SAE INTERNATIONAL

# *MIL-STD-1580 (DPA FOR EEE PARTS) TASK GROUP STATUS*

## *ELECTRONICS TECHNOLOGY WORKSHOP*

Michael Cozzolino/The Aerospace Corporation
Sultan Lilani/Integra Technologies
Jay Brusse/SSAI at NASA Goddard

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# Task Description

**This task is meant to address omissions, tabled items, and typo's associated with the last revision of MIL-STD 1580 in 2019 as well as new items nominated by participants.**

**The types of items identified in this process were:**

***a. Comments that GWG members and others that were believed to unresolved at the final comment resolution of revision C.***

***b. items that had been tabled due to the lack of resources to complete at the time of final comment resolution of revision C in 2019.***

***c. Government and industry inputs regarding everything from typo's to needed additions to reflect popular components not currented covered.in MIL STD 1580.***

***d. Feedback from Laboratories that perform DPA regarding issues or details of various procedures in MIL-STD 1580.***



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# Process

**A kickoff meeting was held in early 2021 at which a list of issues, questions and requests were compiled. Items on this list were voted on for priority and task difficulty and then categorized by type**

- **Teams were formed around each category type. Task leaders were selected from those that volunteered to be actively involved.**
- **Teams, in general, met biweekly. Each team had 10 to 20 volunteers present during their meetings. The entire group of teams would meet on a periodic basis.**
- **Results have been discussed and socialized at JEDEC/SAE and other meetings.**
- **The resulting recommendations will soon go to DLA for compilation and a formal request for comments.**



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# Spreadsheet Example

| Item number | Tabled Item from Rev C Effort? | MIL-STD reference section | Originator | Commodity | Category (Admin, New, PMA, Technical) | Level of effort required | Priority (1, 2, 3) | Comment |
|---|---|---|---|---|---|---|---|---|
| *0* | *No* | *N/A* | *Aerospace* | *ALL* | *Administrative* | *high* | *1* | ***PREPARING ACTIVITY and stakeholders (CE11, CE12, et al) to plan a course of action on if, how, when to act upon the following proposed updates to 1580*** |
| 1 | | 4 | GWG | All | Administrative | low | 2 | The scope should address homogeniety of lots.<br>The following should be added: "from a homogenous production lot. If the production lot is not homogenous, the sample sizes should be increased by a factor as a function of the number of the production lots in the procurement lot. If the procument lot is 3 then the sample size should be increased by a factor of 3. |
| 2 | | 12 | GWG | Crystal | Technical | low | 1 | Requirement 12 page 80: There is a conflict between from A and B. The second sentence of B calls out edge chips. Change the second sentence in B from "edge chips" to "chip outs". |



