

# **Test Verification of Conformity**

# Verification Number: 211202348SHA-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 201112
Product Description:	Grid-connected PV 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:	2021-04-29 to 2021-12-15
Test Report Number(s):	211202348SHA-001
Additional information in App	endix.

Signature

Name: Jonny Jing Position: Manager Date: 2021-12-24



### **APPENDIX:** Test Verification of Conformity

#### This is an Appendix to Test Verification of Conformity Number: 211202348SHA-V1

Manufacturer:

Same as applicant

Specifications table							
Model	HNS3000TL	HNS3600TL-1	HNS3600TL	HNS4000TL	HNS5000TL		
Input:							
Vmax PV (Vdc)	600	600	600	600	600		
Isc PV (absolute Max.) (A)	18 x 2	18	18 x 2	18 x 2	18 x 2		
Number MPP trackers	2	1	2	2	2		
Number input strings	1/1	1	1/1	1/1	1/1		
Max. PV input current(A)	14 x 2	14	14 x 2	14 x 2	14 x 2		
MPPT voltage range (Vdc)	70-550	70-550	70-550	70-550	70-550		
Vdc range @ full power (Vdc)	110-550	265-550	130-550	145-550	180-550		
Output							
Normal Voltage(V)		L/N/PE,	220Vac, 230Vac	, 240Vac			
Frequency (Hz)			50 / 60				
Current (normal) (A)	13.1	15.7	15.7	17.4	21.8		
Current (Max. continuous) (A)	15	17.5	17.5	20	24		
Power rating (W)	3000	3600	3600	4000	5000		
Power Rating (VA)	3000	3600	3600	4000	5000		
Power factor /rated	1 (-0,8~+0,8 adjustable)						
others							
Protective class			Class I	11			
Ingress protection (IP)	11		IP 65				
Temperature (°C)		-25°C to	+60°C (up 45°C	derating)			
Inverter Isolation		3 2 6	Non-isolated				



Specifications table								
Model	HNS6000TL	HNS7000TL	HNS8000TL	HNS9000TL	HNS10000TL			
Input:								
Vmax PV (Vdc)	600	600	600	600	600			
Isc PV (absolute Max.) (A)	18 x 2	18+35	18+35	35 x 2	35 x 2			
Number MPP trackers	2	2	2	2	2			
Number input strings	1/1	1/2	1/2	2/2	2/2			
Max. PV input current(A)	14 x 2	14+26	14+26	26 x 2	26 x 2			
MPPT voltage range (Vdc)	70-550	70-550	70-550	70-550	70-550			
Vdc range @ full power (Vdc)	220-550	220-550	220-550	220-550	220-550			
Output								
Normal Voltage(V)		L/N/PE,	220Vac, 230Vac,	, 240Vac				
Frequency (Hz)	11		50 / 60					
Current (normal) (A)	26.1	30.5	34.8	39.2	43.5			
Current (Max. continuous) (A)	28.7	33.6	38.3	45	50			
Power rating (W)	6000	7000	8000	9000	10000			
Power Rating (VA)	6000	7000	8000	9000	10000			
Power factor /rated	1 (-0,8~+0,8 adjustable)							
others								
Protective class		- 0.4	Class I					
Ingress protection (IP)			IP 65					
Temperature (°C)		-25°C to	+60°C (up 45°C (	derating)				
Inverter Isolation			Non-isolated	10				



#### Annex E4: Verification of Conformity for power generation units

Verification of Conformity for power generation units	No: 211202348SHA-V1				
Manufacturer	Afore New Energy Technology (Shanghai)Co., Ltd. Build No.7, 333 Wanfang Road, Minhang District, Shanghai, China 201112				
Type power generation unit	Grid-connected PV inverter				
Model	HNS3000TL, HNS3600TL-1, HNS3600TL, HNS4000TL, HNS5000TL, HNS6000TL, HNS7000TL, HNS8000TL, HNS9000TL, HNS10000TL				
Accessment values	Max. active power PEmax (W)	3016	HNS3000TL		
Assessment values		9988	HNS10000TL		
	Max. apparent power	3041	HNS3000TL		
	SEmax (VA)	10042	HNS10000TL		
	Rated voltage	1/N/PE~ 230Vac			
Network connection rules	VDE-AR-N 4105 "Power generation systems connected to the low-voltage network" Technical minimum requirements for connection and parallel operation of power generation systems connected to the low voltage network				
Firmware version	V06				
The above mentioned power gene	eration unit meets the require	ements of VDE-AR-N 41	05.		



