ANNEX II + III : TECHNICAL SPECIFICATIONS + TECHNICAL OFFER

Contract title: Supply of Equipment for Photovoltaic Applications for BOTAŞ and TEMSAN

Publication reference: NEAR/ANK/2021/EA-OP/0077

Columns 1-2 should be completed by the contracting authority Columns 3-4 should be completed by the tenderer Column 5 is reserved for the evaluation committee

Annex III - the contractor's technical offer

The tenderers are requested to complete the template on the next pages:

- Column 2 is completed by the contracting authority shows the required specifications (not to be modified by the tenderer),
- Column 3 is to be filled in by the tenderer and must detail what is offered (for example the words 'compliant' or 'yes' are not sufficient)
- Column 4 allows the tenderer to make comments on its proposed supply and to make eventual references to the documentation

The eventual documentation supplied should clearly indicate (highlight, mark) the models offered and the options included, if any, so that the evaluators can see the exact configuration. Offers that do not permit to identify precisely the models and the specifications may be rejected by the evaluation committee.

The offer must be clear enough to allow the evaluators to make an easy comparison between the requested specifications and the offered specifications.

Abbreviations

AC	Alternating Current
СВ	Circuit Breaker
СЕ	European Conformity
CENELEC	European Committee for Electrotechnical Standardization
DC	Direct Current
DIN	Deutsches Institut für Normung (German National Organization for Standardization)
DisCo	Electricity Distribution Company
EMC	Electromagnetic Compatibility
EN	European Standard
EPDK	T.C. Enerji Piyasası Düzenleme Kurumu (Electricity Market Regulatory Authority)
EPDM	Ethylene Propylene Diene Monomer
EU	European Union
GPR	Grid Protection Relay
HV	High Voltage
IEC	International Electrotechnical Commission
IED	Intelligent Electronic Device
IEEE	Institute of Electrical and Electronics Engineers
IP	Ingress Protection
I _{SC}	Short Circuit Current
ISO	International Organization for Standardization
ITC	Isothiocyanates
LBS	Load Break Switch
LV	Low Voltage
MBS	MonoBlock Substation
MDB	Main Distribution Board

MENR	Ministry of Energy and Natural Resources
ONAN	Oil Natural Air Natural
Ра	Pascal (Pressure Unit)
PC	Personal Computer
PE	Protective Earthing
PERC	Passivated Emitter and Rear Cell
PID	Potential Induced Degradation
P _{MAX}	Peak Power
P _{MPP}	Rated Maximum Power
PV	Photovoltaic
PV Module	Photovoltaic Module (Solar Panel)
PUR	Polyurethane
RCPR	Residual Current Protective Relay
ROCOF	Rate of Change of Frequency
RoHS	Restriction of Hazardous Substances
RTU	Remote Terminal Unit
SCADA	Supervisory Control and Data Acquisition
SDB	Sub Distribution Board
SELV	Safety Extra Low Voltage
SPP	Solar Power Plant
SPP LVP	Solar Power Plant Low Voltage Panel
STC	Standard Test Conditions
TBDY	Türkiye Bina Deprem Yönetmeliği (Turkish Building Earthquake Regulation)
TEDAŞ	Türkiye Elektrik Dağıtım A.Ş. (Turkish Electricity Distribution Corporation)
THD	Total Harmonic Distortion
ТМСВ	Thermal Magnetic Circuit Breaker
TSE	Türk Standardlari Enstitüsü (Turkish Standards Institution)

TUV	Technical Inspection Association	
UPS	Uninterruptible Power Supply	
UV	Ultraviolet	
VDE	Verband Deutscher Elektrotechniker (Testing and Certification Institute in Germany)	
V _{OC}	Open Circuit Voltage	
VT	Voltage Transformer	
W _P	Watt-Peak	
W _{AC}	Watt-Alternating Current (AC Output Power)	

OBLIGATORY LEGISLATIONS

- Conformity to the standards specified at the technical specification shall be required for the materials to be used at the SPP. Conformity to Turkish Standards/CENELEC/IEC/EN and other international standards, in order of priority, shall be required for the equipment even if a standard has not been indicated at the specification as per the "Regulation on Unlicensed Power Generation at the Electricity Market". It is obligatory to obey the Electricity Market Law, Law for the Utilization of Renewable Energy Sources for Generating Electrical Energy; regulations, communiques, board resolutions, presidency orders that need to be obeyed based on the mentioned laws, all other official documents; and all current regulations and applications as requested by the Turkish Ministry of Energy and Natural Resources, EPDK, TEDAŞ and DisCos.
- The supplies must be compliant with appropriate EU regulations (which shall be proved with relevant certifications to the regulations, such as CE norm, energy efficiency, and environmental management certifications etc.) and relevant EU and international standards. Tenderers shall state in their offers which regulations and/or standards were implemented for the offered items.
- There exist TEDAŞ/DisCo approved files for this lot. The related TEDAŞ/DisCo approved files and drawings (Appendix E Drawings: 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, 4.10, 4.11, 4.12, 4.13, 4.14, 4.15, 4.16, 4.17, 4.18, 4.19, 4.20, 4.21, 4.22, 4.23, 4.24, 4.25, 4.26, 4.27, 4.28, 4.29, 4.30, 4.31, 4.32, 4.33, 4.34, 4.35, 4.36, 4.37) to the Annex II + III: Technical Specifications + Technical Offer, hereafter referred as Appendix E Drawings exist within Tender Dossier. These files are provided to give a brief outline of the project. Tenderers are advised to refer to these projects where necessary for reference. These technical specifications are drafted in accordance with these files. However, the tenderers are not obliged to submit the proposal in line with these TEDAŞ/DisCo approved files and drawings. Following the commencement of the contract, the contractor will revise the required documentation provided as appendixes of design for the approval of the amendments to the project considering its technical offer. In such situation, the contractor will be responsible for the preparation of application documents, provision of assistance during approval phase and for the process management but End Beneficiaries (BOTAŞ and TEMSAN) will be responsible for the applications.
- All the equipment to be used within the system shall be compatible with the latest versions of TEDAŞ Technical Specifications on related product that is issued by TEDAŞ Directorate of Strategy Development (https://www.tedas.gov.tr/#!tedas_sartnameler_arge).

GENERAL REQUIREMENTS

- Solar Power Plants shall be designed and installed in compliance with the minimum requirements of IEC 62446 or TS EN 62446, and its referred standards.
- Electrical installation of the Solar Power Plants as a whole, shall meet the requirements of IEC HD 60364-7-712 or its Turkish equivalent TS HD 60364-7-712.

- All the equipment shall be provided complete with the necessary accessories and/or parts to ensure that the unit is capable of operating to the required technical and quality specifications immediately. All specifications details listed within each lot for each item are the minimum requirements. Any improvements on the specifications or additional features offered should be clearly identified in the Tenderer's offer. The main components such as PV Module, Inverter, Mounting System, DC Cable, HV and LV AC Cables, Transformer and HV Switchgear shall have minimum ISO 9001 (Quality Management System), ISO 14001 (Environmental Management System) and OHSAS 18001 (Occupational Health and Safety Management System) certifications that may be submitted during the project implementation upon requested by End Beneficiaries (BOTAŞ and TEMSAN).
- All equipment must be in conformity (or compatible) with any standards in force or with the commonly accepted best production practices, including any ISO, IEC, EN or other relevant provisions that may apply to each specific category of equipment.
- In addition to this document, *ANNEX II* + *III* : TECHNICAL SPECIFICATIONS + TECHNICAL OFFER, the contractor shall also be responsible with the requirements/tasks mentioned in the <u>Appendix D to Annex II + III Site Correction Works</u>, <u>Road Construction</u>, <u>Water Drainage Systems and Other Requirements</u> document.
- These technical specifications prevail the information in its Appendix E Drawings. In case of an inconsistency between these documents, the tenderer shall consider the specifications in this document as valid.
- When required by national and/or international regulations, all the costs relating to any licencing, certification, testing, calibration or other documentation of the supplies shall be borne by the contractor.
- It should be noted that whenever a specific standard is mentioned in the technical specifications it has to be understood as that standard or its equivalent.
- Design, planning, shipment, assembly, installation and commissioning related to SPP installation and all the works that cover civil works and revision activities required to complete the work as a whole shall be deemed as within the scope of this work.
- Administrative procedures and applications (approval of the amendment of the Appendices), including costs, considering bureaucratic processes shall be managed by the End-Beneficiaries.
- Installation of each component shall be completed according to the installation principles of the manufacturer of related goods.
- All equipment to be used within the system shall be brand new, unstained, unused and indefectible, and there shall be information on them such as signs, text, numbers, etc. showing the brand, model, production date and basic data; and these documents shall be submitted to the End Beneficiaries (BOTAŞ

and TEMSAN). Prototype shall never be used at the power plant. Offered supplies must be in full compliance with each functional partner. All supplies under the same lot must be fully functional "as a whole".

- Main components such as Boards/Panels, Substations, Metal Works, etc. shall be delivered in an assembled manner conforming to the operation instructions of the devices and boards, together with all the necessary information, warning, caution, death risk plates.
- Whenever a specific brand is used in this technical specification for which a sufficiently precise and fully intelligible description is not possible, it means that the specifications shall meet the brand or its equivalent in terms of functionality.
- All PV Modules to be used within the system shall be manufactured by the same manufacturer and shall be of the same model, type and power. All Inverters to be used within the system shall be manufactured by the same manufacturer and shall be of the same type (three phase and string). All Inverters shall be able to communicate internally and to communicate with the Data Logger and Remote Monitoring System.
- Tenderers shall state with brand/product name and product version of each item they are offering. In case of specifically manufacturing of the parts/components, it shall be clearly stated in the column 3 and/or 4 of the below TS table.

Environmental and Work Health

• The contractor is obliged to ensure work health and safety of all the personnel during the period of work, take precautions regarding fire and emergencies and obey the Work Health and Safety Law no. 6331, relevant legislation and regulations; instructions containing Work Health and Safety Procedures and Principles, if any, of the related unit; the specification provisions and the legislation.

The contractor shall take all the cleaning, fire safety and work safety measures during transport, assembly, welding and cutting works. Scaffolding, ladders, banisters and other apparatus shall be retained as necessary to ensure safe operation and maintenance of equipment.

