Certificate No: TC-5100
Certificate No: CC-2165

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TEST REPORT

TEST REPORT AS PER IS: 13340 (Part 1):2012 **SRF No.: 19010951**

Name & Address of Customer:	ULR-TC510019000000160F Test Report No.: HPLI/Test/1901095101(Part A) Date of Issue: 20/02/2019		
M/s. AB Power System Solution Factory: Gat No. 258/1, Plot No. 8/2, vill. Khalumbre, Chakan – Talegaon Road, Tal Khed, Near Lohr TSI Compound, Dist Pune – 411501	Customer Ref.: Dated 12/01/2019		
	Date of Sample Receipt: 12/01/2019	Start of Test Date: 21/01/2019	End of Test Date: 16/02/2019

PART A - PARTICULARS OF THE SAMPLE SUBMITTED

Sample description	Shunt Power Capacitors of the Self-Healing type for AC Systems having a rated voltage up to and including 1000V
Grade/ variety/ type/ class/ size etc.	Qn: 7.5 Kvar, Un: 525 V, f: 50 Hz, In: 8.25A, 55°C, 3 KV, ⊣□⊢, D, SH
Declared values, if any	7.5Kvar, 525V, 3PH, 50 Hz, Delta Connected, 43µfarad (-5% TO +10%), Temperature Category: 55°C, Overpressure or Thermal disconnector: Not Fitted, Application: Indoor, Internal Fuse: Not used
Code no., BIS seal and IO's sign. if any	Nil
Batch no., date of manufacture and Brand name	Date of Manufacture: January 2019 & Brand Name: "AB POWER CAPACITORS"
Quantity	03 Nos.: (Including Dummy Capacitors)
Condition of the sample	OK
Reference specification (s)	IS 13340(Part 1):2012
Environmental conditions	Temperature (25±2)°C & Relative Humidity<65%

PART B -SUPPLEMENTARY INFORMATION

a) Deviations from the test methods as per relevant specification/work instructions, if any : Nil
b) Details of the drawings, graphs, tables, sketches or photographs as referred in the test report, if any: Nil.
c) Testing procedure according to work instruction HPLI03/Test-cap/WI-30 to 42.
d) The Management System is maintained in accordance with IS/ISO/IEC 17025:2005 and testing Standards/Instruments are traceable to National/International Standards.

Notes: i) This report is not to be reproduced wholly or in part without our special permission in writing.
ii) This report refers only to the particular sample detailed above.
iii) The results reported in this certificate are valid at the time of and under the stipulated conditions of measurement.

For HI PHYSIX LABORATORY INDIA PVT. LTD.

Ashutosh Pathak
(Chief Technical Manager)

Tested By **Checked By** **Approved By**

Format No. P 17 F 04-00

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PART C-TEST RESULT

TEST REPORT NO.: HPLI/Test/1901095101(Part A)

