

Förderverein für Elektrotechnische Normung (FEN) e. V.
Cenelec Electronic Components Committee

CECC

Système Harmonisé d'Assurance de la Qualité
des Composants Electroniques

SPECIFICATION PARTICULIERE:

CONDENSATEURS FIXES
ELECTROLYTIQUES A
L'ALUMINIUM A ELECTROLYTE
NON SOLIDE

Harmonized System of Quality Assessment for
Electronic Components

DETAIL SPECIFICATION:

FIXED ALUMINIUM
ELECTROLYTIC CAPACITORS
WITH NON-SOLID ELECTROLYTE

Harmonisiertes Gütebestätigungssystem für
Bauelemente der Elektronik

BAUARTSPEZIFIKATION:

ALUMINIUM-ELEKTROLYT-
FESTKONDENSATOREN
MIT FLÜSSIGEM ELEKTROLYTEN



1

Edition
Issue
Ausgabe

CECC 30 301-809

1993



Documents
Document Sharing Hub

Information about the System may be obtained from:



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or from the National Authorized Institutions
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who can supply copies of:

- 1 The Internal Regulations of the FEN e.V.
- 2 The Rules of Procedure of the System
- 3 CECC Specifications of the FEN and National Specifications for the System
- 4 CECC 00 200: Qualified Products List (QPL)
- 5 CECC 00 300: List of CECC European Standards (ENs), CECC Publications and related national documents
- 6 CECC 00 301: List of CECC Specifications and related Detail Specifications
- 7 Other CECC Publications and publicity documents

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FOREWORD

The CENELEC Electronic Components Committee is composed of those member countries of the European Committee for Electrotechnical Standardization (CENELEC) who wish to take part in a harmonized System for electronic components of assessed quality.

The object of the System is to facilitate international trade by the harmonization of specifications and quality assessment procedures for electronic components, and by the grant of an internationally recognized Mark, or Certificate, of Conformity. The components produced under the System are thereby acceptable in all member countries without further testing.

This specification should be read in conjunction with the current regulations for the CECC System.

At the date of printing of this specification, the member countries of the CECC are Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom, and copies of it can be obtained from the addresses shown on the blue fly sheet.

PREFACE

This specification was prepared by CECC WG3: "Capacitors".

It is based wherever possible, on the Publications of the International Electrotechnical Commission.

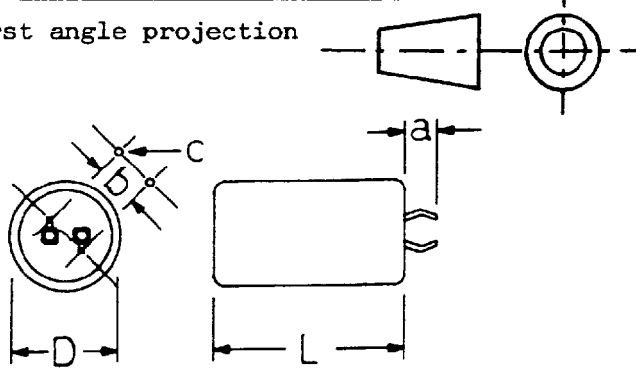
The text of this specification was circulated to the members of CECC WG3 and was approved for publication under the accelerated procedure for the acceptance of detail specifications in accordance with Decisions 10, 11 and 12 of the minutes of the CECC CD meeting in document CECC(Sec)1838.

Secretariat Note

This detail specification was drafted by members of CEMEC WG PC 1A and discussed as documents CEMEC WG PC 1A/ECIF(da Costa)105A and CECC WG3(da Costa)3A by WG3 at their meeting in Milano(1992) with the decision to publish it without voting as stated in the minutes of the meeting:

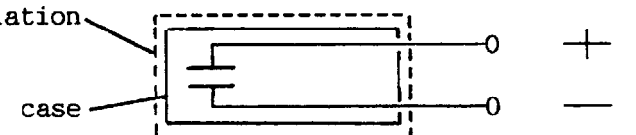
CECC WG3(Secretariat)247, item 15.1.3

To allow for early publication, this detail specification is issued initially in English only. Corresponding versions in French and German will follow on request of ONHs.

