UDC 621·319·45 : [669 - 294]

Indian Standard (Reaffirmed 1998)

SPECIFICATION FOR FIXED, INSULATED, HERMETICALLY SEALED TANTALUM CAPACITORS WITH SOLID ELECTROLYTE

PART III TYPE FCST 2
Section 1 Polar

0. General — This standard shall be read in conjunction with IS : 8507 (Part 1) - 1977 'Specification for fixed, insulated, hermetically sealed tantalum capacitors with solid electrolyte : Part 1 General requirements and methods of test'.

1. Outline Drawing and Dimensions — The outline drawing and dimensions shall be according to Fig. 1 and Table 1.

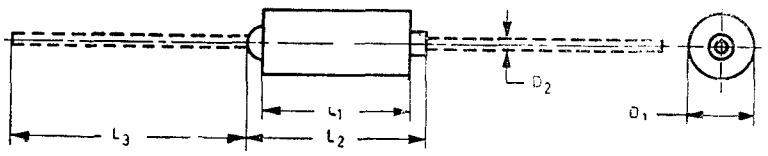

FIG. 1 POLAR SOLID TANTALUM CAPACITOR

Note 1 — The case insulation extends 0·38 mm beyond each end. However, when a shrink fitted insulation is used, it laps over the ends of the capacitor body.

Note 2 — The termination shall consist of tin-lead coated nickel wire.

TABLE 1 DIMENSIONS

Case Size	Dimensions, mm				
	L_1 $\pm$ 0·79	L_2 (*Max*)	L_3 (*Min*)	D_1 $\pm$ 0·41 / 0·38	D_2
(1)	(2)	(3)	(4)	(5)	(6)
A	7·26	10·72	31·75	3·43	0·50 $\pm$ 0·05
B	12·04	15·49	31·75	4·70	0·50 $\pm$ 0·05
C	17·42	20·88	31·75	7·34	0·60 +0·06 −0·05
D	19·96	23·42	31·75	8·92	0·60 +0·06 −0·05

2. Ratings and Characteristics

a) Rated capacitance	see **4.1** of IS : 8507 (Part 1) - 1977
b) Selection tolerance	$\pm$ 5, $\pm$ 10, $\pm$ 20 percent
c) Rated voltage (U_R)	see Table 2
d) Category voltage (U_C)	see Table 2
e) Surge voltage (U_S)	see Table 2
f) Rated temperature	70°C
g) Vibration	10 - 2 000 Hz, 100 m/s², 3 × 3 hours
h) Bump	4 000, 400 m/s²
j) Shock	1 km/s²
k) Acceleration	1 km/s²
m) Climatic category	55/85/56 [see Appendix A of IS : 589-1961 'Basic climatic and mechanical durability tests for components for electronic and electrical equipment (*revised*)'].
n) Low air pressure	2 kPa

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TABLE 2 RATED VOLTAGE (U_R), CATEGORY VOLTAGE (U_C) AND SURGE VOLTAGE (U_S)

(*Clause* 2)

U_R (at 70°C) V	U_C (at 85°C) V	U_S (at 70°C) V
(1)	(2)	(3)
6	6	8
10	10	12
15	10	17
20	13	23
25	20	28
35	23	41
50	33	58
75	50	88
100	67	120

