.

c. Qualification approval of turrets or positioners alone shall be obtained by testing two of each part numbered turret or positioner with two previously qualified basic tools.

TABLE IV. Qualification inspection.

Examination or Test	Requirement Paragraph	Test paragraph	Type I		Type II	
			Basic tools (4.3.1.1a)	Turrets or positioners (4.3.1.1b, c)	Basic tools (4.3.1.2a)	Dies (4.3.1.2b, c)
Visual and mechanical examination	3.1, 3.3, 3.3.1, 3.3.2, 3.4, 3.6, 3.6.1, 3.6.2, 3.6.3, 3.7	4.5	X	X	X	X
Inspection gaging	3.5.1	4.7.1.1	X	X	X	X
Humidity (steady state)	3.5.2	4.7.2	X	---	X	---
In-service gaging	3.5.1	4.7.1.2	X	---	X	---
Handle, indenter and die return operation (full cycling)	3.5.3	4.7.3	X	---	X	---
Ratcheting mechanism	3.5.4	4.7.4	X	---	X	---
High compression force	3.5.5	4.7.5	X	---	X	---
Compression force	3.5.6	4.7.6	X	---	X	---
Deformation of crimped connection	3.5.7	4.7.7	X	X	X	X
Cracking of crimped connection	3.5.8	4.7.8	X	X	X	X
Concentricity (straightness)	3.5.9	4.7.9	X	X	X	X
Voltage drop	3.5.10	4.7.10	X	X	1/X	X1/
Tensile strength	3.5.11	4.7.11	X	X	1/X	X1/
Dielectric strength	3.5.12	4.7.12	---	---	2/X	X2/
Low temperature crimp	3.5.13	4.7.13	X	---	X	---
Compression force	3.5.6	4.7.6	X	---	X	---
Voltage drop	3.5.10	4.7.10	X	---	X	---
Tensile strength	3.5.11	4.7.11	X	---	X	---
Shock	3.5.14	4.7.14	X	---	X	---
In-service gaging	3.5.1	4.7.1.2	X	---	X	---
Handle, indenter and die return operation (full cycling)	3.5.3	4.7.3	3/X	---	3/X	---
Ratcheting mechanism	3.5.4	4.7.4	X	---	X	---
Life	3.5.15	4.7.15	X	---	X	---
Voltage drop	3.5.10	4.7.10	X	---	X	---
Tensile strength	3.5.11	4.7.11	X	---	X	---
Salt spray (corrosion)	3.5.16	4.7.16	X	---	X	---
In-service gaging	3.5.1	4.7.1.2	X	---	X	---
Handle, indenter and die return operation (full cycling)	3.5.3	4.7.3	3/X	---	3/X	---
Ratcheting mechanism	3.5.4	4.7.4	X	---	X	---
Visual and mechanical examination	3.1, 3.3, 3.3.1, 3.3.2, 3.4, 3.6, 3.6.1, 3.6.2, 3.6.3 thru 3.7	4.5	X	X	X	X

1/ Applicable only to dies for crimping terminal lugs, splices, and end caps.
2/ Applicable only to dies for crimping insulated terminal lugs, splices, end caps, and ferrules.
3/ 4.7.3.1 and 4.7.3.2 not applicable.

4.3.1.2 Type II tools.

a. Two of the same part numbered basic tools and dies for which qualification is required and two sets of dies specified on the applicable specification sheet shall be tested. Only one basic tool shall be subjected to the life test (see 4.7.15.2). This signifies qualification approval of both the basic tool and the dies tested.

b. After approval of items in 4.3.1.2a, qualification approval of additional part numbered dies shall be obtained by testing two of each additional die with two previously qualified basic tools.

c. Qualification approval of dies alone shall be obtained by testing two of each part numbered die with two previously qualified basic tools.

4.3.1.3 Type III tools. Test sample quantities and any special requirements shall be in accordance with the applicable specification sheet.

4.3.1.4 Accessory testing. Two of the same part numbered items or accessories shall be tested in accordance with the applicable specification sheet.

