

BOOK No: -

CENTRAL RAILWAY



NAGPUR-DIVISION

ELECTRICAL-DEPARTMENT

GENERAL-SERVICES

TENDER NO : NGP/L/2024/T/20R Date – 17.06.2026

DUE DATE ON: - 16.07.2026 at 16.00 Hrs

Name of Work: Provision of Roof Top on grid solar plant at various stations over Nagpur Division i.e. KRTH, TAKU, KQE, DOH, POX, GDYA, BZU, PAR, NRKR, KATL, KSWR, NGP, KRI, AQ, DMN, WR & PLO etc.

Tender Cost: - Rs. 3,06,51,573.70/-

Bid security: - Rs. 6,13,000/-

Tender issued by: - Sr. Divisional Electrical Engineer (Genl)
Central Railway, Nagpur-440001

Issued to: - M/s. _____

I N D E X

Tender No: - NGP/L/2024/T/20R Date – 17.06.2026

SN	Description
1.	Tender Notice & corrigendum if any
2.	Preamble and Scope of work
3.	PART-I –Regulations for Tenders and Contracts
4	PART – II Standard General Conditions of contract
5	Tender Form
6.	Part – I, Chapter – III Prices and payments
6.	Part – I, Chapter – IV Explanatory Notes to tender schedule
7.	Part – I, Chapter – V Specification, Check list etc for preventive Maintenance
8.	Part – I, Chapter – VI Schedule of quantity and Rates
9.	Part – I, Chapter – VII Forms of Tender etc.
10.	Approved Make

CENTRAL RAILWAY
OFFICE OF THE Sr. DEE (G) NGP
E- TENDER NOTICE No. NGP/L/2024/T/20R Dtd. 17.06.2026.

Sr. Divisional Electrical Engineer (General) Central Railway, 2nd Floor, DRM Building, Kingsway Road, Nagpur-440001 for and on behalf of President of India invites E- Tender through website www.ireps.gov.in for the following work.

SN.	Name of work	Tender cost of work in Rs.	Bid security Rs.	Cost of tender form Rs.	Completion period
1	Provision of Roof Top on grid solar plant at various stations over Nagpur Division i.e. KRTH, TAKU, KQE, DOH, POX, GDYA, BZU, PAR, NRKR, KATL, KSWR, NGP, KRI, AQ, DMN, WR & PLO etc.	3,06,51,573.70/- (Three Crore Six lakh fifty-one thousand five Hundred seventy-three and seventy paise only)	6,13,000/-	Nil	12 months

The offer will remain open for 60 days.

Date & time for submission of tender - 16.07.2026 up to 16.00 Hrs
Date & time of opening of tender - 16.07.2026 up to 16.15 Hrs
Web site particulars - www.ireps.gov.in

Detailed tender notice is placed on notice board in the office of Sr. DEE (G) NGP 2nd floor DRM office building Nagpur. Further any other correction and corrigendum, if any, to be seen on web site only.

-sd-
Sr. Divisional Electrical Engineer (Genl.)
Central Railway, Nagpur
For & on behalf of President
of India

PREAMBLE AND SCOPE OF WORK
NGP/L/2024/T/20R Date – 17.06.2026

1.0.NAME OF WORK: Provision of Roof Top on grid solar plant at various stations over Nagpur Division i.e. KRTH, TAKU, KQE, DOH, POX, GDYA, BZU, PAR, NRKR, KATL, KSWR, NGP, KRI, AQ, DMN, WR & PLO etc.

2.0 SCOPE OF WORK:-

The scope of work covers Design, Supply, erection, testing and commissioning for provision of Roof top ON Grid solar plant at various stations on Nagpur Division as per Schedule.

3.0 APPROXIMATE COST OF THE WORK:- Rs. **3,06,51,573.70/-**

4.0 TIME AND DATE OF CLOSING :-Up to 16:00 Hrs on 16.07.2026

5.0 TIME AND DATE OF OPENING :-16:15 Hrs on 16.07.2026

6.0 Completion Period :-12 months

7.0 VALIDITY OF OFFER :-60 days.

8.0 Bid Security :Rs. **6,13,000/-**

Note:-1)-Tenderer shall submit Bid security as per para 5, Part-I of GCC April 2022 as details given. The Bid Security shall be deposited either in cash through e-payment gateway or submitted as Bank Guarantee bond from a scheduled commercial bank of India or as mentioned in tender documents. The Bank Guarantee bond shall be as per Annexure- VIA and shall be valid for a period of 90 days beyond the bid validity period (Details may can be seen in GCC April 2022)

2) The tender form duly filled up to be submitted as per Annexure I given in tender booklet under GCC April 2022. (EMD should be read as Bid security)

9.FOREIGN EXCHANGE:

No foreign exchange and/or import license shall be released/provided to the Contractor in connection with this contract.

10.0 GENERAL

All the works shall be carried out by the Contractor with tools and equipment's arranged by the Contractor.

1. Water / electricity / transport shall be arranged by the Contractor at his own cost. The Purchaser shall not provide the same under any circumstances. The site for depot / workshop can be provided to the Contractor on his request.
2. The Contractor shall arrange at his own cost, all tools & plants, facilities required for erection, testing and commissioning of all the equipment in compliance with the respective specifications.
3. The schedule of rates and quantities enclosed should be read in conjunction with the explanatory notes given in the tender papers.

11.0 Similar Nature of work (For cost more than Rs.50 lakhs)

(Ref- CEE/C. Rly letter no. L. 326. TL. Policy dtd. 28.03.2018)

Similar nature of works means—Supply, erection, testing and commissioning/AMC /Repairing of Solar Panels/ Solar Water Heater /Solar Lighting System /Solar Power Pack /Wind or Hybrid Power System.

Certificates from the private individuals for whom such works are executed/being executed will not be accepted.

11.1 DOCUMENTS TO BE SUBMITTED ALONG WITH TENDER:

As per GCC April 2022 with latest amendments/correction slip etc.

NOTE: - Tenderers should submit documentary proof in regard to fulfilling these eligibility criteria along with their offer. The offers of tenderers who do not meet the eligibility criteria as mentioned in **GCC Apr-2022 amended by correction slip no.2022/CE-I/CT/GCC-2022/Policy dtd. 14.07.2022& 13.12.2022** above shall not be considered. The tenderers, who fail to submit documentary proof along with their offer will normally, not be considered.

Work executed with Central/State Government Organization/Authorities, PSUs & Government of India Undertaking shall only be considered to quality above eligibility criteria. Certificates from private individual for whom such works are executed/being executed shall not be accepted.

Tenderers may carefully note that their Contract Agreement for this work is liable to be terminated at any time later. In case the documents furnished by them are found to be untrue/misleading or any adverse point comes to light subsequently. The decision of Railway in this regard shall be final and binding for any additional information contact by Sr. Divisional Electric Engineer (General) Central Railway, Nagpur in his office on any working day between 10:00 hours to 17:30 hours

12. GENERAL CONDITION OF CONTRACT:

Unless otherwise stated in the tender papers, contract shall be governed by "General Condition of Contract" applicable for Central Railway, copy of which is available, for reference in the office of the **Senior Divisional Electrical Engineer (Genl) Nagpur**. For block working in Nagpur division, rules/procedure stipulated in PDSR (Power Distribution & Subsidiary

Rules) and G&SR (General & Subsidiary Rules) as applicable for Nagpur division shall be followed. Successful tenderer shall ensure himself & his staff for getting acquaintance of these rules.

13.00 SUBMISSION OF DOCUMENTS: -The tenderer is required to submit the documents along with the tender as per **GCC April 2022 with** amended time to time as above. New GCC can be downloaded from Railway site.

A- List of personnel in the Organization available on hand and proposed to be engaged for the subject work.

B-List of Plant & Machinery available on hand (own) and proposed to be inducted (own & hired to be given separately) for the subject work.

c-The tenderers shall submit a CERTIFICATE as per Annex. V, that they are not liable to be disqualified and all their statements/documents submitted along with bid are true and factual. Standard format of the certificate /affidavit to be submitted by the bidder. Non submission of an affidavit/certificate by the bidder shall result in summary rejection of his/their bid. And it shall be mandatorily incumbent upon the tenderer to identify, state and submit the supporting documents duly self-attested by which they/he is qualifying the Qualifying Criteria mentioned in the Tender Document. It will not be obligatory on the part of Tender Committee to scrutinize beyond the submitted document of tenderer as far as his qualification for the tender is concerned.

14. GENERAL CONDITION OF CONTRACT: Unless otherwise stated in the tender papers, contract shall be governed by “General Condition of Contract” applicable for Central Railway, copy of which is available, for reference in the office of the **Senior Divisional Electrical Engineer (Genl) Nagpur**. For block working in Nagpur division, rules/procedure stipulated in PDSR (Power Distribution & Subsidiary Rules) and G&SR (General & Subsidiary Rules) as applicable for Nagpur division shall be followed. Successful tenderer shall ensure himself & his staff for getting acquaintance of these rules.