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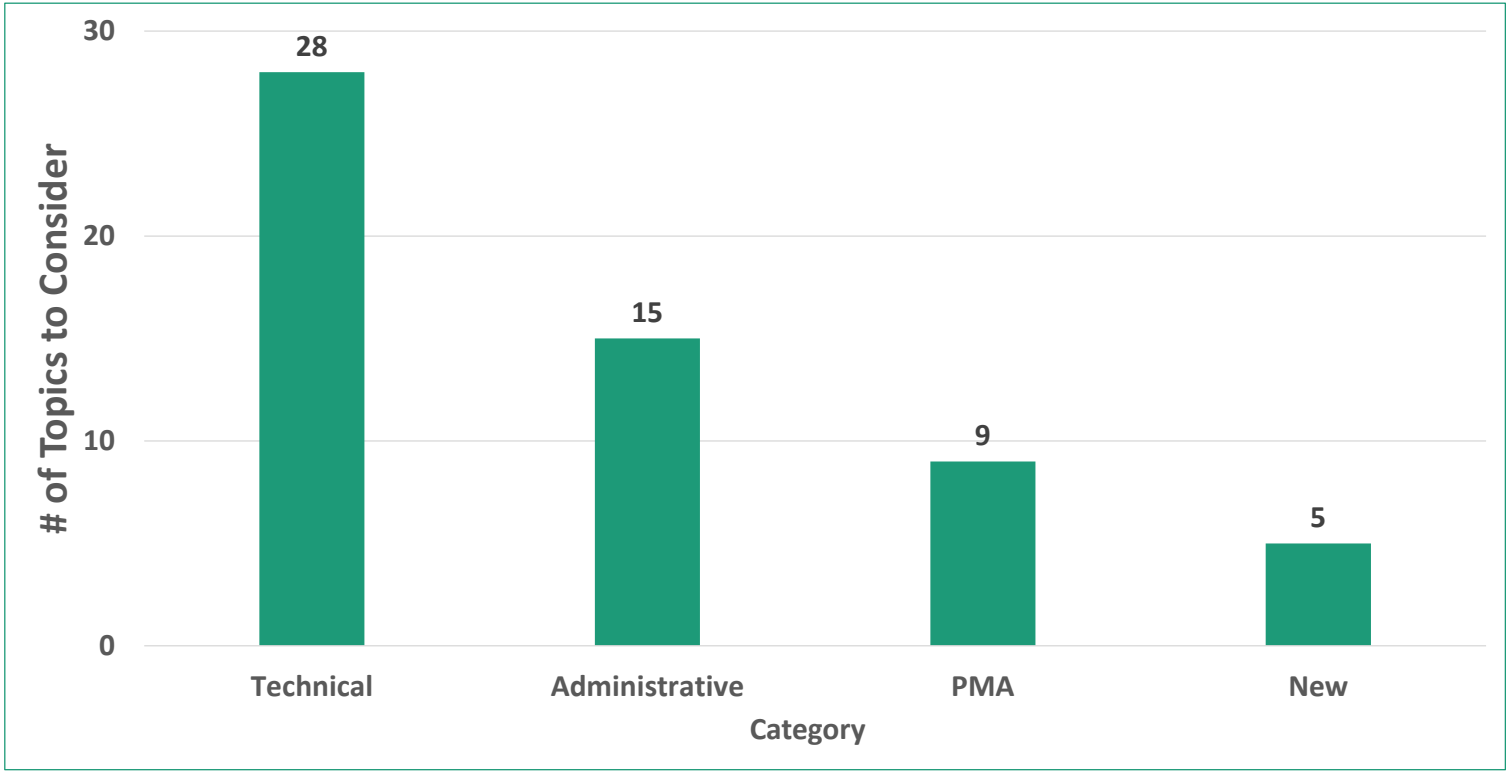
# MIL-STD 1580 Topic by Category





