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APRIL 21, 1961
SUPERSEDING
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(Revision 1) September 4, 1956 and
Fed. Spec. W-I-681a
September 23, 1943

FEDERAL SPECIFICATION

SOLDERING IRON, ELECTRIC

This specification was approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal agencies.

1. SCOPE AND CLASSIFICATION

1.1 **Scope.** This specification covers soldering irons, designed to operate on 115 volts, alternating current (a.c.), plus or minus 10 percent, 60/400 cycles, single phase; or 115 volts, direct current (d.c.), plus or minus 10 percent.

1.1.1 *Federal specification coverage.* This specification does not include all types, styles, and sizes of soldering irons, but only those most commonly used by the Federal Government.

1.2 **Classification.**

1.2.1 *Types, classes, styles, and assemblies.* Soldering irons shall be of the following types, classes, styles, cord assemblies, and heating assemblies, as specified (see 6.1):

Type I.—Standard plug tip.
  Class 1.—Temperature controlled.
    Cord assembly 1. — Two-conductor power cord and plug connector.
  Class 2.—Nontemperature controlled.
    Cord assembly 1. — Two-conductor power cord and plug connector.
    Cord assembly 2. — Three-conductor power cord and plug connector.

Type II.—Temperature controlled, screw tip.
  Cord assembly 1. — Two-conductor power cord and plug connector.
  Cord assembly 2. — Three-conductor power cord and plug connector.

Type III.—Pencil.
  Class 1.—Temperature controlled.
    Style A.—Plug tip.
      Cord assembly 1. — Two-conductor power cord and plug connector.
  Class 2.—Nontemperature controlled.
    Style A.—Plug tip.
      Cord assembly 1. — Two-conductor power cord and plug connector.
      Cord assembly 2.—Three-conductor power cord and plug connector.
    Style B.—Screw tip.
      Heating assembly 1.—Tip temperature 670° Fahrenheit (F.).
      Heating assembly 2.—Tip temperature 780°F.
      Heating assembly 3.—Tip temperature 950°F.

2. APPLICABLE SPECIFICATIONS, STANDARDS, AND OTHER PUBLICATIONS

2.1 **Specifications and standards.** The following specifications, and standards, of the issues in effect on date of invitation for bids, form a part of this specification to the extent specified herein:

Federal Specifications:
  PPP-B-636—Box, Fiberboard.

Federal Standards:

Fed. Std. No. 102—Preservation, Packaging, and Packing Level.

Fed. Std. No. 123—Marking for Domestic Shipment (Civilian Agencies).

(Activities outside the Federal Government may obtain copies of Federal Specifications, Standards, and Handbooks as outlined under General Information, in the Index of Federal Specifications, Standards, and Handbooks and at the prices indicated in the Index. The Index, which includes cumulative monthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D. C.

(Single copies of this specification and other product specifications required by activities outside the Federal Government for bidding purposes are available without charge at the General Services Administration Regional Offices in Boston, New York, Atlanta, Chicago, Kansas City, Mo., Dallas, Denver, San Francisco, Los Angeles, Seattle, and Washington, D. C.

(Federal Government activities may obtain copies of Federal Specifications, Standards, and Handbooks and the Index of Federal Specifications, Standards, and Handbooks from established distribution points in their agencies.)

Military Specifications:

MIL–P–15424 — Packaging of Hand Tools for Domestic and Overseas Shipment and Storage.

Military Standards:

MIL–STD–105 — Sampling Procedures and Tables for Inspection by Attributes.

MIL–STD–129—Marking for Shipment and Storage.

(Copies of Military Specifications and Standards, required by contractors in connection with specific procurement functions should be obtained from the procuring agency or as directed by the contracting officer.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids shall apply.

Governmental:

National Bureau of Standards Handbook:

H28—Screw Thread Standards for Federal Services.

(Application for copies should be addressed to the Superintendent of Documents, Government Printing Office, Washington 25, D. C.)

Nongovernmental:

Underwriters' Laboratories, Inc., Standards:

Subject No. 44—Standard for Rubber Covered Wires and Cables.

Subject No. 499 — Standard for Electric Heating Appliances.

(Application for copies should be addressed to the Underwriters' Laboratories, Inc., 161 Sixth Avenue, New York, N. Y.; 207 East Ohio Street, Chicago, Ill.; or 500 Sansome Street, San Francisco 11, California.)

National Electrical Manufacturers' Association Standard Publication:

No. WD–1–1956 — Outlet Receptacles Attachment Plug Cap and Appliance Plugs.

(Application for copies should be addressed to the National Electrical Manufacturers' Association, 155 E. 44th Street, New York 17, N. Y.)

3. REQUIREMENTS

3.1 Illustrations. The illustrations herein are descriptive and not restrictive and are not intended to preclude the purchase of soldering irons otherwise conforming to this specification.

3.2 Fire and casualty hazards.

3.2.1 Each bidder shall submit to the contracting agency proof that the soldering irons he proposes to supply under this specification conform to the applicable requirements of Underwriters' Laboratories, Inc., Subject No. 499, Standard for Electric Heating Appliances. The label or listing of the Underwriters' Laboratories, Inc., may be accepted as evidence that the soldering irons conform to this requirement.

3.2.2 In lieu of the label or listing, the bidder may submit independent proof satis-

factory to the contracting agency that his soldering irons conform to the applicable requirements of the published standards including methods of test of the Underwriters' Laboratories, Inc., Standard No. 499 for Electric Heating Appliances.

3.2.3 Compliance with the above preliminary requirements in regard to fire and casualty hazards does not absolve the bidder from complete compliance with the requirements of this specification in order to secure acceptance of his material.

3.3 Material. The material used in the construction of soldering irons shall be as specified herein. When the material used is not specified herein, it shall conform to a high quality commercial grade.

3.4 Design. Soldering irons shall be designed to operate on 115 volts, a.c., plus or minus 10 percent, 60/400 cycles, single phase, or 115 volts d.c. plus or minus 10 percent.

3.5 Construction. The soldering iron shall be so constructed that all parts thereof, which may be subject to replacement during the normal life of the assembly, are easily and readily removable for replacement without the necessity of special tools or of returning to the manufacturer.

3.6 Component parts. Each complete soldering iron shall consist essentially of one tip, one heating unit, one handle, 6-foot cord, plus or minus 4 inches (measured from terminal screws to plug connector) and one plug connector.