15.0 ADDRESSES: - Relevant addresses for specified purposes in connection with the tender are given below:

15.1 For Contract execution –Senior Divisional Electrical Engineer, (General) Nagpur, DRM’s Bldg., 2nd floor, Central Railway,Nagpur-440 001.**15.2 For Security Deposit / Earnest Money Deposit. Senior Divisional Finance Manager, Nagpur** DRM’s Bldg., 2nd floor, Central Railway, Nagpur-440 001.**Indian Railways Standard General Conditions of Contract, April-2022**

The GCC, April 2022 has been uploaded on Railway Board’s website. It may be accessed through the path: www.indianrailways.gov.in/railwayboard “About Indian Railways”>* “Railway Board Directorates” >> “Civil Engineering” ** “IR General Conditions of Contracts” ** IR General Condition of Contracts- 2022

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Part -I
Chapter- IV
EXPLANATORY NOTES OF TENDER SCHEDULE
Tender No: - NGP/L/2024/T/20R Date – 17.06.2026

Name of work: Provision of Roof Top on grid solar plant at various stations over Nagpur Division i.e. KRTH, TAKU, KQE, DOH, POX, GDYA, BZU, PAR, NRKR, KATL, KSWR, NGP, KRI, AQ, DMN, WR & PLO etc.

The scope of work covers the electrical work for Provision of Roof Top ON grid Solar Power plant of various capacity at various stations of various location. (i.e. KRTH, TAKU, KQE, DOH, POX, GDYA, BZU, PAR, NRKR, KATL, KSWR, NGP, KRI, AQ, DMN, WR & PLO etc.) over NGP division. with associated accessories/equipment’s as per schedule and specifications given in an approved manner and as per IS standard. It is to be noted that the quantity may be varied as per requirement at the time of execution of work.

In case of any discrepancy / difference between description mentioned in the schedule of price and explanatory note of each item, the description specified in explanatory note and decision taken by Sr. DEE(G)NGP shall be applicable.

Schedule item no. 1

SETC of 25 KWp ON-GRID Solar PV System/ Plant consisting Solar PV Panel and Solar ON-GRID Inverter of similar capacity (THD<3%) with interconnecting wires/cables up to solar ON GRID inverter, proper base plate, canopy box to house Inverter and necessary accessories i.e. ACDB/DCDB ,MCB etc.wiring up to solar Inverter in casing and capping, display board,sign board,two distincte arthing, lightning arrester, liais oning charges, remote monitoring system with maintaining card/chip for 5 years including net charges for RMS System, complete up to net meter installation and export to the grid with 5year ON-SITE warranty and fully comprehensive maintenance contract complete.

Price shall cover for Design, Supplying, installing, testing and commissioning of 25 KWp ON-GRID Solar PV System / Plant consisting Solar PV Poly Crystalline Panel and Solar ON-GRID Inverter of similar capacity (THD<3%) with interconnecting wires / cables up to solar ON GRID inverter, proper base plate, canopy box to house Inverter and necessary accessories i.e. ACDB/ DCDB , MCB etc. wiring up to solar Inverter in casing and capping, display board, sign board, two distinct earthing, lightning arrester, liaisoning charges, remote monitoring system with maintaining card/chip for 5 years including net charges for RMS System, complete up to net meter installation and export to the grid with 5 year ON-SITE warranty and fully comprehensive maintenance contract complete as per the standard specifications complete in an approved manner as per site requirement and as per instruction of site engineer. Price shall also include the cost of Solar generation meter.

25 KWp Solar plant

Sr. No.	Parameter	Specifications
INVERTER		
1	Rated output power of inverter (Kw)	25
2	Switching device	MOSFET/IGBT
3	No, of phase (in Nos)	3
4	Inverter output wave form	Pure sign wave
5	Technology	MPPT based
6	No. of MPPT per inverter (in Nos)	1
7	No. of string at input side of inverter (input port +ve and -ve) (hint: 1 set contains 1 -ve and 1 -ve port)	2 sets
8	Maximum power point tracker	Integrated in the PCU/inverter to maximize energy drawn from the array
9	Operating voltage range of inverter	200V to 1000V
10	Over load support at input side, DC	10% overload DC capacity

11	Maximum input current for each MPPT (in A)	11
12	Service condition	Outdoor
13	Ingress protection rating of inverter	IP 65 (for outdoor use)
14	Cooling medium for inverter	Intelligent fan cooling
15	Manual switch for disconnecting DC supply	yes
16	Inverter mounting type	Yes, wall mounted
17	Standard accessories for inverter	MB4 DC connectors, AC connectors, Nut bolts and inverter manuals.
18	Isolation between input DC and output AC	yes
GENERIC		
1	A grid tied photo voltaic (SPV) power plant consist of	SPV array, module mounting structure, power conditioning unit (PCU), power point tracker (MPPT), inverter and controls and protections, interconnect cable and switches,
2	PV array mounting	Mounted on a suitable structure
3	Grid tied SPV system is	Without battery and designed with necessary features to supplement the grid power during day time
4	Component and parts used in the SPV power plants including the PV module, Metallic structure, cables junction box, switches, PCUs etc.	As per relevant BIS or IEC on international specification, as applicable.
5	Installation and testing for complete system	Yes, including civil work, designing, fabrication, cabling work with suitable bolts, nuts, clamps, connectors and testing etc.
INVERTER OUTPUT		
1	Maximum current for 3 phase inverters (in A)	19.1
2	Output voltage (in V)	415 for 3 phases
3	Inverter Auto trip at output side	Lower at: 304V, higher: at 460V with adjustable.
4	Frequency range	50Hz +/-3
5	grid voltage tolerance	+3 Hz or more
6	Grid frequency synchronization range	-20% and +15%
7	Overall efficiency (in %)	>96
8	Frequency measurement for power conditioners/inverters	As per IEC 61683/IS:61683
9	Environmental testing for power conditioners/inverters	As per IEC 60068-2(1,2,14,30)/equivalent BIS standard.
10	PCU/Inverter shall be capable of complete automatic operation for testing for power conditioners/inverters	Wake up, synchronization and shut down.
PROTECTION FOR INVERTER		
1	Output over current protection	Yes
2	Output over voltage protection	Yes
3	Short circuit protection	Yes
4	Over load protection	125% for 30 Sec.
5	Over temperature protection	Yes at 65-degree C. Cooling fan will auto switch on.
6	Surge protection	Metal oxide varistor (MOV)
7	Insulation resistance monitoring	Yes
8	Grid monitoring protection	Yes

9	THD (in %)	<3%
10	Power factor at output power	0.9
11	Inverter body material	Aluminium casting
SERVICE CONDITION		
1	Operating temperature	-25 to +60 deg. C.
2	Relative humidity (in %)	>95 % non-condensing
3	Maximum altitude at above sea level (in m)	4000
DISPLAY FEATURES ON INVERTER		
1	Type of display	LCD type
2	Net meter	Approved by Govt. of India/state govt. authority concerned for connecting to grid.
Add On item DC DISTRIBUTION BOARD		
1	DC distribution panel to receive the DC from array field	Yes, with surge arresters
2	Ingress protection (Enclosure protection) of DCDB	IP 65
3	Material of bus bar and size	Copper, size as per inverter rating
4	Circuit breaker for input side (DC side) for each inverter	As per requirement
Add On item CABLE FOR INPUT		
1	ISI marked connecting cables according to inverter rating for each system	PV module to inverter DC
2	Electric cable for input	copper cable as per requirement (as per IS: 694:2010 latest)
3	Cable length for PV module to inverter, DC (in m)	As per site requirement
Add On item AC DISTRIBUTION BOARD		
1	AC distribution panel board (DPB) for controlling the AC power from PCU/Inverter.	3 phase 415V +/-10%, 50Hz +/-3Hz
2	Panel construction.	Metal clad, totally enclosed, floor mounted, air insulate, cubical type with changeover switch.
3	Ingress protection (Enclosure protection) of ACDB	IP 65 for outdoor
4	All switches and circuit breakers, connector should conform to	IS:60947 part-I, II and III
5	Panels designed for minimum expected ambient temperature	45 deg. C.
6	Circuit breaker for output side (AC side) for each inverter	As per requirement
Add On item CABLE FOR OUTPUT		
1	ISI marked connecting cables according to inverter rating for each system	From inverter to net meter
2	Conformity of the specification for the cable.	Copper flexible cable as per requirement (as per IS:694:2010 latest)
3	Cable length for output side (from inverter to net meter for each system (in m)	As per site requirement.
Other add on item		
1	Cabling work at input side for each system	With PVC conduit pipe with necessary clamps and screws.
2	Cabling work at output side for each system	With fiber/plastic cable tray of suitable size with fitment accessories.
3	Lightening arrester for each unit	Yes
4	Danger boards and Signages	G.I. Pipe, GI wires and