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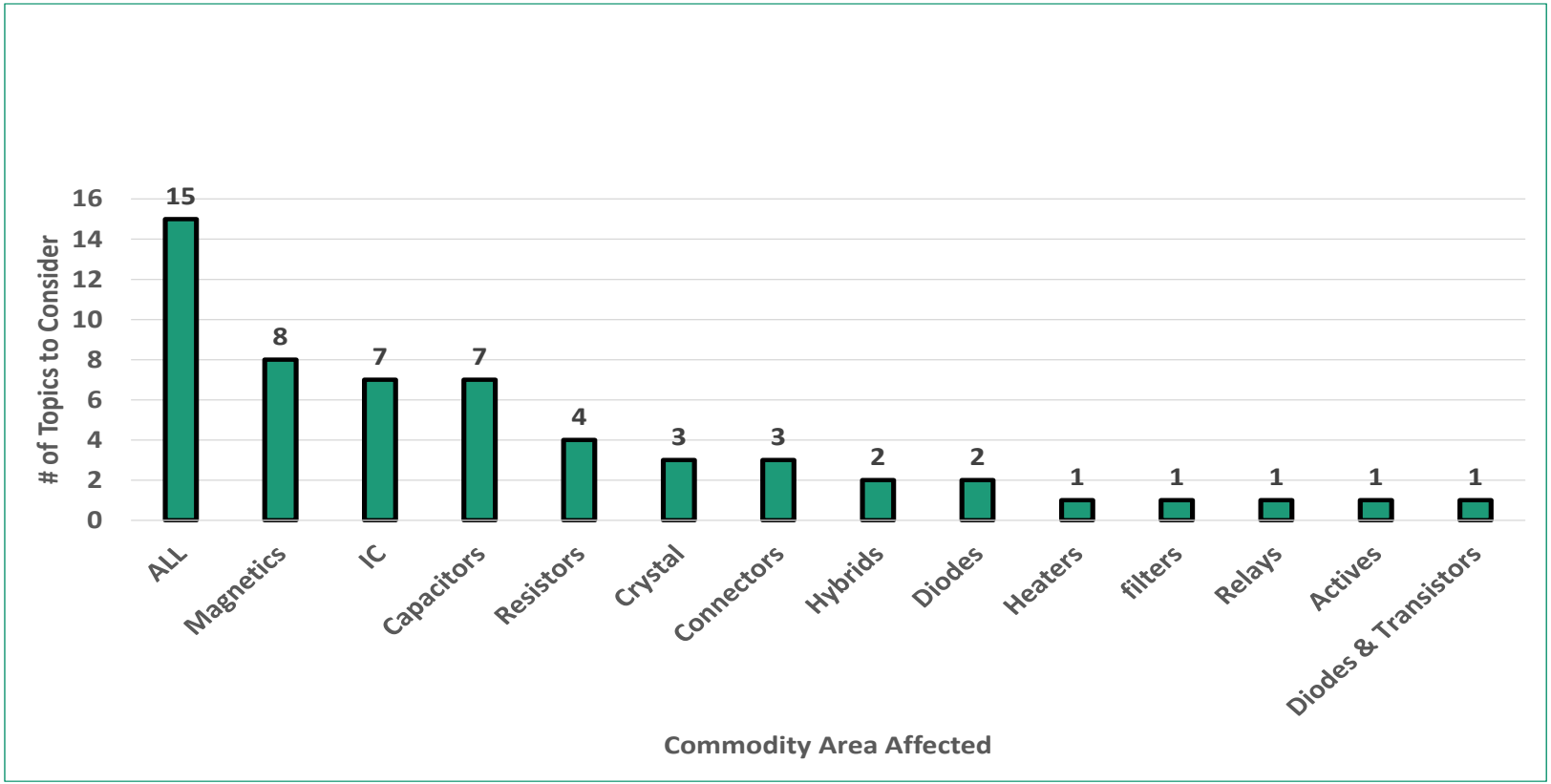
# MIL-STD 1580 Topics by Commodity





