

METRIC

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# DEPARTMENT OF DEFENSE TEST METHOD STANDARD

DESTRUCTIVE PHYSICAL ANALYSIS  
FOR  
ELECTRONIC, ELECTROMAGNETIC,  
AND ELECTROMECHANICAL PARTS



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## MIL-STD-1580B

### FOREWORD

1. This standard is approved for use by all Departments and Agencies of the Department of Defense.
2. To ensure the required high quality of parts used in the designs of space and launch vehicles, stringent in-process controls are imposed and a comprehensive test program is conducted on the completed parts. A key ingredient of the test program is the assessment of part lot quality based on the destructive examination of samples randomly selected from each production lot. The destructive physical analysis (DPA) is used to inspect and verify the internal design, materials, construction, and workmanship of the part. It can also be used to monitor processes, for failure analysis, or to suggest corrective actions. The information derived from the DPA may be used:
  - a. To preclude installation of parts having patent or latent defects;
  - b. To aid in dispositioning parts that exhibit anomalies;
  - c. To aid in defining improvement changes in design, materials, or processes;
  - d. To evaluate supplier production trends.
3. Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Defense Supply Center, Columbus, ATTN: DSCC-VAT, P.O. Box 3990, Columbus, OH 43216-5000, by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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REQUIREMENT

10	Detailed requirements for capacitors.
11	Detailed requirements for connectors.
12	Detailed requirements for quartz crystals.
13	Detailed requirements for diodes.
14	Detailed requirements for feed-through filters.
15	Detailed requirements for magnetic devices (inductors, transformers, and coils).
16	Detailed requirements for microcircuits (monolithic, hybrid, optocoupler, and multichip module).
17	Detailed requirements for relays.
18	Detailed requirements for resistors.
19	Detailed requirements for switches.
20	Detailed requirements for thermistors.
21	Detailed requirements for transistors.
22	Detailed requirements for selected RF devices.
23	Detailed requirements for fuses.
24	Detailed requirements for heaters.

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### 1. SCOPE

1.1 Scope. This standard describes the general requirements for performance of destructive physical analysis (DPA) on samples of parts. In addition to the requirements for the analysis procedures, the general criteria for interpreting results, such as for the acceptance or rejection of associated production lots, is included for typical electronic, electromagnetic, and electromechanical parts.

1.2 Application of the standard. This standard; is intended to be referenced, in detailed part specifications; or in other documents where DPA requirements are imposed, to assure that the practices, procedures, and criteria contained herein are uniformly applied. The requirements are intended to provide the general framework and basis for detailed DPA procedures for specific part types.

### 2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3, 4, and 5 of this standard. This section does not include documents cited in other sections of this standard or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements documents cited in sections 3, 4, and 5 of this standard, 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 listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation (see 6.2).

### SPECIFICATIONS

#### DEPARTMENT OF DEFENSE

MIL-PRF-20	- Capacitor, Fixed, Ceramic Dielectric (Temperature Compensating), Established Reliability and Non-Established Reliability, General Specification for.
MIL-PRF-27	- Transformers and Inductors, (Audio, Power, and High-Power Pulse), General Specification for.
MIL-PRF-123	- Capacitors, Fixed, Ceramic Dielectric (Temperature Stable and General Purpose), High Reliability, General Specification for.
MIL-PRF-3098	- Crystals Units, Quartz, General Specification for.
MIL-PRF-6106	- Relays, Electromagnetic, General Specification for.
MIL-PRF-14409	- Capacitors, Variable (Piston Type, Tubular Trimmer), General Specification for.
MIL-PRF-15305	- Coils, Fixed or Variable, Radio Frequency, General Specification for.
MIL-PRF-15160	- Fuses, Instrument, Power, and Telephone, General Specification for.
MIL-PRF-15733	- Filters and Capacitors, Radio Frequency Interference, General Specification for.
MIL-PRF-19500	- Semiconductor Devices, General Specification for.
MIL-PRF-19978	- Capacitors, Fixed, Plastic (or Paper-Plastic), Dielectric, (Hermetically Sealed in Metal, Ceramic, or Glass Cases) Established and Non-Established Reliability, General Specification for.
MIL-PRF-21038	- Transformers, Pulse, Low Power, General Specification for.
MIL-PRF-23269	- Capacitor, Fixed, Glass Dielectric, Established Reliability, General Specification for.
MIL-PRF-23648	- Resistor, Thermal (Thermistor) Insulated, General Specification for.
MIL-PRF-24236	- Switches, Thermostatic, (Metallic and Bimetallic), General Specification for.
MIL-H-28719	- Header, Hermetically Sealed.
MIL-PRF-28861	- Filters and Capacitors, Radio Frequency/Electromagnetic Interference Suppression, General Specification for.
MIL-PRF-38534	- Hybrid Microcircuits, General Specification for.

