

Harmonized system of quality
assessment for electronic components

Fixed capacitors for use in electronic equipment — Sectional specification for fixed capacitors of ceramic dielectric, class 1

Committees responsible for this British Standard

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- British Telecommunications plc
- EEA (the Association of Electronics, Telecommunications and Business Equipment Industries)
- Electronic Components Industry Federation
- Ministry of Defence
- National Supervising Inspectorate
- Society of British Aerospace Companies Limited

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Contents

	Page
Committees responsible	Inside front cover
National foreword	iii
Section 1. General	
1 General	1
1.1 Scope	1
1.2 Object	1
1.3 Related documents	1
1.4 Information to be given in a detail specification	1
1.5 Terminology	2
1.6 Marking	3
Section 2. Preferred ratings and characteristics	
2 Preferred ratings and characteristics	4
2.1 Preferred characteristics	4
2.2 Preferred values of ratings	4
Section 3. Quality assessment procedures	
3 Quality assessment procedures	7
3.1 Primary Stage of Manufacture	7
3.2 Structurally Similar Components	7
3.3 Certified Records of Released Lots	7
3.4 Qualification Approval	7
3.5 Quality Conformance Inspection	14
Section 4. Test and measurement procedures	
4 Test and measurement procedures	16
4.1 Visual examination and check of dimensions	16
4.2 Electrical tests	16
4.3 Temperature coefficient (∞) and temperature cyclic drift of capacitance	17
4.4 Robustness of terminations	17
4.5 Resistance to soldering heat	17
4.6 Solderability	18
4.7 Rapid change of temperature	18
4.8 Vibration	18
4.9 Bump	18
4.10 Shock	19
4.11 Climatic sequence	19
4.12 Damp heat, steady state	20
4.13 Endurance	21
4.14 Component solvent resistance	22
4.15 Solvent resistance of the marking	22
Appendix A Figures with limits of variation of capacitance with temperature for certain temperature coefficients and classes	23
Figure 1	23
Figure 2	24
Figure 3	25
Figure 4	26
Figure 5	27
Figure 6	28

	Page
Figure 7	29
Figure 8	30
Figure 9	31
Figure 10	32
Figure 11	33
Figure 12	34
Figure 13	35
Figure 14	36
Figure 15	37
Table I	4
Table II	5
Table III	6
Table IV — Sampling plan together with numbers of permissible defectives for qualification approval tests, assessment level E	9
Table V — Test schedule for Qualification Approval	10
Table IV A	15
Table IV B	15
Publication(s) referred to	Inside back cover

National foreword

This British Standard has been prepared under the direction of the Electronic Components Standards Policy Committee. It is identical with IEC 384-8:1988 *“Fixed capacitors for use in electronic equipment. Part 8: Sectional specification: Fixed capacitors of ceramic dielectric, class 1”* published by the International Electrotechnical Commission (IEC). IEC 384-8, also designated QC 300600, is a harmonized specification in the IECQ system for electronic components of assessed quality.

IEC 384-8 was prepared by IEC Technical Committee No. 40 “Capacitors and resistors for electronic equipment” and the United Kingdom participation in the drafting was provided by Technical Committee ECL/4 “Capacitors and resistors for electronic equipment”.

Cross-references

International Standard	Corresponding British Standard
ISO 3:1973	BS 2045:1965 <i>Preferred numbers</i> (Technically equivalent)
IEC 62:1974	BS 1852:1975 <i>Specification for marking codes for resistors and capacitors</i> (Identical)
IEC 63:1963	BS 2488:1966 <i>Schedule of preferred numbers for the resistance of resistors and the capacitance of capacitors for telecommunication equipment</i> (Technically equivalent)
IEC 68	BS 2011 <i>Environmental testing</i>
IEC 384-1:1982	BS 9930 <i>Harmonized system of quality assessment for electronic components. Fixed capacitors for use in electronic equipment</i> Part 0:1983 <i>Generic specification</i> (Identical)
IEC 384-8-1:1988	BS QC 300601:1992 <i>Harmonized system of quality assessment for electronic components. Fixed capacitors for use in electronic equipment. Blank detail specification for fixed capacitors of ceramic dielectric, class 1. Assessment level E^a</i> (Identical)
IEC 410:1973	BS 6001 <i>Sampling procedures for inspection by attributes.</i> Part 1:1991 <i>Specification for sampling plans indexed by acceptable quality levels (AQL) for lot-by-lot inspection</i> (Technically equivalent)
QC 001002:1986	BS QC 001002:1991 <i>Rules of Procedure of the IEC Quality Assessment System for Electronic Components (IECQ)</i> (Identical)

^a In preparation.

