

Test Verification of Conformity

Verification Number: 200601510SHA-V1

On the basis of the tests undertaken, the sample<s> of the below product have been found to comply with the requirements of the referenced specification<s>/standard<s> at the time the tests were carried out. This verification is part of the full test report<s> and should be read in conjunction with it <them>.

Applicant Name & Address:	Afore New Energy Technology (Shanghai)Co., Ltd. Build No.7, 333 Wanfang Road, Minhang District, Shanghai, China 201114
Product Description:	PV Grid interconnected inverter
Ratings & Principle Characteristics:	See Appendix(Specifications table)
Models/Type References:	See Appendix(Specifications table)
Brand Name:	Afore
Relevant Standards:	VDE-AR-N 4105:2018 conjunction with DIN VDE V 0124-100 :2020
Verification Issuing Office Name & Address:	Intertek Testing Services Shanghai Building No.86, 1198 Qinzhou Road (North), Shanghai 200233, China
Date of Tests:	2020-06-01 to 2020-07-12
Test Report Number(s):	200601510SHA-001
Additional information in Appendix.	

Signature



Name: Jonny Jing

Position: Manager

Date: 2020-07-15

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APPENDIX: Test Verification of Conformity

This is an Appendix to Test Verification of Conformity Number: 200601510SHA-V1

Manufacturer: Same as applicant

Specifications table				
Model	BNT036KTL	BNT040KTL	BNT050KTL	BNT060KTL
Input:				
Vmax PV (Vdc)	1000	1000	1000	1000
Isc PV (absolute Max.) (A)	45 x 2	50 x 2	45 x 3	50 x 3
Number MPP trackers	2	2	3	3
Number input strings	4/4	4/4	4/4/4	4/4/4
Max. PV input current(A)	36 x 2	40 x 2	36 x 3	40 x 3
MPPT voltage range (Vdc)	200-950	200-950	200-950	200-950
Vdc range @ full power (Vdc)	500-850	500-850	500-950	500-950
Output				
Normal Voltage(V)	<input type="checkbox"/> 1/N/PE 230Vac <input checked="" type="checkbox"/> 3 ϕ /N/PE 230/400Vac			
Frequency (Hz)	<input checked="" type="checkbox"/> 50 Hz <input type="checkbox"/> 60Hz			
Current (normal) (A)	52.2	58	72.5	87
Current (Max. continuous) (A)	56	61	75	90
Power rating (W)	36000	40000	50000	60000
Power Rating (VA)	36000	40000	50000	60000
Power factor /rated	1(-0.8~0.8)	1(-0.8~0.8)	1(-0.8~0.8)	1(-0.8~0.8)
others				
Protective class	Class I			
Ingress protection (IP)	IP 65			
Temperature (°C)	-25°C to +60°C (up 45°C derating)			
Inverter Isolation	<input checked="" type="checkbox"/> Non-isolated <input type="checkbox"/> High frequency isolated			
Overtoltage category	OVC III (AC Main), OVC II (PV)			
Weight (kg)	66			
Dimensions (WxHxD) (mm)	630 x 850 x 306			

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Annex E.5 Test report “Network interactions” for power generation units
Model: BNT036KTL

Extract from the test report on the certificate of units		200601510SHA-001		
Type of installation:	PV Grid-interactive inverter	Manufacturer 's data		
Installation manufacturer:	Afore New Energy Technology(Shanghai) Co., Ltd.	Type of installation: PV Grid interconnected inverter		
		Power of normal output in nominal conditions):36000 W		
		Rating voltage: 230 V		
Period of measurement:	From 2020-06-01 to 2020-07-12			
		Maximum active Power $P_{E_{max}}$ 36109 W	Maximum reactive Power $S_{E_{max}}$ 36283 VA	
		Switching actions	The limit of k_{imax} is 1.0	
		Switching on without specification (to the primary energy carrier) k_i		0.15
		Most unfavorable case when switching between generator levels k_i		0.15
		Switching on during nominal conditions (of the primary energy carrier) k_i		0.15
		Switching off during normal output k_i		0.31
		Worst value of all switching operations k_{imax}	0.31	
Flicker	Angle of network impedance Ψ_k :		32°	
	Long-term flicker strength P_{lt} :		0.15, 0.19, 0.25	

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Model: BNT036KTL

E.5 Test report “Network interactions” for power generation units

Harmonic- (for the PGU and PGS>3.68kVA/phase)

