


VDE Testing and Certification Institute Section FG32 D-63069 Offenbach		Test Report	VDE Reference No. 820600-4690-0001/126593
		DIN EN 60831-1 (VDE 0560 Part 46):2003-08 EN 60831-1:1996+A1:2003 IEC 60831-1:1996+A1:2002 DIN EN 60831-2 (VDE 0560 Part 47):1997-09 EN 60831-2:1996; IEC 60831-2:1995	Page Number 1 Total number of pages 18
Shunt power capacitors of the self-healing type having a rated voltage up to and including 1 kV			

Report reference No.: 820600-4690-0001/126593

Tested by (+ signature): Mr. Kirscht

Signature: 

Approved by (+ signature): Mr. Bretz

Signature: 

Date of issue: 21.07.2010

Testing Laboratory: VDE Testing and Certification Institute

Address: Merianstraße 28
D-63069 Offenbach

Testing Location: Section FG32

Applicant: LIFASA International Capacitors, S.A.

Address: C/Vallés, 32 Pol.Ind.Can Bernades
08130 Santa Perpetua de Mogoda
Barcelona (Spain)

Standard: EN 60831-1:1996+A1:2003 EN 60831-2:1996
IEC 60831-1:1996+A1:2002 IEC 60831-2:1995

TRF originator: VDE

Master TRF: 02.01

Copyright blank test report: The bodies participating in the Committee of Certification Bodies (CCB) and/or the CENELEC Certification Agreement (CCA).

Test Procedure: CB Scheme
 CCA Scheme

Procedure deviation: N/A

Non-standard test method: N/A

VDE Testing and Certification Institute Section FG32 D-63069 Offenbach	Test Report DIN EN 60831-1 (VDE 0560 Part 46):2003-08 EN 60831-1:1996+A1:2003 IEC 60831-1:1996+A1:2002 DIN EN 60831-2 (VDE 0560 Part 47):1997-09 EN 60831-2:1996; IEC 60831-2:1995	VDE Reference No. 820600-4690-0001/126593 Page Number 2 Total number of pages 18
---	---	--

Type of test object: Shunt power capacitors of the self-healing type having a rated voltage up to and including 1 kV

Trademark:



Model/type reference: POLB44010SK

Manufacturer: LIFASA International Capacitors, S.A.

Address: C/Vallés, 32 Pol.Ind.Can Bernades
08130 Santa Perpetua de Mogoda
Barcelona (Spain)

Ratings: as below

Type of capacitor:

Single-phase unit
 Three-phase unit in delta connection
 Three-phase unit in star connection

Rated voltage: AC 440 V

Rated capacitance: 3 x 5,5 µF

Tolerance on rated capacitance: -5 % +10 %

Rated output: 1,0 kvar

Rated frequency: 50 Hz

Temperature category: D (T_{max} = 55 °C)

Type of termination:

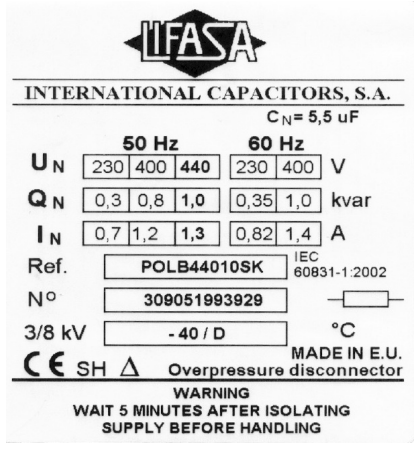


Wire terminations Hose cables
 PVC singlecore cables Flat quick-connectors
 Screw terminals Solder tags

Discharge resistor: Resistance value: 3 x 2,2 MΩ

VDE Testing and Certification Institute D-63069 Offenbach	FG32-PS 006 E Edition IV / 08.03	Date: 21. Jul. 10	Review: Bretz
--	-------------------------------------	-------------------	---------------

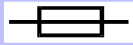
VDE Testing and Certification Institute Section FG32 D-63069 Offenbach	Test Report DIN EN 60831-1 (VDE 0560 Part 46):2003-08 EN 60831-1:1996+A1:2003 IEC 60831-1:1996+A1:2002 DIN EN 60831-2 (VDE 0560 Part 47):1997-09 EN 60831-2:1996; IEC 60831-2:1995	VDE Reference No. 820600-4690-0001/126593
		Page Number 4 Total number of pages 18

Δ 3 x 5,5 μF - 440 V

Clause number and test 26 Marking of the unit The following information shall be marked on the capacitor:	Copy of the marking label 	
Information	Check	Verdict
1) Manufacturer	LIFASA	Pass
2) Identification number and manufacturing year	POLB44010SK 05/2009	Pass
3) Rated output (Q _N) in kvar (for three-phase units the total output shall be given)	1,0 kvar	Pass
4) Rated voltage (U _N) in volts	440 V	Pass
5) Rated frequency (f _N) in Hz	50 Hz	Pass
6) Temperature category	-40/D	Pass
7) Discharge device, if internal, shall be indicated by wording or by the symbol  or by the rated resistance in kΩ or MΩ	Resistor symbol	Pass
8) Reference of self-healing design: "SH" or  or "self-healing"	SH	Pass
Date/Name: 27.11.09 kir		

VDE Testing and Certification Institute Section FG32 D-63069 Offenbach	Test Report DIN EN 60831-1 (VDE 0560 Part 46):2003-08 EN 60831-1:1996+A1:2003 IEC 60831-1:1996+A1:2002 DIN EN 60831-2 (VDE 0560 Part 47):1997-09 EN 60831-2:1996; IEC 60831-2:1995	VDE Reference No. 820600-4690-0001/126593
		Page Number 5 Total number of pages 18

Δ 3 x 5,5 μF - 440 V

Clause number and test		
26 Marking of the unit		
The following information shall be marked on the capacitor:		
Information	Check	Verdict
9) Connection symbol (connection symbol according to 26.2 shall be indicated for all capacitors except single-phase units)	Δ	Pass
10) Internal fuses, if included, shall be indicated by wording or by the symbol 	-	N/A
11) Indication for the overpressure or thermal disconnecter, if such disconnecter is fitted	Overpressure disconnecter	Pass
12) Insulation level U _i in kV, e.g. 3/15 kV (only for units having all terminals insulated from the container)	3/8 kV	Pass
13) Reference to IEC/EN 60831 (plus year of issue of the edition)	IEC 60831-1:02	Pass
Date/Name: 27.11.09 kir		

VDE Testing and Certification Institute D-63069 Offenbach	FG32-PS 006 E Edition IV / 08.03	Date: 21. Jul. 10	Review: Bretz
--	-------------------------------------	-------------------	---------------

VDE Testing and Certification Institute Section FG32 D-63069 Offenbach	Test Report DIN EN 60831-1 (VDE 0560 Part 46):2003-08 EN 60831-1:1996+A1:2003 IEC 60831-1:1996+A1:2002 DIN EN 60831-2 (VDE 0560 Part 47):1997-09 EN 60831-2:1996; IEC 60831-2:1995	VDE Reference No. 820600-4690-0001/126593 Page Number 6 Total number of pages 18
---	---	--

Δ 3 x 5,5 μF - 440 V

Clause number and test	Check	Verdict
22 Discharge device Each capacitor unit and/or bank shall be provided with a means for discharging each unit in 3 min to 75 V or less, from an initial peak voltage of $\sqrt{2}$ times rated voltage U_N . There shall be no switch, fuse cut-out, or any other isolating device between the capacitor unit and this discharge device.	Resistance value: 3 x 2,2 MΩ	Pass
23 Container connections To enable the potential of the metal container of the capacitor to be fixed, and to be able to 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.	Earth connection possible	Pass
Date/Name: 27.11.09 kir		

VDE Testing and Certification Institute Section FG32 D-63069 Offenbach	Test Report DIN EN 60831-1 (VDE 0560 Part 46):2003-08 EN 60831-1:1996+A1:2003 IEC 60831-1:1996+A1:2002 DIN EN 60831-2 (VDE 0560 Part 47):1997-09 EN 60831-2:1996; IEC 60831-2:1995	VDE Reference No. 820600-4690-0001/126593
		Page Number 8 Total number of pages 18

Thermal stability test
 Δ 3 x 5,5 μ F - 440 V

Clause number and test	Sample number				Verdict	Equipment number	Date / Signature
7.1 Capacitance measurement C in μ F ----- $\Delta C / C$ in % (max. 2 % permitted)	No. 1				Pass	1	04.12.09 kir
	Terminals 1-2						
	8,2910						