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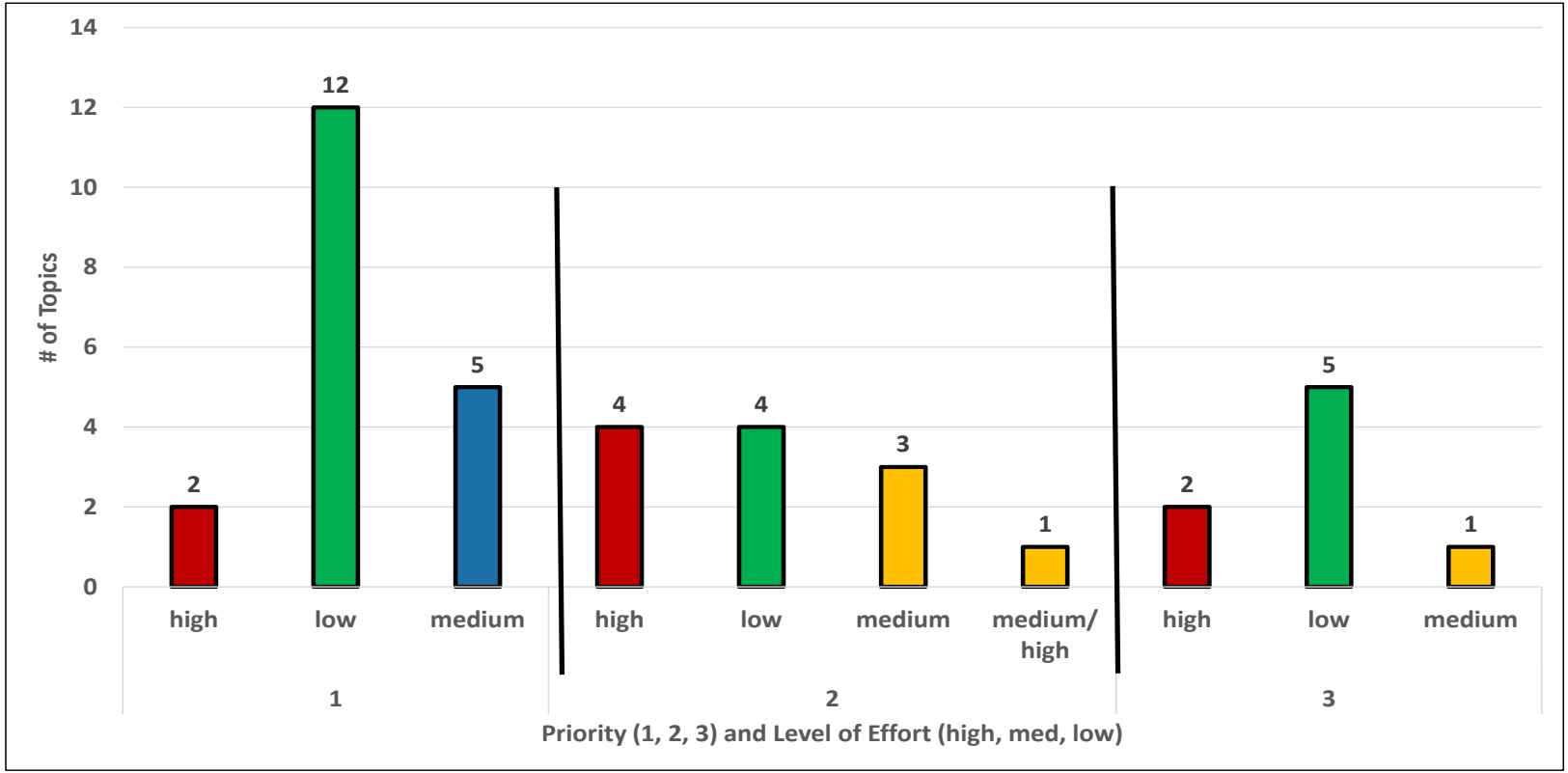
# MIL-STD 1580 Topics
# by Priority and Anticipated Level of Effort





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# Team Leader Assignments

| Topic Leader | Topic Category |
|---|---|
| Mike Cozzolino | Administrative |
| Jay Brusse | Capacitors & Resistors |
| Kathy Laird | Various topics<br>initiated by the GWG* |
| Rachel Garcia<br>Sultan Lilani<br>Gary Downing<br>Trevor Devaney | Various topics<br>initiated by test labs |
| Tom Hester | PMA** |

** GWG = Government Working Group*

*** PMA = Prohibited Materials Analysis*



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# Status of Administrative Items

All but three administrative items have been addressed.

- Two of the 218 original comments for revision C were held by DLA awaiting additional information from GWG & CE-11 before a final decision was made by DLA. (Comments 105 and 106 regarding recommendations from GWG regarding reformatting and rewording paragraph 13.1.X and removing section 13.1.2 (a).)

- The third item was that members of the GWG have requested that the Army and Navy be also added as custodians to MIL-STD 1580. This is not within CE-11 or CE-12 control, although our organizations recognize that MIL-STD 1580 is used by multiple government and DOD organizations. This needs to be addressed between GWG and DLA.



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# Examples of Administrative Items

## Item 37

Comment: Incorrect test method # is called out for Terminal Strength Test. Says use MIL-STD-202 Method 209.
It should say Method 211. MIL-STD 1580 wording, proposed adjustment in red:

24.1.1.4 Terminal strength. Perform terminal strength in accordance with method 2~~09~~11 of MIL-STD-202, condition A…..

## Item 12

Requirement 13, paragraph 13.3.1.3 (hermetic seal) – This paragraph states that gross leak testing shall not be according to condition C. However, the statement ends with “no bubbles or fluorescent residue should be present” which is a bit contradicting given that condition C shall not be performed.