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
1.	TEMSAN Ankara SPP			
1.1.	Photovoltaic Module (PV Module)			
1.1.1.	Total installed capacity (DC) of the SPP shall be minimum 658.44 kW _P . In order to reach this value, taking into consideration the efficiency, power of each PV Module and nominal outputs, the number of modules to be installed shall be determined by tenderers and shall be specified within their offer. At least 25 (twenty-five) amounts of modules, additional to the operational ones, shall be supplied as a substitute in case of sudden failure.			
1.1.2.	PV Modules shall be of monocrystalline structure.			
1.1.3.	Solar Cells that are used to manufacture the PV Modules shall be of PERC cell architecture.			
1.1.4.	Power of each PV Module shall be minimum 310 W _P under <i>Standard Test Conditions</i> ¹ . (¹ STC: Irradiance 1000 W/m ² , Air Mass 1.5,			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	Cell Temperature 25°C)			
1.1.5.	PV Module efficiency shall be minimum 18.60% under STC.			
1.1.6.	PV Modules shall have positive tolerance as instantaneous power output tolerance. The positive tolerance value shall be between $0-5W_P$ or wider range.			
1.1.7.	PV Modules shall be able to operate at -40 °C to $+85$ °C or wider range operation temperature.			
	Temperature coefficient of PV Modules (P_{MPP}) shall not be less than -0.41%.			
1.1.8.	Connectors that are to be used shall be in compliance with EN 62852.			
1.1.9.	Junction box of the PV modules shall meet IP67 standard.			
1.1.10.	Junction box of the PV modules shall have at least 3 (three) by-pass diodes against the power drops caused by shading.			
1.1.11.	If PV Module has a frame, this shall be made			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	of a corrosion-resistant and stainless material.			
1.1.12.	PV Modules shall have resistancy to 2400 Pa wind load and 5200 Pa snow load.			
1.1.13.	PV modules shall have "CE" conformity and shall conform to IEC 61215, IEC 61701 and IEC 61730 standards.			
1.1.14.	PV modules shall have Anti-PID test approvals.			
1.2.	Inverter			
1.2.1.	Cumulative AC output power of the SPP shall be limited to 550.00 kW _{AC} . The design of SPP shall have string inverters. 1 (one) additional Inverter to the operational ones, as a substitute, shall be supplied in case of sudden failure.			
1.2.2.	The inverter shall be three-phase string type with transformerless topology.			
1.2.3.	Inverters shall be able to operate at AC Output Voltage Range between 380-400 V or wider.			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
1.2.4.	Inverters shall be able to operate at DC Input Voltage Range between 580-800 V or wider.			
1.2.5.	Inverters shall be able to provide AC output compatible with the standard frequency of the National Grid and shall provide 400 V_{AC} output voltage.			
1.2.6.	Inverter efficiency shall be minimum 97.80% according to European Standards (euro efficiency).			
1.2.7.	Inverters shall contain anti-islanding protection system as a safety feature that is to be active in case of any power outage occur in the grid and the system shall shut itself off to stop feeding power back to the grid. This feature of the inverter shall be supported by the manufacturer declaration or by conforming to IEC 62116.			
1.2.8.	Inverters shall contain ground fault protection system that enables constant monitoring of ground connection and the system shall disconnect the inverters in case of any ground fault in the DC side (of PV Modules) detected.			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
1.2.9.	Inverters shall be compatible with IEC 62109- 1 and IEC 62109-2 safety standards.			
1.2.10.	Inverters shall be able to operate at an ambient temperature range of minimum -20 °C to +60 °C.			
1.2.11.	Inverters shall meet IP65 standard.			
1.2.12.	THD values of inverters shall not be above 3%.			
1.2.13.	Inverters shall have RS485 and RJ45 communication port as minimum.			
1.2.14.	 Inverters shall enable monitoring instantaneously the following information in minimum; Status Faults and Warnings Total Energy Production (starting from commissioning date) Daily Energy Production Actual Energy Production 			
1.2.15.	Inverters shall contain DC disconnectors, integrated string fuse holders, reverse polarity			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	protection, DC Surge Arrester Type 1+2 and AC Surge Arrester Type 2.			
1.2.16.	Inverters shall be able to provide three phase, neutral and PE output.			
1.2.17.	Inverters shall have "CE" conformities.			
1.2.18.	Inverters shall conform to IEC 61727 standards.			
1.2.19.	Inverters shall meet the requirements according to IEC 61000 for EMC.			
1.2.20.	Inverters shall be in compliance with IEC 60068-2			
1.2.21.	Inverters must be in compliance with the DIN V VDE V 0126 standard.			
1.2.22.	Inverters shall conform to EN 50549-1			
1.3.	Mounting System and Fastenings			
1.3.1.	Contractor shall install the module mounting system (on which PV modules shall be fixated) on the roof of the Building No.1 Factory Building as identified in Appendix E-			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	Drawings			
1.3.2.	The columns that are driven onto the roof (profiles) shall be made of anodized aluminium alloy and shall be in compliance with the quality grade of 6060-T66 in minimum and shall conform to TS EN 15088.			
1.3.3.	All aluminium components shall be made of corrosion-resistant and stainless materials.			
1.3.4.	Clamps to be used in the system shall be made of anodized aluminium alloy and shall be in compliance with the quality grade of 6060-T66 in minimum. Clamp thickness shall be at least 3mm.			
1.3.5.	All bolts and screws (bolts, nuts, washers, shims and other relevant hardware) to be used within the system shall be hot dip galvanized or stainless steel and shall be in compliance with at least 8.8 quality grades.			
1.3.6.	All bolts, screws, studs and other relevant hardware to be used for the installation of PV Modules and fixation of mounting system shall conform to TS EN ISO 3506-1.			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
1.4.	Data Logger and Remote Monitoring System			
1.4.1.	All the necessary equipment, hardware components, consumables and licensed software shall be provided with the proposed system, that can able to provide data and display as identified in this document.			
1.4.2.	Data Logger and Remote Monitoring system shall enable to monitor the SPP online via remote access. The system shall have digital interfaces and web-based portal for enabling remote monitoring via computer and mobile phone.			
1.4.3.	The system shall be compatible with the inverters proposed by the contractor. The system shall be able to provide data from Inverters, Power/Energy Quality Analyzers, Monitoring Relays, Smart Meters, Sensors and Weather Station.			
1.4.4.	Data Logger and Remote Monitoring System shall be able to measure, transmit, record and display (historically, numerically and graphically) the following parameters continously:			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	Total DC Power Generated by PV Modules			
	• Total AC Output Power Transmitted			
	from Inverters,			
	• Total AC Output Power Transmitted to			
	the Grid,			
	• Active and Reactive Power,			
	Summarized			
	Daily/Monthly/Yearly/Total Yields of			
	each Inverter,			
	• Accumulated Consumption within the			
	System,			
	• Entire System Efficiency, Inverter			
	Efficiency and Efficiency Comparison of			
	Inverters,			
	• Environmental Performance (i.e.			
	Prevented CO_2 Emission Amount, Liters			
	of Oil Saved, Amounts of Trees Saved,			
	• Actual Weather Data and Forecasts,			
	• DC/AC Voltage and Current,			
	• Instantaneous DC Power transmitted to			
	the Inverters,			
	• Instantaneous AC Power Output of each			
	Inverter,			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	 All Faults and Errors and Special Cases, Daily/Monthly/Yearly Solar Irradiation Values (kWh/m²), Daily/Monthly/Yearly Ambient and PV Module Temperature Values in unit of °C, Wind Direction and Speed (m/s), Air Pressure and Relative Humidity, Data Acquired from the Fire Protection System, if applicable, Last Update Time 			
1.4.5.	The system shall enable additional accessories connections such as sensors, analyzers and weather station to provide the data as stated above.			
1.4.6.	Data acquired by the system shall be protected and stored safely to enable retrospective analysis for minimum up to 4 (four) years. System configuration and software shall not be affected from communication cuts. The system shall still be able to acquire and store data in case of a power and communication cuts for at least 1 (one) month. Data stored during that period of time shall be transferrable to the online portal			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	when reconnected.			
1.4.7.	The system shall enable sending a day-end report at the end of each day, a month-end report at the end of each month and a year- end report at the end of each year to the e- mail address specified by the beneficiary.			
1.4.8.	The system shall enable reporting extraordinary events, faults and errors occurred at SPP instantaneously to the e-mail address and GSM numbers specified by the beneficiary.			
1.4.9.	The system shall enable permanent data recording and the data acquired shall be importable. System, communication, inverter alarms and alarm at input/output (I/O) must be recorded, as well.			
1.4.10.	Data acquired by the system shall be open to a secure remote access with a common method such as GPRS/GSM/ADSL.			
1.4.11.	Data Logger device, if applicable, shall have RS485 or RJ45 communication ports to be			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	utilized for wired communication.			
1.4.12.	Data Logger device, if applicable, shall have "CE" conformity.			
1.4.13.	Data Logger device, if applicable, shall meet minimum IP20 standard.			
1.4.14.	Data Logger device, if applicable, shall have real time clock features.			
1.4.15.	The system shall contain one irradiation sensor that is to be specifically designed for Solar PV Systems and that enables measurement of solar irradiation and the PV module temperature. Irradiation sensor shall meet minimum IP65 standard, as it will be placed outdoor.			
1.4.16.	Data Logger and Remote Monitoring system shall contain one weather station that enables providing information on air pressure, wind direction and speed, humidity and irradiation. Weather station shall meet minimum IP65 standard as it will be placed outdoor.			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
1.4.17.	Irradiation sensor and weather station shall have RS485 or RJ45 communication port.			
1.5.	SCADA System			
1.5.1.	SCADA System shall be designed and installed conforming to the standards and monitoring and control characteristics specified by the related DisCo.			
1.5.2.	The SCADA System shall be able to connect to the related DisCo's existing communication network and shall enable data transfer to the network and to SCADA Control Center of the related DisCo.			
1.5.3.	RTU, communication and SCADA equipments shall be installed in an independent panel/board. The panel/board shall be designed and installed to be protected from external factors such as gnawings, heat changes.			
1.5.4.	RTU and other communication devices shall be fed from an external Battery Rectifier Group that contains batteries, charger, battery trays, isolation transformer, AC surge arrester, air purifier, fan, control and alarm			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	circuits, cabling and other related accessories. Batteries to be used within the system shall be maintenance free and dry type.			
1.5.5.	SCADA System shall contain RTU that enables the communcation with the existing SCADA network of the related DisCo.			
1.5.6.	RTU shall have IEC 60870-5-104 protocol conformity to enable the communication with the existing SCADA System of the related DisCo.			
1.5.7.	RTU shall have real time clock feature.			
1.5.8.	RTU shall be able to provide data from Power/Energy Quality Analyzers, Monitoring Relays or Smart Meters that enables the measurement of LV power qualities and to transfer the data.			
1.5.9.	RTU shall be able to communicate with and issue a command to GPR located in SPP LVP and shall provide location and position information from TMCB via GPR.			
1.5.10.	RTU shall be able to store data for at least 1 month in case of any energy/communication cut offs and shall operate the system with the			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	logic of FIFO (First In, First Out). RTU shall be able to send data that is stored during energy/communication cut offs to the existing SCADA System of the related DisCo.			
1.5.11.	SCADA System shall contain Modem and Router to ensure the communication between RTU and SCADA Control Center of the related DisCo. The contractor is responsible for providing internet access point. (Satelite/4G/International or Local Service Providers etc.) Router shall be at least 3G Industrial Type with at least 2 ethernet ports.			
1.6.	DC Cables			
1.6.1.	DC Cables shall be specifically manufactured to be used at PV Energy Systems. They shall be PV1-F, H1Z2Z2-K or any type that are conforming to EN 50618.			
1.6.2.	 DC Cables to be used in the system must fulfil the features and must be compliant with the standards as stated below; UV-Resistant (according to EN 50289-4-17) Flame Retardant (EN 60332-1-2) 			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	 Double Insulated Halogen-Free (according to EN 60754 or EN 50525) Ozon Resistant (according to EN 50396) Low Smoke Density (according to EN 61034-2) Low Toxicity per EN 50305 (ITC < 3) Resistant to Acid and Bases (according to EN 60811) 			
1.6.3.	DC Cables shall be Class 5 according to IEC 60228 standard.			
1.6.4.	DC Cables shall be able to operate in a working ambient temperature range between - 30 °C to + 90 °C or wider. DC Cables shall be able to work at a maximum operating temperature of the conductor of 120 °C. Minimum service life of 25 years must be specified according to EN 50618.			
1.6.5.	Maximum short circuit temperature for DC			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	Cables shall be at least 200 °C.			
1.6.6.	DC Cables in the system shall be manufactured in accordance with the maximum rated voltage value of $1,500 V_{DC}$ in minimum.			
1.6.7.	DC Cables shall be in compliance with RoHS directive 2011/65/EU of the European Parliament and of the Council.			
1.6.8.	DC Cables shall have "CE" conformities.			
1.7.	DC Connectors			
1.7.1.	DC Connectors – connection kits and sockets – shall be specifically manufactured to be used at PV Energy Systems.			
1.7.2.	DC Connectors that are to be used for the connection of PV Modules and DC Cables shall be compatible with the offered PV Modules for the system. PV Module manufacturer approval for DC Connector brand/model/type shall be submitted within the offer, unless DC Connectors are provided by the PV Module Manufacturer.			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
1.7.3.	DC Connectors that are to be used for the connection of Inverters and DC Cables shall be compatible with the offered Inverters for the system. Inverter manufacturer approval for DC Connector brand/model/type shall be submitted within the offer, unless DC Connectors are provided by the Inverter Manufacturer.			
1.7.4.	DC Connectors shall be suitable to perform in an operation temperature range between -40 °C to + 85 °C or wider.			
1.7.5.	DC Connectors shall be able to operate at maximum rated voltage value of $1,500 \text{ V}_{DC}$.			
1.7.6.	DC Connectors shall meet IP67 standard.			
1.7.7.	The right size of connectors shall be selected considering the cross-sections of the connected cables. Connecting cables of the specified diameter ranges for the insulating casings in the product technical document shall be used.			
1.7.8.	DC Connectors shall be in compliance with EN 62852.			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
1.7.9.	100 sets of DC Connectors (male+female) shall be provided additionally to the operational ones as substitute in case of failures.			
1.8.	LV AC Cables			
1.8.1.	Four-wire connection (3P-three phases and Neutral) must be completed to connect the inverter to the SPP LVP. Inverter's earthing connection is mandatory. Hence, the cable to be used for Inverter AC output shall be five- pole.			
1.8.2.	LV AC cables to be used in the system shall be made of copper and produced in accordance with TS HD 604 S1 or TS HD 627 S1 or IEC 60502-1 standards.			
1.8.3.	 LV AC Cables to be used in the system must fulfil the features according to the standards as stated below; Flame Retardant (IEC 60332) Halogen-Free (according to EN 60754) Low Smoke Density (according to EN 61034) 			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
1.8.4.	Permissible operating temperature of LV AC Cables shall be at least + 70 °C and permitted short circuit temperature shall be at least + 160 °C.			
1.8.5.	LV AC Cables shall have "CE" conformities.			
1.8.6.	LV AC Cables shall be in compliance with RoHS directive 2011/65/EU of the European Parliament and of the Council.			
1.9.	Data, Signal and Control Cables			
1.9.1.	Screened (shielded) data cables or signal/control cables with copper conductor shall be utilized within the system.			
1.9.2.	Data cables to be used within the system shall be able to operate in an operating temperature range between - $20 ^{\circ}$ C to + $60 ^{\circ}$ C or wider.			
1.9.3.	Data cables to be used in the system must fulfil the features according to the standards as stated below;			
	 Flame Retardant (IEC 60332-1-2) Halogen-Free (according to EN 60754-1) 			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	• Low Smoke Density (according to EN 61034-2)			
1.9.4.	Signal and control cables to be used within the system shall be able to operate in an operating temperature range between - $30 ^{\circ}$ C to + $70 ^{\circ}$ C or wider.			
1.9.5.	Signal and control cables shall be flame retardant according to IEC 60332-1-2 and shall meet EMC requirements.			
1.9.6.	Data, signal and control cables shall have "CE" conformities and shall have RoHS Directive 2011/65/EU of the European Parliament and of the Council compliances.			
1.10.	Boards/Panels			
1.10.1.	There shall be SPP LVP that enables single- point grid connection, control, protection, switching, measuring and monitoring over SPP.			
1.10.2.	All low voltage boards and panels shall be assembled in compliance with IEC 61439 standard.			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
1.10.3.	All boards and panels to be used indoor at the SPP shall meet minimum IP21 standard and all boards and panels to be used outdoor at the SPP shall meet minimum IP65 standard.			
1.10.4.	All plastic insulator materials to be used at the boards/panels shall be resistant against heat and flame and shall conform to IEC 60695- 11-10 standard. (V-0 class for insulator material contacting sections under voltage)			
1.10.5.	All electrical and electronic devices to be used in the boards/panels shall have 'CE' conformities.			
1.10.6.	All Inverters and AC Cables shall be protected via TMCB, which shall be placed in each SPP LVP with suitable current and voltage values, on the input side, with the same amounts of Inverters to be connected and a RCPR behind each TMCB compatible with those TMCBs. On the output side of each SPP LVP, there shall be again TMCB with suitable current and voltage values. TMCB positioned in the output side of each SPP LVP shall be able to change position automatically according to the switch on-off signals.			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
1.10.7.	TMCB, on the output side of each SPP LVP, shall have features to detect residual current. This feature may be ensured by providing an external RCPR.			
1.10.8.	TMCBs to be used in the system shall be manufactured in compliance with TS EN 60947-2 standard.			
1.10.9.	RCPRs to be used in the system shall be Type A or Type AC according to IEC 61008 standard.			
1.10.10.	AC Surge Arresters to be used to prevent overvoltage in the electrical circuits shall be of Type 1+2. AC Surge Arresters shall conform to IEC 61643-11.			
1.10.11.	Surge Arresters to be used within the system (excluding the ones used for communication) shall enable remote monitoring.			
1.10.12.	LV Knife-type fuses to protect AC Surge Arresters shall be in compliance with TS EN 60269-1.			
1.10.13.	Boards/Panels shall contain GPR to detect fault current, over and undervoltage as well as			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	over and underfrequency on the grid and shall protect the system accordingly. GPR shall be able to send switch-on signals to TMCBs in case of grid fluctuations and interruptions, system fault and power cuts and switch-off signals when the grid is recovered, automatically.			
1.10.14.	GPR to be used in Boards/Panels shall be in compliance with TS EN 60255 and shall meet EMC requirements.			
1.10.15.	GPR shall have ROCOF function or vector shift detection feature that detects loss of mains and protects the system accordingly.			
1.10.16.	GPR, as direct relay, shall be fed from an external UPS or Battery Rectifier Group such that it can operate at least 8 (eight) hours in case of energy cuts.			
1.10.17.	Boards/Panels shall contain an electronic single-direction or bidirectional meter that enables monitoring of the SPP energy production.			
1.10.18.	Electronic meter (either Single or Bi- Directional) to be used in Boards/Panels shall conform to TS EN 50470-1 and TS EN			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	50470-3.			
1.10.19.	Electronic meter shall have RS485 or RJ45 communication port as minimum.			
1.10.20.	Boards/Panels shall contain Power/Energy Quality Analyzer that enables measurement of active energy and power, reactive energy and power, frequency, voltage, power factor and current.			
1.10.21.	Power/Energy Quality Analyzer shall have real time clock feature.			
1.10.22.	Power/Energy Quality Analyzer shall have RS485 or RJ45 communication port.			
1.10.23.	Boards/Panels shall contain LV Current Transformers that shall be in compliance with TS EN 61869-2 standard.			
1.10.24.	Busbars to be used in Boards/Panels shall be made of copper and shall conform to TS EN 13601.			
1.10.25.	Equipotential Earthing Busbar shall be positioned in Boards/Panels that enables the connection of the earthing system of the SPP			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	and it shall be made of copper.			
1.10.26.	Emergency Stop System shall exist in Boards/Panels to deactivate TMCB positioned on the output side.			
1.10.27.	Signal Lamps shall be positioned on Boards/Panels to demonstrate the energy existence on the phases.			
1.11.	Earthing and Lightning Protection			
1.11.1.	Protective earthing cable conductor shall be made of the same metal with the phase cable conductors.			
1.11.2.	All connection components of the system shall meet the IEC 50164 or TS EN 62561-1.			
1.11.3.	External earthing system according to 'Goose-Foot' configuration shall be designed and installed for each lightning rod with the whole system including at least 4 (four) grounding electrodes (earthing rods) considering resistivity calculations.			
1.11.4.	Grounding electrodes (earthing rods) shall be connected via earthing conductor.			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
1.11.5.	Grounding electrodes (earthing rods) to be used in the system shall be in compliance with IEC 62305 VDE 0185-305 norms.			
1.11.6.	All galvanized equipment to be used in the earthing system shall be in compliance with TS EN ISO 1461.			
1.11.7.	Anti-corrosive tapes shall be used at each connection point within the earthing system.			
1.11.8.	Busbars to be used in earthing system shall be made of copper and shall conform to TS EN 13601.			
1.12.	Other Requirements			