	-0,05						
	Terminals 1-3						
8.1 Measurement tan δ tan δ in 10^{-4} ----- Δ tan δ in 10^{-4} (max. $2 * 10^{-4}$ permitted)	No. 1				Pass	1	04.12.09 kir
	Terminals 1-2						
	2,4						

	-0,9						
	Terminals 1-3						
	Terminals 2-3						
	8,2855						

	-0,06						
	Terminals 2-3						
	8,2627						

-0,06							
	Terminals 1-3						
	2,3						

	-0,9						
	Terminals 2-3						
	2,2						

-1,0							

Remarks:

VDE Testing and Certification Institute D-63069 Offenbach	FG32-PS 006 E Edition IV / 08.03	Date: 21. Jul. 10	Review: Bretz
--	-------------------------------------	--------------------------	----------------------

VDE Testing and Certification Institute Section FG32 D-63069 Offenbach	Test Report DIN EN 60831-1 (VDE 0560 Part 46):2003-08 EN 60831-1:1996+A1:2003 IEC 60831-1:1996+A1:2002 DIN EN 60831-2 (VDE 0560 Part 47):1997-09 EN 60831-2:1996; IEC 60831-2:1995					VDE Reference No. 820600-4690-0001/126593	
						Page Number 9 Total number of pages 18	

Measurement of tan δ at elevated temperature
 Δ 3 x 5,5 μ F - 440 V

Clause number and test	Sample number					Verdict	Equipment number	Date / Signature
8.1 Measurement of tan δ at elevated temperature tan δ in 10 ⁻⁴	No. 1					Pass	1 19	04.12.09 kir
	Terminals 1-2							
	2,0							
	Terminals 1-3							
	2,0							
	Terminal 2-3							
	1,9							

Voltage test between terminals

Clause number and test	Sample number					Verdict	Equipment number	Date / Signature
9.2 Voltage test between terminals (10 s) U = 2,15 * U _N = 946 V AC	No. 2	No. 3	No. 4	No. 5	No. 6	Pass	3 8	08.02.10 kir
	o.k.	o.k.	o.k.	o.k.	o.k.			

Voltage test between terminals and container

Clause number and test	Sample number					Verdict	Equipment number	Date / Signature
10.2 Voltage test between terminals and container (1 min) U = 2 * U _N + 2 kV or 3 kV (the higher value is to be applied) (6 kV if the unit is directly connected to the aerial power line) U = 3,0 kV AC	No. 2	No. 3	No. 4	No. 5	No. 6	Pass	3 6	08.02.10 kir
	o.k.	o.k.	o.k.	o.k.	o.k.			

Remarks:

VDE Testing and Certification Institute D-63069 Offenbach	FG32-PS 006 E Edition IV / 08.03	Date: 21. Jul. 10	Review: Bretz
--	-------------------------------------	----------------------	------------------

VDE Testing and Certification Institute Section FG32 D-63069 Offenbach	Test Report DIN EN 60831-1 (VDE 0560 Part 46):2003-08 EN 60831-1:1996+A1:2003 IEC 60831-1:1996+A1:2002 DIN EN 60831-2 (VDE 0560 Part 47):1997-09 EN 60831-2:1996; IEC 60831-2:1995		VDE Reference No. 820600-4690-0001/126593
			Page Number 10 Total number of pages 18

Lightning impulse voltage test between terminals and container

Δ 3 x 5,5 μ F - 440 V

Clause number and test	Sample number					Verdict	Equipment number	Date / Signature
15 Lightning impulse voltage test between terminals and container Wave: 1,2/50 μ s to 5/50 μ s 3 impulses of positive polarity followed by 3 impulses of negative polarity U _N ≤ 690 V: U = 8 kV (15 kV if the unit is directly connected to the aerial power line) U _N > 690 V: U = 12 kV (25 kV if the unit is directly connected to the aerial power line) U = 8 kV	No. 2	No. 3	No. 4	No. 5	No. 6	Pass	10	13.07.10
	o.k.	o.k.	o.k.	o.k.	o.k.		11	kir

Remarks:

VDE Testing and Certification Institute Section FG32 D-63069 Offenbach	Test Report DIN EN 60831-1 (VDE 0560 Part 46):2003-08 EN 60831-1:1996+A1:2003 IEC 60831-1:1996+A1:2002 DIN EN 60831-2 (VDE 0560 Part 47):1997-09 EN 60831-2:1996; IEC 60831-2:1995			VDE Reference No. 820600-4690-0001/126593
			Page Number 11 Total number of pages 18	

Discharge test
 Δ 3 x 5,5 μ F - 440 V

Clause number and test	Sample number				Verdict	Equipment number	Date / Signature
7.1 Capacitance measurement C in μ F	No. 7 Terminals 1-2	No. 8 Terminals 1-2	No. 9 Terminals 1-2		Pass	1	04.02.10 kir
	8,2581	8,2862	8,1567				
	Terminals 1-3	Terminals 1-3	Terminals 1-3				
	8,2982	8,2696	8,1859				
	Terminals 2-3	Terminals 2-3	Terminals 2-3				
	8,2538	8,2829	8,1811				
16 Discharge test 5 discharges within 10 minutes Single-phase units and three-phase units in Δ -connection: $U = 2 * U_N$ Three-phase units in Y-connection: $U = 2,31 * U_N$ $U = 880$ V DC	No. 7	No. 8	No. 9		Pass	7	10.02.10 kir
	o.k.	o.k.	o.k.				
9.1 Voltage test between terminals (2 s) $U = 2,15 * U_N = 946$ V AC	No. 7	No. 8	No. 9		Pass	3 8	10.02.10 kir
	o.k.	o.k.	o.k.				
7.1 Capacitance measurement C in μ F ----- $\Delta C / C$ in % (max. 2 % permitted)	No. 7 Terminals 1-2	No. 8 Terminals 1-2	No. 9 Terminals 1-2		Pass	1	11.02.10 kir
	8,2604	8,2862	8,1569				
	-----	-----	-----				
	0,03	0,00	0,00				
	Terminals 1-3	Terminals 1-3	Terminals 1-3				
	8,3006	8,2697	8,1862				
	-----	-----	-----				
	0,03	0,00	0,00				
Terminals 2-3	Terminals 2-3	Terminals 2-3					
8,2564	8,2830	8,1814					
-----	-----	-----					
0,03	0,00	0,00					

Remarks:

VDE Testing and Certification Institute D-63069 Offenbach	FG32-PS 006 E Edition IV / 08.03	Date: 21. Jul. 10	Review: Bretz
--	-------------------------------------	------------------------------	----------------------

VDE Testing and Certification Institute Section FG32 D-63069 Offenbach	Test Report DIN EN 60831-1 (VDE 0560 Part 46):2003-08 EN 60831-1:1996+A1:2003 IEC 60831-1:1996+A1:2002 DIN EN 60831-2 (VDE 0560 Part 47):1997-09 EN 60831-2:1996; IEC 60831-2:1995		VDE Reference No. 820600-4690-0001/126593
			Page Number 12 Total number of pages 18

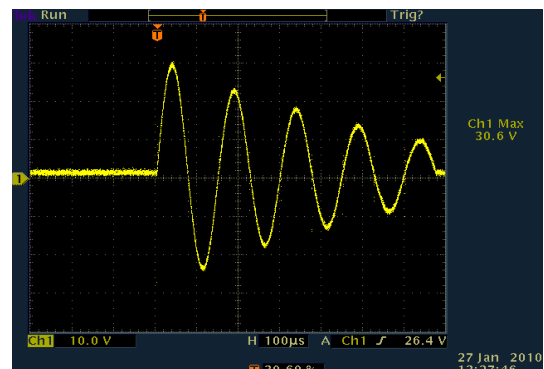
Ageing test (IEC/EN 60831-2)
 Δ 3 x 5,5 μ F - 440 V

Clause number and test	Sample number				Verdict	Equipment number	Date / Signature
	No. 10 Terminals 1-2	No. 11 Terminals 1-2	No. 12 Terminals 1-2				
7.1 Capacitance measurement C in μ F	8,1954	8,2112	8,2013		Pass	1	04.12.09 kir
	8,2118	8,2142	8,2511				
	8,2080	8,2037	8,2051				
17.2 Ageing test t = 750 h T = 46 °C U = 1,25 * U _N = 550 V AC	o.k.	o.k.	o.k.		Pass	5 14 17	Start: 07.12.09 End: 07.01.10 kir
7.1 Capacitance measurement C in μ F (for information only)	8,1931	8,2069	8,1949		Pass	1	11.01.10 kir
	8,2080	8,2090	8,2450				
	8,2051	8,1991	8,1987				
17.2 Discharge cycles Number of cycles: 1000 Duration of each cycle: min. 30 s L = (1000 / C) \pm 20 % in μ H L = 91 μ H Single-phase units and three-phase units in Δ -connection: U = 2 * U _N Three-phase units in Y-connection: U = 2,31 * U _N U = 880 V DC	o.k.	o.k.	o.k.		Pass	2 7	Start: 18.01.10 End: 19.01.10 kir

