



AEROSPACE STANDARD

AS5768

Issued 2008-08
Reaffirmed 2013-07

Tool, Stripper, Electrical Insulation, General Specification For

RATIONALE

AS5768 has been reaffirmed to comply with the SAE five-year review policy.

1. SCOPE

1.1 Specification Requirements

This specification covers design requirements, performance requirements, and methods of procurement for tools and associated accessories used to strip aerospace vehicle electrical wire and cable. Aerospace vehicle electrical wire has stranded conductors with protective plating and specialized insulation. Poor quality wire strippers or mismatched blades can compromise the performance of wiring.

1.2 Intended Use

The purpose of this specification is to define the electrical wire or cable tool's design performance, interchangeability, repeatability, and reliability. The specification establishes standard criteria for the design, manufacture and qualification of stripping tools. Wire or cable stripped by the tool shall be specified with the tool (see 3.1.1). The specification provides a system of procurement and quality control of specified wire stripping tools.

1.3 Qualification

Products procured from this specification require a supplier to be on a Qualified Product List at the time of request for purchase (see 6.4).

1.4 Part Number Structure

Unless otherwise specified in the detail specification the part number structure for the tool shall be

AS5768/Y – XXXX

2. APPLICABLE DOCUMENTS

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

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<http://www.sae.org/technical/standards/AS5768>

2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

AIR1351 Manufacturers' Identification of Aerospace Electrical and Electronic Wiring

AS5768/1 Tool, Stripper, Manually Actuated, Electrical Insulation, Round Wire, Size 10 to 30

AS5768/2 Tool, Stripper, Manually Actuated, Small Grip, Electrical Insulation, Round Wire, Size 16 to 30

2.2 NCSL Publications

Available from National Conference of Standards Laboratories, 2995 Wilderness Place, Suite 107, Boulder, CO 80301-5404, Tel: 303-440-3339, www.ncsli.org.

NCSL Z540-1 General Requirements for Calibration Laboratories and Measuring and Test Equipment

2.3 U.S. Government Publications

Application for copies is address to DODSSP, Subscription Services Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094, <http://assist.daps.dla.mil/quicksearch/>.

MIL-STD-202 Department of Defense, Test Method Standard, Electronic and Electrical Component Parts

SD-6 Provisions Governing Qualification

3. REQUIREMENTS

3.1 Detail Specifications

The tool requirements shall be as specified herein and in accordance with the applicable detail specification. In the event of any conflict between the requirements of this specification and the detail specification, the latter shall govern.

3.1.1 Criteria for Tool Inclusion

The criteria for defining a tool in a detail specification is that a component document, intended to be used with the tool, must be controlled by a component preparing activity such as a user, government, or non-government standard body. It is the responsibility of the wire and cable specification preparer to determine if the specific tool can be used to strip the applicable wire or cable. After the tool has been determined to be acceptable for the wire or cable, the wire or cable preparing activity is recommended to request SAE International to establish an AS5768 detail specification (slant sheet) which should be referenced in the component specification. Requests for tools to be listed in AS5768 shall be made by the component preparing activity to SAE International (see 6.7.1).

3.1.2 Detail Specification Tool Requirements

Each detail specification shall include as a minimum the following.

- a. The detail specification shall specify the wire or cable detail specification and part number, if necessary, with the corresponding tool part number for each tool, or tool-blade combination, or other accessories. Part number shall designate all replaceable parts and removable components such as gripper pads, blades, wire stop, bench mount, and other accessories in the detail specification. Replaceable parts such as screws, springs, hardware, covers, and miscellaneous parts shall be defined in the manufacturer's instruction sheet supplied with each tool. The basic tool and accessories shall include a part number on the body of each part in the detail specification.

- b. The length of the insulation strip shall be specified for each tool or tool-blade combination, if different than specified herein (see Table 3).
- d. Detail blade dimensions are recommended to insure stripping performance characteristics, but not required. The basic tool footprint dimensions shall be definitive enough to insure replacement of the tool in a storage container without modification of the container. Accessory footprint dimensions shall be definitive enough to insure interchangeability with manufacturers.
- d. The required operation characteristics (see 3.7).
- e. The life test operating cycles (see 3.10)
- f. The Metric equivalents may be provided to the nearest 0.01 mm and shown as (x.xx). Metric equivalents are calculated based on 1-inch equals 25.4 mm.
- g. Size, weight, and power requirements of tools shall be commensurate with the tool application. Maximum size and weight (including accessories) shall be included as a requirement on each detail specification.
- h. Tools with V shaped cutting blades, other than rotating V shaped blades (see Figure 3) or shearing type blades shall not be specified.

