Certificate of compliance

Applicant:	**Zhejiang Chisage New Energy Technology Co., Ltd.** **No. 1828,Fuqing South Road,Panhuo Street,Yinzhou District, Ningbo City, Zhejiang Province, China 315000**
Product:	**Photovoltaic and battery inverter (Hybrid-Inverter)**
Model:	**Ven-3G2-LE, Ven-3.6G2-LE, Ven-4G2-LE, Ven-5G2-LE, Ven-6G2-LE, Ven-6.6G2-LE**

The device is designed to work as a generation unit of the type: A

Inverter for single-phase parallel connection to the public grid. The network monitoring and disconnection device is an integral part of the above-mentioned model.

Applied rules and standards:

EN 50549-1:2019/A1:2023
Requirements for parallel connection of installations with distribution networks - Part 1: Connection to an LV distribution network - Production of installations up to and including Type B

4.4 Normal operating range
4.5 Immunity to disturbances
4.6 Active response to frequency deviation
4.7 Power response to voltage variations and voltage changes
4.8 EMC and power quality
4.9 Interface protection
4.10 Connection and starting to generate electrical power
4.11 Ceasing and reduction of active power on set point
4.13 Requirements regarding single fault tolerance of interface protection system and interface switch

EN 50549-10:2022
Requirements for generating plants to be connected in parallel with distribution networks - Part 10: Tests for conformity assessment of generating units

Compliance with the parameters in Annex C of the standard
(see appendix parameter table)

Commission Regulation (EU) 2016/631 of 14 April 2016
Establishing a network code on requirements for grid connection of generators (NC RFG).
Type approval for generation units to use in Type A plants.

At the time of issue of this certificate, the safety concept of an aforementioned representative product corresponds to the valid safety specifications for the specified use in accordance with regulations.

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Certification Program: **NSOP-0032-DEU-ZE-ES-V10**
Certificate number: **U26-0171**
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Certification body

Domenik Koll
Head of Energy Systems Germany

Accreditation

DAkkS Deutsche Akkreditierungsstelle D-ZE-12024-01-00

Accredited certification body by Deutsche Akkreditierungsstelle GmbH (DAkkS) according to ISO/IEC 17065. The accreditation is valid only for the scope listed in the annex of the accreditation certificate D-ZE-12024-01-00. The Deutsche Akkreditierungsstelle GmbH (DAkkS) is signatory of the multilateral arrangements of EA, ILAC and IAF for mutual recognition.

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Type Approval and declaration of compliance with the requirements of EN 50549-1 and Commission Regulation (EU) 2016/631 of 14 April 2016				
Manufacturer	Zhejiang Chisage New Energy Technology Co., Ltd. No. 1828,Fuqing South Road,Panhuo Street,Yinzhou District, Ningbo City, Zhejiang Province, China 315000			
Product type	Photovoltaic and battery inverter (Hybrid-Inverter)			
Inverter model	**Ven-3G2-LE**	**Ven-3.6G2-LE**	**Ven-4G2-LE**	**Ven-5G2-LE**
Input DC (photovoltaic)				
MPP voltage range [V]	150-425	150-425	150-425	150-425
Max. input voltage [V]	500	500	500	500
Max. input current per MPP tracker [A]	18+18	18+18	18+18	18+18
Input DC (battery)				
DC voltage range [V]	40-60	40-60	40-60	40-60
Max. DC voltage [V]	60	60	60	60
Max. DC current per DC input [A]	60	75	85	110
AC connection				
Nominal AC voltage [V]	L/N/PE,230V, 50Hz	L/N/PE,230V, 50Hz	L/N/PE,230V, 50Hz	L/N/PE,230V, 50Hz
Nominal output current [A]	13,0	15,7	17,4	21,7
Max. output current [A]	14,3	17,2	19,1	23,9
Nominal output power inverter [kW]	3,0	3,6	4,0	5,0
Max. apparent output power inverter [kVA]	3,3	3,96	4,4	5,5
Inverter model	**Ven-6G2-LE**	**Ven-6.6G2-LE**	--	--
Input DC (photovoltaic)				
MPP voltage range [V]	150-425	150-425	--	--
Max. input voltage [V]	500	500	--	--
Max. input current per MPP tracker [A]	18+18	18+18	--	--
Input DC (battery)				
DC voltage range [V]	40-60	40-60	--	--
Max. DC voltage [V]	60	60	--	--
Max. DC current per DC input [A]	135	150	--	--
AC connection				
Nominal AC voltage [V]	L/N/PE,230V, 50Hz	L/N/PE,230V, 50Hz	--	--
Nominal output current [A]	26,1	28,7	--	--
Max. output current [A]	28,7	31,6	--	--
Nominal output power inverter [kW]	6,0	6,6	--	--
Max. apparent output power inverter [kVA]	6,6	7,26	--	--