Current wording and suggested change:

“The devices shall be tested according to method 1071 of MIL-STD-750. Fine leak testing shall be according to condition G or H. Gross leak testing shall not be according to condition C. ~~No bubbles or fluorescent residue should be present”.~~

Per MIL-PRF 19500

“Conditions C is prohibited for MIL-PRF-19500 product……


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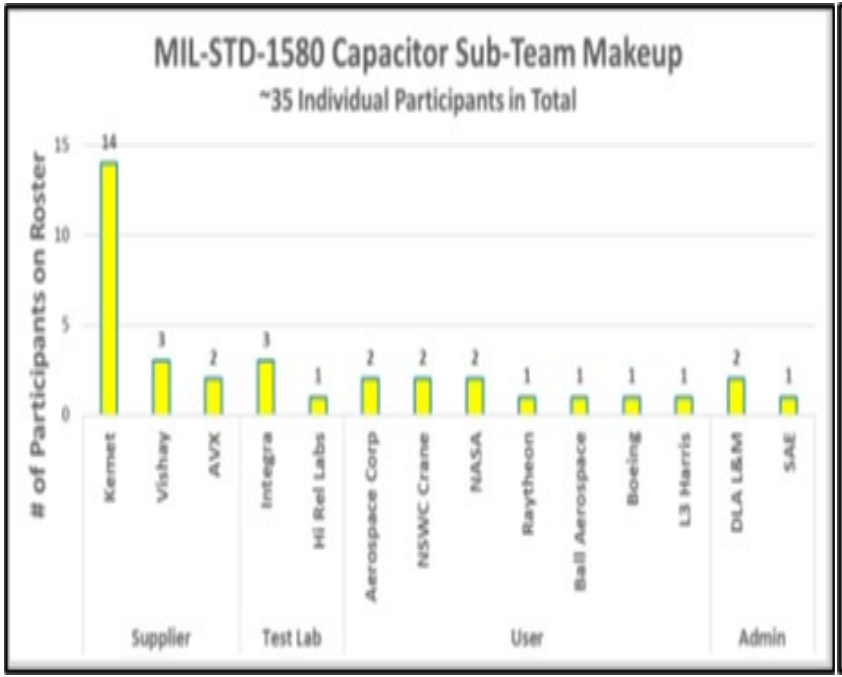
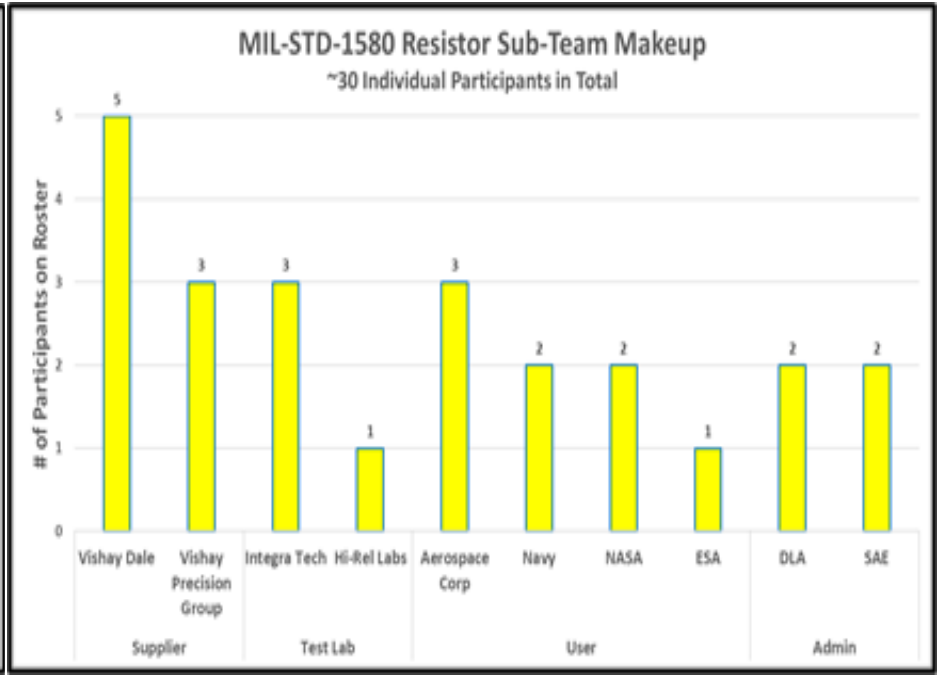
# Capacitor and Resistor Items (Team Lead Jay Brusse)





