

## ENGINEERING PRACTICE STUDY

TITLE: Proposed Changes to MIL-PRF-39010E basic and slash sheets 1 thru 10

24 February 2004

PROJECT NUMBER 5950-1163 FINAL REPORT

Study Conducted By Gene Ebert  
Documentation Standardization Unit, DSCC-VAT

I. OBJECTIVES: Determine what changes are desirable from the users standpoint and practical for manufacturers.

II. BACKGROUND: As a result of comments received from several sources (users and manufacturers) over a period of time, along with the necessity to update the specification content to the latest requirements, an EP Study (Proposed Changes to MIL-PRF-39010E basic and slash sheets 1 thru 10) was distributed to all known users and manufacturers for comments (see attachment 1).

III. RESULTS: Listed by EP study reference number.

- 1) API Delevan has rescinded the request, (see attachment 2, item number 1).
- 2) All replies concurred.
- 3) API Delevan proposed an alternate mounting method (see attachment 3). Data was reviewed and approved (see attachment 4).
- 4) NASA requested that MIL-STD-202 method 210 condition C be retained as it is the most stringent (see attachment 5 item number 4). Per a discussion with Vinod Patel at NASA, paragraph 4.8.10a is to be deleted from MIL-PRF-39010 to remove conflicts between procedures (depth of immersion vs. immerse board so it floats).
- 5) One negative comment received was resolved through a telephone call.
- 6) a) One negative comment received was resolved through a telephone call.  
b) One negative comment received was resolved through a telephone call.  
c) Both the Army and the Air Force expressed strong concerns that the time remain unchanged (see attachments 6 item number 1c and attachment 7 item number 6c).

The comments re summarized along with any actions taken as attachment 8.

IV. CONCLUSIONS: Incorporate the recommended changes contained in the EP Study (see attachment 1) along with the summary (see attachment 8) into revisions of MIL-PRF-39010E basic and slash sheets 1 thru 10 as appropriate.

V. RECOMMENDATIONS:

- a) Establish a project to revise MIL-PRF-39010E to take the following actions resulting from this EP study:
  - 1) Incorporating alternate mounting method for Temperature rise test proposed by API Delevan utilizing Keystone Electronics p/n 1268 terminal mounting clip (see attachment 3).
  - 2) Delete 4.8.10a while maintaining test condition C. this will remove any potential conflict in the procedures. See Results item 4 above
- b. Establish projects to revise MIL-PRF-39010 slash sheets 1 thru 10 to include ambient temperature to be used in performing the Temperature Rise test (see attachment 1 item 1).



## ATTACHMENT 1

**DEFENSE LOGISTICS AGENCY**  
DEFENSE SUPPLY CENTER, COLUMBUS  
POST OFFICE BOX 3990  
COLUMBUS, OH 43216-5000

IN REPLY  
REFER TO DSCC-VAT (Mr. Ebert / DSN 850-0729 [614] 692-0729 / eugene.ebert@dsccl.dla.mil)

MEMORANDUM FOR MILITARY AND INDUSTRY DISTRIBUTION

28 February 2003

SUBJECT: Engineering Practices (EP) Study: Proposed Changes to MIL-PRF-39010E and slash sheets  
(/1 thru /10).  
Project Number 5950-1163.

An engineering practices study is being performed to determine the feasibility of the following changes to the subject document:

- 1) Reference paragraph 4.8.1.3 of MIL-PRF-39010E (Marking Legibility). The requirement for a minimum thickness of .005 inches of silicone resin insulating compound cannot be adequately verified on a cylindrical coil. Typical measuring tools (calipers or micrometers) cannot ensure that the minimum thickness requirement is satisfied on a point to point basis (measurements will only reflect the high points of the resin coating). Recommend verification be achieved by verifying the process on a flat surface and taking a measurement or sectioning a sample and measuring the thickness utilizing an optical measurement system.
- 2) Reference paragraph 4.8.8 and 4.8.8.1 of MIL-PRF-39101 (Temperature Rise and For Cylindrical Coils). Ambient temperature not specified. Recommend all slash sheets be revised to include ambient temperature.
- 3) Reference paragraph 4.8.8.1 of MIL-PRF-39010E (Temperature Rise). The requirement that the wire leads have to be wrapped one turn around the test fixture terminals during temperature rise test is detrimental to the coil's lead integrity. These same coils are also subjected to terminal strength tests as part of Group B, Subgroup 3 inspection. Wrapping/soldering and unsoldering/unwrapping the leads to and from the terminals places extraordinary stress on the leads at the point of egress and weakens them to the point where they are at risk of not meeting terminal strength requirements. Recommend separate samples for temperature rise and terminal strength requirements for Qualification and Group B, Subgroup 3 (Quarterly) Inspections.
- 4) Reference paragraph 4.8.10 of MIL-PRF-39010E (Resistance to Soldering Heat). Test condition C from MIL-STD-202, Method 210 (wave solder - topside board mount component) is currently specified. Recommend test condition B (solder dip) as it more readily satisfies the paragraph 4.8.10(a) requirement.
- 5) Reference paragraph 4.8.15 of MIL-PRF-39010E (Low Temperature Storage). The requirement that coils shall be mounted by their normal mounting means is in conflict with the requirement that there must be at least one inch of free air space around each coil. Typical normal mounting means is when the component body rests on a circuit board and the component leads are bent, cut, and soldered to the circuit board. This type of mounting would obstruct the flow of air across and around the coil. Recommend deleting the phrase "...by their normal mounting means...".
- 6) Reference paragraph 4.8.18 of MIL-PRF-39010 (Moisture resistance).
  - a) Mounting method can be detrimental. No change due to requirements.
  - b) Polarization is unclear. Recommend addition of details to procedures in basic and specifics to slash sheets to clarify requirements.
  - c) The requirement to test within 30 minutes from removal and complete within 8 hours is considered to restrictive. Recommend no change to requirement.