Remarks:

17.2 Discharge cycles

Discharge current: 100 mV = 1 A

 $I_{peak} = 306$ A


VDE Testing and Certification Institute D-63069 Offenbach	FG32-PS 006 E Edition IV / 08.03	Date: 21. Jul. 10	Review: Bretz
--	-------------------------------------	-------------------	---------------

VDE Testing and Certification Institute Section FG32 D-63069 Offenbach	Test Report DIN EN 60831-1 (VDE 0560 Part 46):2003-08 EN 60831-1:1996+A1:2003 IEC 60831-1:1996+A1:2002 DIN EN 60831-2 (VDE 0560 Part 47):1997-09 EN 60831-2:1996; IEC 60831-2:1995		VDE Reference No. 820600-4690-0001/126593
			Page Number 13 Total number of pages 18

Ageing test (IEC/EN 60831-2)
 Δ 3 x 5,5 μ F - 440 V

Clause number and test	Sample number			Verdict	Equipment number	Date / Signature
7.1 Capacitance measurement C in μ F (for information only)	No. 10 Terminals 1-2	No. 11 Terminals 1-2	No. 12 Terminals 1-2	Pass	1	22.01.10 kir
	8,1889	8,2039	8,1912			
	Terminals 1-3	Terminals 1-3	Terminals 1-3			
	8,2044	8,2060	8,2415			
	Terminals 2-3	Terminals 2-3	Terminals 2-3			
	8,2016	8,1960	8,1948			
17.2 Ageing test t = 750 h T = 46 °C U = 1,25 * U _N = 550 V AC	No. 10	No. 11	No. 12	Pass	5 14 17	Start: 26.01.10 End: 26.02.10 kir
	o.k.	o.k.	o.k.			
7.1 Capacitance measurement C in μ F ----- Δ C / C in % (max. 5 % permitted)	No. 10 Terminals 1-2	No. 11 Terminals 1-2	No. 12 Terminals 1-2	Pass	1	01.03.10 kir
	8,1907	8,2047	8,1908			
	-----	-----	-----			
	-0,06	-0,08	-0,13			
	Terminals 1-3	Terminals 1-3	Terminals 1-3			
	8,2055	8,2067	8,2409			
	-----	-----	-----			
	-0,08	-0,09	-0,12			
	Terminals 2-3	Terminals 2-3	Terminals 2-3			
	8,2026	8,1970	8,1941			
	-----	-----	-----			
	-0,07	-0,08	-0,13			

Δ C / C in % averaged over all phases (max. 3 % permitted)	-0,07	-0,08	-0,13			

Remarks:

VDE Testing and Certification Institute D-63069 Offenbach	FG32-PS 006 E Edition IV / 08.03	Date: 21. Jul. 10	Review: Bretz
--	-------------------------------------	-------------------	---------------

VDE Testing and Certification Institute Section FG32 D-63069 Offenbach	Test Report DIN EN 60831-1 (VDE 0560 Part 46):2003-08 EN 60831-1:1996+A1:2003 IEC 60831-1:1996+A1:2002 DIN EN 60831-2 (VDE 0560 Part 47):1997-09 EN 60831-2:1996; IEC 60831-2:1995		VDE Reference No. 820600-4690-0001/126593
			Page Number 14 Total number of pages 18

Ageing test (IEC/EN 60831-2)
 Δ 3 x 5,5 μ F - 440 V

Clause number and test	Sample number					Verdict	Equipment number	Date / Signature
	No. 10	No. 11	No. 12					
10.2 Voltage test between terminals and container (1 min) $U = 2 * U_N + 2 \text{ kV}$ or 3 kV (the higher value is to be applied) (6 kV if the unit is directly connected to the aerial power line) $U = 3,0 \text{ kV AC}$	No. 10 o.k.	No. 11 o.k.	No. 12 o.k.			Pass	3 6	01.03.10 kir
12 Sealing test Heating to and storage (2 h) at maximum ambient temperature + 20 °C $T = 75 \text{ °C}$	No. 10 o.k.	No. 11 o.k.	No. 12 o.k.			Pass	19	02.03.10 kir

Remarks:

VDE Testing and Certification Institute D-63069 Offenbach	FG32-PS 006 E Edition IV / 08.03	Date: 21. Jul. 10	Review: Bretz
--	-------------------------------------	--------------------------	----------------------

VDE Testing and Certification Institute Section FG32 D-63069 Offenbach	Test Report DIN EN 60831-1 (VDE 0560 Part 46):2003-08 EN 60831-1:1996+A1:2003 IEC 60831-1:1996+A1:2002 DIN EN 60831-2 (VDE 0560 Part 47):1997-09 EN 60831-2:1996; IEC 60831-2:1995	VDE Reference No. 820600-4690-0001/126593
		Page Number 15 Total number of pages 18

Self-healing test (IEC/EN 60831-2)
 Δ 3 x 5,5 μ F - 440 V

Clause number and test	Sample number				Verdict	Equipment number	Date / Signature
7.1 Capacitance measurement C in μ F	No. 13 Terminals 1-2	No. 14 Terminals 1-2	No. 15 Terminals 1-2		Pass	1	05.02.10 kir
	8,2060	8,2237	8,0730				
	Terminals 1-3	Terminals 1-3	Terminals 1-3				
	8,1802	8,2588	8,0790				
	Terminals 2-3	Terminals 2-3	Terminals 2-3				
	8,1643	8,2713	8,1521				
18 Self-healing test Single-phase units and three-phase units in Δ -connection: $U_1 = 2,15 * U_N$ Three-phase units in Y-connection: $U_1 = 2,48 * U_N$ $U_1 = 946$ V AC	No. 13	No. 14	No. 15		Pass	3 8 9	09.02.10 kir
	946	946	946				
	Number of clearings	0	0	0			
18 Self-healing test Voltage increase Single-phase units and three-phase units in Δ -connection: $U_2 = 3,5 * U_N$ Three-phase units in Y-connection: $U_2 = 4,04 * U_N$ $U_2 = 1540$ V AC	No. 13	No. 14	No. 15				
	1930	1860	1900				
	Number of clearings	5	5	5			
7.1 Capacitance measurement C in μ F ----- Δ C / C in % (no significant change permitted)	No. 13 Terminals 1-2	No. 14 Terminals 1-2	No. 15 Terminals 1-2		Pass	1	09.02.10 kir
	8,2057	8,2202	8,0589				
	0,00	-0,04	-0,17				
	Terminals 1-3	Terminals 1-3	Terminals 1-3				
	8,1798	8,2578	8,0737				
	0,00	-0,01	-0,07				
	Terminals 2-3	Terminals 2-3	Terminals 2-3				
	8,1645	8,2706	8,1483				
0,00	-0,01	-0,05					

Remarks: When reaching the voltage value of $3,5 * U_N$ the required number of 5 clearings had not occurred. Therefore the voltage had to be increased to higher values in order to reach the required 5 clearings.

VDE Testing and Certification Institute D-63069 Offenbach	FG32-PS 006 E Edition IV / 08.03	Date: 21. Jul. 10	Review: Bretz
--	-------------------------------------	-------------------	---------------

VDE Testing and Certification Institute Section FG32 D-63069 Offenbach	Test Report DIN EN 60831-1 (VDE 0560 Part 46):2003-08 EN 60831-1:1996+A1:2003 IEC 60831-1:1996+A1:2002 DIN EN 60831-2 (VDE 0560 Part 47):1997-09 EN 60831-2:1996; IEC 60831-2:1995	VDE Reference No. 820600-4690-0001/126593
		Page Number 16 Total number of pages 18