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# Example of a Capacitor Team Product

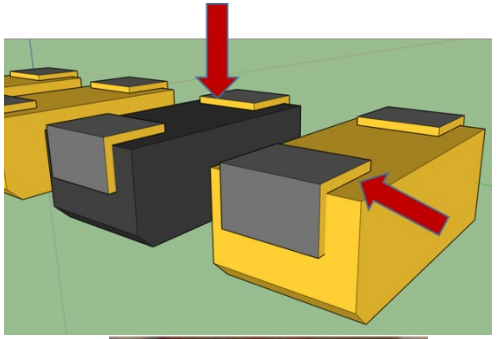
In mid-2021 an ad hoc team of capacitor suppliers, DPA test houses and capacitor commodity and MIL-STD-1580 users/experts formed to deliberate on and then recommend improvements to various capacitor sections in MIL-STD-1580 revision C. The team has met over 20 times approximately every 2 weeks for 1 to 1.5 hour long sessions via SAE-facilitated WEBEX meeting site. An example of output is illustrated below.

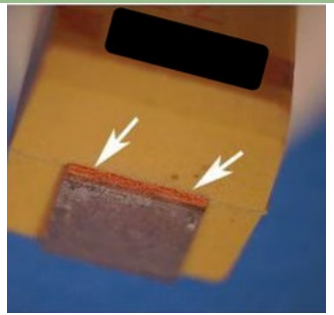
**Section 10.11 DPA for Single Anode Solid Tantalum Chip Capacitors and Section 10.12 DPA for Multi-Anode Solid Tantalum Chip Capacitors**

***Replace paragraphs for Prohibited Materials Analysis (PMA) as noted below***

***Rationale: Leadframes used for tantalum chip capacitors are sometimes made from stamped and formed brass substrates where the brass alloy contains > 5% Zinc by weight. The stamping/forming operations may produce small areas of exposed base metal that would fail to meet the existing MIL-STD-1580 section 9 PMA requirements. The capacitor team consensus was to recommend waiving the PMA requirements for these small areas of exposed Zn-containing alloys unless they amount to a significant sized area that may compromise* meeting standard solderability requirements (i.e., > 5% of total solderable surface area)**

| ***OLD*** | **NEW** |
|---|---|
| 10.11.1.3 Prohibited Materials Analysis (PMA). Prohibited materials analysis shall be performed according to Section 9 of this document. (1 sample) except that only external analysis is required. | 10.11.1.3 Prohibited Materials Analysis (PMA). Prohibited analysis shall be performed on one sample according to S this document, except that only external analysis is requir areas of exposed Zn-containing base metal are acceptabl not collectively exceed 5 percent of the total solderable su of the terminations. |
| **OLD** | ***NEW*** |
| 10.12.2 Prohibited Materials Analysis (PMA). Prohibited materials analysis shall be performed according to Section 9 of this document. (1 sample) except that only external analysis is required. | 10.12.2 Prohibited Materials Analysis (PMA). Prohibited m analysis shall be performed on one sample according to S this document, except that only external analysis is requir areas of exposed Zn-containing base metal are acceptabl not collectively exceed 5 percent of the total solderable su of the terminations. |







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# Example of a Resistor Team Product

In mid-2021 an ad hoc team of resistor suppliers, DPA test houses and resistor commodity and MIL-STD-1580 users/experts formed to deliberate on and then recommend improvements to various resistor sections in MIL-STD-1580 revision C. The team has met ~10 times, first in fall 2021 and now in spring 2022, for 1 to 1.5 hour long sessions via SAE-facilitated WEBEX meeting site. An example of output is described below.