IS 13340 (Part 1):2012

Sl. No	TESTS WITH CLAUSE REFERENCE	SPECIFIED REQUIREMENTS	RESULTS
Routine Tests			
1.	Capacitance Measurements and output calculation (Cl.7 of IS 13340 (Part 1): 2012)	Capacitance shall be measured at voltage and frequency chosen by manufacturer. Rated Capacitance= 43 μF	Measured at rated voltage and Frequency: 525V/50Hz
		Capacitance Tolerance: -5% TO +10%	Sample 1
		Between terminal 1&2	43.9 μF
		Between terminal 2&3	43.9 μF
		Between terminal 3&1	43.9 μF
		In three phase units, Ratio of maximum to minimum value of the capacitance measured between any two line terminals shall not exceed 1.08.	1.00
		Calculated output as per Annex B	7.60 kVAr
2.	Measurement of the tangent of the loss angle (tan δ) of the Capacitor (Cl.8 of IS 13340 (Part 1): 2012)	The capacitor losses (or tan δ) shall be measured at voltage and frequency chosen by manufacturer.	Measured at rated voltage and Frequency: 525V/50Hz
		(Declared value: 0.0025)	Sample 1
		Between terminal 1&2	0.0007
		Between terminal 2&3	0.0009
		Between terminal 3&1	0.0008
3.	Voltage Tests Between terminals (Cl.9.1 of IS 13340 (Part 1): 2012)	Capacitor shall be subjected to an ac test at $U_t = 2.15U_N$ for a minimum time of 2 sec. During the test, no permanent puncture or flashover shall occur. Self-healing breakdowns are permitted.	Test voltage:1.13kV with frequency: 50Hz
		Between terminal 1&2 (3 open)	No puncture or flashover occurred
		Between terminal 2&3 (1 open)	
		Between terminal 3&1 (2 open)	
4.	Voltage tests between terminals and container (Cl.10.1 of IS 13340 (Part 1): 2012)	Units having all terminals insulated from the container shall be subjected to an a.c. voltage applied between the terminals (joined together) and the container. The voltage to be applied is $2U_N + 2$ kV or 3 kV, whichever is higher, for 10sec.	Test voltage: 3.05 kV
		If the units are intended to be connected directly to the aerial power line and by agreement between the manufacturer and the user, the test shall be performed with a voltage of 6 kV.	N/A (Not intended to be connected directly to the aerial power line as declared by manufacturer)
		During the test, neither puncture nor flashover shall occur.	No puncture or flashover occurred

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PART C-TEST RESULT

TEST REPORT NO.: HPLI/Test/1901095101(Part A)

IS 13340 (Part 1):2012

Sl. No	TESTS WITH CLAUSE REFERENCE	SPECIFIED REQUIREMENTS	RESULTS
5.	Test of internal discharge device (Cl.11 and Cl. 22 of IS 13340 (Part 1): 2012)	Each capacitor unit and/or bank shall be provided with a means for discharging each unit in 3 min to 75V or less, from an initial peak voltage of $\sqrt{2}$ times rated voltage U_N. (U_N =525V) Test voltage: 742V	Discharged below 75V in 3 minutes.
		There shall be no switch, fuse cut-out, or any other isolating device between the capacitor unit and this discharge device.	Satisfactory
6.	Sealing test (Cl.12 of IS 13340 (Part 1): 2012)	Unenergized capacitor units shall be heated throughout so that all parts reach a temperature not lower than 20 °C above the maximum value in table 1 corresponding to the capacitor symbol, and shall be maintained at this temperature for 2 h. Test temperature: 75°C. No leakage shall occur	Satisfactory
Type Test			
1.	Voltage Tests Between terminals (Cl.9.2 of IS 13340 (Part 1): 2012)	Capacitor shall be subjected to an a.c test at $U_t = 2.15U_N$ for a minimum time of 10 sec. During the test, no permanent puncture or flashover shall occur.	Test voltage: 1.13kV with frequency: 50Hz
		Between terminal 1&2 (3 open)	No puncture or flashover occurred
		Between terminal 2&3 (1 open)	
		Between terminal 3&1 (2 open)	
2.	Voltage tests between terminals and container (Cl.10.2 of IS 13340 (Part 1): 2012)	Units having all terminals insulated from the container shall be subjected to an a.c. voltage applied between the terminals (joined together) and the container. The voltage to be applied is $2U_N$ + 2 kV or 3 kV, whichever is higher, for a duration of 1 min.	Test voltage: 3.05 kV
		Units are intended to be connected directly to the aerial power line; the test shall be performed with a voltage of 6 kV.	N/A (Not intended to be connected directly to the aerial power line as declared by manufacturer)
		During the test, neither puncture nor flashover shall occur.	No puncture or flashover occurred
		If the capacitor container is of insulating material, the test voltage shall be applied between the terminals and a metal foil wrapped closely round the surface of the container.	N/A (Metal body)
		The test shall be made under dry conditions for indoor units, and with artificial rain (See IEC 60060-1) for units to be used outdoors.	Satisfactory (Tested in Dry conditions)