Destruction test (IEC/EN 60831-2)
 Δ 3 x 5,5 μ F - 440 V

Clause number and test	Sample number				Verdict	Equipment number	Date / Signature
19.1 Destruction test Set of the A.C. voltage supply Single-phase units and three-phase units in Δ -connection: $U = 1,3 * U_N$ Three-phase units in Y-connection: $U = 1,5 * U_N$ $U = 572$ V AC ----- Recorded current in A	No. 16	No. 17	No. 18		Pass	7	18.03.10
	o.k.	o.k.	o.k.			14	kir
19.1 D.C. Conditioning at maximum ambient air temperature $T = 55$ °C Single-phase units and three-phase units in Δ -connection: $U = 10 * U_N$ Three-phase units in Y-connection: $U = 11,55 * U_N$ $U = 4400$ V DC Maintenance of the voltage until voltmeter indicates zero for 3 s to 5 s Short-circuit current: $I = 300$ mA	No. 16	No. 17	No. 18				
	o.k.	o.k.	o.k.				
19.1 A.C. Conditioning at maximum ambient air temperature $t = 3$ min $T = 55$ °C Single-phase units and three-phase units in Δ -connection: $U = 1,3 * U_N$ Three-phase units in Y-connection: $U = 1,5 * U_N$ $U = 572$ V AC ----- Recorded current at the end of the test in A ----- Number of repetitions of D.C. and A.C. conditioning	No. 16	No. 17	No. 18				
	o.k.	o.k.	o.k.				
	1,03	1,31	0,65				
	5	5	6				

Remarks:

VDE Testing and Certification Institute D-63069 Offenbach	FG32-PS 006 E Edition IV / 08.03	Date: 21. Jul. 10	Review: Bretz
--	-------------------------------------	-------------------	---------------

VDE Testing and Certification Institute Section FG32 D-63069 Offenbach	Test Report DIN EN 60831-1 (VDE 0560 Part 46):2003-08 EN 60831-1:1996+A1:2003 IEC 60831-1:1996+A1:2002 DIN EN 60831-2 (VDE 0560 Part 47):1997-09 EN 60831-2:1996; IEC 60831-2:1995	VDE Reference No. 820600-4690-0001/126593
		Page Number 17 Total number of pages 18

Destruction test (IEC/EN 60831-2)
 Δ 3 x 5,5 μ F - 440 V

Clause number and test	Sample number				Verdict	Equipment number	Date / Signature		
19.1 Destruction test - Finally obtained condition Two times blow of the fuse ----- Current lower than 66 % of the initial value	No. 16 N/A ----- o.k.	No. 17 N/A ----- o.k.	No. 18 N/A ----- o.k.		Pass		18.03.10 kir		
19.2 Destruction test - Test requirements No escaping liquid material falling away in drops ----- No break of the container ----- No emission of flames and/or fiery particles from the openings (no burning or scorching of the cheesecloth)	No. 16 o.k. ----- o.k.	No. 17 o.k. ----- o.k.	No. 18 o.k. ----- o.k.			Pass			18.03.10 kir
10.1 Voltage test between terminals and container (10 s) U = 1,5 kV AC	No. 16 o.k.	No. 17 o.k.	No. 18 o.k.		Pass		3 6	19.03.10 kir	

Remarks:


VDE Testing and Certification Institute D-63069 Offenbach	FG32-PS 006 E Edition IV / 08.03	Date: 21. Jul. 10	Review: Bretz
--	-------------------------------------	-------------------	---------------

VDE Testing and Certification Institute Section FG32 D-63069 Offenbach	Test Report DIN EN 60831-1 (VDE 0560 Part 46):2003-08 EN 60831-1:1996+A1:2003 IEC 60831-1:1996+A1:2002 DIN EN 60831-2 (VDE 0560 Part 47):1997-09 EN 60831-2:1996; IEC 60831-2:1995	VDE Reference No. 820600-4690-0001/126593
		Page Number 18 Total number of pages 18

Photo documentation of tested types:



VDE Testing and Certification Institute D-63069 Offenbach	FG32-PS 006 E Edition IV / 08.03	Date: 21. Jul. 10	Review: Bretz
--	-------------------------------------	-------------------	---------------

VDE Testing and Certification Institute Section FG32 D-63069 Offenbach		Test Report	VDE Reference No. 820600-4690-0001/126593
		DIN EN 60831-1 (VDE 0560 Part 46):2003-08 EN 60831-1:1996+A1:2003 IEC 60831-1:1996+A1:2002 DIN EN 60831-2 (VDE 0560 Part 47):1997-09 EN 60831-2:1996; IEC 60831-2:1995	Page Number 1 Total number of pages 18

Report reference No.: 820600-4690-0001/126593

Tested by (+ signature): Mr. Kirscht

Signature: *E. Kirscht*

Approved by (+ signature): Mr. Bretz

Signature: *Bretz*

Date of issue: 21.07.2010

Testing Laboratory: VDE Testing and Certification Institute

Address: Merianstraße 28
D-63069 Offenbach

Testing Location: Section FG32

Applicant: LIFASA International Capacitors, S.A.

Address: C/Vallés, 32 Pol.Ind.Can Bernades
08130 Santa Perpetua de Mogoda
Barcelona (Spain)

Standard: EN 60831-1:1996+A1:2003 EN 60831-2:1996
IEC 60831-1:1996+A1:2002 IEC 60831-2:1995

TRF originator: VDE

Master TRF: 02.01

Copyright blank test report: The bodies participating in the Committee of Certification Bodies (CCB) and/or the CENELEC Certification Agreement (CCA).




Test Procedure: CB Scheme
 CCA Scheme

Procedure deviation: N/A

Non-standard test method: N/A

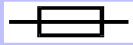
VDE Testing and Certification Institute Section FG32 D-63069 Offenbach	Test Report DIN EN 60831-1 (VDE 0560 Part 46):2003-08 EN 60831-1:1996+A1:2003 IEC 60831-1:1996+A1:2002 DIN EN 60831-2 (VDE 0560 Part 47):1997-09 EN 60831-2:1996; IEC 60831-2:1995	VDE Reference No. 820600-4690-0001/126593
		Page Number 4 Total number of pages 18

Δ 3 x 219,2 μF - 440 V

Clause number and test 26 Marking of the unit The following information shall be marked on the capacitor:	Copy of the marking label 	
Information	Check	Verdict
1) Manufacturer	LIFASA	Pass
2) Identification number and manufacturing year	POLB44400SK 05/2009	Pass
3) Rated output (Q _N) in kvar (for three-phase units the total output shall be given)	40,0 kvar	Pass
4) Rated voltage (U _N) in volts	440 V	Pass
5) Rated frequency (f _N) in Hz	50 Hz	Pass
6) Temperature category	-40/D	Pass
7) Discharge device, if internal, shall be indicated by wording or by the symbol  or by the rated resistance in kΩ or MΩ	Resistor symbol	Pass
8) Reference of self-healing design: "SH" or  or "self-healing"	SH	Pass
Date/Name: 16.04.10 kir		

VDE Testing and Certification Institute Section FG32 D-63069 Offenbach	Test Report DIN EN 60831-1 (VDE 0560 Part 46):2003-08 EN 60831-1:1996+A1:2003 IEC 60831-1:1996+A1:2002 DIN EN 60831-2 (VDE 0560 Part 47):1997-09 EN 60831-2:1996; IEC 60831-2:1995	VDE Reference No. 820600-4690-0001/126593
		Page Number 5 Total number of pages 18

Δ 3 x 219,2 μF - 440 V

Clause number and test		
26 Marking of the unit		
The following information shall be marked on the capacitor:		
Information	Check	Verdict
9) Connection symbol (connection symbol according to 26.2 shall be indicated for all capacitors except single-phase units)	Δ	Pass
10) Internal fuses, if included, shall be indicated by wording or by the symbol 	-	N/A
11) Indication for the overpressure or thermal disconnecter, if such disconnecter is fitted	Overpressure disconnecter	Pass
12) Insulation level U _i in kV, e.g. 3/15 kV (only for units having all terminals insulated from the container)	3/8 kV	Pass
13) Reference to IEC/EN 60831 (plus year of issue of the edition)	IEC 60831-1:02	Pass
Date/Name: 16.04.10 kir		

VDE Testing and Certification Institute D-63069 Offenbach	FG32-PS 006 E Edition IV / 08.03	Date: 21. Jul. 10	Review: Bretz
--	-------------------------------------	-------------------	---------------

VDE Testing and Certification Institute Section FG32 D-63069 Offenbach	Test Report DIN EN 60831-1 (VDE 0560 Part 46):2003-08 EN 60831-1:1996+A1:2003 IEC 60831-1:1996+A1:2002 DIN EN 60831-2 (VDE 0560 Part 47):1997-09 EN 60831-2:1996; IEC 60831-2:1995	VDE Reference No. 820600-4690-0001/126593 Page Number 6 Total number of pages 18
---	---	--

Δ 3 x 219,2 μF - 440 V

Clause number and test	Check	Verdict
22 Discharge device Each capacitor unit and/or bank shall be provided with a means for discharging each unit in 3 min to 75 V or less, from an initial peak voltage of $\sqrt{2}$ times rated voltage U_N . There shall be no switch, fuse cut-out, or any other isolating device between the capacitor unit and this discharge device.	Resistance value: 3 x 110 kΩ	Pass
23 Container connections To enable the potential of the metal container of the capacitor to be fixed, and to be able to 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.	Earth connection possible	Pass
Date/Name: 16.04.10 kir		

