

PERFORMANCE SPECIFICATION

DELAY LINES, PASSIVE,  
GENERAL SPECIFICATION FOR

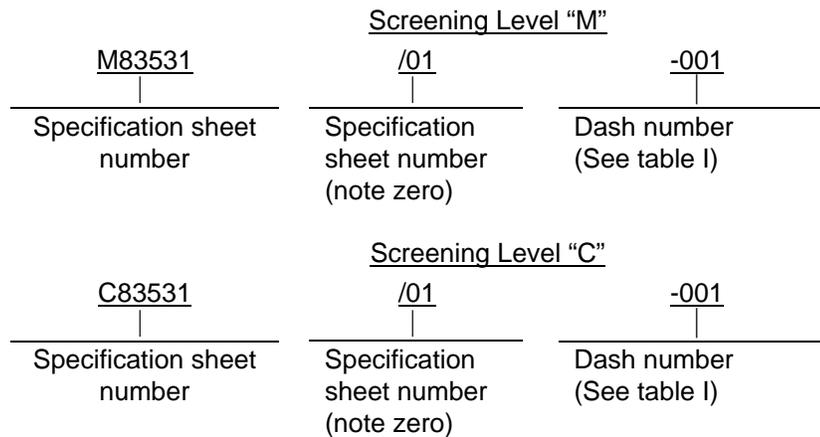
This specification is approved for use by all Departments  
and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers the general requirements for fixed passive (tapped and untapped) pulse delay lines. The specification has two product levels, a high reliability screening level "M" and screening level "C".

1.2 Classification.

1.2.1 Part or Identifying Number (PIN). Delay lines specified herein (see 3.1) will be identified by a PIN which consists of the military designator, the basic number of the associated specification, and assigned dash number (see 3.1), and a screening level that indicates the level of quality and reliability (see 1.3.1). The PIN will be in the following form derived as indicated:



Comments, suggestions or questions on this document should be addressed to Defense Supply Center Columbus, ATTN: VAT, Post Office Box 3990, Columbus, OH 43218-3990), or emailed to [relay@dla.mil](mailto:relay@dla.mil). Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at <http://assist.daps.dla.mil>

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1.3.1 Screening level. The screening level is identified by a single letter M or C. Use screening level M for high reliability military applications (see 4.5.2.2) and level C for general-purpose military applications (see 4.4, 4.4.7e, and 4.5.2.1).

### 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 for 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, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

#### DEPARTMENT OF DEFENSE SPECIFICATIONS

- MIL-PRF-55342 - Resistors, Fixed, Film, Chip, Nonestablished Reliability, Established Reliability, Space Level, General Specification for.
- MIL-PRF-55681 - Capacitor, Chip, Multiple Layer, Fixed, Ceramic Dielectric, Established Reliability and Non-Established Reliability, General Specification for.
- MIL-PRF-83531/1B - Delay Lines, 10-Tap, Dual-In-Line, 14-Pin.
- MIL-PRF-83531/4 - Delay Lines, 10-Tap, Dual-In-Line, 14-Pin, Surface Mount Device.

#### DEPARTMENT OF DEFENSE STANDARDS

- MIL-STD-202 - Test Method Standard, Electronic and Electrical Component Parts.
- MIL-STD-790 - Established Reliability and High Reliability Qualified Products List (QPL) Systems for Electrical, Electronic, and Fiber Optic Parts Specification.
- MIL-STD-810 - Environmental Test Methods and Engineering Guidelines.
- MIL-STD-1285 - Marking of Electrical and Electronic Parts.

(Copies of these documents are available online at <http://assist.daps.dla.mil/quicksearch/> or <http://assist.daps.dla.mil/> or 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 these documents are those cited in the solicitation or contract.

#### ELECTRONIC INDUSTRIES ASSOCIATION (EIA) STANDARD

- EIA Standard -557-A - Statistical Process Control Systems.

(Copies of this document are available online at [www.eia.org](http://www.eia.org) or from ECA/EIA Standards and Technology, 2500 Wilson Boulevard, Arlington, VA 22201-3834.)

2.4 Order of precedence. In the event of a conflict between the text of this document and the references cited herein (except for associated specifications, specification sheets, or MS standards), 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

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

3.2 Qualification. Delay lines furnished under this specification shall be products which are authorized by the qualifying activity for listing on the applicable qualified products list at the time of award of contract (see 4.4 and 6.4).

3.3 Qualified Products List (QPL) system. The manufacturer shall establish and maintain a QPL system for parts covered by this specification. Requirements for this system are specified in [MIL-STD-790](#). Delay lines shall be subjected to and pass all applicable requirements, tests, and inspections specified herein, including qualification and quality conformance inspection requirements.

3.3.1 Statistical Process Control (SPC). As part of the overall [MIL-STD-790](#) QPL system, the manufacturer shall establish an SPC system that meets the requirements of [EIA-557](#).

3.3.2 Electrostatic discharge (ESD) control program. As part of the overall [MIL-STD-790](#) QPL system, the manufacturer shall establish and maintain an ESD control system. As a minimum, this program shall address the identification of ESD sensitive (ESDS) sub-components and end items, facilities, training design protection, handling procedures, marking, cleaning, packaging, and verification.

3.4 Materials. The materials shall be as specified herein; however, when a definite material is not specified, a material shall be used which will enable the delay lines to meet the performance requirements of this specification.

3.4.1 Flammable materials. Materials used in the construction of delay lines shall be nonflammable and non-explosive.

3.4.2 Corrosive materials. Corrosive materials used in any of the manufacturing processes shall be removed or neutralized so that no corrosion will result from such use. Materials used in the construction of delay lines shall be non-corrosive.

3.4.3 Solder and soldering flux. Solder and soldering flux shall be of such quality as to enable the delay lines to meet all the requirements of this specification.

3.4.4 Case material. Unless otherwise specified (see 3.1), cases may be of metallic or nonmetallic material. All metallic surfaces shall be protected against corrosion and shall be free from blisters and other defects which may affect the protective properties of this finish.

3.4.5 Terminals. The terminals shall facilitate soldering and meet the performance specifications provided within this specification (see 3.1). The use of tin plating is prohibited. Use of tin-lead finishes

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are acceptable provided that the minimum lead content is 3 percent. For additional information and guidance on terminals, see [6.5](#).