3.2 Materials (see 5.1)

All materials shall be suitable for the fabrication/produce ability or maintenance of aerospace hardware when used on land or sea. Materials shall be specified in the detail specification.

3.3 Tool Design Characteristics Examination (5.2)

3.3.1 Manually Actuated Mechanical Wire Stripper for Round Wire Using Split Blades Design (see Figure 1 and 5.2.1)

Each blade cavity shall be cylindrical, as shown in Figure 1. If die dimension are specified as a minimum each blade profile shall be defined in relation to the dimensions of the wire, as shown in Figure 2. Tools with V shaped cutting blades shown in Figure 3 or shearing blades shall not be specified.

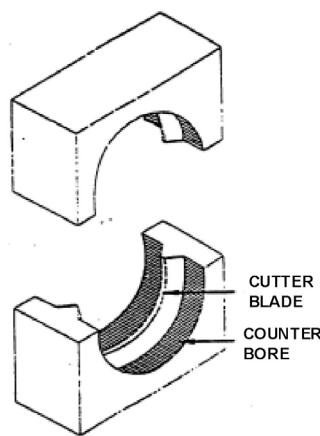


FIGURE 1 - SPLIT BLADE WIRE STRIPPER DESIGN

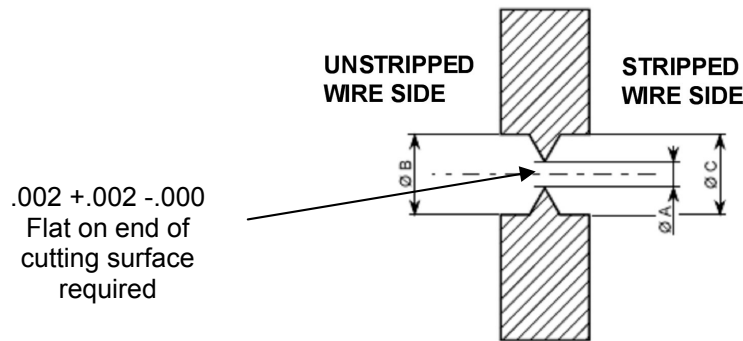


FIGURE 2 - DIMENSION REQUIREMENTS FOR SPLIT BLADE ACCESSORIES

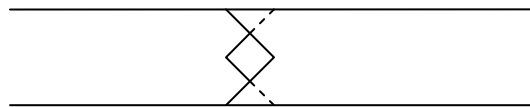


FIGURE 3 - V SHAPE (KNIFE TYPE) BLADES ACCESSORIES THAT FORM SQUARE WIRE STRIP CAVITIES (UNACCEPTABLE)

3.3.2 Manually Actuated, High Frequency Signal Cable Strippers Design Examination (see 5.2.2)

Design characteristics shall be defined in the detail specification.

3.4 Tool Assembly Instruction Examination (see 3.1.2a and 5.3)

Each tool specified with accessories shall be provided with concise and clearly written individual instructions. The tool shall be easily assembled and disassembled in accordance with the tool instruction without the use of special tools. Tool instructions shall be formatted with the following information:

- a. Title: The instructions shall include AS5768 and supplier's part numbers.
- b. Detail Tool Pictorials: The pictorials shall include AS5768 and manufacturer's part numbers.
- c. Detail Accessories Pictorials: The pictorial shall include AS5768 accessories, and manufacturers' part numbers.
- d. Safety Instructions: Instructions shall be provided on how to safely select and operate each tool.
- e. Operational Instructions: Instructions shall be provided on how to select and operate each tool. The instructions shall include applicable component part numbers that can be stripped by the tool.
- f. Maintenance Instructions: Information shall be clear, concise, and include pictorials as needed.
- g. Replaceable Part List: The instructions shall include AS5768 and manufacturer designated part numbers. All replaceable parts (see 3.1.2a) designated in the detail specification by part number shall be included in the assembly instructions. All parts that can be removed to assemble accessories shall be designated in the assembly instructions by part number or a physical description sufficient to permit replacement (i.e., screw thread and length description, etc.).
- h. Supplier Information: The instructions and tool packaging shall include address and telephone number(s) of suppliers.

