

EXTRACT FROM REPORT N. SUEE240400004251 REFERENCE STANDARD

VDE-AR-N 4105:2018-11 + CORRECTION 1: 2020-10: GENERATORS CONNECTED TO THE LOW-VOLTAGE DISTRIBUTION NETWORK – TECHNICAL REQUIREMENTS FOR THE CONNECTION TO AND PARALLEL OPERATION WITH LOW-VOLTAGE DISTRIBUTION NETWORKS

Test Report Number : **SUEE240400004251 Attachment Report**

Type : **Energy Storage System**

Trademark : **ANKER**

Tested Model : **A17C1**

Variant Models : **A17C3**

APPLICANT

Name : **Anker Innovations Limited**

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TESTING LABORATORY

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TRF No. EEC_ VDE-AR-N 4105

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2. Equipment operation & construction information (manuals, electrical diagrams, information about components, operation procedures).
3. Documental information (brand and models' names, address or other information about applicant, company or manufacturer).
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Test Report Historical Revision:

Test Report Version	Date	Resume
SUEE240400004251 Attachment Report	2024/04/09	First issuance

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1- Scope

SGS-CSTC Standards Technical Services Co., Ltd. Suzhou Branch has been contracted by Anker Innovations Limited, in order to perform the testing according to:

- VDE-AR-N 4105:2018-11: "Generators connected to the low-voltage distribution network – Technical requirements for the connection to and parallel operation with low-voltage distribution networks" and including "Correction 1:2020-10".

This document is an extract from the test report SUEE240400004251 compliant to the Annex E of VDE-AR-N 4105:2018-11: "Power generation systems connected to the low-voltage distribution network" and including "Correction 1:2020-10".

- VDE V 0124-100:2020-06: Grid integration of generator plants Low-voltage – Test requirements for generation units, intended for connection and parallel operation on the low-voltage grid.

2- Equipment Under Testing

Apparatus type : Energy Storage System
Installation : Fixed installation
Manufacturer : **Anker Innovations Limited**
Trade mark : ANKER
Model / Type reference : A17C1
Serial Number : APCGQ80E13200076
Software Version : v1.3.1.0
Rated Characteristics : PV input: 16-60 V, Max. 4× 16 A
Battery rated voltage: 16V, Max.: 75A
AC output: L/N/PE 230 V, 50 Hz, 3.5 A, 800 W

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E.4 Unit certificate

Unit certificate		No. SUEE240400004251
Manufacture		Anker Innovations Limited
Power generation unit type		Single phase – Fixed installation
☒ Inverter	☒ Asynchronous generator	☐ Synchronous generator
☐ Stirling generator	☐ Fuel cell	Other _____
Assessment values	max. active power $P_{E\max}$	0.8 kW
	max. apparent power $S_{E\max}$	0.8 kVA
	Rated voltage	230 V
Rated values	Rated current (AC) I_r	3.5 A
Rated values	Initial short-circuit AC current	3.5 A
Network connection rule	VDE-AR-N 4105 “Generators connected to the low-voltage distribution network” Technical minimum requirements for connection and parallel operation of power generation systems connected to the low-voltage network	
Test requirement	DIN VDE V 0124-100 (VDE V 0124-100) “Network integration of power generation systems – Low voltage” Test requirements for power generation units intended for connection to and parallel operation on the low-voltage network	

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E.5 Requirements for the test report for power generation units

Extract from test report for unit certificate "Determination of electrical properties"					No. SUEE240400004251			
System Manufacturer			Anker Innovations Limited					
Manufacturer indications:			Type of system:		Single phase – Fixed installation			
			Max. active power P _{E_{max}}		0.8 kW			
			Rated voltage:		230 V			
Flicker	Network impedance angle ψ_k		32°					
	Initial flicker factor C _{ψ}		33%P _n		66% P _n		100% P _n	
			3.19		5.63		5.63	

