

STANDARD NO.IEC NO: 60931-1

Test date: 14/08/2021-20/08/2021

P/I NO.: IR-20210523-2

DTD:23.05.2021

PRODUCT NAME: 20 kVar, 440V, 50 Hz, 3Phase, APP OIL FILLED CAPACITOR WITH TERMINAL COVER .

**TEST CONDITIONS: AS PER IEC-60931-1** 

Sr. No.	REQUIREMENT /TEST	SPECIFICATIONS	RESULT	REMARK
1	kVAr Rating	20 kVAr on an average	20.39 kVAr	PASS
2	Voltage Rating	440 V	440 Volts	PASS
3	Basic μfd Value (in μfd )	164.42 μfd on an average	167.67 μfd	PASS
4	Sr. No. of the Capacitor	SJG-1886 to 1910	SJG-1886 to 1910	PASS
5	Capacitor Type	APP	APP	PASS
6	Frequency	50 Hz or 60Hz	50 Hz.	PASS
7.1	Capacitance Measurement and Output Calculation before HV	-5% to +15% of basic μF for units and banks upto 100 kVAr	167.67 μfd +1.95 %	PASS
7.2	Capacitance Measurement and Output Calculation after HV	-5% to +15% of basic μF for units and banks upto 100 kVAr	167.67 μfd +1.95 %	PASS
8	Measurement of the tangent of the loss angle (tan $\delta$ ) of the capacitor	Shall not exceed value declared by manufacture max. value 0.5W/kVAr	0.22 W/kVAr	PASS
9	Voltage tests between Terminals (High Voltage test)	4.3 x Rated Voltage for 10 sec	Withstood	PASS
10	Voltage tests between terminals and container	3 KV AC for 10 Sec	Withstood	PASS
11	Test of internal discharge device	In 3 min reduce to 75 V or less	Withstood	PASS
	Sealing Test (Leakage Test)	75°C for 2 Hrs	No leakage of Impregnant.	PASS
12				



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13	Guide for Installation and Operation of L.T. Power Capacitors:	
	General Installation Special Service conditions Switching and protective devices and connections	
	Choice of rated Voltage	
	Operating temperature	
	High Ambient air temperature	
	Evaluation of losses	The installation manual attached congretaly
	Over voltages	The installation manual attached separately
	Overload currents	
	Capacitors connected to system with Audio frequency remote control	
	Immunity	

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**TEST CONDITIONS: AS PER IEC-60931-1** 

#### **TYPE TEST**

Capacitor specification: 50 kVAr, 440 V, 3 Phase, 50 Hz, APP (Film + Foil ) Type capacitor.

Sr. No : SST-0001/18 SST-0002/18 SST-0003/18	INS Level : 3/15 kV	Temp Category : -5 /+55°C	kVAr :50	Voltage : 440 Volts	
Capacitance: 411μF	I <sub>N</sub> : 65.61Amps	Discharge Device : Externally Fitted	Freq: 50 Hz	Phase : 3	
Connection: Delta Connected	Impregnant : NPCB	Year : 2018	Fuse : Internal	Standard : IEC : 60931 (Part 1) 1996.	

Sr. No	Test conducted	Specifications of the test as per the standard	Requirement as per	Test result
	as per the IEC	,	the specification	
1	Thermal Stability test as per Cl. No 13.	The Magnitude of the voltage throughout the last 24 Hrs of the test shall be adjusted to give a output using the measured capacitance, of at least 1.44 times its rated output.  Throughout the last 6 Hrs of the test, the temp rise shall not increase by more than 1°C.  At the end of the thermal stability test the difference between the measured temperature of the container and ambient air shall be recorded. Before and after the test the capacitance shall be measured within the standard temperature range for testing, and	No change in capacitance greater than 2% shall be apparent from the readings.  The value of the second measurement of the Tangent of loss angle shall be not greater than that of the first by more than	The change in capacitance is less than 2% and change in the value of the Tan $\delta$ is less than 2 x $10^{-4}$ .
		these two measurements shall be corrected to the same dielectric temperature.  A measurement of Tangent of dielectric loss angle shall be made before and after the Thermal Stability test, at a temp of approximately 20°C.	2 x 10 <sup>-4</sup> .	Hence passed
2	Measurement of the Tangent of the loss angle ( $\tan \delta$ ) of the capacitor at elevated	The capacitor losses ( $\tan \delta$ ) 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 the tan $\delta$ , measured in accordance with Cl. No 14.1 of IEC shall not exceed the value declared by the manufacturer for the	The Tan δ value is lesser than the agreed value Hence