		Earthing as per IS: 3043-1987.
PV MODULE		
1	PV module manufactured in	India
2	PV module conforming to	As per IEC 61215/IS:14286 latest for Poly crystalline silicon.
3	PV modules construction, testing and safety requirement.	As per IEC 61730(Part 1) and (Part 2} latest
4	PV module shall comply salt mist corrosion testing	As per IEC 61701/IS:61701 latest
5	PV module rating	Poly crystalline – 335/340Wp or above
6	Tolerance for rated output power of PV module	+/-3%
7	No. of PV module for each solar power plant system	Suitable Nos.
8	The peak power point voltage and the peak power point current of any supplied module.	Not vary by more than 2%
9	Protective device against surge at the PV module.	Yes
10	Material for module frame (corrosion resistant)	Anodized Alluminium
11	Each PV module shall supply with RF ID tag with complete information about PV module.	Yes
ARRAY STRUCTURE		
1	Material of mounting surface.	Hot dipped galvanized mounting structure
2	Angle of inclination as per site condition to take maximum isolation	Yes, for each mounting structure.
3	Material of mounting structure for mounting the modules/panes /arrays.	Structural shed, Grade: E300 (as per IS:2062:2011 latest)
4	Galvanization of mounting structure.	As per IS:4759 latest
5	Structure material shall be corrosion resistant and electrolytically compatible.	Module frame, fasteners, nut and bolts.
6	Material of fasteners	Steel as per IS:1367(Pt.1):2002 latest.
7	The structure design	Designed to easy replacement of module.
8	Civil structure	As per load bearing capacity of roof, wind pressure and wind velocity of specific place SPV Panel load.
9	The total load of the structure (when installed the PV module)	less than 60 Kg/m2, on the surface
10	Minimum clearance of the structure from the roof level.	300 mm
11	Wate Proofing	Proper water proofing of grouting and foundation so, that there shall be no water leakage.
12	Proof Checking	Proof checking of design as per load bearing capacity of roof , wind velocity, wind pressure and load of SPV Module.
JUNCTION BOX		
1	The junction boxes	Provided in the PV array for termination of connecting cables.
2	Junction box on PV module	Sealed type.
3	Material of junction box	FRP
4	Ingress protection (degree of protection) for	IP 65
5	Wire/cables termination	Through cable lugs

6	Input and output termination	Through single or double compression glands.
7	Copper bus bar/terminal blocks housed in the junction box with suitable termination threads	Yes
8	Provision of Earthing	Yes
9	Surge protection device for each junction box.	Yes
WIND LOAD		
1	The mounting structure shall be so designed to withstand the speed of the wind zone of the location where a PV system is proposed to be installed.	Yes
2	Compliance to wind velocity test for the mounting structure of the PV system.	As per IS 875:1987-part 3 latest
3	Regional wind withstand capacity which the mounting structure of PV system support is suitable to withstand (in Km/Hr)	150
WARRANTEE & GAURANTEE		
1	Minimum guarantee for maintain of out peak watt capacity.	>/=90% at the end of 10 yrs and >/= 80% at the end of 25 yrs.
2	Warrantee for PV modules from the date of supply as per MNRE specification.	>/= 25 yrs
3	The warrantee card	Contain the details of the system and information about the system and condition of warrantee
4	Operation and maintenance manual for each solar module shall be furnish to the buyer/Consignee.	Solar PV system out of synchronization and disconnected from the grid.
5	Provision for isolation for inverter output with respect to the grid,	Provided with 4 pole isolators.
6	Locking facility for isolation switch	Yes
CERTIFICATIONS		
1	PV module shall comply with BIS compulsory registration scheme and certificate shall furnish to buyer/consignee on demand	Yes
2	BIS CRS certificate for PV module	As per IS:14286 (for Poly crystalline silicon PV modules)
3	BIS CRS number must declare	R-84002607
4	Availability of type reports wind load withstand test for mounting structure including calculation sheet from central govt. Lab/NABL.ILAC accredited lab to prove conformity of specification and agreed to furnish test report and certificates.	Yes
5	Availability of type test reports for PCUs/Inverters. PV module to prove the conformity of the specification from	MNRE approved Lab

6	Agreed to furnish all the test report and certification to buyer/consignee on demand.	Yes
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Note: Equivalent standards may be used for different system components of the plants.

Warranty:

The Supplier/Contractor shall Warranty, satisfactory performance of 25 KWp Grid connected solar power plant and allied equipment’s as given in TERMS & CONDITIONS OF CONTRACT from the date of handing over of the installation to the Railway in normal working conditions. During the Warranty period the Supplier/Contractor shall rectify free of cost of all defects which may develop due to faulty design, material failure and bad workmanship inclusive of free replacement of defective parts. On every occasion when the equipment goes out of service. During the warranty period the parts of the equipment’s requiring repairs or replacements will be handed over to the contractor at site and the parts after repairs or replacements shall be fitted in the equipment at site by the contractor. All expenses involved in full filling the above warranty obligations shall be borne by the contractor. **The cost includes Maintenance contract for warranty period. Any repairs including replacement of spares for any required is the responsibility of contractor and total system warrantee 5 yrs.**

Schedule item no. -2

SETC of 20 KWp ON-GRID Solar PV System/ Plant consisting Solar PV Panel and Solar ON-GRID Inverter of similar capacity (THD<3%) with interconnecting wires/cables up to solar ON GRID inverter, proper base plate, canopy box to house Inverter and necessary accessories i.e. ACDB/DCDB ,MCB etc.wiring up to solar Inverter in casing and capping, display board,sign board,two distincte arthing, lightning arrester, liaisoning charges, remote monitoring system with maintaining card/chip for 5 years including net charges for RMS System, complete up to net meter installation and export to the grid with 5year ON-SITE warranty and fully comprehensive maintenance contract complete.

Price shall cover for Design, Supply, Installation, testing and commissioning of 20 KWp roof top on-grid solar plant with, MPPT technology with SPV array, Module Mounting Structure, Power Conditioning unit (PCU) consisting of Maximum Power Point Tracker (MPPT), Inverter 3 phase (20KW output Pure sine wave inverter), and Controls and Protections, interconnect Cables and switches etc. 20 KWp ON-GRID Solar PV System / Plant consisting Solar PV Poly Crystalline Panel or Mono Crystalline Panel or latest as per the requirement or suitable nos. and Solar ON-GRID Inverter of similar capacity (THD<3%) with interconnecting wires / cables up to solar ON GRID inverter, proper base plate, Canopy box to house Inverter and necessary accessories i.e. ACDB/ DCDB , MCB etc. wiring up to solar Inverter in casing and capping, display board, sign board, two distinct earthing, lightning arrester, liaisoning charges, remote monitoring system with maintaining card/chip for 5 years including net charges for RMS System, complete up to net meter installation and export to the grid with 5 year ON-SITE warranty and fully comprehensive maintenance contract complete as per the standard specifications complete in an approved manner as per site requirement and as per instruction of site engineer. Price shall also include the cost of Solar generation meter.

20 KWp Solar plant

Sr. No.	Parameter	Specifications
INVERTER		
1	Rated output power of inverter (Kw)	20
2	Switching device	MOSFET/IGBT
3	No, of phase (in Nos)	3
4	Inverter output wave form	Pure sign wave
5	Technology	MPPT based
6	No. of MPPT per inverter (in Nos)	1
7	No. of string at input side of	2 sets

	inverter (input port +ve and -ve) (hint: 1 set contains 1 -ve and 1 -ve port)	
8	Maximum power point tracker	Integrated in the PCU/inverter to maximize energy drawn from the array
9	Operating voltage range of inverter	200V to 1000V
10	Over load support at input side, DC	10% overload DC capacity
11	Maximum input current for each MPPT (in A)	11
12	Service condition	Outdoor
13	Ingress protection rating of inverter	IP 65 (for outdoor use)
14	Cooling medium for inverter	Intelligent fan cooling
15	Manual switch for disconnecting DC supply	yes
16	Inverter mounting type	Yes, wall mounted
17	Standard accessories for inverter	MB4 DC connectors, AC connectors, Nut bolts and inverter manuals.
18	Isolation between input DC and output AC	yes
GENERIC		
1	A grid tied photo voltaic (SPV) power plant consist of	SPV array, module mounting structure, power conditioning unit (PCU), power point tracker (MPPT), inverter and controls and protections, interconnect cable and switches,
2	PV array mounting	Mounted on a suitable structure
3	Grid tied SPV system is	Without battery and designed with necessary features to supplement the grid power during day time
4	Component and parts used in the SPV power plants including the PV module, Metallic structure, cables junction box, switches, PCUs etc.	As per relevant BIS or IEC on international specification, as applicable.
5	Installation and testing for complete system	Yes, including civil work, designing, fabrication, cabling work with suitable bolts, nuts, clamps, connectors and testing etc.
INVERTER OUTPUT		
1	Maximum current for 3 phase inverters (in A)	19.1
2	Output voltage (in V)	415 for 3 phases
3	Inverter Auto trip at output side	Lower at: 304V, higher: at 460V with adjustable.
4	Frequency range	50Hz +/-3
5	grid voltage tolerance	+3 Hz or more
6	Grid frequency synchronization range	-20% and +15%
7	Overall efficiency (in %)	>96
8	Frequency measurement for power conditioners/inverters	As per IEC 61683/IS:61683
9	Environmental testing for power conditioners/inverters	As per IEC 60068-2(1,2,14,30)/equivalent BIS standard.
10	PCU/Inverter shall be capable of complete automatic operation for testing for power conditioners/inverters	Wake up, synchronization and shut down.
PROTECTION FOR INVERTER		
1	Output over current protection	Yes

