

Specification for

Capability approval for custom-built capacitors and capacitor modules: Generic data and methods of test

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Foreword

This British Standard, which has been prepared under the direction of the Electronic Components Standards Committee, is the generic specification for custom-built capacitors and capacitor modules in the BS 9000 system of standards for electronic parts of assessed quality.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 20 and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

0 Introduction

This British Standard is the generic specification for custom-built capacitors and capacitor modules which are not appropriate for assessment under qualification approval for one or more of the following reasons.

- a) Each type is designed for a particular customer requirement.
- b) Each type requires an individual specification to satisfy the particular customer's needs.
- c) The customer requirement cannot be satisfied from a standard range capable of qualification approval.

Capacitors in these categories are termed custom-built capacitors. Examples of custom-built capacitors are those having package and/or fixing and termination arrangements peculiar to a particular customer's application or capacitors requiring a specialized process to achieve a particular customer functional requirement, etc.

Section 1. Principles and mandatory procedures

1.1 General matters

1.1.1 Scope. This specification gives details of the general requirements, test procedures and other information relating to the capability approval of manufacturers of custom-built capacitive units. The units included in the definition of the capability for which approval is sought may have either a single or multi-capacitor function, as described in 1.1.1.1 and 1.1.1.2.

1.1.1.1 Custom-built capacitors. This standard covers custom-built capacitors of the following types.

- a) Types performing a single capacitive function and manufactured using one or more capacitive elements (see 1.1.3.1) permanently electrically interconnected such that only one pair of lead-outs (see 1.1.3.2) is available for circuit connection and electrical test purposes.
- b) Types performing only a capacitive function, even when incorporating any add-on component (see 1.1.3.3).

1.1.1.2 Custom-built capacitor modules. This standard covers custom-built capacitor modules of the following types.

- a) Assemblies of capacitors performing a multi-capacitive function and manufactured using two or more capacitors or capacitive elements, permanently electrically interconnected such that sufficient lead-outs are available to allow measurement of all specified capacitive functions of the module for circuit connection and electrical test purposes.
- b) Types performing only capacitive functions, even when incorporating any add-on component.

1.1.2 Related documents

BS 1852, (IEC 62) *Marking codes for resistors and capacitors.*

BS 2011, (IEC 68) *Environmental testing.*

BS 2045, (ISO 3) *Preferred numbers.*

BS 2488, (IEC 63) *Schedule of preferred numbers for the resistance of resistors and the capacitance of capacitors for telecommunication equipment.*

BS 3939, (IEC 617) *Graphical symbols for electrical power, telecommunications and electronics diagrams.*

BS 4727, *Glossary of electrotechnical, power, telecommunications, electronics, lighting and colour terms.*

BS 5775, *Specification for quantities, units and symbols.*

BS 6001, (ISO 2859) *Sampling procedures for inspection by attributes — Part 1: Specification for sampling plans indexed by acceptable quality level (AQL) for lot-by-lot inspection.*

BS 9000, *General requirements for a system for electronic components of assessed quality — Part 1: Specification of general procedures.*

BS 9070, *Specification for fixed capacitors of assessed quality: generic data and methods of test.*

BS CECC 30000, *Harmonized system of quality assessment for electronic components. Generic specification: Fixed capacitors.*

BS CECC 30100, *Harmonized system of quality assessment for electronic components. Sectional specification: Fixed polyethylene terephthalate film dielectric metal foil capacitors for direct current.*

BS CECC 30500, *Harmonized system of quality assessment for electronic components: Sectional specification: Fixed metallized polycarbonate film dielectric capacitors for direct current.*

PD 9002, *BS 9000, IECQ and CECC qualified products list.*

1.1.3 Terminology. For the purposes of this British Standard, the definitions given in BS 4727 apply together with the following.

1.1.3.1 capacitive element. An element that is either:

- a) a BS 9000 or BS CECC qualification approved capacitor; or
- b) a part-manufactured capacitor falling within the boundaries and technologies of the manufacturer's own declared capability approval.

1.1.3.2 lead-outs. Any electrical connections that are available for circuit connection and electrical test purposes.

1.1.3.3 add-on components. Components other than capacitors that are essential to the customer requirements that do not change the capacitive function of the item. Such components shall be permanently attached to the assembly both mechanically and electrically. They are acceptable for incorporation only when procured in accordance with 3.3 of BS 9000-5:1989.

1.1.4 Letters, symbols, signs and abbreviations. The letters, symbols, signs and abbreviations which are employed in all documents applicable to electronic components covered by this specification shall be in conformity with BS 5775 or shall be derived in accordance with the principles of that standard.

