Invitation to Tender (ITT)

Location	**Burao, Somaliland**	PR NO	**023**
DATE	**January/February 2026**		
PROJECT NAME	**PURCHASE, SUPPLY, AND INSTALLATION OF EQUIPMENT/MATERIALS FOR MATERIAL RECOVERY FACILITY (MRF) IN BURAO**		

The Burao Municipality, in conjunction with the Somaliland, invite bidders from eligible supply companies for the above-named project being implemented by the Burao Municipality.

It should be noted that contractors are automatically disqualified from participating in this tender if they assisted with any part of this project or tender process, including preparation of technical documents, or if they are related to a member of the Bid Committee without prior disclosure. Small businesses, minority-owned firms, and women's business enterprises are encouraged to apply.

The Mandatory criteria for bidders are as follows. FAILURE TO SUBMIT ANY OF THESE DOCUMENTS WILL LEAD TO AUTOMATIC DISQUALIFICATION:

a) Valid certificate of registration (Bar Code matches with Certificate Information) from the Ministry of Trade and Tourism, Somaliland, and Burao Municipality.
b) Valid Tax Compliance Certificate (Bar Code matches with Certificate Information) from Ministry of Finance and Economic Development, Somaliland.
c) Completely Filled out, Signed and Stamped Financial Bid. See Attachment I Below
d) Filled and Signed Declaration Confirming the Absence of Any Conflict of Interest. See Annex A Below.

Other relevant submission requirements related to the evaluation criteria (Annex C) are:

e) Technical Proposal outlining understanding of the assignment, implementation methodology, and implementation plan.
f) List of previous relevant experience indicating company name, project name, company representative (name, telephone number & email), and evidence (contracts, signed recommendation letters and signed Completion/Successful letters or signed delivery notes)

A bidder is unlikely to be considered for award if they have more than one on-going project in **Burao**. A bidder is also unlikely to be considered for award if they have one on-going project in a location other than in **Burao** or within 5kms.

Submission (Physical & Electronically): Completed bid documents should be submitted in sealed envelopes addressed to: **The Bid Committee, Burao SWM Materials, MRF (PR 023)**

Bids are to be delivered to and received at **the Burao Municipality Office on or before 12 February 2026 at 4:00 pm.** Bidders are also required to submit their bids by email (sinaan.tender@dt-global.com) as two separate PDF files - Technical Proposal and Financial Proposal. Both files **MUST** be **password-protected**, with the passwords to be provided in person on the bid opening day at the Burao Municipality Office in Burao. Bids received after the deadline date and time will not be considered and shall be returned to the bidders unopened.

Offers are to remain valid for 180 days from the closing date of this tender. The Bid Committee reserves the right to vary the quantity of work/materials specified in the tender document without any change in unit price or other terms and conditions and to accept or reject any, all, or part of submitted offers.

Bid Opening: Bids will be opened at the **Burao Municipality office in Burao on 14 February 2026 at 10:00am** in the presence of the Bid Committee and applicants who wish to attend.

Evaluation Criteria: Offers will be evaluated by factors including, but not limited to, financial and technical criteria, record of past performance, integrity, and community rapport.

Women-owned construction companies are strongly encouraged to apply.

ANNEX A

PROPOSAL OFFEROR
DECLARATION CONFIRMING THE ABSENCE OF ANY CONFLICT OF INTEREST

Subject: DECLARATION CONFIRMING THE ABSENCE OF ANY CONFLICT OF INTEREST

Ref: PR 023 – Purchase, Supply & Installation of Equipment/Materials for Material Recovery Facility (MRF) in Burao (PR 023)

We, as authorized representative of_____
(**Insert Company Name, Fill and Sign Table Below)** certify that:

- I do not have any material, personal or financial relationship with **DT Global/Burao Municipality**, or to its employees;
- I will uphold the integrity and impartiality of this procurement process in sprit and in fact;
- I will not engage in any corrupt practice during the procurement process i.e. solicit or accept, either directly or indirectly any gift, favour, loan, kickback, payment, commission or any other thing of monetary value from a potential or actual bidder;
- I will not engage in fraudulent practice (misrepresentation or omission of facts in order to influence a procurement process;
- I will immediately notify the **SINAAN Procurement** of any attempt to influence me.