3.4.5.1 Solder dip/retraining leads. Only the manufacturer (or his authorized category B or C distributor) may solder dip/retrain the leads of products supplied to this specification, provided the solder dip process (see [appendix A, 3.2.3](#)) has been approved by the qualifying activity.

TABLE I. Qualification inspection.

Inspection	Requirement paragraph	Test method paragraph	Number of sample units	Number of allowable failures
<u>Q-I</u> Dimensions Thermal shock (50 cycles) Seal Electrical characteristics Visual inspections <u>1/</u>	3.5.1 3.6 3.7 3.8 3.5.2	4.6.2 4.6.4 4.6.5 4.6.6 4.6.3	22	2
<u>Q-II</u> Moisture resistance Salt spray (corrosion) (metal cases only) Vibration Shock Electrical characteristics Visual inspection <u>1/</u>	3.11 3.12 3.13 3.14 3.8 3.5.2	4.6.9 4.6.10 4.6.11 4.6.12 4.6.6 4.6.3	6	0
<u>Q-III</u> Life Terminal strength Fungus <u>2/</u> Electrical characteristics Dielectric withstanding voltage at reduced barometric pressure Visual inspection <u>1/</u>	3.15 3.16 3.17 3.8 3.18 3.5.2	4.6.13 4.6.14 4.6.15 4.6.6 4.6.16 4.6.3	6	0
<u>Q-IV</u> Resistance to soldering heat Flammability	3.19 3.20	4.6.17 4.6.18	4	0
<u>Q-V</u> Resistance to solvents Solderability	3.9 3.10	4.6.7 4.6.8	4	0

1/ The "JAN" or "J" marking and PIN are not required on qualification samples.

2/ The fungus test shall not be performed if the manufacturer provides certification that all external materials are non-nutrient to fungus growth or suitably treated to retard fungus growth.

3.4.5.2 Meniscus. Terminals shall be free of case meniscus or other foreign material and shall be solderable for a minimum of .010 inch (0.25 mm) above the seating plane of the delay line.

3.4.6 Passive circuit elements. Capacitors shall be qualified or screened to [MIL-PRF-55681](#). Resistors shall be qualified or screened to [MIL-PRF-55342](#). The inductor shall be so designed as to allow the delay line to meet the requirements specified herein.

3.4.7 Magnet wire. Magnet wire, when used shall be selected to enable the part to meet the requirements of this specification. Additional information and guidance on magnet wire is provided in [6.6](#).

3.4.8 Pure tin. Use of pure tin, plating or otherwise, is prohibited internally and externally (see [6.9](#)). Use of tin-lead finishes are acceptable provided that the minimum lead content is 3 percent. Acceptance or approval of any constituent material shall not be construed as a guaranty of the acceptance of the finished product (see [4.6.1](#)).

3.5 Interface and physical dimensions. Delay lines shall meet the interface and physical dimensions specified (see [3.1](#)), and shall meet all performance requirements and product characteristics specified herein.

3.5.1 Dimensions. When delay lines are inspected in accordance with [4.6.2](#), the dimensions shall be within the tolerances specified on the applicable specification sheet (see [3.1](#)).

3.5.2 Visual inspection. When delay lines are inspected in accordance with [4.6.3](#), they shall not exhibit flaking, pitting, blistering, peeling, cracks, bursting, bulging, or other defects. The delay lines shall also meet the requirements of [3.1](#), [3.22](#), and [3.23](#).

3.6 Thermal shock. When delay lines are tested as specified in [4.6.4](#), not more than 10 percent of the surface shall have peeling, flaking, chipping, cracking, or other impairment of the protective finish; no evidence of other physical damage such as cracks, bursting, or bulging of the case; or other defects that would affect the mechanical or electrical operation, and there shall be no electrical discontinuity.

3.7 Seal. When delay lines are tested as specified in [4.6.5](#) there shall be no evidence of continuous air bubble flow or compound leakage.

3.8 Electrical characteristics. Delay lines shall be capable of meeting all the electrical requirements specified (see [3.1](#) and [3.8.1](#) through [3.8.8](#)).

3.8.1 Delay time. When tested in accordance with [4.6.6.1.1](#), the overall specified delay time of the line shall be as specified. The input-to-tap and tap-to-sequential tap shall be as specified (see [3.1](#)).

3.8.2 Rise time. When measured in accordance with [4.6.6.1.2](#), the rise time of pulses taken at the point of maximum delay shall not exceed the value specified (see [3.1](#)). The rise time measured at the taps shall not exceed the rise time required at the point of maximum delay.

3.8.3 Voltage attenuation. When measured in accordance with [4.6.6.1.3](#), the voltage attenuation of pulses taken at the point of maximum delay with respect to the input pulse amplitude shall not exceed the value specified (see [3.1](#)). The voltage attenuation measured at the taps shall not exceed the voltage attenuation required at the point of maximum delay.

3.8.4 Distortion. Unless otherwise specified (see [3.1](#)), when measured in accordance with [4.6.6.1.4](#), the all encompassing distortion of pulses appearing at the point of maximum delay shall not exceed  $\pm 15$  percent.

3.8.5 Delay time variation with temperature. When tested in accordance with 4.6.6.1.5, the delay time variation with temperature shall not exceed the value specified (see 3.1).

3.8.6 DC resistance. When delay lines are tested as specified in 4.6.6.1.6, the dc resistance shall be as specified (see 3.1).

3.8.7 Nominal characteristic impedance. When tested in accordance with 4.6.6.1.7, nominal characteristic impedance shall be as specified on individual specification sheets (see 3.1).

3.8.8 Insulation resistance. Unless otherwise specified (see 3.1), when delay lines are tested in accordance with 4.6.6.1.8, the minimum insulation resistance shall be 1,000 megohms (MΩ).

3.9 Resistance to solvents. When delay lines are tested as specified in 4.6.7, there shall be no evidence of mechanical damage, and the markings shall remain legible. The paint or exterior finish shall not soften, peel, or show other signs of deterioration.

3.10 Solderability. When delay lines are tested as specified in 4.6.8, they shall meet the applicable criteria for terminal evaluation in the test method.