VDE Testing and Certification Institute Section FG32 D-63069 Offenbach	Test Report DIN EN 60831-1 (VDE 0560 Part 46):2003-08 EN 60831-1:1996+A1:2003 IEC 60831-1:1996+A1:2002 DIN EN 60831-2 (VDE 0560 Part 47):1997-09 EN 60831-2:1996; IEC 60831-2:1995	VDE Reference No. 820600-4690-0001/126593
		Page Number 7 Total number of pages 18

Thermal stability test
 Δ 3 x 219,2 μ F - 440 V

Clause number and test	Sample number					Verdict	Equipment number	Date / Signature
7.1 Capacitance measurement C in μ F	No. 1					Pass	1	16.04.10 kir
	Terminals 1-2							
	333,44							
	Terminals 1-3							
	Terminals 1-3							
	333,16							
	Terminals 2-3							
	332,76							
8.1 Measurement tan δ tan δ in 10^{-4}	No. 1					Pass	1	16.04.10 kir
	Terminals 1-2							
	10,4							
	Terminals 1-3							
	Terminals 1-3							
	11,0							
	Terminals 2-3							
	10,4							
13 Thermal stability test t = 48 h T = 55 °C Q = 1,44 * Q _N U = 1,2 * U _N = 528 V AC	No. 1					Pass	4 12 15	Start: 20.04.10 End: 22.04.10 kir
	o.k.							
13 Measurement of the temperature of the capacitor container during the last 6 h 1 st Measurement T in °C ----- 2 nd Measurement T in °C ----- 3 rd Measurement T in °C ----- 4 th Measurement T in °C	No. 1					Pass	4	22.04.10 kir
	61,3							
	61,3							
	61,4							
	61,4							

Remarks:

VDE Testing and Certification Institute D-63069 Offenbach	FG32-PS 006 E Edition IV / 08.03	Date: 21. Jul. 10	Review: Bretz
--	-------------------------------------	-------------------	---------------

VDE Testing and Certification Institute Section FG32 D-63069 Offenbach	Test Report DIN EN 60831-1 (VDE 0560 Part 46):2003-08 EN 60831-1:1996+A1:2003 IEC 60831-1:1996+A1:2002 DIN EN 60831-2 (VDE 0560 Part 47):1997-09 EN 60831-2:1996; IEC 60831-2:1995				VDE Reference No. 820600-4690-0001/126593
					Page Number 9 Total number of pages 18

Measurement of tan δ at elevated temperature
 Δ 3 x 219,2 μF - 440 V

Clause number and test	Sample number					Verdict	Equipment number	Date / Signature
8.1 Measurement of tan δ at elevated temperature tan δ in 10 ⁻⁴	No. 1					Pass	1 19	22.04.10 kir
	Terminals 1-2							
	10,5							
	Terminals 1-3							
	10,7							
	Terminal 2-3							
	9,9							

Voltage test between terminals

Clause number and test	Sample number					Verdict	Equipment number	Date / Signature
9.2 Voltage test between terminals (10 s) U = 2,15 * U _N = 946 V AC	No. 2	No. 3	No. 4			Pass	3 8 18	09.06.10 kir
	o.k.	o.k.	o.k.					

Voltage test between terminals and container

Clause number and test	Sample number					Verdict	Equipment number	Date / Signature
10.2 Voltage test between terminals and container (1 min) U = 2 * U _N + 2 kV or 3 kV (the higher value is to be applied) (6 kV if the unit is directly connected to the aerial power line) U = 3,0 kV AC	No. 2	No. 3	No. 4			Pass	3 6	09.06.10 kir
	o.k.	o.k.	o.k.					

Remarks:

VDE Testing and Certification Institute D-63069 Offenbach	FG32-PS 006 E Edition IV / 08.03	Date: 21. Jul. 10	Review: Bretz
--	-------------------------------------	------------------------------	----------------------

VDE Testing and Certification Institute Section FG32 D-63069 Offenbach	Test Report DIN EN 60831-1 (VDE 0560 Part 46):2003-08 EN 60831-1:1996+A1:2003 IEC 60831-1:1996+A1:2002 DIN EN 60831-2 (VDE 0560 Part 47):1997-09 EN 60831-2:1996; IEC 60831-2:1995		VDE Reference No. 820600-4690-0001/126593
			Page Number 10 Total number of pages 18

Lightning impulse voltage test between terminals and container

Δ 3 x 219,2 μF - 440 V

Clause number and test	Sample number				Verdict	Equipment number	Date / Signature
15 Lightning impulse voltage test between terminals and container Wave: 1,2/50 μs to 5/50 μs 3 impulses of positive polarity followed by 3 impulses of negative polarity U _N ≤ 690 V: U = 8 kV (15 kV if the unit is directly connected to the aerial power line) U _N > 690 V: U = 12 kV (25 kV if the unit is directly connected to the aerial power line) U = 8 kV	No. 2	No. 3	No. 4		Pass	10	13.07.10
	o.k.	o.k.	o.k.			11	kir

Remarks:

VDE Testing and Certification Institute Section FG32 D-63069 Offenbach	Test Report DIN EN 60831-1 (VDE 0560 Part 46):2003-08 EN 60831-1:1996+A1:2003 IEC 60831-1:1996+A1:2002 DIN EN 60831-2 (VDE 0560 Part 47):1997-09 EN 60831-2:1996; IEC 60831-2:1995			VDE Reference No. 820600-4690-0001/126593
			Page Number 11 Total number of pages 18	

Discharge test
 Δ 3 x 219,2 μ F - 440 V

Clause number and test	Sample number				Verdict	Equipment number	Date / Signature
7.1 Capacitance measurement C in μ F	No. 5 Terminals 1-2	No. 6 Terminals 1-2	No. 7 Terminals 1-2		Pass	1	16.04.10 kir
	334,06	332,84	332,30				
	Terminals 1-3	Terminals 1-3	Terminals 1-3				
	332,88	331,86	332,80				
	Terminals 2-3	Terminals 2-3	Terminals 2-3				
	332,22	331,04	333,52				
16 Discharge test 5 discharges within 10 minutes Single-phase units and three-phase units in Δ -connection: $U = 2 * U_N$ Three-phase units in Y-connection: $U = 2,31 * U_N$ $U = 880$ V DC	No. 5	No. 6	No. 7		Pass	7	28.04.10 kir
	o.k.	o.k.	o.k.				
9.1 Voltage test between terminals (2 s) $U = 2,15 * U_N = 946$ V AC	No. 5	No. 6	No. 7		Pass	3 8 18	28.04.10 kir
o.k.	o.k.	o.k.					
7.1 Capacitance measurement C in μ F ----- $\Delta C / C$ in % (max. 2 % permitted)	No. 5 Terminals 1-2	No. 6 Terminals 1-2	No. 7 Terminals 1-2		Pass	1	28.04.10 kir
	334,18	332,94	332,42				
	0,04	0,03	0,04				
	Terminals 1-3	Terminals 1-3	Terminals 1-3				
	333,00	331,94	332,92				
	0,04	0,02	0,04				
	Terminals 2-3	Terminals 2-3	Terminals 2-3				
	332,32	331,14	333,64				
0,03	0,03	0,04					

Remarks:

VDE Testing and Certification Institute D-63069 Offenbach	FG32-PS 006 E Edition IV / 08.03	Date: 21. Jul. 10	Review: Bretz
--	-------------------------------------	--------------------------	----------------------

VDE Testing and Certification Institute Section FG32 D-63069 Offenbach	Test Report DIN EN 60831-1 (VDE 0560 Part 46):2003-08 EN 60831-1:1996+A1:2003 IEC 60831-1:1996+A1:2002 DIN EN 60831-2 (VDE 0560 Part 47):1997-09 EN 60831-2:1996; IEC 60831-2:1995		VDE Reference No. 820600-4690-0001/126593
			Page Number 12 Total number of pages 18

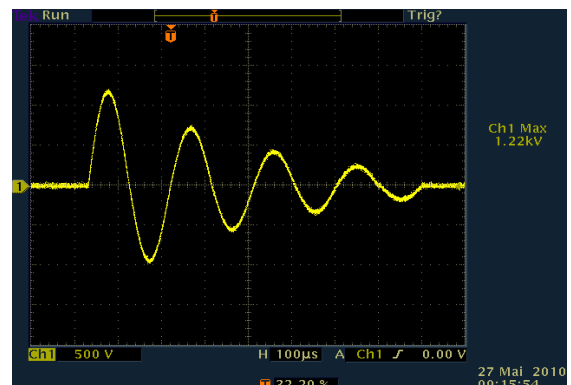
Ageing test (IEC/EN 60831-2)
 Δ 3 x 219,2 μ F - 440 V