3.7 Size. Except for type II soldering irons, the size of the soldering iron, defined as the diameter of the tip, shall be as shown in the applicable table, as specified (see 6.1). Type II soldering irons shall be available with interchangeable tip sizes and shapes (tip numbers) (see 3.18.2.1 and 6.1).

3.8 Tip temperature. Except for type III, class 2, style B, the tip temperature (the temperature on the working surface of the tip when the iron is idling) shall stabilize within the temperature range of 700° F. to 850° F. when tested as specified in 4.5.3. The tip temperature for type III, class 2, style B soldering irons shall be as specified in 3.19.3.2.

3.9 Wattage rating. The wattage ratings of soldering irons shall be governed by the efficiency requirements specified (see 3.12).

3.10 Heating time. Soldering irons shall reach a temperature sufficient to melt solder consisting of 50-50 lead and tin in the time specified for the applicable iron, when tested as specified in 4.5.4.

3.11 Electrical insulation. The heating unit shall be effectively insulated so that break down of the insulation does not occur when tested as specified in 4.5.5.

3.12 Efficiency. The watt-seconds energy input necessary to melt 1 ounce of solder consisting of 50-50 lead and tin shall not exceed the value specified herein for the applicable iron, when tested as specified in 4.5.6.

3.13 Rest stand. A rest stand or other means shall be provided for the purpose of supporting the iron assembly while heating and while not in use.

3.14 Screw threads. Screw threads used on soldering irons shall conform to National Bureau of Standards Handbook H28.

3.15 Identification marking. Each soldering iron shall be marked in a plain and permanent manner with the manufacturer's name or with a trademark of such known character that the source of manufacture may be determined readily, with the manufacturer's model number, part number, and type designation, and with the voltage of the supply system from which the units are normally intended to be used.

3.16 Finish. Unless constructed of corrosion-resisting material, the rest stand and all metal parts of irons other than soldering

tips, shall be suitably protected to prevent oxidation or injury from soldering flux and fumes.

3.17 Type I, standard plug tip. Type I soldering irons shall be designed to accommodate and shall be provided with plug tips. The soldering irons shall conform to table I, and shall be similar to figure 1.

3.17.1 *Class 1, temperature controlled.* The class 1, temperature-controlled soldering irons shall have a thermostatic characteristic which shall maintain a stabilized tip temperature, within the specified temperature range (see 3.8), on the working surface of the tip to preclude overheating of the tip and to provide sufficient heat so that the material to be joined is capable of melting the solder. As heat is transferred in soldering, the power input shall increase to replace the heat loss. The stabilized tip temperature shall not vary in excess of plus or minus 5 percent. Temperature controlled soldering irons shall conform to the requirements specified herein when tested as specified in 4.5.7.

TABLE I.—*Type I, standard plug-tip soldering iron*

Tip		Shell assembly diameter	Weight (without cord)	Energy input per ounce of 50-50 lead-tin solder	Heating time
Diameter	Length[1] extending from shell assembly				
A ±2 percent	B (Min.)	C (Max.)	(Max.)	(Max.)	(Max.)
Inch	*Inches*	*Inches*	*Ounces*	*Watt-seconds*	*Minutes*
¼	1¼	9/16	7	6,000	2½
3/8	2	7/8	12	5,000	4
½	2	1 1/8	18	5,000	4½
5/8	2¼	1¼	22	5,000	5
7/8	2¼	1 9/16	40	4,000	6

[1] The tip length (dimension B) shall be the distance from the shell of the iron to the end of the tip.

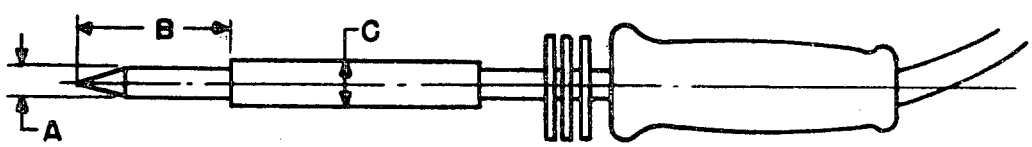

FIGURE 1.—Type I, cord assembly 1 and 2 soldering irons, standard plug tip, two- and three-conductor, power cord and plug connector.

3.17.1.1 *Tips.* Tips shall be of the plug type design and shall be made of commercially pure copper, tellurium copper alloy or leaded copper. The tip shall be secured to the heating unit with a setscrew of corrosion resistant metal and the union of the tip and heating unit shall be such as to conduct heat effectively from the heating unit to the work. The setscrew shall be of such length that when it is properly seated the head of the setscrew shall be essentially flush with the surface of the heating unit or shell assembly. Tips shall be coated completely with another metal that will be conducive to the prevention of oxidation and shall be properly tinned. The working surfaces of tips smaller than 5/8 inch shall be suitably pointed or shaped and tips of 5/8 inch and larger shall be chisel shaped, unless otherwise specified (see 6.1).

3.17.1.2 *Heating unit.* The heating unit shall be wound with a high quality resistance wire or ribbon and shall be electrically insulated from the core and the shell of the iron by high grade mica. The core of the heating unit shall be of one piece of metal with a closed-bottom hole suitable for receiving the tip. A positive means shall be provided for securing the core and preventing its rotation in the shell. The setscrew which secures the tip to the heating unit will not be acceptable as a method of securing the core to prevent rotation.

3.17.1.3 *Shell assembly.* The shell assembly shall provide mechanical support for the tip and heating unit and shall enclose the heating unit and the electrical leads from the heating unit to the terminal connections. The shell shall be of corrosion-resistant steel or some other suitable metal. If metal other than corrosion-resistant steel is used, the shell shall be adequately plated for protection against oxidation and rust.

3.17.1.4 *Handle.* The handle shall be of a thermosetting plastic, or a hardwood, or a suitable heat-resistant composition material, unless one of these specific types of handles is specified (see 6.1). The handle shall be designed of either one- or two-piece construction so that any temperature rise will not be uncomfortable to the bare hand. The handle shall be fabricated so as to afford a comfortable grip to the hand and shall be flanged on the end nearest the heating unit. The handle shall be securely fastened to the shell assembly; friction methods alone will not be considered sufficiently positive. Handles secured by screw threads shall have threaded metal inserts. Removal of the handle, giving access to the terminal connections, shall be accomplished in such a manner that the core will not turn in the shell nor the leads from the terminal connection to the heating unit be injured or broken. The external surface of the handle shall be smooth throughout and free of screw heads and other projections. Heads of screws, used in securing the handle, shall be a sufficient depth below the external surface to prevent the transmittal of heat to the operator's hand. The cord end of the handle shall be suitably flared and smoothly finished, or other means shall be provided to prevent chafing and breakage of the cord at its entrance to the handle.