The British Standard which implements the IECQ Rules of Procedure is BS 9000 *“General requirements for a system for electronic components of assessed quality”* Part 3:1991 *“Specification for the national implementation of the IECQ System”*.

The Technical Committee has reviewed the provisions of QC 001001 to which reference is made in the text and has decided that they are acceptable for use in conjunction with this standard.

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 38, an inside back cover 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.

Section 1. General

1 General

1.1 Scope

This standard is applicable to fixed capacitors of ceramic dielectric with a defined temperature coefficient (dielectric Class 1), intended for use in electronic equipment, including leadless capacitors but excluding multilayer ceramic chip capacitors¹⁾.

1.2 Object

The object of this standard is to prescribe preferred ratings and characteristics and to select from IEC Publication 384-1:1982 the appropriate quality assessment procedures, tests and measuring methods and to give general performance requirements for this type of capacitor. Test severities and requirements prescribed in detail specifications referring to this sectional specification shall be of equal or higher performance level because lower performance levels are not permitted.

1.3 Related documents

IEC Publications:

Publication 62:1974	<i>Marking Codes for Resistors and Capacitors.</i>
Publication 63:1963	<i>Preferred Number Series for Resistors and Capacitors.</i>
	Amendment No. 1 (1967)
	Amendment No. 2 (1977)
Publication 68:	<i>Basic Environmental Testing Procedures.</i>
Publication 384-1:1982	<i>Fixed Capacitors for Use in Electronic Equipment. Part 1: Generic Specification.</i>
	Amendment No. 2 (1987)
Publication 410:1973	<i>Sampling Plans and Procedures for Inspection by Attributes.</i>
Publication QC 001001:1986	<i>Basic Rules of the IEC Quality Assessment System for Electronic Components (IECQ).</i>
Publication QC 001002:1986	<i>Rules of Procedure of the IEC Quality Assessment System for Electronic Components (IECQ).</i>

ISO Publication:

ISO Standard 3:1973, *Preferred Numbers — Series of Preferred Numbers.*

NOTE The above references apply to the current editions except for IEC 68, of which the referenced edition in the applicable test clauses of the generic specification shall be used.

1.4 Information to be given in a detail specification

Detail specifications shall be derived from the relevant blank detail specification.

Detail specifications shall not specify requirements inferior to those of the generic, sectional or blank detail specification. When more severe requirements are included, they shall be listed in Sub-clause 1.9 of the detail specification and indicated in the test schedules, for example by an asterisk.

NOTE The information given in Sub-clause 1.4.1 may for convenience, be presented in tabular form.

The following information shall be given in each detail specification and the values quoted shall preferably be selected from those given in the appropriate clause of this sectional specification.

1.4.1 Outline drawing and dimensions

There shall be an illustration of the capacitor as an aid to easy recognition and for comparison of the capacitor with others. Dimensions and their associated tolerances, which affect interchangeability and mounting, shall be given in the detail specification. All dimensions shall preferably be stated in millimetres, however when the original dimensions are given in inches, the converted metric dimensions in millimeters shall be added.

¹⁾ Which are covered by IEC Publication 384-10.

Normally the numerical values shall be given for the length of the body, the width and height of the body and the wire spacing, or for cylindrical types, the body diameter, and the length and diameter of the terminations. When necessary, for example when a number of items (capacitance values/voltage ranges) are covered by a detail specification, the dimensions and their associated tolerances shall be placed in a table below the drawing.

When the configuration is other than described above, the detail specification shall state such dimensional information as will adequately describe the capacitor. When the capacitor is not designed for use on printed boards, this shall be clearly stated in the detail specification.