### Annex E.5 Test report "Network interactions" for power generation units

Extract from the of units	test report on the certificate	21	1202348SH	A-001		
Type of installation:	Grid-connected PV inverter	Ma	anufacturer '	s data		
Installation	Afore New Energy	Ty: inv	Type of installation: Grid-connected P inverter			
manufacturer:	Technology(Shanghai) Co., Ltd.	Power of normal output in nomi conditions):3000 W			ominal	
		Ra	ting voltage	:	230 V	
Period of measurement:		From 2021-04-29 to 2021-12	<u>2-15</u>			
inicada cinicita.						
		Maximum active Power P <sub>Emax</sub> <u>3016</u> W Ma	aximum read	ctive Power	S <sub>Emax</sub> <u>3041</u> VA	
		Switching actions Switching on without specification (to the primary energy carrier)	/ Ki	0.136	The limit of <i>k</i> imax	
		Most unfavorable case when switching between generator levels	<i>k</i> i	0.142	is 1.0	
		Switching on during nominal conditions (of the primary energy carrier)	<i>k</i> i	0.141		
		Switching off during normal output	<i>k</i> i	0.303		
		Worst value of all switching operations	$k_{\text{imax}}$	0.314		
Flicker		Angle of network impedanceΨ <sub>k</sub> :		32		
		Long-term flicker strength P	t.	0.1	5	





#### Model: HNS3000TL

E.5 Test re	port "	Network	interactions	" for	power	generation	units
Llauma amia (	1 fan 4				In la a a a	<b>`</b>	

		Load current: 100 %		
Ordinal number	Current (%)	Current (%)	Current (%)	Limit (%)
	L1	L2	L3	
0	0.015	-	-	0.5%
1		-	_	
2	0.239	-	_	1.08
3	1.185	-	-	2.3
4	0.060	-	-	0.43
5	0.519	-	-	1.14
6	0.051	-	-	0.30
7	0.173	-	-	0.77
8	0.058	-	-	0.23
9	0.200	-	-	0.40
10	0.123		-	0.184
11	0.253		-	0.33
12	0.093		-	0.153
13	0.215		-	0.21
14	0.091		-	0.131
15	0.344	-	-	0.15
16	0.074	-	-	0.115
17	0.084	-	-	0.132
18	0.038	-		0.102
19	0.163	-	-	0.118
20	0.065			0.092
21	0.107	-		0.107
22	0.038	-	-	0.084
23	0.040	-	- 11	0.098
24	0.038	-	- U	0.077
25	0.077			0.09
26	0.054		-	0.071
27	0.049		- 2 2	0.083
28	0.050	-	-	0.066
29	0.051	-		0.078
30	0.036	-	-	0.061
31	0.054	-		0.073
32	0.040	-		0.058
33	0.036	-		0.068
34	0.049	-	-	0.054
35	0.062	-	-	0.064
36	0.030	-		0.051
37	0.040	-	-	0.061
38	0.034	-	-	0.048
39	0.033		-	0.058
40	0.043		-	0.046
THD	1.83		-	5
PWHD	-		-	٢٢/٥