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PART C-TEST RESULT **TEST REPORT NO.: HPLI/Test/1901095101(Part A)**

IS 13340 (Part 1):2012

Sl. No	TESTS WITH CLAUSE REFERENCE	SPECIFIED REQUIREMENTS	RESULTS
3.	Thermal stability test (Cl.13 of IS 13340 (Part 1): 2012)	The test capacitor unit subjected to the test shall be placed between two dummy units submitted by manufacturer which shall be energized at the same voltage as the test capacitor. After all parts of capacitor have attained temperature of the ambient air, the capacitor shall subjected for 48h to an a.c. voltage of sinusoidal form. The magnitude of the voltage of the test shall be adjusted to give a calculated output of at least 1.44 times its rated output.	See Remark 1
		During the last six hours, the temperature of the container near the top shall be measured at least four times. The temperature rise shall not be increase by more than 1°C.	
		At the end of the stability test, the difference between the measured temperature of the container and the ambient air temperature shall be recorded.	
		Before and after the test the Capacitance shall be measured within the standard temperature range for testing before and after the thermal stability test. These two measurements shall be corrected to the same dielectric temperature. No change of capacitance greater than 2% shall be apparent from these measurements.	
		Between terminal 1&2	
		Between terminal 2&3	
		Between terminal 3&1	
		A measurement of the tangent of the loss angle (tan δ) shall be made before and after the thermal stability test, at a temperature of approximately 20 °C. (Change in Loss angle: Max. $2x10^{-4}$)	
		Between terminal 1&2	
		Between terminal 2&3	
		Between terminal 3&1	

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PART C-TEST RESULT

TEST REPORT NO.: HPLI/Test/1901095101(Part A)

IS 13340 (Part 1):2012

Sl. No	TESTS WITH CLAUSE REFERENCE	SPECIFIED REQUIREMENTS	RESULTS		
4.	Measurement of the tangent of the loss angle (tan δ) of the capacitor at elevated temperature (Cl.14 of IS 13340 (Part 1): 2012)	The capacitor losses (tan δ) shall be measured at the end of the thermal stability test The measuring voltage shall be that of the thermal stability test. The value of tan δ, measured in accordance with 14.1, shall not exceed the value declared by manufacturer.	See Remark 1		
		Between terminal 1&2			
		Between terminal 2&3			
		Between terminal 3&1			
5.	Lightning impulse voltage test between terminals and container (Cl.15 of IS 13340 (Part 1): 2012)	The impulse test shall be performed with a wave of 1.2/50 μs to 5/50 μs having a peak value of 8 kV if the rated voltage of the capacitor is $U_N \leq 690$ V or having a peak value of 12 kV if $U_N > 690$ V. No. of impulses:3 Positive polarity followed by 3 Negative polarity between the terminals joined together and container.	Satisfactory (Tested at 8 kV)		
		Units indented to be connected directly to the aerial power line, test shall be performed at voltage having peak value of 15kV for capacitors rated voltage $U_N \leq 690$V or having a peak value of 25 kV if $U_N > 690$ V.	N/A (Not intended to be connected directly to the aerial power line as declared by manufacturer)		
6.	Discharge test (Cl.16 of IS 13340 (Part 1): 2012)	The capacitor was charged by means of dc and then discharge through a gap situated as close as possible to the capacitor. Test subjected to five such discharges within 10 Min.	Voltage was applied equal to $2U_N$ (i.e.1050V) between third terminal and two other terminals joined together and subjected to five such discharges		
		Voltage test between terminals within 5 minute after discharge test. During the test no permanent breakdown or flashover shall occur.	Test voltage: 1.13 kV No permanent breakdown or flashover occurred		
		Between terminal 1&2 (3 open)			
		Between terminal 2&3 (1 open)			
		Between terminal 3&1 (2 open)			
		The capacitance shall be measured before the discharge test and after the voltage test. The measurements shall not differ by an amount corresponding either to breakdown of an element, or to blowing of an internal fuse, or by more than 2 %.	Before Discharge Test	After Voltage Test	difference
		Between terminal 1&2 (3 open)	43.9 μF	43.7 μF	-0.46%
		Between terminal 2&3 (1 open)	43.8 μF	43.9 μF	0.23%
		Between terminal 3&1 (2 open)	43.9 μF	43.6 μF	-0.68%