3.5 Visual Examination (see 5.4)

The tool and accessories shall exhibit no cracks, broken parts, or jagged edges. Tools with accessories shall be constructed to allow maintenance and repair necessitated by normal operational wear and handling. Tool dimensions shall be in accordance with the detail specification.

3.5.1 Visual Examination of Manually Actuated Wire Stripper for Round Wire Using Split Blades (see Figure 1 and 5.4.1)

Disassemble and reassemble the tool with replaceable blades in accordance with the tool assembly instructions (see 5.3). When visually examined the blade cavity shall be as shown in Figure 5. The blade cavity shall be cylindrical and form a complete perimeter. A slight asymmetry of the two halves of the blade may be acceptable if the blade does not damage the conductor when stripped (see 3.7.1). The unacceptable blade defects as shown in Figure 6 have asymmetrical shapes that do not form complete perimeters or cylinders.

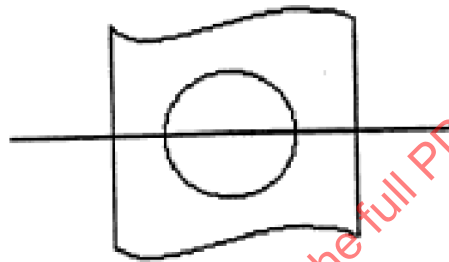


FIGURE 5 - ACCEPTABLE SPLIT BLADES IN A CLOSED POSITION

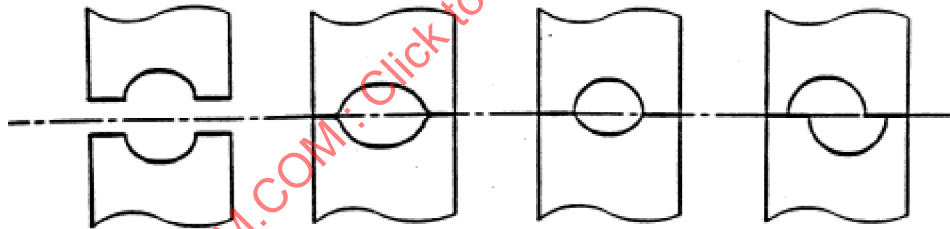


FIGURE 6 - UNACCEPTABLE SPLIT BLADES IN A CLOSED POSITION

3.5.2 Visual Examination of Manually Actuated High Frequency Signal Cable Strippers (see 5.4.2)

Tool shall be examined for dimensions and physical characteristics as defined in the detail specification.

3.5.3 Tool Assembly Weight (see 5.4.3)

The weight of the tool with all accessories attached shall be as specified in the detail specification.

3.6 Marking Examination (see 5.5)

The identification marks shall be durable and withstand typical handling and usage. The identification marks shall be clearly readable after all specified tests. Trademarks and logos when used for identification rather than the manufacturer's name and address shall be registered in AIR1351.

3.7 Tool Insulation Strip Performance (see 5.6)

Tool operation characteristics shall be defined in the detail specification.

3.7.1 Insulation Strip Compression Force (see 5.6.1)

The insulation strip force required to complete the cycle of the tool shall not exceed the value specified in the applicable detail specification.

3.7.2 Wire Insulation Strip Performance Characteristics (see 5.6.2)

The conductor may exhibit nicks or scrapes as shown in Figure 7, but the base metal shall not be exposed. Indentations caused by the pads (jaws) gripping the insulation, when specified, are acceptable, provided the insulation or topcoat is not torn or separated and the indentation does not reduce the wire diameter to less than 80% of the original wire diameter. The stripped wires shown in Figures 8 through 10 are failures (unacceptable strips).

