

**GUIDELINES FOR EMPANELMENT OF GRID TIED INVERTER MANUFACTURERS FOR IMPLEMENTATION OF SRTPV PROGRAM IN BESCOM.**

**I. NEW EMPANELMENT**

1. The grid tied inverter manufacturer shall register their application in the prescribed form in the office of General Manager (DSM), Corporate Office, BESCOM. The prescribed application form is uploaded in the website.
2. The grid tied inverter manufacturer shall pay the processing fee as detailed below by DD drawn in favor of AGM(E&S), Corporate Office, BESCOM, Bengaluru which shall not be refundable.

<b>Sl. No</b>	<b>Capacity of the grid tied inverter</b>	<b>Processing fee in Rs. For each model</b>
1	1 kW up to 5kW	10000/-
2	>5kW up to 50kW	15000/-
3	>50 kW up to 1000kW	25000/-

3. The grid tied inverter manufacturer shall furnish the following documents.
  - a. Company Registration Certificate
  - b. Factory License/Trade License along with necessary certificates
  - c. GST Registration Certificate
  - d. Relevant Type Test reports of grid-tied inverters as per technical and grid connectivity standards as specified in Annexure-A (In both hard and soft copies).
  - e. Company's turn over for past 3 financial years duly certified by auditor
  - f. List of service centers in Bangalore, Mysore, Mangalore, Hubli and Gulburga along with address, name of the contact person with Mobile no. and email id.
  - g. Details of capacity wise grid tied inverters offered for empanelment with details of model etc.
  - h. Technical specification of grid tied inverters
  - i. Self-declaration letter for not-black listed in any DISCOM's/Utilities/Govt. related concerns/ Nodal agencies.
  - j. Self-declaration for providing minimum guarantee of 5 years for the inverters and declaration for efficiency of the inverter is more than 95%
  - k. An undertaking on a non-judicial stamp paper of Rs.200/- for providing service support during the entire guaranteed period of 5 years shall be furnished.
  - l. The price list of empaneled inverters from time to time for publishing the same in BESCOM website.

3. **The validity of the type test reports shall be considered as 5 years from the date of testing (earliest of all test reports of various tests done on a particular product).**

4. The grid tied inverter manufacturer shall arrange for one time factory inspection and the inspection cost shall be borne by the manufacturer. The inspection shall be done by one officer each from GM (QS&S) section and GM (DSM) section
5. The vendor approval shall be given for a period of one year initially and further extendable for two more years subject to the discretion of BESCOM with following conditions
  - a. Submission of Performance certificate from the concerned sub-divisional officer
  - b. There is no change in technical specification
  - c. Payment of renewal fee
6. BESCOM reserves the right to delist such of the manufacturer from the empanelment list without any further intimation from this office in case the performance of inverters is not satisfactory within the guaranteed period or any other valid reasons.

## **II. ADDITIONAL CAPACITY OF GRID TIED INVERTER**

1. The grid tied inverter manufacturer shall submit their request for additional capacity in the office of General Manager (DSM), Corporate Office, BESCOM.
2. The grid tied inverter manufacturer shall pay the processing fee as detailed below by DD drawn in favor of AGM(E&S), Corporate Office, BESCOM, Bengaluru which shall not be refundable.

<b>Sl. No</b>	<b>Capacity of the grid tied inverter</b>	<b>Processing fee in Rs. For each model</b>
1	1 kW up to 5kW	10000/-
2	>5kW up to 50kW	15000/-
3	>50 kW up to 1000kW	25000/-

3. The grid tied inverter manufacturer shall furnish the following documents
  - a. Relevant Type Test reports of grid-tied inverters as per technical and grid connectivity standards as specified in Annexure-A (In both hard and soft copies).
  - b. Details of Capacity wise grid tied inverters offered for empanelment with details of Model etc.
  - c. Technical specification of grid tied inverters.
  - d. Self-declaration letter for not-black listed in any DISCOM's/Utilities/Govt. related concerns/Nodal agencies.
  - e. The price list of empaneled inverters from time to time for publishing the same in BESCOM website.
  - f. An undertaking on a non-judicial stamp paper of Rs.200/- for providing service support during the entire guaranteed period of 5 years shall be furnished.

- g. Self-declaration for providing minimum guarantee of 5 years for the inverters and declaration for efficiency of the inverter is more than 95%.
4. **The validity of test reports shall be considered as 5 years from the date of testing (earliest of all test reports of various tests done on a particular product).**
5. The vendor approval shall be given for a period of one year initially and further extendable for two more years subject to the discretion of BESCOM with following conditions
- Submission of Performance certificate from the concerned sub-divisional officer
  - There is no change in technical specification
  - Payment of renewal fee
6. BESCOM reserves the right to delist such of the manufacturer from the empanelment list without any further intimation from this office in case the performance of inverters is not satisfactory within the guaranteed period or any valid reasons.