Specification available from: CECC General Secretariat	CECC 30 301-809 Issue 1 1993
ELECTRONIC COMPONENTS OF ASSESSED QUALITY - DETAIL SPECIFICATION IN ACCORDANCE WITH: CECC 30 000 Issue 3, Amdts 1 to 8 CECC 30 300 Issue 2, Amdts 1 to 4	
First angle projection  $a : (6,3^{+1,0}_{-1,5}) \text{ mm}$ $b : (10 \pm 0,1) \text{ mm}$ $c : \text{Diameter of holes in printed board: } (2,0 \pm 0,1) \text{ mm}$ $D, L : \text{See Table 1}$ Marking information: See Clause 1.5.2 Polarity must be clearly indicated Pressure relief device mandatory	WG DETAIL SPECIFICATION FOR FIXED ALUMINIUM ELECTROLYTIC CAPACITORS WITH NON-SOLID ELECTROLYTE Polar Cylindrical Metallic case Insulated Unidirectional rigid terminations (snap-in) for use on printed boards Assessment level E

QUICK REFERENCE DATA: Rated capacitance (C_R) range: 33 μF to 47 000 μF
 Capacitance tolerance: $\pm 20 \%$
 Rated voltage (U_R) range: 10 to 400 V d.c.
 Climatic category: 40/105/56 *
 Performance grade: Long-life grade 2000 h

* See Sub-clause 1.9.1

Circuit diagram Note: Contact of negative pole to metallic case is not defined	
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Information about manufacturers who have components qualified to this detail specification is available in the current CECC 00 200: Register of Firms, Products, and Services Approved under the CECC System.

It is intended that this specification should replace national specifications. Relevant numbers will be published by the National Committees and published under issue 2 of this specification.

1 GENERAL DATA1.1 METHOD OF MOUNTING FOR VIBRATION AND SHOCK TESTS

The capacitor is to be mounted by its body which shall be rigidly clamped to the work surface. See 1.3.2 of CECC 30 300, Issue 2.

1.2 DIMENSIONS

Table 1

Dimensions in mm		
Case size reference	D max. (1)	L max. (1)
1	23,0	32
2	23,0	42
3	26,5	27
4	26,5	32
5	26,5	42
6	31,5	32
7	31,5	42
8	31,5	52
9	36,5	32
10	36,5	42
11	36,5	52

(1) including insulation sleeve

1.3 RATINGS AND CHARACTERISTICS

Capacitance range, C_R	see Table 2A
Tolerance on rated capacitance	$\pm 20 \%$
Rated voltage range, U_R	see Table 2A
Category voltage, U_C	rated voltage
Climatic category	40/105/56 *
Rated temperature	105 °C *
Rated ripple current	see Table 2B
Equivalent series resistance (ESR)	see Table 2B
Leakage current in μA	see Table 2B
Impedance	see Table 2B

* See Sub-clause 1.9.1

Table 2A

Values of capacitance and voltage related to case sizes (see Table 1)

U_R (V)	10	16	25	40	63	100	200	250	385 or 400
C_R (μF)	case size reference								
33									1/3
47									1/3
68								1/3	2/4
100							1/3	1/3	5/6
150							1/3	2/4	7/9
220							2/4	5/6	8/10
330						1/3	5/6	7/9	11
470						1/3	7/9	8/10	
680					1/3	2/4	8/10	11	
1 000					1/3	5/6	11		
1 500				1/3	2/4	7/9			
2 200			1/3	1/3	5/6	8/10			
3 300		1/3	1/3	2/4	7/9	11			
4 700	1/3	1/3	2/4	5/6	8/10				
6 800	1/3	2/4	5/6	7/9	11				
10 000	2/4	5/6	7/9	8/10					
15 000	5/6	7/9	8/10	11					
22 000	7/9	8/10	11						
33 000	8/10	11							
47 000	11								