4.3.2 Qualification rejection. There shall be no failures during any examination or test of the basic tools, turrets, positioners, and dies submitted for qualification test (see 3.2).

4.3.3 Retention of qualification. To retain qualification, the supplier shall forward to the qualifying activity at 18-month intervals a summary report of group A conformance inspections. At 36-month intervals, a group B conformance inspection report shall be submitted. The qualifying activity shall establish the initial reporting date. The report shall consist of:

a. A summary of the results of the tests performed for inspection of product for delivery, Group A, indicating as a minimum the number of lots that have passed and the number that have failed. The results of tests of all reworked lots shall be accounted for and identified.

b. The complete results of tests performed for qualification verification inspection, Group B including the number and mode of failures. The test report shall include results of all qualification verification inspection tests performed and completed during the 36-month period. If the test results indicate non-conformance with specification requirements, and corrective action acceptable to the qualifying activity has not been taken, action may be taken to remove the failing product from the qualified products list.

Failure to submit the report within 60 days after the end of each 36-month period may result in loss of qualification for the product. In addition to the periodic submission of inspection data, the supplier shall immediately notify the qualifying activity at any time during the 36-month period that the inspection data indicates failure of the qualified product to meet the requirements of this specification.

In the event that no production occurred during the reporting period, a report shall be submitted certifying that the company still has the capabilities and facilities necessary to produce the item. If during three consecutive reporting periods there has been no production, the manufacturer may be required, at the discretion of the qualifying activity, to submit a representative product from each group for testing in accordance with the qualification inspection requirements of 4.3.

4.4 Conformance inspection.

4.4.1 Group A and group B inspections. Conformance inspection shall consist of the following:

a. Group A inspection (lot by lot) (see 4.4.2).
b. Group B inspection (periodic) (see 4.4.3).

4.4.2 Group A inspection. Before acceptance, tools shall be selected in accordance with ASQC-Z1.4, inspection level S-4. The tools shall be subjected to the examinations and tests in the sequence specified in table V. Delivery of products that have passed the group A inspection shall not be delayed pending the results of the group B inspection. Group A rejection and reinspection shall be in accordance with the procedures of ASQC-Z1.4.

4.4.2.1 Disposition of group A samples. Tools that have met all the group A inspections are permitted to be used on the contract or purchase order if the lot is accepted and the sample units are still within specified tolerance.

TABLE V. Group A inspection.

Examination or Test	Requirement paragraph	Test paragraph	Type I		Type II	
			Basic tools (4.3.1.1a)	Turrets or positioners (4.3.1.1b, c)	Basic tools (4.3.1.2a)	Dies (4.3.1.2b,c)
Visual and mechanical examination	3.1, 3.3, 3.3.1, 3.3.2, 3.4, 3.6, 3.6.1, 3.6.2, 3.6.3, 3.7	4.5	X	X	X	X
Inspection gaging	3.5.1	4.7.1.1	X	X	X	X
Handle, indenter and die return operation (full cycling)	3.5.3	4.7.3	1/X	---	1/X	---
Ratcheting mechanism	3.5.4	4.7.4	X	---		
High compression force	3.5.5	4.7.5	X	---	X X	--- ---
Deformation of crimped connection	3.5.7	4.7.7	X	X	X	X
Concentricity (straightness)	3.5.9	4.7.9	X	X	---	---
Tensile strength	3.5.11	4.7.11	X	X	---	---

1/ 4.7.3.1 and 4.7.3.2 if applicable.

4.4.3 Group B inspection. A periodic inspection shall be made at 36-month intervals from the date of the letter of notification of the qualification. Group B inspection shall consist of the examinations and tests performed, or as required by the qualifying activity, in the sequence specified in table VI on one sample unit selected from inspection lots that have passed the group A inspection. Group B rejection and reinspection shall be in accordance with the procedures of ASQC-Z1.4.