2	Output over voltage protection	Yes
3	Short circuit protection	Yes
4	Over load protection	125% for 30 Sec.
5	Over temperature protection	Yes at 65-degree C. Cooling fan will auto switch on.
6	Surge protection	Metal oxide varistor (MOV)
7	Insulation resistance monitoring	Yes
8	Grid monitoring protection	Yes
9	THD (in %)	<3%
10	Power factor at output power	0.9
11	Inverter body material	Aluminium casting
SERVICE CONDITION		
1	Operating temperature	-25 to +60 deg. C.
2	Relative humidity (in %)	>95 % non-condensing
3	Maximum altitude at above sea level (in m)	4000
DISPLAY FEATURES ON INVERTER		
1	Type of display	LCD type
2	Net meter	Approved by Govt. of India/state govt. authority concerned for connecting to grid.
Add On item DC DISTRIBUTION BOARD		
1	DC distribution panel to receive the DC from array field	Yes, with surge arresters
2	Ingress protection (Enclosure protection) of DCDB	IP 65
3	Material of bus bar and size	Copper, size as per inverter rating
4	Circuit breaker for input side (DC side) for each inverter	As per requirement
Add On item CABLE FOR INPUT		
1	ISI marked connecting cables according to inverter rating for each system	PV module to inverter DC
2	Electric cable for input	copper cable as per requirement (as per IS: 694:2010 latest)
3	Cable length for PV module to inverter, DC (in m)	As per site requirement
Add On item AC DISTRIBUTION BOARD		
1	AC distribution panel board (DPB) for controlling the AC power from PCU/Inverter.	3 phase 415V +/-10%, 50Hz +/-3Hz
2	Panel construction.	Metal clad, totally enclosed, floor mounted, air insulate, cubical type with changeover switch.
3	Ingress protection (Enclosure protection) of ACDB	IP 65 for outdoor
4	All switches and circuit breakers, connector should conform to	IS:60947 part-I, II and III
5	Panels designed for minimum expected ambient temperature	45 deg. C.
6	Circuit breaker for output side (AC side) for each inverter	As per requirement
Add On item CABLE FOR OUTPUT		
1	ISI marked connecting cables according to inverter rating for each system	From inverter to net meter
2	Conformity of the specification for the cable.	Copper flexible cable as per requirement (as per IS:694:2010 latest)
3	Cable length for output side	As per site requirement.

	(from inverter to net meter for each system (in m)	
Other add on item		
1	Cabling work at input side for each system	With PVC conduit pipe with necessary clamps and screws.
2	Cabling work at output side for each system	With fiber/plastic cable tray of suitable size with fitment accessories.
3	Lightening arrester for each unit	Yes
4	Danger boards and Signages	G.I. Pipe, GI wires and Earthing as per IS: 3043-1987.
PV MODULE		
1	PV module manufactured in	India
2	PV module conforming to	As per IEC 61215/IS:14286 latest for Poly or Mono crystalline silicon or latest
3	PV modules construction, testing and safety requirement.	As per IEC 61730(Part 1) and (Part 2} latest
4	PV module shall comply salt mist corrosion testing	As per IEC 61701/IS:61701 latest
5	PV module rating	Poly crystalline or Mono crystalline or latest
6	Tolerance for rated output power of PV module	+/-3%
7	No. of PV module for each solar power plant system	Suitable Nos.
8	The peak power point voltage and the peak power point current of any supplied module.	Not vary by more than 2%
9	Protective device against surge at the PV module.	Yes
10	Material for module frame (corrosion resistant)	Anodized Alluminium
11	Each PV module shall supply with RF ID tag with complete information about PV module.	Yes
ARRAY STRUCTURE		
1	Material of mounting surface.	Hot dipped galvanized mounting structure
2	Angle of inclination as per site condition to take maximum isolation	Yes, for each mounting structure.
3	Material of mounting structure for mounting the modules/panes /arrays.	Structural shed, Grade: E300 (as per IS:2062:2011 latest)
4	Galvanization of mounting structure.	As per IS:4759 latest
5	Structure material shall be corrosion resistant and electrolytically compatible.	Module frame, fasteners, nut and bolts.
6	Material of fasteners	Steel as per IS:1367(Pt.1):2002 latest.
7	The structure design	Designed to easy replacement of module.
8	Civil structure	As per load bearing capacity of roof, wind pressure and wind velocity of specific place SPV Panel load.
9	The total load of the structure (when installed the PV module)	less than 60 Kg/m2, on the surface
10	Minimum clearance of the structure from the roof level.	300 mm
11	Wate Proofing	Proper water proofing of grouting and foundation so, that there shall be no water leakage.
12	Proof Checking	Proof checking of design as per load bearing capacity of roof , wind velocity, wind pressure

		and load of SPV Module.
JUNCTION BOX		
1	The junction boxes	Provided in the PV array for termination of connecting cables.
2	Junction box on PV module	Sealed type.
3	Material of junction box	FRP
4	Ingress protection (degree of protection) for	IP 65
5	Wire/cables termination	Through cable lugs
6	Input and output termination	Through single or double compression glands.
7	Copper bus bar/terminal blocks housed in the junction box with suitable termination threads	Yes
8	Provision of Earthing	Yes
9	Surge protection device for each junction box.	Yes
WIND LOAD		
1	The mounting structure shall be so designed to withstand the speed of the wind zone of the location where a PV system is proposed to be installed.	Yes
2	Compliance to wind velocity test for the mounting structure of the PV system.	As per IS 875:1987-part 3 latest
3	Regional wind withstand capacity which the mounting structure of PV system support is suitable to withstand (in Km/Hr)	150
WARRANTEE & GAURANTEE		
1	Minimum guarantee for maintain of out peak watt capacity.	>/=90% at the end of 10 yrs and >/= 80% at the end of 25 yrs.
2	Warrantee for PV modules from the date of supply as per MNRE specification.	>/= 25 yrs
3	The warrantee card	Contain the details of the system and information about the system and condition of warrantee
4	Operation and maintenance manual for each solar module shall be furnish to the buyer/Consignee.	Solar PV system out of synchronization and disconnected from the grid.
5	Provision for isolation for inverter output with respect to the grid,	Provided with 4 pole isolators.
6	Locking facility for isolation switch	Yes
CERTIFICATIONS		
1	PV module shall comply with BIS compulsory registration scheme and certificate shall furnish to buyer/consignee on demand	Yes
2	BIS CRS certificate for PV module	As per IS:14286 (for Poly crystalline silicon or Mono crystalline silicon PV modules or latest)
3	BIS CRS number must declare	R-84002607
4	Availability of type reports wind load withstand test for mounting structure including calculation	Yes

	sheet from central govt. Lab/NABL.ILAC accredited lab to prove conformity of specification and agreed to furnish test report and certificates.	
5	Availability of type test reports for PCUs/Inverters. PV module to prove the conformity of the specification from	MNRE approved Lab
6	Agreed to furnish all the test report and certification to buyer/consignee on demand.	Yes

Note: Equivalent standards may be used for different system components of the plants.