Clause number and test	Sample number				Verdict	Equipment number	Date / Signature
7.1 Capacitance measurement C in μ F	No. 8 Terminals 1-2	No. 9 Terminals 1-2			Pass	1	16.04.10 kir
	334,54	331,94					
	Terminals 1-3	Terminals 1-3					
	333,70	334,16					
	Terminals 2-3	Terminals 2-3					
	333,74	332,84					
17.2 Ageing test t = 750 h T = 51 °C U = 1,25 * U _N = 550 V AC	No. 8 o.k.	No. 9 o.k.			Pass	5 13 16	Start: 23.04.10 End: 24.05.10 kir
7.1 Capacitance measurement C in μ F (for information only)	No. 8 Terminals 1-2	No. 9 Terminals 1-2			Pass	1	26.05.10 kir
	334,58	331,90					
	Terminals 1-3	Terminals 1-3					
	333,72	334,16					
	Terminals 2-3	Terminals 2-3					
	333,72	332,88					
17.2 Discharge cycles Number of cycles: 1000 Duration of each cycle: min. 30 s L = (1000 / C) \pm 20 % in μ H L = 2,3 μ H Single-phase units and three-phase units in Δ -connection: U = 2 * U _N Three-phase units in Y-connection: U = 2,31 * U _N U = 880 V DC	No. 8 o.k.	No. 9 o.k.			Pass	2 7	Start: 27.05.10 End: 28.05.10 kir

Remarks: 17.2 Discharge cycles

Discharge current: 100 mV = 1 A

I_{peak} = 12,2 kA



VDE Testing and Certification Institute D-63069 Offenbach	FG32-PS 006 E Edition IV / 08.03	Date: 21. Jul. 10	Review: Bretz
--	-------------------------------------	--------------------------------------	----------------------------------

VDE Testing and Certification Institute Section FG32 D-63069 Offenbach	Test Report DIN EN 60831-1 (VDE 0560 Part 46):2003-08 EN 60831-1:1996+A1:2003 IEC 60831-1:1996+A1:2002 DIN EN 60831-2 (VDE 0560 Part 47):1997-09 EN 60831-2:1996; IEC 60831-2:1995		VDE Reference No. 820600-4690-0001/126593
			Page Number 13 Total number of pages 18

Ageing test (IEC/EN 60831-2)
 Δ 3 x 219,2 μ F - 440 V

Clause number and test	Sample number				Verdict	Equipment number	Date / Signature
7.1 Capacitance measurement C in μ F (for information only)	No. 8 Terminals 1-2	No. 9 Terminals 1-2			Pass	1	31.05.10 kir
	334,52	331,82					
	Terminals 1-3	Terminals 1-3					
	333,64	334,06					
	Terminals 2-3	Terminals 2-3					
	333,66	332,78					
17.2 Ageing test t = 750 h T = 51 °C U = 1,25 * U _N = 550 V AC	No. 8 o.k.	No. 9 o.k.			Pass	5 13 16	Start: 11.06.10 End: 12.07.10 kir
7.1 Capacitance measurement C in μ F ----- Δ C / C in % (max. 5 % permitted)	No. 8 Terminals 1-2	No. 9 Terminals 1-2			Pass	1	14.07.10 kir
	334,54	331,86					
	0,00	-0,02					
	Terminals 1-3	Terminals 1-3					
	333,66	334,12					
	-0,01	-0,01					
	Terminals 2-3	Terminals 2-3					
	333,66	332,84					
	-0,02	0,00					
Δ C / C in % averaged over all phases (max. 3 % permitted)	-0,01	-0,01					

Remarks:

VDE Testing and Certification Institute D-63069 Offenbach	FG32-PS 006 E Edition IV / 08.03	Date: 21. Jul. 10	Review: Bretz
--	-------------------------------------	-------------------	---------------

VDE Testing and Certification Institute Section FG32 D-63069 Offenbach	Test Report DIN EN 60831-1 (VDE 0560 Part 46):2003-08 EN 60831-1:1996+A1:2003 IEC 60831-1:1996+A1:2002 DIN EN 60831-2 (VDE 0560 Part 47):1997-09 EN 60831-2:1996; IEC 60831-2:1995			VDE Reference No. 820600-4690-0001/126593
				Page Number 14 Total number of pages 18

Ageing test (IEC/EN 60831-2)
 Δ 3 x 219,2 μ F - 440 V

Clause number and test	Sample number					Verdict	Equipment number	Date / Signature
10.2 Voltage test between terminals and container (1 min) $U = 2 * U_N + 2 \text{ kV}$ or 3 kV (the higher value is to be applied) (6 kV if the unit is directly connected to the aerial power line) $U = 3,0 \text{ kV AC}$	No. 8	No. 9				Pass	3	14.07.10
	o.k.	o.k.					6	kir
12 Sealing test Heating to and storage (2 h) at maximum ambient temperature + 20 °C $T = 75 \text{ °C}$	No. 8	No. 9				Pass	19	15.07.10
	o.k.	o.k.						kir

Remarks:

VDE Testing and Certification Institute D-63069 Offenbach	FG32-PS 006 E Edition IV / 08.03	Date: 21. Jul. 10	Review: Bretz
--	-------------------------------------	--------------------------	----------------------

VDE Testing and Certification Institute Section FG32 D-63069 Offenbach	Test Report DIN EN 60831-1 (VDE 0560 Part 46):2003-08 EN 60831-1:1996+A1:2003 IEC 60831-1:1996+A1:2002 DIN EN 60831-2 (VDE 0560 Part 47):1997-09 EN 60831-2:1996; IEC 60831-2:1995		VDE Reference No. 820600-4690-0001/126593
			Page Number 15 Total number of pages 18

Self-healing test (IEC/EN 60831-2)
 Δ 3 x 219,2 μ F - 440 V

Clause number and test	Sample number				Verdict	Equipment number	Date / Signature
7.1 Capacitance measurement C in μ F	No. 10 Terminals 1-2	No. 11 Terminals 1-2	No. 12 Terminals 1-2		Pass	1	16.04.10 kir
	328,48	330,12	330,10				
	Terminals 1-3	Terminals 1-3	Terminals 1-3				
	330,22	332,90	333,64				
	Terminals 2-3	Terminals 2-3	Terminals 2-3				
	330,58	332,40	333,58				
18 Self-healing test Single-phase units and three-phase units in Δ -connection: $U_1 = 2,15 * U_N$ Three-phase units in Y-connection: $U_1 = 2,48 * U_N$ $U_1 = 946$ V AC	No. 10	No. 11	No. 12		Pass	3 8 9 18	26.05.10 kir
	946	946	946				
	Number of clearings	0	0	0			
18 Self-healing test Voltage increase Single-phase units and three-phase units in Δ -connection: $U_2 = 3,5 * U_N$ Three-phase units in Y-connection: $U_2 = 4,04 * U_N$ $U_2 = 1540$ V AC	No. 10	No. 11	No. 12				
	1370	1470	1520				
	Number of clearings	5	5	5			
7.1 Capacitance measurement C in μ F ----- $\Delta C / C$ in % (no significant change permitted)	No. 10 Terminals 1-2	No. 11 Terminals 1-2	No. 12 Terminals 1-2		Pass	1	27.05.10 kir
	328,58	330,26	330,20				
	0,03	0,04	0,03				
	Terminals 1-3	Terminals 1-3	Terminals 1-3				
	330,30	333,02	333,76				
	0,02	0,04	0,04				
	Terminals 2-3	Terminals 2-3	Terminals 2-3				
	330,68	332,52	333,68				
0,03	0,04	0,03					

Remarks:

VDE Testing and Certification Institute D-63069 Offenbach	FG32-PS 006 E Edition IV / 08.03	Date: 21. Jul. 10	Review: Bretz
--	-------------------------------------	-------------------	---------------

VDE Testing and Certification Institute Section FG32 D-63069 Offenbach	Test Report DIN EN 60831-1 (VDE 0560 Part 46):2003-08 EN 60831-1:1996+A1:2003 IEC 60831-1:1996+A1:2002 DIN EN 60831-2 (VDE 0560 Part 47):1997-09 EN 60831-2:1996; IEC 60831-2:1995		VDE Reference No. 820600-4690-0001/126593
			Page Number 16 Total number of pages 18

