



**PRODUCT MANUAL FOR
AC MOTOR CAPACITORS
ACCORDING TO IS 2993:1998 / IEC 252:1993**

This Product Manual shall be used as reference material by all Regional/Branch Offices & licensees to ensure coherence of practice and transparency in operation of certification under Scheme-I of Bureau of Indian Standards (Conformity Assessment) Regulations, 2018 for various products. The document may also be used by prospective applicants desirous of obtaining BIS certification licence/certificate.

1.	Product	:	IS 2993:1998 / IEC 252:1993
	Title	:	AC Motor Capacitors
	No. of amendments	:	Nil
2.	Sampling Guidelines		
a)	Raw material	:	NA
b)	Grouping Guidelines	:	Please refer Annex - A
c)	Sample Size	:	As per Table 1 of IS 2993
3.	List of Test Equipment	:	Please refer Annex - B
4.	Scheme of Inspection and Testing	:	Please refer Annex - C
5.	Possible tests in a day	:	Please refer Annex - D
6.	Scope of the Licence : Licence is granted to use Standard Mark as per IS 2993:1998 / IEC 252:1993 with the following scope:		
	Name of the product	AC motor capacitors	
	Type	Ratings ____ μ F, ____ V, continuous/intermittent/starting operation, ____ Hz, class of operation A/B/C/D, climatic categories _____, self-healing/non-self-healing type, safety class P0/P1/P2	

ANNEX AGrouping Guidelines

1. The parameters as given below shall be considered for grouping of “AC motor capacitors” as per IS 2993: 1998/ IEC 252: 1993 for GoL/CSoL:
 - (a) Rated Capacitance
 - (b) Rated Voltage
 - (c) Rated frequency
 - (d) Climatic category
 - (e) Kind of operation: Continuous/ Intermittent/ Starting
 - (f) Class of operation – A/B/C/D
 - (g) Self-healing capacitor/ non-self-healing capacitor
2. Capacitors with different rated capacitances shall be considered as one group, provided the parameters stated at 1(b) & 1(c) remain the same. Capacitors with the highest and lowest rated output in a group shall be tested for covering the entire range of capacitors in that group.
3. If capacitors with a wider climatic category are tested, capacitors with a narrower climatic category shall also be covered. However, capacitors with lower minimum permissible operating temperature can be included without further testing.
4. Within a group, if capacitor with higher class of operation is tested, capacitors with lower class of operation shall be covered. For e.g, if capacitor with class of operation A is tested, Capacitors with class of operation B, C, D shall be covered.
5. To cover all varieties in the scope of the Licence with respect to kind of operation and healing within a group,
 - one capacitor of self-healing and non-self-healing type shall be tested
 - one capacitor for each kind of operation (i.e. continuous/ intermittent/ starting) shall be tested.
6. Test for class of safety protection (P1/P2) is optional. However, if safety class P2 is tested, P1 and P0 shall be covered and if safety class P1 is tested, P0 shall also be covered.
7. The Firm shall declare the varieties of Capacitors they intend to cover in the Licence. The Scope of Licence may be restricted based on the Manufacturing and Testing capabilities of the Manufacturer.
8. During the operation of the Licence, BO shall ensure that all the varieties covered in the Licence are tested in rotation, to the extent possible.

ANNEX B**List Of Test Equipment***Major test equipment required to test as per the Indian Standard*

Sl. No.	Test Equipment	Tests used in with Clause Reference
1	Air Conditioner, Thermometer	For test conditions - Cl 2.1.2
2	Loss Factor Meter	Tangent of Loss Angle - Cl 2.5
3	Voltmeter	Discharge devices - Cl 4.4
4	High Voltage tester	Voltage test between terminals - Cl 2.7 Voltage test between terminals and Case - Cl 2.8
5	Capacitance Bridge	Capacitance measurement - Cl 2.9
6	Vernier Calipers	Check of Dimensions - Cl 2.10 Creepage distances and Clearances - Cl 4.1 Terminals and Connecting cables - Cl 4.2
7	Heating Oven and temperature recorder	Sealing test - Cl.2.12
8	Cotton Cloth and Petroleum Spirit	Indelibility of Marking - Cl 2.6.1(National Foreword)
9	Tensile testing machine	Test Ua-Tensile - Cl 2.11.1.1
10	Suitable Loads	Test Ub-Bending - Cl 2.11.1.2
11	Set up for Torsion test	Test Uc- Torsion - Cl 2.11.1.3
12	Torque wrench	Test Ud – Torque - Cl 2.11.1.4
13	Set up for Vibration Test	Vibration - Cl 2.11.3
14	Set up for Soldering Test	Soldering- Cl 2.11.2
15	Test Chamber	Endurance Test - Cl 2.13
16	Damp heat test chamber	Damp heat test - Cl 2.14
17	Destruction Test apparatus - Test apparatus for d.c Conditioning and a.c. destruction test	Destruction Test- Cl 2.16