Signed:

NAME	COMPANY	TITLE	SIGNATURE

ANNEX B
SCOPE OF WORK
Purchase, Supply & Installation of Equipment/Materials for Material Recovery Facility (MRF) in Burao (PR 023)
BURAO

1. Background

The Sinaan Programme, funded by the Foreign, Commonwealth and Development Office (FCDO) and implemented by DT Global, supports Burao Municipality in strengthening urban resilience, promoting cleaner environments, and enhancing community participation in service delivery.

As part of its urban environmental management initiatives, Sinaan proposes the establishment of recycling centers to support municipalities in improving hygiene and environmental conditions across streets, public spaces, residential neighborhoods, seasonal riverbeds, and informal settlements. The project will create employment and income opportunities for city residents while reducing pollution by diverting plastic waste that is frequently burned, a practice associated with severe negative health impacts. Designed as an economically sustainable intervention, the project will deliver long-term environmental, social, and public-health benefits.

To support the municipality in implementing this initiative, Sinaan seeks to engage a qualified company with demonstrated experience in purchase, supply and installation of the materials for the for the Material Recovery Facility (MRF) in Burao.

2. Purpose of the Assignment

The purpose of this assignment is to hire the services of an company to purchase, supply, and install equipment for the Material Recovery Facility (MRF) in Burao, which includes any required clearances, insurance, delivery and installation to Burao, which will be undertaken in collaboration with the Municipality and the Sinaan Programme. This does not include the building of the facility (shed and floor).

3. Scope of Work

The company will be required to purchase, supply, and install equipment for the Material Recovery Facility (MRF) in Burao, which includes any required clearances, insurance, delivery and installation to Burao.

4. Deliverables

The Company shall provide the following deliverables:

1. Packing List for all items supplied
2. Delivery Note (with Serial number, where applicable) for all items supplied.
3. Certificates of origin, quality, and conformity (where applicable)
4. Installation of all supplied equipment in accordance with approved designs/drawings and manufacturer guidelines
5. Mechanical and electrical installation completion report
6. Testing and commissioning reports confirming operational readiness
7. Operation and Maintenance (O&M) manuals for all installed equipment
8. Warranty certificates for equipment and materials supplied
9. As-built drawings reflecting the final installed configuration
10. Training of MRF staff on equipment operation, safety, and basic maintenance
11. Training attendance records and training materials
12. Health, Safety, and Environmental (HSE) compliance documentation
13. Final completion report
14. Defects liability and after-sales support details
15. Photo & Video Documentation of installed equipment and activities.

5. Duration of Assignment

The assignment is expected to run for 6-9 months (inclusive of defects and liability period).

6. Required Profile of the Company

The selected entity must meet the following criteria:

- Legally registered and operating in Somaliland.
- Minimum 5 years of experience in purchase, supply and Installation of Equipment/Materials for MRF.
- Ability to procure, supply, install, and train on usage of all MRF equipment
- Proven financial management capacity and compliance with donor reporting requirements.
- Strong safeguarding, protection, and Do No Harm policies.

7. Reporting and Coordination

The company will report to the Mayor of the Municipality and coordinate with Sinaan Programme City Coordinator. The company will work under the overall technical guidance of DT Global SINAAN SWM Lead and Engineers and submit all necessary reports, photographs, videos and documents to the Deputy Team Leader of Sinaan Project for approvals.