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- MIL-PRF-38535 - Integrated Circuits, (Microcircuits), Manufacturing, General Specification for.
- MIL-DTL-38999 - Connectors, Electrical, Circular, Miniature, High Density, Quick Disconnect (Bayonet, Threaded, and Breech Coupling), Environment Resistant, Removable Crimp and Hermetic Solder Contacts, General Specification for.
- MIL-PRF-39001 - Capacitors, Fixed, Mica Dielectric, Established Reliability and Non-Established Reliability, General Specification for.
- MIL-PRF-39003 - Capacitors, Fixed, Electrolytic (Solid Electrolyte), Tantalum, Established Reliability, General Specification for.
- MIL-PRF-39005 - Resistors, Fixed, Wire-Wound (Accurate), Non-Established Reliability, Established Reliability, General Specification for.
- MIL-PRF-39006 - Capacitor, Fixed, Electrolytic (Nonsolid Electrolyte), Tantalum, Establish Reliability, General Specification for.
- MIL-PRF-39006/22 - Capacitors, Fixed, Electrolytic (Nonsolid Electrolyte), Tantalum, (Polarized, Sintered Slug), 85 Deg. C (Voltage Derated to 125 Deg. C), Establish Reliability, Style CLR79.
- MIL-PRF-39007 - Resistors, Fixed, Wire-Wound (Power Type), Non-Established Reliability, Established Reliability, and Space Level, General Specification for.
- MIL-PRF-39009 - Resistors, Fixed, Wire-Wound (Power Type, Chassis Mounted), Non-Established Reliability, and Established Reliability, General Specification for.
- MIL-PRF-39010 - Coils, Radio Frequency, Fixed, Molded, Established Reliability, and Non-Established Reliability, General Specification for.
- MIL-PRF-39012 - Connectors, Coaxial, Radio Frequency, General Specification for.
- MIL-PRF-39014 - Capacitor, Fixed, Ceramic Dielectric (General Purpose), Established Reliability, and Non-Established Reliability, General Specification for.
- MIL-PRF-39015 - Resistors, Variable, Wire-Wound, (Lead Screw Actuated), Non-Established Reliability, and Established Reliability General Specification for.
- MIL-PRF-39016 - Relays, Electromagnetic, Established Reliability, General Specification for.
- MIL-PRF-39017 - Resistors, Fixed, Film (Insulated), Non-Established Reliability, and Established Reliability, General Specification for.
- MIL-PRF-39035 - Resistor, Variable, Nonwire-Wound, (Adjustment Type), Non-Established Reliability, and Established Reliability, General Specification for.
- MIL-PRF-49470 - Capacitor, Fixed, Ceramic Dielectric, Switch Mode Power Supply, Standard Reliability and High Reliability.
- MIL-PRF-55182 - Resistors, Fixed, Film, Non-Established Reliability, Established Reliability, and Space Level, General Specification for.
- MIL-C-55302 - Connectors, Printed Circuit Subassembly and Accessories.
- MIL-PRF-55342 - Resistors, Fixed, Film, Chip, Non-Established Reliability, Established Reliability, Space Level, General Specification for.
- MIL-PRF-55365 - Capacitor, Fixed, Electrolytic (Tantalem), Chip, Non-Established Reliability, Established Reliability, General Specification for.
- MIL-PRF-55681 - Capacitor, Chip, Multiple Layer, Fixed, Ceramic Dielectric, Established Reliability, Non-Established Reliability, General Specification for.
- MIL-W-81044 - Wire, Electric, Crosslinked Polyaklene, Crosslinked Aklane - Imide Polymer, or Polyarylene Insulated, Copper or Copper Alloy.
- MIL-DTL-81381 - Wire, Electric, Polyimide-Insulated, Copper or Copper Alloy.
- MIL-PRF-83401 - Resistor, Networks, Fixed, Film, and Capacitor-Resistor Networks, Ceramic Capacitor and Fixed Film Resistors, General Specification for.
- MIL-PRF-83421 - Capacitor, Fixed, Metallized, Plastic Film Dielectric, (DC, AC, or DC and AC), Hermetically Sealed in Metal or Ceramic Cases, Established Reliability, General Specification for.
- MIL-PRF-83446 - Coils, Radio Frequency, Chip, Fixed or Variable, General Specification for.
- MIL-PRF-83500 - Capacitors, Fixed, Electrolytic (NonSolid Electrolyte), Tantalum Cathode, General Specification for.