The above list is indicative only and may not be treated as exhaustive.

ANNEX C

Scheme Of Inspection And Testing

1. LABORATORY - A laboratory shall be maintained which shall be suitably equipped (as per the requirement given in column 2 of Table 1) and staffed, where different tests given in the specification shall be carried out in accordance with the methods given in the specification.

1.1 The manufacturer shall prepare a calibration plan for the test equipments.

2. TEST RECORDS – The manufacturer shall maintain test records for the tests carried out to establish conformity.

3. LABELLING AND MARKING - As per the requirements of IS 2993:1998 / IEC 252:1993

4. CONTROL UNIT - All the capacitors of the same type and rating manufactured in a day shall constitute a control unit.

5. LEVELS OF CONTROL - The tests as indicated in column 1 of Table 1 and the levels of control in column 3 of Table 1, shall be carried out on the whole production of the factory which is covered by this plan and appropriate records maintained in accordance with paragraph 2 above.

6. REJECTIONS – Disposal of non-conforming product shall be done in such a way so as to ensure that there is no violation of provisions of BIS Act, 2016.

TABLE 1

(1)				(2)	(3)		
Test Details				Test equipment requirement R: required (or) S: Sub-contracting permitted	Levels of Control		
Cl.	Requirement	Test Methods			No. of Sample	Frequency	Remarks
		Clause	Reference				
2.4.1(a)	Sealing test (if applicable)	2.12	IS 2993	R	Every capacitor	---	
2.4.1(b)	Voltage test between terminals	2.7	IS 2993	R			
2.4.1(c)	Voltage test between terminals and case	2.8	IS 2993	R			
2.4.1(d)	Visual examination	2.6	IS 2993	R			
2.4.1(e)	Capacitance measurement	2.9	IS 2993	R			
2.4.1(f)	Tangent of loss angle	2.5	IS 2993	R			
5.1	Marking	5.1	IS 2993	---	One	Each Control Unit	
2.6.1*	Indelibility of marking	2.6.1*	IS 2993	R			
4.1	Creepage distances and clearances	4.1	IS 2993	R			
4.2	Terminals and connecting Cables	4.2	IS 2993	R			
4.3	Earth connections	4.3	IS 2993	R			
4.4	Discharge devices	4.4	IS 2993	R	Once in 3 months for each Model of Capacitor	sample selection shall be in accordance with clause 1.3.27 and Table 1 of IS 2993	
2.7	Voltage test between terminals (Type test)	2.7	IS 2993	R			
2.8	Voltage test between terminals and case (Type test)	2.8	IS 2993	R			
2.10	Check of dimensions	2.10	IS 2993	R			
2.11	Mechanical tests	2.11	IS 2993	S			
2.13	Endurance test	2.13	IS 2993	S			
2.14	Damp heat test	2.14	IS 2993	S			
2.15	Self-healing test (if applicable)	2.15	IS 2993	S	Once in a year for each Model of Capacitor		
2.16	Destruction test (if marked on the capacitor)	2.16	IS 2993	S		Once in 3 years for each Model of Capacitor	

*Please refer National Foreword of IS 2993

Note-1: Sub-contracting is permitted to a laboratory recognized by the Bureau or Government laboratories empanelled by the Bureau.

Note-2: Levels of control given in column 3 are obligatory in nature.

ANNEX D

Possible Tests in a day

- (a) Sealing test
- (b) Voltage tests between terminals
- (c) Voltage tests between terminals and case
- (d) Visual examination
- (e) Capacitance Measurement
- (f) Tangent of loss angle