3.11 Moisture resistance. When tested in accordance with 4.6.9, there shall be no evidence of other physical damage that would affect the mechanical or electrical operation of the delay line. There shall be no evidence of electrical discontinuity.

3.12 Salt spray (corrosion) (metal cases only) (when specified, see 3.1). When delay lines are tested as specified in 4.6.10, there shall be no evidence of corrosion as exhibited by any visible degradation of the surfaces that can be attributed to flaking, pitting, blistering, or otherwise loosened protective coating or metal surface.

3.13 Vibration. When delay lines are tested as specified in 4.6.11, there shall be no leakage of filling material and no evidence of other physical damage such as cracks, bursting, or bulging of the case. There shall be no evidence of mechanical damage and there shall be no electrical discontinuity during the test.

3.14 Shock. When delay lines are tested as specified in 4.6.12, there shall be no leakage of filling material and no evidence of other physical damage such as cracks, bursting, or bulging of the case. There shall be no evidence of mechanical damage and there shall be no electrical discontinuity during the test.

3.15 Life. When delay lines are tested as specified in 4.6.13, there shall be no evidence of impairment to the protective finish or of other physical damage such as cracks, bursting, or bulging of the case, and there shall be no evidence of electrical discontinuity.

3.16 Terminal strength. When delay lines are tested as specified in 4.6.14, there shall be no evidence of loosening, rupturing, or other mechanical damage. Bends shall not be considered as damage unless surface cracking is evident. Except for flexible leads, there shall be no rotation of the terminals. Rotation of the external portion of the metallic portion of a "hook" type terminal exceeding 10 degrees shall constitute a failure.

3.17 Fungus. The manufacturer shall certify that all external materials are nonnutrient to fungus growth or are suitably treated to retard fungus growth, or shall perform the test specified in 4.6.15. When delay lines are tested as specified in 4.6.15, there shall be no evidence of fungus growth on the external surface.

3.18 Dielectric withstanding voltage at reduced barometric pressure. When delay lines are tested as specified in 4.6.16, there shall be no arcing, flashover, breakdown of insulation, or other evidence of damage.

3.19 Resistance to soldering heat. When delay lines are tested as specified in 4.6.17, there shall be no softening of the insulation or loosening of the windings or terminals, no evidence of internal solder reflow or heat damage, and no evidence of discontinuity.

3.20 Flammability. When delay lines are tested as specified in 4.6.18, there shall be no evidence of violent burning which results in an explosive-type fire, and the coating material used shall be self-extinguishing. Delay lines shall not be considered to have failed if they are consumed by the applied flame. Delay lines shall be considered to have failed only if an explosion or dripping of flaming material occurs, an explosive-type flame is produced, or if visible burning continues beyond the allowable duration of 3 minutes after removal of the applied flame.

3.21 Winding continuity. When delay lines are tested as specified in 4.6.19, all windings shall be electrically continuous.

### 3.22 Marking.

3.22.1 JAN and J marking. The United States Government has adopted, and is exercising legitimate control over the certification marks "JAN" and "J", respectively, to indicate that items so marked or identified are manufactured to, and meet all the requirements of specifications. Accordingly, items acquired to and meeting all the criteria specified herein and in applicable specifications, shall bear the certification mark "JAN" except that items too small to bear the certification mark "JAN" shall bear the letter "J". The "JAN" or "J" shall be placed immediately before the part number except that if such location would place a hardship on the manufacturer in connection with such marking, the "JAN" or "J" may be located on the first line above or below the part number. Items furnished under contracts or orders which either permit or require deviation from the conditions or requirements specified herein and in applicable specifications shall not bear "JAN" or "J". In the event an item fails to meet the requirements of this specification and the applicable specification sheets or associated specifications, the manufacturer shall remove completely the military part number and the "JAN" or the "J" from the sample tested and also from all items represented by the sample. The "JAN" or "J" certification mark shall not be used on products acquired to contractor drawings or specifications. The United States Government has obtained Certificate of Registration No. 504,860 for the certification mark "JAN" and Registration Number 1,586,261 for the certification mark "J".

3.22.2 Full marking. Each delay line shall be marked on the top in accordance with method I of MIL-STD-1285 with the following information:

- a. "JAN" or "J" marking (see 3.22.1).
- b. Military PIN (see 1.2.1).

- c. Index mark identification (next to pin 1, input) (see 3.1).
- d. Manufacturer's CAGE code or logo.
- e. Date code.

3.23 PIN level substitution (see 1.2.1). Delay lines that have been subjected to the 100 percent screen tests ("M" PIN level) are substitutable, with acquiring agency approval, for delay lines that have not been subjected to the 100 percent screening tests ("C" PIN level). All other performance characteristics (delay time, rise time, voltage attenuation, distortion, delay time variation with temperature, dc resistance, nominal characteristic impedance, and insulation resistance) must be the same. Unless specified in the contract or purchase order (see 6.2), delay lines shall not be remarked.

3.24 Recycled, recovered, or environmentally preferable materials. Recycled, recovered or environmentally preferable materials should be used to the maximum extent possible provided that the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle costs.

3.25 Workmanship. Delay lines shall be processed in such a manner as to be uniform in quality and shall be free from defects that would affect life and serviceability. Parts shall be free of flash pits, voids, and excessive mold marks. A visible parting line is acceptable.

#### 4. VERIFICATION

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

- a. Qualification inspection (see 4.4).
- b. Conformance inspection (see 4.5).

4.2 QPL system. The manufacturer shall establish and maintain a QPL system as described in 3.3. Evidence of such compliance shall be verified.

4.3 Inspection conditions. Unless otherwise specified herein, all inspections shall be performed in accordance with the test conditions specified in the "GENERAL REQUIREMENTS" of MIL-STD-202.

#### 4.4 Qualification inspection.

4.4.1 Acceptable laboratory. Qualification inspection shall be performed at a laboratory acceptable to the Government (see 6.4) on sample passive delay lines produced with equipment and procedures normally used in production.

4.4.2 Screening: Qualification of the "C" screening level PIN is predicated upon qualification of the "M" screening level PIN. Upon request of the manufacturer, qualification to the "C" screening level PIN's will be granted for the envelope of products successfully qualified to the "M" screening level PIN's. The products involved must be of the same design, manufactured using the same facilities, processes, and materials as the product originally submitted for and qualified under the "M" screening level.