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- MIL-PRF-83500/1 - Capacitors, Fixed, Electrolytic (NonSolid Electrolyte), Tantalum Anode and Cathode, Established Reliability, and Non-Established Reliability, Styles CRL01, CLR02, and CLR03.
- MIL-PRF-83536 - Relays, Electromagnetic, Established Reliability
- MIL-PRF-87164 - Capacitors, Fixed, Mica Dielectric, High Reliability, General Specification for.
- MIL-PRF-87217 - Capacitors, Fixed, Supermetallized Plastic Film Dielectric, Direct Current for Low Energy, High Impedance Applications, Hermetically Sealed in Metal Cases, High Reliability, General Specification for.

STANDARDS

FEDERAL

- FED-STD-H28 - Screw-Thread Standards for Federal Services.

DEPARTMENT OF DEFENSE

- MIL-STD-202 - Test Methods for Electronic and Electrical Component Parts.
- MIL-STD-750 - Semiconductor Devices.
- MIL-STD-883 - Microcircuits.
- MIL-STD-981 - Design, Manufacturing and Quality Standards for Custom Electromagnetic Devices for Space Applications.
- MIL-STD-1285 - Marking of Electric and Electronic Parts.

(Unless otherwise indicated, copies of the above specifications, standards, and handbooks are available from the Document Automation and Production Service, Building 4D (DPM-DODSSP), 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

2.2.2 Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

NATIONAL INSTITUTE OF STANDARDS TECHNOLOGY (NIST)

- NBS Special Publication 400-35 - Notes on SEM Examination of Microelectronic Devices.

(Application for copies should be addressed to National Institute of Standards Technology, 100 Bureau Drive, Stop 3460, Gaithersburg, MD 20899-3960.)

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

SOCIETY OF AUTOMOTIVE ENGINEERS, INC

- SAE-AMS2644 - Inspection Materials, Penetrants

(Application for copies should be addressed to the Society of Automotive Engineers, Inc.; 400 Commonwealth Drive, Warrendale, PA 15096-0001.)

ELECTRONIC INDUSTRIES ALLIANCE (EIA)

EIA-469 - Standard Test Method for Destructive Physical Analysis (DPA) of Ceramic Monolithic Capacitors.

(Application for copies should be addressed to Electronic Industries Alliance, 2500 Wilson Boulevard, Arlington, VA 22201-3834.)

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI/NCSL Z540-1 - Calibration Laboratories and Measuring and Test Equipment – General Requirements.

(Applications for copies should be addresses to the American National Standards Institute (ANSI), 11 West 42nd Street, New York, NY 10036-8002.)

(Non-Government standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents also may be available in or through libraries or other informational services.)

2.4 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. DEFINITIONS

3.1 Contracting officer. A contracting officer is a person with the authority to enter into, administer, or terminate contracts and make related determinations and findings. The term includes authorized representatives of the contracting officer acting within the limits of their authority as delegated by the contracting officer.

3.2 Defect. A defect is any nonconformance from specified requirements which affects form, fit, or function.

3.3 Destructive physical analysis (DPA). A DPA is a systematic, logical, detailed examination of parts during various stages of physical disassembly, conducted on a sample of completed parts from a given lot, wherein parts are examined for a wide variety of design, workmanship, and processing problems that may not show up during normal screening tests. The purpose of these analyses is to determine those lots of parts, delivered by a vendor, which have anomalies or defects such that they could, at some later date, cause a degradation or catastrophic failure of a system.

3.4 Lot-related defect. A lot-related defect is an anomaly attributable to a variance in the design, manufacturing, test, or inspection process that is repetitive throughout a production lot.

3.5 Production lot (electronic parts). A production lot is a group of parts defined by the part specification or drawing, and identified with a lot date code.