Warranty:

The Supplier/Contractor shall Warranty, satisfactory performance of 25 KWp Grid connected solar power plant and allied equipments as given in TERMS & CONDITIONS OF CONTRACT from the date of handing over of the installation to the Railway in normal working conditions. During the Warranty period the Supplier/Contractor shall rectify free of cost of all defects which may develop due to faulty design, material failure and bad workmanship inclusive of free replacement of defective parts. On every occasion when the equipment goes out of service. During the warranty period the parts of the equipments requiring repairs or replacements will be handed over to the contractor at site and the parts after repairs or replacements shall be fitted in the equipment at site by the contractor. All expenses involved in full filling the above warranty obligations shall be borne by the contractor. **The cost includes Maintenance contract for warranty period. Any repairs including replacement of spares for any required is the responsibility of contractor and total system warrantee 5 yrs.**

Schedule item no. 3

SETC of 10 KWp ON-GRID Solar PV System/ Plant consisting Solar PV Panel and Solar ON-GRID Inverter of similar capacity (THD<3%) with interconnecting wires/cables up to solar ON GRID inverter, proper base plate, canopy box to house Inverter and necessary accessories i.e. ACDB/DCDB ,MCB etc.wiring up to solar Inverter in casing and capping, display board,sign board,two distinct arthing, lightning arrester, liaisoning charges, remote monitoring system with maintaining card/chip for 5 years including net charges for RMS System,complete up to net meter installation and export to the grid with 5year ON-SITE warranty and fully comprehensive maintenance contract complete.

Price shall cover for Supplying, installing, testing and commissioning of 10 kWp ON-GRID Solar PV System / Plant consisting Solar PV Poly Crystalline Panel or Mono Crystalline Panel or latest as per the requirement or suitable nos. and Solar ON-GRID Inverter of similar capacity (THD<3%) with interconnecting wires / cables up to solar ON GRID inverter, proper base plate, Canopy box to house Inverter and necessary accessories i.e. ACDB/ DCDB , MCB etc. wiring up to solar Inverter in casing and capping, display board, sign board, two distinct Earthing, lightning arrester, liaisoning charges, remote monitoring system with maintaining card/chip for 5 years including net charges for RMS system, complete up to net meter installation and export to the grid with 5 year ON-SITE warranty and fully comprehensive maintenance contract complete in an approved manner as per site requirement and as per instruction of site engineer. Price shall also include the cost of solar generation meter.

10 KWp Solar plant

Sr. No.	Parameter	Specifications
INVERTER		
1	Rated output power of inverter (Kw)	10
2	Switching device	MOSFET/IGBT
3	No, of phase (in Nos)	3
4	Inverter output wave form	Pure sign wave
5	Technology	MPPT based
6	No. of MPPT per inverter (in Nos)	1

7	No. of string at input side of inverter (input port +ve and -ve) (hint: 1 set contains 1 -ve and 1 -ve port)	2 sets
8	Maximum power point tracker	Integrated in the PCU/inverter to maximize energy drawn from the array
9	Operating voltage range of inverter	200V to 1000V
10	Over load support at input side, DC	10% overload DC capacity
11	Maximum input current for each MPPT (in A)	11
12	Service condition	Outdoor
13	Ingress protection rating of inverter	IP 65 (for outdoor use)
14	Cooling medium for inverter	Intelligent fan cooling
15	Manual switch for disconnecting DC supply	yes
16	Inverter mounting type	Yes, wall mounted
17	Standard accessories for inverter	MB4 DC connectors, AC connectors, Nut bolts and inverter manuals.
18	Isolation between input DC and output AC	yes
GENERIC		
1	A grid tied photo voltaic (SPV) power plant consist of	SPV array, module mounting structure, power conditioning unit (PCU), power point tracker (MPPT), inverter and controls and protections, interconnect cable and switches,
2	PV array mounting	Mounted on a suitable structure
3	Grid tied SPV system is	Without battery and designed with necessary features to supplement the grid power during day time
4	Component and parts used in the SPV power plants including the PV module, Metallic structure, cables junction box, switches, PCUs etc.	As per relevant BIS or IEC on international specification, as applicable.
5	Installation and testing for complete system	Yes, including civil work, designing, fabrication, cabling work with suitable bolts, nuts, clamps, connectors and testing etc.
INVERTER OUTPUT		
1	Maximum current for 3 phase inverters (in A)	19.1
2	Output voltage (in V)	415 for 3 phases
3	Inverter Auto trip at output side	Lower at: 304V, higher: at 460V with adjustable.
4	Frequency range	50Hz +/-3
5	grid voltage tolerance	+3 Hz or more
6	Grid frequency synchronization range	-20% and +15%
7	Overall efficiency (in %)	>96
8	Frequency measurement for power conditioners/inverters	As per IEC 61683/IS:61683
9	Environmental testing for power conditioners/inverters	As per IEC 60068-2(1,2,14,30)/equivalent BIS standard.
10	PCU/Inverter shall be capable of complete automatic operation for testing for power conditioners/inverters	Wake up, synchronization and shut down.

PROTECTION FOR INVERTER		
1	Output over current protection	Yes
2	Output over voltage protection	Yes
3	Short circuit protection	Yes
4	Over load protection	125% for 30 Sec.
5	Over temperature protection	Yes at 65-degree C. Cooling fan will auto switch on.
6	Surge protection	Metal oxide varistor (MOV)
7	Insulation resistance monitoring	Yes
8	Grid monitoring protection	Yes
9	THD (in %)	<3%
10	Power factor at output power	0.9
11	Inverter body material	Aluminium casting
SERVICE CONDITION		
1	Operating temperature	-25 to +60 deg. C.
2	Relative humidity (in %)	>95 % non-condensing
3	Maximum altitude at above sea level (in m)	4000
DISPLAY FEATURES ON INVERTER		
1	Type of display	LCD type
2	Net meter	Approved by Govt. of India/state govt. authority concerned for connecting to grid.
Add On item DC DISTRIBUTION BOARD		
1	DC distribution panel to receive the DC from array field	Yes, with surge arresters
2	Ingress protection (Enclosure protection) of DCDB	IP 65
3	Material of bus bar and size	Copper, size as per inverter rating
4	Circuit breaker for input side (DC side) for each inverter	MCB 10A or as per requirement
Add On item CABLE FOR INPUT		
1	ISI marked connecting cables according to inverter rating for each system	PV module to inverter DC
2	Electric cable for input	1Cx4 Sq.mm copper cable (as per IS: 694:2010 latest)
3	Cable length for PV module to inverter, DC (in m)	As per site requirement
Add On item AC DISTRIBUTION BOARD		
1	AC distribution panel board (DPB) for controlling the AC power from PCU/Inverter.	3 phase 415V +/-10%, 50Hz +/-3Hz
2	Panel construction.	Metal clad, totally enclosed, floor mounted, air insulate, cubical type with changeover switch.
3	Ingress protection (Enclosure protection) of ACDB	IP 65 for outdoor
4	All switches and circuit breakers, connector should conform to	IS:60947 part-I, II and III
5	Panels designed for minimum expected ambient temperature	45 deg. C.
6	Circuit breaker for output side (AC side) for each inverter	MCB 10A or as per requirement
Add On item CABLE FOR OUTPUT		
1	ISI marked connecting cables according to inverter rating for each system	From inverter to net meter

2	Conformity of the specification for the cable.	4 core x10 Sq.mm copper flexible cable (as per IS:694:2010 latest)
3	Cable length for output side (from inverter to net meter for each system (in m)	As per site requirement.
Other add on item		
1	Cabling work at input side for each system	With PVC conduit pipe with necessary clamps and screws.
2	Cabling work at output side for each system	With fiber/plastic cable tray of suitable size with fitment accessories.
3	Lightening arrester for each unit	Yes
4	Danger boards and Signages	G.I. Pipe, GI wires and Earthing as per IS: 3043-1987.
PV MODULE		
1	PV module manufactured in	India
2	PV module conforming to	As per IEC 61215/IS:14286 latest for Poly or Mono crystalline silicon or latest .
3	PV modules construction, testing and safety requirement.	As per IEC 61730(Part 1) and (Part 2} latest
4	PV module shall comply salt mist corrosion testing	As per IEC 61701/IS:61701 latest
5	PV module rating	Poly crystalline or Mono crystalline silicon or latest
6	Tolerance for rated output power of PV module	+/-3%
7	No. of PV module for each solar power plant system	Suitable Nos.
8	The peak power point voltage and the peak power point current of any supplied module.	Not vary by more than 2%
9	Protective device against surge at the PV module.	Yes
10	Material for module frame (corrosion resistant)	Anodized Alluminium
11	Each PV module shall supply with RF ID tag with complete information about PV module.	Yes
ARRAY STRUCTURE		
1	Material of mounting surface.	Hot dipped galvanized mounting structure
2	Angle of inclination as per site condition to take maximum isolation	Yes, for each mounting structure.
3	Material of mounting structure for mounting the modules/panes /arrays.	Structural shed, Grade: E300 (as per IS:2062:2011 latest)
4	Galvanization of mounting structure.	As per IS:4759 latest
5	Structure material shall be corrosion resistant and electrolytically compatible.	Module frame, fasteners, nut and bolts.
6	Material of fasteners	Steel as per IS:1367(Pt.1):2002 latest.
7	The structure design	Designed to easy replacement of module.
8	Civil structure	As per load bearing capacity of roof, wind pressure and wind velocity of specific place SPV Panel load.
9	The total load of the structure (when installed the PV module)	less than 60 Kg/m2, on the surface
10	Minimum clearance of the structure from the roof level.	300 mm