4.4.3.1 Disposition of Group B samples. Sample units that have been subjected to group B inspection shall not be delivered on the contract or purchase order.

TABLE VI. Group B inspection.

Examination or test	Requirement paragraph	Test paragraph	Type I		Type II	
			Basic tools (4.3.1.1a)	Turrets or positioners (4.3.1.1b, c)	Basic tools (4.3.1.2a)	Dies (4.3.1.2b,c)
Inspection gaging	3.5.1	4.7.1.2	X	X	X	X
Compression force	3.5.6	4.7.6	X	----	X	----
Deformation of crimped connection	3.5.7	4.7.7	X	X	X	X
Cracking of crimped connection	3.5.8	4.7.8	X	X	X	X
Concentricity (straightness)	3.5.9	4.7.9	X	X	----	----
Voltage drop	3.5.10	4.7.10	X	X	----	1/X
Tensile strength	3.5.11	4.7.11	X	----	----	1/X
Low temperature crimp	3.5.13	4.7.13	X	----	X	----
Compression force	3.5.6	4.7.6	X	----	X	----
Voltage drop	3.5.10	4.7.10	X	----	----	----
Tensile strength	3.5.11	4.7.11	X	----	----	----
Shock	3.5.14	4.7.14	X	----	X	----
In-service gaging	3.5.1	4.7.1.2	X	----	X	----
Handle, indentor and die return operation (full cycling)	3.5.3	4.7.3	X	----	X	----
Ratcheting mechanism	3.5.4	4.7.4	X	----	X	----
Visual and mechanical examinations	3.1, 3.3, 3.3.1, 3.3.2, 3.4, 3.6, 3.6.1, 3.6.2, 3.6.3, 3.7	4.5	X	X	X	X

1/ Applicable only to dies for crimping terminal lugs, splices, and end caps.

4.5 Visual and mechanical inspection. The tools, accessories, piece parts, and tool gages shall be examined to ensure conformance with requirements of this specification and the applicable specification sheet not covered by the performance requirements of 3.5. In-process controls of component parts, unrelated to lot sizes of finished tools, may be utilized in lieu of examination of these components in the finished tools to ensure conformance of these component parts. Examination in a continuing manner shall be performed to ensure compliance with the following requirements:

a. Applicable specification sheet (see 3.1).
b. Materials (see 3.3).
c. Finish (see 3.3.1 and 3.3.2).
d. Design and construction (including dimensions) (see 3.4).
e. Marking (see 3.6, 3.6.1., 3.6.2, and 3.6.3).
f. Workmanship (see 3.7).

4.6. Wired assemblies. Wired assemblies crimped during the tests specified in 4.7 shall be made with lengths of silver-, tin-, or nickel-plated wire conforming to MIL-W-22759, MIL-W-16878, MIL-W-81044, or as specified in the applicable specification sheet (see 3.1).

4.7 Test methods.

4.7.1 Gaging. Activate the tool to the fully closed position. The "GO" gage shall be freely inserted in the space between the opposing closed indenters or dies of the tool. With the "GO" pin in this position, the pressure on the tool handles shall be released, and the tool shall automatically return to its fully open position. Close the tool to the fully closed position. The "NO-GO" pin of the gage shall not be insertable between the opposing indenters or dies of the tool. Type III tools shall be gaged or otherwise calibrated in accordance with applicable specification sheets.

4.7.1.1 Inspection gaging. Indenter or die closures shall be tested with the inspection gages specified in 3.4.5.1 and shall meet the requirements of 3.5.1.

4.7.1.2 In-service gaging. Indenter or die closures shall be tested with the in-service gage specified in 3.4.5.2, or with the manufacturer's equivalent inspection gage, and shall meet the requirements of 3.5.1.

4.7.2 Humidity (steady state). The basic tool, with its turret, positioner, or die installed shall be exposed to steady state humidity in accordance with MIL-STD-202, method 103, condition A. The basic tool and turret, positioner, and die shall meet the requirements of 3.5.2.