3. Marking — See **7** of IS : 8507 (Part 1) - 1977.

4. Construction and Workmanship — See **5** of IS : 8507 (Part 1) - 1977.

5. Classification of Tests — See **8.1** of IS : 8507 (Part 1) - 1977.

5.1 General Conditions for Tests — *See* **8.2** of IS : 8507 (Part 1) - 1977.

5.1.1 The test schedule and requirements shall be in accordance with Table 3.

TABLE 3 TEST SCHEDULE AND REQUIREMENTS

Sl No.	Test	Clause Ref in IS : 8507 (Part I)- 1977	Condition of Test	Requirement
(1)	(2)	(3)	(4)	(5)
i)	*All Samples*			
	a) Visual examination	8.4.1	—	The workmanship and finish shall be satisfactory. The marking shall be legible
	b) Dimensions	8.4.2	—	The dimensions of the capacitors and their terminations shall conform to values given in Table 1 used with Fig. 1
	c) Capacitance	8.3.2	—	The capacitance value shall correspond with the rated capacitance taking into account the tolerance
	d) Tangent of loss angle	8.3.3	—	The value shall not exceed: *Rated Voltage* — *Tan δ, Percent* 6·0 & 10 V — 10 15 & 20 V — 8 25 & 35 V — 6
	e) Leakage current	8.3.1	—	Leakage current shall not exceed 0·02 μA/μF-V or 1μA whichever is greater
	f) Voltage proof	8.3.4	—	There shall be no breakdown or flash-over
	g) Insulation resistance	8.3.5	—	Insulation resistance shall not be less than 100 MΩ
	h) Sealing	8.4.10	—	There shall be no leakage of electrolyte and bubbling of gas when fully immersed in the solution
ii)	*First Group*			
	a) Solderability	8.4.4	—	The tinning shall be uniform and good
	b) Robustness of terminations	8.4.3	—	—
	I) Visual examination	8.4.1	—	There shall be no damage

(*Continued*)

TABLE 3 TEST SCHEDULE AND REQUIREMENTS — *Contd*

Sl No.	Test	Clause Ref in IS : 8507 (Part I)- 1977	Condition of Test	Requirement
(1)	(2)	(3)	(4)	(5)
c)	Bump	8.4.6	4000,400 m/s²	—
	1) Visual examination	8.4.1	—	There shall be no damage
	2) Capacitance	8.3.2	—	Change in capacitance value shall not exceed ± 8 percent
	3) Tangent of loss angle	8.3.3	—	The value shall not exceed: *Rated Voltage* — *Tan δ, Percent* 6·0 & 10 V — 15 15 & 20 V — 12 25 & 35 V — 9
	4) Leakage current	8.3.1	—	Leakage current shall not exceed 0·04 μA/μF-V or 2 μA whichever is greater
d)	Vibration	8.4.5	10-2 000 Hz 100 m/s², 3×3 h.	—
	1) Visual examination	8.4.1	—	There shall be no damage
	2) Capacitance	8.3.2	—	Change in capacitance value shall not exceed ± 8 percent
	3) Tangent of loss angle	8.3.3	—	As in (ii) (c) (3)
	4) Leakage current	8.3.1	—	Leakage current shall not exceed 0·04 μA/μF-V or 2 μA whichever is greater
e)	Shock	8.4.7	—	—
	1) Visual examination	8.4.1	—	There shall be no damage
	2) Capacitance	8.3.2	—	Capacitance value shall not exceed ± 8 percent
	3) Tangent of loss angle	8.3.3	—	The value shall not exceed: As in (ii) (c) (3)
	4) Leakage current	8.3.1	—	As in (ii) (c) (4)
	Acceleration (steady state	8.4.8	1 km/s² rigidly mounted using brackets	—
	1) Visual examination	8.4.1	—	There shall be no damage
	2) Capacitance	8.3.2	—	Change in capacitance value shall not exceed ± 8 percent
	3) Tangent of loss angle	8.3.3	—	As in (ii) (c) (3)
	4) Leakage current	8.3.1	—	As in (ii) (c) (4)
g)	Rapid change of temperature	8.5.3	—	—
	1) Visual examination	8.4.1	—	There shall be no damage
	2) Capacitance	8.3.2	—	Change in capacitance value shall not exceed ± 8 percent
	3) Tangent of loss angle	8.3.3	—	As in (ii) (c) (3)
	4) Leakage current	8.3.1	—	As in (ii) (c) (4)
h)	Climatic sequence	8.5.1	—	—
	1) Dry heat	8.5.1.2	At maximum category temperature (± 85°C) for 16 h	—
	2) Damp heat (accelerated) First cycle	8.5.1.3	—	—
	i) Visual examination	8.4.1	—	There shall be no damage

(Continued)