Section 18.5 Film Resistors

Purpose:

1. Clarify Deprocessing Instructions for THICK FILM Chip Resistors to make clear that Removal of Protective Glassivation Shall NOT Be Performed
2. Specify visual inspection magnification range to be 30x to 60x and define 30x as referee magnification (instead of “30x minimum”)

Rationale:

1. Removal of Protective Glassivation over thick film resistors is Impractical without Inducing Damage to Resistor Element
2. Standardizing Minimum Inspection Magnification in case of dispute

In addition, the team has focused on creating sections for components types not currently discussed, but in common usage, such as current sense resistors, shunts.



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# DPA Laboratory Led Team (Team Lead Sultan Lilani)

## Tasks

- Resolve 10 items identified by the CE-11, CE-12 and GWG communities.
- Subsequently the team was assigned the task to provide a proposal for a Flip Chip DPA procedure for incorporation into MIL STD 1580 Rev D.

## The Team

- Hi-Rel (Trevor Devaney), ORS (Jim McEwen), Integra (Sultan, Gary Downing, Rachel Garcia, DPACI (Doug Schweitzer), NASA Marshall (Kathy Laird, Ron Hodges, Benny Damron), Aerospace (Mike C, Larry H, Marco); Vishay (Bruce Gilder, Brian Ward), Golden Altos (Ben Mendoza), Bruce Gildir, NWSC Crane (Dontel Diggs),Microchip (Eli Kawam), AVX (Jared Conley) Army (Janel Cross); Navy (Dontrel Diggs) and others including DLA …

## High Level Summary

- The team provided recommended modifications for the ten assigned items.
- A proposed Flip Chip DPA procedure has been drafted.


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# Examples of Laboratory Team Recommendations

**Concern:** *Plastic encapsulated diode/transistors not addressed* (GWG)

**Resolution**: The recommendation was to create requirements in the Diode and Transistor sections of MIL-STD-1580 and remove paragraph 16.5.3 which was causing confusion. A draft was generated.

**Concern:** *Requirement 16.5 (PEMS) – Paragraph 16.5.1.8 for bond pull states "All bond lifts and failures shall be investigated with SEM, documented and dispositioned as customer review". Suggest that this is limited, possibly suggest "image typical lowest pull". (Integra)*

**Resolution:** For Bond Pull Testing we would recommend a reduced quantity of bond wires be pulled according to the following schedule:

| Number of Bonds Per Device | Number of Bond Pulls Per Device Required |
|---|---|
| 1 - 50 | 100% |
| 51 - 100 | 50% or 75 bonds whichever is greater |
| 101 - 500 | 50% or 250 bonds whichever is greater |
| Greater than 500 | 250 bonds |

Bonds to be pulled should include bonds located at each corner of the die, the middle of each side of the die, and the shortest and longest bond wires available. All bond pull failures shall be inspected in the SEM and typical images of each type of bond failure shall be provided



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# Prohibited Material Analysis (PMA)
# Team Lead Thomas Hester

**Issues:** Task was to attempt to resolve of PMA issues within MIL-STD 1580 which are either poorly defined or which cause repetitive rejections that are typically approved as ‘use as is’ at MRB. This team is ongoing.

Example Topics:

- Magnetics PMA of internal elements

Request to add statement "do not analyze the core material" for zinc since these are predominantly Zn oxides (Hi Rel Laboratory).

- PMA for Zinc-containing materials

Waive use of zinc inside of HERMETIC style relays and switches that contain internal elements that contain zinc (e.g., brass elements)

Review the maximum zinc and other material maximum limits in section 9 of MIL-STD 1580. Also, review the requirement to verify the lack of a pure tin underplate on surfaces.


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# Summary

The teams have completed most of their tasks and results have seem communicated to CE-11 and CE-12 members during multiple meetings. In addition, advance copies have been provided to Aerospace's PMP organization to accommodate some of their funding/schedule issues.

Recommended changes are being transferred to individual DLA form 155's and will be complied for submittal to DLA. DLA will review and send comments to their distribution for a 45 day review cycle.



