

ENGINEERING PRACTICES STUDY

TITLE: PROPOSAL TO ADD PART NUMBERS CONTAINING A LEAD FINISH  
DESIGNATORS IN MIL-PRF-19500 SLASH SHEETS

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STUDY PROJECT (SEE ATTACHMENTS 1 - 4)

FINAL REPORT  
5961-2015-066

Study Conducted by DLA LAND AND MARITIME

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I. **OBJECTIVES:** DLA Land and Maritime-VAC conducted an engineering practice study to review a proposal to add additional part numbers containing a lead finish designator to the Part Identification Number (PIN) to MIL-PRF-19500 and its applicable specification sheets. The purpose of the survey was to obtain input from the military services, manufacturers, and user communities to determine whether the following proposals are an acceptable solution for transitioning to PINs with a lead finish designator while ensuring compatibility with logistics support of legacy devices.

II. **BACKGROUND:** MIL-PRF-19500 currently does not require the lead finish to be specified in the PIN on JAN branded parts, or provide any guidance as an option for including lead finish in the part marking. We have received many requests to add this lead finish information to the device PINs. A previous survey was sent out requesting feedback on adding lead finish to the existing device PIN or compiling a list of default lead finishes on the QPDSIS. The survey participants did not feel that changing the historical existing device PINs was the best option. This change would have affected a large amount of existing parts lists and military drawings requiring a large amount of resources. As a result of the previous study, the default lead finish for each qualified device was added to the MIL-PRF-19500 QPL listing (QPDSIS) to help identify the default lead finish for each device.

[http://www.landandmaritime.dla.mil/Downloads/QPLQML/19500/QPDSIS\\_19500.pdf](http://www.landandmaritime.dla.mil/Downloads/QPLQML/19500/QPDSIS_19500.pdf)

The following four items (Pin Format, Logistics support, Marking, and Default lead finish) were proposed during this EP study.

1. **Pin Format.** This new proposal will make the historical device PINs inactive on MIL-PRF-19500 specification sheets while adding duplicate PINs that will contain a lead finish designator. This will allow a user to order a specific lead finish by a PIN instead of listing the required lead finish in the acquisition document. The original device PINs will remain in the specification sheet for a transition period to alleviate the concerns mentioned in the results of the previous survey. Over time, existing non-defined lead finish PINs could eventually be replaced by the duplicate PINs that contain the lead finish suffix. All new devices incorporated into MIL-PRF-19500 specification sheets will also contain this lead finish suffix. The lead finish designator will be preceded by a "-" and be located at the very end of the PIN so it will not be associated with other similar suffixes. See **Attachments 1 - 3** for proposed additions to MIL-PRF-19500.

We will transition PINs that do not contain the lead finish suffix to "Inactive for new design" and create a substitution table in each specification sheet. See **Attachment 4**. For devices which are currently produced with multiple lead finishes, a lead finish will be selected for the superseding PIN that represents similar package and quality level combinations.

The previous lead finish study indicated that the majority of the users require devices with solder (-A), gold (-C), or silver (-J) designation. The new listing of default lead finishes on the QPDSIS also only reflects these finishes. Solder dip and solder plate have been combined to only specify only "solder".

2. **Logistics support.** Because a National Stock Number (NSN) can have only one controlling Reference Number, either the non-definitive lead finish Reference Number can be updated to a definitive lead finish Reference Number or, the old NSN would get replaced with an NSN with a definitive lead finish NSN. Substitutability information would also be added to the NSN to ensure proper replacement of historical NSN.

3. **Marking.** The lead finish suffix will not be required to be marked on the device itself but will still be included in the PIN on the slash sheet, on the device packaging, and traceability documents.

4. **Default lead finish.** The default lead finish listing currently in the QPDSIS will remain valid for the historical device PINs and will be used in conjunction with the substitution table that will be added to the slash sheets. When inventory of the old device type (without the lead suffix) is depleted and new device types (with the lead finish suffix in the PIN) are qualified, the default lead finish information along with the old device type will be removed from the QPDSIS.

III. **RESULTS:** The EP study requested input on the following four items (Pin Format, Logistics support, Marking, and Default lead finish). The comments received by DLA Land and Maritime have been reviewed and indicate that the majority of military services, manufacturers, and users did concur with the four proposed items.

One of the main concerns brought up was the objection to the original proposal of requiring the lead finish suffix to be marked on the device. This proposal impacted a few manufacturers standard product flow which allows for the parts to be marked and stored in inventory for future sale. Once the parts are ordered, any subsequent lead finish can be performed prior to shipment at a later time. As a result, we then changed the proposal to require the lead finish designator to only be part of the PIN and external packaging and not as a mandatory part of the device marking. This change would allow the manufacturer to perform an alternate lead finish before shipping, as long as it is accounted for in the production traveler, to maintain the flexibility of their inventory and better customer response. This proposal is similar to the flow used by the military capacitors. (Their devices are stocked unfinished and then when an order is placed they choose from a few lead types and finishes to complete the capacitor.) The C of C that gets shipped with the devices would then include the updated PIN with the lead finish that represents the type of finish that they are shipping.