Load current: 100 %				
Ordinal number	Current (%) L1	Current (%) L2	Current (%) L3	Limit (%)
0	0.080	0.200	0.050	0.5% I
1	--	--	--	--
2	0.498	0.579	0.636	8%
3	0.241	0.105	0.226	Not stated
4	0.124	0.160	0.104	4%
5	1.205	1.019	1.147	10.7%
6	0.080	0.099	0.100	2.67%
7	0.403	0.421	0.340	7.2%
8	0.053	0.083	0.081	2%
9	0.070	0.046	0.086	Not stated
10	0.090	0.072	0.048	1.6%
11	0.139	0.141	0.114	3.1%
12	0.038	0.042	0.055	1.33%
13	0.196	0.143	0.120	2%
14	0.041	0.044	0.034	-
15	0.055	0.050	0.090	-
16	0.032	0.042	0.036	-
17	0.121	0.197	0.189	-
18	0.039	0.045	0.044	-
19	0.199	0.156	0.184	-
20	0.048	0.038	0.041	-
21	0.050	0.046	0.060	-
22	0.045	0.041	0.042	-
23	0.140	0.156	0.087	-
24	0.039	0.041	0.040	-
25	0.090	0.067	0.075	-
26	0.025	0.027	0.026	-
27	0.026	0.022	0.026	-
28	0.019	0.017	0.018	-
29	0.030	0.037	0.039	-
30	0.014	0.014	0.013	-
31	0.026	0.029	0.036	-
32	0.011	0.010	0.012	-
33	0.010	0.008	0.013	-
34	0.008	0.009	0.008	-
35	0.029	0.027	0.036	-
36	0.007	0.008	0.008	-
37	0.033	0.037	0.046	-
38	0.007	0.008	0.006	-
39	0.008	0.007	0.019	-
40	0.007	0.009	0.007	-
THD	1.646%	1.522%	1.650%	13%
PWHD	0.015%	0.015%	0.015%	22%

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E.7 Requirements to the Test Report on the NS protection

Model: BNT036KTL

Extract from the test report for the NS protection "Determination of electric properties"	200601510SHA-001		
Test report NS Protection			
Type of NS protection: <u>Integral</u>	Futher manufacturer instructions		
Software version: <u>DSP TP 2.03</u>			
Manufacturer: <u>Afore New Energy Technology(Shanghai) Co., Ltd.</u>			
Period of measurement: <u>From 2020-06-01 to 2020-07-12</u>			
	Inverter(s)		
	Directly coupled synchronous and asynchronous generators with Pn>50KW		
Protective function	Set value	Tripping value	Tripping value NS protection
Rise-in-voltage protection U >>	1.25 * U _n	290V	165 ms
Rise-in-voltage protection U >	1.15 * U _n	266V	181 ms
Voltage drop protection U <	0.8 * U _n	183.2V	2 s*
Voltage drop protection U <	0.45 * U _n	102.7V	246 ms
Frequency decrease protection f <	47.5Hz	47.48Hz	185 ms
Frequency increase protection f >	51.5Hz	51.51Hz	183 ms
<p>^a The tripping time includes the period from the limit value violation U/f until the tripping signal to the interface switch.</p> <p>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.</p> <p>The disconnection time (sum of tripping time of the NS protection plus response time of the interface switch) shall not exceed 200 ms</p> <p>* Longest disconnection of the rise-in-voltage protection as a moving 10-minute-average.</p>			
<input checked="" type="checkbox"/> For integrated NS protection			
Assigned to power generation unit of type	PV Grid-interactive inverter		
Type integrated interface switch	Power Relay		
Response time of interface switch for integrated NS protection	12ms		
Verification of the entire functional chain "integrated NS protection – interface switch" has resulted in successful disconnection.			
NOTE1: U _n =230V			

Annex E.5 Test report “Network interactions” for power generation units
Model: BNT060KTL

Extract from the test report on the certificate of units		200601510SHA-001	
Type of installation:	Grid-connected Micro Inverter	Manufacturer 's data	
Installation manufacturer:	Afore New Energy Technology (Shanghai) Co., Ltd.	Type of installation: PV Grid interconnected inverter	
		Power of normal output in nominal conditions): 60000W	
		Rating voltage: 230 V	
Period of measurement:	From 2020-06-01 to 2020-07-12		
Maximum active Power $P_{E_{max}}$	60084 W	Maximum reactive Power $S_{E_{max}}$	600181 VA
Switching actions			
Switching on without specification (to the primary energy carrier)	k_i	0.15	The limit of k_{imax} is 1.0
Most unfavorable case when switching between generator levels	k_i	0.15	
Switching on during nominal conditions (of the primary energy carrier)	k_i	0.15	
Switching off during normal output	k_i	0.31	
Worst value of all switching operations	k_{imax}	0.31	
Flicker	Angle of network impedance Ψ_k :	32°	
	Long-term flicker strength P_{fl} :	0.15, 0.19, 0.25	