### **III. RENEWAL OF EMPANELED MANUFACTURER**

- The grid tied inverter manufacturer shall submit their request for renewal in the office of General Manager (DSM), Corporate Office, BESCOM before two month of expiry of the approval.
- The grid tied inverter manufacturer shall pay the processing fee as detailed below by DD drawn in favor of AGM(E&S), Corporate Office, BESCOM, Bengaluru which shall not be refundable.

<b>Sl. No</b>	<b>Capacity of the grid tied inverter</b>	<b>Processing fee in Rs. For each model</b>
1	1 kW up to 5kW	10000/-
2	>5kW up to 50kW	15000/-
3	>50 kW up to 1000kW	25000/-

- The grid tied inverter manufacturer shall furnish the following documents.
  - Relevant Type Test reports of grid-tied inverters as per technical and grid connectivity standards as specified in Annexure-A (In both hard and soft copies).
  - Company's turn over for past 3 financial years duly certified by auditor
  - List of service centers in Bangalore, Mysore, Mangalore, Hubli and Gulburga along with address, name of the contact person with Mobile no. and email id.
  - Details of capacity wise grid tied inverters offered for empanelment with details of model etc.



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- e. Self-declaration letter for not-black listed in any DISCOM's/Utilities/Govt. related concerns/Nodal agencies.
  - f. Self-declaration for providing minimum guarantee of 5 years for the inverters and declaration for efficiency of the inverter is more than 95%.
  - g. An undertaking on a non-judicial stamp paper of Rs.200/- for providing service support during the entire guaranteed period of 5 years shall be furnished.
  - h. The price list of empaneled inverters from time to time for publishing the same in BESCOM website.
  - i. Performance Certificate issued by the sub-divisional officer, BESCOM for the inverters already installed in BESCOM jurisdiction under SRTPV program.
  - j. Renewal will be considered only for the capacity already empaneled.
4. The grid tied inverter manufacturer who have registered before 01.10.2018 shall arrange for one time factory inspection of the manufacturing unit and the inspection cost shall be borne by the manufacturer. The inspection shall be done by one officer each from GM (QS&S) section and GM (DSM) section.
- 5. The validity of test reports shall be considered as 5 years from the date of testing (earliest of all test reports of various tests done on a particular product).**
6. BESCOM reserves the right to delist such of the manufacturer from the empanelment list without any further intimation from this office in case the performance of inverters is not satisfactory within the guaranteed period or any valid reasons.

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**General Manager (DSM)  
BESCOM**



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## APPLICATION FORM

### FOR EMPANELMENT OF GRID-TIED INVERTER MANUFACTURER

COMPANY DETAILS			
1	Name of the Company		
2	GST Registration number of the company		
3	Brand Name of the Product		
4	Address of the Company with Telephone/Fax No., Email id		
5	Name of the authorized representative at the company with address, contact no. and email id		
6	Turnover of the company for past 3 financial years duly certified by auditor in Rs.lakhs	FY	
7	Details of the manufacturing unit (Address)		
8	Product range(capacity wise) offered for empanelment (Shall be supported by test certificates as stated in Annexure-I)	Capacity	Model
9	Vendor fees Paid Details Amount in Rs DD No. & Date Name of the Bank & Branch		

Name & Signature of Authorized person  
with seal of the company

**Annexure-A**

**Technical Standards for Grid tied inverters**

BOS Item / System	Standard Description		Standard Number
	Grid tied inverters	1	Environmental Testing
2		Efficiency Measurements	IEC 61683: 1999
3		Product safety standard	IEC - 62109-1 (2010) IEC - 62109-2 (2011)
4		Grid Connectivity standard /Utility interface	IEC 61727:2004.
5		Test procedure for islanding prevention measures for utility-interconnected PV inverters	IEC 62116:2008 or IEEE 1547 and IEEE 1547.1
6		Electromagnetic compatibility & Electro Magnetic Interference	IEC 61000-6-1:2007. IEC 61000-6-3:2007. IEC 61000-3-2:2006 IEC 61000-3-3:2007.
7		Ingress protection	IP 65 (for outdoor)/ IP 21 (for indoor) As per IEC 529
<p>Note:</p> <ol style="list-style-type: none"> <li>For above 10KVA rating, self-certification by manufacturers for Environmental Testing &amp; Efficiency Measurements is acceptable.</li> <li>In case if the Charge controller is not built-in the inverter, IEC 62093 test is required separately for Charge controller.</li> </ol>			

