

MIL-S-12204C
4 January 1974
SUPERSEDING
MIL-S-12204B
8 October 1954

MILITARY SPECIFICATION

SOLDER, LEAD-TIN ALLOY

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

1. SCOPE

1.1 Scope. This specification covers solder intended for use on aluminum and aluminum alloys (see 6.4).

1.2 Classification. The solder shall be of the following types and compositions, as specified (see 6.2 and 6.3). Percent of nominal composition shall be as specified in table I.

Type I	-Spooled wire.
Type II	-Stick.
Composition A	-Lead, tin, zinc.
Composition B	-Tin, zinc.
Composition C	-Tin, zinc, aluminum.
Composition D	-Zinc, aluminum.

FSC 3439

MIL-S-12204C

2. APPLICABLE DOCUMENTS

2.1 The following documents of the issue in effect on date of invitation for bids or request for proposal form a part of this specification to the extent specified herein:

SPECIFICATIONS

Federal

QQ-A-250

-Aluminum and Aluminum Alloy Plate and Sheet; General Specification for.

Military

MIL-W-45562

-Welding and Soldering Equipment, Supplies and Accessories, Packaging of.

STANDARDS

Federal

FED. TEST Method
STD. No. 151

-Metals; Test Methods.

Military

MIL-STD-105

-Sampling Procedures and Tables for Inspection by Attributes.

MIL-STD-130

-Identification Marking of US Military Property.

(Copies of specifications and standards required by suppliers in connection with specific procurement functions should be obtained from the procuring agency or as directed by the contracting officer.)

3. REQUIREMENTS

3.1 Material. Material shall be as specified herein. Material not specified shall be selected by the supplier and shall be subject to all provisions of this specification. Materials shall be free from all defects and imperfections that could affect the serviceability of the finished product.

3.2 Chemical composition. The chemical composition of the solder shall conform to table I. Metallic impurities shall not exceed 0.20 percent.

3.2 Solder strength. Soldered joints shall within a minimum force of 1000 pounds after 4 hours accelerated aging, and when specified (see 6.2), after 7 days immersion in salt water when tested as specified in 4.4.2.2.

3.4 Type I. Type I solder shall be furnished in 1/8-inch-diameter wire, wound and securely held in place on nonreturnable one-inch-diameter spools. The spools shall be constructed so as to prevent the wire from slipping from the spool cores. Unless otherwise specified (see 6.2), the spools shall be furnished as one-pound net weight of solder.

3.5 Type II. Type II shall be furnished in stick form, approximately 1/4-inch diameter and 14 inches in length, weighing approximately 1/4-pound per stick.

3.6 Identification marking. The solder shall be identified in accordance with MIL-STD-130. The information shall include whether solder is to be used with flux and type of a flux to be used.

MIL-S-12204C

TABLE I

TIN ALLOY; LEAD-TIN ALLOY;
ZINC ALLOY SOLDERS

Classification	Nominal Composition, %				*Temperature, °F		
	Tin	Lead	Zinc	Aluminum	Solidus	Liquidus	Pasty Range
Comp A	34	63	3	---	335	500	165
Comp B	85	---	15	---	390	445	55
Comp B	80	---	20	---	390	518	128
Comp B	70	---	30	---	390	592	202
Comp B	60	---	40	---	390	645	255
Comp B	50	---	50	---	390	675	285
Comp C	73-87	---	8-15	5-12	380	780-950	400-570
Comp D	---	---	95	5	720	720	0

* Temperature ranges are for information purpose only.

3.7 Workmanship. Solder shall be processed in such a manner as to be uniform in quality and shall be free from defects that could affect life serviceability, or appearance.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the supplier may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. 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.

MIL-S-12204C

4.2 Classification of inspection. Inspection shall be classified as follows:

- (a) Quality conformance inspection (see 4.3).
- (b) Inspection of preparation for delivery (see 4.5).

4.3 Quality conformance inspection.

4.3.1 Lot. Unless otherwise specified (see 6.2), a lot for purposes of inspection, shall consist of all material presented at one time from the same source and processed under the same conditions.

4.3.2 Sampling. Unless otherwise specified herein, sampling for examination shall be in accordance with MIL-STD-105, level I. Sampling for tests shall be as specified in the applicable test.

4.3.3 Examination. Samples selected in accordance with 4.3.2 shall be examined as specified in 4.4.1. AQL shall be 10.0 percent.

4.3.4 Tests. Solder shall be tested in accordance with 4.4.2. Failure of any test shall be cause for rejection of the lot from which the sample was taken.