4.7.3 Handle, indenter, and die return operation (full cycling). The tool shall be activated to the fully closed position without a wired assembly in the tool, and then the hand pressure shall be released from the tool. This operation shall be repeated several times.

4.7.3.1 Type I tools. The tool shall be operated again to make up 20 wired assemblies for each contact size and wire accommodated by the tool and turret or positioner under test. Ten wired assemblies shall be made with the largest size wire accommodated by the contact as specified in table VII and 10 wired assemblies with the smallest size wire. The three wired assemblies made up as specified in 4.7.6.1 may be considered as being included in the total number specified above. Upon completion of each operation of the tool and release of the applied pressure, the tool shall meet the requirements of 3.5.3.

4.7.3.2 Type II tools. The tool assembled with the dies as specified in the applicable specification sheet shall be used to crimp 10 test ferrule assemblies as specified on figure 1 and the applicable specification sheet. Assemblies, as specified in 4.7.6.2, may be considered as being included in the total number specified. Upon completion of each operation of the tool and release of the applied pressure, the tool shall meet the requirements of 3.5.3.

4.7.3.3 Type III tools. Test methods shall be in accordance with the applicable specification sheet.

4.7.4 Ratcheting mechanism. When tested in accordance with 4.7.4.1, 4.7.4.2, or 4.7.4.3, tools shall meet the requirements of 3.5.4. Power tool cycle control test methods shall be as specified in the applicable specification sheet.

4.7.4.1 Type I tools. The tool shall be closed on the "NO-GO" pin of the inspection gage in accordance with the applicable specification sheet until a positive force is exerted by the indenters on the gage pin. CAUTION: DO NOT CRIMP THE GAGE. When the operator's hand pressure is released, the tool shall meet the requirements of 3.5.4.1.

4.7.4.2 Type II tools. With dies installed having a combined height as specified in the applicable specification sheet, a compression force shall be exerted on the handles of the tool, 1.25 ±0.125 inches from the extremities of the handles. Without crimping a wired assembly, the force required to release the ratcheting mechanism shall meet the requirements of 3.5.4.2.

4.7.4.3 Type III tools. Ratchet mechanism requirements shall be in accordance with the applicable specification sheet.

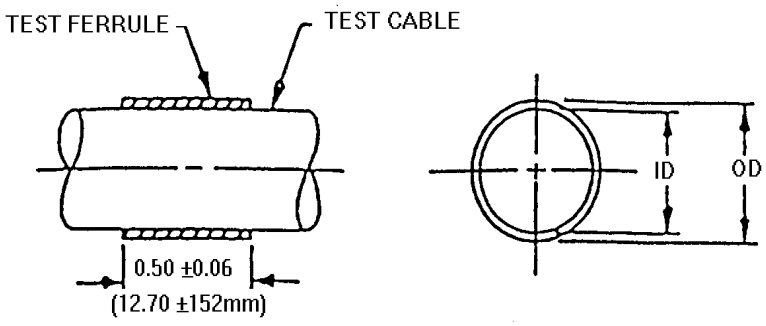
4.7.5 High compression force. A compression force shall be exerted on the handles of the tool, 1.25 ±0.125 inches from the extremities of the handles at a rate of 5 pounds per second until a force of 150 pounds is reached. The force shall be applied while crimping the largest size wire barrel with the largest size wire crimped by the type I tool, or the test ferrule specified in the applicable specification sheet for the type II tool. The 150-pound force shall be continuously applied for 30 seconds. The tool shall then be tested in accordance with 4.7.1.1 and shall meet the requirements of 3.5.5.

4.7.6 Compression force.

4.7.6.1 Type I tools. The tool shall be mounted such that a compression force can be exerted on the handles, 1.25 ±0.125 inches from the extremities of the handles. Three contacts with the largest size wire barrel accommodated by the basic tool shall be crimped to the largest size wire specified for them. The force necessary to make the crimps shall meet the requirements of 3.5.6.