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

Extract from the test report for the NS protection			211202348SHA-00	1
"Determination of electric	properties"			
Test report NS Protection	on			
Type of NS protection:	Integral		Further manufacture	er instructions
Software version:	<u>V06</u>			
Manufacturer:	<u>Afore New Energy</u> <u>Technology(Shanghai)</u>	Co., Ltd.		
Period of measurement:	From 2021-04-29 to 20	21-12-15		
				Inverter(s)
Protectiv	e function	Set value	Tripping value	Tripping value NS protection
Rise-in-voltage protection	n U >>	1.25 * <i>U</i> n	288.0V	0.188 s
Rise-in-voltage protection	nU>	1.15 * <i>U</i> <sub>n</sub>	264.8V	0.191 s
Voltage drop protection L	]<	0.8 * <i>U</i> <sub>n</sub>	183.8V	2.990 s*
Voltage drop protection U <		0.45 * Un	103.3V	0.295 s
Frequency decrease protection f <		47.5Hz	47.48Hz	0.190 s
Frequency increase protection f > 51.5			51.52Hz	0.196 s
<sup>a</sup> The tripping time includ switch. When planning the powe obtained as indicated abo	es the period from the lim r generation system, the r ove.	it value violation t	J/f until the tripping s	ignal to the interface hall be added to the maximum time value
The disconnection time (: * Longest disconnection (	sum of tripping time of the of the rise-in-voltage prote	NS protection plection as a moving	us response time of t g 10-minute-average	he interface switch) shall not exceed 200 ms
Sor integrated NS pr	otection			
Assigned to power gener	Grid-connected PV inverter			
Type integrated interface	switch			Power Relay

Verification of the entire functional chain "integrated NS protection – interface switch" has resulted in successful disconnection. NOTE1: Un=230V

## Annex E.5 Test report "Network interactions" for power generation units Model: HNS10000TL

Extract from the of units	test report on the certificate				211202348S	HA-001		
Type of installation:	Grid-connected PV inverter		Manufacturer 's data					
Installation	Afore New Energy				Type of insta inverter	Ilation: Grid-	connect	ed PV
manufacturer:	Technology(Shanghai) Co., Ltd.		Power of normal output in nomina conditions):1000 W			al		
					Rating voltag	je:		230 V
Period of measurement:		From	n 2021-0	04-29 to 2021	<u>-12-15</u>			
		Maximum active Power	P <sub>Emax</sub>	<u>9988</u> W	Maximum re	active Power	$S_{\text{Emax}}$	<u>10042 </u> VA
		Switching actions Switching on without spe energy carrier)	cificatio	on (to the prim	ary <i>k</i> i	0.136	The	e limit of <i>k</i> imax
	Most unfavorable case when switching between generator levels				en <i>k</i> i	0.142		is 1.0
		Switching on during nom primary energy carrier)	inal con	nditions (of the	e k <sub>i</sub>	0.141		
		Switching off during norn	nal outp	out	<i>k</i> i	0.303		
		Worst value of all switchi	ng oper	rations	<i>k</i> <sub>imax</sub>	0.314		
Flicker		Ang imp	le of ne edance	twork Ψ <sub>k</sub> :	P.,	3	2°	
	Long-term flicker strength P <sub>it</sub> .				h P <sub>it</sub> :	0.	17	



#### Model: HNS1000TL

E.5 Test re	port '	'Network	interactions"	for p	ower	generation	units
Llamma ania	1 6			1-1/ 4 /	a la a a a'		