4.4.3 Sample. The number of units comprising a sample of delay lines to be submitted for qualification inspection shall be as specified in [table I](#).

4.4.4 Test routine. Qualification samples shall be subjected to the tests of [table I](#), in the order shown. All sample units shall be subjected to the tests of Q-I. The sample delay lines shall then be divided into three groups (see [table I](#)). The tests within each group shall be performed in the order shown.

4.4.5 Failures. Failures in excess of those allowed in [table I](#) shall be cause for refusal to grant qualification.

4.4.6 Extent of qualification. Extent of qualification shall be applicable only for delay lines on the same specification sheet. As a requisite for extension of qualification, the product involved must be manufactured using the same facilities, processes, and materials as the product originally submitted for qualification. Qualification of the lowest total delay time and highest total delay time for a given specification sheet will extend qualification for all intermediate total delay values. Lowest delay time shall have lowest impedance; highest delay time shall have highest impedance.

4.4.7 Retention of qualification. To retain qualification, every 24 months, the contractor shall provide verification of the following requirements:

- a. [MIL-STD-790](#) program.
- b. Design of the passive delay line has not been modified.
- c. Screening tests, qualification inspections, and conformance inspections have been performed as specified herein.
- d. The contractor retains the capability to manufacture and test passive delay lines to this specification.
- e. Continued qualification to screening level C shall be based on continued maintenance of qualification for screening level M.

In the event that no production occurred during this period, the contractor shall still verify to the qualifying activity the capability to manufacture and test the QPL passive delay line still exists and the contractor wants to remain on the QPL.

#### 4.5 Conformance inspection and in-process inspection.

4.5.1 Inspection of product for delivery. For the "M" level PIN, inspection of product for delivery shall consist of group A inspections (see [4.5.2.2](#)). For the "C" part level number, inspection of product for delivery shall consist of the manufacturer's inspection system (see [4.5.2.1](#)).

##### 4.5.1.1 Production and inspection lots.

4.5.1.1.1 Production lot. A production lot shall consist of all delay lines of a single PIN produced under essentially the same conditions, and offered for inspection at one time.

4.5.1.1.2 Inspection lot. An inspection lot shall consist of all delay lines of the same specification sheet manufactured under the same processes and conditions during a manufacturing period of 1 month

maximum.

4.5.2 Group A inspection

4.5.2.1 “C” screening level PIN. The manufacturer shall establish and maintain an inspection system to verify that delay lines meet the electrical, visual, mechanical, and solderability requirements. In-line or process controls may be part of such a system. The inspection system shall include criteria for lot rejection and corrective action. The inspection system shall be verified under the overall QPL system (see 3.3). NOTE: Since the “C” level delay line is the same design as the “M” level without the mandatory conformance inspection system, this product is still expected to meet the environmental qualification type requirements (moisture resistance, shock, or vibration) (see 4.5.3.4).

4.5.2.2 “M” screening level PIN. Group A inspection shall consist of the inspections specified in table II, in the order shown.

TABLE II. Group A inspection.

Inspection	Requirement paragraph	Test method paragraph
<u>A-I</u>		
Thermal shock (15 cycles)	3.6	4.6.4
Seal <u>1/</u>	3.7	4.6.5
Delay time(all taps and output)	3.8.1	4.6.6.1.1
Rise time (output only)	3.8.2	4.6.6.1.2
Insulation resistance	3.8.8	4.6.6.1.8
<u>A-II</u>		
Dimensions	3.5.1	4.6.2
Visual inspection	3.5.2	4.6.3
DC resistance	3.8.6	4.6.6.1.6
Voltage attenuation (output only)	3.8.3	4.6.6.1.3
Distortion (output only)	3.8.4	4.6.6.1.4
Nominal characteristic impedance (at input)	3.8.7	4.6.6.1.7
Delay time variation with temperature (output only)	3.8.5	4.6.6.1.5
<u>A-III</u>		
Solderability <u>2/</u>	3.10	4.6.8

1/ This seal test can be eliminated for plastic injection molded cases if the manufacturer has demonstrated process control under the SPC program (see 3.3.1), or other method that has been approved by the qualifying activity. If the design, material, technology, or processing of the part is changed or, if there are any quality problems, or failures, the qualifying activity may require resumption of the specified testing. Deletion of testing does not relieve the manufacturer from meeting the test requirement in case of dispute.

2/ This solderability test can be eliminated if the manufacturer has demonstrated process control under the SPC program (see 3.3.1), or other method that has been approved by the qualifying activity. If the design, material, technology, or processing of the part is changed

or, if there are any quality problems, or failures, the qualifying activity may require resumption of the specified testing. Deletion of testing does not relieve the manufacturer from meeting the test requirement in case of dispute.

#### 4.5.2.3 Sampling plan.

4.5.2.3.1 A-I. One hundred percent inspection shall be performed on a production lot basis as specified in table II. Lots having more than five percent total rejects shall not be furnished on the contract. Delay lines out of specification limits shall not be shipped with the lot. Lots that exceed the group A, A-I screening PDA requirement may be supplied as class C level parts, provided all defects have been removed as part of a corrective action, and the part meets all C level part requirements. If the manufacturer can demonstrate this test has been performed for five consecutive times with zero failures, the frequency of this test, with the approval of the qualifying activity, can be performed on an annual basis. If the design, material, technology or processing of the part is changed, or if there are any quality problems or failures, the qualifying activity may require resumption of the original test frequency.

4.5.2.3.1.1 Manufacturer's production inspection. If the manufacturer performs tests similar to those specified in A-I of [table II](#) as the final step of the production process, group A, A-I inspection may be waived and results from the manufacturer's production tests may be used instead. Authority to waive the A-I inspection shall only be granted by the qualifying activity. The following criteria must be complied with:

- a. Tests conducted by the manufacturer during production shall be clearly identical to or more stringent than those specified for A-I. Test conditions shall be equal to or more stringent than those specified for A-I tests.
- b. Manufacturer subjects 100 percent of the product supplied under this specification to the production tests.
- c. The parameters measured and the failure criteria shall be the same or more stringent than those specified herein.
- d. The lot rejection criteria are the same or more stringent than those specified herein.
- e. Once approved, the manufacturer shall not change the test procedure or criteria without prior notification to and concurrence from the qualifying activity.