4.7.6.2 Type II tools. The tool shall be mounted as specified in 4.7.6.1. Test ferrule assemblies as specified on figure 1 and the applicable specification sheet shall be crimped. The opposing dies shall close to a maximum gap of 0.010 inch and the force necessary to make the crimps shall meet the requirements of 3.5.6. Three test ferrule assemblies as specified on figure 1 and the applicable specification sheet shall be crimped.

4.7.6.3 Type III tools. The compression force shall be in accordance with the applicable specification sheet.



Ferrule material shall be seamless copper tubing, alloy number 122.
Anneal to Rockwell hardness of 55 (maximum) on the 15-T scale.
For ferrule ID, OD, and test cable, see applicable specification sheet (see 3.1).

FIGURE 1. Test ferrule and cable for compression force test for type II tools.

4.7.7 Deformation of crimped connection.

4.7.7.1 Type I tools. The maximum diameter of the crimped wire barrels on all contact-wire assemblies made up for 4.7.3.1 and 4.7.6.1, if applicable, shall be measured and shall meet the requirements of 3.5.7.1 (see table VII).

4.7.7.2 Type II tools. The wired assemblies as specified in for 4.7.3.2 and 4.7.6.2, if applicable, shall be visually examined for symmetry of crimp, sharp edges or corners, or other characteristics that render the assembly unable to perform as required, and shall meet the requirements of 3.5.7.2.

4.7.7.3 Type III tools. The requirement for deformation of crimped connections shall be in accordance with the applicable specification sheet.

TABLE VII. Wire barrel range accommodation.

Wire Barrel Size																	
Wire Size	000	00	0	1	2	4	6	8	10	12	16	20	22	22D	22m 3/	24	28
0000 00	1/X	X															
0 1		1/X	X X	X													
2 4			1/X	1/X	X 1/X	X											
6 8				1/X		1/X	X 1/X	X									
10 12								1/X	X 1/X	X							
14 16										X	X						
18 20											X X	X					
22 24												X X	X X	X X	X	X	
26 28													X 2/X	X X	X X	X X	X
30 32																	X X

1/ With electrical conductive bushing.
2/ Applies only to contact size 23-22.
3/ Inactive for new design.

4.7.8 Cracking of crimped connection. The crimped connection of all wired assemblies made up for 4.7.3 and 4.7.6, if applicable, shall be inspected with the aid of a magnifying device having a power magnification of 10. The crimped connection shall meet the requirements of 3.5.8.

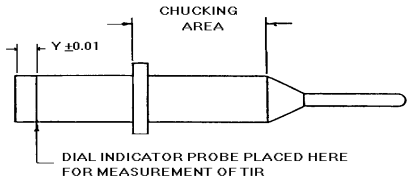
4.7.9 Concentricity (straightness).

4.7.9.1 Type I tools. Six contact-wire assemblies are required for this test. Three of the assemblies prepared for 4.7.3.1 with the smallest size wire barrel accommodated by the tool and crimped to the smallest size wire specified for that size contact shall be used. The other three assemblies shall be the assemblies prepared for 4.7.6.1, if applicable, with the largest size wire specified for that size contact. The wired contacts shall be chucked in the retention area shown on figure 2 and rotated. The total indicator reading (TIR) shall be taken at the diameters specified

in the figure. The test setup shall be as shown on figure 3. The TIR measurements shall conform to 3.5.9.1.

4.7.9.2 Type II tools. The wired assemblies prepared for 4.7.3.2 and 4.7.6.2, if applicable, shall be visually examined for bending of tongues on terminals and curvature of splice bodies and shall meet the requirements of 3.5.9.2.

4.7.9.3 Type III tools. Concentricity for Type III tools shall be in accordance with the applicable specification sheets.



For sizes 12 and larger pin contacts, Y = 0.05. For pin contacts smaller than size 12, Y = ½ the distance from the rear of the wire barrel to the beginning of the crimped indent.

FIGURE 2. Contact retention and measurement area concentricity test.