Ordinal number     Current (%) L1     Current (%) L2     Current (%) L3     Limit (%) L3       0     0.025     -     -     0.5% I       1     -     -     -     -       2     0.284     -     -     8%       3     1.967     -     -     4%       4     0.077     -     -     4%       5     0.786     -     -     10.7%       6     0.043     -     -     2%       7     0.369     -     -     7.2%       8     0.042     -     -     2%       9     0.181     -     -     3.1%       11     0.176     -     -     3.1%       12     0.088     -     -     1.33%       13     0.184     -     -     -       15     0.125     -     -     -       16     0.062     -     -     -       17     0.131     - <th></th>	
L1     L2     L3 $-1000000000000000000000000000000000000$	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	
3   1.967   -   .   Not stated $4$ 0.077   -   -   4% $5$ 0.786   -   -   10.7% $6$ 0.043   -   -   2.67% $7$ 0.369   -   -   2.67% $7$ 0.369   -   -   2% $9$ 0.181   -   -   2% $9$ 0.181   -   -   1.6%     10   0.046   -   -   1.6%     11   0.176   -   1.33%   3.1%     12   0.088   -   -   2%     14   0.054   -   -   -     15   0.125   -   -   -     16   0.062   -   -   -   -     17   0.131   -   -   -   -     19   0.093   -   -   -   -   -     20   0.0455   -   -   -   -   -   -	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	ł
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	Ł
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	
18     0.038     -     -        19     0.093     -     -        20     0.045     -     -        21     0.035     -     -        22     0.030     -     -        23     0.032     -     -        24     0.036     -     -        25     0.084     -     -        26     0.027     -     -	
19     0.093     -     -        20     0.045     -     -        21     0.035     -     -        22     0.030     -     -        23     0.032     -     -        24     0.036     -     -        25     0.084     -     -        26     0.027     -     -	
20     0.045     -        21     0.035     -     -        22     0.030     -     -        23     0.032     -     -        24     0.036     -     -        25     0.084     -     -        26     0.027     -     -	
21   0.035   -   -      22   0.030   -   -      23   0.032   -   -      24   0.036   -   -      25   0.084   -   -      26   0.027   -   -	
22 0.030 -    23 0.032 - -   24 0.036 - -   25 0.084 - -   26 0.027 - -	
23 0.032 -    24 0.036 - -   25 0.084 - -   26 0.027 - -	
24     0.036     -     -        25     0.084     -     -        26     0.027     -     -	
25     0.084     -     -        26     0.027     -     -	
26 0.027	
27 0.035	
28 0.043	
29 0.042	
30 0.021	
31 0.036	
32 0.022	
33 0.023	
34 0.030	
35 0.058	
36 0.034	
37 0.035	
38 0.022	
39 0.069	
40 0.046	
THD 2.307 - 13%	
PWHD 1.378 - 22%	



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

Model: HNS1000TL

Extract from the test report for the NS protection			211202348SHA-001			
"Determination of electric properties"						
Test report NS Protectio	n		1			
Type of NS protection:	Integral		Further manufactur	rer instructions		
Software version:	<u>V06</u>					
Manufacturer:	Afore New Energy					
	<u>Technology(Shanghai)</u> C	<u> Co., Ltd.</u>				
Period of measurement:	From 2021-04-29 to 202	1-12-1 <u>5</u>	•			
				Inverter(s)		
Protective	e function	Set value	Tripping value	Tripping value NS protection		
Rise-in-voltage protection	U >>	1.25 * <i>U</i> n	288.0V	0.188 s		
Rise-in-voltage protection	U>	1.15 * <i>U</i> <sub>n</sub>	264.8V	0.191 s		
Voltage drop protection U	<	0.8 * <i>U</i> n	183.8V	2.990 s*		
Voltage drop protection U	<	0.45 * Un	103.3V	0.295 s		
Frequency decrease prote	ection f <	47.5Hz	47.48Hz	0.190 s		
Frequency increase prote	ction f >	51.5Hz	51.52Hz	0.196 s		
obtained as indicated abo The disconnection time (s * Longest disconnection o	ve. um of tripping time of the N f the rise-in-voltage protec	IS protection plution as a moving	us response time of g 10-minute-average	the interface switch) shall not exceed 200 ms e.		
Sor integrated NS pro	otection		5			
Assigned to power genera	tion unit of type			Grid-connected PV inverter		
Type integrated interface	switch			Power Relay		
Response time of interface switch for integrated NS protection 12ms						
Verification of the entire fu	nctional chain "integrated	NS protection –	interface switch" ha	as resulted in successful disconnection.		
NOTE1: Un=230V						
	La I	-	7			
Signature	- C C					
Name: Jonny Jing						
<b>Position: Manager</b>						

Name: Jonny Jing **Position: Manager** Date: 2021-12-24

This Verification is for the exclusive use of Intertek's client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the exclusive use of interfex schema and is provided pursuant to the agreement between interfex and to chema interfex and the chema interfex and to chema inte