1.1.5 Graphical symbols. The graphical symbols which are employed in all documents applicable to electronic components covered by this specification shall be in accordance with BS 3939 or shall be derived in accordance with the principles of that standard.

1.1.6 Marking of the component and package

1.1.6.1 Each custom-built capacitor or capacitor module shall be marked with a) and b) and with as many of the remaining items, in the order given below, as is practicable.

- a) Polarity (electrolytic capacitors only).
- b) Rated capacitance and tolerance (these values may be in code form in accordance with BS 1852 (IEC 62).
- c) Rated voltage (d.c. and/or a.c.).
- d) Date code and lot identification (see 4.2 of BS 9000-7:1989).
- e) Manufacturer's name or trade mark.
- f) Number of the detail specification and (where necessary) pattern number.
- g) Any additional marking required by the detail specification.

1.1.6.2 All the information required by 1.1.6.1 shall be marked on the package of the components.

NOTE Where a transparent package is used, the information may be marked on a label which may be read without opening the package.

1.1.7 Eligibility for capability approval. The primary stage of manufacture of a capacitor or capacitor module is that at which the primary performance of the capacitor is determined and is defined as:

- a) the winding of the element of a wound type;
- b) the stacking of the plates of a plate type;
- c) the formation of the oxide layer of an electrolytic type;
- d) the application of the electrodes to a single layer dielectric capacitor plate, disc, tube or similar construction.

NOTE The requirements of 3.3.5 of BS 9000-5:1989 do not apply to custom-built capacitive elements, capacitors or capacitor modules.

1.1.8 Delayed delivery. The period following manufacturer's acceptance inspection, after which reinspection to group A is required, shall be as follows.

- a) Aluminium electrolytic capacitors (all types): 12 months.
- b) All other capacitors of climatic category -/-/04 and -/-/A4: 12 months.
- c) All other capacitors of any type or climatic category: 24 months.

NOTE At the discretion of the manufacturer, aluminium electrolytic capacitors may be subjected to conditioning in accordance with the requirements of the relevant sectional specification prior to retesting to group A inspection.

1.1.9 Certified test records. Not applicable.

1.1.10 Preferred climatic categories. The custom-built capacitors and capacitor modules covered by this document are classified into climatic categories according to the general rules given in BS 2011 and should be selected from the following preferred climatic categories:

Lower category temperature: – 55 °C to – 25 °C;

Upper category temperature: 70 °C to 125 °C;

Damp heat steady state: 4 days to 56 days.

1.1.11 Unchecked parameters. Unchecked parameters are not used for inspection purposes and consistent performance under such conditions cannot be relied upon.

1.1.12 Ordering information. See customer detail specification.

1.1.13 Release prior to completion of group B tests. Not applicable.

1.1.14 Supplementary procedures for reduced inspection. The procedures of 9.3.3 of BS 6001-1:1991 are applicable.

1.1.15 Rectification. Rework shall only be permitted within the procedures declared in the manufacturer's approved capability manual.

Such procedures have to demonstrate, to the satisfaction of the supervising inspectorate, that the subsequent reliability of the component as supplied to the customer is not thereby impaired.

1.2 Test procedures

Test methods shall be selected from BS 9000 series or CECC specifications.

1.3 Capability approval and maintenance procedures

A manufacturer wishing to supply custom-built capacitors and capacitor modules in accordance with this standard is required:

- a) to conform to the provision and requirements of clause 2 of BS 9000-4:1989.
- b) to obtain approval of his production capability using a declared technology in accordance with the procedures and requirements given in clause 3 of BS 9000-6:1989, together with the following:
 - 1) description of capability: capability manual;
 - 2) programme for capability assessment;
 - 3) performance for capability assessment programme;
 - 4) abstract of description of capability for publication in PD 9002;
 - 5) capability approval report;
 - 6) quality conformance inspection.

1.3.1 Description of capability. Manufacturers shall describe the scope and extent of their capability by means of a capability manual compiled in accordance with clause 3 of BS 9000-6:1989 and as required in the sectional specifications.

Each manufacturer seeking approval is required to declare the scope of his application in terms of the items shown in Figure 1.

1.3.2 Programme for capability approval. The manufacturer shall prepare a programme for the assessment of the declared capability to the satisfaction of the National Supervising Inspectorate (NSI). This programme shall be so designed that all the declared boundary conditions and range of products of the capability will be assessed and shall include the following:

- a) details of the capability qualifying components (CQCs) to be used;
- b) details of the inspection requirements for these components including stress levels, where appropriate, and all relevant test limits.

The extension of capability approval to cover changes in technology and/or extension of the ranges of products may occur. Such extensions shall be supported by the satisfactory outcome of a product assurance programme covering the required extension.