1.12.1.	The Contractor shall provide and install properly at least 5 (five) deck ladders (caged vertical ladders) in compliance with National and International Safety Standards for enabling external and direct access to the rooftop. Deck ladders shall be made of anti- corrosive and stainless material. Locked doors must be placed both on the ladder entrance and exit for each ladder.			
1.12.2.	The Contractor shall provide and install at			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	least 5 (five) full safety systems (fall arrest systems) in compliance with National and International Safety Standards and shall leave the system on the roof for the usage of the Beneficiary during operations and maintenance period for each section of the roof, Each system shall contain at least anchorage systems compatible with the insulated panel roof structure, self retracting horizontal lifeline system, full body harness, and lanyard. The system shall be utilized according to Regulation on Occupational Health and Safety.			
1.12.3.	The contractor shall be responsible for the supply and installation of the related materials for deionization of the water that will be utilized during SPP cleaning process.			
1.13.	Fire Protection System			
1.13.1.	Contractor shall be responsible for providing the Fire Protection System Report from related Fire Authority. Fire Protection System shall be designed and installed according to the related report.			
1.13.2.	Contractor is obliged to place portable fire extinguishers at necessary locations as per the			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	regulations.			
1.14.	Grid Connection			
1.14.1.	SPP shall be monitored and measured via Current and Voltage Metering Switchgear with LBS positioned in TEMSAN Ankara Transformer Station – TAC-673 (TR-3683).			
1.14.2.	Single-direction meter positioned in the Current and Voltage Metering Switchgear with LBS within TEMSAN Ankara Transformer Station – TAC-673 (TR-3683) shall be replaced with at least two bi- directional electronic meters (one principal, one spare) both conforming to TS EN 50470- 1 and TS EN 50470-3.			
1.14.3.	Electronic meters shall have RS485 or RJ45 communication port as minimum.			
1.14.4.	SPP shall be completely isolated from the distribution network via protection relay (Loss of Main) in case of any short circuit failure occurred at SPP or any power outage occur in the distribution system.			
1.15.	Insulation Roof Panel			
1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
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1.15.1.	Contractor shall provide and install Insulation Roof Panels as a whole system (including but not limited to roof panels, accessories – aluminium profiles, flashings – fasteners and consumables) for the entire Building No.1 Factory Building s identified in Appendix E- Drawings. The contractor is responsible for supply and installation of insulation roof panels for Building No.1 Facility Building in TEMSAN Ankara Facility, as shown in Appendix E - Drawings. The contractor is responsible for the entire process even if supply of insulation roof panels intends to strengthen the roof of building for roof type panels. All the equipment shall be provided complete with the necessary accessories and/or parts to ensure that the unit is capable of operating to the required technical and quality specifications immediately. Existing roof panels will be removed properly and replaced by those supplied by the contractor. Removed roof panels will be stored properly in a place of facility that is to be shown by End Beneficiary (TEMSAN). Removal and carrying to the storage area will be the contractor's responsibility. The entire process to complete the work as a whole shall be deemed as within the scope of this work.			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
1.15.2.	Insulation roof panels shall be of galvanized plates filled with PUR for thermal insulation and shall be in compliance with TS EN 14509 and must be certified accordingly.			
1.15.3.	Insulation thickness of the panels shall be at least 50 mm. The panels must be 5 ribs-top with at most 0,50 mm. external and internal facing thickness.			
1.15.4.	Roof panels shall meet the fire reaction requirements at least for Class C-s3,d2 according to EN 13501-1.			
1.15.5.	Metal sheets must be galvanized with minimum 100 gr./m ² .			
2.	BOTAS SARIL SPP			
2.1.	Photovoltaic Module (PV Module)			
2.1.1.	Total installed capacity (DC) of the SPP shall be minimum 1,196.91 kW _P . In order to reach this value, taking into			
	consideration the efficiency, power of each PV Module and nominal outputs, the number of modules to be installed shall be determined			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	by tenderers and shall be specified within their offer. At least 25 (twenty-five) amounts of modules, additional to the operational ones, shall be supplied as a substitute in case of sudden failure.			
2.1.2.	PV Modules shall satisfy the Technical Specifications item 1.1 and its sub-items for PV Module Specifications except 1.1.1.			
2.2.	Inverter			
2.2.1.	Cumulative AC output power of the SPP shall be limited to 999.00 kW _{AC} . The design of SPP shall have string inverters. 1 (one) additional Inverter to the operational ones, as a substitute, shall be supplied in case of sudden failure.			
2.2.2.	Inverters shall satisfy the Technical Specifications item 1.2 and its sub-items for Inverter Specifications except 1.2.1 and 1.2.5.			
2.3.	Mounting System and Fastenings			
2.3.1.	Contractor shall install the module mounting system (on which PV modules shall be fixated) on the ground.as described in			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	Appendix E-Drawings: Sarıl.			
2.3.2.	All columns, beams, cross and profiles to be used in the mounting system shall be made of hot dip galvanized or stainless steel and shall conform to the quality grade of ST37 or S235 in minimum according to DIN 17100 and TS EN 10025-2 standards, respectively.			
2.3.3.	Hot dip galvanized coatings implementation on steel components shall be done according to TS EN ISO 1461/D1.			
2.3.4.	Clamps to be used in the system shall be made of anodized aluminium alloy and shall be in compliance with the quality grade of 6063-T6 in minimum. Clamp thickness shall be at least 3mm.			
2.3.5.	All bolts and screws (bolts, nuts, washers, shims and other relevant hardware) to be used within the system shall be hot dip galvanized or stainless steel and shall be in compliance with at least 8.8 quality grades.			
2.3.6.	All bolts, screws, studs and other relevant hardware to be used for the installation of PV Modules and fixation of mounting system			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	shall conform to TS EN ISO 3506-1.			
2.3.7.	Concrete to be cast to fulfil the hole, only in case of any drilling processs required to embed steel column, shall be of minimum C20 quality.			
2.4.	Data Logger and Remote Monitoring System			
2.4.1.	Data Logger and Remote Monitoring System shall satisfy the Technical Specifications item 1.4 and all its sub-items for Data Logger and Remote Monitoring System Specifications.			
2.5.	SCADA System			
2.5.1.	RTU shall be able to provide data from Power/Energy Quality Analyzers, Monitoring Relays or Smart Meters that enables the measurement of HV and LV power qualities and to transfer the data.			
2.5.2.	Status and control signals provided by HV switchgears via power/energy quality analyzers or monitoring relays that are specified in the Signal List published by related DisCo and door status, fire detector, motion sensor, DC System and transformer			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	protection information shall be transferred to I/O cards/modules which are to be positioned in SCADA Board.			
2.5.3.	RTU shall be able to communicate with and issue a command to the GPR located in MDB and shall provide location and position information from the main TMCB via GPR.			
2.5.4.	SCADA System shall satisfy the Technical Specifications item 1.5 and its sub-items for SCADA System Specifications except 1.5.8 and 1.5.9.			
2.6.	DC Cables			
2.6.1.	DC Cables shall satisfy the Technical Specifications item 1.6 and all its sub-items for DC Cables Specifications.			
2.7.	DC Connectors			
2.7.1.	DC Connectors shall satisfy the Technical Specifications item 1.7 and all its sub-items for DC Connectors Specifications.			
2.8.	AC Cable Set (LV AC Cables, HV AC Cables)			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
2.8.1.	Four-wire connection (3P-three phases and Neutral) must be completed to connect the inverter to the distribution board(s). Inverter's earthing connection is mandatory. Hence, the cable to be used for Inverter AC output shall be five-pole.			
2.8.2.	LV AC cables to be used in the system between Inverters, SDBs – if available –, MDB and Transformer shall be made of copper and produced in accordance with TS HD 604 S1 or TS HD 627 S1 or IEC 60502-1 standards.			
2.8.3.	 LV AC Cables to be used in the system must fulfil the features according to the standards as stated below; Flame Retardant (IEC 60332) Halogen-Free (according to EN 60754) Low Smoke Density (according to EN 61034) 			
2.8.4.	Permissible operating temperature of LV AC Cables shall be at least + 70 °C and permitted short circuit temperature shall be at least + 160 °C.			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
2.8.5.	HV AC cables to be used in the system between MonoBlock Substation (BOTAS SARIL SPP Transformer Station) and BOTAS SARIL Distribution Station shall be made of copper and shall be produced according to IEC 60502-2 or TSE K 204.			
2.8.6.	Permissible operating temperature of HV AC Cables shall be at least + 90 °C and permitted short circuit temperature shall be at least + 250 °C.			
2.8.7.	Both HV and LV AC Cables shall have "CE" conformities.			
2.8.8.	Both HV and LV AC Cables shall be in compliance with RoHS directive 2011/65/EU of the European Parliament and of the Council.			
2.9.	Data, Signal and Control Cables			
2.9.1.	Data, Signal and Control Cables shall satisfy the Technical Specifications item 1.9 and all its sub-items for Data, Signal and Control Cables Specifications.			
2.10.	Boards/Panels			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
2.10.1.	Boards/Panels shall satisfy the Technical Specifications item 1.10 and its sub-items for Boards/Panels Specifications except 1.10.1, 1.10.6, 1.10.7, 1.10.13, 1.10.14, 1.10.17, 1.10.18, 1.10.20, 1.10.23, 1.10.24, 1.10.25, 1.10.26 and 1.10.27.			
2.10.2.	All Inverters and AC Cables shall be protected via TMCB, which shall be both placed in SDB – if applicable -, and in MDB with suitable current and voltage values, on the input side, with the same amounts of Inverters to be connected and a RCPR behind each TMCB compatible with those TMCBs. On the output side of each SDB – if available – and MDB, there shall be again TMCB with suitable current and voltage values. TMCB positioned in the output side of MDB shall be able to change position automatically according to the switch on-off signals.			
2.10.3.	TMCB, on the input side of each SDB – if available – or on the input side of MDB (where Inverters connected) and on the output side of MDB, shall have features to detect residual current. This feature may be ensured by providing an external RCPR.			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
2.10.4.	MDB shall contain GPR to detect fault current, over and undervoltage as well as over and underfrequency on the grid and shall protect the system accordingly. GPR shall be able to send switch-on signals to TMCBs in case of grid fluctuations and interruptions, system fault and power cuts and switch-off signals when the grid is recovered, automatically.			
2.10.5.	GPR to be used in the MDB shall be in compliance with TS EN 60255 and shall meet EMC requirements.			
2.10.6.	MDB shall contain an electronic single- direction or bidirectional meter that enables monitoring of the SPP energy production.			
2.10.7.	Electronic meter (either Single or Bi- Directional) to be used in MDB shall conform to TS EN 50470-1 and TS EN 50470-3.			
2.10.8.	MDB shall contain Power/Energy Quality Analyzer that enables measurement of active energy and power, reactive energy and power, frequency, voltage, power factor and current.			
2.10.9.	MDB shall contain LV Current Transformers			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	that shall be in compliance with TS EN 61869-2 standard.			
2.10.10.	Busbars to be used in the SDB – if applicable – and MDB shall be made of copper and shall conform to TS EN 13601.			
2.10.11.	Equipotential Earthing Busbar shall be positioned in MDB that enables the connection of the earthing system of the SPP and it shall be made of copper.			
2.10.12.	Emergency Stop System shall exist in the MDB to deactivate TMCB positioned on the output side of the MDB.			
2.10.13.	Signal Lamps shall be positioned on the MDB to demonstrate the energy existence on the phases.			
2.11.	MonoBlock Substation (BOTAS SARIL SPP Transformer Station)			
2.11.1.	Compact and concrete type monoblock substation with metal enclosed and air or gas insulated HV switchgears shall be used in the project. Monoblock substation will inhold			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	MDB, Transformer and HV Switchgears.			
2.11.2.	MBS shall be designed in accordance with TS EN 62271-202 standard.			
2.11.3.	Concrete type MBS shall be at least C35 quality in compliance with TS EN 206.			
2.11.4.	Compact type monoblock substation shall be designed and manufactured with working hall inside enabling workings and direct access.			
2.11.5.	MBS shall be equipped with personal protection equipment including insulating (dielectric) mat, insulating rubber gloves and insulating stand with working voltage upto 12 kV.			
2.11.6.	MBS shall be equipped with Battery Rectifier Group. Dry type and maintenance-free batteries shall be utilized.			
2.12.	Transformer			
2.12.1.	Transformer shall be required at SPP and will be positioned in the MBS (BOTAS SARIL SPP Transformer Station). Transformer to be used shall be a three-phase distribution transformer with rated power of 1,250 kVA			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	and HV coil rated voltage of 6.3 Transformer shall be suitable for indoor usage.			
2.12.2.	Transformer shall be oil immersed and hermetic type, without gas pad, double coiled, fully closed and ONAN.			
2.12.3.	LV coil rated voltage of the transformer shall be identified according to the AC output voltage of the Inverters used in the system.			
2.12.4.	Transformer to be used shall be compatible with IEC 60076 standard. The transformer shall have continuous operation capacity at every output power such that permissible temperature rises are not exceeded at any level.			
2.12.5.	Both HV and LV windings of transformer shall be wound from aluminium or copper sheets.			
2.12.6.	Insulation material to be used for winding insulation shall be at least A Class according to TS EN 60085.			
2.12.7.	De-energized tap changer that enables changing the voltage ratio of transformer shall be applicable on HV coils of the transformer.			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	Tap changers to be used in the system shall be resistant to high-voltage impulse, overload current and short-circuit current.			
2.12.8.	HV bushings of transformer shall be plug-in type.			
2.12.9.	LV bushings of transformer shall conform to TS EN 50386.			
2.13.	High-Voltage (HV) Switchgears			
2.13.1.	MBS (BOTAS SARIL SPP Transformer Station) shall be equipped with metal enclosed HV Switchgears conforming to TS EN 62271-200 and TS EN 62271-100.			
2.13.2.	MBS (BOTAS SARIL SPP Transformer Station) shall be equipped with an Incoming- Outgoing Switchgear with CB and VT (Autoproducer) and an Incoming-Outgoing Switchgear with CB for transformer protection.			
2.13.3.	Incoming-Outgoing Switchgear with CB and VT (Autoproducer) shall be equipped with a GPR conforming to TS EN 60255 and GPR shall meet EMC requirements.			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
2.13.4.	GPR shall be able to detect fault current, over and undervoltage as well as over and underfrequency on the grid and shall protect the system accordingly.			
2.13.5.	GPR shall have ROCOF function or vector shift detection feature that detects loss of mains and protects the system accordingly.			
2.13.6.	GPR within the HV Switchgears, as indirect relay, shall be fed from an external UPS such that each can operate at least 8 (eight) hours in case of energy cut-off.			
2.13.7.	Incoming-Outgoing Switchgear with CB for transformer protection shall be equipped with Digital Overcurrent and Earth Fault Protection Relay having RS485 or RJ45 communication port.			
2.13.8.	Busbars to be used in HV system shall be made of copper and shall conform to TS EN 13601.			
2.13.9.	Switch disconnectors, if available – may be used in HV Switchgears –, shall be in compliance with TS EN 62271-102.			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
2.13.10.	HV Current Transformers to be used within the system shall be compatible with TS EN 61869-2.			
2.13.11.	HV Voltage Transformers to be used within the system shall be compatible with TS EN 61869-3.			
2.14.	Earthing and Lightning Protection			
2.14.1.	Earthing and Lightning Protection shall satisfy the Technical Specifications item 1.11 and all its sub-items for Earthing and Lightning Protection Specifications.			
2.15.	Other Requirements			
2.15.1.	Contractor shall procure and construct wire fenced wall circumventing the entire SPP with appropriate displacements for entry/exit and operating area according to dimensions and properties specified within Appendix E- Drawings. Also, wire fenced wall shall be designed and installed such that it will not cast shade on the PV Modules.			
2.15.2.	Contractor shall provide and arrange a living container that is to be used as the shelter for			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	security guards as it is seen in the Appendix E- Drawings. It shall require as minimum; one bedroom with two single beds with pattens, one bathroom with shower, one living room including office area with one worktable for at least four people, and including kitchen area with two doors static refrigerator, hobs (cooktops) with four heating zone, one air conditioner (at least 9000 btu) and one electric heater. Contractor shall be responsible for electrical, mechanical and plumbing infrastructure of the living container. All related water tanks (sanitary tank, water storage/supply tank, waste-water tank etc.) shall also be provided by the contractor, if required.			
2.15.3.	Living container shall have reinforced concrete structure and shall be 70 m ² in minimum and shall conform to the drawing under Appendix E - Drawings.			
2.15.4.	Contractor shall be responsible for the whole process to - indicatively 1 km - connect to the existing water supply network nearby to enable access to water within the project site.			
2.15.5.	The contractor shall be responsible for the supply and installation of the related materials for deionization of the water that will be			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	utilized during SPP cleaning process.			
2.15.6.	Apart from the living container, the contractor shall provide and arrange a storage container with at least 12 m ² area.			
2.16.	CCTV/Lighting/Alarm System/Fire Protection			
2.16.1.	Contractor shall provide and install CCTV system to enable live video surveillance and further access by recording. The system shall enable audio recording as well. The system shall be monitored and controlled via PC and LED monitor that is to be positioned within the living container (please refer to 2.15.2).			
2.16.2.	CCTV system shall contain fixed IP cameras with night vision and zoom feature at sufficient quantity ensuring that there will be no dead-zones around wire fenced wall. Proper lens characteristic shall be selected to enable sufficient video quality.			
2.16.3.	CCTV system shall also contain Dome IP cameras with night vision and zoom feature at sufficient quantity to enable aeral viewpoint of the SPP. Proper lens characteristic shall be			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	selected to enable sufficient video quality.			
2.16.4.	CCTV system shall be able to monitor the SPP day and night and shall have limited area protection software to enable notifications to the beneficiary in case of any danger occurred within the defined limited area. System shall contain siren alarms and flashing light to enable notifying security guards.			
2.16.5.	CCTV system must include monitor, microphone and recorders (DVR, NVR etc.). The camera images shall be collected at two separate recorders with one being spare.			
2.16.6.	Wired security cameras will be used within the system. Appropriate network, signal, control and/or data cables, switches and signal boosters will be utilized to avoid signal weakening.			
2.16.7.	Contractor shall provide at least 40 inches LED monitor to the living container for CCTV system monitoring.			
2.16.8.	Contractor shall provide cabinet (with wheels) for servers to the living container.			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
2.16.9.	Contractor is responsible for the supply and installation of the internet access point such that CCTV system ables to operate.			
2.16.10.	The cameras shall conform to industrial outdoor conditions with at least IP 65 protection class.			
2.16.11.	The camera and recording system shall be fed from UPS such that they can operate at least 8 (eight) hours in case of energy cut-off. The provision of the UPS shall be the contractor's responsibility.			
2.16.12.	Data acquired by the camera system shall be protected and stored safely to enable retrospective analysis for minimum up to 1 (one) year. System configuration and software shall not be affected from communication cuts. The system shall still be able to acquire and store data in case of a power and communication cuts for at least 24 (twenty- four) hours. Data stored during that period of time shall be transferrable to the server when reconnected.			
2.16.13.	All the electrical and electronic devices to be used in the CCTV system shall have 'CE'			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	conformities.			
2.16.14.	All the devices and materials to be used in the application of CCTV system shall conform to TSE or international standards (ISO, IEC, TUV, etc.).			
2.16.15.	Contractor is responsible for the supply and installation of CCTV and Lighting columns with sufficient quantity for cameras and luminaires. Columns can be equipped both with luminaires and cameras.			
2.16.16.	Contractor is responsible for the supply and installation of panels/boards to energize cameras and luminaires.			
2.16.17.	Contractor shall provide and install lighting luminaires at sufficient quantity ensuring that there will be no unlighted place around wire fenced wall.			
2.16.18.	All lightings shall be LED luminaires.			
2.16.19. "	The luminaires to be used in the system shall contain light detection and motion sensors.			
2.16.20.	Contractor shall be responsible for the design and installation of alarm system including			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	voice alarms and notification devices against fire, flood and robbery.			
2.16.21.	Contractor shall be responsible for providing the Fire Protection System Report from related Fire Authority. Fire Protection System shall be designed and installed according to the related report.			
2.16.22.	Contractor is obliged to place portable fire extinguishers at necessary locations as per the regulations.			
2.16.23.	Fire Alarm System with control panel shall be placed within the MBS, for at least 2 zones, and system shall be in compliance with EN 54-2 and EN 54-4.			
2.16.24.	Control panel system must be designed such that it must be fed from an exterior battery system which is again to be provided by the contractor. The entire system shall be able to operate at least 8 (eight) hours in case of energy cut-offs.			