4.5.2.3.2 A-II. A sample of parts shall be randomly selected from each production lot in accordance with [table III](#). If one or more defects are found, the lot shall be rescreened and the defective parts removed. After screening and removal of defective parts, a new sample of parts shall be randomly selected in accordance with [table III](#). If one or more defects are found in the second sample, the lot shall be rejected and shall not be supplied to this specification.

TABLE III. Sampling plan for A-II of group A inspection. [1/](#)

Lot size	Sample size
1 to 13	All
14 to 150	13
151 to 280	20
281 to 500	29
501 to 1,200	34
1,201 to 3,200	42
3,201 to 10,000	50
10,001 to 35,000	60
35,001 to 150,000	74
150,001 to 500,000	90
500,001 and over	102

[1/](#) No defects are allowed.

4.5.2.3.2.1 Rejected lots (A-II). Rejected inspection lots may be resubmitted for Federal Government acceptance only if the manufacturer performs 100-percent inspection on delay lines of the lot for those characteristics which were defective and resulted in rejection of the lot, removes all defective units and resubmits the lot for quality conformance inspection. Resubmitted lots shall be kept separate from new lots, and shall be clearly identified as resubmitted lots.

4.5.2.3.3 A-III. Five samples shall be randomly selected from each inspection lot and subjected to the solderability test. The manufacturer may use electrical rejects or empty body delay lines from the A-I screening tests, or dummy units subject to the same processes and in the same lot as the items in the inspection lot, for all or part of the samples to be used for solderability testing. Dummy units, if used shall be clearly marked as such. If there are one or more defects, the lot shall have failed.

4.5.2.3.3.1 Failed lots. Failed lots may be reworked using the following procedure: The manufacturer submits the failed lot to a 100 percent solder dip using the process described in [3.4.5.1](#). Following the solder dip, the seal test and electrical measurements required in group A, A-I, shall be repeated on 100 percent of the lot. The PDA for the electrical measurements shall be as for the A-I tests. Five additional samples shall then be selected and subjected to the solderability test with zero defects allowed. If the lot fails this solderability test, the lot shall be rejected and shall not be furnished to this specification.

4.5.2.3.3.2 Solderability test samples. The solderability test is considered to be destructive due to the steam aging process involved in the test. Samples submitted to this test shall not be supplied on the contract.

4.5.2.4 Disposition of sample units. Sample units which have passed all the group A inspections shall be delivered on the contract or purchase order if the lot is accepted. (Exception: Parts which have undergone solderability testing shall not be delivered; see [4.5.2.3.3.2](#)).

4.5.2.5 Retention of qualification inspection(M level only). Every 36 months, the requalification inspection shall be performed at a laboratory acceptable to the government (see [6.4](#)) on sample units produced with equipment and procedures used in production. Requalification inspection shall consist of the inspections specified in [table IV](#), in the order shown.

TABLE IV. Requalification inspection

Inspection	Requirement paragraph	Test method Paragraph	Number of sample units		Number of allowable failures	
			Single submission	Combined submission	Single submission	Combined submission
<u>R-I</u> Dimensions Thermal shock (50 cycles) Seal Electrical characteristics Visual inspection	3.5.1 3.6 3.7 3.8 3.5.2	4.6.2 4.6.4 4.6.5 4.6.6 4.6.3	14	7	2	1
<u>R-II</u> Resistance to solvents <u>1/</u> Solderability Moisture resistance Salt spray (corrosion) (metal cases only) Vibration Shock Electrical characteristics Visual inspection	3.9 3.10 3.11 3.12 3.13 3.14 3.8 3.5.2	4.6.7 4.6.8 4.6.9 4.6.10 4.6.11 4.6.12 4.6.6 4.6.3	4	2	0	0
<u>R-III</u> Life Terminal strength Fungus <u>2/</u> Electrical characteristics Dielectric withstanding voltage at reduced barometric pressure Visual inspection	3.15 3.16 3.17 3.8 3.18 3.5.2	4.6.13 4.6.14 4.6.15 4.6.6 4.6.16 4.6.3	4	2	0	0
<u>R-IV</u> Resistance to solder heating Flammability	3.19 3.20	4.6.17 4.6.18	4	2	0	0

1/ Units from group IV may be used to fulfill the minimum sample size required for the resistance to solvents test only when using the combined-type submission.

2/ The fungus test need not be performed if the manufacturer provides certification that all external materials are nonnutrient to fungus growth or suitably treated to retard fungus growth.

4.5.3 Sample. The number of sample units shall be as specified in [4.5.3.1](#) and [4.5.3.2](#).

4.5.3.1 Single-type submission. A sample consisting of 14 units of the specification delay line for which requalification is sought.

4.5.3.2 Combined-type submission. To requalify all parts on an individual specification sheet, test samples shall be selected as follows:

- a. Seven sample units of the lowest nominal characteristic impedance, total delay time, and maximum attenuation by impedance for which requalification is sought, shall be tested.
- b. Seven sample units of the highest nominal characteristic impedance, with the associated highest total delay time and maximum attenuation by impedance for which requalification is sought, shall be tested.

4.5.3.3 Failures. Failures in excess of those allowed in table IV shall be cause for the entire sample lot to fail.

4.5.3.4 Disposition of sample units. Sample units which have been subjected to requalification inspection shall not be delivered on the contract or purchase order.

4.5.3.5 Noncompliance. If a sample fails to pass requalification inspection, the manufacturer shall notify the qualifying activity and the cognizant inspection activity of the cause of such failure and take corrective action on the materials and/or processes and on all units of product which can be corrected and which were manufactured under essentially the same conditions, with essentially the same materials, processes, etc., and which were subject to the same failure. Acceptance and shipment of the product shall be discontinued until corrective action acceptable to the qualifying activity has been taken. After the corrective action has been taken, the requalification inspection shall be repeated on additional sample units (all inspections, or the inspection which the original sample failed, at the option of the qualifying activity). Group A inspection may be reinstated; however, final acceptance and shipment shall be withheld until the requalification inspection has shown that the corrective action was successful. In the event of failure after reinspection, the cause of such failure shall be immediately furnished to the cognizant inspection activity and the qualifying activity.