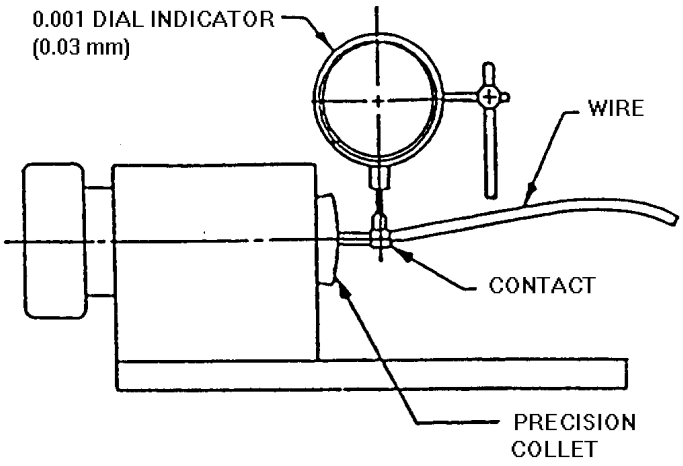


FIGURE 3. Test setup for concentricity measurement.

4.7.10 Voltage drop.

4.7.10.1 Type I tools. The entire length of the contact-wire assemblies prepared for 4.7.3.1 and 4.7.6.1, if applicable, shall be made to carry the applicable dc test current specified in tables I and III. The test equipment fixture shall be set up in accordance with figure 4. After the temperature stabilizes (approximately one minute), the voltage drop shall be measured with a millivolt measuring device attached from a point on the positioning shoulder to a point 1/2 inch distant on the attached wire as shown on figure 4 and shall meet the requirements of 3.5.10.1.

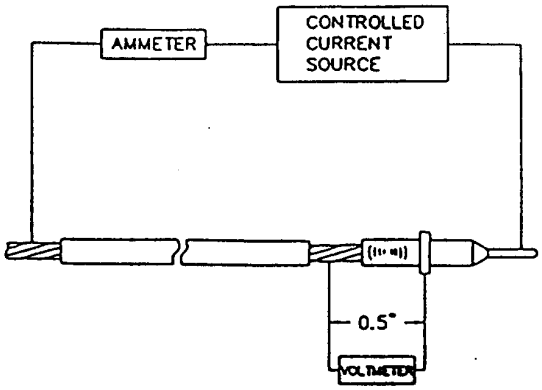


FIGURE 4. Voltage drop test (typical setup).

4.7.10.2 Type II tools. The wired assemblies prepared for 4.7.3.2 and 4.7.6.2, if applicable, shall be tested in accordance with the voltage drop of the specification to which the crimped item is qualified and shall meet the requirements of the component specification sheet and 3.5.10.2.

4.7.10.3 Type III tools. The compression force shall be in accordance with the applicable specification sheets.

4.7.11 Tensile strength. The wired assemblies prepared for 4.7.3 and 4.7.6, if applicable, shall be placed in a tensile testing device with appropriate fixtures, and a force shall be applied to pull the wire out of the assembly or break the wire or crimped item. The speed of head travel of the tensile device shall be 1.0 ±0.25 inch per minute. The holding surfaces of the tensile device clamp may be serrated to provide sufficient gripping or holding strength. The wired assemblies shall meet the requirements of 3.5.11.

4.7.12 Dielectric strength of type II tools (applicable only to dies for crimping insulated terminal lugs, splices, end caps). Four wired assemblies of the largest size and type accommodated by the tool shall be prepared and tested in accordance with the dielectric strength test of the specification to which the crimp item is qualified, and shall meet the requirements of the component specification and 3.5.12.

4.7.13 Low temperature crimp. The basic tool, turret, positioner, or die, and the items to be crimped shall be exposed to a temperature of 15 °C for 2 hours. Immediately after removing these items from the test chamber, while the tool is at the low temperature, the tool shall be used to make its respective crimps. Four wire assemblies shall be made.