3.6 Screenable defect. A screenable defect is one for which an effective, nondestructive screening test or inspection can be reasonably developed and applied to eliminate with confidence the nonconforming items from the lot.

3.7 Calibration. Comparison of measurement standard or instrument of known accuracy with another standard, instrument or device to detect, correlate, report or eliminate by adjustment, any variation in the accuracy of the item being compared. Use of calibrated items provide the basis for value traceability of product technical specifications to national standard values. Calibration is an activity related to measurement and test equipment performed in accordance with ANSI/NCSL Z540-1 or equivalent.

3.8 Acronyms. The acronyms used in this standard are defined as follows.

CDRL	-	Contract Data Requirements List.
DPA	-	Destructive Physical Analysis.
EDS	-	Energy Dispersive Spectroscopy.
FA	-	Failure Analysis.
FIB	-	Focused Ion Beam.
IR	-	Insulation Resistance.
LCC	-	Leadless Chip Carrier.
LID	-	Leadless Inverted Device.
PIND	-	Particle Impact Noise Detection.
PMPCB	-	Parts Material and Processes Control Board.
RGA	-	Residual Gas Analysis.
SCD	-	Source Control Drawing.
SEM	-	Scanning Electron Microscope.

3.9 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.

#### 4. GENERAL REQUIREMENTS

##### 4.1 Sample size.

4.1.1 DPA for a lot conformance test. When a DPA is conducted to verify lot conformance, the minimum sample size shall be two (2) percent or five (5) units, whichever is greater, to a maximum of 30 units per Lot Date Code and Part Number combination. Further consideration should be made of increasing the sample size to random representative sampling for non-homogeneous lots, lots manufactured on non-QPL/QML lines, or lower quality level parts. In case of high cost parts, parts with very limited availability, or parts manufactured on a controlled QPL/QML product line the sample size may be reduced with the approval of Parts, Materiel, and Processes Control Board (PMPCB) or as defined by project or program requirements. The DPA shall be performed by an agency other than the manufacturer of the part.

4.1.1.1 DPA sample criteria. Units in the DPA sample may either be randomly selected or selected as most revealing based upon some characteristic known to be associated with certain problems for that part type.

4.1.1.2 Parallel tests. When a DPA is not conducted to verify lot conformance, but for some other reason, the various units in a DPA sample need not follow the same test sequence. Different tests may be performed on different units in a parallel test sequence to save time or to allow greater flexibility in test procedures. When a parallel test sequence is used for a particular part type, additional DPA units may be required above the maximum number specified to assure that all tests and inspections are completed.

4.1.1.3 Combined samples/stratified sampling. Combined or stratified DPA samples are acceptable for similar items manufactured using the same lots of materials, the same processes, and the same controls, if they have the same lot date code and vary only in some limited characteristics. The agency combining or stratifying samples must have current historical data/experience within the previous two years with the vendor and part types being combined in order to qualify for this option. Additionally, the approval of the PMPCB is also required.

4.1.1.4 Utilization of rejects. Electrical reject devices from a production lot may be used as DPA samples provided that the devices were only rejected due to out-of-tolerance parameters. These devices may consist of parts rejected during previous screening inspections. These devices must be approved by the PMPCB and should only be utilized when part availability is low or cost is high.

4.1.2 Resampling. If equipment failures, procedural errors, or other events independent of the parts themselves resulted in the initial DPA sample being inconclusive, a second DPA sample may be selected. However, the original samples shall be retained for review by appropriate agencies. The resample sample size may be determined on the basis of any partial results from the initial sample, and the type of defects that are being investigated.

4.2 DPA procedures. DPAs shall be conducted in accordance with documented procedures prepared for the specific part. The DPA procedures for a specific part shall be based on the requirements stated in this standard, the part procurement specification, and the configuration information for that part provided by the particular manufacturer. The critical test sequences and possible test branches to allow parallel testing shall be indicated in the procedures. All samples shall be serialized and all pre-DPA test data shall be recorded for reference at post-DPA evaluation. As a minimum, the procedure shall include applicable instructions for initial external inspections, electrical tests, radiography, disassembly, sample preparation, microscope or scanning electron microscope (SEM) examinations, and data recording. All DPA shall be done in an area that minimizes the risk of introduction of artifacts. The procedure shall contain a baseline drawing or sketch and, where practicable, a photograph of the part for comparison. The procedure shall indicate the pass-fail criteria applicable to that part type. The procedure shall include a checklist; generally similar to the example shown on figure 4-1 to be used in recording attributes data. All defects during DPA examination shall be photographed. The use of digital images is permitted. Electrical and variable data shall be recorded.