3.17.1.5 *Terminal connections.* Efficient means for connecting the power cord to the heating unit shall be provided. A strain relief shall be provided to relieve the connection from strain caused by pulling on the cord. Means shall be provided to prevent short-circuiting the bare portions of the wire.

3.17.1.6 *Terminal block.* The terminal block shall be a material which will not become brittle nor develop poor heat-resisting qualities. Studs and connectors of opposite polarity shall be adequately insulated from each other. Provision shall be made to prevent the terminal block from turning. All metal parts, screws and nuts shall be of a material which will prevent corrosion, oxidation and other injury from heat, soldering flux, and fumes or shall be suitably plated to give equivalent protection.

3.17.1.7 *Continuous operation, idle.* Soldering irons shall be capable of idling in a hori-

zontal position for 5 hours at design voltage without damage to the heating unit in free air at a room temperature of 70°F. with no forced ventilation. The power input shall not exceed 50 percent of the initial power input while the iron is idling (see 4.5.1). Also, the temperature rise of the exterior of the handle shall not exceed 54°F. (see 4.5.2).

3.17.1.8 *Cord assembly 1, two-conductor power cord and plug connector.* Cord assembly 1 soldering irons shall be provided with an abrasive, water, oil, and grease-resistant two-conductor power cord capable of withstanding a temperature of 194°F., and a two-pronged plug connector. The power cord shall be provided with No. 18 A.W.G. or heavier conductors and shall conform to the UL Standard Subject No. 44 for Power Cords and Plugs. The plug connector shall be two-pronged and shall conform to UL specifications.

3.17.2 *Class 2, nontemperature controlled.* The class 2 soldering irons shall conform to the requirements specified in 3.17.1.1 through 3.17.1.8 except that the change in power input specified in 3.17.1.7 shall not exceed plus or minus 5 percent (see 4.5.1).

3.17.2.1 *Cord assembly 2, three-conductor power cord and plug connector.* Cord assembly 2 soldering irons shall be provided with an abrasive, water, oil and grease-resistant three-conductor power cord capable of withstanding a temperature of 194°F. and a three-pronged plug connector. The power cord shall be provided with No. 18 A.W.G. or heavier conductors and shall conform to the UL Standard Subject No. 44 for Power Cords and Plugs. Unless otherwise specified (see 6.1), the plug configuration shall conform to NEMA Standard WD–1–1956 for 2-pole, 3-wire grounding type, 15 amperes, 125 volts and shall either be rubber covered and molded as an integral part of the cord or a rubber-covered detachable connector fastened to the cord.

3.18 Type II, temperature-controlled screw type. Type II soldering irons shall conform to 3.17.1 through 3.17.1.7 and shall be furnished in cord assemblies 1 and 2 as specified in 3.17.1.8 and 3.17.2.1. Type II soldering irons shall be of one size, designed to accommodate, and shall be provided with interchangeable screw tips of the size and shape as specified in 3.18.2.1. Type II soldering irons shall conform to the dimensions shown in table II and shall be similar to figure 2.

3.18.1 *Continuous operation, idle.* Type II soldering irons shall conform to 3.17.1.7.

3.18.2 *Tips.* The tips shall be of the screw-type design and shall be made of commercially pure copper, tellurium copper alloy or leaded copper. Tips shall be coated completely with another metal that will be conducive to the prevention of oxidation and shall be properly tinned. The tips shall have a $\frac{7}{16}$-14NC–1 thread and a 30-degree (minus 4 minutes) included angle tapered shoulder on one end which shall fit the tapered and threaded hole in the core of the iron. The tips shall be provided with a hexagonal, square, or rectangular section for tightening and loosening the tip from the shell assembly of the iron.

3.18.2.1 *Working ends.* The working end of the tips shall be designed and provided in the sizes and shapes (tip numbers) as shown on figures 3 through 8 as specified (see 6.1). The tolerances on the dimensions shown on figures 3 through 8 shall be plus or minus $\frac{1}{64}$ inch for whole numbers and fractions, and plus or minus 1 degree for angles.

3.18.2.2 *Nonseizing compound.* Tips required for type II soldering irons shall be provided with a suitable nonseizing compound.

3.19 Type III, pencil. Type III soldering irons shall be designed to permit the iron to be held in the same manner as a pencil during soldering operations.

TABLE II.—*Type II, temperature controlled, screw-tip soldering iron*

Overall length	Shell assembly	Weight without cord and tip	Energy input per ounce of 50–50 lead-tin solder	Heating time
A (Max.)	C (Max.)	(Max.)	(Max.)	(Max.)
Inches	*Inch*	*Ounces*	*Watt-seconds*	*Minutes*
13	15/16	12	6,000	2

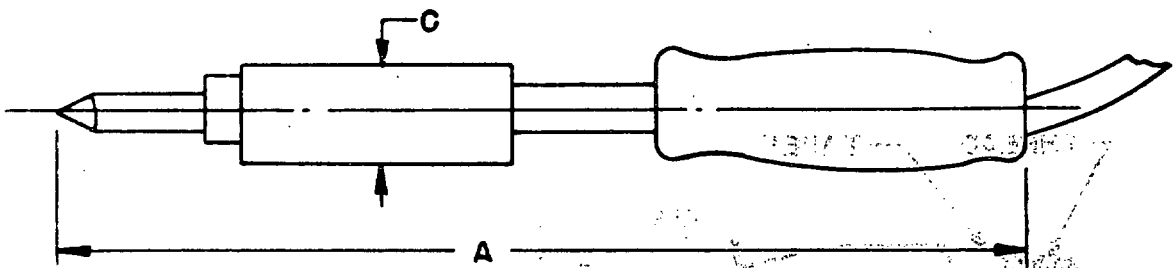

FIGURE 2.—Type II, cord assembly 1 and 2, soldering iron temperature controlled, screw tip, two-conductor and three-conductor power cord and plug connector.