4.7.13.1 Type I tools. Two assemblies shall be made with the largest size wire barrel with the largest size wire accommodated by the wire barrel. Two assemblies shall be made with the smallest size wire barrel crimped by the tool with the smallest size wire accommodated by the wire barrel in accordance with table VII.

4.7.13.2 Type II tools. Two crimp assemblies shall be made with the type II tool using the test ferrule and cable shown on figure 1 and the applicable specification sheet (see 3.1). The assemblies shall meet the requirements specified in 3.5.6 and 3.5.12 (where applicable).

4.7.13.3 Type III tools. Not applicable to type III tools.

4.7.14 Shock. The tool, with a turret, positioner, or die installed, shall be loosely placed in a 12 x 12 x 12-inch box made of 1/4-inch plywood, which has been rigidly fastened to the carriage of a shock test device. The box may be open at the top to facilitate accessibility to the tool. The tool shall be subjected to a shock test in accordance with MIL-STD-202, method 213, test condition I. Two shocks shall be applied, one with the contact entrance of the tool facing the bottom of the box and the other with the contact entrance facing away from the bottom. The tool shall meet the requirements of 3.5.14.

4.7.15 Life test.

4.7.15.1 Type I tools. Only one tool shall be tested. The tool shall be mounted such that it can be mechanically actuated at a rate of 15 to 20 cycles per minute, where a cycle consists of depressing the handles of the tool to the fully closed or positive stop position and allowing the handles to return to the fully opened position. The tool selector setting shall be set as specified in table VIII. A compression force shall be applied to the extremities of the handles to crimp test rods of the diameters and materials shown in table VIII, as applicable. For tools used to crimp size 12 contacts, the rod shall be advanced a minimum of 1/4 inch after each crimp to provide a new crimping surface. For tools used to crimp size 16 and smaller contacts, the rod shall be advanced a minimum of 1/8 inch. After every 50,000 cycles, the tool shall be manually operated to crimp six wire-contact assemblies using the largest wire barrel that the basic tool is designed to crimp. Three of the contacts shall be crimped to the largest size wire and three to the smallest size wire accommodated by the contact. The tool shall not require adjustments or repairs during

the 200,000 cycles, but it shall be permissible to remove foreign matter and lubricate the tool every 50,000 cycles. The requirements of 3.5.15.1 shall be met.

4.7.15.2 Type II tools. Only one tool shall be tested. The tool shall be mounted such that it can be mechanically actuated at a rate of 15 to 20 cycles per minute, where a cycle consists of depressing the handles of the tool to the fully closed or positive stop position and allowing the handles to return to the fully opened position. A set of dies used to crimp the largest ferrule, terminal, or splice that the tool is designed to crimp shall be installed in the tool such that a 30 to 50 pound handle force is required to release the ratcheting mechanism at the end of the normal crimping cycle with no sample in the tool. After every 5,000 cycles, the tool shall be manually operated to crimp six wired assemblies using the largest terminal, splice, or ferrule accommodated by the tool. Three wired assemblies shall be crimped to the largest size wire or cable and three assemblies crimped to the smallest size accommodated by the item. When only one size wire or cable is specified, only three samples shall be prepared. The tool shall not require adjustments or repairs during the 25,000 cycles. The requirements of 3.5.15.2 shall be met.

TABLE VIII. Test rod for life test for type I tools.

Largest contact accommodated	Selector setting	Rod dia. - in (+0.001)	Material specification	Physical properties
12	8	0.125	Commercial leaded bronze or ASTM-B133 or ASTM-B272	Rockwell hardness B50 +2
16 20	7 8	0.064	ASTM-B16 or QQ-W-343	Minimum tensile strength 48,000 pounds per square inch (psi)

4.7.16 Salt spray (corrosion). The basic tool with turret, positioner, or die installed shall be subjected to a salt spray (corrosion) test in accordance with MIL-STD-202, method 101, condition B. The salt solution shall be a 5 percent concentration. Immediately after removal from the chamber, the basic tool and turret, positioner, or die shall be rinsed in running water not warmer than 38 °C and subsequently dried in a circulating air oven for 12 hours at a temperature of 38 ±3 °C. Upon removal from the oven, the basic tool and turret, positioner, or die shall meet the requirements of 3.5.16.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of materiel is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activity within the Military Department of Defense Agency, or within the Military Department's System Command. Packaging data retrieval is available from the managing Military

Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

(This section contains information of a general or explanatory nature which may be helpful, but is not mandatory.)