Interface protection system and interface switch (Network and system protection "NS-protection")	
Type of protection	integrated NS-protection
Assigned to generation unit type	Ven-3G2-LE, Ven-3.6G2-LE, Ven-4G2-LE, Ven-5G2-LE, Ven-6G2-LE, Ven-6.6G2-LE
Integrated interface switch	Type of switching equipment 1: Relay (Model HF161F-40W) Type of switching equipment 2: Relay (Model HF161F-40W)
	Note: The output is switched off by the inverter bridge and two relay in series in each line and neutral.
Firmware version	INV: 0.3.0.0.1.B DCDC: 0.0.0.1.0.6 DISP: 0.2.1.0.0.C

Note

The settings of the product are password protected adjustable.

In case the generators are used with an external protection device, the protection settings of the inverters are to be adjusted according to the manufacturer's declaration.

The above stated generators are tested according to the requirements in the EN 50549-1 and the Commission Regulation (EU) 2016/631 of 14 April 2016. Any modification that affects the stated tests must be named by the manufacturer/supplier of the product to ensure that the product meets all requirements.

Type Approval and declaration of compliance with the requirements of EN 50549-1 and Commission Regulation (EU) 2016/631 of 14 April 2016

Parameter Table

Name of parameter set	EN50549-1&EN50549-10
Specific technical requirement	EN50549-10

Clause of EN 50549-1	**Parameter**	**Remarks / additional information[b]**	**setting range**	**default settings used**	
4.3.2 Interface switch	Single fault tolerance for interface switch		yes | no	yes	
4.4.2 Operating frequency range	47,0 – 47,5 Hz Duration		0 s – 20 s	0s	
	47,5 – 48,5 Hz Duration		30 – 90 min	30 min	
	48,5 – 49,0 Hz Duration		30 – 90 min	30 min	
	49,0 – 51,0 Hz Duration		not configurable	unlimited	
	51,0 – 51,5 Hz Duration		30 – 90 min	30 min	
	51, 5 – 52 Hz Duration		0 – 15 min	0 s	
4.4.3 Minimal requirement for active power delivery at under frequency	Reduction threshold		not configurable 49,0 Hz – 49,5 Hz	Electronic inverter, no power reduction take place 49,5 Hz	
	Maximum reduction rate		not configurable 2 – 10% P_M/Hz	≤ 2 % 10% P_M/Hz	
4.4.4 Continuous operating voltage range	Upper limit		not configurable 1,0 U_n – 2,0 U_n	1,15 U_n 1,10 U_n	
	Lower limit		not configurable 0,9 U_n – 1,0 U_n	0,85 U_n, 0,90 U_c	
4.5.2 Rate of change of frequency (ROCOF) immunity	ROCOF withstand capability (defined with a sliding measurement window of 500 ms) non-synchronous generating technology (inverter): synchronous generating technology:		not configurable 0 – 10 Hz/s yes no	2 Hz/s	
4.5.3.2 Generating plant with non-synchronous generating technology (FRT)	Maximum power resumption time		not defined	≤1 s	
	Voltage-Time-Diagram		see Figure 6,of EN 50549-1:2019	Time [s]	U [p.u.]
				0,00	0,20
				0,15	0,20
				1,50	0,85
				180	0,85
				180	0,90
4.5.4 Over-voltage ride through (OVRT)	Voltage-Time-Diagram		not configurable see Figure 8 of EN 50549-1:2019	Time [s]	U [p.u.]
				0,0	1,25
				0,1	1,25
				0,1	1,20