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**TEST CONDITIONS: AS PER IEC-60931-1** 

temperature CI. No. 14  Container shall be subjected a test according to terminals and containers, as per the CI. No. 10.2  CI. Voltage test between the container and intended for exposed Voltage test between terminal and container  CI. No. 16				<u> </u>	
3 Voltage test between terminals and containers, as per the Cl. No. 10.2  4 Lightning Impulse Voltage test between terminal and container and intended for exposed between terminal and container by light test between terminal and container by light test between terminal and container by light test between terminal and container and intended for exposed installations shall be subjected to this test. Unless otherwise agreed between manufacturer and purchaser, the impulse test shall be performed with a wave of 1.2 / 50 µs to 5 / 50 µs, having a peak value of 15 kV, if the rated voltage of the capacitor is UN ≤660 V. or having peak value of 25 kV, if UN ≥660 V. Three Impulses of negative polarity shall be applied between terminals joined together and the container.  The absence of failure during this test , shall be verified by a cathode ray oscillograph, which is used to record the voltage and check the wave shape.  5 Discharge test Cl. No 16  Discharge test Cl. No 16  Discharge test test test test est test est test est		temperature		temp and voltage of	the test is
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Voltage between terminals and containers, as per the Cl. No. 10.2   Voltage test between terminals and container shall be subjected a test according to 10.1 / 10.2 for a duration of 1 min with a voltage of 3 kV, if the rated voltage of 6 kV if Un >660 V.					
Voltage between terminals and containers, as per the Cl. No. 10.2				manufacturer and the	
between terminals and containers, as per the Cl. No. 10.2 for a duration of 1 min with a voltage of of 3 kV, if the rated voltage of the capacitor is UN 5 660 V. or with a voltage of 6 kV if Un > 660 V. here impulse value of 25 kV, if Un ≥ 660 V, or having a peak value of 15 kV, if the rated voltage of the capacitor is UN 5 between terminal and container.  During the test No. flash over shall occur where the test passed occurred. Hence the test passed the container and intended for exposed installations shall be subjected to this test. Unless otherwise agreed between manufacturer and purchaser, the impulse test shall be performed with a wave of 1.2 / 50 µs to 5 / 50 µs, having a peak value of 15 kV, if the rated voltage of the capacitor is UN ≤660 V. Three Impulses of positive polarity shall be applied between terminals joined together and the container.  The absence of failure during this test , shall be verified by a cathode ray oscillograph, which is used to record the voltage and check the wave shape.  Discharge test Cl. No 16  Discharge test or capacitor is UN ≤660 V. Three Impulses of negative polarity shall be charged by means of a DC Voltage and discharged through a gap situated as close as possible to the capacitor.  The unit shall be charged by means of a DC Voltage and discharged through a gap situated as close as possible to the capacitor.  The unit shall be subjected to five such discharges within 10 min. The test voltage shall be be equal to 2 UN.  Within 5 Mins after this test, the unit shall be subjected to a voltage test between terminals. The capacitance shall be measured, before and after the voltage test.				purchaser.	