6.1 Intended use. Tools covered by this specification are intended for crimping MIL-C-39029 removable contacts (e.g., power, coaxial, shielded, thermocouple and filter pin contacts); MIL-PRF-39012 coaxial connectors; MIL-T-7928 terminals, splices, and end caps; MIL-S-81824 splices; and MIL-F-21608 ferrules to wire conductors for use in electric connectors, terminal junction systems, and other electric or electronic components. These tools may be used to crimp other connecting devices of design or materials other than those specified herein provided the required performance is obtained. Type III tools may be used for functions as specified in their applicable specification sheets.

6.1.1 Tool selection. For tool selection, see the applicable component specification.

6.1.2 Type I tools. Crimping contacts without positioners or turrets (as applicable) is not a recommended practice.

6.2 Acquisition requirements. Acquisition documents must specify the following:

a. Title, number, and date of this specification and applicable specification sheet.

b. Issue of DoDISS to be cited in the solicitation, and if required, the specific issue of the individual documents referenced (see 2.2.1).

c. Military part number for basic tools, turrets, positioners, dies, in-service gages, and other tools as required.

d. Quantity desired.

e. Packaging (see 5.1).

6.3 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in qualified products list QPL No. 22520 whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products, that they propose to offer to the Federal Government, tested for qualification in order that they may be eligible to be awarded contracts or purchase orders for the products covered by this specification. Information pertaining to qualification of products may be obtained the Naval Air Warfare Center Aircraft Division Patuxant River, Code 4.5.6.1, Suite 5

48142 Shaw Road, Unit 5, Patuxant River, MD. 20670.

6.4 Patent notice. The Government has a royalty-free license under the listed patents for the benefit of manufacturers of the item either for the Government or for use in equipment to be delivered to the Government.

U.S. patent numbers	U.S. patent applications serial numbers
2,991,675	158,956
3,059,511	172,195
3,063,313	172,354
	302,170
	617,783

6.6 Subject term (key word) listing.

Connectors
Connectors, electrical
Contacts
Dies
End caps
Ferrules
Gages, inspection
Positioners
Splices
Terminals
Turret
Wire, electrical

6.7 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extent of the changes.

CONCLUDING MATERIAL

Custodians:
Army - CR
Air Force - 85

Review activities:
Army - MI, AV
Navy - SH, EC
Air Force - 17, 99
DLA - CC

Preparing activity:
Navy - AS

(Project 5120-0085)

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.
   NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER MIL-DTL-22520G	2. DOCUMENT DATE (*YYMMDD*) 970917

3. DOCUMENT TITLE
CRIMPING TOOLS, WIRE TERMINATION, GENERAL SPECIFICATION FOR

4. NATURE OF CHANGE (*Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.*)

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME (*Last, First, Middle Initial*)	b. ORGANIZATION	
c. ADDRESS (*Include Zip Code*)	d. TELEPHONE (*Include Area Code*) (1) Commercial: (2) DSN: (*If Applicable*)	7. DATE SUBMITTED (*YYMMDD*)

8. PREPARING ACTIVITY

a. NAME COMMANDER NAVAL AIR WARFARE CENTER AIRCRAFT DIVISION	b. TELEPHONE NUMBER (*Include Area Code*) (1) Commercial: (908) 323-2628 (2) DSN: 624-2628
c. ADDRESS (*Include Zip Code*) CODE 414100B120-3 HIGHWAY 547 LAKEHURST, NJ 08733-5100	IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Quality and Standardization Office, 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466 Telephone (703) 756-2340 DSN 289-2340

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