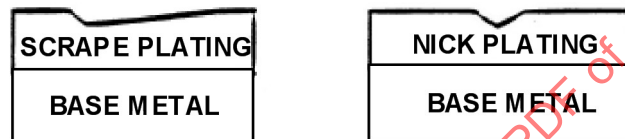


FIGURE 7 - ACCEPTABLE CONDUCTOR PLATING DAMAGE

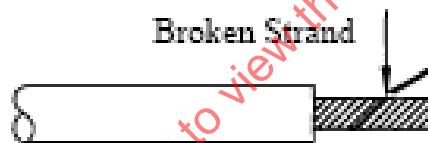


FIGURE 8 - BROKEN STRAND (UNACCEPTABLE STRIP)



FIGURE 9 - UN-STRANDED, SPLAYED, OR BIRD-CAGED CONDUCTOR (UNACCEPTABLE STRIPS)

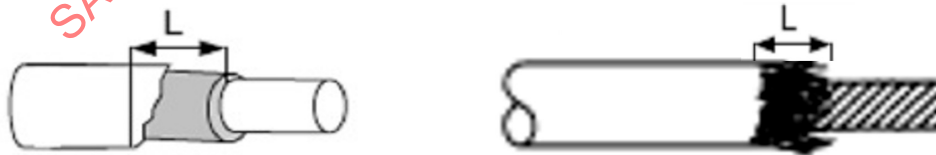


FIGURE 10 - INTER-TAPE OR FRAYED INSULATION EXPOSURE- "L" EXCEED 0.039 OR 50% OF THE INSULATION'S OUTSIDE DIAMETER WHICH EVER IS GREATER (UNACCEPTABLE STRIPS)

3.7.3 Round Cable Insulation Strip Performance Characteristics (see 5.6.3)

The round cable strip performance characteristics shall be as specified in the detail specification.

3.8 Shock Characteristics (see 5.7)

The tool and/or required accessories attached shall meet marking legibility and the tool insulation strip performance requirement, after being subjected to the shock test (see 3.6 and 3.7).

3.9 Humidity Characteristics (see 5.8)

Corrosion that does not affect the performance characteristics of the tool is acceptable. The tool and/or required accessories attached shall meet marking legibility and the tool insulation strip performance requirement after being subjected to the humidity test (see 3.6 and 3.7).

3.10 Life Characteristics (see 5.9)

The tool and/or required accessories attached shall strip the wire or cable the number of cycles specified in the detail specification. On the last strip, the tool and worn blades shall meet the stripping performance requirement (see 3.7) and the tool operation characteristics (see detail specification). After exposure to the number of specified cycles, if the blades are replaceable, the tool shall be disassembled and blades and grippers (if specified) replaced in accordance with the tool assembly instructions (see 3.4). The tool and new blades shall meet the stripping performance requirements (see 3.7).

3.11 Corrosion Characteristics (see 5.10)

Corrosion that does not affect the performance characteristics of the tool is acceptable. The tool and/or required accessories attached shall meet marking legibility and the tool insulation strip performance requirement after being subjected to the corrosion test (see 3.6 and 3.7).

3.12 Workmanship (see 5.11)

The tool, and accessories shall be free of sharp edges, burrs, and other design or production related characteristics that would hamper the tool's performance or cause physical harm to the operator.

4. QUALITY ASSURANCE

4.1 Responsibility for Inspection

Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all contract inspection requirements as specified herein. Except as otherwise specified in the contract or purchase order, the supplier may use any approved facilities (see 4.6) suitable for the performance of the inspection requirements specified herein. The Qualifying Activity has the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements (see 6.4).

4.2 Responsibility for Compliance

All items must meet all technical requirements of the product specification. The inspection set forth in this specification shall become a part of the supplier's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the supplier of the responsibility of assuring that all products comply with all requirements of the contract. Sampling in quality conformance does not authorize submission of known defective material, either indicated or actual, nor does it commit the purchaser to acceptance of defective material.

4.3 Test Equipment and Inspection Facilities

Test and measuring equipment and inspection facilities of sufficient accuracy, quality, and quantity to permit performance of the required inspection shall be established and maintained by the supplier. The establishment and maintenance of a calibration system to control the accuracy of the measuring and test equipment shall be in accordance with NCSL Z540-1 or equivalent standards approved by the qualifying activity.

4.4 Classification of Inspections

The inspections specified herein are classified as follows:

- a. Qualification inspection (see 4.6)
- b. Periodic qualification inspection (see 4.7)
- c. Quality conformance inspection (see 4.8)

4.5 Inspection Conditions

The conditions for the inspections are specified as applicable and all test data shall be compiled in accordance with SD-6.