4.2.1 Baseline sketch. The general configuration of the devices to be examined are shown in the baseline sketches and drawings contained herein. These baseline sketches shall be used as a reference during the disassembly process. Typical drawings of baseline sketches are shown in requirements 10 through 24.

4.2.2 DPA data records. Each DPA shall be assigned a unique number for identification purposes. All markings on each part shall be recorded. Measurements shall be made and data recorded to substantiate the DPA findings in accordance with the applicable DPA procedures. Each data page and item shall reference the assigned DPA number. The DPA data records would typically include:

- a. Outline of DPA procedure used.
- b. The DPA summary sheet (figure 4-1).
- c. The DPA test data sheets (figure 4-2 is an example for external visual).
- d. Original x-rays, n-rays, and photographs, individually serialized and referenced, as required.
- e. Other data or analysis results that support findings.

4.2.3 Test and inspection methods. Test and inspection methods shall be consistent with the requirements of the applicable part specification or drawing. When test and inspection methods other than those specified in the part specification or drawing are used, they shall be selected from or based on MIL-STD-202, MIL-STD-750, or MIL-STD-883, where applicable. Where test equipment is used to make quantitative measurements, the test equipment shall be maintained in accordance with ANSI Z540-1.

4.2.3.1 External visual. Record all markings on each part, check for configuration compliance, and inspect for any external defects that may affect reliability in accordance with the detailed requirements for each applicable section.

4.2.4 Evaluation criteria. Criteria for evaluation of DPA variables and attributes data shall be defined in the applicable DPA procedure for the particular part. The criteria shall be based on the requirements of the detailed part specification or drawing or on other applicable baseline documentation. Defects described on the DPA summary sheets shall reference the criteria used to establish the defects. Each rejectable defect shall be described and photographed for inclusion in the DPA report. The use of digital images is permitted. The resolution of anomalies shall also be annotated in the report.

<b><i>DPA Summary Sheet</i></b>				
Part Type	Part Number	Lot/Date Code	Lot Size	Manufacturer
PO Number	DPA Number	DPA Sample Size	S.O. Number	
S/N DPA Samples				

<u>Applicable Task</u>	<u>Quantity Tested</u>	<u>Quantity Failed</u>	<u>Failed ID No.</u>	<u>Technician</u>	<u>Date</u>
<input type="radio"/> External Visual	_____	_____	_____	_____	_____
<input type="radio"/> Gross Leak	_____	_____	_____	_____	_____
<input type="radio"/> Fine Leak	_____	_____	_____	_____	_____
<input type="radio"/> PIND	_____	_____	_____	_____	_____
<input type="radio"/> Internal Visual (Delidded)	_____	_____	_____	_____	_____
<input type="radio"/> Internal Visual (Sectioned Devices)	_____	_____	_____	_____	_____
<input type="radio"/> Bond Strength	_____	_____	_____	_____	_____
<input type="radio"/> SEM	_____	_____	_____	_____	_____
<input type="radio"/> Die Sheer	_____	_____	_____	_____	_____
Lot Disposition	<input type="radio"/> Accepted	<input type="radio"/> Rejected	<input type="radio"/> Customer review		

Parts Engineering Comment:

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FIGURE 4-1. Sample DPA summary sheet.

4.3 Radiography. X-ray examination shall be performed when required by the contract or dictated by device/package technology, before delidding to examine cavity devices and to determine internal clearances. It is also useful as an aid in locating delidding and sectioning cuts and to nondestructively investigate suspected defects. When x-ray radiographs are included as part of the DPA, suitable image quality indicators shall be used on each radiograph. Sections herein may require more specific radiographic examination.

4.4 Disassembly and sample preparation. Assure that all DPA requirements that cannot be satisfied after disassembly are satisfied prior to the start of disassembly, for example, measurements of entrapped water vapor or volatile contaminants within cavity devices. In all cases, care shall be exercised during disassembly and sample preparation to prevent damage that would introduce anomalies or the generation of contamination that would mask valid DPA data for the device being examined. The following requirements are applicable where appropriate.