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close as possible to the capacitor.  It shall be subjected to five such discharges within 10 min. The test voltage shall be be equal to 2 UN.  Within 5 Mins after this test, the unit shall be subjected to a voltage test between terminals. The capacitance shall be measured, before and after the voltage test.  amount corresponding either to Breakdown of an element, or to blowing of an internal fuse, or by more than 2%.  or the change in capacitance is less than 2%. Hence the test	5	Discharge test	The unit shall be charged by means of a DC	The measurements	No
close as possible to the capacitor.  It shall be subjected to five such discharges within 10 min. The test voltage shall be be equal to 2 UN.  Within 5 Mins after this test, the unit shall be subjected to a voltage test between terminals. The capacitance shall be measured, before and after the voltage test.  amount corresponding either to Breakdown of an element, or to blowing of an internal fuse or the change in capacitance is less than 2%.  Hence the voltage test between terminals. The capacitance shall be measured, before and after the voltage test.		Cl. No 16	Voltage and discharged through a gap situated as	shall not differ by an	Breakdown
It shall be subjected to five such discharges within 10 min. The test voltage shall be be equal to 2 UN.  Within 5 Mins after this test, the unit shall be subjected to a voltage test between terminals. The capacitance shall be measured, before and after the voltage test.  Corresponding either to Breakdown of an element, or to blowing of an internal fuse, or by more than 2%.  Within 5 Mins after this test, the unit shall be subjected to a voltage test between terminals. The capacitance shall be measured, before and after the voltage test.			close as possible to the capacitor.	amount	of an
It shall be subjected to five such discharges within 10 min. The test voltage shall be be equal to 2 UN.  Within 5 Mins after this test, the unit shall be subjected to a voltage test between terminals. The capacitance shall be measured, before and after the voltage test.  to Breakdown of an element, or to blowing of an internal fuse, or by more than 2%.  or the change in capacitance is less than 2%. Hence the test			·	corresponding either	element, or
within 10 min. The test voltage shall be be equal to 2 UN.  Within 5 Mins after this test, the unit shall be subjected to a voltage test between terminals. The capacitance shall be measured, before and after the voltage test.  element, or to blowing of an internal fuse or the change in capacitance is less than 2%.  Hence the test			It shall be subjected to five such discharges		
to 2 UN.  Within 5 Mins after this test, the unit shall be subjected to a voltage test between terminals. The capacitance shall be measured, before and after the voltage test.  of an internal fuse, or by more than 2%.  or the change in capacitance is less than 2%. Hence the test			_		_
Within 5 Mins after this test, the unit shall be subjected to a voltage test between terminals. The capacitance shall be measured, before and after the voltage test.  by more than 2%.  change in capacitance is less than 2%. Hence the test					
Within 5 Mins after this test, the unit shall be subjected to a voltage test between terminals.  The capacitance shall be measured, before and after the voltage test.  capacitance is less than 2%. Hence the test			33 2 3		
subjected to a voltage test between terminals.  The capacitance shall be measured, before and after the voltage test.  is less than 2%. Hence the test			Within 5 Mins after this test the unit shall be	Symble than 270.	_
The capacitance shall be measured, before and after the voltage test.  2%. Hence the test					•
after the voltage test. the test					
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passea.			arter the voltage test.		
				201	passeg.