2.16.25. 2	MBS shall be equipped with multi sensor detectors such as fire, heat, smoke and CO_2 detectors to identify dangerous situations. Divisions within the MBS shall be equipped			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	separately with gas/water-combined extinguishing systems.			
2.16.26.	Fire Alarm System shall contain electronic siren alarms and flashing light to enable notifying security guards.			
2.17.	High-Voltage (HV) Switchgear			
	BOTAS SARIL Distribution Station			
2.17.1.	SPP shall be connected to BOTAS SARIL Distribution Station by equipping BOTAS SARIL Distribution Station with metal enclosed HV Switchgear in accordance with the latest version of related TEDAŞ Technical Specification, conforming to TS EN 62271- 200 and TS EN 62271-100.			
2.17.2.	Incoming-Outgoing Switchgear with CB shall be placed within BOTAS SARIL Distribution Station, being in compliance with the existing switchgears.			
2.17.3.	CB within the Incoming-Outgoing Switchgear shall be fed from the batteries of the Battery Rectifier Group placed in BOTAS SARIL Distribution Station.			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
2.17.4.	Incoming-Outgoing Switchgear with CB shall be equipped with Digital Protection Relay having RS485 or RJ45 communication port.			
2.17.5.	Busbars to be used in HV system shall be made of copper and shall conform to TS EN 13601.			
2.17.6.	Switch disconnectors, if available – may be used in HV Switchgears –, shall be in compliance with TS EN 62271-102.			
2.17.7.	HV Current Transformers to be used within the system shall be compatible with TS EN 61869-2.			
2.17.8.	HV Voltage Transformers to be used within the system shall be compatible with TS EN 61869-3.			
2.18.	Grid Connection			
2.18.1.	Single-direction meter positioned within the Current and Voltage Metering Switchgear with LBS within BOTAS SARIL Distribution Station shall be replaced with at least two bi- directional electronic meters (one principal, one spare) both conforming to TS EN 50470-			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	1 and TS EN 50470-3.			
2.18.2.	Electronic meters shall have RS485 or RJ45 communication port as minimum.			
2.18.3.	Existing Current and Voltage Metering Switchgear with LBS within BOTAS SARIL Distribution Station shall be equipped with an Energy/Power Quality Analyzer that enables measurement of active energy and power, reactive energy and power, frequency, voltage, power factor and current and that has real time clock feature and RS485 or RJ45 communication port.			
3.	BOTAS PS-5 SPP			
3.1.	Photovoltaic Module (PV Module)			
3.1.1.	Total installed capacity (DC) of the SPP shall be minimum 1,196.91 kW _P . In order to reach this value, taking into consideration the efficiency, power of each PV Module and nominal outputs, the number of modules to be installed shall be determined by tenderers and shall be specified within their offer. At least 25 (twenty-five) amounts of modules, additional to the operational ones,			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	shall be supplied as a substitute in case of sudden failure.			
3.1.2.	PV Modules shall satisfy the Technical Specifications item 1.1 and its sub-items for PV Module Specifications except 1.1.1.			
3.2.	Inverter			
3.2.1.	Cumulative AC output power of the SPP shall be limited to 999.00 kW _{AC} . The design of SPP shall have string inverters. 1 (one) additional Inverter to the operational ones, as a substitute, shall be supplied in case of sudden failure.			
3.2.2.	Inverters shall satisfy the Technical Specifications item 1.2 and its sub-items for Inverter Specifications except 1.2.1 and 1.2.5.			
3.3.	Mounting System and Fastenings			
3.3.1.	Mounting System and Fastenings shall satisfy the Technical Specifications item 2.3 and all its sub-items for Mounting System and Fastenings Specifications.			
3.4.	Data Logger and Remote Monitoring			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	System			
3.4.1.	Data Logger and Remote Monitoring System shall satisfy the Technical Specifications item 1.4 and all its sub-items for Data Logger and Remote Monitoring System Specifications.			
3.5.	SCADA System			
3.5.1.	SCADA System shall satisfy the Technical Specifications item 2.5 and all its sub-items for SCADA System Specifications.			
3.6.	DC Cables			
3.6.1.	DC Cables shall satisfy the Technical Specifications item 1.6 and all its sub-items for DC Cables Specifications.			
3.7.	DC Connectors			
3.7.1.	DC Connectors shall satisfy the Technical Specifications item 1.7 and all its sub-items for DC Connectors Specifications.			
3.8.	AC Cable Set (LV AC Cables, HV AC Cables)			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
3.8.1.	LV and HV AC Cables shall satisfy the Technical Specifications item 2.8 and its sub- items for AC Cable Set Specifications except 2.8.5.			
3.8.2.	HV AC cables to be used in the system between MonoBlock Substation (BOTAS PS- 5 SPP Transformer Station) and BOTAS PS-5 Distribution Station shall be made of one of the following materials – copper or aluminium – both produced according to IEC 60502-2 or TSE K 204.			
3.9.	Data, Signal and Control Cables			
3.9.1.	Data, Signal and Control Cables shall satisfy the Technical Specifications item 1.9 and all its sub-items for Data, Signal and Control Cables Specifications.			
3.10.	Boards/Panels			
3.10.1.	Boards/Panels shall satisfy the Technical Specifications item 2.10 and all its sub-items for Boards/Panels Specifications.			
3.11.	MonoBlock Substation			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	(BOTAS PS-5 SPP Transformer Station)			
3.11.1.	MBS (BOTAS PS-5 SPP Transformer Station) shall satisfy the Technical Specifications item 2.11 and all its sub-items for MonoBlock Substation (BOTAS SARIL SPP Transformer Station) Specifications.			
3.12.	Transformer			
3.12.1.	Transformer shall be required at SPP and will be positioned in the MBS (BOTAS PS-5 SPP Transformer Station). Transformer to be used shall be a three-phase distribution transformer with rated power of 1,250 kVA and HV coil rated voltage of 6.3 kV as specified in Call Letter. Transformer shall be suitable for indoor usage.			
3.12.2.	Transformer shall satisfy the Technical Specifications item 2.12 and its sub-items for Transformer Specifications except 2.12.1.			
3.13.	High-Voltage (HV) Switchgears			
3.13.1.	MBS (BOTAS PS-5 SPP Transformer Station) shall be equipped with metal enclosed HV Switchgears in accordance with			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	the latest version of related TEDAŞ Technical Specification, conforming to TS EN 62271- 200 and TS EN 62271-100.			
3.13.2.	MBS (BOTAS PS-5 SPP Transformer Station) shall be equipped with an Incoming- Outgoing Switchgear with CB and VT (Autoproducer) and an Incoming-Outgoing Switchgear with CB for transformer protection.			
3.13.3.	HV Switchgears shall satisfy the Technical Specifications item 2.13 and its sub-items for HV Switchgears Specifications except 2.13.1 and 2.13.2.			
3.14.	Earthing and Lightning Protection			
3.14.1.	Earthing and Lightning Protection shall satisfy the Technical Specifications item 1.11 and all its sub-items for Earthing and Lightning Protection Specifications.			
3.15.	Other Requirements			
3.15.1.	Contractor shall be responsible for the connection of CCTV System, Fire Protection and Alarm System and Remote Monitoring System of BOTAS PS-5 SPP to the living			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	container as identified in item 2.15.2 and that is to be placed between BOTAS SARIL SPP and BOTAS PS-5 SPP.			
3.15.2.	Other Requirements shall satisfy the Technical Specifications item 2.15 and its sub-items for Other Requirements Specifications except 2.15.2 and 2.15.3.			
3.16.	CCTV/Lighting/Alarm System/Fire Protection			
3.16.1.	Contractor shall provide and install CCTV system to enable live video surveillance and further access by recording. The system shall enable audio recording as well. The system shall be monitored and controlled via PC and LED monitor that is to be positioned within the living container under item 2.15.2.			
3.16.2.	40 inches LED monitor and cabinet (with wheels) for servers placed within the living container under item 2.15.2 shall be utilized for both BOTAS SARIL SPP and BOTAS PS-5 SPP.			
3.16.3.	CCTV/Lighting/Alarm System/Fire Protection shall satisfy the Technical Specifications item 2.16 and its sub-items for			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	CCTV/Lighting/Alarm System/Fire Protection Specifications except 2.16.1, 2.16.7 and 2.16.8.			
3.17.	High-Voltage (HV) Switchgear			
	BOTAS PS-5 Distribution Station			
3.17.1.	SPP shall be connected to BOTAS PS-5 Distribution Station by equipping BOTAS PS-5 Distribution Station with metal enclosed HV Switchgear in accordance with the latest version of related TEDAŞ Technical Specification, conforming to TS EN 62271- 200 and TS EN 62271-100.			
3.17.2.	Incoming-Outgoing Switchgear with CB shall be placed within BOTAS PS-5 Distribution Station, being in compliance with the existing switchgears.			
3.17.3.	CB within the Incoming-Outgoing Switchgear shall be fed from the batteries of the Battery Rectifier Group placed in BOTAS PS-5 Distribution Station.			
3.17.4.	HV Switchgear BOTAS PS-5 Distribution Station shall satisfy the Technical Specifications sub-items 2.17.4, 2.17.5,			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	2.17.6, 2.17.7 and 2.17.8 for HV Switchgear BOTAS SARIL Distribution Station.			
3.18.	Grid Connection			
3.18.1.	Single-direction meter positioned within the Current and Voltage Metering Switchgear with LBS within BOTAS PS-5 Distribution Station shall be replaced with at least two bi- directional electronic meters (one principal, one spare) both conforming to TS EN 50470- 1 and TS EN 50470-3.			
3.18.2.	Electronic meters shall have RS485 or RJ45 communication port as minimum.			
3.18.3.	Existing Current and Voltage Metering Switchgear with LBS within BOTAS PS-5 Distribution Station shall be equipped with an Energy/Power Quality Analyzer that enables measurement of active energy and power, reactive energy and power, frequency, voltage, power factor and current and that has real time clock feature and RS485 or RJ45 communication port.			
4.	BOTAS Silopi SPP			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
4.1.	Photovoltaic Module (PV Module)			
4.1.1.	Total installed capacity (DC) of the SPP shall be minimum 1,196.91 kW _P . In order to reach this value, taking into consideration the efficiency, power of each PV Module and nominal outputs, the number of modules to be installed shall be determined by tenderers and shall be specified within their offer. At least 25 (twenty-five) amounts of modules, additional to the operational ones, shall be supplied as a substitute in case of sudden failure.			
4.1.2.	PV Modules shall satisfy the Technical Specifications item 1.1 and its sub-items for PV Module Specifications except 1.1.1.			
4.2.	Inverter			
4.2.1.	Cumulative AC output power of the SPP shall be limited to 999.00 kW _{AC} . The design of SPP shall have string inverters. 1 (one) additional Inverter to the operational ones, as a substitute, shall be supplied in case of sudden failure.			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
4.2.2.	Inverters shall satisfy the Technical Specifications item 1.2 and its sub-items for Inverter Specifications except 1.2.1 and 1.2.5.			
4.3.	Mounting System and Fastenings			
4.3.1.	Mounting System and Fastenings shall satisfy the Technical Specifications item 2.3 and all its sub-items for Mounting System and Fastenings Specifications.			
4.4.	Data Logger and Remote Monitoring System			
4.4.1.	Data Logger and Remote Monitoring System shall satisfy the Technical Specifications item 1.4 and all its sub-items for Data Logger and Remote Monitoring System Specifications.			
4.5.	SCADA System			
4.5.1.	SCADA System shall satisfy the Technical Specifications item 2.5 and all its sub-items for SCADA System Specifications.			
4.6.	DC Cables			
4.6.1.	DC Cables shall satisfy the Technical			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	Specifications item 1.6 and all its sub-items for DC Cables Specifications.			
4.7.	DC Connectors			
4.7.1.	DC Connectors shall satisfy the Technical Specifications item 1.7 and all its sub-items for DC Connectors Specifications.			
4.8.	AC Cable Set (LV AC Cables, HV AC Cables)			
4.8.1.	LV and HV AC Cables shall satisfy the Technical Specifications item 2.8 and its sub- items for AC Cable Set Specifications except 2.8.5.			
4.8.2.	HV AC cables to be used in the system between MonoBlock Substation (BOTAS Silopi SPP Transformer Station) and Distribution Station (Gendarmerie Station/73TR-03880) shall be made of copper and shall be produced according to IEC 60502-2 or TSE K 204.			
4.9.	Data, Signal and Control Cables			
4.9.1.	Data, Signal and Control Cables shall satisfy the Technical Specifications item 1.9 and all			
1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
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	its sub-items for Data, Signal and Control Cables Specifications.			
4.10.	Boards/Panels			
4.10.1.	Boards/Panels shall satisfy the Technical Specifications item 2.10 and all its sub-items for Boards/Panels Specifications.			
4.11.	MonoBlock Substation			
	(BOTAS Silopi SPP Transformer Station)			
4.11.1.	MBS (BOTAS Silopi SPP Transformer Station) shall satisfy the Technical Specifications item 2.11 and its sub-items for MonoBlock Substation (BOTAS SARIL SPP Transformer Station) Specifications except 2.11.5.			
4.11.2.	MBS shall be equipped with personal protection equipment including insulating (dielectric) mat, insulating rubber gloves and insulating stand with working voltage upto 36 kV.			
4.12.	Transformer			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
4.12.1.	Transformer shall be required at SPP and will be positioned in the MBS (BOTAS Silopi SPP Transformer Station). Transformer to be used shall be a three-phase distribution transformer with rated power of 1,250 kVA and HV coil rated voltage of 34.5 kV as specified in Call Letter. Transformer shall be suitable for indoor usage.			
4.12.2.	Transformer shall satisfy the Technical Specifications item 2.12 and its sub-items for Transformer Specifications except 2.12.1.			
4.13.	High-Voltage (HV) Switchgears			
4.13.1.	MBS (BOTAS Silopi SPP Transformer Station) shall be equipped with metal enclosed HV Switchgears in accordance with the latest version of related TEDAŞ Technical Specification, conforming to TS EN 62271- 200 and TS EN 62271-100.			
4.13.2.	MBS (BOTAS Silopi SPP Transformer Station) shall be equipped with an Incoming- Outgoing Switchgear with CB and VT (Autoproducer), a Current and Voltage Metering Switchgear with LBS and an Incoming-Outgoing Switchgear with CB for			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	transformer protection.			
4.13.3.	Current and Voltage Metering Switchgear with LBS shall be equipped with at least two bi-directional electronic meters (one principal, one spare) both conforming to TS EN 50470-1 and TS EN 50470-3.			
4.13.4.	Electronic meters within HV Switchgears shall have RS485 or RJ45 communication port as minimum.			
4.13.5.	Current and Voltage Metering Switchgear with LBS shall be equipped with an Energy/Power Quality Analyzer that enables measurement of active energy and power, reactive energy and power, frequency, voltage, power factor and current and that has real time clock feature and RS485 or RJ45 communication port.			
4.13.6.	HV Switchgears shall satisfy the Technical Specifications item 2.13 and its sub-items for HV Switchgears Specifications except 2.13.1 and 2.13.2.			
4.14.	Earthing and Lightning Protection			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
4.14.1.	Earthing and Lightning Protection shall satisfy the Technical Specifications item 1.11 and all its sub-items for Earthing and Lightning Protection Specifications.			
4.15.	Other Requirements			
4.15.1.	Other Requirements shall satisfy the Technical Specifications item 2.15 and all its sub-items for Other Requirements Specifications.			
4.16.	CCTV/Lighting/Alarm System/Fire Protection			
4.16.1.	CCTV/Lighting/Alarm System/Fire Protection shall satisfy the Technical Specifications item 2.16 and all its sub-items for CCTV/Lighting/Alarm System/Fire Protection Specifications.			
4.17.	High-Voltage (HV) Switchgear Distribution Station (Gendarmerie Station 73TR-03880)			
4.17.1.	SPP shall be connected to Distribution Station (Gendarmerie Station/73TR-03880) by			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	equipping Distribution Station with metal enclosed HV Switchgear in accordance with the latest version of related TEDAŞ Technical Specification, conforming to TS EN 62271- 200 and TS EN 62271-100.			
4.17.2.	Incoming-Outgoing Switchgear with CB shall be placed within Distribution Station (Gendarmerie Station/73TR-03880), being in compliance with the existing switchgears.			
4.17.3.	CB within the Incoming-Outgoing Switchgear shall be fed from the batteries of the Battery Rectifier Group.			
4.17.4.	HV Switchgear Distribution Station (Gendarmerie Station/73TR-03880) shall satisfy the Technical Specifications sub-items 2.17.4, 2.17.5, 2.17.6, 2.17.7 and 2.17.8 for HV Switchgear BOTAS SARIL Distribution Station.			
5.	BOTAS IDIL SPP			
5.1.	Photovoltaic Module (PV Module)			
5.1.1.	Total installed capacity (DC) of the SPP shall be minimum 1,196.91 kW _P .			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	In order to reach this value, taking into consideration the efficiency, power of each PV Module and nominal outputs, the number of modules to be installed shall be determined by tenderers and shall be specified within their offer. At least 25 (twenty-five) amounts of modules, additional to the operational ones, shall be supplied as a substitute in case of sudden failure.			
5.1.2.	PV Modules shall satisfy the Technical Specifications item 1.1 and its sub-items for PV Module Specifications except 1.1.1.			
5.2.	Inverter			
5.2.1.	Cumulative AC output power of the SPP shall be limited to 999.00 kW _{AC} . The design of SPP shall have string inverters. 1 (one) additional Inverter to the operational ones, as a substitute, shall be supplied in case of sudden failure.			
5.2.2.	Inverters shall satisfy the Technical Specifications item 1.2 and its sub-items for Inverter Specifications except 1.2.1 and 1.2.5.			
5.3.	Mounting System and Fastenings			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
5.3.1.	Mounting System and Fastenings shall satisfy the Technical Specifications item 2.3 and all its sub-items for Mounting System and Fastenings Specifications.			
5.4.	Data Logger and Remote Monitoring System			
5.4.1.	Data Logger and Remote Monitoring System shall satisfy the Technical Specifications item 1.4 and all its sub-items for Data Logger and Remote Monitoring System Specifications.			
5.5.	SCADA System			
5.5.1.	SCADA System shall satisfy the Technical Specifications item 2.5 and all its sub-items for SCADA System Specifications.			
5.6.	DC Cables			
5.6.1.	DC Cables shall satisfy the Technical Specifications item 1.6 and all its sub-items for DC Cables Specifications.			
5.7.	DC Connectors			
5.7.1.	DC Connectors shall satisfy the Technical			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	Specifications item 1.7 and all its sub-items for DC Connectors Specifications.			
5.8.	AC Cable Set (LV AC Cables, HV AC Cables)			
5.8.1.	LV and HV AC Cables shall satisfy the Technical Specifications item 2.8 and its sub- items for AC Cable Set Specifications except 2.8.5.			
5.8.2.	HV AC cables to be used in the system between MonoBlock Substation (BOTAS IDIL SPP Transformer Station) and BOTAS PS-3/A Distribution Station shall be made of copper and shall be produced according to IEC 60502-2 or TSE K 204.			
5.9.	Data, Signal and Control Cables			
5.9.1.	Data, Signal and Control Cables shall satisfy the Technical Specifications item 1.9 and all its sub-items for Data, Signal and Control Cables Specifications.			
5.10.	Boards/Panels			
5.10.1.	Boards/Panels shall satisfy the Technical Specifications item 2.10 and all its sub-items			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	for Boards/Panels Specifications.			
5.11.	MonoBlock Substation			
	(BOTAS IDIL SPP Transformer Station)			
5.11.1.	MBS (BOTAS IDIL SPP Transformer Station) shall satisfy the Technical Specifications item 2.11 and all its sub-items for MonoBlock Substation (BOTAS SARIL SPP Transformer Station) Specifications.			
5.12.	Transformer			
5.12.1.	Transformer shall be required at SPP and will be positioned in the MBS (BOTAS IDIL SPP Transformer Station). Transformer to be used shall be a three-phase distribution transformer with rated power of 1,250 kVA and HV coil rated voltage of 6.3 kV as specified in Call Letter. Transformer shall be suitable for indoor usage.			
5.12.2.	Transformer shall satisfy the Technical Specifications item 2.12 and its sub-items for Transformer Specifications except 2.12.1.			
5.13.	High-Voltage (HV) Switchgears			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
5.13.1.	MBS (BOTAS IDIL SPP Transformer Station) shall be equipped with metal enclosed HV Switchgears in accordance with the latest version of related TEDAŞ Technical Specification, conforming to TS EN 62271- 200 and TS EN 62271-100.			
5.13.2.	MBS (BOTAS IDIL SPP Transformer Station) shall be equipped with an Incoming- Outgoing Switchgear with CB and VT (Autoproducer) and an Incoming-Outgoing Switchgear with CB for transformer protection.			
5.13.3.	HV Switchgears shall satisfy the Technical Specifications item 2.13 and its sub-items for HV Switchgears Specifications except 2.13.1 and 2.13.2.			
5.14.	Earthing and Lightning Protection			
5.14.1.	Earthing and Lightning Protection shall satisfy the Technical Specifications item 1.11 and all its sub-items for Earthing and Lightning Protection Specifications.			
5.15.	Other Requirements			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
5.15.1.	Other Requirements shall satisfy the Technical Specifications item 2.15 and all its sub-items for Other Requirements Specifications.			
5.16.	CCTV/Lighting/Alarm System/Fire Protection			
5.16.1.	CCTV/Lighting/Alarm System/Fire Protection shall satisfy the Technical Specifications item 2.16 and all its sub-items for CCTV/Lighting/Alarm System/Fire Protection Specifications.			
5.17.	High-Voltage (HV) Switchgear BOTAS PS-3/A Distribution Station			
5.17.1.	SPP shall be connected to BOTAS PS-3/A Distribution Station by equipping BOTAS PS-3/A Distribution Station with metal enclosed HV Switchgear in accordance with the latest version of related TEDAŞ Technical Specification, conforming to TS EN 62271- 200 and TS EN 62271-100.			
5.17.2.	Incoming-Outgoing Switchgear with CB shall be placed within BOTAS PS-3/A Distribution			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	Station, being in compliance with the existing switchgears.			
5.17.3.	CB within the Incoming-Outgoing Switchgear shall be fed from the batteries of the Battery Rectifier Group placed in BOTAS PS-3/A Distribution Station.			
5.17.4.	HV Switchgear BOTAS PS-3/A Distribution Station shall satisfy the Technical Specifications sub-items 2.17.4, 2.17.5, 2.17.6, 2.17.7 and 2.17.8 for HV Switchgear BOTAS SARIL Distribution Station.			
5.18.	Grid Connection			
5.18.1.	Single-direction meter positioned within the Current and Voltage Metering Switchgear with LBS within BOTAS PS-3/A Distribution Station shall be replaced with at least two bi- directional electronic meters (one principal, one spare) both conforming to TS EN 50470- 1 and TS EN 50470-3.			
5.18.2.	Electronic meters shall have RS485 or RJ45 communication port as minimum.			
5.18.3.	Existing Current and Voltage Metering Switchgear with LBS within BOTAS PS-3/A			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	Distribution Station shall be equipped with an Energy/Power Quality Analyzer that enables measurement of active energy and power, reactive energy and power, frequency, voltage, power factor and current and that has real time clock feature and RS485 or RJ45 communication port.			
6.	BOTAS PS-3/A SPP			