4.4.1 Delidding. Delidding shall be as described in the detailed requirement section for the specific part type. An example of a delidding tool is shown on figure 4-2. In all instances, when opening devices for DPA, all reasonable precautions shall be taken to avoid introducing fluid or particulate contamination into the device or damaging its internal structure. All delidding shall be performed in a clean environment. During and after delidding all portions of a device shall be identifiable with the parent device. Samples that have been delidded shall be stored in a clean, moisture-free environment for further inspection.

4.4.2 Sectioned samples. Techniques similar to those used to prepare sectioned metallurgical and mineralogical specimens for optical examination are generally applicable to the preparation of DPA samples. The device to be examined is first potted in a suitable low shrinkage, room temperature resin. It is advisable to remove bubbles prior to curing. It is then cut or rough ground to the desired section plane, followed by fine grinding, polishing, and sometimes etching to bring out the necessary detail. The process by which samples are mounted, sectioned, and polished can readily induce high stresses in the materials. Such stresses can, and often do, result in damage which might be interpreted as product defects, but which never existed in the undisturbed specimen. This is particularly true for brittle materials with relatively low mechanical strength such as ceramic dielectric materials. As an aid to those involved in DPA, EIA-469 describes abnormalities resulting from faulty sample preparation for ceramic capacitors. This same information may be useful for other device types.

4.4.3 SEM samples. Transistor and integrated circuit chips shall be prepared for SEM examination in accordance with method 2077 of MIL-STD-750 or method 2018 of MIL-STD-883 as applicable and as modified herein. Additional guidelines are provided in NBS Special Publication 400-35. Other types of parts shall be prepared for SEM by using standard laboratory techniques for mounting and coating; taking care that anomalies are not introduced by the process.

4.5 Photographs/imagery. At the onset of any destructive physical Analysis (DPA), all typical part markings shall be recorded in an image prior to disassembly of the devices. Subsequently, a minimum of two recorded images are required to document the baseline characteristics of an opened device prior to performance of further destructive tests. These shall be supplemented with other recorded images or photographs as required to document all observed defects or anomalies. Microscopy techniques such as color, dark field, phase contrast, and interference contrasts shall be used as necessary to enhance image clarity. When SEM is performed to verify metallization step coverage integrity, an image of the worst-case oxide step and an image of the worst-case metallization shall be obtained. Additionally, where anomalous conditions are noted and SEM evaluation would assist in further delineation of the condition, it is required that the SEM be utilized for this purpose to record images of greater detail and information. Each image shall be labeled or otherwise identified with the applicable serial number, accelerating voltage, tilt, and the magnification used. Results of SEM energy dispersion spectroscopy (EDS) shall be supplied when appropriate.

4.6 DPA residues/samples. All residues shall be packaged, marked, and accompany the original DPA test report to the contractor for final approval and retention.