1.4.2 Mounting

The detail specification shall specify the method of mounting to be applied for normal use and for the application of the vibration and the bump or shock tests. The capacitors shall be mounted by their normal means. The design of the capacitor may be such that special mounting fixtures are required in its use. In this case the detail specification shall describe the mounting fixtures and they shall be used in the application of the vibration and bump or shock tests.

1.4.3 Ratings and characteristics

The ratings and characteristics shall be in accordance with the relevant clauses of this specification, together with the following:

1.4.3.1 Rated capacitance range

See Sub-clause 2.2.4.1

NOTE When products approved to the detail specification have different ranges, the following statement should be added: "The range of values available in each voltage range is given in the qualified products list".

1.4.3.2 Particular characteristics

Additional characteristics may be listed, when they are considered necessary to specify adequately the component for design and application purposes.

1.4.3.3 Soldering

The detail specification shall prescribe the test methods, severities and requirements applicable for the solderability and the resistance to soldering heat tests.

1.4.4 Marking

The detail specification shall specify the content of the marking on the capacitor and on the package. Deviations from Sub-clause 1.6 of this sectional specification, shall be specifically stated.

1.5 Terminology

In addition to the applicable terms and definitions of IEC Publication 384-1 the following definitions apply:

1.5.1 Fixed capacitors of ceramic dielectric, Class 1

A capacitor specially designed and suited for resonant circuit application where low losses and high stability of capacitance are essential or where a precisely defined temperature coefficient is required e.g. for compensating temperature effects in the circuit. The ceramic dielectric is defined by its rated temperature coefficient (α).

1.5.2 Sub-class

For a given rated temperature coefficient the sub-class is defined by the rated tolerance on the temperature coefficient (see Table II, Sub-clause 2.2.5.3).

NOTE The rated temperature coefficient value and its tolerance refer to the temperature interval of + 20 °C to + 85 °C but because in practice TC curves are not strictly linear, it is necessary to define limiting capacitance deviations ($\Delta C/C$) for other temperatures (see Table III), Sub-clause 2.2.5.3). The same information is expressed in graphical form in Figure 1 to Figure 15. These figures enable the user to form an estimate of the value and tolerance of $\frac{1}{C} \left(\frac{dC}{dT} \right)_T$, the incremental temperature coefficient at a given temperature

T, though this quantity is not required specifically to be measured in the test.

1.5.3 Rated voltage (U_R)

The rated voltage is the maximum d.c. voltage which may be applied continuously to the terminations of a capacitor at the rated temperature.

NOTE The sum of the d.c. voltage and the peak a.c. voltage applied to the capacitor shall not exceed the rated voltage. The value of the peak alternating voltage shall not exceed the value determined by the permissible reactive power.

1.6 Marking

Sub-clause 2.4 of IEC Publication 384-1, with the following details:

1.6.1 The information given in the marking is normally selected from the following list; the relative importance of each item is indicated by its position in the list:

- a) rated capacitance;
- b) rated voltage²⁾ (d.c. voltage may be indicated by the symbol $\text{---} \text{---} \text{---}$ or ---);
- c) tolerance on rated capacitance;
- d) Temperature coefficient and, space permitting, its tolerance in code, see Table II (Sub-clause 2.2.5.3)²⁾;
- e) Year and month (or week) of manufacture;
- f) Manufacturer's name or trade mark;
- g) Climatic category;
- h) Manufacturer's type designation;
- i) Reference to the detail specification.

1.6.2 Coding of temperature coefficient is given in Table II (Sub-clause 2.2.5.3). In case of colour code spot, stripe or ring may be used; moreover for temperature coefficients, where two colours are required, second colour may be provided by the colour of the body or of the typographical marking.

1.6.3 The capacitor shall be clearly marked with a) and with as many as possible of the remaining items as is considered necessary. Any duplication of information in the marking on the capacitor should be avoided.

1.6.4 The package containing the capacitor(s) shall be clearly marked with all the information listed in Sub-clause 1.6.1.

1.6.5 Any additional marking shall be so applied that no confusion can arise.

²⁾ Information required under 1.6.1 b) and 1.6.1 d) may be given in code form under manufacturer's, or national, type or style designation.