6.1.	Photovoltaic Module (PV Module)			
6.1.1.	Total installed capacity (DC) of the SPP shall be minimum 1,196.91 kW _P . In order to reach this value, taking into consideration the efficiency, power of each PV Module and nominal outputs, the number of modules to be installed shall be determined by tenderers and shall be specified within their offer. At least 25 (twenty-five) amounts of modules, additional to the operational ones, shall be supplied as a substitute in case of sudden failure.			
6.1.2.	PV Modules shall satisfy the Technical Specifications item 1.1 and its sub-items for PV Module Specifications except 1.1.1.			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
6.2.	Inverter			
6.2.1.	Cumulative AC output power of the SPP shall be limited to 999.00 kW _{AC} . The design of SPP shall have string inverters. 1 (one) additional Inverter to the operational ones, as a substitute, shall be supplied in case of sudden failure.			
6.2.2.	Inverters shall satisfy the Technical Specifications item 1.2 and its sub-items for Inverter Specifications except 1.2.1 and 1.2.5			
6.3.	Mounting System and Fastenings			
6.3.1.	Mounting System and Fastenings shall satisfy the Technical Specifications item 2.3 and all its sub-items for Mounting System and Fastenings Specifications.			
6.4.	Data Logger and Remote Monitoring System			
6.4.1.	Data Logger and Remote Monitoring System shall satisfy the Technical Specifications item 1.4 and all its sub-items for Data Logger and Remote Monitoring System Specifications.			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
6.5.	SCADA System			
6.5.1.	SCADA System shall satisfy the Technical Specifications item 2.5 and all its sub-items for SCADA System Specifications.			
6.6.	DC Cables			
6.6.1.	DC Cables shall satisfy the Technical Specifications item 1.6 and all its sub-items for DC Cables Specifications.			
6.7.	DC Connectors			
6.7.1.	DC Connectors shall satisfy the Technical Specifications item 1.7 and all its sub-items for DC Connectors Specifications.			
6.8.	AC Cable Set (LV AC Cables, HV AC Cables)			
6.8.1.	LV and HV AC Cables shall satisfy the Technical Specifications item 2.8 and its sub- items for AC Cable Set Specifications except 2.8.5.			
6.8.2.	HV AC cables to be used in the system between MonoBlock Substation (BOTAS PS-			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	3/A SPP Transformer Station) and BOTAS PS-3/A Distribution Station shall be made of copper and shall be produced according to IEC 60502-2 or TSE K 204.			
6.9.	Data, Signal and Control Cables			
6.9.1.	Data, Signal and Control Cables shall satisfy the Technical Specifications item 1.9 and all its sub-items for Data, Signal and Control Cables Specifications.			
6.10.	Boards/Panels			
6.10.1.	Boards/Panels shall satisfy the Technical Specifications item 2.10 and all its sub-items for Boards/Panels Specifications.			
6.11.	MonoBlock Substation			
	(BOTAS PS-3/A SPP Transformer Station)			
6.11.1.	MBS (BOTAS PS-3/A SPP Transformer Station) shall satisfy the Technical Specifications item 2.11 and all its sub-items for MonoBlock Substation (BOTAS SARIL SPP Transformer Station) Specifications.			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
6.12.	Transformer			
6.12.1.	Transformer shall be required at SPP and will be positioned in the MBS (BOTAS PS-3/A SPP Transformer Station). Transformer to be used shall be a three-phase distribution transformer with rated power of 1,250 kVA and HV coil rated voltage of 6.3 kV as specified in Call Letter. Transformer shall be suitable for indoor usage.			
6.12.2.	Transformer shall satisfy the Technical Specifications item 2.12 and its sub-items for Transformer Specifications except 2.12.1.			
6.13.	High-Voltage (HV) Switchgears			
6.13.1.	MBS (BOTAS PS-3/A SPP Transformer Station) shall be equipped with metal enclosed HV Switchgears in accordance with the latest version of related TEDAŞ Technical Specification, conforming to TS EN 62271- 200 and TS EN 62271-100.			
6.13.2.	MBS (BOTAS PS-3/A SPP Transformer Station) shall be equipped with an Incoming- Outgoing Switchgear with CB and VT (Autoproducer) and an Incoming-Outgoing			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	Switchgear with CB for transformer protection.			
6.13.3.	HV Switchgears shall satisfy the Technical Specifications item 2.13 and its sub-items for HV Switchgears Specifications except 2.13.1 and 2.13.2.			
6.14.	Earthing and Lightning Protection			
6.14.1.	Earthing and Lightning Protection shall satisfy the Technical Specifications item 1.11 and all its sub-items for Earthing and Lightning Protection Specifications.			
6.15.	Other Requirements			
6.15.1.	Contractor shall be responsible for the connection of CCTV System, Fire Protection and Alarm System and Remote Monitoring System of BOTAS PS-3/A SPP to the living container as identified in item 2.15.2 and that is to be placed between BOTAS IDIL SPP and BOTAS PS-3/A SPP.			
6.15.2.	Other Requirements shall satisfy the Technical Specifications item 2.15 and its sub-items for Other Requirements			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	Specifications except 2.15.2 and 2.15.3.			
6.16.	CCTV/Lighting/Alarm System/Fire Protection			
6.16.1.	Contractor shall provide and install CCTV system to enable live video surveillance and further access by recording. The system shall enable audio recording as well. The system shall be monitored and controlled via PC and LED monitor that is to be positioned within the living container under item 2.15.2.			
6.16.2.	40 inches LED monitor and cabinet (with wheels) for servers placed within the living container under item 2.15.2 shall be utilized for both BOTAS IDIL SPP and BOTAS PS- 3/A SPP.			
6.16.3.	CCTV/Lighting/Alarm System/Fire Protection shall satisfy the Technical Specifications item 2.16 and its sub-items for CCTV/Lighting/Alarm System/Fire Protection Specifications except 2.16.1, 2.16.7 and 2.16.8.			
6.17.	High-Voltage (HV) Switchgear			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	BOTAS PS-3/A Distribution Station			
6.17.1.	SPP shall be connected to BOTAS PS-3/A Distribution Station by equipping BOTAS PS-3/A Distribution Station with metal enclosed HV Switchgear in accordance with the latest version of related TEDAŞ Technical Specification, conforming to TS EN 62271- 200 and TS EN 62271-100.			
6.17.2.	Incoming-Outgoing Switchgear with CB shall be placed within BOTAS PS-3/A Distribution Station, being in compliance with the existing switchgears.			
6.17.3.	CB within the Incoming-Outgoing Switchgear shall be fed from the batteries of the Battery Rectifier Group placed in BOTAS PS-3/A Distribution Station.			
6.17.4.	HV Switchgear BOTAS PS-3/A Distribution Station shall satisfy the Technical Specifications sub-items 2.17.4, 2.17.5, 2.17.6, 2.17.7 and 2.17.8 for HV Switchgear BOTAS SARIL Distribution Station.			
6.18.	Grid Connection			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
6.18.1.	Single-direction meter positioned within the Current and Voltage Metering Switchgear with LBS within BOTAS PS-3/A Distribution Station shall be replaced with at least two bi- directional electronic meters (one principal, one spare) both conforming to TS EN 50470- 1 and TS EN 50470-3.			
6.18.2.	Electronic meters shall have RS485 or RJ45 communication port as minimum.			
6.18.3.	Existing Current and Voltage Metering Switchgear with LBS within BOTAS PS-3/A Distribution Station shall be equipped with an Energy/Power Quality Analyzer that enables measurement of active energy and power, reactive energy and power, frequency, voltage, power factor and current and that has real time clock feature and RS485 or RJ45 communication port.			
7.	BOTAS PIRINCLIK SPP			
7.1.	Photovoltaic Module (PV Module)			
7.1.1.	Total installed capacity (DC) of the SPP shall be minimum 1,196.91 kW _P .			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	In order to reach this value, taking into consideration the efficiency, power of each PV Module and nominal outputs, the number of modules to be installed shall be determined by tenderers and shall be specified within their offer. At least 25 (twenty-five) amounts of modules, additional to the operational ones, shall be supplied as a substitute in case of sudden failure.			
7.1.2.	PV Modules shall satisfy the Technical Specifications item 1.1 and its sub-items for PV Module Specifications except 1.1.1.			
7.2.	Inverter			
7.2.1.	Cumulative AC output power of the SPP shall be limited to 999.00 kW _{AC} . The design of SPP shall have string inverters. 1 (one) additional Inverter to the operational ones, as a substitute, shall be supplied in case of sudden failure.			
7.2.2.	Inverters shall satisfy the Technical Specifications item 1.2 and its sub-items for Inverter Specifications except 1.2.1 and 1.2.5.			
7.3.	Mounting System and Fastenings			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
7.3.1.	Mounting System and Fastenings shall satisfy the Technical Specifications item 2.3 and all its sub-items for Mounting System and Fastenings Specifications.			
7.4.	Data Logger and Remote Monitoring System			
7.4.1.	Data Logger and Remote Monitoring System shall satisfy the Technical Specifications item 1.4 and all its sub-items for Data Logger and Remote Monitoring System Specifications.			
7.5.	SCADA System			
7.5.1.	SCADA System shall satisfy the Technical Specifications item 2.5 and all its sub-items for SCADA System Specifications.			
7.6.	DC Cables			
7.6.1.	DC Cables shall satisfy the Technical Specifications item 1.6 and all its sub-items for DC Cables Specifications.			
7.7.	DC Connectors			
7.7.1.	DC Connectors shall satisfy the Technical			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	Specifications item 1.7 and all its sub-items for DC Connectors Specifications.			
7.8.	AC Cable Set (LV AC Cables, HV AC Cables)			
7.8.1.	LV and HV AC Cables shall satisfy the Technical Specifications item 2.8 and its sub- items for AC Cable Set Specifications except 2.8.5.			
7.8.2.	HV AC cables to be used in the system between MonoBlock Substation (BOTAS Pirinclik SPP Transformer Station) and BOTAS Pirinclik Distribution Station (21TR- 01300) shall be made of copper and shall be produced according to IEC 60502-2 or TSE K 204.			
7.9.	Data, Signal and Control Cables			
7.9.1.	Data, Signal and Control Cables shall satisfy the Technical Specifications item 1.9 and all its sub-items for Data, Signal and Control Cables Specifications.			
7.10.	Boards/Panels			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
7.10.1.	Boards/Panels shall satisfy the Technical Specifications item 2.10 and all its sub-items for Boards/Panels Specifications.			
7.11.	MonoBlock Substation (BOTAS Pirinclik SPP Transformer Station)			
7.11.1.	MBS (BOTAS Pirinclik SPP Transformer Station) shall satisfy the Technical Specifications item 2.11 and its sub-items for MonoBlock Substation (BOTAS SARIL SPP Transformer Station) Specifications except 2.11.5.			
7.11.2.	MBS shall be equipped with personal protection equipment including insulating (dielectric) mat, insulating rubber gloves and insulating stand with working voltage up to 36 kV.			
7.12.	Transformer			
7.12.1.	Transformer shall be required at SPP and will be positioned in the MBS (BOTAS Pirinclik SPP Transformer Station). Transformer to be used shall be a three-phase distribution			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	transformer with rated power of 1,250 kVA and HV coil rated voltage of 34.5 kV as specified in Call Letter. Transformer shall be suitable for indoor usage.			
7.12.2.	Transformer shall satisfy the Technical Specifications item 2.12 and its sub-items for Transformer Specifications except 2.12.1.			
7.13.	High-Voltage (HV) Switchgears			
7.13.1.	MBS (BOTAS Pirinclik SPP Transformer Station) shall be equipped with metal enclosed HV Switchgears in accordance with the latest version of related TEDAŞ Technical Specification, conforming to TS EN 62271- 200 and TS EN 62271-100.			
7.13.2.	MBS (BOTAS Pirinclik SPP Transformer Station) shall be equipped with an Incoming- Outgoing Switchgear with CB and VT (Autoproducer) and an Incoming-Outgoing Switchgear with CB for transformer protection.			
7.13.3.	HV Switchgears shall satisfy the Technical Specifications item 2.13 and its sub-items for HV Switchgears Specifications except 2.13.1			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	and 2.13.2.			
7.14.	Earthing and Lightning Protection			
7.14.1.	Earthing and Lightning Protection shall satisfy the Technical Specifications item 1.11 and all its sub-items for Earthing and Lightning Protection Specifications.			
7.15.	Other Requirements			
7.15.1.	Other Requirements shall satisfy the Technical Specifications item 2.15 and all its sub-items for Other Requirements Specifications.			
7.16.	CCTV/Lighting/Alarm System/Fire Protection			
7.16.1.	CCTV/Lighting/Alarm System/Fire Protection shall satisfy the Technical Specifications item 2.16 and all its sub-items for CCTV/Lighting/Alarm System/Fire Protection Specifications.			
7.17.	High-Voltage (HV) Switchgear BOTAS Pirinclik Distribution Station			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	(21TR-01300)			
7.17.1.	SPP shall be connected to BOTAS Pirinclik Distribution Station by equipping BOTAS Pirinclik Distribution Station with metal enclosed HV Switchgear in accordance with the latest version of related TEDAŞ Technical Specification, conforming to TS EN 62271- 200 and TS EN 62271-100.			
7.17.2.	Incoming-Outgoing Switchgear with CB shall be placed within BOTAS Pirinclik Distribution Station, being in compliance with the existing switchgears.			
7.17.3.	CB within the Incoming-Outgoing Switchgear shall be fed from the batteries of the Battery Rectifier Group placed in BOTAS Pirinclik Distribution Station.			
7.17.4.	HV Switchgear BOTAS Pirinclik Distribution Station shall satisfy the Technical Specifications sub-items 2.17.4, 2.17.5, 2.17.6, 2.17.7 and 2.17.8 for HV Switchgear BOTAS SARIL Distribution Station.			
7.18.	Grid Connection			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
7.18.1.	Single-direction meter positioned within the Current and Voltage Metering Switchgear with LBS within BOTAS Pirinclik Distribution Station shall be replaced with at least two bi-directional electronic meters (one principal, one spare) both conforming to TS EN 50470-1 and TS EN 50470-3.			
7.18.2.	Electronic meters shall have RS485 or RJ45 communication port as minimum.			
7.18.3.	Existing Current and Voltage Metering Switchgear with LBS within BOTAS Pirinclik Distribution Station shall be equipped with an Energy/Power Quality Analyzer that enables measurement of active energy and power, reactive energy and power, frequency, voltage, power factor and current and that has real time clock feature and RS485 or RJ45 communication port.			
8.	TEMSAN DIYARBAKIR SPP			
8.1.	Photovoltaic Module (PV Module)			
8.1.1.	Total installed capacity (DC) of the SPP shall be minimum 455.70 kW_{P} .			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	In order to reach this value, taking into consideration the efficiency, power of each PV Module and nominal outputs, the number of modules to be installed shall be determined by tenderers and shall be specified within their offer. At least 25 (twenty-five) amounts of modules, additional to the operational ones, shall be supplied as a substitute in case of sudden failure.			
8.1.2.	PV Modules shall satisfy the Technical Specifications item 1.1 and its sub-items for PV Module Specifications except 1.1.1.			
8.2.	Inverter			
8.2.1.	Cumulative AC output power of the SPP shall be limited to 400.00 kW _{AC} . The design of SPP shall have string inverters. 1 (one) additional Inverter to the operational ones, as a substitute, shall be supplied in case of sudden failure.			
8.2.2.	Inverters shall satisfy the Technical Specifications item 1.2 and its sub-items for Inverter Specifications except 1.2.1 and 1.2.5			
8.3.	Mounting System and Fastenings			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
8.3.1.	Mounting System and Fastenings shall satisfy the Technical Specifications item 2.3 and all its sub-items for Mounting System and Fastenings Specifications.			
8.4.	Data Logger and Remote Monitoring System			
8.4.1.	Data Logger and Remote Monitoring System shall satisfy the Technical Specifications item 1.4 and all its sub-items for Data Logger and Remote Monitoring System Specifications.			
8.5.	SCADA System			
8.5.1.	SCADA System shall satisfy the Technical Specifications item 2.5 and all its sub-items for SCADA System Specifications.			
8.6.	DC Cables			
8.6.1.	DC Cables shall satisfy the Technical Specifications item 1.6 and all its sub-items for DC Cables Specifications.			
8.7.	DC Connectors			
8.7.1.	DC Connectors shall satisfy the Technical			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	Specifications item 1.7 and all its sub-items for DC Connectors Specifications.			
8.8.	AC Cable Set (LV AC Cables, HV AC Cables)			
8.8.1.	LV and HV AC Cables shall satisfy the Technical Specifications item 2.8 and its sub- items for AC Cable Set Specifications except 2.8.5.			
8.8.2.	HV AC cables to be used in the system between MonoBlock Substation (TEMSAN Diyarbakir SPP Transformer Station) and TEMSAN Diyarbakir Distribution Station shall be made of copper and shall be produced according to IEC 60502-2 or TSE K 204.			
8.9.	Data, Signal and Control Cables			
8.9.1.	Data, Signal and Control Cables shall satisfy the Technical Specifications item 1.9 and all its sub-items for Data, Signal and Control Cables Specifications.			
8.10.	Boards/Panels			
8.10.1.	Boards/Panels shall satisfy the Technical Specifications item 2.10 and all its sub-items			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	for Boards/Panels Specifications.			
8.11.	MonoBlock Substation			
	(TEMSAN DIYARBAKIR SPP Transformer Station)			
8.11.1.	MBS (TEMSAN Diyarbakir SPP Transformer Station) shall satisfy the Technical Specifications item 2.11 and its sub-items for MonoBlock Substation (BOTAS SARIL SPP Transformer Station) Specifications except 2.11.5.			
8.11.2.	MBS shall be equipped with personal protection equipment including insulating (dielectric) mat, insulating rubber gloves and insulating stand with working voltage up to 36 kV.			
8.12.	Transformer			
8.12.1.	Transformer shall be required at SPP and will be positioned in the MBS (TEMSAN Diyarbakir SPP Transformer Station). Transformer to be used shall be a three-phase distribution transformer with rated power of 500 kVA and HV coil rated voltage of 34.5 kV as specified in Call Letter. Transformer			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	shall be suitable for indoor usage.			
8.12.2.	Transformer shall satisfy the Technical Specifications item 2.12 and its sub-items for Transformer Specifications except 2.12.1.			
8.13.	High-Voltage (HV) Switchgears			
8.13.1.	MBS (TEMSAN Diyarbakir SPP Transformer Station) shall be equipped with metal enclosed HV Switchgears in accordance with the latest version of related TEDAŞ Technical Specification, conforming to TS EN 62271- 200 and TS EN 62271-100.			
8.13.2.	MBS (TEMSAN Diyarbakir SPP Transformer Station) shall be equipped with an Incoming- Outgoing Switchgear with CB and VT (Autoproducer) and an Incoming-Outgoing Switchgear with CB for transformer protection.			
8.13.3.	HV Switchgears shall satisfy the Technical Specifications item 2.13 and its sub-items for HV Switchgears Specifications except 2.13.1 and 2.13.2.			
8.14.	Earthing and Lightning Protection			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
8.14.1.	Earthing and Lightning Protection shall satisfy the Technical Specifications item 1.11 and all its sub-items for Earthing and Lightning Protection Specifications.			
8.15.	Other Requirements			
8.15.1.	Other Requirements shall satisfy the Technical Specifications item 2.15 and all its sub-items for Other Requirements Specifications.			
8.16.	CCTV/Lighting/Alarm System/Fire Protection			
8.16.1.	CCTV/Lighting/Alarm System/Fire Protection shall satisfy the Technical Specifications item 2.16 and all its sub-items for CCTV/Lighting/Alarm System/Fire Protection Specifications.			
8.17.	High-Voltage (HV) Switchgear TEMSAN Diyarbakir Distribution Station			
8.17.1.	SPP shall be connected to TEMSAN Diyarbakir Distribution Station by equipping TEMSAN Diyarbakir Distribution Station			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	with metal enclosed HV Switchgear in accordance with the latest version of related TEDAŞ Technical Specification, conforming to TS EN 62271-200 and TS EN 62271-100.			
8.17.2.	Incoming-Outgoing Switchgear with CB shall be placed within TEMSAN Diyarbakir Distribution Station, being in compliance with the existing switchgears.			
8.17.3.	CB within the Incoming-Outgoing Switchgear shall be fed from the batteries of the Battery Rectifier Group placed in TEMSAN Diyarbakir Distribution Station.			
8.17.4.	HV Switchgear TEMSAN Diyarbakir Distribution Station shall satisfy the Technical Specifications sub-items 2.17.4, 2.17.5, 2.17.6, 2.17.7 and 2.17.8 for HV Switchgear BOTAS SARIL Distribution Station.			
8.18.	Grid Connection			
8.18.1.	Single-direction meter positioned within the Current and Voltage Metering Switchgear with LBS within TEMSAN Diyarbakir Distribution Station shall be replaced with at least two bi-directional electronic meters (one			
1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
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	principal, one spare) both conforming to TS EN 50470-1 and TS EN 50470-3.			
8.18.2.	Electronic meters shall have RS485 or RJ45 communication port as minimum.			
8.18.3.	Existing Current and Voltage Metering Switchgear with LBS within TEMSAN Diyarbakir Distribution Station shall be equipped with an Energy/Power Quality Analyzer that enables measurement of active energy and power, reactive energy and power, frequency, voltage, power factor and current and that has real time clock feature and RS485 or RJ45 communication port.			
9.	BOTAS SULTANHANI SPP			
9.1.	Photovoltaic Module (PV Module)			
9.1.1.	Total installed capacity (DC) of the SPP shall be minimum 2,410.56 kW _P . In order to reach this value, taking into consideration the efficiency, power of each PV Module and nominal outputs, the number of modules to be installed shall be determined by tenderers and shall be specified within			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
	of modules, additional to the operational ones, shall be supplied as a substitute in case of sudden failure.			
9.1.2.	PV Modules shall satisfy the Technical Specifications item 1.1 and its sub-items for PV Module Specifications except 1.1.1.			
9.2.	Inverter			
9.2.1.	Cumulative AC output power of the SPP shall be limited to 2,000.00 kW _{AC} . The design of SPP shall have string inverters. 1 (one) additional Inverter to the operational ones, as a substitute, shall be supplied in case of sudden failure.			
9.2.2.	Inverters shall satisfy the Technical Specifications item 1.2 and its sub-items for Inverter Specifications except 1.2.1 and 1.2.5.			
9.3.	Mounting System and Fastenings			
9.3.1.	Mounting System and Fastenings shall satisfy the Technical Specifications item 2.3 and all its sub-items for Mounting System and Fastenings Specifications.			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
9.4.	Data Logger and Remote Monitoring System			
9.4.1.	Data Logger and Remote Monitoring System shall satisfy the Technical Specifications item 1.4 and all its sub-items for Data Logger and Remote Monitoring System Specifications.			
9.5.	SCADA System			
9.5.1.	SCADA System shall satisfy the Technical Specifications item 2.5 and all its sub-items for SCADA System Specifications.			
9.6.	DC Cables			
9.6.1.	DC Cables shall satisfy the Technical Specifications item 1.6 and all its sub-items for DC Cables Specifications.			
9.7.	DC Connectors			
9.7.1.	DC Connectors shall satisfy the Technical Specifications item 1.7 and all its sub-items for DC Connectors Specifications.			
9.8.	AC Cable Set (LV AC Cables, HV AC Cables)			