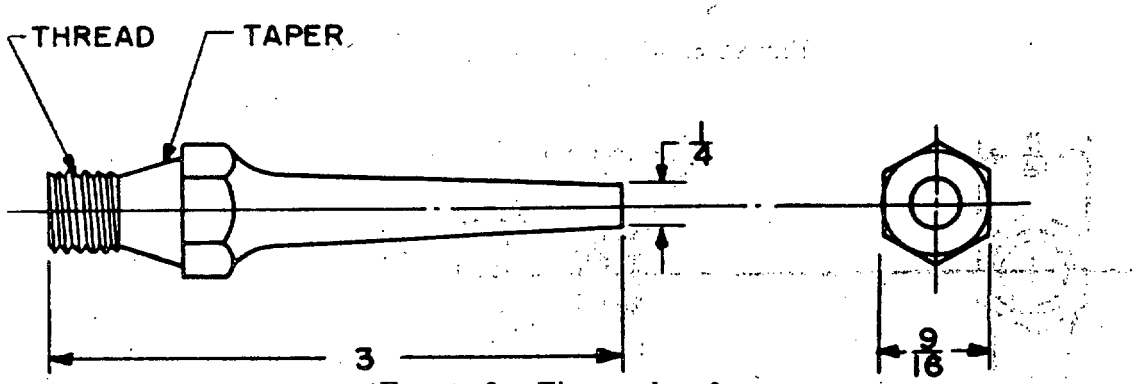

FIGURE 3.—Tip number 0.

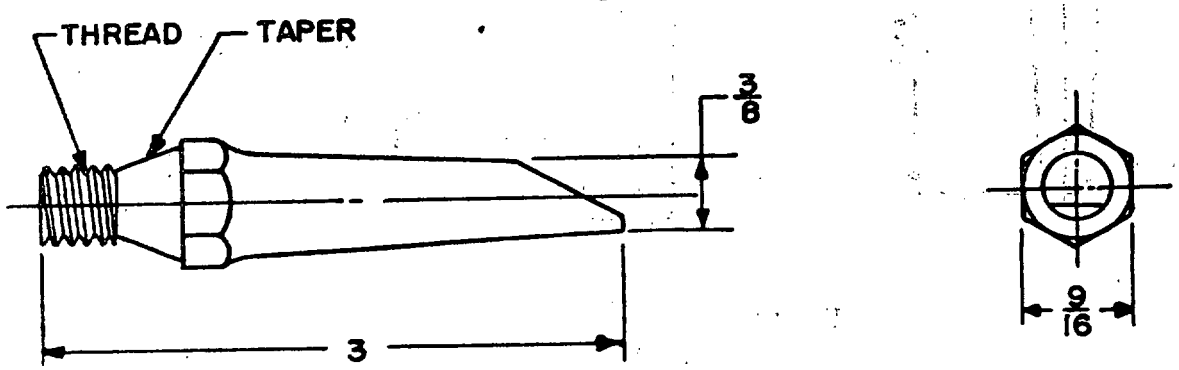

FIGURE 4.—Tip number 1.

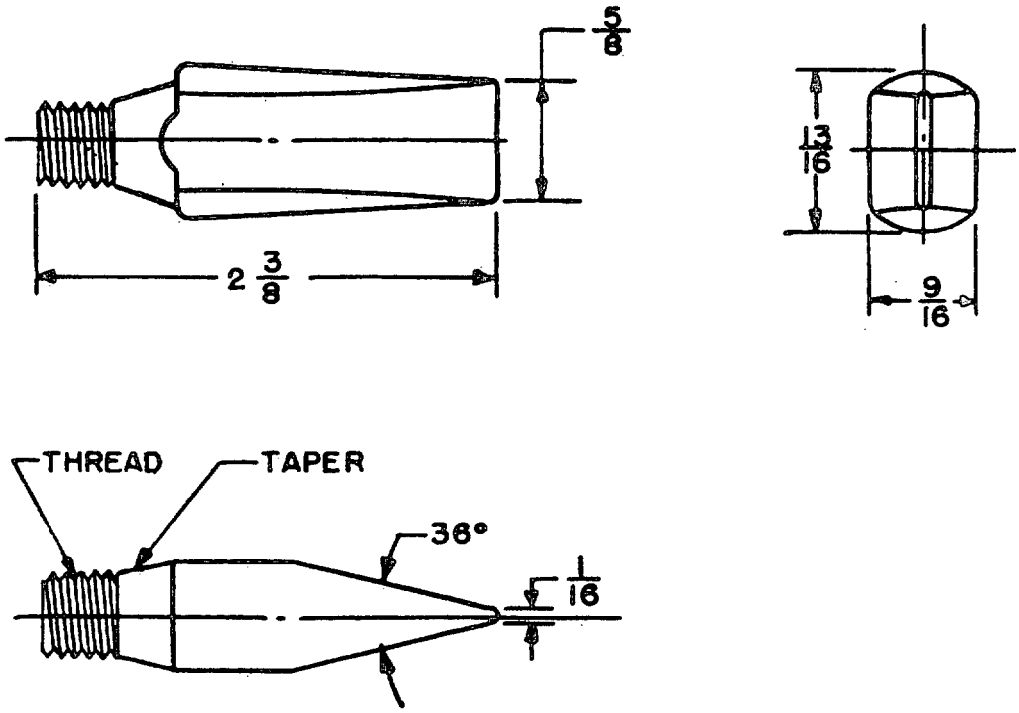

FIGURE 5.—Tip number 2.

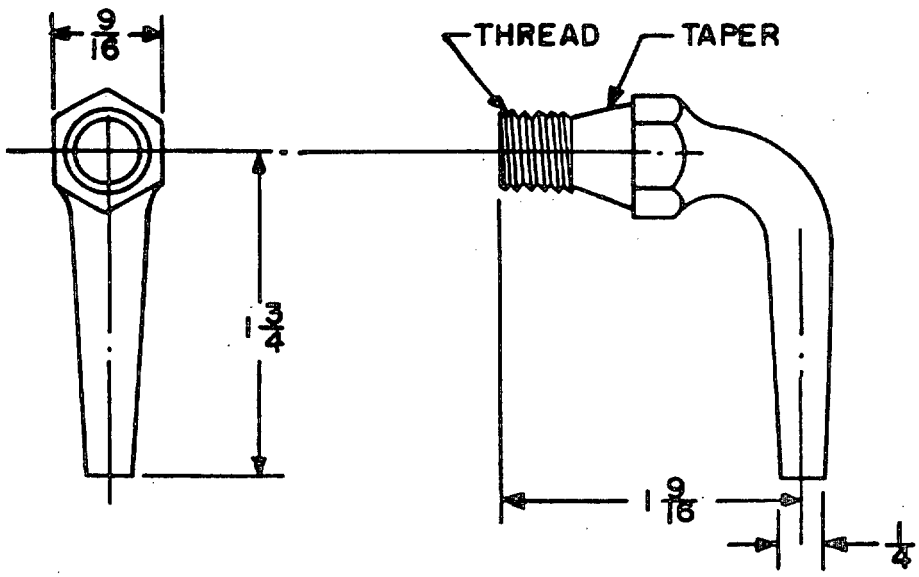

FIGURE 6.—Tip number 3.