Section 2. Preferred ratings and characteristics

2 Preferred ratings and characteristics

2.1 Preferred characteristics

The values given in detail specifications shall preferably be selected from the following:

2.1.1 Preferred climatic categories

The capacitors covered by this specification are classified into climatic categories according to the general rules given in IEC Publication 68-1.

The lower and upper category temperatures and the duration of the damp heat, steady state test shall be chosen from the following:

Lower category temperature: -55°C , -40°C , -25°C and -10°C .

Upper category temperature: $+70^{\circ}\text{C}$, $+85^{\circ}\text{C}$, $+100^{\circ}\text{C}$ and $+125^{\circ}\text{C}$.

Duration of the damp heat, steady state test: 4, 10, 21 and 56 days.

The severities for the cold and dry heat tests are the lower and upper category temperatures respectively.

2.2 Preferred values of ratings

2.2.1 Rated temperature

For capacitors covered by this specification, the rated temperature is equal to the upper category temperature.

2.2.2 Rated voltage (U_R)

The preferred values of rated voltage are: 40–63–100–160–250–400–630–1 000–1 600 V. These values conform to the basic series of preferred values R5 given in ISO Standard 3: Preferred Numbers — Series of Preferred Numbers. If other values are needed they shall be chosen from the R10 series.

2.2.3 Category voltage (U_C)

Since the rated temperature is defined as the upper category temperature, the category voltage is equal to the rated voltage, as defined in IEC Publication 384-1, Sub-clause 2.2.17.

2.2.4 Preferred values of rated capacitance and associated tolerance values

2.2.4.1 Preferred values of rated capacitance

Rated capacitance values shall be taken from the series of IEC Publication 63; the E6, E12 and E24 series are preferred.

2.2.4.2 Preferred tolerances on rated capacitance

Table I

Preferred series	$C_R \geq 10 \text{ pF}$		$C_R < 10 \text{ pF}$	
	Tolerances	Letter code	Tolerances	Letter code
E 6	$\pm 20 \%$	M	$\pm 2 \text{ pF}$	G
E 12	$\pm 10 \%$	K	$\pm 1 \text{ pF}$	F
	$\pm 5 \%$	J	$\pm 0.5 \text{ pF}$	D
E 24	$\pm 2 \%$	G	$\pm 0.25 \text{ pF}$	C
	$\pm 1 \%$	F	$\pm 0.1 \text{ pF}$	B

2.2.5 Temperature coefficient (α)

2.2.5.1 Table II of Sub-clause 2.2.5.3 shows the preferred rated temperature coefficient and the associated tolerances, expressed in parts per million per degree Celsius ($10^{-6}/^{\circ}\text{C}$), and the corresponding sub-classes and codes.

The detail specification shall specify for each temperature coefficient the minimum value of capacitance for which the given tolerance of temperature coefficient may be verified, considering the accuracy of the methods of capacitance measurement specified.

For values of capacitance lower than these minimum values:

- The detail specification shall specify a multiplying factor for the tolerance on α , as well as the permissible changes of capacitance at the lower and upper category temperature.

b) Special methods of measurement may be necessary and, if required, shall be stated in the detail specification.

2.2.5.2 Table III of Sub-clause **2.2.5.3** shows for each combination of temperature coefficient and tolerance the permissible relative variation of capacitance expressed in parts per thousand at each of the upper and lower category temperatures. Temperature coefficients and tolerances are expressed in parts per million per degree Celsius ($10^{-6}/^{\circ}\text{C}$).

2.2.5.3 Figure 1 to Figure 15 (Appendix A) show the limits of variation of capacitance with temperature for certain temperature coefficients and sub-classes.

