

## Certificate

## NEN EN50438

Manufacturer declaration and Type testing of compliance with the regulations of the Netherlands on connection of photovoltaic installations to the low voltage network.

Type reference number	Evershine TLC4000 Evershine TLC5000 Evershine TLC6000		
Type	Photovoltaic Inverter		
Manufacturer:	Jiangsu Zeversolar New Energy CO., LTD.		
Address	No. 198 Xiangyang Road, Suzhou, 215011 China		
Tel	+86 512 6937 0998	Fax	+86 512 6937 0630
E:mail	<a href="mailto:service.china@zeversolar.com">service.china@zeversolar.com</a>	Web site	<a href="http://www.zeversolar.com">www.zeversolar.com</a>

Test house details:	Jiangsu Zeversolar New Energy CO., LTD. R&D Department, Suzhou
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Type reference	Nominal AC power	Max.AC power
Evershine TLC4000	4.0kW	4.0kW
Evershine TLC5000	5.0kW	5.0kW
Evershine TLC6000	6.0kW	6.0kW

Jiangsu Zeversolar New Energy CO., LTD hereby declares that the inverter listed above meet the regulations of the Netherlands on connection of photovoltaic installations to the low voltage network.


The inverters conforming to the regulations of the Netherlands are characterized, along with the specification in the datasheet and the CE declaration, by the following features:

- There are two certificate of VDE 0126-1-1/A1:2012 and VDE 0126-1-1:2013 issued by an accredited institute. Those certificates can be downloaded from the website <http://www.zeversolar.com/>.
- The automatic disconnection devices integrated within the inverters meet the requirements of DIN VDE 0126-1-1:2006 with the deviation of NEN EN50438.
- These parameters can't be changed by user, an installer or by any person other than Zeversolar (password protected).

The results of VDE 0126-1-1:2006 and the deviation of NEN EN50438 tests are summarized in this certificate.

Complete documentation on test details is available at Zeversolar on demand.

The model TLC4000 and TLC5000 is same as TLC6000 on hardware except that the output power and the size of the heat sink.

Name of signatory and title	Sandy Gong Manager of Safety Dept	Date and Place	2014.06.16 Suzhou
Signed		On behalf of	Jiangsu Zeversolar New Energy CO., LTD.

## POWER QUALITY

Harmonic current emissions as per EN 61000-3-2							
Harmonic	Test Value in Amps Phase 1	% of fund Phase 1	Test Value in Amps Phase 2	% of fund Phase 2	Test Value in Amps Phase 3	% of fund Phase 3	Limit value in Amps
2	0.020	0.234	0.020	0.235	0.032	0.374	1.080
3	0.007	0.078	0.028	0.321	0.010	0.119	2.300
4	0.007	0.078	0.012	0.140	0.012	0.134	0.430
5	0.072	0.834	0.065	0.747	0.071	0.814	1.140
6	0.001	0.015	0.006	0.073	0.006	0.068	0.300
7	0.032	0.370	0.028	0.320	0.023	0.270	0.770
8	0.018	0.207	0.022	0.258	0.024	0.274	0.230
9	0.003	0.034	0.007	0.087	0.005	0.054	0.400
10	0.018	0.203	0.022	0.256	0.021	0.243	0.184
11	0.024	0.277	0.027	0.318	0.026	0.298	0.330
12	0.002	0.028	0.003	0.036	0.006	0.067	0.153
13	0.021	0.245	0.020	0.229	0.021	0.244	0.210
14	0.008	0.087	0.005	0.053	0.004	0.048	0.131
15	0.001	0.014	0.003	0.034	0.002	0.018	0.150
16	0.001	0.009	0.003	0.036	0.002	0.023	0.115
17	0.016	0.182	0.015	0.179	0.016	0.184	0.132
18	0.003	0.037	0.002	0.020	0.003	0.040	0.102
19	0.014	0.167	0.015	0.169	0.012	0.138	0.118
20	0.003	0.035	0.002	0.022	0.004	0.051	0.092
21	0.000	0.004	0.004	0.044	0.003	0.040	0.107
22	0.003	0.030	0.008	0.091	0.005	0.060	0.084
23	0.010	0.121	0.015	0.170	0.012	0.136	0.098
24	0.002	0.023	0.003	0.036	0.005	0.061	0.077
25	0.012	0.144	0.011	0.126	0.011	0.121	0.090
26	0.003	0.029	0.003	0.040	0.002	0.020	0.071
27	0.001	0.006	0.003	0.040	0.001	0.013	0.083
28	0.002	0.022	0.001	0.011	0.001	0.011	0.066
29	0.011	0.125	0.012	0.136	0.010	0.119	0.078
30	0.002	0.020	0.001	0.014	0.002	0.024	0.061
31	0.010	0.110	0.010	0.116	0.009	0.107	0.073
32	0.002	0.023	0.002	0.019	0.001	0.006	0.058
33	0.003	0.031	0.002	0.027	0.003	0.030	0.068
34	0.003	0.031	0.003	0.040	0.001	0.007	0.054
35	0.010	0.111	0.010	0.110	0.006	0.065	0.064
36	0.002	0.026	0.002	0.027	0.005	0.059	0.051
37	0.011	0.129	0.012	0.134	0.012	0.137	0.061
38	0.002	0.018	0.005	0.058	0.003	0.039	0.048
39	0.006	0.066	0.003	0.038	0.001	0.011	0.058
40	0.002	0.029	0.001	0.016	0.001	0.015	0.046