<b>Specifications of Inverter</b>	
Parameters	Detailed Specifications
Nominal Voltage	230V / 415V
Voltage range	+10% to -20% of nominal voltage
Operating frequency range	50 Hz ( 47.5 to 52 Hz)
Waveform	Sine Wave
Harmonics	AC side total harmonic current distortion < 5%
Ripple	DC voltage ripple content shall be not more than 1%.
Efficiency	Efficiency shall be >95%
Losses	Maximum losses in sleep mode: 2W per 5kW Maximum losses in stand-by mode: 10W
Casing protection levels	Degree of protection: Minimum IP-21 for internal units and IP 65 for outdoor units
Temperature	Should withstand from -10 to +60 deg Celsius
Humidity	Should withstand up to 95% (relative humidity)
Operation	Completely automatic including wake up, synchronization (phase-locking) and shut down
MPPT	MPPT range must be suitable to individual array voltages in power packs
Protections	Over voltage; both input & output
	Over current; both input & output
	Over/Under grid frequency
	Over temperature
	Short circuit
	Lightening
	Surge voltage induced at output due to external source
	Islanding
Recommended LED indications	Inverter ON
	Grid ON
	Inverter Under / Over Voltage
	Inverter Overload
	Inverter Over Temperature
Recommended LCD Display on Front Panel	Accurate displays on the front panel:
	DC input voltage
	DC current
	AC Voltage ( all 3 phases)
	AC current ( all 3 phases)
	Ambient temperature
	Instantaneous & cumulative output power
	Daily DC energy produced
Communication interface	RS485 / RS 232 (with or without USB)

Sl. No.	Parameters	Requirements	Reference
1.	Overall Conditions of Service	Reference to regulations	Conditions for Supply of Electricity of Distribution Licensees in the State of Karnataka
2.	Overall Grid Standards	Reference to regulations	Central Electricity Authority (Grid Standards) Regulations 2010
3.	Equipment	Applicable industry standards	IEC/EN standards
4.	Safety and Supply	Reference to regulations, Chapter III (General Safety Requirements)	Central Electricity Authority (Measures of Safety and Electricity Supply) Regulations, 2010 and subsequent amendments
5.	Meters	Reference to regulations and additional conditions issued by the Commission.	Central Electricity Authority (Installation & Operation of Meters) regulations 2006 and subsequent amendments
6.	Harmonic Current	Harmonic current injections from a generating station shall not exceed the limits specified in IEEE 519	IEEE 519 relevant CEA (Technical Standards for Connectivity of the distributed generation resource) regulations 2013 and subsequent amendments
7.	Synchronization	Photovoltaic system must be equipped with a grid frequency synchronization device, if the system is using synchronizer inherently built into the inverter then no separate synchronizer is required.	Relevant CEA (Technical Standards for Connectivity of the distributed generation resources) regulations 2013 and subsequent amendments.
8.	Voltage	The voltage-operating window should minimize nuisance tripping and should be under operating range of 80% to 110% of the nominal connected voltage. beyond a clearing time of 2 seconds, the Photovoltaic system must isolate itself from the grid.	Relevant CEA (Technical Standards for Connectivity of the distributed generation resources) regulations 2013 and subsequent amendments.



## Technical Standards for Interconnection

Sl. No.	Parameters	Requirements	Reference
9.	Flicker	Operation of Photovoltaic system shouldn't cause voltage flicker in excess of the limits stated in IEC 61000 or other equivalent Indian standards, if any	Relevant CEA regulations 2013 and subsequent if any, (Technical Standards for Connectivity of the distributed generation resource)
10.	Frequency	When the Distribution system frequency deviates outside the specified conditions (50.5 Hz on upper side and 47.5 Hz on lower side up to 0.2 sec), the Photovoltaic system shouldn't energize the grid and should shift to island mode	
11.	DC Injection	Photovoltaic system should not inject DC power more than 0.5% of full rated output at the interconnection point. or 1% of rated inverter output current into distribution system under any operating conditions	
12.	Power Factor	While the output of the inverter is greater than 50%, a lagging power factor of greater than 0.9 shall be maintained	
13.	Islanding and Disconnection	The Photovoltaic system in the event of voltage or frequency variations must island/ disconnect itself within IEC standard on stipulated period	
14.	Overload and Overheat	The inverter should have the facility to automatically switch off in case of overload or overheating and should restart when normal conditions are restored	

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## Checklist to be enclosed:

Sl no	Particulars	Details to be filled by the applicant.	Please enclose a copy of the particulars stated
1	Name of the Company		Copy of Company Registration certificate
2	Brand Name of the Company		Copy of the self-certification letter of the company
3	GST Registration numbers		Copy of GST certificates
4	Turnover of the company		Copy of the company's turn over for past 3 financial years duly certified by Auditor
5	Details of Service centers maintained in Bangalore, Mysore, Mangalore, Hubli, Gulbarga in Karnataka state.		Copy of list of service centers in Bangalore, Mysore, Mangalore, Hubli, Gulbarga along with address, Name of the contact person with Mobile no. and email id.
6	Capacity of the Grid tied inverters offered for empanelment		Copy of Details of Capacity wise inverters offered for empanelment with details of Model etc.
7	Undertaking	Terms and conditions of undertaking will be furnished after the approval.	Shall furnish in Rs. 200/- non judicial stamp paper
8	Blacklisted in any of DISCOM's/Utilities in India		Copy of Self-declaration letter for not-black listed in any DISCOM's/Utilities/ Govt. related concerns/ Nodal agencies.
9	Test certificates & Test reports	Please furnish details.	To be enclosed as per Annexure-A

Name & Signature of Authorized person  
with seal of the company