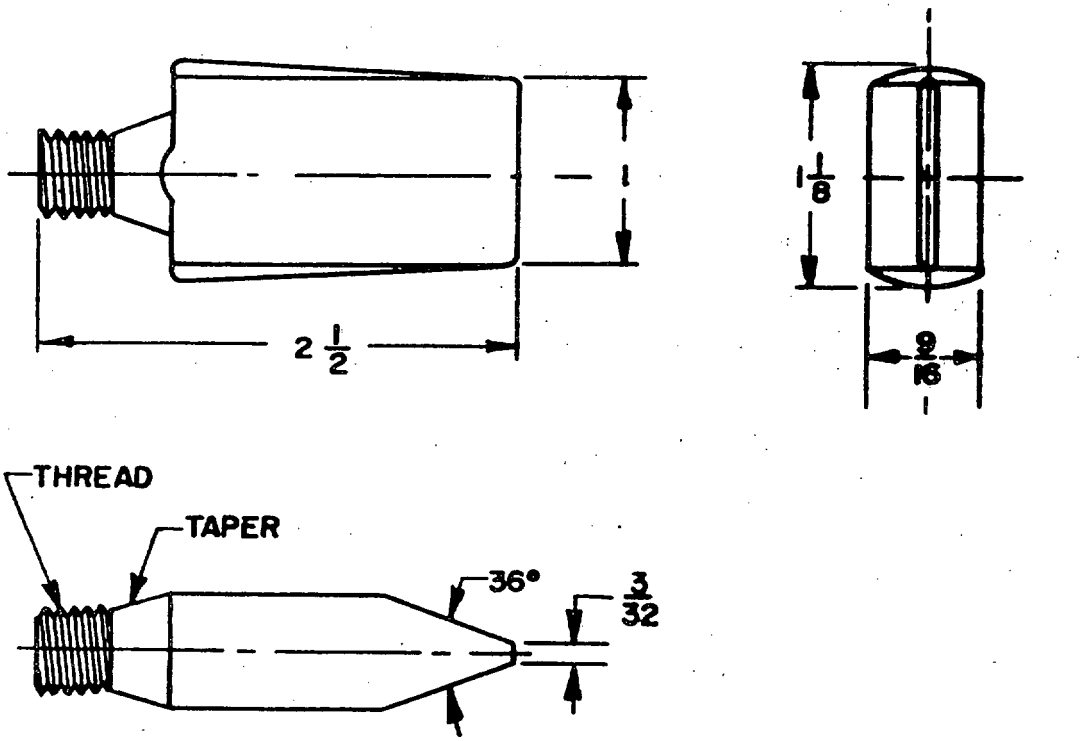

FIGURE 7.—Tip number 4.

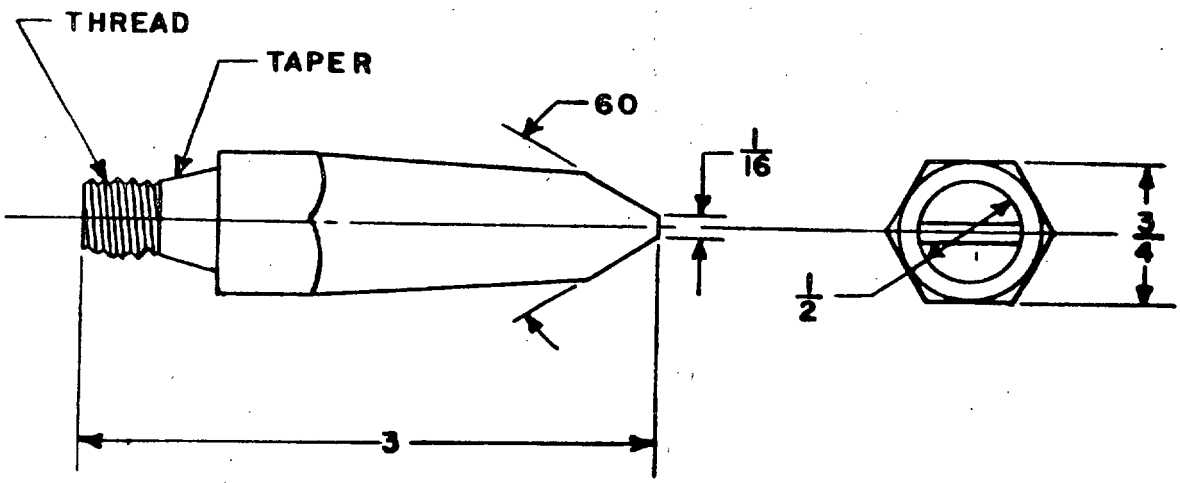

FIGURE 8.—Tip number 5.

3.19.1 *Class 1, style A, temperature controlled, plug tip.* Type III, class 1, style A soldering irons shall conform to the requirements specified in 3.17.1 through 3.17.1.8 with the following exceptions:

3.19.1.1 *Tip.* The tip shall conform to 3.17.-1.1, except that the ⅛-inch-tip size soldering iron shall have one extra tip bent at an angle of 30 degrees. The bend shall not interfere with the method used in securing the tip to the heating unit.

3.19.1.2 *Handle.* The handle shall conform to 3.17.1.4 except that the material used shall be thermosetting plastic.

3.19.1.3 *Cord assemblies.* In addition to the requirements specified in 3.17.1.8, the cord furnished with type III, class 1, style A soldering irons shall possess such flexibility as to bend 90 degrees when tested as specified in 4.5.8.

3.19.1.4 Type III, class 1, style A soldering irons shall conform to the dimensions shown in table III and shall be similar to figure 9.