Voltage Fluctuations and Flicker as per EN 61000-3-3								
	Starting			Stopping			Running	
	dmax	dc	d(t)	dmax	dc	d(t)	Pst	Plt 2 hours
Measured Values	-0.45%	-0.71%	-0.28%	0.67%	0.66%	0.37%	0.18	0.07
Limits set under EN 61000-3-3	4%	3.3%	3.3% 500ms	4%	3.3%	3.3% 500ms	1.0	0.65
Test start date	2014.1.8			Test end date			2014.1.8	
Test location	Audix Technology (Wujiang) Co., Ltd. EMC Dept							

Power factor *			
Test Voltage level	210 V	230 V	253 V
Measured value at 100%Pn	0.998	0.999	0.999
Limit	>0.95	>0.95	>0.95

\* Measured at three voltage levels and at full output. The voltage maintained within  $\pm 1.5\%$  of the stated level during the test.

## UNDER / OVER FREQUENCY PROTECTION

Function	Limit		Actual setting		Trip test	
	Frequency[Hz]	Time[s]	Frequency[Hz]	Time[s]	Frequency[Hz]	Time[s]
U/F Stage 1	48.0	2.0	48.0	1.9	48.00	1.897
O/F Stage 1	51.0	2.0	51.0	1.9	51.02	1.910

## UNDER / OVER VOLTAGE PROTECTION

Function	Limit		Actual setting		Trip test	
	Voltage [V]	Time [s]	Voltage [V]	Time [s]	Voltage [V]	Time [s]
U/V Stage 1 L 1	184.0	2.0	184.0	1.9	183.5	1.900
U/V Stage 1 L 2	184.0	2.0	184.0	1.9	183.6	1.916
U/V Stage 1 L 3	184.0	2.0	184.0	1.9	183.5	1.912
O/V Stage 1 L1	253.0	2.0	253.0	1.9	252.9	1.900
O/V Stage 1 L2	253.0	2.0	253.0	1.9	252.7	1.916
O/V Stage 1 L3	253.0	2.0	253.0	1.9	251.9	1.920

## LOSS OF MAINS TEST

Method used	Reactive power disturbed		
	25% Prated	50% Prated	100% Prated
Output power level			
Limit according to VDE 0126-1-1	5s	5s	5s
Trip time (L:+5%)	1.120s	1.104s	1.088s
Trip time (L:+4%)	1.130s	1.318s	1.158s
Trip time (L:+3%)	1.172s	1.320s	1.190s
Trip time (L:+2%)	1.092s	1.150s	1.184s
Trip time (L:+1%)	1.136s	1.106s	1.184s
Trip time (L:+0%)	1.336s	1.278s	1.246s
Trip time (L:-1%)	1.124s	1.386s	1.102s
Trip time (L:-2%)	1.086s	1.136s	1.104s
Trip time (L:-3%)	1.168s	1.312s	1.086s
Trip time (L:-4%)	1.164s	1.278s	1.426s
Trip time (L:-5%)	1.110s	1.338s	1.334s

## RECONNECTION TIME MEASUREMENT

Reconnection time	Under/over Voltage	Under / over Frequency	Loss of Mains
Minimum value	20s	20s	20s
Actual setting	30s	30s	30s
Recorded value	30s	30s	30s

## DC CURRENT MONITORING

A direct current feed to the low voltage grid due to a defective generator operation must lead to a disconnection within 0.2 s. (according to VDE 0126-1-1)

Function	Limit		Trip test	
	DC current [A]	Time [ms]	DC current [A]	Time [ms]
Positive DC current	1.0	200	0.98	170.5
Negative DC current	1.0	200	0.99	163.5

## RESIDUAL CURRENT MONITORING

Test for correct triggering in event of steadily rising residual current

PV connection	Limit		Trip test	
	Fault current [mA]	Time [ms]	Test Current [mA]	Time [ms]
PV+	300	300	105	165.5
PV-	300	300	103	177

## Test for correct triggering in event of steadily rising residual current

PV connection	Limit		Trip test	
	Fault current [mA]	Time [ms]	Test Current [mA]	Time [ms]
PV+	30	300	30.6	187.5
PV+	60	150	59.5	86.6
PV+	150	40	150.2	20.0
PV-	30	300	30.5	169.0
PV-	60	150	60.5	93.5
PV-	150	40	150.2	21.0

## ARRAY INSULATION RESISTANCE DETECTION

The value of the total resistance, including the intentional resistance for array functional grounding, the expected insulation resistance of the array to ground, and the resistance of any other networks connected to ground (for example measurement networks) must not be lower than  $R = (V_{MAX} PV/30 \text{ mA})$  ohms. (according to EN 62109-2)

PV connector	Test resistance value	Activation(Yes/No)	Display
PV+	200K $\Omega$	Yes	Isolation Fault
PV-	200K $\Omega$	Yes	Isolation Fault