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PART C-TEST RESULT

TEST REPORT NO.: HPLI/Test/1901095101(Part A)

IS 13340 (Part 1):2012

Sl. No	TESTS WITH CLAUSE REFERENCE	SPECIFIED REQUIREMENTS	RESULTS
7.	Ageing Test (Cl.17 of IS 13340 (Part 1) & (Part 2): 2012)	The capacitor unit is mounted as specified in enclosure in which heated air is circulated with an air velocity such that the temperature variation at any point of enclosure do not exceed 2 °C . The capacitor shall be energized at a voltage equal to 1.25 U_N for 750 hours. For Ageing test, case temperature of the capacitor shall be maintained which is the highest mean temperature in 24 hours (as per Table 1 of IS 13340 (Part 1):2012) plus the difference between the capacitor case temperature and the cooling air temperature recorded at the end of thermal stability test.	See Remark 1
		The capacitor shall then be subjected to 1000 discharge cycles consisting of charging the capacitor to a dc voltage of $2U_N$ between terminal 1&3 (terminal 2 left open) for 30s minimum charge-discharge cycle as specified.	
		The Ageing test will repeated after 1000 charge and discharge cycles at 1.25 U_N for 750 hours	
		During the test no permanent breakdown, interruption or flashover shall occur.	
		Change in Capacitance before and after ageing test.	
		Between terminal 1&2 (Limit: 5% Max.)	
		Between terminal 2&3 (Limit: 5% Max.)	
		Between terminal 3&1 (Limit: 5% Max.)	
		Overall Phase (Limit: 3% Max.)	
		On one phase, (Limit: 5% Max.)	
		The Voltage test has been carried out between terminals and container as prescribed in 10.1 of IS 13340 (Part 1):2012.	
		The Sealing test has been carried out as prescribed in Cl. 12 of IS 13340 (Part 1):2012.	
8.	Self-healing Test (Cl.18 of IS 13340 (Part 1) & (Part 2): 2012)	The capacitor or element shall be subjected to an ac voltage of $2.15U_N$ for 10 seconds. If fewer than five breakdowns occurred during this time the voltage shall be increased slowly until five breakdowns have occurred since the beginning of the test or until the voltage has reached 3.5 times the rated voltage. The capacitance was then measured at rated voltage 525Volts ac, Frequency: 50Hz	Test voltage : 1.13kV No. of breakdowns occur: >5

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PART C-TEST RESULT **TEST REPORT NO.: HPLI/Test/1901095101(Part A)**