#### 4.6 Methods of inspection.

4.6.1 Materials. The manufacturers shall certify in writing that the materials used meet all the requirements of [3.4](#).

4.6.2 Dimensions. All dimensions shall be measured to determine conformance with [3.5.1](#).

4.6.3 Visual inspection. Delay lines shall be visually inspected with normal or corrected 20/20 vision to meet the requirements of [3.5.2](#).

4.6.4 Thermal shock (see 3.6). Unless otherwise specified (see 3.1), delay lines shall be tested in accordance with method 107 of MIL-STD-202, measurements before and after: Winding continuity in accordance with 3.21 and 4.6.19.

- a. Test condition B for group A. (Exception: Low temperature shall be  $-55^{\circ}\text{C}$  ( $+0/-3^{\circ}\text{C}$ ) and 15 cycles shall be used.)
- b. Test condition B-2 (50 cycles) for qualification, except low temperature shall be  $-55^{\circ}\text{C}$  ( $+0/-3^{\circ}\text{C}$ ).

4.6.5 Seal (see 3.7). Delay lines shall be immersed in a bath of water (or any other liquid of no greater density and surface tension), and maintained at a temperature of at least  $85^{\circ}\text{C}$  for 2 to 3 minutes. The temperature of the delay line shall not exceed  $40^{\circ}\text{C}$  at the time of immersion. Delay lines shall be arranged in a single layer to allow visible access to all tested units.

4.6.6 Electrical characteristics (see 3.8).

4.6.6.1 Pulse methods. The delay time, rise time, attenuation, distortion, and thermal stability tests shall be conducted by applying an input pulse with a rise time of 1 ns to 5 ns to the delay line. The terminating impedance of the delay line shall be resistive and within  $\pm 1$  percent of the value specified. Unless otherwise specified (see 3.1), the source impedance shall be within  $\pm 5$  percent of the value of the terminating impedance.

4.6.6.1.1 Delay time. The time delay of pulses taken at each tap and the output of delay lines shall be measured to determine conformance with 3.8.1. In the case of sectionalized lines, the time delay of any combination of tandem sections shall be measured.

4.6.6.1.2 Rise time. The rise time of pulses taken at the output terminals (for sectionalized lines with all sections in tandem), shall be measured to determine conformance with 3.8.2.

4.6.6.1.3 Voltage attenuation. The amplitude of pulses taken at the input and output terminals (for sectionalized lines with all sections in tandem), shall be measured and the attenuation computed (see 3.8.3).

4.6.6.1.4 Distortion. The distortion of pulses taken at the output terminals (for sectionalized lines with all sections in tandem), when the delay line is fed with the specified input pulses shall be measured to determine conformance with 3.8.4.

4.6.6.1.5 Delay time variation with temperature. The delay line shall be enclosed in a thermal chamber in which the temperature shall be variable over the applicable temperature range (see 3.8.5). The delay line shall be allowed to reach thermal stability at a sufficient number of temperatures covering the applicable temperature range (see 3.8.5) and at each stabilized temperature the delay time shall be measured and the delay time variation from the reference temperature delay time shall be recorded (see 3.8.5).

$$\frac{ppm}{\circ C} = \frac{(total\ delay\ at\ 125^{\circ}C) - (total\ delay\ at\ 25^{\circ}C)}{(total\ delay\ at\ 25^{\circ}C)(125^{\circ}C - 25^{\circ}C)} 10^6$$

$$\frac{ppm}{\circ C} = \frac{(total\ delay\ at\ -55^{\circ}C) - (total\ delay\ at\ 25^{\circ}C)}{(total\ delay\ at\ 25^{\circ}C)(125^{\circ}C - (-55^{\circ}C))} 10^6$$

4.6.6.1.5.1 Alternate measuring method. The following alternate method for measuring delay time variation using pulse width may be used:

$$\Delta Td = \frac{\Delta PW\ at\ extreme\ temperature}{2}$$

To convert Td to PPM/°C: Td (ns) at extreme temperature X 10<sup>6</sup> = PPM/°C.

4.6.6.1.6 DC resistance (see 3.8.6). Direct current (dc) resistance shall be measured in accordance with method 303 of MIL-STD-202.

4.6.6.1.7 Nominal characteristic impedance (at input) (see 3.8.7). Nominal characteristic impedance shall be measured and shall conform to the values listed in applicable specification sheets (see 3.1).

4.6.6.1.8 Insulation resistance (see 3.8.8). The delay lines shall be subjected to the insulation resistance test outlined in method 302 of MIL-STD-202. The following details shall apply:

- a. Test condition: A.
- b. Measurements shall be taken between input and ground. Metal cases shall also be tested between terminals and case.

4.6.7 Resistance to solvents (see 3.9). Delay lines shall be tested in accordance with method 215 of MIL-STD-202.

4.6.8 Solderability (see 3.10). Delay lines shall be tested in accordance with method 208 of MIL-STD-202. The following details shall apply:

- a. Special preparation of specimen: Sample units shall not have been soldered during any of the previous tests. Solder dipping in accordance with 3.4.5.1 is permitted.
- b. All terminals of each part shall be tested.

4.6.9 Moisture resistance (see 3.11). Unless otherwise specified (see 3.1), delay lines shall be tested in accordance with method 106 of MIL-STD-202, except step 7b, which is not applicable. Load voltages not applicable. Measurement before and after: Winding continuity in accordance with 3.21 and 4.6.19.

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4.6.10 Salt spray (corrosion) (metal cases only) (see 3.12). Delay lines shall be tested in accordance with method 101 of [MIL-STD-202](#), test condition A.

4.6.11 Vibration (see 3.13). Delay lines shall be tested in accordance with method 214 of [MIL-STD-202](#). The following details shall apply:

- a. Method of mounting: Delay lines shall be mounted by soldering to a printed-wiring board.
- b. One test point.
- c. Test conditions I, K, 15 minutes.
- d. Measurement before and after: Winding continuity in accordance with [3.21](#) and [4.6.19](#).

4.6.12 Shock (see 3.14). Unless otherwise specified (see [3.1](#)), delay lines shall be tested in accordance with method 213 of [MIL-STD-202](#), test condition I.