4.6 Qualification Inspection

Qualification inspection shall be in accordance with Table 1. Sequential testing is not required. A request for qualification shall be made to the qualifying activity prior to initiating testing. Testing cannot begin until the supplier has received an authorization letter. The qualifying activity has the authority to modify the specification test requirements to resolve test failures/discrepancies and to wave testing to verify specific product manufacturing changes or qualifications by similarity. For each tool tested the supplier shall use the same materials, manufacturing procedures, and methods of inspection as would be used to provide the tool to a purchaser. The qualifying activity shall perform the tests specified in Table 1 and supplier shall perform the tests specified in Table 2 in a laboratory of their choice. All test laboratories requires Qualifying Activity Approval.

TABLE 1 - QUALIFYING ACTIVITY TEST REQUIREMENTS

Technical Requirements	Requirement Paragraph	Test Method Paragraph
Tool Insulation Strip Performance	3.7	5.6
Life Characteristics	3.10	5.9

TABLE 2 - MANUFACTURER TEST REQUIREMENTS

Technical Requirements	Requirement Paragraph	Test Method Paragraph	Quality Assurance
Materials	3.2	5.1	4.8
Tool Design Characteristics Examination	3.3	5.2	
Tool Assembly Instruction Examination	3.4	5.3	4.8
Visual Examination	3.5	5.4	4.8
Marking Examination	3.6	5.5	4.8
Shock Characteristics	3.8	5.7	
Humidity Characteristics	3.9	5.8	
Corrosion Characteristics	3.11	5.10	
Workmanship	3.12	5.11	

4.6.1 Qualification by Similarity

Qualification by similarity is based on similarity in tool characteristics or other factors demonstrated by the supplier to the qualifying activity. Qualification by similarity shall be specified by the qualifying activity and agreed to by the supplier.

4.6.2 Qualification Sample

The supplier shall, for each tool tested, use the same material(s), manufacturing procedures, and methods of inspection as would be used to provide the tool to a purchaser. Test samples shall be specified in the detail specification.

4.7 Periodic Qualification Inspection (see 4.8)

Periodic qualification inspection shall be performed every 36 months from the original qualification approval date in accordance with Table 1. Whenever there is a change in tool design, the supplier will notify the qualifying activity immediately. The qualifying activity will then determine if qualification inspection needs to be performed prior to the periodic qualification date. The submission date may be modified by the qualifying activity to accommodate qualifying activity schedules. Periodic qualification shall be in accordance with Table 1.

4.7.1 Periodic Certification

If no production of the qualified products has occurred for the periodic reporting period, the supplier may provide a certification to the qualifying activity that no changes in the product materials, manufacturing processes, or site of production has occurred since the initial qualification inspection (see 4.6). No more than one certification is permitted. The supplier may be required to submit the certification on a specified form provided by the qualifying activity.

4.7.2 Periodic Qualification Samples

Unless otherwise specified, two tools shall be evaluated for each test specified in Table 1. The specified tool used to strip the largest diameter wire or cable and the smallest diameter wire or cable shall be tested. When the specified wire or cable types includes both extruded and tape constructions, the tool for smallest diameter wire or cable shall be for the extruded type and the tool for the largest diameter wire or cable shall be for the tape type. The remaining blade dimensions shall be compared to the supplier's drawing dimensions and the results submitted to the qualifying activity without the supplier's drawing tolerances.

4.8 Quality Conformance Inspection

Tools shall be selected from the production lot in accordance with ASQC-Z1.4, inspection level S-4. The tools shall be subjected to the examinations and tests in specified in Table 2. All tools shall pass the requirements. Failure of a tool will require corrective action of the lot and another inspection in accordance with ASQC-Z1.4, inspection level S-4. The qualifying activity shall be provided a summary of lot failures and details of the corrective actions with the next periodic qualification inspection report.

5. TEST METHODS

5.1 Material

The supplier shall certify all specified materials. The qualifying activity reserves the right to request verification of certified materials.

5.2 Tool Design Characteristic Examination (see 3.3)

5.2.1 Manually Actuated Mechanical Wire Stripper for Round Wire Using Split Blades Design (see 3.3.1)

Visually examine the tool and blades for characteristics specified.

5.2.2 Manually Actuated High Frequency Signal Cable Strippers Examination (see 3.3.2)

Visually examine the tool and blades for characteristics specified in the detail specification.

5.3 Tool Assembly Instruction Examination (see 3.4)

The tool instructions shall be examined for all information as defined in 3.4. Assemble and remove all accessories from the basic tool in accordance with the tool instructions. No special tools (unless supplied with the tool) shall be used for assembly and disassembly of the tool accessories unless otherwise specified by part number in the detail specification. Only typical tools found in a mechanic's toolbox (i.e., screwdriver, hammer, pliers) shall be used.