Another concern received was being able to still order the historical device PIN. In addition to adding the superseding PIN with the lead finish, we are proposing to keep the historical part numbers on the slash sheet but list them "inactive for new design" so they can still be ordered if needed. If the historical part is ordered but is not available, then a new table inserted in the slash sheet would dictate what part number would be received in its place. In the table, the historical device would be matched up with the most common version (lead finish) that was supplied in the past and provide the new part number that will include the lead finish suffix. Historically, in most cases, there was only one lead finish used for each device type. For the instances where there were more than one lead finish used, the table would show which one would be the default. The table will also provide guidance and justification for incoming inspection and receiving for instances when the historical PIN is ordered, but the new PIN with the lead finish is received. After the new PIN with the lead finish has been added to the slash sheet, we are proposing a one year implementation date for the lead finish change for the manufacturer. This replacement proposal is very similar to how the "-1" devices were introduced into the slash sheets replacing the "non -1" devices. The devices without the "-1" were kept in the slash sheet for reference and the "-1" devices were listed as the preferred device (See MIL-PRF-19500/116 for -1 example replacement information).

We received one comment to add (-N) for nickel as one of the lead finish designators.

IV. **CONCLUSIONS:** Based on the comments received we will incorporate the proposals herein into the next proposed amendment of MIL-PRF-19500.

V. **RECOMMENDATIONS:** DLA Land and Maritime recommends that the accepted proposed changes of this EP Study be incorporated in the next revision/amendment of MIL-PRF-19500.

**Attachment 1 - Addition to MIL-PRF-19500 to define lead finish suffix.**

1.3.7 Suffix letters. The following suffix letters may be incorporated in the military part number as applicable.

A, B, C, etc. (except L, M, R, S, U, P)	Indicates a modified version which is substitutable for the basic numbered (non-suffix) device.
M	Indicates matching of specified parameters of separate devices.
R	Indicates reverse polarity packaging of the basic numbered device.
L or S	Indicates that the terminal leads are longer or shorter, respectively, than those of the basic numbered device.
P	Indicates particle impact noise detection (PIND) screened devices (JANTX, and JANTXV only).
U	Indicates unleaded or surface mounted devices (different package configurations may also include a suffix letter).
UR	Indicates unleaded or surface mounted (round end-cap diodes).
US	Indicates unleaded or surface mounted (square end-cap diodes).
T1, T2, T3, U1, U2, UB, etc.	Indicates package identifier (see H.5)
-1	Indicates metallurgical bond.
	<b>Lead finish</b>
-A	Indicates solder lead finish
-C	Indicates gold lead finish
-J	Indicates silver lead finish
-N	Indicates nickel lead finish

Suffix letter(s), except for P, must be used and marked on the device only when specific device types are covered by the applicable specification sheet requiring the suffix letters (see 3.10.6). Suffix letters must be used in the order of appearance in the table. Tolerance must be listed before any case outline designator. A reverse designation must be listed after any part tolerance listing.

3.9 Lead and terminal finish. The lead and terminal finish shall be in accordance with appendix H herein. **The lead finish shall be designated in the PIN in accordance with 1.3.7.** The lead finishes applicable to this specification sheet are listed on QPDSIS-19500.

3.10.6 PIN. Each semiconductor device shall be marked with the type designation which shall be formulated as shown in 1.3. If the device size does not allow the complete PIN to be marked on the device, the component designation portion (see 1.3.5) shall be omitted first, followed by the quality level. RHA designators will be included to the abbreviated PIN as appropriate. **The lead finish suffix is not required to be marked on the device.**

**Attachment 2** - Addition to MIL-PRF-19500 to inform users that they need to include the preferred lead finish when ordering legacy devices. This is the current requirement if users need a specific lead finish. The new wording takes into account that the new part numbers will have the lead finish information included and will not be needed as additional information when ordering.

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, and date of this specification.
- b. Packaging requirements (see 5.1).
- c. PIN (see 1.3).
- d. Number of the applicable specification sheets (see 3.1). For additional information on PINs, contact DLA Land and Maritime, ATTN: VAC, P.O. Box 3990, Columbus, OH 43218-3990, or <http://www.dla.mil/Programs/MILSpec/DocSearch.aspx>.
- e. Lead formation, length, finish, if other than that specified, or when a choice is required by the device application.
- f. Data requirements, when applicable.
- g. Specify point of shipment.
- h. PIND screening when required.
- i. Date code and specification revision letter should not be restricted by the acquisition documents (see 3.10.8).