11	Wate Proofing	Proper water proofing of grouting and foundation so, that there shall be no water leakage.
12	Proof Checking	Proof checking of design as per load bearing capacity of roof , wind velocity, wind pressure and load of SPV Module.
JUNCTION BOX		
1	The junction boxes	Provided in the PV array for termination of connecting cables.
2	Junction box on PV module	Sealed type.
3	Material of junction box	FRP
4	Ingress protection (degree of protection) for	IP 65
5	Wire/cables termination	Through cable lugs
6	Input and output termination	Through single or double compression glands.
7	Cupper bus bar/terminal blocks housed in the junction box with suitable termination threads	Yes
8	Provision of Earthing	Yes
9	Surge protection device for each junction box.	Yes
WIND LOAD		
1	The mounting structure shall be so designed to withstand the speed of the wind zone of the location where a PV system is proposed to be installed.	Yes
2	Compliance to wind velocity test for the mounting structure of the PV system.	As per IS 875:1987-part 3 latest
3	Regional wind withstand capacity which the mounting structure of PV system support is suitable to withstand (in Km/Hr)	150
WARRANTEE & GAURANTEE		
1	Minimum guarantee for maintain of out peak watt capacity.	>/=90% at the end of 10 yrs and >/= 80% at the end of 25 yrs.
2	Warrantee for PV modules from the date of supply as per MNRE specification.	>/= 25 yrs
3	The warrantee card	Contain the details of the system and information about the system and condition of warrantee
4	Operation and maintenance manual for each solar module shall be furnish to the buyer/Consignee.	Solar PV system out of synchronization and disconnected from the grid.
5	Provision for isolation for inverter output with respect to the grid,	Provided with 4 pole isolators.
6	Locking facility for isolation switch	Yes
CERTIFICATIONS		
1	PV module shall comply with BIS compulsory registration scheme and certificate shall furnish to buyer/consignee on demand	Yes
2	BIS CRS certificate for PV module	As per IS:14286 (for Poly crystalline silicon or Mono crystalline silicon PV modules or latest)
3	BIS CRS number must declare	R-84002607
4	Availability of type reports wind	Yes

	load withstand test for mounting structure including calculation sheet from central govt. Lab/NABL/ILAC accredited lab to prove conformity of specification and agreed to furnish test report and certificates.	
5	Availability of type test reports for PCUs/Inverters. PV module to prove the conformity of the specification from	MNRE approved Lab
6	Agreed to furnish all the test report and certification to buyer/consignee on demand.	Yes

Note: Equivalent standards may be used for different system components of the plants.

Warranty:

The Supplier/Contractor shall Warranty, satisfactory performance of 10 kWp Grid connected solar power plant and allied equipments as given in TERMS & CONDITIONS OF CONTRACT from the date of handing over of the installation to the Railway in normal working conditions. During the Warranty period the Supplier/Contractor shall rectify free of cost of all defects which may develop due to faulty design, material failure and bad work man ship inclusive of free replacement of defective parts. On every occasion when the equipment goes out of service. During the warranty period the parts of the equipments requiring repairs or replacements will be handed over to the contractor at site and the parts after repairs or replacements shall be fitted in the equipment at site by the contractor. All expenses involved in full filling the above warranty obligations shall be borne by the contractor. **The cost includes Maintenance contract for warranty period. Any repairs including replacement of spares for any required is the responsibility of contractor and total system warrantee 5 yrs.**

Schedule item no. -4

SETC of 5 KWp roof top on-grid solar plant with, MPPT technology with SPV array, Module Mounting Structure, Power Conditioning Unit (PCU) consisting of Maximum Power Point Tracker (MPPT), Inverter 3 phase (5KW output puresine wave inverter), and Controls and Protections, inter connect cables and switches all complete up to net meter installation and export to the grid with 5 year ON-SITE warranty and fully comprehensive maintenance contract complete.as per the standard specifications.

Price shall cover for Design, supply, installation, testing and commissioning of 5 KWp roof top on-grid solar plant with , MPPT technology with SPV array, Module Mounting Structure, Power Conditioning Unit (PCU) consisting of Maximum Power Point Tracker (MPPT), Inverter 3phase (5KW output pure sine wave inverter), and Controls and Protections, interconnect cables and switches etc. 5 KWp ON-GRID Solar PV System / Plant consisting PV Poly Crystalline Panel or Mono Panel or latest and Solar ON-GRID Inverter of similar capacity (THD<3%) with interconnecting wires/ cables up to solar ON GRID inverter, proper base plate, Canopy box to house Inverter and necessary accessories i.e. ACDB/ DCDB , MCB etc. wiring up to solar Inverter in casing and capping, display board, sign board, two distinct earthing, lightning arrester, liaisoning charges, remote monitoring system with maintaining card/chip for 5 years including net charges for RMS System, complete up to net meter installation and export to the grid with 5 year ON-SITE warranty and fully comprehensive maintenance contract complete as per the standard specifications complete in an approved manner as per site requirement and as per instruction of site engineer. Price shall also include the cost of Solar generation meter.

5 KWP Solar plant

Sr. No.	Parameter	Specifications
INVERTER		
1	Rated output power of inverter (Kw)	5KW
2	Switching device	MOSFET/IGBT
3	No, of phase (in Nos)	3
4	Inverter output wave form	Pure sign wave

5	Technology	MPPT based
6	No. of MPPT per inverter (in Nos)	2
7	No. of string at input side of inverter (input port +ve and -ve) (hint: 1 set contains 1 -ve and 1 -ve port)	3 sets
8	Maximum power point tracker	Integrated in the PCU/inverter to maximize energy drawn from the array
9	Operating voltage range of inverter	160V to 850V
10	Over load support at input side, DC	30% of maximum input voltage for 3 phase system.
11	Maximum input current for each MPPT (in A)	18
12	Service condition	Outdoor
13	Ingress protection rating of inverter	IP 65 (for outdoor use)
14	Cooling medium for inverter	Constant speed fan cooled
15	Manual switch for disconnecting DC supply	Yes
16	Inverter mounting type	Yes, wall mounted
17	Standard accessories for inverter	MB4 DC connectors, AC connectors, Nut bolts and inverter manuals.
18	Isolation between input DC and output AC	Yes
GENERIC		
1	A grid tied photo voltaic (SPV) power plant consist of	SPV array, module mounting structure, power conditioning unit (PCU), power point tracker (MPPT), inverter and controls and protections, interconnect cable and switches,
2	PV array mounting	Mounted on a suitable structure
3	Grid tied SPV system is	Without battery and designed with necessary features to supplement the grid power during day time
4	Component and parts used in the SPV power plants including the PV module, Metallic structure, cables junction box, switches, PCUs etc.	As per relevant BIS or IEC on international specification, as applicable.
5	Installation and testing for complete system	Yes, including civil work, designing, fabrication, cabling work with suitable bolts, nuts, clamps, connectors and testing etc.
INVERTER OUTPUT		
1	Maximum current for 3 phase inverters (in A)	27
2	Output voltage (in V)	415 for 3 phases
3	Inverter Auto trip at output side	Lower at: 304V, higher: at 460V with adjustable.
4	Frequency range	50Hz +/-3
5	grid voltage tolerance	+3 Hz or more
6	Grid frequency synchronization range	-20% and +15%
7	Overall efficiency (in %)	>96
8	Frequency measurement for power conditioners/inverters	As per IEC 61683/IS:61683
9	Environmental testing for power conditioners/inverters	As per IEC 60068-2(1,2,14,30)/equivalent BIS standard.
10	PCU/Inverter shall be capable of complete automatic operation for testing for power conditioners/inverters	Wake up, synchronization and shut down.
PROTECTION FOR INVERTER		
1	Output over current protection	Yes