				5,0	1,20
				5,0	1,15
				60	1,15
				60	1,10
4.5.5 Phase jump immunity	Phase jump immunity		not configurable	20°	
4.6.1 Power response to over frequency (LFSM-O)	Threshold frequency f_1		50,2 Hz – 52,0 Hz	50,2 Hz	
	Droop		2% – 12%	5%	
	Power reference		P_M | P_{max}	P_M for other nonsynchronous Generating technology	
	Intentional delay		0 s – 2 s	0 s	
	Deactivation threshold fstop		50,0 Hz – f_1	deactivated	
	Deactivation time t_{stop}		0 s – 600 s	-	
	Acceptance of staged disconnection		yes | no	yes	
4.6.2 Power response to under frequency (LFSM-U)	Threshold frequency f_1		49,8 Hz – 46,0 Hz	49,8 Hz	
	Droop		2 % – 12%	5%	
	Power reference		P_M | P_{max}	P_{max}	
	Intentional delay		0 s – 2 s	0 s	
4.7.2.2 Capabilities	Active factor range overexcited		0,90 – 1 / 48% P_d - 0 0,95 – 1 / 33% P_d - 0	0,95 – 1 / 33% P_d - 0	
	Active factor range underexcited		0,90 – 1 / 48% Pd - 0 0,95 – 1 / 33% Pd - 0	0,95 – 1 / 33% Pd - 0	
4.7.2.3 Control modes	Enabled control mode		Q setp. Q(U) Q(P) cos φ setp. cos φ (P)	activated deactivated deactivated deactivated deactivated	
4.7.2.3.2 Set point control modes	Q setpoint and excitation		0% – 48% P_D, 0% – 33% P_D	0	
	cos φ setpoint and excitation		1,0 – 0,9	1	
4.7.2.3.3 Voltage related control modes	Characteristic curve		cos φ (P) Q(P)	indicate default characteristic	
	Time constant		3 s – 60 s	10 s	
	Min cos φ		0,0 – 1	0,9	
	Lock in power		0% – 20%	deactivated	
	Lock out power		0% – 20%	deactivated	
4.7.2.3.4 Power related control mode	Characteristic curve		Q(U) P(U)	Q(U) (three-phase inverter) 0,00…-0,436 0,92…-0,436 0,94…0,0 1,06…0,0	

				1,08…0,436 1,20…0,436 P(U) deactivated
4.7.4.2.2 Zero current mode for converter connected generating technology	Enabling		enable | disable	disabled
	Static voltage range overvoltage		100 % U_n – 120 % U_n	120 % U_n
	Static voltage range undervoltage		20 % U_n – 100 % U_n	50 % U_n
4.9.3 Requirements on voltage and frequency protection	Threshold for protection as dedicated device [in A or kW, kVA]		43 A Note: Rated current of internal safety device!	Internal safety device
	Undervoltage threshold stage 1		0,2 U_n – 1 U_n	0,85 U_n
	Undervoltage operate time stage 1		0,1 s – 100 s	1,2 – 1,5 s
	Undervoltage threshold stage 2		0,2 U_n – 1 U_n	N/A
	Undervoltage operate time stage 2		0,1 s – 5 s	N/A
	Overvoltage threshold stage 1		1,0 U_n – 1,2 U_n	1,15 U_n
	Overvoltage operate time stage 1		0,1 s – 100 s	0,1 – 0,2 s
	Overvoltage threshold stage 2		1,0 U_n – 1,3 U_n	1,25 U_n (N/A)
	Overvoltage operate time stage 2		0,1 s – 5 s	0,1 s (N/A)
	Overvoltage threshold 10 min mean protection[a]		1,0 U_n – 1,15 U_n	1,10 U_n
	Overvoltage operate time 10 min mean protection[a]		0,04 s – 10,00 s	10 min (update every 3s)
	Underfrequency threshold stage 1		47,0 Hz – 50,0 Hz	47,5 Hz
	Underfrequency operate time stage 1		0,1 s – 100 s	0,3 s – 0,5 s
	Underfrequency threshold stage 2		47,0 Hz – 50,0 Hz	N/A
	Underfrequency operate time stage 2		0,1 s – 5 s	N/A
	Overfrequency threshold stage 1		50,0 Hz – 52,0 Hz	52,0 Hz
	Overfrequency operate time stage 1		0,1 s – 100 s	0,3 s – 0,5 s
	Overfrequency threshold stage 2		50,0 Hz – 52,0 Hz	N/A
	Overfrequency operate time stage 2		0,1 s – 5,0 s	N/A

	Loss of mains according EN 62116 (LoM)		0 s – 6000 s	ROCOF 2,5 Hz/s (0,5 s) active 2 s (5 s)
4.10.2 Automatic reconnection after tripping	Lower frequency		47,0 Hz – 50,0 Hz	49,5 Hz
	Upper frequency		50,0 Hz – 52,0 Hz	50,2 Hz
	Lower voltage		50% U_n – 100 % U_n	85% U_n, 90% U_c
	Upper voltage		100% U_n – 120% U_n	110% U_n
	Observation time		10 s – 600 s	60 s
	Active power increase gradient		6% – 3000% / min	10% / min
4.10.3 Starting to generate electrical power	Lower frequency		47,0 Hz – 50,0 Hz	49,5 Hz
	Upper frequency		50,0 Hz – 52,0 Hz	50,1 Hz
	Lower voltage		50% – 100% U_n	85% U_n, 90% U_c
	Upper voltage		100% – 120% U_n	110% U_n
	Observation time		10 s – 600 s	60 s
	Active power increase gradient		6% – 3000% / min	disabled
4.11.1 Ceasing active power	Remote operation of the logic interface		RS485	
4.11.2 Reduction of active power on set point	Remote operation NOTE: If yes further definition is provided by the DSO		RS485	