8. Payment Modality

Payments will be made based on satisfactory completion of deliverables and submission of required documentation, following the Sinaan Programme's procurement management procedures as follows:

- Tranche 1 – 20%: Payable upon submission and approval of a work plan, and provision of three (3) quotations with specifications of all equipment for review and approval, prior to purchase.
- Tranche 2 – 70%: Payable upon delivery of materials to site; formal confirmation of delivery with all required documentation (Packing List, Delivery Note (with Serial numbers), and Certificates of origin, quality, and conformity (where applicable); completion of installation, commissioning, and testing of equipment with photographic and videographic evidence of operation; and Reports (Mechanical and electrical installation completion report, Testing and commissioning reports confirming operational readiness, Operation and Maintenance (O&M) manuals for all installed equipment, and Warranty certificates for equipment and materials supplied).
- Tranche 3 – 10%: Payable following the successful conclusion of the six-months defects liability period and after-sales support details.

9. Ethical and Safeguarding Requirements

The company must:

- Ensure that all staff and volunteers adhere to safeguarding and PSEA (Protection from Sexual Exploitation and Abuse) standards.
- Apply Do No Harm principles across all activities.
- Ensure all volunteers and workers use appropriate PPE.
- Comply with local regulations, municipal guidance, and environmental standards.

ANNEX C:
EVALUATION CRITERIA

TECHNICAL EVALUATION

Documentation will be evaluated according to the criteria stated herein. The relative importance of each individual criterion is indicated by the number of points assigned thereto. A total of 100 points is the maximum possible technical score for each proposal. The evaluation criteria serves to: (a) identify the significant factors which the Offeror should address in their proposal under each section and (b) set the standard against which all proposals will be evaluated.

1. Technical Approach (50 Points):

The Offeror's submission will be evaluated on the extent to which it demonstrates a clear understanding of the Scope of Work (SOW) and presents a practical, coherent, and achievable approach to meeting the project objectives. The Technical Approach shall include the following components:

1.1 Implementation Methodology (30 Points):

The Offeror shall provide detailed documentation describing the proposed methodology for the procurement, supply, installation, and commissioning of MRF equipment, including:

- **Materials Quality Assurance:**
  Description of quality assurance and quality control procedures to ensure all equipment and materials comply with the required technical specifications, standards, and performance requirements.

- **Procurement and Supplier Selection Approach: A clear description of the procurement strategy, including:**
  - A comparative list of quotations obtained from multiple equipment suppliers, clearly indicating supplier name, equipment scope, pricing, delivery timelines, warranty terms, and after-sales support.
  - Justification for the recommended supplier, explaining the basis of selection, including technical compliance, quality, price competitiveness, delivery schedule, local support capacity, and overall value for money.

- **Supply and Installation Methodology:**
  Proposed logistics, transportation, handling, installation, and commissioning techniques appropriate to the local operating conditions.

- **Operations and Maintenance Strategy:**
  Description of the maintenance approach, including preventive and corrective maintenance plans, training modules and techniques to be used, and availability of spare parts and technical support.

1.2 Detailed Work Plan (20 Points)

The Offeror shall submit a detailed work plan outlining timelines, sequencing, and responsibilities for all phases of the assignment, including:

- Procurement and contracting with selected suppliers
- Transportation, customs clearance, and delivery
- Installation, commissioning, and testing
- Defects liability and warranty support period

2. **Past Performance and Experience (10 Points):**

   - Evidence of experience in Somaliland in the purchase, supply, installation, and training of equipment for Material Recovery Facilities (MRFs) or similar waste management or industrial projects. (5 points)
   - Provide past performance documentation for similar assignments. This may include signed contracts, signed recommendation letters and signed Completion/Successful letters or signed delivery notes. Offeror to provide in addition a list with name of companies, company representatives name and contact details (telephone and email) (5 points)

3. **Proposed Key Personnel (10 points)**

   The Offeror must provide:

   - Detailed list of available key proposed personnel along with CVs and Copy of Qualifications that will be involved with the activity (5 Points)
   - Clarity and effectiveness of the company and staffing plan, demonstrating the necessary mix of skills and experience. (5 Points)

