

شماره: 410-05-NT-PK-L-0059

تاریخ: ۱۴۰۵/۰۳/۱۱

صفحه: ۱ از ۱

پیوست: دارد

مدیریت محترم پروژه نیروگاه خورشیدی ۲۰ مگاواتی زارچ یزد

جناب آقای مهندس دبیری

موضوع: ارسال ITP اینورترهای نیروگاه زارچ

با سلام و احترام

بدین وسیله به استحضار می‌رساند به پیوست، ITP اینورترهای نیروگاه زارچ جهت بررسی و تأیید ارسال می‌گردد. خواهشمند است پس از بررسی، نتیجه را اعلام فرمایید.



با احترام

مدیر پروژه



احداث نیروگاه خورشیدی 20 مگاواتی زارچ یزد
شماره قرارداد: PKSP-P2-C2-0410



ITP for Inverter

ITP for Inverter

00	2026/06/01	IFA	M. Milan	H. Goudarzi	H. Goudarzi
Rev.	Date	Purpose of Issue	Prepared By	Checked By	Approved By

ITP for Inverter



احداث نیروگاه خورشیدی 20 مگاواتی زارچ یزد
شماره قرارداد: PKSP-P2-C2-0410



ITP for Inverter

Document Title:

ITP for PV

1. Purpose

The purpose of this inspection and test plan is to establish the inspections and tests in conjunction with quality plan for inverter production.

2. Definitions

Project: ZARCH Project

OW Employer: PKSPCO

SP Site Supervision :

CO EPC Contractor: Pishgaman Energy Nouratech

H Hold point (Notification required, Presence is mandatory)

W Witness (Notification required, Presence not mandatory)

RC Random Check (Notification required, Presence not mandatory)

RD Review of Documents

A Approved

SW Spot Witness (Notification required, Presence not mandatory)

3. References

Codes and standards for inspections and tests shall be in accordance with those specified in the contractual documents, purchase orders, requisitions, specifications, data sheets, drawings and company official instructions. Applicable Standards: Grid connection standard EN50549, G99, AS4777.2, VDE0126, IEC61727, VDE4110, CEA 2019 Safety / EMC standard IEC62109-1/-2, EN61000-6-2/-4 (if applicable)

4. Responsibilities

Contractor shall prepare inspection procedure and submit for review and approval of Company prior to use.

The contractor shall control the individual inspection procedures for final inspection. The record means work instructions, checklists which give evidence that the work has passed inspection.

ITP for Inverter

Inspection and test plan (ITP)

Row	Step of inspection / Activity	Reference	Standard Renge	ACCEPTANCE CRITERIA)	inspection position			Note
		procedure /spec/code			NT	-	pksp	
1	Inspection							
1.1	Check the surface—clean and no scratch; check the LCD Board—no scratch;	Appearance inspection standards	Refer to the finished product appearance inspection standard	Fully compliant	W	-	W	
1.2	Check and confirm the tightness of screws;	1. The Biotechnology Department creates Standard Operating Procedures (SOPs) based on the torque standards provided by R&D, defining torque standards for different screws. 2. The Engineering Department (ME) provides manual torque screwdrivers that meet the torque specifications to the Industrial Quality Control (IPQC) department for random inspection and verification, based on the torque values defined in the SOPs. 3. Frequency: IPQC inspects 5 pieces every 2 hours to confirm whether the screws are tightened.	Refer to the SOP (Standard Operating Procedure) process inspection checklist	Valid & approved	W	-	W	
1.3	Check and confirm the tightness of AC/DC terminal;	1. The Biotechnology Department creates Standard Operating Procedures (SOPs) based on the torque standards provided by R&D, defining torque standards for different screws. 2. The Manufacturing Equipment (ME) department sets the electric screwdriver torque according to the torque values defined in the SOPs and performs morning and afternoon checks to confirm whether the electric screwdriver torque is up to standard. 3. The Industrial Quality Control (IPQC) department conducts visual inspections at 5 pieces per 2 hours to confirm whether the	Refer to the SOP (Standard Operating Procedure) process inspection checklist	Valid & approved	W	-	W	
1.4	Check the silk print—clear, in proper place, and with correct color;	Printing: Refer to the drawings; Inspection: Refer to the screen printing inspection specifications.	Screen Printing Inspection Standards	Valid & approved	W	-	W	
1.5	Check the package—no humidity, subsidence, or smearing;	Reference Packaging Specifications	Refer to the finished product appearance inspection standard	Valid & approved	W	-	W	

Inspection and test plan (ITP)