TABLE 3 TEST SCHEDULE AND REQUIREMENTS — *Contd*

Sl No.	Test	Clause Ref in IS : 8507 (Part I) 1977	Condition of Test	Requirement
(1)	(2)	(3)	(4)	(5)
	3) Cold *	8.5.1.4	At minimum category temperature (-55°C) for 2 h	—
	i) Visual examination	8.4.1	—	There shall be no damage
	4) Low air pressure	8.5.1.5	2 kPa	There shall be no short circuit
	5) Damp heat (accelerated) remaining cycles	8.5.1.6	—	—
	i) Visual examination	8.4.1	—	There shall be no damage
	ii) Voltage proof	8.3.4	—	There shall be no breakdown or flash-over
	iii) Insulation resistance	8.3.5	—	100 MΩ, *Min*
	iv) Capacitance	8.3.2	—	Change in capacitance value shall not exceed ± 8 percent
	v) Tangent of loss angle	8.3.3	—	As in (ii) (c) (3)
	vi) Leakage current	8.3.1	—	As in (ii) (c) (4)
iii)	*Second Group*			
	a) Damp heat (long term)	8.5.2	To one half of the specimens rated voltage shall be applied	—
	1) Visual examination	8.4.1	—	There shall be no damage
	2) Voltage proof	8.3.4	—	There shall be no breakdown or flash-over
	3) Insulation resistance	8.3.5	—	100 MΩ, *Min*
	4) Capacitance	8.3.2	—	Change in capacitance value shall not exceed ± 8 percent
	5) Tangent of loss angle	8.3.3	—	As in (ii) (c) (3)
	6) Leakage current	8.3.1	—	As in (ii) (c) (4)
iv)	*Third Group*			
	a) Endurance	8.7	—	—
	1) Visual examination	8.4.1	—	There shall be no damage
	2) Capacitance	8.3.2	—	Change in capacitance value shall not exceed ± 15 percent
	3) Tangent of loss angle	8.3.3	—	The value shall not exceed: *Rated Voltage* — *Tan δ, Percent* 6·0 & 10 V — 20 15 & 20 V — 16 25 & 35 V — 12
	4) Leakage current	8.3.1	—	Leakage current shall not exceed 0·03 μA/μF-V or 1·5 μA whichever is greater
	5) Voltage proof	8.3.4	—	There shall be no breakdown or flash-over
v)	*Fourth Group*			
	a) Mould growth	8.5.5	—	There shall be no mould growth

*During the last 10 minutes of the period of exposure the rated voltage shall be applied to the specimens. No short circuit shall occur.

(*Continued*)

TABLE 3 TEST SCHEDULE AND REQUIREMENTS — *Contd*

Sl No.	Test	Clause Ref in IS : 8507 (Part I)-1977	Condition of Test	Requirement
(1)	(2)	(3)	(4)	(5)
vi)	*Fifth Group*			
	a) Resistance to soldering heat	8.4.4.2	—	—
	i) Visual examination	8.4.1	—	There shall be no damage
	ii) Capacitance	8.3.2	—	Change in capacitance value shall not exceed ± 5 percent
	iii) Tangent of loss angle	8.3.3	—	As in (ii) (c) (3)
	iv) Leakage current	8.3.1	—	As in (ii) (c) (4)
	b) Resistance to solvents	8.4.9	—	—
	i) Visual examination	8.4.1	—	The marking shall be legible and shall not rub off. There shall be no damage
vii)	*Sixth Group*			
	a) Characteristics at low and high temperature	8.6	—	—
	Step 1 at 25°C			
	1) Capacitance	8.3.2	—	The capacitance value shall correspond with the rated capacitance taking into account the tolerance
	2) Tangent of loss angle	8.3.3	—	As in (i) (d)
	Step 2 at -55°C			
	1) Capacitance	8.3.2	—	Change in capacitance value shall not exceed ± 12 percent from the value recorded at Step 1
	2) Tangent of loss angle	8.3.3	—	As in (ii) (c) (3)
	Step 3 at 25°C			
	1) Capacitance	8.3.2	—	The value shall not exceed the Step 1 value
	2) Tangent of loss angle	8.3.3	—	As in Step 1
	3) Leakage current	8.3.1	—	This shall not exceed 0·02 μA/μF-V or 1 μA whichever is greater
	Step 4 at +85°C			
	1) Capacitance	8.3.2	—	Change in capacitance value shall not exceed ± 15 percent
	2) Tangent of loss angle	8.3.3	—	As in (ii) (c) (3)
	3) Leakage current	8.3.1	—	Leakage current shall not exceed 12·5 times the value specified in (i) (e)
	b) Surge	8.8	—	—
	1) Visual examination	8.4.1	—	There shall be no damage
	2) Capacitance	8.3.2	—	Change in capacitance value shall not exceed ± 10 percent
	3) Tangent of loss angle	8.3.3	—	50 percent of the initial limits
	4) Leakage current	8.3.1	—	100 percent of the initial limits
	c) Salt mist	8.5.4	4 days	—
	1) Visual examination	8.4.1	—	There shall be no corrosion or any other damage
	2) Leakage current	8.3.1	—	—

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