1.Item Number	2.Specifications Required	3.Specifications offered	4. Notes, Remarks, Ref to Documentation	5.Evaluation Committee's Notes
9.8.1.	LV and HV AC Cables shall satisfy the Technical Specifications item 2.8 and its sub- items for AC Cable Set Specifications except 2.8.5.			
9.8.2.	HV AC cables to be used in the system between MonoBlock Substation (BOTAS Sultanhani SPP Transformer Station) and BOTAS Existing SPP Transformer Station shall be made of copper and shall be produced according to IEC 60502-2 or TSE K 204.			
9.9.	Data, Signal and Control Cables			
9.9.1.	Data, Signal and Control Cables shall satisfy the Technical Specifications item 1.9 and all its sub-items for Data, Signal and Control Cables Specifications.			
9.10.	Boards/Panels			
9.10.1.	Boards/Panels shall satisfy the Technical Specifications item 2.10 and all its sub-items for Boards/Panels Specifications.			
9.11.	MonoBlock Substation			
	(BOTAS Sultanhani SPP Transformer			

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	Station)			
9.11.1.	MBS (BOTAS Sultanhani SPP Transformer Station) shall satisfy the Technical Specifications item 2.11 and its sub-items for MonoBlock Substation (BOTAS SARIL SPP Transformer Station) Specifications except 2.11.5.			
9.11.2.	MBS shall be equipped with personal protection equipment including insulating (dielectric) mat, insulating rubber gloves and insulating stand with working voltage up to 36 kV.			
9.12.	Transformer			
9.12.1.	Transformer shall be required at SPP and will be positioned in the MBS (BOTAS Sultanhani SPP Transformer Station). Transformer to be used shall be a three-phase distribution transformer with rated power of 2,500 kVA and HV coil rated voltage of 31.5 kV as specified in Call Letter. Transformer shall be suitable for indoor usage.			
9.12.2.	Transformer shall satisfy the Technical Specifications item 2.12 and its sub-items for			