COST PROPOSAL/ FINANCIAL BID EVALUATION (30 Points)

Evaluation scores are assigned for cost. The review of the cost proposal/quotation shall include cost realism. This process will include a review of the cost portion of the Offeror's quotation to determine if the overall costs proposed are reasonable and realistic for the work to be performed, if the cost reflects that the Offeror understands the requirements, and if the costs are consistent with the technical part of the proposal. Cost proposals providing more direct funding towards the program instead of administrative costs will be reviewed favorably in the best value determination. Offerors must use the RFQ template provided above.

Evaluation of cost proposals /quotations will consider, but not be limited to, the following:

- Cost realism and completeness of cost proposal and supporting documentation.
- Overall cost control evidenced in the proposal such as avoidance of excessive salaries, competitive procurement of subcontracts, excessive cost of management oversight and other costs in excess of reasonable requirements.
- Amount of proposed fee, if any.
- Cost efficiency of proposed Other Direct Costs (ODCs) – If applicable, that needs to be justified. .

Bidders are reminded that DT Global is not obligated to award a negotiated subcontract based on lowest proposed cost or to the bidder with the highest technical evaluation score. DT Global will make award to the bidder whose proposal offers the best value to the SINAAN program considering both technical and cost factors. When competing technical proposals are considered essentially equal then cost will become the determining factor.

Technical Evaluation Pass Mark: 70 Points

ATTACHMENT I: FINANCIAL BID

Attached also in Excel

ATTACHMENT I
Financial Bid for Submission

Insert Company Name

PURCHASE, SUPPLY, AND INSTALLATION OF MATERIALS FOR MATERIAL RECOVERY FACILITY (MRF) IN BURAO				
(Must be submitted in Excel & PDF Format (electronically), as well as printed on Company Letterhead and Signed/Stamped by a Company Representative				
Description	**Unit Type**	**No. of Units**	**Unit Price ($)**	**Subtotal ($)**
Horizontal baler **Specifications:** Horizontal semi-automatic baler with door for PET bottles ≥150-ton press force, producing uniform export bales 5-wire tying, target bale density ≥300 kg/m^3, suitable for containerized export. Should also be able to do OCC and LDPE export bales	No.	1		$ -
2 ton Forklift - Diesel **Specifications:** 2-ton forklift with three easily interchangeable attachments - Baler Clamp, Forklift and Bucket	No.	1		$ -
Purchase, supply and installation of Weighbridge **Specifications:** Size: 18 Meter X 3.5 Meter; Capacity: 80 tons	No.	1		$ -
Platform Scale(s) **Specifications:** 2x2 meters; 2 ton capacity	No.	1		$ -
Large Scale Plastic Crusher **Specifications:** For rigid plastic - 500 Kg per hour	No.	1		$ -
PET De-labeller **Specifications:** 500 kg per hour – to remove the labels on PET bottles	No.	1		$ -
Solar Power to run 60kw (no battery) and wiring **Specifications:** 60 kWp to operate horizontal baler, De-labeller and crusher, Further Specifications **are attached** in the **ITB Attachment II**	No.	1	$ -	$ -
Transportation Costs to Burao	No.	1		$ -
Installation Costs	No.	1		$ -
Sub Total Cost (In USD)				**$ -**
Freight (incl of Insurance)				
Tax				
GRAND TOTAL COST (In USD)				**$ -**

Price Guarantee : Upon issuance of a subcontract award all unit prices cited will be valid for the complete period of performance.

Authorized Representative :

_____
PRINT NAME

_____
TITLE

_____
SIGNATURE

_____
COMPANY SEAL/STAMP

NOTE: DT Global will not respond to questions pertaining to this ITB over the phone. DT Global will not in any way assist Offerors in preparing their bids nor reimburse any bid preparation costs incurred by the Offeror.