Table II

Rated temperature coefficient (α) ($10^{-6}/^{\circ}\text{C}$)	Tolerance on temperature coefficient ($10^{-6}/^{\circ}\text{C}$)	Sub-class	Letter code		Colour code for temperature coefficient
			α	Tolerance	
+ 100	± 15 ± 30	1A 1B	A	F G	Red + Violet
0	± 15 ± 30 ± 60	1A 1B 1F	C	F G H	Black
– 33	± 15 ± 30	1A 1B	H	F G	Brown
– 75	± 15 ± 30	1A 1B	L	F G	Red
– <u>150</u>	± 15 ± 30 ± 60	1A 1B 1F	P	F G H	Orange
– 220	± 15 ± 30	1A 1B	R	F G	Yellow
– 330	± 30 ± 60	1A 1B	S	G H	Green
– 470	± 30 ± 60	1A 1B	T	G H	Blue
– <u>750</u>	± 60 ± 120 ± 250	1A 1B 1F	U	H J K	Violet
– 1 000	± 60 ± 120 ± 250	1A 1B 1F	Q	H J K	Red + Yellow
– 1 500	± 250	1F	V	K	Orange + Orange
– 2 200	± 500	1F	K	L	Yellow + Orange
– 3 300	± 500	1F	D	L	Green + Orange
– 4 700	$\pm 1\,000$	1F	E	M	Blue + Orange
– 5 600	$\pm 1\,000$	1F	F	M	Black + Orange
+ 140 $\geq \alpha \geq$ – 1 000	5)	1C	SL	—	Grey
+ 250 $\geq \alpha \geq$ – 1 750	5)	1D	UM	—	White

NOTE 1 Preferred temperature coefficients (α) are underlined.

NOTE 2 α values + 33. $10^{-6}/^{\circ}\text{C}$ and – 47. $10^{-6}/^{\circ}\text{C}$ may also be obtained on request.

NOTE 3 The rated temperature coefficients and their tolerances are defined using the capacitance change between the temperatures 20 $^{\circ}\text{C}$ and 85 $^{\circ}\text{C}$.

NOTE 4 A capacitor with a temperature coefficient of 0. $10^{-6}/^{\circ}\text{C}$ and a tolerance on temperature coefficient of $\pm 30.10^{-6}/^{\circ}\text{C}$ is designed as a CG capacitor (Sub-class 1B).

NOTE 5 Those temperature coefficient values are not subject to inspection, since no limits for relative capacitance variation are specified in Table III.