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	Transformer Specifications except 2.12.1.			
9.13.	High-Voltage (HV) Switchgears			
9.13.1.	MBS (BOTAS Sultanhani SPP Transformer Station) shall be equipped with metal enclosed HV Switchgears in accordance with the latest version of related TEDAŞ Technical Specification, conforming to TS EN 62271- 200 and TS EN 62271-100.			
9.13.2.	MBS (BOTAS Sultanhani SPP Transformer Station) shall be equipped with an Incoming- Outgoing Switchgear with LBS and an Incoming-Outgoing Switchgear with CB for transformer protection.			
9.13.3.	Incoming-Outgoing Switchgear with CB for transformer protection shall enable remote control.			
9.13.4.	HV Switchgears shall satisfy the Technical Specifications sub-items 2.13.7, 2.13.8, 2.13.9, 2.13.10 and 2.13.11 for HV Switchgears.			
9.14.	Earthing and Lightning Protection			

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9.14.1.	Earthing and Lightning Protection shall satisfy the Technical Specifications item 1.11 and all its sub-items for Earthing and Lightning Protection Specifications.			
9.15.	Other Requirements			
9.15.1.	Other Requirements shall satisfy the Technical Specifications item 2.15 and all its sub-items for Other Requirements Specifications.			
9.16.	CCTV/Lighting/Alarm System/Fire Protection			
9.16.1.	CCTV/Lighting/Alarm System/Fire Protection shall satisfy the Technical Specifications item 2.16 and all its sub-items for CCTV/Lighting/Alarm System/Fire Protection Specifications.			
9.17.	High-Voltage (HV) Switchgear BOTAS Existing SPP Transformer Station			
9.17.1.	SPP shall be connected to BOTAS Existing SPP Transformer Station by equipping BOTAS Existing SPP Transformer Station			