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Model: BNT060KTL

F.3 Requirements to the Test Report on Generation Units

Harmonic- (for the PGU and PGS≤3.68kVA/phase)

Load current: 100 %				
Ordinal number	Current (%) L1	Current (%) L2	Current (%) L3	Limit (%)
0	0.070	0.150	0.190	0.5% I
1	--	--	--	--
2	0.398	0.569	0.571	8%
3	0.203	0.131	0.197	Not stated
4	0.127	0.152	0.105	4%
5	1.001	0.830	0.969	10.7%
6	0.090	0.081	0.092	2.67%
7	0.353	0.364	0.303	7.2%
8	0.055	0.072	0.066	2%
9	0.062	0.053	0.074	Not stated
10	0.083	0.065	0.046	1.6%
11	0.105	0.103	0.091	3.1%
12	0.038	0.044	0.055	1.33%
13	0.135	0.111	0.067	2%
14	0.037	0.041	0.034	-
15	0.052	0.039	0.080	-
16	0.033	0.039	0.031	-
17	0.084	0.152	0.147	-
18	0.034	0.037	0.040	-
19	0.145	0.116	0.141	-
20	0.046	0.038	0.037	-
21	0.040	0.043	0.046	-
22	0.043	0.036	0.039	-
23	0.089	0.095	0.043	-
24	0.039	0.036	0.041	-
25	0.120	0.081	0.107	-
26	0.029	0.028	0.030	-
27	0.027	0.027	0.024	-
28	0.021	0.018	0.022	-
29	0.030	0.033	0.046	-
30	0.014	0.014	0.013	-
31	0.015	0.024	0.028	-
32	0.011	0.010	0.011	-
33	0.009	0.008	0.009	-
34	0.008	0.008	0.009	-
35	0.029	0.025	0.032	-
36	0.007	0.006	0.006	-
37	0.023	0.030	0.033	-
38	0.007	0.006	0.006	-
39	0.007	0.006	0.014	-
40	0.006	0.006	0.006	-
THD	1.428%	1.376%	1.458%	13%
PWHD	0.012%	0.012%	0.013%	22%

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E.7 Requirements to the Test Report on the NS protection

Model: BNT060KTL

Extract from the test report for the NS protection "Determination of electric properties"	200601510SHA-001		
Test report NS Protection			
Type of NS protection: <u>Integral</u>	Futher manufacturer instructions		
Software version: <u>DSP TP 2.03</u>			
Manufacturer: <u>Afore New Energy Technology(Shanghai) Co., Ltd.</u>			
Period of measurement: <u>From 2020-06-01 to 2020-07-12</u>			
	Inverter(s)		
	Directly coupled synchronous and asynchronous generators with Pn>50KW		
Protective function	Set value	Tripping value	Tripping value NS protection
Rise-in-voltage protection U >>	1.25 * U _n	290V	165 ms
Rise-in-voltage protection U >	1.15 * U _n	266V	181 ms
Voltage drop protection U <	0.8 * U _n	183.2V	2 s*
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Frequency decrease protection f <	47.5Hz	47.48Hz	185 ms
Frequency increase protection f >	51.5Hz	51.51Hz	183 ms
<p>^a The tripping time includes the period from the limit value violation U/f until the tripping signal to the interface switch.</p> <p>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.</p> <p>The disconnection time (sum of tripping time of the NS protection plus response time of the interface switch) shall not exceed 200 ms</p> <p>* Longest disconnection of the rise-in-voltage protection as a moving 10-minute-average.</p>			
<input checked="" type="checkbox"/> For integrated NS protection			
Assigned to power generation unit of type	PV Grid-interactive inverter		
Type integrated interface switch	Power Relay		
Response time of interface switch for integrated NS protection	12ms		
Verification of the entire functional chain "integrated NS protection – interface switch" has resulted in successful disconnection.			
NOTE1: U _n =230V			

Signature



Name: Jonny Jing

Position: Manager

Date: 2020-07-15