Bill of Quantities (BOQ) – 60 kW On-Grid Solar PV System							
	Item No.	**Description**	**Specification / Rating**	**Unit**	**Qty**	**Unit Cost (In USD)**	**Total Cost (In USD)**
A.	**PV Generation System**						
	A1	Solar PV Modules	Monocrystalline ≥500 Wp, IEC 61215/61730	Nos	120		$ -
	A4	DC String Combiner Box	≥16 inputs, fused, DC SPD Type II, IP65	Nos	4		$ -
	A5	DC Isolator Switch	1000–1500 V DC, lockable	Nos	6		$ -
	A6	DC Solar Cable (+/–)	UV resistant, 4–10 mm²	m	500		$ -
	A7	MC4 Compatible Connectors	TÜV certified	Pairs	100		$ -
	A8	DC Surge Protection Device	Type II, IEC 61643	Nos	4		$ -
B.	**Grid-Tied Inverter & Power Conditioning**						
	B1	Grid-Tied Solar Inverter	20 kW, 3-phase, IEC 62109	Nos	3		$ -
	B3	AC Main Distribution Board (MDB)	3-phase with MCCB & metering	Nos	1		$ -
	B4	AC Isolator / MCCB	Rated for inverter output	Nos	4		$ -
	B5	AC Surge Protection Device	Type II, IEC 61643	Nos	2		$ -
	B6	AC Power Cables	Cu/Al XLPE, sized per NEC/IEC	m	600		$ -
C.	**Grid Interconnection & Protection**						
	C1	Net Meter / Bi-Directional Meter	Utility approved, IEC 62053	Nos	1		$ -
	C2	Grid Protection Panel	Anti-islanding relay (IEEE 1547)	Nos	1		$ -
	C3	Synchronization Panel	Voltage & frequency protection	Nos	1		$ -
D.	**Earthing & Lightning Protection**						
	D1	Earth Electrodes	Copper bonded ≥3 m	Nos	6		$ -
	D2	Earthing Conductor	Bare copper 16–70 mm²	m	300		$ -
	D3	Earth Busbar	Copper with terminals	Nos	2		$ -
	D4	Lightning Protection System	IEC 62305 compliant	Set	1		$ -
E.	**Monitoring & Metering**						
	E1	Energy Meter (PV Generation)	3-phase, Class 1.0	Nos	1		$ -
F.	**Balance of System (BOS)**						
	F1	Cable Trays & Conduits	GI / PVC outdoor rated	Lot	1		$ -
TOTAL (IN USD)							**$ -**

Procument Items	Potential Companies 1	Potential Companies 2	Potential Companies 3	Potential Companies 4	Potential Companies 5	Potential Companies 6	Potential Companies 7	Potential Companies 8	Potential Companies 9	Potential Companies 10	Other Potential Companies for ALL Items
Horizontal baler	Jewel	Xtpack	Dezhou Qunfeng Machinery Manufacturing Co., Ltd.	Zhangjiagang Wuhe Machinery Co., Ltd	Jiangyin Huake Machinery Equipment Co., Ltd.	Shandong Haina Machinery Equipment Group Co., Ltd.	Well Advanced Technology Co., Ltd	Austropressen	**Bramidan**	hello baler	Shreeji Machinery (https://www.shreejimachineryindia.com/) Ahmedabad, India Mr. Vinay Parihar Email: shreejimachinery2021@gmail.com Phone: +91-8048619579
Fork lift/ Front loader	Ever-run	Xiamen	LTMG Forklift (Xiamen LTMG Co., Ltd.)	NOELIFT Equipment Co., Ltd.	Jiangsu Huize Intelligent Technology Co., Ltd.						
Weighbridge	NITAI GROUP	Quanzhou Wanggong Electronic Scale Co., Ltd.	Fujian Keda Scales Co., Ltd.	Ningbo Optima Scale Co., Ltd.	Shandong Qunfeng Heavy Industry Technology Co., Ltd.						Convotech Engineering LLP (https://convotechengg.com/) Ahmedabad, India Mr. Ankit Panchal Email: info@convotechengg.com Phone: +91-8048619640
Platform Scale(s)	Changzhou Intelligent Weighing Electronic Co., Ltd.	Quanzhou Wanggong Electronic Scale Co., Ltd.	Fujian Keda Scales Co., Ltd.	Ningbo Optima Scale Co., Ltd.	Shandong Qunfeng Heavy Industry Technology Co., Ltd.						Orchid Material Handling Solutions Private Limited (https://www.orchidmhs.com/) Pune, India Vaishnavi Kharche Email: sales@orchidmhs.com Phone: +91-8048614141
Large Scale Shredder	Maanshang Minglian Machine Blade Factory										Tektron Industrial Supplies Ltd (https://tektronindustrial.net/) Address: P. O. Box: 273 00623, Parklands, Nairobi. Contact: Mr. Naren Email ID: naren@tektronindustrial.net Mobile: +254712341122.
De-labeller / Label Remover	Jiangsu Mooge Machine Co., Ltd.	Zheng Zhou Taizy Trading Co., LTD									
Solar Power to run 60kWp (no battery)											