Table 2B

ESR, impedance, rated ripple current and leakage current

U_R (V)	C_R (μF) at 20 °C and 100 Hz	Case ref.	ESR (m Ω) at 20 °C and 100 Hz max.	Impedance (m Ω) at 20 °C and 10 kHz max.	Rated ripple current (A) at 105 °C and 100 Hz	Leakage current (mA) at 20 °C and 5 min max.
10	4 700	1	120*	105	1,3	0,29
	4 700	3	120*	105	1,3	0,29
	6 800	1	83*	72	1,6	0,41
	6 800	3	97	88	1,5	0,41
	10 000	2	66	59	1,9	0,60
	10 000	4	66	59	1,9	0,60
	15 000	5	54	49	2,2	0,90
	15 000	6	60	52	2,1	0,90
	22 000	7	46	43	2,6	1,3
	22 000	9	61	55	2,3	1,3
	33 000	8	38	35	3,1	2,0
	33 000	10	46	43	2,8	2,0
	47 000	11	35	30	3,6	2,8
16	3 300	1	130*	110	1,3	0,32
	3 300	3	130*	110	1,3	0,32
	4 700	1	90*	78	1,6	0,46
	4 700	3	98	89	1,5	0,46
	6 800	2	71	63	1,8	0,66
	6 800	4	74	63	1,8	0,66
	10 000	5	58	52	2,2	0,96
	10 000	6	71	61	2,0	0,96
	15 000	7	49	45	2,6	1,4
	15 000	9	60	55	2,3	1,4
	22 000	8	43	40	3,0	2,1
	22 000	10	47	41	2,9	2,1
	33 000	11	37	32	3,5	3,2
25	2 200	1	140*	120	1,3	0,33
	2 200	3	140*	120	1,3	0,33
	3 300	1	97*	83	1,5	0,50
	3 300	3	110*	93	1,4	0,50
	4 700	2	77*	67	1,7	0,71
	4 700	4	78*	67	1,7	0,71
	6 800	5	62*	56	2,1	1,0
	6 800	6	74	62	1,9	1,0
	10 000	7	52	48	2,5	1,5
	10 000	9	70	60	2,2	1,5
	15 000	8	45	42	2,9	2,3
	15 000	10	49	42	2,8	2,3
	22 000	11	39	33	3,4	3,3

* See Sub-clause 1.9

Note: To obtain the ripple current rating at 50 Hz the figure at 100 Hz must be multiplied by 0,80.

Table 2B continued

ESR, impedance, rated ripple current and leakage current

U_R (V)	C_R (μF) at 20 °C and 100 Hz	Case ref.	ESR (m Ω) at 20 °C and 100 Hz max.	Impedance (m Ω) at 20 °C and 10 kHz max.	Rated ripple current (A) at 105 °C and 100 Hz	Leakage current (mA) at 20 °C and 5 min max.
40	1 500	1	160*	125	1,2	0,36
	1 500	3	160*	125	1,2	0,36
	2 200	1	110*	92	1,4	0,53
	2 200	3	120*	99	1,3	0,53
	3 300	2	82*	71	1,8	0,80
	3 300	4	83*	71	1,8	0,80
	4 700	5	66*	59	2,2	1,1
	4 700	6	78	64	2,0	1,1
	6 800	7	55	50	2,4	1,6
	6 800	9	74	63	2,1	1,6
	10 000	8	47	44	2,8	2,4
	10 000	10	52	44	2,7	2,4
	15 000	11	40	34	3,3	3,6
63	680	1	240*	195	1,0	0,26
	680	3	240*	195	1,0	0,26
	1 000	1	170*	130	1,2	0,38
	1 000	3	170*	140	1,2	0,38
	1 500	2	120*	100	1,4	0,57
	1 500	4	140*	100	1,4	0,57
	2 200	5	90*	77	1,8	0,84
	2 200	6	100*	77	1,7	0,84
	3 300	7	70*	62	2,3	1,3
	3 300	9	80*	71	2,1	1,3
	4 700	8	58*	52	2,6	1,8
	4 700	10	62*	52	2,5	1,8
	6 800	11	48	38	3,1	2,6
100	330	1	440*	280	0,80	0,20
	330	3	440*	280	0,80	0,20
	470	1	300*	200	0,96	0,29
	470	3	330*	220	0,92	0,29
	680	2	190*	150	1,10	0,41
	680	4	230*	155	1,00	0,41
	1 000	5	160*	115	1,40	0,60
	1 000	6	190*	135	1,30	0,60
	1 500	7	120*	86	1,80	0,90
	1 500	9	140*	105	1,70	0,90
	2 200	8	93*	67	1,80	1,3
	2 200	10	115*	84	1,60	1,3
	3 300	11	88	64	2,00	2,0

* See Sub-clause 1.9

Note: To obtain the ripple current rating at 50 Hz the figure at 100 Hz must be multiplied by 0,80.