P (%P _n)	0	10	20	30	40	50	60	70	80	90	100	Limit
Nr. / Order	I (A)	I (A)	I (A)	I (A)	I (A)	I (A)	I (A)	I (A)	I (A)	I (A)	I (A)	I (A)
2	0.013	0.013	0.014	0.013	0.013	0.013	0.013	0.012	0.011	0.010	0.008	1.080
3	0.059	0.059	0.059	0.066	0.072	0.081	0.090	0.099	0.107	0.116	0.124	2.300
4	0.009	0.011	0.009	0.009	0.009	0.008	0.007	0.008	0.008	0.007	0.006	0.430
5	0.034	0.036	0.036	0.035	0.036	0.035	0.033	0.031	0.030	0.029	0.028	1.140
6	0.004	0.003	0.004	0.004	0.004	0.003	0.003	0.003	0.003	0.003	0.003	0.300
7	0.021	0.021	0.022	0.020	0.021	0.021	0.019	0.019	0.019	0.018	0.018	0.770
8	0.005	0.005	0.004	0.004	0.004	0.004	0.005	0.004	0.004	0.004	0.004	0.230
9	0.015	0.015	0.012	0.013	0.012	0.014	0.014	0.014	0.014	0.015	0.015	0.400
10	0.005	0.004	0.004	0.005	0.004	0.005	0.005	0.005	0.005	0.004	0.004	0.184
11	0.010	0.011	0.011	0.011	0.010	0.009	0.010	0.010	0.010	0.010	0.010	0.330
12	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.004	0.004	0.003	0.003	0.153
13	0.009	0.009	0.010	0.010	0.010	0.010	0.009	0.009	0.009	0.009	0.009	0.210
14	0.003	0.002	0.003	0.002	0.003	0.002	0.003	0.003	0.003	0.003	0.003	0.131
15	0.005	0.005	0.004	0.004	0.004	0.005	0.005	0.005	0.005	0.005	0.005	0.150
16	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.115
17	0.004	0.004	0.004	0.004	0.003	0.003	0.003	0.004	0.003	0.004	0.004	0.132
18	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.102
19	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.118
20	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.092
21	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.107
22	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.084
23	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.098
24	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.077
25	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.004	0.004	0.004	0.090
26	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.071
27	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.004	0.004	0.083
28	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.066
29	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.005	0.078
30	0.003	0.003	0.003	0.003	0.003	0.003	0.004	0.003	0.003	0.003	0.003	0.061
31	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.073
32	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.004	0.003	0.058
33	0.006	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.006	0.068
34	0.003	0.003	0.004	0.004	0.004	0.003	0.003	0.004	0.003	0.004	0.004	0.054
35	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.064
36	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.051
37	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.005	0.005	0.005	0.061
38	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.048
39	0.006	0.006	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.058
40	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.004	0.046
THC (%)	0.079	0.080	0.080	0.084	0.089	0.096	0.103	0.110	0.117	0.125	0.132	23.000
PWHC(%)	0.111	0.109	0.108	0.107	0.107	0.106	0.108	0.108	0.106	0.109	0.111	23.000

E.7 Requirements for the test report for the NS protection

Extract from test report for NS protection "Determination of electrical properties"		No. SUEE240400004251	
Test report NS protection			
Type of NS protection: Integrated NS protection		Further manufacturer indications	
Protective function	Set value	Tripping value	Tripping time NS protection ⁽¹⁾
Rise-in voltage protection U>>	1.250 Un	1.248 Un	93.0 ms
⁽²⁾ Rise-in voltage protection U>	1.100 Un	--	485.4 s
Voltage drop protection U<	0.800 Un	0.798 Un	274.4 s
Voltage drop protection U<	0.450 Un	0.450 Un	327.0 ms
Frequency decrease protection f<	47.50 Hz	47.50 Hz	92.0 ms
Frequency increase protection f>	51.50 Hz	51.50 Hz	93.5 ms
⁽¹⁾ The tripping time includes the period from the limit violation U/f until the tripping signal to the interface switch. When planning the power generation system, the response time of the interface switch shall be added to the maximum time value obtained as indicated above. The disconnection time (sum of tripping time of the NS protection plus response time of the interface switch) shall not exceed 200 ms. ⁽²⁾ Longest disconnection of the voltage increase protection as a sliding 10 min mean value, according to clause 5.5.7 of VDE 0124-100 standard.			
☒ For integrated NS protection			
Assigned to power generation unit of type		HF140FF/012-2HSW	
Type integrated interface switch		Power Relay	
Response time of interface switch for integrated NS protection		20 ms	
Verification of the entire functional chain "integrated NS protection – interface switch" has resulted in successful disconnection			☒

-----END OF THE REPORT-----