Row	Step of inspection / Activity	Reference procedure /spec/code	Standard Renge	ACCEPTANCE CRITERIA)	inspection position			Note
					NT	-	pksp	
1.6	Check the silk print (on package)—confirm to the design drawing;	Reference Packaging Specifications	Refer to the finished product appearance inspection standard	Valid & approved	W	-	W	
1.7	Check the accessories are complete, the nameplate is correct, and the entity is in accordance with the order requirement.	Refer to the work order BOM and drawings	Meet the relevant requirements	Valid & approved	W	-	W	
2	Safety Test items							
2.1	Hi-pot/PV isolation/ Ground resistance test	2545Vdc(Pv/Grid)to-Ground. 5090Vdc(PW/Grid)to-RS485.	No-breakdown.arc-or sparksu	Valid & approved	W	-	W	
2.2	Sealing test	One endotracheal tube is connected, and all others are closed and sealed, with all interfaces properly plugged.	-3200	Valid & approved	W	-	W	
2.3	Power up test	Refer to power-on test requirements	The equipment is operating normally after power-on.	Valid & approved	W	-	W	
3	Funtional Test items							
3.1	Night consumption	The inverter's DC side is disconnected, and the AC side is connected to the grid. A power meter measures the AC side power.	<3W	Valid & approved	W		W	
3.2	Start up voltage	Measure standby power consumption when supplied by AC	<500V	Valid & approved	W		W	
3.3	Comm. Test	Tested under rated power	The communication is normal	Valid & approved	W		W	

Inspection and test plan (ITP)

Row	Step of inspection / Activity	Reference procedure /spec/code	Standard Renge	ACCEPTANCE CRITERIA)	inspection position			Note
					NT	-	pksp	
3.4	Display Accuracy calibration	After the external equipment conditions stabilize (3-5 seconds after adjustment), simultaneously record the voltage/current/frequency/output power of phases A, B, and C displayed on the LCD, and the voltage/current/frequency/output power of phases A, B, and C measured by power metering. Calculate the differences, and judge the results based on the absolute difference.	Voltage: (LCD display - power meter display), error value $\pm 8V$; Current: LCD display - power meter display $\leq 1\%$, $\pm 8A$; Frequency: LCD display - power meter display $< 0.05Hz$;	Valid & approved	W		W	
3.5	TEMP Test	Temperature detection	17-45°	Valid & approved	W		W	
3.6	Fan Test	Fan self-test enabled test	Determine whether the fan start-stop operation status is qualified.	Valid & approved	W		W	
3.7	Max.MPPT Efficiency	NA	NA	Valid & approved	W		W	
3.8	LOW IRRADIANCE TEST	NA	NA	Valid & approved	W		W	

Inspection and test plan (ITP)

Row	Step of inspection / Activity	Reference procedure /spec/code	Passed Renge	ACCEPTANCE CRITERIA)	inspection position			Note
					ntech	ins	pksp	
3.10	DC Accuracy calibration	Synchronous recording of liquid crystal display PV1, PV2 channels... voltage, current, input power and power measurement test PV1, PV2 channels... voltage, current, input power, and calculating the difference. The results are judged based on the absolute difference.	Voltage: (LCD display - power meter display) / Power meter display * 100% ≤ 1%, ±15V (for data recording, data distribution analysis) Current: LCD display - power meter display ±16A (for data recording, data distribution analysis)	Valid & approved	W	-	W	
3.11	AC Accuracy calibration	After the external equipment conditions are stable (after adjustment for 3 to 5 seconds), synchronously record the voltages/current/frequencies/output power of phases A, B, and C displayed on the LCD, as well as the voltages/current/frequencies/output power measured by the power metering test for phases A, B, and C, and calculate the differences. The results will be judged based on the absolute differences.	Voltage: (LCD display - power meter display), error value ±8V; Current: LCD display - power meter display ≤ 1%, ±8A Frequency: LCD display - power meter display < 0.05Hz;	Valid & approved	W	-	W	
3.12	DC/AC power Comparison	Synchronously record the LCD input DC power of the inverter and the LCD output AC power of the inverter, calculate the difference, and determine the result based on the absolute difference.	Inverter (LCD input DC power - Inverter LCD output AC power) / LCD input DC power * 100% ≤ 5%	Valid & approved	W	-	W	
3.13	Conversion efficiency	The upper computer reads the efficiency of the power analyzer.	95% < AC power measured by power meter ÷ DC power measured by power meter < 98.5% Average the 10 cumulative data points (1 data point collected every 0.5 seconds)	Valid & approved	W	-	W	
3.14	THDi	1) Set the PV source voltage and power through the ATE system; 2) The loaded inverter starts and operates normally.	THD (total) ≤ 5%; Average of 10 consecutive data points (1 data point collected every 0.5 seconds)	Valid & approved	W	-	W	

ITP for Inverter

Inspection and test plan (ITP)