6.2.1 Order requirements. The date code and specification revision letter should not be restricted by the acquisition documents (see 3.10.8). The JAN brand or the abbreviations (see 3.10.6.1) must not be used on any semiconductor device acquired under contracts which permit or require any changes to this specification or the applicable specification sheet, except for:

- a. Lead length.
- b. Lead finish, when ordering device part numbers that do not include a lead finish suffix (see 1.3.7).
- c. PIND testing. PIND screening to requirements beyond those specified herein may be performed only when imposed by the acquisition document upon the component manufacturer. A new PIN will be created in accordance with 1.3 and 3.10.3. Devices which pass such screens may be JAN branded or may retain the JAN brand if already marked. All devices failing such screens must not be JAN branded or, if already marked, must have the JAN brand removed or the device destroyed. PIND screening will follow the flow outlined in Figure E-4 unless otherwise specified by the customer.
- d. Lead forming (see E.5.3.4 and E.5.4.2). The forming of leads must not be performed except for specific customer orders where the lot is controlled throughout processing by specific lot travelers. The bend must not be closer than .050 inch (1.27 mm) to the lead to package seal.
- e. Additional marking.

Attachment 3

H.4.2 Lead and terminal finish. In addition to the requirements of H 4.1, all leads and terminals, except those intended to be attached using threaded fasteners, shall be solderable in accordance with test method 2026 of MIL-STD-750. Combinations of pre-plate electroplate and/or electroless nickel shall not exceed 650 microinches total. See table H-II for a list of standard lead finishes. If the customer **orders legacy device part numbers that do not include a lead finish suffix, and** requires a specific lead finish it must be specified on the acquisition document.

TABLE H-II. Guideline for standard lead finishes.

SnPb, dipped or plated	Au plated.
Cylinder style with leads through the base: TO-18, TO-5, TO-39, TO-46, TO-72 etc. (JAN, TX, TXV, JANS as applicable)	Cylinder style with leads through the base: TO-18, TO-5, TO-39, TO-46, TO-72 etc. (JANS only)
Rectangular leaded devices: TO-254, TO-257.	Ceramic Surface Mount U, U1, U2, U3, U4, U5, UA, UB
Heat sink mounted TO packages: TO-3, TO-66, TO-59, TO-63	14 lead flat pack TO-86, all quality levels
Stud mounted rectifiers: DO-4, DO-5, DO-8, DO-9	
All axial and MELF SMD's. DO-35, DO-35UR, DO-7, DO-213	
10, 14 and 16 lead ceramic DIPs	

~~1/ This table is only provided for a guideline of typical case outline finishes, manufacturers may provide any finish specified in section H.4 herein. If the customer requires a specific lead finish it shall be specified on the acquisition document.~~

1/ For devices that do not contain the lead finish suffix in the part number, this table may be used as a guideline of typical case outline finishes. Manufacturers may provide any finish specified in section H.4 herein. A complete list of default lead finishes are available on the QPDSIS (See 3.9). If the customer requires a specific lead finish it shall be specified on the acquisition document.

2/ For devices that contain the lead finish suffix in the part number. The lead finish designated in the part number supersedes this table.

Attachment 4 – Example paragraphs that will be added to the individual specification sheets.

Front page title block - part numbers that do not have a lead finish suffix will be listed as inactive in a text box below the title section.

The requirements for acquiring the product described herein shall consist of this specification sheet and MIL-PRF-19500.

Types 1N5283-1, 1N5283UR-1 are inactive for new design. See 6.4.X

3.4.1 **Lead finish.** Lead finish shall be solderable in accordance with MIL-PRF-19500, MIL-STD-750, and herein. Where a choice of lead finish is desired, when ordering devices without a lead finish suffix, it shall be specified in the acquisition document (see 6.2).

6.4.1 **Cross-reference of lead finish suffix Pins.** Legacy Non-lead finish suffix devices do not indicate the lead finish in the PIN and are inactive for new design. Lead finish suffix devices supersede legacy non-lead finish suffix devices and are preferred. There has been no change to the device, the lead finish information will now be represented as a suffix of the PIN. For Government logistic support, the devices containing the new lead finish suffix PIN will be supplied to the end user if the legacy PIN is ordered and no longer available.

\*(For devices that are only available in a certain lead finish then that finish will be represented in the cross reference table.)

Legacy PIN		Superseding PIN
JAN1N5283-1		JAN1N5283-1-A
JAN2N2222A		JAN2N2222A-A
JANS2N2222A		JANS2N2222A-C
JAN2N2222AUB		JAN2N2222AUB-A
JANS2N2222AUB		JANS2N2222AUB-C
JANTX2N5002	1/	JANTX2N5002-A
JANS2N5002		JANS2N5002-C

\*(In some cases, legacy devices were produced with multiple lead finishes from the same, or different, manufacturers using a single PIN. When this is the case the note below will be added to the supersession table in the slash sheet.)

1/ This part number is known to be supplied using multiple lead finishes. For these devices, a lead finish was selected for the superseding PIN that represented similar packages and quality levels combinations. See the [QPDSIS-19500](#) for a full list of available lead finishes for this part number.