Table 2B continued

ESR, impedance, rated ripple current and leakage current

U_R (V)	C_R (μF) at 20 °C and 100 Hz	Case ref.	ESR (m Ω) at 20 °C and 100 Hz max.	Impedance (m Ω) at 20 °C and 10 kHz max.	Rated ripple current (A) at 105 °C and 100 Hz	Leakage current (mA) at 20 °C and 5 min max.
200	100	1	1 300*	800	0,45	0,12
	100	3	1 300*	800	0,45	0,12
	150	1	850*	540	0,56	0,18
	150	3	850*	540	0,56	0,18
	220	2	610*	430	0,72	0,27
	220	4	610*	430	0,72	0,27
	330	5	435*	300	1,00	0,40
	330	6	435*	300	1,00	0,40
	470	7	335*	225	1,2	0,57
	470	9	335*	225	1,2	0,57
	680	8	235*	155	1,5	0,82
250	680	10	235*	155	1,5	0,82
	1 000	11	160*	125	1,9	1,2
385	68	1	1 750*	1 050	0,38	0,11
	68	3	1 750*	1 050	0,38	0,11
	100	1	1 150*	600	0,47	0,15
	100	3	1 150*	600	0,47	0,15
	150	2	800*	450	0,61	0,23
	150	4	800*	450	0,61	0,23
	220	5	550*	300	0,82	0,33
	220	6	550*	300	0,82	0,33
	330	7	400*	250	1,00	0,50
	330	9	400*	250	1,00	0,50
	470	8	300*	175	1,30	0,71
	470	10	300*	175	1,30	0,71
	680	11	200*	150	1,70	1,0
385	33	1	3 600*	2 000	0,26	0,08
	33	3	3 600*	2 000	0,26	0,08
	47	1	2 400*	1 400	0,32	0,11
	47	3	2 400*	1 400	0,32	0,11
	68	2	1 650*	1 000	0,41	0,16
	68	4	1 650*	1 000	0,41	0,16
	100	5	1 150*	700	0,52	0,24
	100	6	1 150*	700	0,52	0,24
	150	7	750*	500	0,71	0,35
	150	9	750*	500	0,71	0,35
	220	8	550*	350	1,00	0,51
	220	10	550*	350	1,00	0,51
	330	11	400*	250	1,30	0,77

* See Sub-clause 1.9

Note: To obtain the ripple current rating at 50 Hz the figure at 100 Hz must be multiplied by 0,80.

Table 2B continued

ESR, impedance, rated ripple current and leakage current

U_R (V)	C_R (μF) at 20 °C and 100 Hz	Case ref.	ESR (m Ω) at 20 °C and 100 Hz max.	Impedance (m Ω) at 20 °C and 10 kHz max.	Rated ripple current (A) at 105 °C and 100 Hz	Leakage current (mA) at 20 °C and 5 min max.
400	33	1	3 600*	2 000	0,26	0,08
	33	3	3 600*	2 000	0,26	0,08
	47	1	2 400*	1 400	0,32	0,12
	47	3	2 400*	1 400	0,32	0,12
	68	2	1 650*	1 000	0,41	0,17
	68	4	1 650*	1 000	0,41	0,17
	100	5	1 150*	700	0,52	0,24
	100	6	1 150*	700	0,52	0,24
	150	7	750*	500	0,71	0,36
	150	9	750*	500	0,71	0,36
	220	8	550*	350	1,00	0,53
	220	10	550*	350	1,00	0,53
	330	11	400*	250	1,30	0,80

* See Sub-clause 1.9

Note: To obtain the ripple current rating at 50 Hz the figure at 100 Hz must be multiplied by 0,80.

1.4 RELATED DOCUMENTS

Generic specification
Sectional specification

CECC 30 000, Issue 3, Amdts. 1 - 8
CECC 30 300, Issue 2, Amdts. 1 - 4

1.5 MARKING

See 2.4 of CECC 30 000 with the details given below.