2	Output over voltage protection	Yes
3	Short circuit protection	Yes
4	Over load protection	125% for 30 Sec.
5	Over temperature protection	Yes at 65-degree C. Cooling fan will auto switch on.
6	Surge protection	Metal oxide varistor (MOV)
7	Insulation resistance monitoring	Yes
8	Grid monitoring protection	Yes
9	THD (in %)	<3%
10	Power factor at output power	0.9
11	Inverter body material	Aluminium casting
SERVICE CONDITION		
1	Operating temperature	-25 to +60 deg. C.
2	Relative humidity (in %)	>95 % non-condensing
3	Maximum altitude at above sea level (in m)	4000
DISPLAY FEATURES ON INVERTER		
1	Type of display	LCD type
2	Net meter	Approved by Govt. of India/state govt. authority concerned for connecting to grid.
3	Generating power data storage facility	Yes for 1 yr from the date of commissioning.
4	Interface facility for transmitting the generating power data for cloud storage.	With Wi-Fi Net
Add On item DC DISTRIBUTION BOARD		
1	DC distribution panel to receive the DC from array field	Yes, with surge arresters
2	Ingress protection (Enclosure protection) of DCDB	IP 65
3	Material of busbar and size	Copper, size as per inverter rating
4	Circuit breaker for input side (DC side) for each inverter	MCB 10A or as per requirement
Add On item CABLE FOR INPUT		
1	ISI marked connecting cables according to inverter rating for each system	PV module to inverter DC
2	Electric cable for input	1Cx4 Sq.mm copper cable (as per IS: 694:2010 latest)
3	Cable length for PV module to inverter, DC (in m)	As per site requirement
Add On item AC DISTRIBUTION BOARD		
1	AC distribution panel board (DPB) for controlling the AC power from PCU/Inverter.	3 phase 415V +/-10%, 50Hz +/-3Hz
2	Panel construction.	Metal clad, totally enclosed, floor mounted, air insulate, cubical type with changeover switch.
3	Ingress protection (Enclosure protection) of ACDB	IP 65 for outdoor
4	All switches sand te circuit breakers, connector should conform to	IS:60947 part-I, II and III
5	Panels designed for minimum expected ambient temperature	45 deg. C.
6	Circuit breaker for output side (AC side) for each inverter	MCB 10A or as per requirement
Add On item CABLE FOR OUTPUT		
1	ISI marked connecting cables according to inverter rating for each system	From inverter to net meter

2	Conformity of the specification for the cable.	4Cx4 Sq.mm copper flexible cable (as per IS: 694:2010 latest)
3	Cable length for output side (from inverter to net meter for each system (in m)	As per site requirement.
Other add on item		
1	Cabling work at input side for each system	With PVC conduit pipe with necessary clamps and screws.
2	Cabling work at output side for each system	With fiber/plastic cable tray with fitment accessories.
3	Lightening arrester for each unit	Yes
4	Danger boards and signages	G.I. Pipe, GI wires and earthing as per IS:3043-1987.
PV MODULE		
1	PV module manufactured in	India
2	PV module conforming to	As per IEC 61215/IS:14286 latest for Poly or Mono crystalline silicon or latest .
3	PV modules construction, testing and safety requirement.	As per IEC 61730(Part 1) and (Part 2) latest
4	PV module shall comply salt mist corrosion testing	As per IEC 61701/IS:61701 latest
5	PV module rating	Poly crystalline or Mono crystalline silicon or latest
6	Tolerance for rated output power of PV module	+/-3%
7	No. of PV module for each solar power plant system	Suitable nos.
8	The peak power point voltage and the peak power point current of any supplied module.	Not vary by more than 2%
9	Protective device against surge at the PV module.	Yes
10	Material for module frame (corrosion resistant)	Anodized aluminium
11	Each PV module supply with	IV curve sheet at STC.
12	Each PV module shall supply with RF ID tag with complete information about PV module.	Yes
ARRAY STRUCTURE		
1	Material of mounting surface.	Hot dipped galvanized GI mounting structure
2	Angle of inclination as per site condition to take maximum isolation	Yes, for each mounting structure.
3	Material of mounting structure for mounting the modules/panes /arrays.	Structural shed, Grade: E300 (as per IS:2062:2011 latest)
4	Galvanization of mounting structure.	As per IS:4759 latest
5	Structure material shall be corrosion resistant and electrolytically compatible.	Module frame, fasteners, nut and bolts.
6	Material of fasteners	Steel as per IS:1367(Pt.1):2002 latest.
7	The structure design	Designed to easy replacement of module.
8	Civil structure	As per load bearing capacity of roof, wind pressure and wind velocity of specific place SPV Panel load.
9	The total load of the structure (when installed the PV module)	less than 60 Kg/m2, on the surface
10	Minimum clearance of the structure from the roof level.	300 mm

11	Wate Proofing	Proper water proofing of grouting and foundation so, that there shall be no water leakage.
12	Proof Checking	Proof checking of design as per load bearing capacity of roof , wind velocity, wind pressure and load of SPV Module.
JUNCTION BOX		
1	The junction boxes	Provided in the PV array for termination of connecting cables.
2	Junction box on PV module	Sealed type.
3	Material of junction box	FRP
4	Ingress protection (degree of protection) for	IP 65
5	Wire/cables termination	Through cable lugs
6	Input and output termination	Through single or double compression glands.
7	Cupper busbar/terminal blocks housed in the junction box with suitable termination threads	Yes
8	Provision of earthing	Yes
9	Surge protection device for each junction box.	Yes
WIND LOAD		
1	The mounting structure shall be so designed to withstand the speed of the wind zone of the location where a OV system is proposed to be installed.	Yes
2	Compliance to wind velocity test for the mounting structure of the PV system.	As per IS 875:1987-part 3 latest
3	Regional wind withstand capacity which the mounting structure of PV system support is suitable to withstand (in Km/Hr)	150
WARRANTEE & GAURANTEE		
1	Minimum guarantee for maintain of out peak watt capacity.	>/=90% at the end of 10 yrs and >/= 80% at the end of 25 yrs.
2	Warrantee for PV modules from yeh date of supply as per MNRE specification.	>/= 25 yrs
3	The warrantee card	Contain the details of the system and information about the system and condition of warrantee
4	Operation and maintenance manual for each solar module shall be furnish to the buyer/Consignee.	Yes
5	In case of grid failure, or low or high voltage.	Solar PV system out of synchronization and disconnected from the grid.
6	Provision for isolation for inverter output with respect to the grid,	Provided with 4 pole isolators.
7	Locking facility for isolation switch	Yes
CERTIFICATIONS		
1	PV module shall comply with BIS compulsory registration scheme and certificate shall furnish to buyer/consignee on demand	Yes
2	BIS CRS certificate for PV module	As per IS:14286 (for Poly crystalline silicon or Mono crystalline silicon PV modules or latest)
3	BIS CRS number must declare	NIR1248547

4	Availability of type reports wind load withstand test for mounting structure including calculation sheet from central govt. Lab/NABL/ILAC accredited lab to prove conformity of specification and agreed to furnish test report and certificates.	Yes
5	Availability of type test reports for PCUs/Inverters. PV module to prove the conformity of the specification from	MNRE approved Lab
6	Agreed to furnish all the test report and certification to buyer/consignee on demand.	Yes

Note: Equivalent standards may be used for different system components of the plants.

Warranty:

The Supplier/Contractor shall Warranty, satisfactory performance of 5 kWp Grid connected solar power plant and allied equipments as given in TERMS & CONDITIONS OF CONTRACT from the date of handing over of the installation to the Railway in normal working conditions. During the Warranty period the Supplier/Contractor shall rectify free of cost of all defects which may develop due to faulty design, material failure and bad workmanship inclusive of free replacement of defective parts. On every occasion when the equipment goes out of service. During the warranty period the parts of the equipments requiring repairs or replacements will be handed over to the contractor at site and the parts after repairs or replacements shall be fitted in the equipment at site by the contractor. All expenses involved in fulfilling the above warranty obligations shall be borne by the contractor. **The cost includes Maintenance contract for warranty period. Any repairs including replacement of spares for any required is the responsibility of contractor and total system warrantee 5 yrs.**

Schedule item no. -5

SETC of LT PVC insulated, armoured, PVC sheathed Allu. Conductor cables size of 4 Core 25 Sq. mm with aluminium lugs, glands suitable nut bolt etc.

Price shall cover for Supply, Transportation, laying, connecting and commissioning of specified size of LT XLPE insulated, stranded, PVC outer sheathed armoured aluminum conductor cable in the trench under the track/ under ordinary soil/ along the wall/truss/purl in of cover over shed with proper cheating arrangement. The cable shall be confirming to ISS 7098 latest. The cable should be connected by providing heavy duty lugs of suitable size and heat shrinkage transparent sleeve to be provided by provision of suitable code numbering on both ends covering the portion of lugs sleeve and 2 “length of cable portion. After connection cable should be properly dressed up with the help of suitable clamping with rubber spacing or suitable plastic cable tie. While dressing the laying should be ensured straight and turning point it should be of 90 degree with suitable curve. Price also includes the Laying & saddling of cable on Wall/MS girder complete Lug glands etc with MS clamps Hardware& painting as per site requirement.

(i) 4 Core 25 Sq.mm.

Schedule item no. 6

Provision of trench in all kind of normal Soil to depth 40x100cm & filling the trench (After laying cable) to bring the original condition.

