

ENGINEERING PRACTICE STUDY

TITLE: QUALIFICATION REQUIREMENTS FOR
TERMINATION FINISHES IN MIL-PRF-32535

26 March 2021

FINAL REPORT

Study Conducted by DLA Land and Maritime

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I. OBJECTIVE: An engineering practices study has been conducted to solicit feedback from ceramic capacitor manufacturers and users regarding a proposal to add an extension of qualification allowance for the various termination finishes offered in [MIL-PRF-32535](#) (Capacitor, Chip, Fixed, Ceramic Dielectric (Temperature Stable and General Purpose), Extended Range, High Reliability and Standard Reliability, General Specification for).

II. BACKGROUND: Prior to 2015, the military ceramic capacitor chip specifications ([MIL-PRF-55681](#) and [MIL-PRF-123](#)) did not address qualification requirements for the various termination finishes offered. Qualification of termination finishes was based on informal agreements between the manufacturers and the qualifying activity.

During the development of [MIL-PRF-32535](#), the following requirement was introduced:

A.3.1.5 Termination. Termination qualification will be restricted to that submitted.

Strictly interpreted, qualification testing of each termination finish is required each time a larger capacitance value is submitted for qualification testing. This was not the intent of paragraph A.3.1.5; therefore, DLA Land and Maritime is proposing the addition of an extension of qualification based on the capacitor groups defined in table A-I:

A.3.1.5 Termination. Termination qualification will be restricted to that submitted. Qualification of a termination in any capacitor size will extend to all capacitance values, voltage ratings, and voltage-temperature limits / temperature characteristic in that same size (i.e., specification sheet). Qualification of a termination in any size will also extend to smaller sizes within the applicable qualification group (see table A-I).

TABLE A-I. Qualification groups.

Group	Capacitor sizes
1	Smaller than 0805 (/1, /2, and /3)
2	0805 and larger (/4, /5, /6, /7, and /8)
3	0306 (/9) and 0508 (/10)
4	IDCs (/11, /12, and /13)

A similar extension of qualification was coordinated and accepted into revision E of [MIL-PRF-123](#) in 2020:

E.4.5 Termination. Termination qualification shall be restricted to that submitted. Qualification of a termination in any style will extend to all capacitance values, voltage ratings, and voltage-temperature limits in that same style. Qualification of a termination in any style will also extend to styles with smaller case sizes.

III. RESULTS: Recipients of the study were asked to provide comments to john.bonitatibus@dla.mil. There were no objections to the proposal; however, a qualified source (KEMET Corporation) submitted wording that they feel would provide additional clarification:

KEMET recognizes that there is a need to provide clarification on the wording in paragraph A.3.1.5 since a potential interpretation could imply that samples from all possible terminations could be required for every single qualification part on every qualification which was not the original intent. While the proposed wording would specify that qualification of terminations on larger case sizes would cover smaller ones, there are still challenges that may arise. If we do not clarify this wording, then KEMET feels that may limit the number of Termination types offered going forward due to the time and costs involved in the qualification efforts.

KEMET would propose the following comments for consideration.

For Initial Qualifications, the proposed wording may be appropriate with the following clarification:

1) Applicable Group III tests from TABLE XIV (Qualification inspection) shall be performed on each termination type for which qualification is requested. The balance of the qualification testing can be performed on a single termination.

Because of the unique structure of the available products in MIL-PRF-32535 with multiple voltages allowed for the same capacitance value, there will continue to be expansions to the product offerings. In some cases, these expansions will be limited to single case sizes, so there will be confusion at that point on what terminations should be done if larger case sizes have already been qualified and are not included in that specific addition. This could also be applicable to smaller qualifications as a result of process changes that are not applicable to the entire product range. Therefore, KEMET proposes that the wording above apply to Initial Qualifications. A separate sentence could be added that states the following: Termination inclusion in expansions of current product offerings or due to process changes will be negotiated with DLA to determine applicability.

IV. CONCLUSIONS: Military and industry representatives agree with the proposed addition of an extension of qualification allowance for the various termination finishes offered in [MIL-PRF-32535](#). However, a qualified source suggests additional wording be added to the original proposal for clarification.

V. RECOMMENDATIONS: DLA Land and Maritime recommends that an extension of qualification allowance for the various termination finishes offered in [MIL-PRF-32535](#) be added during the next specification action. The proposed additional wording offered by a qualified source will be considered at that time.