Please review the recommended changes and provide concurrence or comments and/or suggested changes via e-mail to [eugene.ebert@dsc.dla.mil](mailto:eugene.ebert@dsc.dla.mil) or by FAX to (614) 692-6939.

Comments or suggested changes that are not editorial in nature should include justification. Industrial activities should indicate whether they are commenting from the standpoint of a "User" or "Manufacturer." Military review activities should forward comments to their custodians in sufficient time to allow for consolidating the departmental reply. All agencies, industry, and coordinated custodian comments should be sent to this center. Comments originating from the military departments must be identified as either "Essential" or "Suggested." Essential comments, which must be accepted or withdrawn, should be supported by test data unless they obviously require no data.

Please return comments to this Center no later than COB 23 April 2003. Any further coordination concerning this document will be circulated only to firms and organizations that furnish comments or reply that they have an interest.

Indicate below your interest and FAX or e-mail, to DSCC-VAT, DSN 850-6939 or commercial 614-692-6939, or e-mail comments to [eugene.ebert@dsc.dla.mil](mailto:eugene.ebert@dsc.dla.mil).

\_\_\_\_\_ CONCUR          \_\_\_\_\_ NO INTEREST          \_\_\_\_\_ WILL REPLY BY DEADLINE  
COMPANY NAME \_\_\_\_\_ POINT OF CONTACT \_\_\_\_\_  
PHONE \_\_\_\_\_ E-MAIL \_\_\_\_\_

If there are any questions, please contact Gene Ebert, phone DSN 850-0729/commercial 614-692-0729, FAX DSN 850-6939/commercial 614-692-6939, DSCC-VAT, P.O. Box 3990, Columbus, OH 43216-5000.

/S/

KENDALL A. COTTONGIM  
Chief  
Electronics Components Team

cc:

James Burke	DSCC-CPAA
Bob Evans	DSCC-VQP
Michael Jones	DSCC-VSC
William Heckman	DSCC-VSS
Dwight Oglesby	DSCC-VQP

## ATTACHMENT 2

### Ebert, Eugene (Gene) A (DSCC)

**From:** Joe Browne [jbrowne@delevan.com]  
**Sent:** Wednesday, April 23, 2003 1:35 PM  
**To:** eugene.ebert@dsc.dla.mil  
**Subject:** Engineering Practices (EP) Study: Proposed Changes to MIL-PRF-39010E and Slash Sheets (/1 thru /10)

Reference: DSCC-VAT (Project Number 5950-1163); API e-mail of 21 January 2003

Comments from Manufacturer (API Delevan)

Mr. Ebert:

In reference to the memorandum of 28 February 2003, the following comments are submitted for review.