ATTACHMENT II: TECHNICAL SPECIFICATIONS - 60 kW ON-GRID SOLAR PV SYSTEM

1. System Description

The system shall be a grid-connected solar photovoltaic (PV) power plant with a nominal installed DC capacity of approximately 60 kWp, designed to operate in parallel with the local utility grid. The system shall export power to the grid and/or supply on-site loads in compliance with local utility requirements.

- **System Type:** Grid-Tied (No Battery Storage)
- **Installed PV Capacity:** ~60 kWp DC
- **AC Export Capacity:** 60 kW AC
- **Grid Type:** 400 V, 3-phase, 50 Hz
- **Design Life:** ≥ 25 years
- **Climate:** Hot, dusty, coastal / semi-arid

2. Applicable Codes, Standards & Grid Requirements

2.1 International Standards

- IEC 61215 – PV Module Design Qualification
- IEC 61730 – PV Module Safety
- IEC 62109-1 & 2 – Safety of Inverters
- IEC 61000 Series – EMC & Power Quality
- IEC 61643 – Surge Protection Devices
- IEC 60364 – Electrical Installations
- IEC 62305 – Lightning Protection
- IEEE 1547 – Anti-islanding & Grid Interconnection
- EN 50549 – Grid-connected generation

Parameter	Requirement
Nominal Voltage	400 V ±10%
Nominal Frequency	50 Hz
Frequency Ride-Through	47.5 – 52 Hz
Voltage Ride-Through	85% – 110%
Anti-Islanding	Mandatory
Power Factor	≥ 0.95 (adjustable ±0.8)
THD (Current)	< 5%
Export Limitation	Required where grid capacity is weak

Due to weak and unstable grids, the system shall comply with the following practical grid requirements commonly enforced by Somaliland utilities (municipal utilities, private IPPs):

Inverters must remain connected during short voltage/frequency deviations to avoid nuisance tripping.

3. PV Modules

- **Type:** Monocrystalline Silicon
- **Rated Power:** 500–550 Wp
- **Module Efficiency:** ≥ 20%
- **Temperature Coefficient (Pmax):** ≤ −0.35 %/°C
- **Operating Temperature:** −40 °C to +85 °C
- **Glass:** Anti-reflective, tempered
- **Frame:** Anodized aluminum
- **Ingress Protection:** IP68 junction box

Certification: IEC 61215, IEC 61730

Warranty:

- Performance: 25 years (≥80% output)
- Product: ≥ 10 years

4. Optimized String Sizing (High-Temperature Design)

Design Assumptions

- Module rating: **550 Wp**
- Voc @ STC: ~49.5 V
- Temp coefficient Voc: −0.28 %/°C
- Maximum ambient temperature: **45 °C**
- Inverter max DC voltage: **1100 V**

Adjusted Voc @ High Temperature

Voc drops at high temperatures, improving safety margin.