Destruction test (IEC/EN 60831-2)
 Δ 3 x 219,2 μ F - 440 V

Clause number and test	Sample number				Verdict	Equipment number	Date / Signature
19.1 Destruction test Set of the A.C. voltage supply Single-phase units and three-phase units in Δ -connection: $U = 1,3 * U_N$ Three-phase units in Y-connection: $U = 1,5 * U_N$ $U = 572$ V AC ----- Recorded current in A	No. 13	No. 14			Pass	7	10.06.10 kir
	o.k.	o.k.				14 17	
19.1 D.C. Conditioning at maximum ambient air temperature $T = 55$ °C Single-phase units and three-phase units in Δ -connection: $U = 10 * U_N$ Three-phase units in Y-connection: $U = 11,55 * U_N$ $U = 4400$ V DC Maintenance of the voltage until voltmeter indicates zero for 3 s to 5 s Short-circuit current: $I = 300$ mA	No. 13	No. 14					
	o.k.	o.k.					
19.1 A.C. Conditioning at maximum ambient air temperature $t = 3$ min $T = 55$ °C Single-phase units and three-phase units in Δ -connection: $U = 1,3 * U_N$ Three-phase units in Y-connection: $U = 1,5 * U_N$ $U = 572$ V AC ----- Recorded current at the end of the test in A ----- Number of repetitions of D.C. and A.C. conditioning	No. 13	No. 14					
	o.k.	o.k.					
	0,0	0,0					
	1	1					

Remarks:

VDE Testing and Certification Institute D-63069 Offenbach	FG32-PS 006 E Edition IV / 08.03	Date: 21. Jul. 10	Review: Bretz
--	-------------------------------------	-------------------	---------------

VDE Testing and Certification Institute Section FG32 D-63069 Offenbach	Test Report DIN EN 60831-1 (VDE 0560 Part 46):2003-08 EN 60831-1:1996+A1:2003 IEC 60831-1:1996+A1:2002 DIN EN 60831-2 (VDE 0560 Part 47):1997-09 EN 60831-2:1996; IEC 60831-2:1995			VDE Reference No. 820600-4690-0001/126593
			Page Number 17 Total number of pages 18	

Destruction test (IEC/EN 60831-2)
 Δ 3 x 219,2 μ F - 440 V

Clause number and test	Sample number				Verdict	Equipment number	Date / Signature
19.1 Destruction test - Finally obtained condition Two times blow of the fuse ----- Current lower than 66 % of the initial value	No. 13	No. 14			Pass		10.06.10 kir
	N/A	N/A					
	o.k.	o.k.					
19.2 Destruction test - Test requirements No escaping liquid material falling away in drops ----- No break of the container ----- No emission of flames and/or fiery particles from the openings (no burning or scorching of the cheesecloth)	No. 13	No. 14			Pass		10.06.10 kir
	o.k.	o.k.					
	o.k.	o.k.					
10.1 Voltage test between terminals and container (10 s) U = 1,5 kV AC	No. 13	No. 14			Pass	3 6	11.06.10 kir

Remarks:

VDE Testing and Certification Institute D-63069 Offenbach	FG32-PS 006 E Edition IV / 08.03	Date: 21. Jul. 10	Review: Bretz
--	-------------------------------------	--------------------------	----------------------

VDE Testing and Certification Institute Section FG32 D-63069 Offenbach	Test Report DIN EN 60831-1 (VDE 0560 Part 46):2003-08 EN 60831-1:1996+A1:2003 IEC 60831-1:1996+A1:2002 DIN EN 60831-2 (VDE 0560 Part 47):1997-09 EN 60831-2:1996; IEC 60831-2:1995	VDE Reference No. 820600-4690-0001/126593
		Page Number 18 Total number of pages 18

Photo documentation of tested types:



VDE Testing and Certification Institute D-63069 Offenbach	FG32-PS 006 E Edition IV / 08.03	Date: 21. Jul. 10	Review: Bretz
--	-------------------------------------	-------------------	---------------

VDE Prüf- und Zertifizierungsinstitut GmbH • Merianstraße 28 • D-63069 Offenbach

LIFASA International Capacitors, S.A.
C/Vallés, 32 Pol.Ind.Can Bernades
08130 Santa Perpetua de Mogoda
Barcelona (Spain)

Offenbach, 2012-07-05

Your ref.	Your letter	Our ref. - please indicate	Contact
	2012-03-16	5011749-4690-0001/165687 FG32/bt-mak	Mr. Bretz Tel (+49) (69) 83 06-322 Fax (+49) (69) 83 06-636 andreas.bretz@vde.com

Dear Sirs,

Translation: In any case the German version shall prevail

P r ü f b e r i c h t zur Information des Auftraggebers *Test Report for the Information of the applicant*

Produkt / Product Shunt power capacitor - three-phase unit in delta connection Typ / Type POLB52500SK

Dieser Prüfbericht enthält das Ergebnis einer einmaligen Untersuchung an dem zur Prüfung vorgelegten Erzeugnis. Ein Muster dieses Erzeugnisses wurde geprüft, um die Übereinstimmung mit den nachfolgend aufgeführten Normen bzw. Abschnitten von Normen festzustellen. Die Prüfung wurde durchgeführt von 2011-11-15 bis 2012-06-13.

This test report contains the result of a singular investigation carried out on the product submitted. A sample of this product was tested to found the accordance with the thereafter listed standards or clauses of standards resp.

The testing was carried out from 2011-11-15 to 2012-06-13.

Der Prüfbericht berechtigt Sie nicht zur Benutzung eines Zertifizierungszeichens des VDE und berücksichtigt ausschließlich die Anforderungen der unten genannten Regelwerke.

The test report does not entitle for the use of a VDE Certification Mark and considers solely the requirements of the specifications mentioned below.



Wenn gegenüber Dritten auf diesen Prüfbericht Bezug genommen wird, muss dieser Prüfbericht in voller Länge an gleicher Stelle verfügbar gemacht werden.

Whenever reference is made to this test report towards third party, this test report shall be made available on the very spot in full length.

Applicant: LIFASA International Capacitors, S.A.
C/Vallés, 32 Pol.Ind.Can Bernades
08130 Santa Perpetua de Mogoda
Barcelona (Spain)

Manufacturer: LIFASA International Capacitors, S.A.
C/Vallés, 32 Pol.Ind.Can Bernades
08130 Santa Perpetua de Mogoda
Barcelona (Spain)

Test object: Shunt power capacitor
Three-phase unit in delta connection

Type: POLB52500SK

Rated capacitance: Δ 3 x 192,4 μ F

Rated output: 50 kvar

Rated voltage: AC 525 V

Rated frequency: 50 Hz

Temperature category: D (Maximum ambient temperature 55 °C)

Applicable Specification

DIN EN 60831-1 (VDE 0560 Teil 46):2003-08
EN 60831-1:1996+A1:2003
IEC 60831-1:1996+A1:2002
DIN EN 60831-2 (VDE 0560 Teil 47):1997-09
EN 60831-2:1996
IEC 60831-2:1995

Shunt power capacitors of the self-healing type for a.c. systems having a rated voltage up to and including 1 kV



Test procedure

Sample no. 1	Thermal stability test ($t = 48$ h; $T = 55^{\circ}\text{C}$; $U = 1,2 \times U_N = 630$ V AC) Measurement of the tangent of the loss angle at elevated temperature
Sample no. 2 to no. 4	Voltage test between terminals ($U = 2,15 \times U_N = 1129$ V AC) Voltage test between terminals and container ($U = 3,05$ kV AC) Lightning impulse voltage test between terminals and container ($U_{\text{peak}} = 12$ kV)
Sample no. 5 to no. 7	Discharge test
Sample no. 8 to no. 9	Ageing test Part a): $t = 750$ h $T = 53^{\circ}\text{C}$ $U = 1,25 \times U_N = 656$ V AC Part b): 1000 discharge cycles $I_{\text{peak}} = 12,8$ kA Part c): $t = 750$ h $T = 53^{\circ}\text{C}$ $U = 1,25 \times U_N = 656$ V AC
Sample no. 10 to no. 12	Self-healing test
Sample no. 13 to no. 14	Destruction test
Place of testing	The tests have been carried out at the VDE Testing and Certification Institute in Offenbach
Measuring and testing equipment:	The measuring and testing equipment used in the testing laboratory is calibrated before being put into service and thereafter according to an established programme



Test result

The samples of type POLB52500SK, AC 525 V - 50 kvar did pass all of the above listed tests. This means that all requirements of DIN EN 60831-1 (VDE 0560 Teil 46):2003-08; EN 60831-1:1996+A1:2003; IEC 60831-1:1996+A1:2002 and DIN EN 60831-2 (VDE 0560 Teil 47):1997-09; EN 60831-2:1996; IEC 60831-2:1995 are fulfilled.