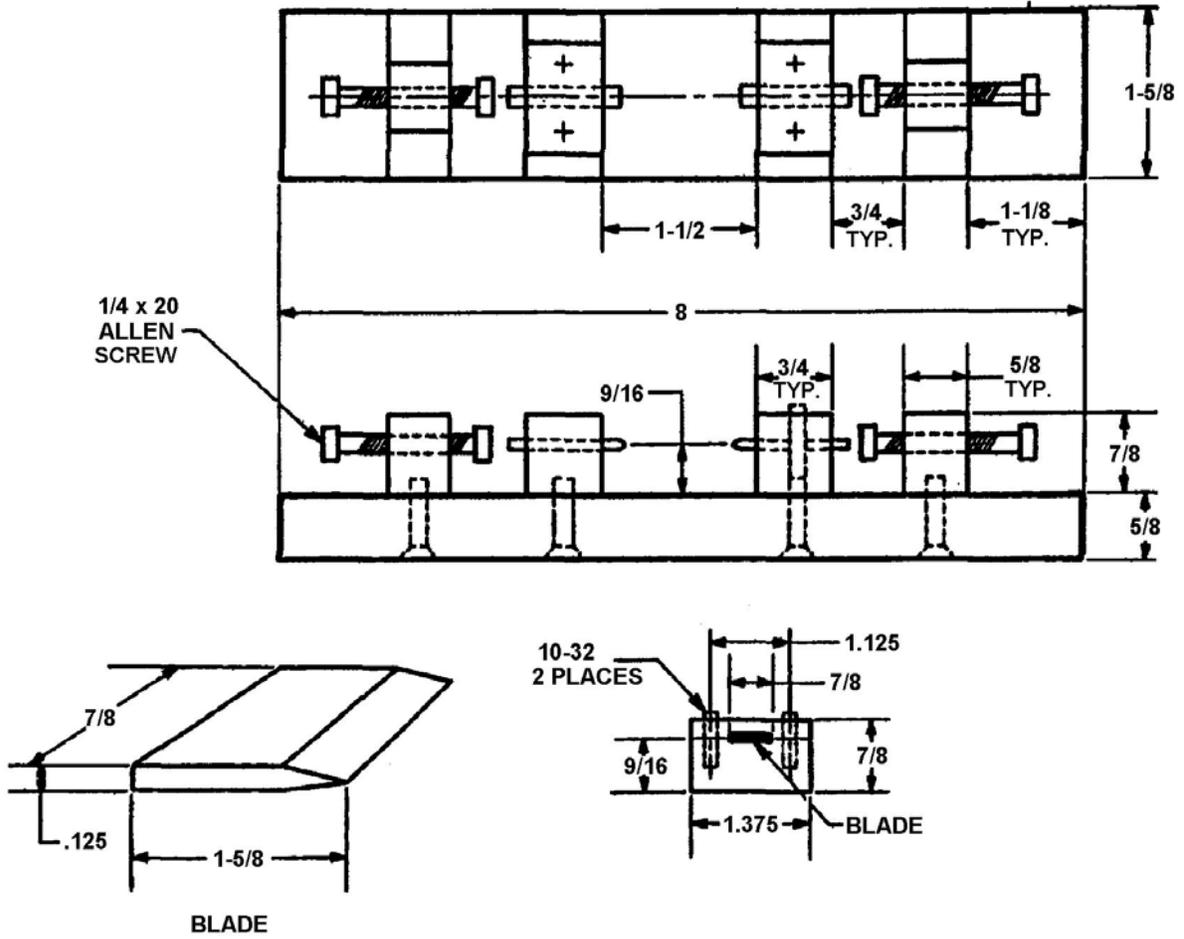


FIGURE 4-2. Example of flat pack delidding vise.

5. DETAILED REQUIREMENTS

5.1 Detailed requirements. The detailed requirements for components are covered in requirements 10 through 24.

6. NOTES

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

6.1 Intended use. This standard is intended to be referenced, as applicable, in acquisition contracts involving the manufacture of parts or equipment to be used in space and launch vehicles. To ensure the required high quality of the parts, stringent in-process controls must be imposed and a comprehensive test program conducted on the completed parts. A key ingredient of the test program is the assessment of part lot quality based on the destructive examination of samples randomly selected from each production lot. This DPA is used to verify the internal design, materials, construction, and workmanship of the "as-built" sample parts to preclude installation of parts having patent or latent defects. DPA can also be used to monitor processes to evaluate supplier production trends and for failure analysis. DPA can also be used to derive information to aid in defining improvement changes in design, materials, or processes or to aid in dispositioning parts that exhibit anomalies.

6.2 Tailored application. The technical requirements in each contract should be tailored to the needs of that particular acquisition. Performance specifications and standards need not be applied in their entirety. Only the minimum requirements needed to provide the basis for achieving the program requirements should be imposed. The cost of imposing each requirement of this standard should be evaluated against the benefits that should be realized. However, the risks and potential costs of not imposing requirements must also be considered. The tailoring should be implemented by the wording used to state the applicable requirements in the specifications or in other contractual documents.

6.3 Documentation. Documents, forms, technical manuals, and data are prepared and distributed in accordance with the Contract Data Requirements List (CDRL) of the applicable contract. The data items discussed in this standard are not deliverable unless invoked by the CDRL or the applicable contract.

6.4 Subject term (key word) listing.

Analysis	Inductors
Capacitors	Inspections
Coils	Microcircuits
Connectors	Particles
Contacts	Physical
Crystals	Resistors
Decapsulation	Switches
Delid	Thermistors
Destructive	Transformers
Diodes	Transistors
Filters	

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

Custodians:  
Air Force - 19  
DLA - CC  
NASA - NA

Preparing activity:  
DLA - CC

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