Table III

		Permissible relative variation in capacitance in parts per 1 000 between 20 °C and a given temperature							
		Lower category temperatures				Upper category temperature			
α 10 ⁻⁶ /°C	Tol. 10 ⁻⁶ /°C	- 55 °C	- 40 °C	- 25 °C	- 10 °C	+ 70 °C	+ 85 °C	+ 100 °C	+ 125 °C
+ 100	± 15 (F) ± 30 (G)	- 8.63/- 5.90 - 9.75/- 4.10	- 6.90/- 4.76 - 7.80/- 3.38	- 5.18/- 3.60 - 5.85/- 2.61	- 3.45/- 2.42 - 3.90/- 1.79	4.22/5.75 3.42/6.50	5.53/7.48 4.55/8.45	6.80/9.15 5.60/10.4	8.93/11.9 7.35/13.5
<u>0</u>	± 15 (F) ± 30 (G) ± 60 (H)	- 1.13/2.67 - 2.25/4.05 - 4.50/6.90	- 0.904/2.00 - 1.80/3.09 - 3.60/5.31	- 0.678/1.40 - 1.35/2.20 - 2.70/3.83	- 0.453/0.869 - 0.900/1.39 - 1.80/2.45	- 0.860/0.750 - 1.63/1.50 - 3.17/3.00	- 0.975/0.975 - 1.95/1.95 - 3.90/3.90	- 1.20/1.23 - 2.40/2.42 - 4.80/4.85	- 1.58/1.69 - 3.15/3.23 - 6.30/6.46
- 33	± 15 (F) ± 30 (G)	1.35/5.65 0.225/7.05	1.08/4.34 0.180/5.44	0.810/3.13 0.135/3.93	0.540/2.00 0.090/2.52	- 2.55/- 0.900 - 3.32/- 0.150	- 3.12/- 1.17 - 4.10/- 0.195	- 3.84/- 1.40 - 5.04/- 0.233	- 5.04/- 1.75 - 6.62/- 0.29
- 75	± 15 (F) ± 30 (G)	4.50/9.65 3.38/11.5	3.60/7.47 2.70/8.89	2.70/5.42 2.03/6.43	1.80/3.49 1.35/4.13	- 4.71/- 3.00 - 5.51/- 2.25	- 5.85/- 3.90 - 6.83/- 2.93	- 7.20/- 4.64 - 8.40/- 3.47	- 9.45/- 5.74 - 11.0/- 4.25
<u>- 150</u>	± 15 (F) ± 30 (G) ± 60 (H)	10.1/16.9 9.00/18.2 6.75/22.3	8.08/13.1 7.20/14.1 5.40/17.3	6.06/9.55 5.40/10.3 4.05/12.5	4.04/6.17 3.60/6.66 2.70/8.09	- 8.56/- 6.75 - 9.33/- 6.00 - 11.0/- 4.50	- 10.7/- 8.78 - 11.7/- 7.80 - 13.7/- 5.85	- 13.2/- 10.5 - 14.4/- 9.29 - 16.8/- 7.15	- 17.3/- 13.1 - 18.9/- 11.5 - 22.1/- 9.27
- 220	± 15 (F) ± 30 (G)	15.4/23.2 14.3/24.5	12.3/18.1 11.4/19.1	9.24/13.2 8.58/14.0	6.17/8.57 5.72/9.07	- 12.2/- 10.2 - 12.9/- 9.54	- 15.3/- 13.3 - 16.3/- 12.4	- 18.8/- 16.0 - 20.0/- 14.9	- 24.7/- 20.2 - 26.3/- 18.9
- 330	± 30 (G) ± 60 (H)	22.5/33.4 20.3/38.3	18.0/26.2 16.2/29.9	13.5/19.2 12.2/21.8	9.0/12.5 8.12/14.2	- 18.5/- 15.0 - 20.2/- 13.5	- 23.4/- 19.5 - 25.4/- 17.6	- 28.8/- 23.4 - 31.2/- 21.2	- 37.8/- 29.5 - 41.0/- 26.7
- 470	± 30 (G) ± 60 (H)	33.0/48.5 30.8/51.2	26.4/37.9 24.6/40.0	19.8/27.7 18.5/29.3	13.2/18.0 12.3/19.0	- 25.8/- 22.0 - 27.4/- 20.5	- 32.5/- 28.6 - 34.5/- 26.7	- 40.0/- 34.3 - 42.4/- 32.1	- 52.5/- 43.2 - 55.7/- 40.5
<u>- 750</u>	± 60 (H) ± 120 (J) ± 250 (K)	51.8/76.5 47.3/82.4 37.5/103	41.4/59.9 37.8/64.5 30.0/80.0	31.1/43.9 28.4/47.3 22.5/58.2	20.7/28.6 18.9/30.8 15.0/37.6	- 41.7/- 34.5 - 45.0/- 31.5 - 52.0/- 25.0	- 52.7/- 44.9 - 56.6/- 41.0 - 65.0/- 32.5	- 64.8/- 53.9 - 69.6/- 50.3 - 80.0/- 40.0	- 85.1/- 67.8 - 91.4/- 65.6 - 105/- 52.5
- 1 000	± 60 (H) ± 120 (J) ± 250 (K)	70.5/99.7 66.0/105 56.3/117	56.4/78.0 52.8/82.3 45.0/91.7	42.3/57.2 39.6/60.4 33.8/67.2	28.2/37.3 26.4/39.3 22.5/43.8	- 54.4/- 47.0 - 57.5/- 44.0 - 64.2/- 37.5	- 68.9/- 61.1 - 72.8/- 57.2 - 81.3/- 48.8	- 84.8/- 75.2 - 89.6/- 70.4 - 100/- 60.0	- 111/- 98.7 - 118/- 92.4 - 131/- 78.8
- 1 500	± 250 (K)	93.8/161	75.0/126	56.3/92.8	37.5/60.6	- 89.8/- 62.5	- 114/- 81.3	- 140/- 100	- 184/- 131
- 2 200	± 500 (L)	128/248	102/195	76.8/143	51.2/93.4	- 139/- 85.4	- 176/- 111	- 216/- 137	- 284/- 179
- 3 300	± 500 (L)	210/352	168/275	126/203	84.0/132	- 195/- 140	- 247/- 182	- 304/- 224	- 399/- 294
- 4 700	± 1 000 (M)	278/525	222/412	167/303	111/198	- 292/- 185	- 371/- 241	- 456/- 297	- 599/- 389
- 5 600	± 1 000 (M)	345/607	276/476	207/350	138/228	- 338/- 230	- 429/- 299	- 528/- 368	- 693/- 483
NOTE Preferred temperature coefficient values (α) are underlined.									