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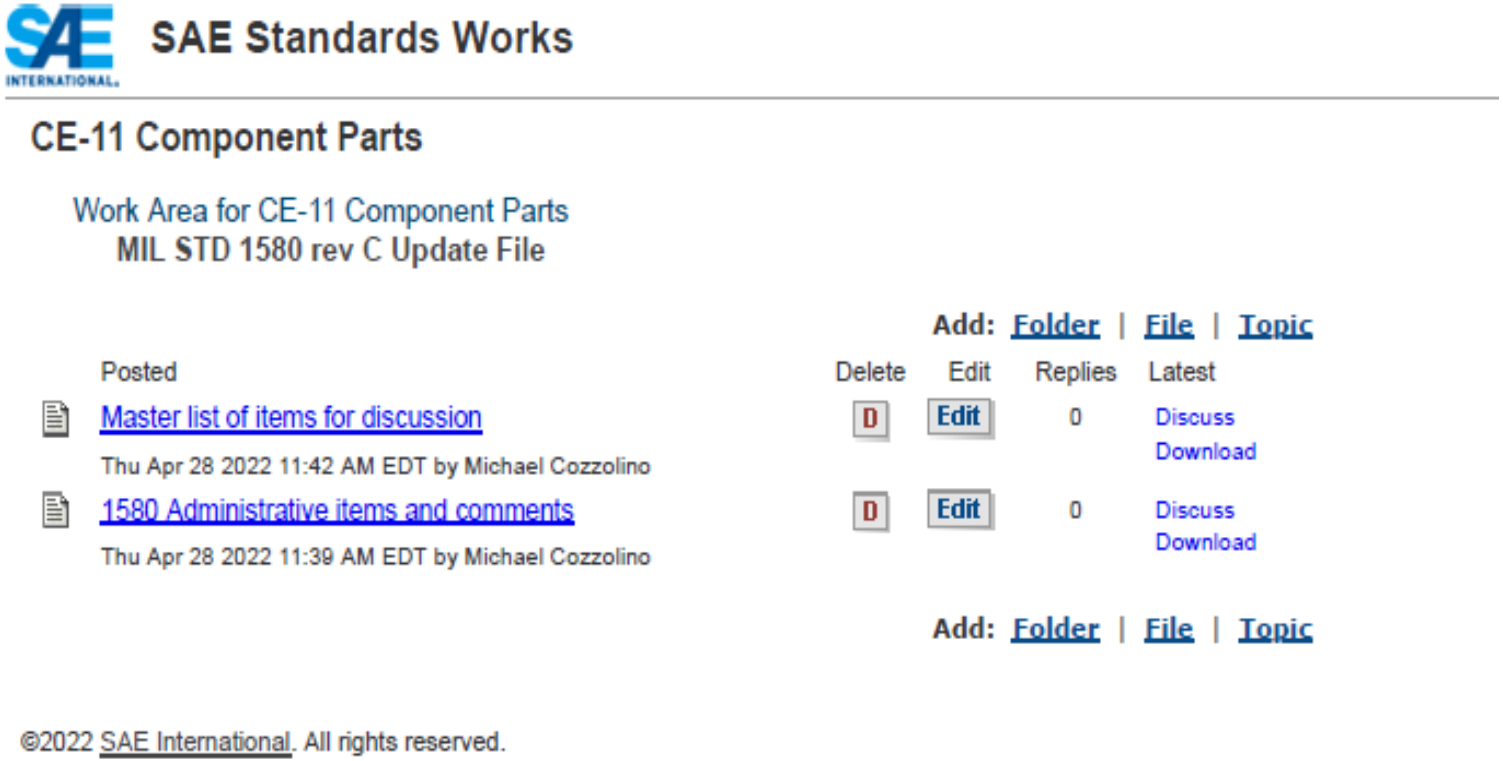
# Where to find Information



SAE Standards Works

CE-11 Component Parts

Work Area for CE-11 Component Parts
MIL STD 1580 rev C Update File

Add: Folder | File | Topic

| Posted | Delete | Edit | Replies | Latest |
|---|---|---|---|---|
| Master list of items for discussion<br>Thu Apr 28 2022 11:42 AM EDT by Michael Cozzolino | D | Edit | 0 | Discuss<br>Download |
| 1580 Administrative items and comments<br>Thu Apr 28 2022 11:39 AM EDT by Michael Cozzolino | D | Edit | 0 | Discuss<br>Download |

Add: Folder | File | Topic

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# QUESTIONS?

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