4.4 Inspection procedure.

4.4.1 Examination. Solder shall be examined as specified herein for the following defects:

- 101. Weight not as specified
- 102. Dimensions not as specified.
- 103. Identification not as specified.
- 104. Material not free from defects.
- 105. Solder not uniform in appearance.

MIL-S-12204C

4.4.2 Tests.

4.4.2.1 Chemical analysis. Chemical analysis shall be in accordance with Fed. Test Method Std. No. 151, method optional. Nonconformance to 3.2 shall constitute failure of this test.

4.4.2.2 Solder strength.

4.4.2.2.1 Preparation of test specimen. Solder strength shall be determined on specimens prepared from two 1 by 6 by 0.062 inch strips of aluminum conforming to QQ-A-250, temper H14, lapped one inch and soldered together. Prior to soldering, the surfaces to be soldered together shall be tinned in the following manner:

- (a) Heat the metal strips by a non-oxidizing flame until it is hot enough to melt the solder.
- (b) Melt a little solder on the part to be tinned.
- (c) Remove from flame and scratch briskly with a wire brush.
- (d) Repeat the above procedure until a surface one by 1-1/2 inches is covered by an adhering thin film of solder.
Care shall be taken not to overheat the strips and burn the previously tinned parts or melt the aluminum strip.

After tinning is completed, the tinned surfaces shall be jointed and the strips soldered together using a soldering iron or torch. Flux as recommended by the supplier may be used.

4.4.2.2.2 Procedure. After soldering is complete, the specimen shall be subjected to 4 hours of accelerated aging by suspending in an oven at 100° C. plus or minus 1° C. (212° F. plus or minus 2° F.) or in boiling water at the same temperature. The specimen shall then be immersed in salt water so that the length and width of the specimen are in a horizontal position with one end of the specimen clamped one inch from the end. A wax coated iron or steel weight of 100 grams plus or minus one gram shall be placed on the specimen with the center of the weight 1/2 inch from the unsupported end. When specified (see 3.3), the entire setup, including the weight shall be immersed in a 6 percent (by weight) salt solution at 25° C. plus or minus 1° C. (77° F. plus or minus 2° F.) for 7 days. No bare metal, except that

MIL-S-12204C

of the specimen, shall be in contact with the salt solution. The applied load shall be in a direction parallel to the axis of the specimen. Solder strength shall be the average value of 5 determinations.

4.4.2.2.3 Failure criteria. Nonconformance to 3.3 shall constitute failure of this test.

4.5 Inspection of preparation for delivery. The preservation, packaging, packing, and marking of the solder shall be examined and tested to determine conformance to MIL-W-45562.

5. PREPARATION FOR DELIVERY

5.1 Preservation, packaging, packing, and marking. The solder shall be preserved, packaged, packed, and marked in accordance with MIL-W-45562. The level of preservation and packaging shall be level A, B, or C, and the level of packing shall be level A, B, or C as specified (see 6.2).

6. NOTES

6.1 Intended use. The solders covered by this specification are intended for use on aluminum and aluminum alloy. Solders are to be used with soldering flux as recommended by the supplier.

6.2 Ordering data. Procurement documents should specify the following:

- (a) Title, number, and date of this specification.
- (b) Type and composition required (see 1.2).
- (c) When 7-day immersion in salt water is required (see 3.3).
- (d) Net weight of solder on spools when other than as specified (see 3.4).
- (e) Size of lot for inspection, if other than as specified (see 4.3.1)
- (f) Level of preservation and packaging and level of packing required (see 5.1).

MIL-S-12204C

6.3 Classification change. Composition D-zinc, aluminum has been included in this revision as an additional composition with no change in types.

6.4 Aluminum solder is generally not recommended for joints that will be exposed to the weather. When moisture is present to form an electrolyte, the difference in potential between the solder and the aluminum will cause electrolytic corrosion to occur, with consequent failure of the joint. It is recommended that the soldered joint be protected by an organic protective coating.

Custodians:

Army - ME
Navy - OS
Air Force - 84

Preparing activity:

Army - ME

Review activities:

Army - GL, MI, WC

User activities:

Army - EL, AT
Navy - MC

Project No. 3432-0092

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions - Reverse Side)

1. DOCUMENT NUMBER

2. DOCUMENT TITLE

3a. NAME OF SUBMITTING ORGANIZATION

4. TYPE OF ORGANIZATION (Mark one)

VENDOR

USER

MANUFACTURER

OTHER (Specify): _____

b. ADDRESS (Street, City, State, ZIP Code)

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

c. MAILING ADDRESS (Street, City, State, ZIP Code) - Optional

8. DATE OF SUBMISSION (YYMMDD)

(TO DETACH THIS FORM, CUT ALONG THIS LINE.)