Section 3. Quality assessment procedures

3 Quality assessment procedures

3.1 Primary Stage of Manufacture

For single layer capacitors the primary stage of manufacture is the metallizing of the dielectric to form the electrode; for multilayer capacitors it is the first common firing of the dielectric-electrode assembly.

3.2 Structurally Similar Components

Capacitors considered as being structurally similar are capacitors produced with similar processes and materials, though they may be of different case sizes and values.

3.3 Certified Records of Released Lots

The information required in Sub-clause 3.5.1 of IEC Publication 384-1 shall be made available when prescribed in the detail specification and when requested by a purchaser. After the endurance test the parameters for which variables information is required are the capacitance change, $\tan \delta$ and the insulation resistance.

3.4 Qualification Approval

The procedures for Qualification Approval testing are given in Sub-clause 3.4 of the Generic specification, IEC Publication 384-1.

The schedule to be used for Qualification Approval testing on the basis of lot-by-lot and periodic tests is given in Sub-clause 3.5 of this specification. The procedure using a fixed sample size schedule is given in Sub-clauses 3.4.1 and 3.4.2 below.

3.4.1 Qualification Approval on the basis of the fixed sample size procedure

Sampling

The fixed sample size procedure is described in IEC Publication 384-1, Sub-clause 3.4.2 b). The sample shall be representative of the range of capacitors for which approval is sought. This may or may not be the complete range covered by the detail specification.

When approval is sought for one temperature coefficient only, the sample shall consist of specimens having the lowest and highest voltages, and for these voltages the lowest and highest capacitances values. When there are more than four rated voltages an intermediate voltage shall also be tested. Thus, for the approval of a range, testing is required of either four or six values (capacitance/voltage combinations) for each temperature coefficient. Where the total range consists of less than four values, the number of specimens to be tested shall be that required for four values. When approval is sought for more than one temperature coefficient, see Sub-clause 3.4.2.

Spare specimens are permitted as follows:

- a) One per value which may be used to replace the permitted defective in Group "0".
- b) One per value which may be used as replacements for specimens which are defective because of incidents not attributable to the manufacturer.

The numbers given in Group "0" assume that all groups are applicable. If this is not so the numbers may be reduced accordingly.

When additional groups are introduced into the Qualification Approval test schedule, the number of specimens required for Group "0" shall be increased by the same number as that required for the additional groups.

Table IV gives the number of samples to be tested in each group or sub-group together with the permissible number of defectives for qualification approval tests.

3.4.2 Tests

The complete series of tests specified in Table IV and Table V are required for the approval of capacitors covered by one detail specification. The tests of each group shall be carried out in the order given.

The whole sample shall be subjected to the tests of Group "0" and then divided for the other groups.

Specimens found defective during the tests of Group "0" shall not be used for the other groups.

"One defective" is counted when a capacitor has not satisfied the whole or a part of the tests of a group.

When approval is sought for more than one temperature coefficient at the same time, tests of Groups 1 and 2 shall be carried out on the smallest temperature coefficient, but the tests of Groups 3 and 4 shall be carried out on each individual temperature coefficient.

The approval is decided on an individual temperature coefficient basis in accordance with the permissible defectives indicated in columns 6, 7, 9 and 10 of Table IV. In order to calculate the total defectives for temperature coefficients other than the smallest (to compare with columns 7 and 10) the defectives in Groups 1 and 2 for the smallest temperature coefficient are added to the defectives in Groups 3 and 4 for that particular temperature coefficient.

The approval is granted when the number of defectives does not exceed the specified number of permissible defectives for each group or sub-group and the total number of permissible defectives.

NOTE Table IV and Table V together form the fixed sample size test schedule for which Table IV includes the details for the sampling and permissible defective for the different tests or groups of test, whereas Table V together with the details of test contained in Section 4 gives a complete summary of test conditions and formance requirements and indicates where e.g. for the test method or conditions of test a choice has to be made in the detail specification.

The conditions of test and performance requirements for the fixed sample size test schedule shall be identical to those prescribed in the detail specification for quality conformance inspection.