VDE Testing and Certification Institute
Section FG32



Andreas Bretz
Reviewer



Eberhard Kirscht
Test Engineer



A COMPANY OF THE **VDE** ASSOCIATION FOR ELECTRICAL, ELECTRONIC & INFORMATION TECHNOLOGIES

Managing Director
Dipl.-Ing./Dipl.-Kfm. Wilfried Jäger
Merianstrasse 28
D-63069 Offenbach
Phone: +49 (0) 69 83 06-0
Fax: +49 (0) 69 83 06-555
E-mail: vde-institut@vde.com
<http://www.vde.com>

Venue:
Offenbach/Main
HRB 43618
VAT-IDNo.: DE261922990
Tax No.: 04425092566

Make Payments to
Dresdner Bank Frankfurt
BLZ 500 800 00
Account-No.: 198 027 000
S.W.I.F.T.-Code:
DRES DE FF
IBAN
DE 9150080000198027000

Notified Body according to the Equipment and Product Safety Act (GPSG) for technical work equipment and consumer products. Notified body according to the EMC Directive 2004/108/EG for Electromagnetic Compatibility (EMC). Accredited by DAR accreditation bodies according to DIN EN ISO/IEC 17020, 17021, 17025 and DIN EN 45011. Accredited by: IEC – International Electrotechnical Commission – IEC/IEC/CB, IECQ and CENELEC – European committee for Electrotechnical Standardization – CCA, HAR, ENEC.

VDE Prüf- und Zertifizierungsinstitut GmbH • Merianstraße 28 • D-63069 Offenbach

LIFASA International Capacitors, S.A.
C/Vallés, 32 Pol.Ind.Can Bernades
08130 Santa Perpetua de Mogoda
Barcelona (Spain)

Offenbach, 2010-07-22

Your ref.
Mr. Bronislav
Jirásek

Your letter
2009-11-06

Our ref. - please indicate
820600-4690-0001/126593
FG32/bt-wah

Contact
Mr. Bretz
Tel (+49) (69) 83 06-322
Fax (+49) (69) 83 06-636
andreas.bretz@vde.com

Dear Sirs,

Translation: In any case the German version shall prevail

Prüfbericht zur Information des Auftraggebers *Test Report for the Information of the applicant*

Produkt / Product Shunt power capacitor - three-phase unit in delta connection **Typ / Type POLB44010SK and POLB44400SK**

Dieser Prüfbericht enthält das Ergebnis einer einmaligen Untersuchung an dem zur Prüfung vorgelegten Erzeugnis. Ein Muster dieses Erzeugnisses wurde geprüft, um die Übereinstimmung mit den nachfolgend aufgeführten Normen bzw. Abschnitten von Normen festzustellen. Die Prüfung wurde durchgeführt von 2009-11-27 bis 2010-07-15.

*This test report contains the result of a singular investigation carried out on the product submitted. A sample of this product was tested to found the accordance with the thereafter listed standards or clauses of standards resp.
The testing was carried out from 2009-11-27 to 2010-07-15.*

Der Prüfbericht berechtigt Sie nicht zur Benutzung eines Zertifizierungszeichens des VDE und berücksichtigt ausschließlich die Anforderungen der unten genannten Regelwerke.

The test report does not entitle for the use of a VDE Certification Mark and considers solely the requirements of the specifications mentioned below.



Wenn gegenüber Dritten auf diesen Prüfbericht Bezug genommen wird, muss dieser Prüfbericht in voller Länge an gleicher Stelle verfügbar gemacht werden.

Whenever reference is made to this test report towards third party, this test report shall be made available on the very spot in full length.

Applicant: LIFASA International Capacitors, S.A.
C/Vallés, 32 Pol.Ind.Can Bernades
08130 Santa Perpetua de Mogoda
Barcelona (Spain)

Manufacturer: LIFASA International Capacitors, S.A.
C/Vallés, 32 Pol.Ind.Can Bernades
08130 Santa Perpetua de Mogoda
Barcelona (Spain)

Test object: Shunt power capacitor
Three-phase unit in delta connection

Type: a) POLB44010SK
b) POLB44400SK

Rated capacitance: a) Δ 3 x 5,5 μ F
b) Δ 3 x 219,2 μ F

Rated output: a) 1,0 kvar
b) 40,0 kvar

Rated voltage: AC 440 V

Rated frequency: 50 Hz

Temperature category: D (Maximum ambient temperature 55 °C)

Applicable Specification

DIN EN 60831-1 (VDE 0560 Teil 46):2003-08
EN 60831-1:1996+A1:2003
IEC 60831-1:1996+A1:2002
DIN EN 60831-2 (VDE 0560 Teil 47):1997-09
EN 60831-2:1996
IEC 60831-2:1995

Shunt power capacitors of the self-healing type for a.c. systems having a rated voltage up to and including 1 kV



Test procedure

Sample no. 1 (1 kvar)
Sample no. 1 (40 kvar)

Thermal stability test
($t = 48$ h; $T = 55^{\circ}\text{C}$; $U = 1,2 \times U_N = 528$ V AC)
Measurement of the tangent of the loss angle
at elevated temperature

Sample no. 2 to no. 6 (1 kvar)
Sample no. 2 to no. 4 (40 kvar)

Voltage test between terminals ($U = 2,15 \times U_N = 946$ V AC)
Voltage test between terminals and container ($U = 3,0$ kV AC)
Lightning impulse voltage test between terminals and container ($U_{\text{peak}} = 8$ kV))

Sample no. 7 to no. 9 (1 kvar)
Sample no. 5 to no. 7 (40 kvar)

Discharge test

Sample no. 10 to no. 12 (1 kvar)
Sample no. 8 to no. 9 (40 kvar)

Ageing test
Part a): $t = 750$ h
 $T = 46^{\circ}\text{C}$ (1 kvar)
 $T = 51^{\circ}\text{C}$ (40 kvar)
 $U = 1,25 \times U_N = 550$ V AC
Part b): 1000 discharge cycles
Part c): $t = 750$ h
 $T = 46^{\circ}\text{C}$ (1 kvar)
 $T = 51^{\circ}\text{C}$ (40 kvar)
 $U = 1,25 \times U_N = 550$ V AC

Sample no. 13 to no. 15 (1 kvar)
Sample no. 10 to no. 12 (40 kvar)

Self-healing test

Sample no. 16 to no. 18 (1 kvar)
Sample no. 13 to no. 14 (40 kvar)

Destruction test

Place of testing

The tests have been carried out at the VDE Testing and Certification Institute in Offenbach

Measuring and testing equipment:

The measuring and testing equipment used in the testing laboratory is calibrated before being put into service and thereafter according to an established programme



Test result

The 1 kvar-samples and the 40 kvar-samples did pass all of the above listed tests. This means that all requirements of DIN EN 60831-1 (VDE 0560 Teil 46):2003-08; EN 60831-1:1996+A1:2003; IEC 60831-1:1996+A1:2002 and DIN EN 60831-2 (VDE 0560 Teil 47):1997-09; EN 60831-2:1996; IEC 60831-2:1995 are fulfilled.

VDE Testing and Certification Institute
Section FG32

Brnk



A COMPANY OF THE **VDE** ASSOCIATION FOR ELECTRICAL, ELECTRONIC & INFORMATION TECHNOLOGIES

Managing Director
Dipl.-Ing./Dipl.-Kfm. Wilfried Jäger
Merianstrasse 28
D-63069 Offenbach
Phone: +49 (0) 69 83 06-0
Fax: +49 (0) 69 83 06-555
E-mail: vde-institut@vde.com
<http://www.vde.com>

Venue:
Offenbach/Main
HRB 43618
VAT-ID No.: DE261922990
Tax No.: 04425092566

Make Payments to
Dresdner Bank Frankfurt
BLZ 500 800 00
Account-No.: 198 027 000
S.W.I.F.T.-Code:
DRES DE FF
IBAN
DE 9150080000198027000

Notified Body according to the Equipment and Product Safety Act (GPSG) for technical work equipment and consumer products. Notified body according to the EMC Directive 2004/108/EG for Electromagnetic Compatibility (EMC). Accredited by DAR accreditation bodies according to DIN EN ISO/IEC 17020, 17021, 17025 and DIN EN 45011. Accredited by: IEC – International Electrotechnical Commission – IEC/IEC/CB, IECQ and CENELEC – European committee for Electrotechnical Standardization – CCA, HAR, ENEC.