Recommended String Configuration

- **Modules per string:** 18 modules
- **String voltage (Voc @ STC):** ~891 V
- **Operating voltage (Vmp):** ~720–750 V
- **Total strings:** 6 strings
- **Total modules:** 108 modules (~59.4 kWp)

This configuration ensures:

- Safe DC voltage under all conditions
- Optimal MPPT efficiency
- Reduced current losses

5. Inverters
Inverter Configuration (Optimized)

Item	Specification
Inverter Type	Grid-tied, transformer less
Capacity	3 × 20 kW
Phases	3-phase
Max DC Voltage	≥ 1100 V
MPPT Trackers	≥ 2 per inverter
Efficiency	≥ 98%
Protection	Anti-islanding, OV/UV, OF/UF
Cooling	Forced air (tropical rated)
Communication	Modbus TCP/RTU
Grid connection standard	G99, VDE-AR-N 4105/VDE V 0124, EN 50549-1, VDE 0126/UTE C 15/VFR:2019, RD 1699/RD 244/UNE 206006/UNE 206007-1, CEI 0-21, C10/11, NRS 097-2-1, EIFS 2018.2, IEC 62116, IEC 61727, IEC 60068, IEC 61683, EN 50530
Safety / EMC standard IEC/EN 62109-1/-2, IEC/EN 61000-6-1/-2/-3/-4	Safety / EMC standard IEC/EN 62109-1/-2, IEC/EN 61000-6-1/-2/-3/-4

Inverter Selection Rationale

- Redundancy (1 inverter failure ≠ full shutdown)
- Easier maintenance
- Better MPPT performance under partial shading

6. DC System & Protection

- DC Combiner Boxes with:
  - String fuses
  - DC isolators
  - DC SPD Type II
- DC cables:
  - UV & heat resistant
  - XLPO insulated
  - Sized at ≥ 1.25 × Isc
- Polarity protection & labeling mandatory

7. AC System & Grid Interconnection

- AC Main Distribution Board with:
  - MCCB
  - AC SPD Type II
  - Energy meters
- **Grid Protection Relay Panel**:
  - Over/under voltage
  - Over/under frequency
  - ROCOF / Vector shift

8. Earthing & Lightning Protection

- Separate earthing for:
  - PV structures
  - DC system
  - AC system
- Earth resistance:
  - ≤ 5 ohms (target ≤ 2 ohms)
- Copper-bonded earth rods (≥3 m)
- Lightning protection per IEC 62305

9. Monitoring & SCADA - Optional

- Web-based real-time monitoring
- Parameters:
  - Power, energy, voltage, frequency
  - Inverter status
  - Fault alarms
- GSM / Ethernet connectivity
- Data storage ≥ 1 year

10. Performance Requirements

- Performance Ratio (PR): ≥ 75%
- Annual Degradation: ≤ 0.6%
- Availability: ≥ 98%
- Total System Losses: ≤ 15%

11. Installation & Environmental Considerations

- Dust-resistant enclosures (IP65+)
- Elevated mounting for ventilation
- Corrosion-resistant materials (coastal zones)
- Cable routing protected from UV & rodents

12. Testing & Commissioning

- Insulation resistance testing

- I–V curve testing
- Grid synchronization tests
- Anti-islanding verification
- Power quality (THD) test

13. Documentation & Deliverables

- As-built drawings
- Single Line Diagram (SLD)
- Protection settings report
- Test & commissioning certificates
- O&M manuals and training

14. Warranties

Component	Warranty
PV Modules	25 years performance
Inverters	≥ 5 years
Structures	≥ 10 years
Installation	≥ 2 years