1. Marking Legibility .API would prefer to delete the minimum thickness requirement for the amount of silicone resin insulating compound that must be applied to the coils. DSCC's recommendation only satisfies the requirement in a single plane (NOTE: Resin is applied by hand brushing it on to the surface of the coil; there is no automated process at API such that it could be applied to a flat surface and a comparison measurement made) .If the thickness requirement must be maintained, then API will rescind its request to delete the requirement. The method of verification does not become critical if the coating is thick enough across the length of the coil. Measurements can be made in several different directions across the length of the coil. Verification can be achieved if measurements are well above the minimum requirement.
2. Temperature Rise (ambient temperature not specified) .Recommendation is acceptable.
3. Temperature Rise (wrapping wire leads) .Recommendation is acceptable, but separate samples would only be required for temperature rise test. All other tests (except temperature rise) in Qualification Inspection, Group II and Group B Inspection, Subgroup 3, including terminal strength test would utilize the same samples.
4. Resistance to Soldering Heat .Recommendation is acceptable.
5. Low Temperature Storage .Recommendation is acceptable.
6. Moisture Resistance .Mounting method is detrimental to part body and lead integrity. Since leads have to be soldered to the mounting rack, it is very difficult to keep the part bodies in a straight line. The parts have to be in a uniform order so that the mounting strap (including the conductive, moisture resistant, resilient material) can be mounted such that it covers the entire length of all bodies. In accordance with paragraph 4.8.18 of MIL-PRF-39010E, all mounting straps must be removed to perform step 7A of MIL-STD-202, Method 106 test procedure. Unfortunately, parts stick to the conductive material when the mounting material is removed; the bodies are forced upward which places stress on the leads that are already in a fixed position due to being soldered. The cylindrical, corrosion resistant, nonconducting rod that is used to support the coils from underneath does not provide uniform support across the length of the coil. Consequently, what appears to be sufficient contact pressure results in parts cracking. Finally, parts cannot be unsoldered and removed from the mounting rack in sufficient time to perform DWV and IR tests within the allotted time (30 minutes); again, the mounting method does not lend itself to an easy release.

## ATTACHMENT 3

### **Ebert, Eugene (Gene) A (DSCC)**

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**From:** Joe Browne [jbrowne@dniovan.com]  
**Sent:** Wednesday, August 20, 2003 4:37 PM  
**To:** eugene.ebert@dla.mil  
**Subject:** EP Study (MIL-PRF-39010)

Gene:

Initial evaluation is complete in regards to the use of v-notch terminals for the temperature rise test. A sample size of three pieces of P/N M39010/03A220KR was selected for the trial run (the fixture as shown in Figure 7 of MIL-PRF-39010E is tooled for three pieces). Parts were first mounted per the current method which is to wrap each lead one turn around the test fixture terminal and then solder the lead to the terminal. Test was performed. Temperature rise measurements recorded were 11.37°C, 10.27°C, and 10.40°C (Average: 10.68°C). Requirement is 15°C Max. After the test, the parts were then unsoldered, unwrapped, and removed from the terminals. The new V-notch clips were then mounted and soldered to the terminals. The same parts used in the first test were inserted into the clips and then soldered to the clips in the same order as the first test. The leads were NOT wrapped around the terminals or the clips. The leads were in their natural position prior to being soldered to the clips. Test was then performed. Temperature rise measurements recorded were 11.26°C, 11.22°C, and 10.33°C (Average: 10.94°C). Though there is no requirement for tolerance on repeatability, an engineering rule of thumb is that measurements recorded on the same part subjected to repeated tests should be within ±2 degrees of each other. Consequently, the slight differences between readings would be considered normal.

It appears that measurements of parts soldered into the v-notch clips are as reliable as measurements made on parts that are wrapped and soldered to the fixture terminals. The clips are manufactured by Keystone Electronics Corp., Astoria, New York. Reference Keystone Part No. 1268. A data sheet is available for review.

If you have any questions or comments or are in need of further information, please feel free to contact me at your convenience. Thank you.

FW: MIL-PRF-39010 EP STUDY, ALTERNATE COIL MOUNTING METHOD

Page 1 of 3

**Ebert, Eugene (Gene) A (DSCC)**

**From:** Carver, Jeffrey L CECOM LRC LEO [Jeffrey.Carver@us.army.mil]  
**Sent:** Tuesday, January 20, 2004 2:10 PM  
**To:** Ebert, Eugene (Gene) A (DSCC)  
**Subject:** RE: MIL-PRF-39010 EP STUDY, ALTERNATE COIL MOUNTING METHOD

US Army CECOM concurs with the proposed alternate coil mounting method.

Jeff Carver

-----Original Message-----

**From:** Ebert, Eugene (Gene) A (DSCC) [mailto:Eugene.Ebert@dla.mil]  
**Sent:** Friday, December 12, 2003 12:54 PM  
**To:** Jeffrey Carver (E-mail)  
**Subject:** FW: MIL-PRF-39010 EP STUDY, ALTERNATE COIL MOUNTING METHOD

Jeff,  
In your reply to the EP Study on MIL-PRF-39010, you wanted to see specifics on how coils would be mounted if the present test method is changed.

Below is correspondence received from API Delevan concerning the utilization of a notched fixture (Keystone Electronics Corp. p/n 1268) for mounting and data they provided for comparison purposes.