4.6.13 Life (see 3.15). Delay lines shall be tested in accordance with method 108 of [MIL-STD-202](#). The following details shall apply:

- a. Distance of temperature measurements from specimens: Three inches in still air.
- b. Test temperature and tolerance:  $125^{\circ}\text{C} \pm 3^{\circ}\text{C}$  ( $257^{\circ}\text{F} \pm 5^{\circ}\text{F}$ ).
- c. Operating conditions: Three volts, square wave, 50 percent duty cycle, output loaded with terminating impedance, taps not loaded, pulse width shall be three times the nominal total delay.
- d. Test condition: D.
- e. Measurements during test: Measure temperature daily. Measure total delay time at room temperature (within 2 hours of removal from elevated temperature) weekly. Add the time that the units are out of the  $125^{\circ}\text{C}$  environment to the total test time to ensure that test condition D is complied with.
- f. Measurements after test: Electrical characteristics. Measure after units have returned to room temperature, but within 8 hours of the end of the life test.

4.6.14 Terminal strength (see 3.16). Delay lines shall be tested in accordance with method 211 of [MIL-STD-202](#), test condition A, applied force  $5(+0.25/-0)$  pounds. One terminal on each test sample shall be subjected to the test.

4.6.15 Fungus (see 3.17). Unless certification is provided, delay lines shall be tested in accordance with method 508 of [MIL-STD-810](#).

4.6.16 Dielectric withstanding voltage at reduced barometric pressure (see 3.18). Delay lines designed for operation above 10,000 feet shall be tested in accordance with method 105 of MIL-STD-202. The following details shall apply:

- a. Duration of application of test voltage: Not less than 1 second, or more than 5 seconds. The duration of the test shall begin when 95 percent of the test potential is reached.
- b. Points of application of test voltage: Between mutually insulated terminals. For metal cases, also test between terminals and case.
- c. Limiting value of surge current: Shall not exceed 5 milliamperes (mA).
- d. Test condition: C.
- e. Magnitude of test voltage: 50 volts dc.
- f. Examination during and after test: Delay lines shall be examined for evidence of arcing, flashover, breakdown of insulation, and damage.

4.6.17 Resistance to soldering heat (see 3.19). Delay lines shall be tested in accordance with method 210 of MIL-STD-202. The following details shall apply:

- a. Special preparation of specimen: None.
- b. Mount board shall not be metal clad.
- c. Test condition: B or C, as applicable.
- d. Cooling time: Five minutes.
- e. Examinations after test: Electrical characteristics and x-ray in two perpendicular planes (the two largest surface areas). The X-ray shall be performed by any means that will provide a clear contrast between the material density of the unit components. Three to ten power magnification shall be used to inspect for foreign material in the terminal area and for voids around the terminals.

4.6.18 Flammability (see 3.20). Delay lines shall be tested in accordance with method 111 of MIL-STD-202. The following details shall apply:

- a. Point of flame application: The flame shall be applied to the body of each delay line.
- b. Allowable time for burning of visible flame on specimen: Three minutes maximum.
- c. Inspection during and after test: Delay lines shall be inspected for evidence of violent burning which results in an explosive-type fire, dripping or flaming material, and visible burning which continues beyond the allowable duration after removal of the applied flame.

4.6.19 Winding continuity (see 3.21). All windings of delay lines shall be tested for electrical continuity.

## 5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When packaging of materiel is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Service or Defense Agency, or within the military service's system commands. 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 that may be helpful, but is not mandatory.)

6.1 Intended use. Delay lines covered by this specification are designed to be used in electronic equipment where a pulse delay is required. Their principle areas of application are for aircraft, missiles, spacecraft, shipboard, and ground-support equipment. The delay lines covered by this specification must be able to operate satisfactorily in military systems under the following demanding conditions: operating temperature range of -55°C to +125°C, up to 100g of shock, and have reduced susceptibility to corrosion in salt water environments. These military requirements are verified under a qualification system.

6.2 Acquisition requirements. Acquisition documents should specify the following, as a minimum:

- a. Title, number, and date of the specification.
- b. Title, number, and date of the applicable specification sheet.
- c. Complete military PIN (see 1.2.1 and 3.1).
- d. Terminal finish code in accordance with MIL-STD-1276, revision B (see 3.4.5).
- e. Packaging (see 5.1).

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6.3 Non-military drawings. Drawings describing non-military delay lines submitted to DSCC for evaluation under the MPCAG program should include, as a minimum, the following information:

- a. Reference to [MIL-PRF-83531](#) (when applicable).
- b. Dimensions and tolerances.
- c. Case and terminal materials.
- d. Schematic (circuit diagram).
- e. Operating temperature range.
- f. Delay time (total).
- g. Delay time (per tap).
- h. Delay time variation with temperature.
- i. Rise time.
- j. Impedance (ohms).
- k. Attenuation.
- l. DC resistance.
- m. Distortion.
- n. Weight.
- o. Part marking (index mark minimum).
- p. Verification.
- q. Vendor PIN.
- r. Vendor CAGE number (formerly FSCM).

NOTE: Drawings covering off-the-shelf commercial parts should be classified as specification control drawings.

6.4 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. 83531 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 orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from (Defense Supply Center, Columbus, ATTN: DSCC-VQP, 3990 East Broad Street, Columbus, OH, 43213-1199).

6.4.1 Copies of "Provisions Governing Qualification". Copies of SD-6, "Provisions Governing Qualification", may be obtained from the Defense Automated Printing Service, Building 4D, (DPM-DODSSP), 700 Robbins Avenue, Philadelphia, PA 19111-5094.

6.5 Terminals. It is recommended terminals be type LR(0.52) G-\*\*-C\* in accordance with [MIL-STD-1276](#), except that maximum thickness shall be 450 microinches. Tin plating is prohibited (see [3.4.5](#)). (NOTE: Pure tin plating shall not be used as an undercoat.) Plating with pure tin may result in tin whisker growth. This could, in turn, cause shorts and intermittents, especially in low-power (5mA and below) applications. For additional information on this matter, see [ASTM B545](#).