Row	Step of inspection / Activity	Reference procedure /spec/code	Passed Renge	ACCEPTANCE CRITERIA)	inspection position			Note
					ntech	ins	pksp	
3.15	IR and continuity tests passed	1. Connect the analog insulation fault testing tool (with the specified resistance connected), and close the connection. It is required that when the inverter is set to 90% of the company's standard resistance, it cannot be connected to the grid, the LCD fault indicator light remains constantly on, displaying "PV ISO-PRO" fault, and when the inverter is set to 110% of the company's standard resistance, it can be connected to the grid normally. Note that each path needs to be tested through PV+ to ground and PV- to ground. (1) Confirm the type of the inverter and refer to the comparison table to confirm the insulation impedance standard value R for the country or region (such as the standard requirement of 20K) and the company's standard setting value R (such as the company's product setting value of 200K). Connect the DC side of the inverter to the DC power supply, and directly connect the AC side output to the grid (if using an AC source, make sure that the power ground wire and the inverter ground wire are connected to the same large ground). (2) Connect the test ground wire to the grounding terminal of the inverter. (3) According to the confirmed setting value R, prepare the test resistor Rmin (90% of the company's standard setting value R) and connect it between the positive pole (or negative pole) and the grounding terminal of the inverter. (4) First turn on the grid or AC power supply, then start the DC source to power on the inverter. (5) Check if the LCD display of the inverter reports the PV ISO-PRO fault, record it, then disconnect the grid and DC source, switch the test resistor. (6) Connect the confirmed and prepared resistor Rmax (110% of the company's standard setting value R) between the positive pole (or negative pole) and the grounding terminal of the inverter. (7) First turn on the grid or AC power supply, then start the DC source to power on the inverter. (8) Check if the LCD display of the inverter is normal and connected to the grid, and if there is power output, then disconnect the grid and DC source, record the results. 2. PV- to ground, operate in the same way as PV+ to ground.	1. If the PV ISO-PRO module fails when the minimum接入 resistance Rmin is connected and it can be normally connected when the maximum接入 resistance Rmax is connected, the test meets the standard requirements. 2. If the PV ISO-PRO module does not fail when the minimum接入 resistance Rmin is connected or fails when the maximum接入 resistance Rmax is connected, the test does not meet the standard requirements.	Valid & approved	W	-	W	
3.16	Soft Run	1) Set the PV source voltage and power through the ATE system; 2) The loaded inverter starts and operates normally.	The software starts timing when it receives the "power-on" command. It stops timing when the inverter sends a "running" status feedback. It is considered qualified if the timing duration does not exceed the specified limit (within 100 seconds).	Valid & approved	W	-	W	

ITP for Inverter

Inspection and test plan (ITP)

Row	Step of inspection / Activity	Reference procedure /spec/code	Passed Renge	ACCEPTANCE CRITERIA)	inspection position			Note
					ntech	ins	pksp	
3.17	Time Calibration	Read the time of the inverter and compare it with the real-time time of the computer. Determine whether the time is within the standard range.	≤ 5 minutes	Valid & approved	W	-	W	
3.18	Software Version	Read the current software version of the inverter and compare it with the configured version of the system settings; 1) Pre-configure all the specifications of the inverters and their corresponding software versions; 2) Conduct communication comparison;	Correct version	Valid & approved	W	-	W	
3.19	SN SN Comparison	Match the machine SNs exactly	Match SN consistency	Valid & approved	W	-	W	
3.20	Grounding voltage test	1. If the external DC source and the grid environment impedance are fixed, the reading of Jinlang Cloud's ground voltage value is also a constant value. This can be used to determine whether there is any inconsistency in insulation impedance within the inverter. 2. The upper computer reads the ground voltage value.	Read the value of the liquid crystal grounding voltage within the DC voltage range of 200 - 700V.	Valid & approved	W	-	W	
3.21	Set national standards	Set to the national standard that was originally set for this model of device at the time of its manufacture.	Set to the national standard that was originally set for this model of device at the time of its manufacture.	Valid & approved	W	-	W	
3.22	Reset	1. This test will be conducted at the end. 2. The 485 communication is enabled, and a one-click shutdown command is sent (including clearing historical data and restoring factory settings). 3. The operation records and fault records of the inverter have been cleared.	Check the operation records of the inverter. The fault records have been cleared and it has been restored to the factory settings.	Valid & approved	W	-	W	

Inspection and test plan (ITP)

Row	Step of inspection / Activity	Reference procedure /spec/code	Passed Renge	ACCEPTANCE CRITERIA)	inspection position			Note
					ntech	ins	pksp	
3.23	PF	The upper computer reads the PF value displayed by the power analyzer.	When the Pn ratio is greater than 50% to 100%, $0.99 \leq \lambda \leq 1$; When the Pn ratio is between 20% and 50%, $0.95 \leq \lambda \leq 1$; Take the average of 10 cumulative data points (collecting data once every 0.5 seconds)	Valid & approved	W	-	W	
3.24	DC Injection	The host computer reads the AC and DC components displayed by the power analyzer.	$\leq 2\%$; The average value of 10 consecutive data sets is calculated (1 data point is collected every 0.5 seconds)	Valid & approved	W	-	W	