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**From:** Joe Browne [jbrowne@delevan.com]  
**Sent:** Wednesday, December 10, 2003 1:17 PM  
**To:** Ebert, Eugene (Gene) A (DSCC)  
**Subject:** EP Study (MIL-PRF-39010)

Gene:

Per our conversation of 11/24/03, attached is the revised file (Temperature Rise Evaluation.xls) that incorporates the missing "(T-t)" into the formula for calculating temperature rise. My apologies for the delay in sending this file to you. If you have any additional questions or comments, please feel free to direct them to my attention. Thank you.

<<Temperature Rise Evaluation.xls>>

**From:** Joe Browne [jbrowne@delevan.com]  
**Sent:** Friday, November 21, 2003 5:28 PM  
**To:** Ebert, Eugene (Gene) A (DSCC)  
**Subject:** EP Study (MIL-PRF-39010)

Gene:

In regards to the use of the v-notch terminals for the temperature rise test, evaluation is complete on 36 sample pieces (12 pieces per core material). Reference the attached file (Temperature Rise Evaluation.xls) for recorded data. Reference my e-mail message of 8/20/03 for details on

ATTACHMENT 5

4-17-03 11:12:13 1000 2550778

4 2 2

National Aeronautics and  
Space Administration  
**Goddard Space Flight Center**  
Greenbelt, MD 20771



Reply to Attn of:

562

April 17, 2003

Defense Logistics Agency  
Defense Supply Center, Columbus  
ATTN: Eugene Ebert  
Post Office Box 3990  
Columbus, OH 43216-5000

**SUBJECT:** Engineering Practices (EP) Study: Proposed Changes to MIL-PRF-39010E and slash sheets (/1 thru /10).

The proposed changes have been reviewed by members of NASA GSFC's, Parts, Packaging & Assembly Technologies Office (Code 562). Following are their comments:

- 1) Paragraph 4.8.1.3. Agree
- 2) Paragraph 4.8.8 and 4.8.8.1. Agree
- 3) Paragraph 4.8.8.1. Mounting method. The solid device leads equivalent to AWG 22 or AWG 24 should be capable of being solderable to the test fixture terminals as straight leads. If not, agree that splitting samples into two groups is the best solution.
- 4) Paragraph 4.8.10. Users will be using a variety of soldering techniques on these parts (wave, reflow, hand soldering, dip, etc.). Since Condition C is the most stringent, we recommend that it be retained.
- 5) Paragraph 4.8.15. Agree.
- 6) Paragraph 4.8.18. Agree.

Reviewed by: Gerard Kiernan/QSS/Code 562  
Thom Perry/QSS/Code 562

Concurred by: Vinod Patel 4/11/03  
Vinod Patel/NASA/Code 562  
Lead, Project Component Engineering Group

ATTACHMENT 6

AMSAM-RD-SE-TD (700-47d)

Page 1 of 2

**Ebert, Eugene (Gene) A (DSCC)**

**From:** Caylor, Vicky A [Vicky.Caylor@rdcc.redstone.army.mil] *Army - MI*  
**Sent:** Monday, April 28, 2003 8:04 AM  
**To:** 'eugene.berth@dla.mil'  
**Cc:** Readus, Nancy; Command SGS; Stanley, Marcia J; CR (E-mail)  
**Subject:** Engineering Practice Study, MIL-PRF-39010 and Slash Sheets (/1 Th rough /10)

DEPARTMENT OF THE ARMY  
 United States Army Aviation and Missile Command  
 Redstone Arsenal, Alabama 35898-5000

AMSAM-RD-SE-TD

22 Apr 03

MEMORANDUM FOR Defense Logistics Agency, Defense Supply Center Columbus  
 (DSCC-VAT/Mr. Gene Ebert), 3990 East Broad Street, Columbus, OH 43216-5000

SUBJECT: Engineering Practice Study, MIL-PRF-39010 and Slash Sheets (/1 Through /10), Project  
 Number 5950-1163

1. Reference message, E-Mail, Defense Supply Center, Columbus, DSCC-VAT,  
 Mr. Gene Ebert, 6 Mar 03, subject as above.

2. Standardization code MI has a review interest in the subject document with the following essential  
 comments:

a. Paragraph 4.8.1.3, Marking Legibility – Verifying the coating process on a flat surface would not  
 correspond to coating a cylinder. Cross sectioning and measuring the thickness provides the most  
 practical method.

b. Paragraphs 4.8.8 and 4.8.8.1 – Concur with the recommendation on adding ambient temperature  
 to the slash sheets and providing separate samples for temperature rise and terminal strength tests.  
 However, the temperature rise test should then be included in a separate group to provide the final  
 electrical test on units that proceed through the remaining tests (including terminal strength). The  
 terminal strength test method (as well as resistance to soldering heat) does not include an electrical test,  
 and instead relies on the electrical test (final) requirement in the qualification and group B groups.

c. Paragraph 4.8.18 – Retain the time limits on testing after moisture resistance to preclude excessive  
 drying of the test units, which would avoid the intent of the test.