6.6 Magnet wire (see [3.4.7](#)). It is recommended that MW-1000 be considered for magnet wire.

6.7 New specification sheets. A new specification sheet may be requested by supplying the following:

- a. A proposed specification sheet prepared in the same format as the existing specification sheets.
- b. An explanation of the difference(s) between the proposal and the most similar existing specification sheet.
- c. A list of military contracts or systems in which the proposed specification sheet part(s) have been or will be used.

This information should be forwarded to Defense Supply Center, Columbus, ATTN: DSCC-VAT, 3990 East Broad Street, Columbus, OH, 43213-1199.

6.8 Subject term (key word listing).

Microcircuit

Relay

6.9 Tin whisker growth. Use of tin plating is prohibited (see [3.4.8](#)). The use of alloys with tin content greater than 97 percent, by mass, may exhibit tin whisker growth problems after manufacture. Tin whiskers may occur anytime from a day to years after manufacture and can develop under typical operating conditions, on products that use such materials. Conformal coating applied over top of a whisker-prone surface will not prevent the formation of tin whiskers. Alloys of 3 percent lead, by mass, have shown to inhibit the growth of tin whiskers. For additional information on this matter, refer to [ASTM-B545](#) (Standard Specification for Electrodeposited Coatings of Tin).

6.10 Environmentally preferable material. Environmentally preferable materials should be used to the maximum extent possible to meet the requirements of this specification. As of the dating of this document, the U.S. Environmental Protection Agency (EPA) is focusing efforts on reducing 31 priority chemicals. The list of chemicals is available on their website at <http://www.epa.gov/epaoswer/hazwaste/minimize/chemlist.htm>. Further information is available at the following EPA site: <http://www.epa.gov/epaoswer/hazwaste/minimize/>. Included in the EPA list of 31 priority chemicals are cadmium, lead, and mercury. Use of the materials on the list should be minimized or eliminated unless needed to meet the requirements specified herein (see [Section 3](#)).

6.11 Changes from previous issue. The margins of this specification are marked with vertical lines to indicate where changes from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous issue.

APPENDIX A

A. SCOPE

A.1 Statement of scope. This appendix contains the details of the quality assurance program which serves as the basis for qualification. This appendix is a mandatory part of the specification. The information contained herein is intended for compliance only.

A.2 APPLICABLE DOCUMENTS.

DEPARTMENT OF DEFENSE STANDARDS

[MIL-STD-1276](#) - Leads for Electrical and Electronic Component Parts.

(Copies of these documents are available online at <http://assist.daps.dla.mil/quicksearch/> or <http://assist.daps.dla.mil/> or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

A.3 SUBMISSION

A.3.1 Sample.

A.3.1.1 Single-type submission. A sample consisting of 22 sample units of the specific delay line for which qualification is sought shall be submitted.

A.3.1.2 Combined-type submission. To obtain qualification for all parts on an individual specification sheet for which qualification is sought, samples for testing shall be selected on the following basis:

- a. Eleven sample units of the lowest nominal characteristic impedance, total delay time, and maximum attenuation by impedance for which qualification is sought shall be submitted.
- b. Eleven sample units of the highest nominal characteristic impedance, with the associated highest total delay time and maximum attenuation by impedance for which qualification is sought shall be submitted.

A.3.1.3 Information to be submitted to the qualifying activity. The following information, along with that required by 6.4, shall be submitted to the qualifying activity:

- a. A program outlining compliance with this appendix.
- b. A list of all PIN's for which qualification is desired.
- c. Drawings covering the design of these items, including the components and materials used.
- d. A sample of the in-process inspections performed for each device type for which qualification is requested.

APPENDIX A

- e. Test results demonstrating that at least 22 delay lines of the specification sheet for which qualification is requested have met the requirements of the applicable screening tests of the qualification inspection requirements of table I.
- f. A program describing compliance with the requirements specified in [MIL-STD-790](#).

A.3.1.4 Listing on the QPL. Listing on the QPL shall be granted after approval of the information submitted by the manufacturer (see [30.1.3](#)).

A.3.2. SOLDER DIP (RETINNING) LEADS

A.3.2.1 Solder dip (retinning) leads (not applicable to terminal L). The manufacturer (or his authorized category B or C distributor) may solder dip/retin the leads of product supplied to this specification provided the solder dip process ([30.2.2](#)) or an equivalent processes that has been approved by the qualifying activity.

A.3.2.2 Qualifying Activity Approval. Approval of the solder dip process will be based on one of the following options:

- a. When the original lead finish qualified was hot solder dip lead finish 52 of [MIL-STD-1276](#) (Note: The 200 microinch maximum thickness is not applicable), the manufacturer shall use the same solder dip process for retinning as is used in the original manufacture of the products.
- b. When the lead originally qualified was not hot solder dip lead finish 52 of [MIL-STD-1276](#) as prescribed in [30.2.2a](#), approval for the process to be used for solder dip shall be based on the following test procedure:
  - (1) Thirty samples of any PIN for each style and lead finish are subjected to the manufacturer's solder dip process. Following the solder dip process, the delay lines shall be subjected to the electrical tests of the group A inspection. No defects are allowed.
  - (2) Ten of the 30 samples shall then be subjected to the solderability test as specified in [4.6.8](#). No defects are allowed.

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A.3.2.3 Solder dip/retraining options. The manufacturer (or authorized category B or C distributor) may solder dip/retin as follows:

- a. After the solder/retraining process, the electrical measurements required in the group A inspection shall be performed on 100 percent of the lot. The maximum Percent Defective Allowable (PDA) for the electrical measurements shall be 10 percent (or one device, whichever is greater). Failed lots may be re-dipped or re-tinned, then subjected to the electrical measurements specified in group A. Failed lots may be reinspected one time only. The maximum PDA for reinspected lots shall be 7 percent. In all circumstances, group A inspection in accordance with [table II](#) shall be performed.
- b. As a corrective action, if the lot fails the group A solderability test, the procedure described in [30.2.3a](#) may be performed.

Custodians:

Army - CR  
Navy - EC  
Air Force – 85  
DLA – CC

Preparing activity:  
DLA - CC

(Project 5999-2008-002)

Review activities:

Air Force - 19, 99  
Navy - AS, CG, MC, SH

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at <http://assist.daps.dla.mil/>.