STANDARD NO.IEC NO: 60931-1

Test date: 14/08/2021-20/08/2021

P/I NO.: IR-20210523-2

DTD:23.05.2021

PRODUCT NAME: 20 kVar, 440V, 50 HZ, 3PHASE, APP OIL FILLED CAPACITOR WITH TERMINAL COVER .

**TEST CONDITIONS: AS PER IEC-60931-1** 

6	Ageing Test as	During the test No permanent break down,	During the test No	No
	per Cl. No 17 of	interruption or flash over shall occur.	permanent break	permanent
	IEC 60931 -2.	At the end of the test capacitor shall cool down	down interruption or	breakdown
		freely to the ambient temperature, and the	flash over shall occur.	or
		capacitance shall then be measured, under the	The maximum	interruption
		same conditions, as before the test.	permitted variation of	took place.
		The maximum permitted variation of	capacitance compared	Change in
		capacitance compared to the values measured	to the values	capacitance
		before the test shall be 3% averaged over all the	measured before the	is within the
		phases and 5% on one phase.	test shall be 3%	permitted
		Voltage test between terminals and container	averaged over all the	limits.
		shall be carried out.	phases and 5% on one	No leakage of
		The sealing test shall be repeated.	phase.	fluid
				observed.
				Hence the
				test is
				passed.
7	Disconnecting	- Before opening, no significant deformation of		
	test on internal	the container shall be apparent.	No significant	Capacitor
	fuses as per	- After opening the container, a check shall be	deformation, No	withstood all
	Clause 5.3 of	made to ensure that:	damage of additional	conditions.
	IEC 60931-3:	a) no significant deformation of sound fuses is	fuses .	Hence
		apparent;		passed the
		b) No more than one additional fuse (or one-		test.
		tenth of fused elements directly in parallel) has		
		been damaged.		- 6
8	Maximum	Capacitor units shall be suitable for operation at		Confirmed
	permissible	voltage levels according to table 3 of IEC 60931-		and passed
	voltage	1.		- 6 .
9	Maximum	Capacitor units shall be suitable for continuous		Confirmed
	permissible	operation at an r.m.s. line current of 1.3 times		and passed
	current	the current that occurs at rated sinusoidal		
		voltage and rated frequency, excluding		
		transients. Taking into account the capacitance		
		tolerances of 1.15 C <sub>N</sub> , the maximum current can		
10	Disabassa	reach 1.5 l <sub>N</sub> .		Duna si da d
10	Discharge	Each capacitor unit and/or bank shall be	\/a \(\frac{1}{2}\)	Provided
	Device	provided with a means for discharging each unit	Voltage measured	externally.
		in 3 min to 75 V or less, from an initial peak	after 3 mins found to	passed
		voltage of fi times rated voltage UN.	be less than 75 V.	







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PRODUCT NAME: 20 kVar, 440V, 50 HZ, 3PHASE, APP OIL FILLED CAPACITOR WITH TERMINAL COVER .

**TEST CONDITIONS: AS PER IEC-60931-1** 

11	Container	Container To enable the potential of the metal container		
	connections	of the capacitor to be fixed, and to be able to		Provided.
		carry the fault current in the event of a		
		breakdown to the container, the metallic		
		container shall be provided with connection		
		capable of carrying the fault current.		
	Protection of	When capacitors are impregnated with		The liquid is
12	the	products that shall not be dispersed into the		environment
	environment	environment, the necessary precautions shall		friendly.
		be taken.		,

# **RATING PLATE DETAILS**

MANUFACTURER	M/s.SHREEM ELECTRIC LIMITED
IDENTIFICATION NUMBER AND	
MANUFACTURING YEAR	SJG-1886/21 to 1910/21
RATED OUTPUT QN IN kVAr	20 kVAr
	440 Volt
RATED VOLTAGE U <sub>N</sub> IN VOLTS	
RATED FREQUENCY f <sub>N</sub> IN Hz	50 Hz
Basic μfd Value (in μfd )U <sub>N</sub>	164.42 μfd
TEMPERATURE CATEGORY	-40/D
DISCHARGE DEVICE	Externally Fitted
CONNECTION SYMBOL	Delta (Δ)
PHASE	3 Phase
INTERNAL FUSES	Yes
IMPREGNANT	NPCB
WEIGHT	13 Kg APPROX
INSULATION LEVEL U <sub>i</sub> IN kV	3/15 kV
REFERENCE TO IEC 60931	IEC 60931-1

Industrial Estate,

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PRODUCT NAME: 20 kVar, 440V, 50 HZ, 3PHASE, APP OIL FILLED CAPACITOR WITH TERMINAL COVER .

**TEST CONDITIONS: AS PER IEC-60931-1** 



<u>CONCLUSION:</u> Place and date of inspection at Shreem Electrical Limited located in Kolhapur, India on 14.08.2021 and the sample test performed by manufacturer from 14.08.2021 to 20/08/2021. Sample test witnessed by our SAI inspector in laboratory of the manufacturer and concluded that the goods are in conformity with standard No.: **IEC 60931-1.** 

Furthermore, we confirm that the test report is acceptable and the manufacturer's laboratory found to be as qualified.

Manufacturer's Representative

S.A.I. Representative

MPP Div.

Gat No. 311

Wear R.K.Market

Yard Gate

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