3. Point of contact is Ms. Nancy Readus, nancy.readus@rdcc.redstone.army.mil, commercial 256-876-  
 6990, DSN 746 6990.

FOR THE COMMANDER:

4/28/2003

ATTACHMENT 7

**Ebert, Eugene (Gene) A (DSCC)**

**From:** Brand Frederick I Civ 88 OSS/OSE [Frederick.Brand@wpafb.af.mil]  
**Sent:** Thursday, April 17, 2003 2:53 PM  
**To:** eugene.ebert@dla.mil  
**Subject:** RE: MIL-PRF-39010 ENGINEERING PRACTICES (EP) STUDY

Mr. Ebert,

Air Force 11 submits the below suggested comments to subject EP, numbered respectively.

- 1) No Objections
- 2) Concur
- 3) perhaps the terminal strength test could just be moved before the temperature rise test.
- 4) Concur
- 5) No Objections
- 6) a) Coils should be mounted to simulate their NHA environment.  
There would seem to be a greater chance of moisture effects if coils were mounted.  
b) No Objections  
c) Moisture Resistance: The requirement to test dwtv and insulation resistance within 30 minutes of the conditioning period and performing electrical tests within 8 hours does not appear restrictive to us. The coils need to be tested within a reasonably time period to insure the integrity of the moisture resistance test.

88 OSS/OSE  
Fred Brand  
DSN 986-2568  
frederick.brand@wpafb.af.mil

Original Message

From: Ebert, Eugene (Gene) A (DSCC) [mailto:Eugene.Ebert@dla.mil]  
Sent: Thursday, March 06, 2003 1:55 PM  
To: Beymer, Ken R (DSCC); Brooks, Charles (Charlie) H (DSCC); Burke, James F (DSCC); Evans, Robert (Bob) (DSCC); Jones, Michael C (DSCC); Heckman, William K (DSCC); Oglesby, Dwight U (DSCC); Army .AR (E-mail); Army .CR (E-mail); Army .CR4 (E-mail); Army .MI (E-mail); Navy .AS (E-mail); Navy .EC (E-mail); Navy .MC (E-mail); Air Force .19 (E-mail); --skwan@elcbalt; CG .Navy (E-mail); OS .Navy (E-mail); Air Force .11 (E-mail); 'Sandberg, Vicki'; Snyder, Charles (AFMC LGIS) ; Ken Knapp (E-mail)  
Subject: MIL-PRF-39010 ENGINEERING PRACTICES (EP) STUDY

Everyone,

Please review the below EP Study considering changes to MIL-PRF-39010 and slash sheets 1 thru 10, and provide comments to me by COB 23 April 2003. <<EPStudy.pdf>>

For your information, below is a link to the DSCC web site where DSCC managed Government documents are available:

## Attachment 8

Engineering Practice (EP) Study, MIL-PRF-39010 and slash sheets 1 thru 10

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EP Study #	Subject (paragraph)	Comments summary
1	Marking (4.8.1.3)	Manufacturer (API Delevan) rescinded the request.
2	Ambient temp. (4.8.8)	Complete concurrence was received from all parties.
3	Temp Rise Mounting 4.8.8.1	API Delevan proposed an alternate mounting method utilizing straight leads soldered into a "V" notched clip (Keystone Electronics Corp. p/n 1268). API submitted data comparing the old method and the proposed method and the results have been accepted.
4	Resistance to Soldering Heat (4.8.10)	NASA has requested test condition C be retained as it is the most stringent requirement. Remove paragraph 4.8.10a to avoid any confusion with MIL-STD-202 method 210 test condition C procedures (depth of immersion vs. immersed so board floats).
5	Low Temp. Storage Mounting (4.8.15)	One negative comment was received from the Army. This was resolved through a telephone call.
6a	Moisture Resistance Mounting (4.8.18)	One negative comment was received. The Air Force requested this comment be withdrawn.
6b	Moisture Resistance Polarization (4.8.18)	One negative comment was received. API Delevan requested this comment be withdrawn.
6c	After Moisture Resistance Test Time (4.8.18)	Both the Air Force and Army expressed strong concerns that the time limits remain unchanged.