5.4 Visual Examination (see 3.5)

Examine the tools and blades with 3X magnification for cracks, broken parts, loosened accessories, rough edges, or any other abnormalities. Examine for all dimensions with standard calibrated laboratory tools that measure at least one digit more than the required dimension.

5.4.1 Visual Examination of Manually Actuated Wire Stripper for Round Wire Using Split Blades (see 3.5.1)

Position a light source behind and in the middle of the closed blades then visually inspect for imperfections or blade misalignment.

5.4.2 Visual Examination of Manually Actuated High Frequency Cable Strippers (see 3.5.2)

Visually examine the strippers in accordance with the detail specification.

5.4.3 Tool Weight (see 3.5.3)

Weigh the tool on a calibrated scale with an accuracy of ± 0.01 pounds.

5.5 Marking Examination (3.6)

Examine wire stripper tool and accessories for required marking and legibility with 1X magnification. Verify trademarks are listed or been certified to be listed in AIR1351.

5.6 Tool Insulation Strip Performance (see 3.7)

Examine the tool for the operation characteristics specified in the detail specification.

5.6.1 Insulation Strip Compression Force (see 3.7.1)

For handheld stripping tools, the tool shall be mounted such that a compression force can be exerted on the handles at a point 1.25 inches $\pm$ 0.125 inches from the end of the handles. The force shall be applied at a rate of 1 inch per minute. Unless otherwise specified, the force will be applied while stripping an AS22759/34 size 20 wire at the strip length specified in Table 3. The method for other tool types shall be defined in the detail specification.

5.6.2 Wire Insulation Strip Performance Characteristics (see 3.7.2)

Measure and record the insulated wire or cable diameter or specified outer configuration at each strip location prior to stripping. The wire or cable diameter or outer configuration shall be in accordance with the wire or cable specification. Strip the specified wire or cable for the tool type in accordance with the tool instruction. The strip length shall be in accordance with Table 3 or as specified in the detail specification. Examine the wire or cable for strip performance characteristics with 3X magnification unless otherwise specified in the detail specification. Measure the frayed insulation or tape exposure. Measure the wire or cable diameter 2 inches from the end of the strip, and measure the wire diameter at the pad indentation (if applicable). Determine the indentation percent change by dividing the indentation diameter by the wire or cable diameter. A shadowgraph measurement is recommended.

TABLE 3 - WIRE STRIP LENGTH FOR ROUND WIRE

Wire Size	Strip Length -0.0/+0.03	Wire Size	Strip Length -0.0/+0.03
30-24	0.156	22-10	0.250

5.6.3 High Frequency Cable Insulation Strip Performance Characteristics (see 3.7.3)

Strip the specified cable for the tool type in accordance with the tool instruction. Examine the dielectric for frays, tails, and tags with the unaided eye. Examine the remaining parts of the cable for strip performance characteristics with 3X magnification

5.7 Shock Characteristics Test (see 3.8)

The tool, with all heaviest accessories designed to be continually attached when stripping a component, shall be loosely placed in a box made of approximately 1/4 inch (6 mm) plywood which has been rigidly fastened to the carriage of a shock test device. The box dimension shall be a cube with sides approximately 4 inch (100 mm) longer than the longest length of a fully assembled tool. The box may be open at the top to facilitate accessibility to the tool. The tool shall be subjected to a shock in accordance with test method 213 test condition I of MIL-STD-202. Two shocks shall be applied, one with the strip entrance of the tool facing the bottom of the box and the other with the entrance facing away from the bottom. The tool shall be examined for tool insulation strip performance (see 5.6) and marking legibility (see 5.5).

5.8 Humidity Characteristics Test (see 3.9)

The tool with accessories attached shall be tested in accordance with test method 106 of MIL-STD-202. Sub-cycles and post testing in the humidity environment shall not be performed. The tool and accessories shall then be dried in a circulating air oven for 12 hours at a temperature of 100 °F $\pm$ 5.4 °F (38 °C $\pm$ 3 °C). The tool and accessories shall be examined for corrosion, tool insulation strip performance (see 5.6), and marking legibility (see 5.5). The compression force test is not required.