3.19.2 *Class 2, style A nontemperature controlled, plug tip.* Type III, class 2, style A soldering irons shall be designed to accommodate, and be provided with, plug tips. The soldering irons shall conform to 3.17.1.1

TABLE III.—*Type III, classes 1 and 2, style A, pencil, temperature-controlled and nontemperature controlled, plug-tip soldering iron*

Tip		Shell assembly diameter	Weight (without cord)	Energy input per ounce of 50-50 lead-tin solder	Heating time
Diameter	Length extending from shell assembly				
A ±2 percent	B (Min.)	C (Max.)	(Max.)	(Max.)	(Max.)
Inch	*Inches*	*Inch*	*Ounces*	*Watt-seconds*	*Minutes*
⅛	⅞	⅜	1½	6,000	1½
¼	1¼	½	3	6,000	2

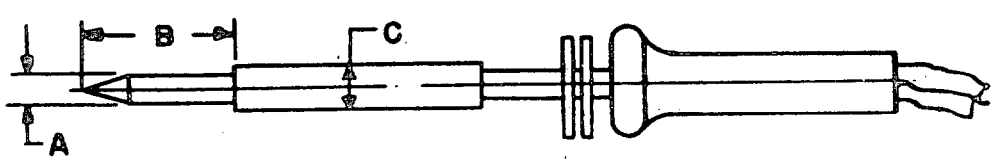

FIGURE 9.—Type III, classes 1 and 2, style A, pencil, temperature controlled and nontemperature controlled, plug tip soldering iron.

through 3.17.1.8 and 3.17.2.1 with the exception of the tip, handle and cord assemblies as follows:

3.19.2.1 *Tip and handle.* Tip and handle shall conform to 3.19.1.1 and 3.19.1.2, respectively.

3.19.2.1.1 *Cord assembly 1.* The cord assembly for type III, class 2, style A, cord assembly 1 soldering irons shall conform to 3.19.1.3.

3.19.2.1.2 *Cord assembly 2.* The cord assembly for type III, class 2, style A, cord assembly 2 soldering irons, in addition to the requirements specified in 3.17.2.1 shall possess such flexibility as to bend at least 45° when tested as specified in 4.5.8.

3.19.2.2 Type III, class 2, style A soldering irons shall conform to the dimensions shown in table III and shall be similar to figure 9.

3.19.3 *Class 2, style B, nontemperature controlled screw tip.* Type III, class 2, style B soldering irons shall be designed so that the handle shall be provided with a screw socket, either candelabra screw or other suitable type, for use with interchangeable tip and heating units, as hereinafter specified. Soldering irons (handle with tip and heating unit engaged, excluding the cord assembly) shall have a maximum weight of 6 ounces and shall be similar to figure 10.

3.19.3.1 *Design.* The tip and heating unit (heating assembly), except the ⅛-inch-size tip, shall be either an integral unit or shall be united by screw-threads or other suitable means. The ⅛-inch size tips shall be secured by screw-threads. The heating unit shall be equipped with screw-threads to engage the proper handle receptacle.

3.19.3.2 *Heating assemblies.* Heating assemblies shall be available with tip temperatures of 670°, 780° and 950° F., as specified (see 6.1), and shall conform to the requirements shown in table IV.

TABLE IV.—*Heating assemblies for type III, class 2, style B, pencil, nontemperature controlled screw-tip soldering iron*

Heating assembly	Tip temperature	Energy input per ounce of 50–50 lead-tin solder	Heating time
		(Max.)	(Max.)
	Degrees Fahrenheit	*Watt-seconds*	*Minutes*
1	670 ± 27	3,000	2
2	780 ± 27	5,000	2
3	950 ± 54	6,000	1½

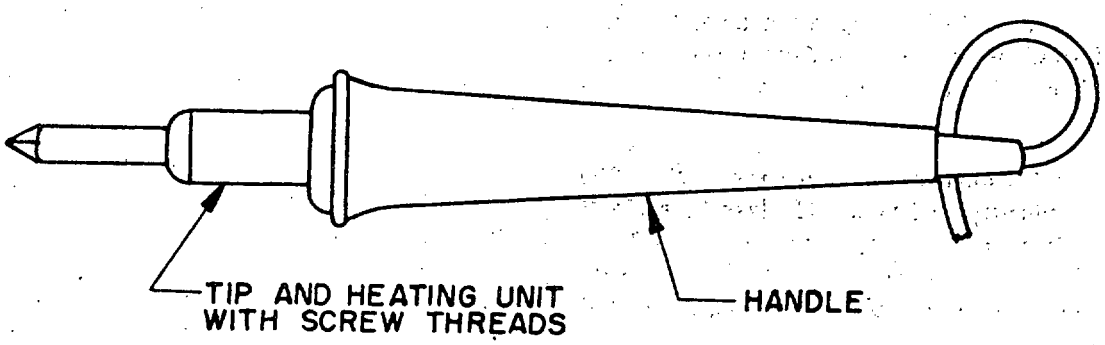

FIGURE 10.—Type III, class 2, style B, heating assembly 1, 2 and 3, soldering iron, pencil, nontemperature controlled, screw tip, tip temperature 670°, 780°, and 950°F.

3.19.3.3 *Tips.* Tips shall be available in 1/8-, 1/4-, 5/16-, and 3/8-inch diameters with a tolerance of plus or minus 2 percent as specified (see 6.1). The tip length extending from the heating unit shall be not less than 7/8 inch. The 1/8-inch-diameter tip shall be available straight or bent at an angle of 30 degrees and the bend shall not interfere with the method used in securing the tip to the heating unit. Unless otherwise specified, the working surfaces of the tips shall be suitably pointed or shaped (see 6.1).

3.19.3.4 *Heating unit.* The heating unit shall be wound with a high quality resistance wire or ribbon and shall be electrically insulated with magnesium oxide, aluminum oxide, or other highly efficient ceramic or ceramo-compounds.

3.19.3.5 *Handle.* The handle shall be in accordance with 3.17.1.4. The handle shall be provided with a screw-type receptacle. The receptacle employed shall satisfactorily accommodate and secure the heating unit and tip provided for the iron. The handle shall be designed to afford a comfortable grip and shall be flanged on the end nearest the heating unit. The cord shall be suitably protected from wear and breakage at the entry point of the handle.

3.19.3.6 *Terminal connections.* Efficient means shall be provided for connecting the power cord to the heating receptacle. A strain relief shall be provided to relieve the connection from strain caused by pulling on the cord.

3.19.3.7 *Continuous operation, idle.* The idling operation of type III class 2, style B soldering irons shall conform to 3.17.1.7 except that the change in power input specified shall not exceed plus or minus 5 percent (see 4.5.1).

3.19.3.8 *Cord assembly.* The cord assembly furnished with type III, class 2, style B soldering iron shall conform to 3.17.1.8, and in addition, the cord shall possess such flexibility as to bend 90 degrees when tested as specified in 4.5.8. The cord and handle may be furnished as an integral unit.

3.20 Workmanship. The soldering irons, including all parts and accessories, shall be constructed, assembled, and finished in a thoroughly workmanlike manner to assure procurement of good quality equipment of a neat general appearance. Standards of workmanship shall be such that soldering irons specified herein shall comply with all applicable requirements in section 3.