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	with metal enclosed HV Switchgear in accordance with the latest version of related TEDAŞ Technical Specification, conforming to TS EN 62271-200 and TS EN 62271-100.			
9.17.2.	Incoming-Outgoing Switchgear with CB shall be placed within BOTAS Existing SPP Transformer Station, being in compliance with the existing switchgears.			
9.17.3.	CB within the Incoming-Outgoing Switchgear shall be fed from the batteries of the Battery Rectifier Group placed in BOTAS Existing SPP Transformer Station.			
9.17.4.	HV Switchgear BOTAS Existing SPP Transformer Station shall satisfy the Technical Specifications sub-items 2.17.4, 2.17.5, 2.17.6, 2.17.7 and 2.17.8 for HV Switchgear BOTAS SARIL Distribution Station.			
9.18.	Grid Connection			
9.18.1.	There already exist two bi-directional electronic meters (one principal, one spare) within the existing Current and Voltage Metering Switchgear with LBS positioned in China Tianchen Engineering Corporation			

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	Mer. Cin. Distribution Station. Separate bi- directional electronic meters shall be used for each transformer to be used within SPP. As the system has two transformers, two additional bi-directional electronic meters (one principal, one spare) shall be placed within the existing Current and Voltage Metering Switchgear with LBS positioned in China Tianchen Engineering Corporation Mer. Cin. Distribution Station.			
9.18.2.	Electronic meters shall have RS485 or RJ45 communication port as minimum.			
9.18.3.	Current and voltage transformers with two separate secondary windings shall be used within the Existing Current and Voltage Metering Switchgear with LBS to feed bi- directional meters (one principal, one spare) separately.			
9.18.4.	Existing Current and Voltage Metering Switchgear with LBS within China Tianchen Engineering Corporation Mer. Cin. Distribution Station shall be equipped with an Energy/Power Quality Analyzer, unless already installed, that enables measurement of active energy and power, reactive energy and power, frequency, voltage, power factor and			

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	current and that has real time clock feature and RS485 or RJ45 communication port.			
9.18.5.	For BOTAS Sultanhani SPP project specific, there exist a SPP with the capacity of 1,188.00 kW _P /999.00 kW _{AC} , belonging to BOTAŞ, that has already been built within the same parcel with BOTAS Sultanhani SPP. Existing SPP has not been commissioned yet and commissioning of both existing and newly built SPP with the capacity of 2,410.56 kW _P /2,000.00 kW _{AC} (=3,598.56 kW _P /2,999.00 kW _{AC} in total) shall be completed by the contractor since the whole system (existing and to be builded) should be commissioned with the same application due to the breucratic reasons. Energy Transmission Line to connect the SPP with BOTAS Tuz Gölü Natural Gas Underground Storage Facility distribution system has already been built and shall again be commissioned by the contractor. Contractor shall not be responsible for any improvement/changes that may be required for the commissioning of already built SPP and Energy Transmission Line. BOTAŞ shall be responsible for any amendment that will be required for the project commissioning, if and only if required amendments are associated			

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	with or related to already built SPP and Energy Transmission Line. TEDAŞ/DisCo approved files and drawings regarding BOTAS Sultanhani SPP, shared within Tender Dossier as Appendix E - Drawings, cover only the files and drawings related to newly built SPP with the capacity of 2,410.56 $kW_P/2,000.00 kW_{AC}$.			