1.5.1 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:

- (1) Rated capacitance
- (2) Rated voltage (d.c. voltage may be indicated by the symbol $\overline{\text{---}}$ or ---)
- (3) Polarity of the terminations
- (4) Tolerance on rated capacitance
- (5) Reference to the grade: the abbreviation "LL" may be used for marking purposes
- (6) Year and month (or week) of manufacture
- (7) Manufacturer's name or trade mark
- (8) Rated ripple current
- (9) Climatic category
- (10) Manufacturer's type designation
- (11) Reference to the detail specification
- (12) CECC Mark

- 1.5.2 The capacitor shall be clearly marked with (1) to (5) listed in 1.5.1 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.
- 1.5.3 The package containing the capacitor(s) shall be clearly marked with all the information given by items (1), (2), (6), (7), (10) and (12) in 1.5.1, and as many of the remaining items considered necessary by the manufacturer.
- 1.5.4 Any additional marking shall be so applied that no confusion can arise.

1.6 ORDERING INFORMATION

Detail specification number, number of issue

Rated capacitance

Tolerance on rated capacitance

Rated d.c. voltage

Case size reference

Ordering example for capacitor with rated capacitance 1000 μ F, tolerance on rated capacitance $\pm 20\%$ (M), rated voltage 100 V d.c. and case size 6:

CECC 30 301-8XX-X-1000-M-100-6

1.7 CERTIFIED TEST RECORDS OF RELEASED LOTS

Not required.

1.8 ADDITIONAL INFORMATION (not for inspection purposes)

1.8.1 Equivalent series resistance (ESR), see Table 2B:

In no case are the ESR limits less severe than the corresponding maximum values of the tangent of loss angle given in CECC 30 300. To ensure that this basic requirement is fulfilled the following formula has been used:

$$ESR_{\max.} = \frac{\tan \delta_{\max.}}{2 \times \pi \times f \times C_{\max.}}$$

1.8.2 Full vibration and shock performance may not be available if mounting methods other than those specified in Sub-clause 1.1 of this specification are used.

1.8.3 Useful Life

If useful life is to be indicated, the following definition of useful life applies:

A) Load Conditions

Load conditions for the definition of useful life are:

- rated voltage
- rated ripple current (the peak voltage of the alternating voltage superimposed on the d.c. voltage must not exceed the value of the rated

- voltage)
- rated temperature

B) Failure Criteria

Failures are specified as follows:

- short or open circuit
- capacitance change exceeding 3 times the limit for endurance testing given in the sectional specification or 50 % (whichever is the smaller)
- $\tan \delta$ or ESR exceeding 3 times the initial limit
- HF impedance exceeding 3 times the initial limit
- unusable terminations
- severely damaged insulation
- external shorting of the terminations by the electrolyte
- operation of the pressure relief device (When a repetitive pressure relief device is incorporated in the capacitor, the effects of the intended operation of the device - for example slight colouring or discolouring, slight wetting, etc. - shall not be considered as failure. Seepage, however, is not permitted.)

C) Failure Percentage

End of life is reached when the failure percentage exceeds 1 %.

1.9 ADDITIONAL OR INCREASED SEVERITIES OR REQUIREMENTS TO THOSE SPECIFIED IN THE GENERIC AND/OR SECTIONAL SPECIFICATION, INDICATED BY AN ASTERISK

Table 3

Table Group/Sub-group Clause/Sub-clause	additional and/or increased severities or requirements
Table 2B	ESR
Table 4B Sub-group C5A Sub-clause 4.17	duration of storage at high temperature

- 1.9.1 The upper category temperature is not one of the preferred temperatures; 105 °C has been chosen due to current industry practice.

2. INSPECTION REQUIREMENTS

2.1 PROCEDURES

- 2.1.1 For Qualification Approval, the procedures shall be in accordance with 3.4 of CECC 30 300, Issue 2.
- 2.1.2 For Quality Conformance Inspection, the test schedule (Table 4) includes sampling, periodicity, severities and requirements. The formation of inspection lots is covered by Sub-clause 3.5.1 of CECC 30 300, Issue 2.

Notes on Tables 4A and 4B

Note 1: Clause numbers of tests and performance requirements refer to CECC 30 300, Issue 2, and Section 1 of this specification.

Note 2: Inspection Levels (IL) and Acceptable Quality Levels (AQL) are selected from IEC 410.

Note 3: In Tables 4A and 4B: P = periodicity (in months)
n = sample size
c = acceptance criterion
(permitted number of defectives)
D = destructive
ND = non-destructive

Note 4: This sub-group is considered ND provided the requirements of sub-groups A1 and A2 are satisfied.