4. SAMPLING, INSPECTION, AND TEST PROCEDURES

4.1 The supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own or any other inspection facilities and services acceptable to the Government. Inspection records of the examination and tests shall be kept complete and available to the Government as specified in the contract or order. The Government reserves 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.

4.2 Sampling.

4.2.1 *Inspection lot.* All soldering irons of the same type, class, style, cord-assembly and heating assembly, offered for delivery at one time, shall be considered a lot for purposes of sampling and inspection.

4.2.2 *Sampling for group A tests.* Sample soldering irons shall be selected from each lot in accordance with Military Standard MIL–STD–105 at inspection level II and shall be subjected to the group A tests of 4.3.1. Any iron which fails in any test or is defective in any way shall be rejected. Lots shall be accepted or rejected in accordance with Acceptable Quality Level (AQL) 1.5 percent defective.

4.2.3 *Sampling for group B tests.* Sample soldering irons shall be selected from each lot in accordance with inspection level L–7 of Military Standard MIL–STD–105 and subjected to the group B tests of 4.3.2. Any iron which fails in any test shall be rejected. Lots shall be accepted or rejected in accordance with AQL 4.0 percent defective, except that all of the small sample sizes of inspection level L–7 shall be used and the acceptance number for these small samples shall be zero.

4.3 Lot acceptance inspection.

4.3.1 *Group A tests.* Each of the sample soldering irons selected in accordance with 4.2.2 shall be subjected to each of the tests specified hereinafter, and the results of each test shall be compared with this specification (see 4.3.3).

Group A inspection and tests	*Test paragraph*
Examination	4.4
Heating time	4.5.4
Insulation resistance	4.5.5
Cord flexibility (type III)	4.5.8

4.3.2 *Group B tests.* Each of the sample soldering irons selected in accordance with 4.2.3 shall be subjected to each of the tests specified hereinafter, and the results of each test shall be compared with this specification (see 4.3.3).

Group B inspection and tests	*Test paragraph*
Continuous operation	4.5.1
Handle temperature	4.5.2
Tip temperature	4.5.3
Efficiency	4.5.6

4.3.3 *Rejected lots.* Failure to conform to this specification for any group A and B test shall be counted as a defect and the soldering iron shall be rejected. If the number of such nonconforming soldering irons in any sample exceeds the acceptance number for that sample, the lot represented by the sample shall be rejected.

4.4 Examination. Soldering irons shall be examined to ascertain that the design, weight, tip dimensions, materials and workmanship are in strict conformance with this specification. Observation shall be made as to the readiness with which necessary adjustments may be made. The fit of parts shall be observed with particular reference to the interchangeability of such parts as will be likely to require replacement during the normal service life of the iron.

4.5 Acceptance tests.

4.5.1 *Continuous operation.* Soldering irons shall be idled continuously in a horizontal position at design voltage for 5 hours. No auxiliary means shall be provided for dissipating the heat. At the conclusion of the test the iron shall be examined to determine that the heating unit was not damaged. Type I, class 2 and type III, class 2 soldering irons shall be tested to determine that the wattage input has not changed more than plus or minus 5 percent during the 5-hour idling period (see 3.17.2, 3.19.2 and 3.19.3.7). Type I, class 1, type II, and type III, class 1 soldering irons shall be tested to determine that the average input wattage does not exceed 50 percent of the maximum input wattage as specified in 3.17.1.7.

4.5.2 *Handle temperature.* The temperature of the handle exterior shall be measured before and at the conclusion of the 5-hour idling period of the continuous operation test to determine that the temperature rise has not exceeded 54°F. over the ambient temperature (see 3.17.1.7, 3.17.2, 3.18.1, 3.19.1, 3.19.2 and 3.19.3.5).

4.5.3 *Tip temperature.* Soldering irons with either a thermocouple peened to the tip or other suitable temperature measuring device attached shall be placed in a horizontal position at room temperature and energized. When the tip temperature has become stabilized the temperature shall conform to the requirements for the applicable iron (see 3.8 and 3.19.3.2).

4.5.4 *Heating time.* Soldering irons shall be tested to determine compliance with the heat-

ing time requirements specified for the applicable iron. Tests shall be made at room temperature with the iron operating at design voltage (see 3.10).

4.5.5 *Electrical insulation test.* The insulation of the soldering irons shall be subjected to an alternating voltage of 1000 volts (effective value) 60 cycles per second applied between the current carrying parts and the exposed metal parts with which an operator or work might come in electrical contact. Both while unheated and while the iron is at operating temperature the test voltage shall be applied for one minute. The leakage current shall not exceed one milliampere during this test and there shall be no other indication of insulation failure (see 3.11).

4.5.6 *Efficiency.* Soldering irons shall be tested to determine compliance with the efficiency requirements for the applicable iron (see 3.12). The following test equipment and test procedure or other suitable equipment and test procedure approved by the bureau or agency concerned shall be used in determining the efficiency of soldering irons.

4.5.6.1 *Efficiency test equipment.* Soldering irons and solder required in the test, shall be supported by steel framework. Soldering irons shall be fastened to the framework in a position of 30 degrees with the tip downward. The solder shall rest in a slide which is built in the framework. The long length of the solder shall make an angle of 90 degrees with the long length of the soldering iron. The solder shall be general purpose 50-50 lead tin solder, 15 inches long, and of the size and cross-sectional shape as specified in table V for the size tip in the soldering iron under test.

4.5.6.2 *Efficiency test procedure.* Melting characteristics shall be determined by supporting the soldering iron in the frame, with the tip downward. The soldering iron shall be allowed to attain the temperature necessary to melt solder. The solder placed in its slide, shall be fed to the tip of the iron by gravity.

TABLE V.—*Solder bar for efficiency test*

Soldering iron tip size (nominal)	Solder bar size	Solder bar shape
Inch	*Inch*	
1/8	1/16	round
1/4	1/8	round
5/16	1/8	round
3/8	1/4 by 1/4	square
1/2	1/4 by 1/4	square
5/8	1/4 by 1/4	square
7/8	3/8 by 1/2	rectangular
1	3/8 by 1/2	rectangular

The power shall be turned off when the solder bar has been melted as follows:

(*a*) Soldering irons rated at 175 watts or less shall have the power turned off when 50 percent of solder has been melted.

(*b*) For soldering irons rated in excess of 175 watts but less than 300 watts the percentage of solder bar melted before turning the power off shall be equal to 85 minus two-tenths of the rated wattage (percent = 85 — 0.2 (rated wattage)).