IS 13340 (Part 1):2012

Sl. No	TESTS WITH CLAUSE REFERENCE	SPECIFIED REQUIREMENTS	RESULTS		
		Change in Capacitance before and after the Self- healing test.	Before Test	After Test	Change in Capacitance
		Between terminal 1&2	43.8 µF	43.7 µF	-0.23%
		Between terminal 2&3	43.9 µF	43.7 µF	-0.46%
		Between terminal 3&1	43.6 µF	43.9 µF	0.69%
9.	Destruction Test (Cl.19 of IS 13340 (Part 1) & (Part 2): 2012)	The capacitor sample was mounted in a circulating air oven maintained at a temperature of 55°C. After, all the parts of the capacitor attained the test temperature; the destruction test was performed between terminals 3 and 1 & 2 (joined together). a) A.C. Voltage $1.3U_N$ b) D.C. Voltage $10\ U_N$	See Remark 1		
		At the conclusion of the test, following conditions are met.			
		a) Escaping liquid material may wet the outer surface of the capacitor but shall not fall in drops.			
		b) Container may deform & damage but not broken.			
		c) Flame or fiery shall not be emitted from opening			
		d) The results of dielectric test between terminal and container with 1500V for 10s shall be satisfactory			
Overloads					
10.	Maximum permissible Voltage (Cl.20 of IS 13340 (Part 1): 2012)	Long Duration voltage	Long duration voltage as per table 3 of cl. 20.1 of IS 13340 Part 1 & Part 2:2012 as declared by manufacturer		
11.	Maximum permissible current (Cl.21 of IS 13340 (Part 1): 2012)	Maximum permissible current	Max current 1.3 times as per IS 13340 Part 1 & Part 2:2012 as declared by manufacturer		
Markings					
12.	Markings of the unit (Cl.26 of IS 13340 (Part 2): 2012)	The following information shall be marked indelibly, either directly or by means of a plate, on each capacitor unit:	See below		
		a) Manufacturer	"AB. POWER SYSTEM SOLUTION"		
		b) Identification number and manufacturing year (The year may be a part of the identification number or be in code form.)	Marked as Sr. No.: "SAE-18191212" & Dt. of Mfr.: JAN 2019		
		c) Rated output Q_N in kilovars (kvar).	7.5 Kvar		
		d) Rated voltage U_N in volts (V).	525 V		
		e) Rated frequency f_N in hertz (Hz).	50 Hz		

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IS13340 (Part 1):2012

Sl. No	TESTS WITH CLAUSE REFERENCE	SPECIFIED REQUIREMENTS	RESULTS
		f) Temperature category	55°C
		g) Discharge device, if internal, shall be indicated by wording or by the symbol -□- or by the rated resistance in kilohms (kΩ) or megohms (MΩ).	Marked as "-□-"
		h) Reference of self-healing design: "SH" or ⫲ or "self-healing".	SH
		i) Connection symbol (All capacitors, except single-phase units having one capacitance only, shall have their connection indicated. For standardized connection symbols, see 26.2).	Marked as "D"
		j)Internal fuses, if included, shall be indicated by wording or by the symbol -▭-	N/A (Not used)
		k) Indication for the overpressure or thermal disconnector, if such disconnector is fitted.	N/A (Not fitted)
		l) Insulation level Ui in kilovolts (kV). (Only for units having all terminals insulated from the container).	3 KV
		m) Reference to IEC 60831 (plus year of issue of the edition).	Marked as "IS 13340 (Part -1) - 2012 / IEC60831-1"
		A warning notice should be included as follows: "WARNING: WAIT 5 MINUTES AFTER ISOLATING SUPPLY BEFORE HANDLING	Warning Marked as "Wait 5 minutes After Isolating Supply Before Handling"
	Standardized connection symbols (Cl.26.2 of IS 13340 (Part 2): 2012)	The type of connection shall be indicated either by letters or by the following symbols:	See below
		D or Δ = Delta	Marked as "D"
		Y or ⅄ = star	N/A
		YN or ⅄ = star, neutral brought out	N/A
		III or ||| = three sections without interconnection	N/A

PART D:-

Remarks: 1. Test report issued excluding Thermal stability test, Measurement of the tangent of the loss angle (tan δ) of the capacitor at elevated temperature, Ageing Test and Destruction Test as per the customer's request. Test report for Thermal stability test, Measurement of the tangent of the loss angle (tan δ) of the capacitor at elevated temperature, Ageing Test and Destruction Test will be issued separately after completion of the test.

2. The observations given in part A of the cover page of the test report are taken from the marking on samples and specification provided with the sample.

3. N/A=Not Applicable

******* END OF THE TEST REPORT *******

For HI PHYSIX LABORATORY INDIA PVT. LTD.

Ashutosh Pathak
(Chief Technical Manager)

Tested by **Checked by** **Approved by**

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