(*c*) Soldering irons rated at 300 watts or greater shall have the power turned off when 25 percent of the solder bar has been melted.

4.5.6.2.1 After the power has been turned off, the solder shall be allowed to continue to melt so that the reserve heat of the iron can be utilized. The total solder melted shall be used in determining the thermal efficiency of the soldering iron.

4.5.6.2.2 *Determination of power input for temperature controlled irons.* The power recorded while temperature controlled soldering irons are using current shall be construed as the power input. The time determination shall be only the actual time that the soldering iron permits a current flow during the solder melting process.

4.5.7 *Temperature control characteristic.* Type I, class 1, type II, and type III, class 1

temperature controlled soldering irons shall be subjected to a temperature control characteristic test with the iron operating at design voltage (see 3.17.1). The soldering iron under test shall be placed in a horizontal position and energized for approximately 20 minutes so that the iron may reach a stabilized condition relative to the ambient temperature. For the next 20 minutes the energy input shall be measured by use of a portable watt-hour meter standard or similar electrical energy measuring instrument. The soldering iron under test shall then be placed in a vertical position, with the tip pointing downward, so that the tip, except for approximately the ¼ inch before the tip joins the shell assembly, shall be immersed in a beaker or similar vessel having a capacity of 1500 milliliters (50.7 fluid ounces), a mean diameter of approximately 12 centimeters (4.7 inches), and containing 1000 milliliters (33.8 fluid ounces) of water which is at ambient temperature. The energy input shall then be recorded for another 20-minute period while the tip is immersed in water which shall be kept in motion by stirring. The soldering iron shall be considered to have a sufficient degree of temperature control characteristics and classed as a temperature controlled soldering iron if the percent increase in energy consumption is not less than 100 percent. The percent increase in energy consumption shall be calculated as follows:

Percent increase in energy consumption equals the energy input while in water minus the energy input while in air, divided by the energy input while in air, multiplied by 100; where the energy input is in watt-seconds.

$$\text{(Percent increase in energy consumption} = \frac{\text{energy in water (watt-sec.)} - \text{energy in air (watt-sec.)}}{\text{energy in air (watt-sec.)}} \times 100)$$

4.5.8 *Cord flexibility for type III irons.* The cord shall be clamped ¾ inch from the handle, and the iron without tip shall be allowed to hang freely beneath. The cord for cord assembly 1 soldering irons shall form a 90° bend perpendicular to the clamped portion of the cord (see 3.19.1.3, 3.19.2.1.1 and 3.19.3.8). The cord for cord assembly 2 soldering irons shall form at least a 45° bend from the horizontal clamped portion of the cord (see 3.19.2.1.2).

5. PREPARATION FOR DELIVERY

(For civil agency procurement, the definitions and applications of the levels of packaging and packing shall be in accordance with Federal Standard No. 102.)

5.1 Cleaning, preservation and packaging. (See 6.1.)

5.1.1 *Level A.* Preservation and packaging of irons shall be in accordance with level A of Military Specification MIL–P–15424.

5.1.2 *Level C.* Cleaning, preservation and packaging shall be in accordance with the supplier's commercial practice.

5.2 Packing. (See 6.1.)

5.2.1 *Level A.* Irons packaged as specified (see 6.1) shall be packed in accordance with the level A requirements of Military Specification MIL–P–15424.

5.2.2 *Level B.*

5.2.2.1 *Military.* Irons packaged as specified (see 6.1) shall be packed in accordance with the level B requirements of Military Specification MIL–P–15424.

5.2.2.2 *Nonmilitary.* Twelve soldering irons of one type and one size shall be packed in an intermediate container. Intermediate containers shall conform to Federal Specification PPP–B–636, Box, Fiberboard, type I or

type II, class 1, style optional. Weight of contents shall not exceed box weight limitations. Four intermediate boxes of 12 irons each shall be packed in a shipping container conforming to PPP–B–636, Box, Fiberboard, type I and type II, class 1, style optional. Weight of box and contents shall not exceed box weight limitations.

5.2.3 *Level C.* Soldering irons shall be packed in substantial commercial containers of the type, size and kind commonly used for the purpose, so constructed as to insure acceptance and safe delivery by common or other carriers, at the lowest rate, to point of delivery called for in the contract or purchase order.

5.3 **Marking.**

5.3.1 *Military marking.* In addition to any special marking required by the contract or order, or herein, interior and exterior shipping containers shall be marked in accordance with Military Standard MIL–STD–129.

5.3.2 *Nonmilitary marking.* In addition to any special marking, interior and exterior shipping containers shall be marked in accordance with Federal Standard No. 123.

6. NOTES

6.1 **Ordering data.** Purchasers should exercise any desired options offered herein, and procurement documents should specify the following:

(*a*) Title, number, and date of this specification.
(*b*) Type, class, style, cord assembly and heating assembly, as applicable (see 1.2).
(*c*) Size tip required (except type II) (see 3.7 and applicable table).
(*d*) Tip shape, if a specific shape is required for types I and III (see 3.17.1.1 and 3.19.1.1).
(*e*) Type of handle, if a choice is required (see 3.17.1.4, 3.19.1.2, 3.19.2.1 or 3.19.3.5).
(*f*) Plug configuration (for cord assembly 2) if other than specified (see 3.17.2.1).
(*g*) Tip number required for type II soldering irons (see 3.18.2.1).
(*h*) Tip temperature required for type III, class 2, style B (see 3.19.3.2).
(*i*) Tip diameter and working surface required for type III, class 2, style B (see 3.19.3.3).
(*j*) Level of preservation, packaging, and packing required (see 5.1 and 5.2).

6.2 **Transportation description.** Transportation description and minimum weights applicable to this commodity are:

Rail:

Tools, electric, not otherwise indexed by name, with or without accessories.
Carload minimum weight 30,000 pounds.

Motor:

Tools, electric, not otherwise indexed,
Truckload minimum weight (W) 30.4 pounds, (W) subject to Rule 34, National Motor Freight Classification.

CUSTODIANS:
Army—Ordnance Corps
Navy—Bureau of Ships
Air Force—WADD.

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5. PROBLEM AREAS

a. Paragraph Number and Wording:

b. Recommended Wording:

c. Reason/Rationale for Recommendation:

6. REMARKS

7a. NAME OF SUBMITTER *(Last, First, MI)* – Optional	b. WORK TELEPHONE NUMBER *(Include Area Code)* – Optional
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