Excavation of cable trench in all types of soil of size 400mm wide x 1 mtr. deep and making good of the same to its original form and shape after complete including all connected materials and works. Price shall cover for providing excavation and backfilling of the trench of size 400mm wide and 1000mm deep in all kinds of soil, if not mentioned anywhere or as per details specification given for cable laying. The work shall also include providing bricks, sand layer of 200mm thick in the trench for embedding the cable and providing cable route marker made of M.S. angle of size 40x40x6mm in “J” shape 1300mm long in the trench before laying the cable. A nameplate of size 130x100x10mm indicating raised type letters for “C.R.-LT Cable” shall be provided on the top of angle size 40*x*40x6 mm duly riveted at two locations. The cable route marker shall be provided at a distance of 15 mtrs apart.

Schedule item no. 7

Provision of trench in hard rock/soil/road track crossing to depth 40x100cm & filling the trench (After laying to bring the original condition.)

Price shall cover for providing excavation and backfilling of the trench of size 400mm wide and 1000mm deep (if not mentioned anywhere or as per details specification given for cable laying) under the railway track/cement concrete / spun pipe in the trench. The work shall also include providing supply & laying of 150 mm dia. circular RCC pipes/HDPE pipe as per schedule and cable route marker made of M.S. angle of size 40x40x6mm in “J” shape 1300mm long in the trench before laying the cable. A nameplate of size 130x100x10mm indicating raised type letters for “C.R.-LT Cable” shall be provided on the top of angle size 40x40x6mm duly revetted at two locations. The cable route marker shall be provided at a distance of 15 meters a part. The flooring shall be made good with cement concrete as original by the contractor after completion of trenching work up to the satisfaction of the Engineer at Site. The exact route of the HT/LT cable is to be decided in consultation with Engineer in charge.

Schedule item no. -8

Supply and laying of 63mm outer dia.(2") size of HDPE pipe for cable supporting Grade PE- 100,PN 6 (Kg/Cm2Capacity) as per IS 4984-1995 or latest, complete with all connected accessories required as per site conditions as per the specification. The pipe shall be laid with UG cable along with earth wire where laid in cable trench sand breaking hard soil/ concrete/road etc.

Price shall cover for Supply and laying of 63 mm outer dia(2") size of HDPE pipe for cable supporting Grade PE- 100, PN 6 (Kg/Cm2 Capacity) as per IS 4984 -1995 or latest , complete with all connected accessories required as per site conditions as per the specification. The pipe shall be laid with UG cable along with earth wire where laid in cable trenches and breaking hard soil/concrete/ road etc. in an approved manner as per instruction of site engineer.

Schedule item no. -9

SETC of DPX3 160 thermal magnetic based release;1cu = 36kA;63A 4 Pole MCCB conform to IEC 60947-2of or its equivalent with extended ROM, spreader links (2 sets)

Price shall cover for supply and fixing of 63A 4 Pole MCCB in Suitable MS cover or in available electric panel (if available) having following features-

- MCCBs for switching, remote tripping and protection of low voltage electrical system.
- It should have thermal magnetic based release.
- Breaking capacity Icu = 36Ka.
- It should conform to IEC 60947-2 of or its equivalent with extended ROM, with spreader links (2 sets).Make- L&T, Schneider, Havells, Legrand of standard model and as per list of makes attached.

Schedule item no. -10

Supply and fixing of D curve FP MCBs of 32 A with all connected accessories.

Price shall cover for supply and fixing of D curve Four Pole MCB of 32 Amp in suitable MS cover, breaking capacity -10 KA, ISI Marked as per IS/IEC 60898-1 2002, Sliding bottom clamp, IP 20 protected terminals. Color coded on/off indication on dolly. Make- L&T, Schneider, Havell’s or equivalent to DX3 32 FP Model of Legrand complete in an approved manner as per instruction of site engineer.

Schedule item no. -11

Provision of M.S. Work for Ladder size as per site requirement complete with fixing arrangement.

The price shall cover the cost of fabricating and erecting M.S. work for additional height of solar plant as per site requirement alongwith clamp, nut bolts etc. riveted, bolted or welded in built up sections including cutting, grinding and straightening, drilling, riveting, handling, hoisting and fixing in position etc. including applying a priming coat of approved steel primer etc. and duly painted with fine finish with contractors steel and materials. The work shall be done as per the site requirement in an approved manner and as per the instructions of field supervisor.

List of locations for provision of On Grid Solar Power plants

Provision of Roof Top Solar Plant of various capacity on NGP Divn. (Feasible location are given below)			
S. No.	Name of Station	Location	Proposed Capacity of solar plant In KWP
SSE EL Amla			
1	KRTH	Station Building	10
2	TAKU	New Station Building	10
3	KQE	New Station Building	20
4	POX	New Station Building	10
5	DOH	PWI office	5
6	DOH	Station Building	10
7	GDYA	Station Building	20
8	BZU	RPF barrack	20
9	PAR	Old DYSS office	10
SSE (EL) NGP			
1	NRKR	New Station Building	10
2	KATAL	Station Building	30
3	KSWR	New PRS building	10
4	NGP	Control Building	70
5	NGP	Running Room	50
SSE (EL) AQ			
1	KRI	Station Building	10
2	Ajni	DTC	30
3	Ajni	C-cabin	20
4	Ajni	B-cabin	15
5	Ajni	MELPL	20
SSE (EL) WR			
1	Wardha	New PRS building	15
2	Wardha	SSE Elect. depot	15
3	Wardha	Telecom office	20
4	Wardha	Repiter building	10
5	Wardha	RRI Building	15
6	Wardha	GRPF/C&W Building	20
7	Wardha	Union Office	15
8	Wardha	WR substation 500KVA	5
9	Wardha	RMS	20
10	Wardha	Retiring Room PF-1/2	5
11	Wardha	Toilet at station PF-1/2	5
12	Wardha	New Running room	5
SSE (EL) BPQ			
1	PLO	New PRS building	20
		Total	575

Note- The locations in the above list are tentative and may change or shifted as per site requirement within Nagpur division.

Part -I Chapter VI

SCHEDULE OF QUANTITY AND RATES

Schedule of quantity and rates
Tender No: - NGP/L/2024/T/20R Date – 17.06.2026

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Name of work: Provision of Roof Top on grid solar plant at various stations over Nagpur Division i.e. KRTH, TAKU, KQE, DOH, POX, GDYA, BZU, PAR, NRKR, KATL, KSWR, NGP, KRI, AQ, DMN, WR & PLO etc.

Sr. No.	Item description	S/E	Unit	Unit Rate	Qty	Total Amount
1	SETC of 25 KWp ON-GRID Solar PV System/ Plant consisting Solar PV Panel and Solar ON-GRID Inverter of similar capacity (THD<3%) with interconnecting wires/cables up to solar ON GRID inverter, proper base plate, canopy box to house Inverter and necessary accessories i.e. ACDB/DCDB ,MCB etc. wiring up to solar Inverter in casing and capping, display board, sign board, two distinct arthing, lightning arrester, liaisoning charges, remote monitoring system with maintaining card/chip for 5 years including net charges for RMS System, complete up to net meter installation and export to the grid with 5year ON-SITE warranty and fully comprehensive maintenance contract complete. Tentative locations - NGP & AQ,	S&E	Set	1203027.27	5	6015136
2	SETC of 20 KWp ON-GRID Solar PV System/ Plant consisting Solar PV Panel and Solar ON-GRID Inverter of similar capacity (THD<3%) with interconnecting wires/cables up to solar ON GRID inverter, proper base plate, canopy box to house Inverter and necessary accessories i.e. ACDB/DCDB ,MCB etc.wiring up to solar Inverterin casing and capping, display board,sign board,two distincte arthing, lightning arrester, liaisoning charges, remote monitoring system with maintaining card/chip for 5 years including net charges for RMS System,complete up to net meter installation and export to the grid with 5year ON-SITE warranty and fully comprehensive maintenance contract complete. Tentative locations - KQE, GDYA, BZU, NGP, AQ, DMN, WR & PLO.	S&E	Set	1073150.62	10	10731506
3	SETC of 10 KWp ON-GRID Solar PV System/ Plant consisting Solar PV Panel and Solar ON-GRID Inverter of similar capacity (THD<3%) with interconnecting wires/cables up to solar ON GRID inverter, proper base plate, canopy box to house Inverter and necessary accessories i.e. ACDB/DCDB ,MCB etc. wiring up to solar Inverter in casing and capping, display board, sign board, two distinct earthing, lightning arrester, liaisoning charges, remote monitoring system with maintaining card/chip for 5 years including net charges for RMS System, complete up to net meter installation and export to the grid with 5year ON-SITE warranty and fully comprehensive maintenance contract complete. Tentative locations - KRTH, TAKU, POX, DOH, PAR, NRKR, KATL, KSWR, AQ, WR.	S&E	Set	493491.13	20	9869823

4	SETC of 5 KWp roof top on-grid solar plant with, MPPT technology with SPV array, Module Mounting Structure, Power Conditioning Unit (PCU) consisting of Maximum Power Point Tracker (MPPT), Inverter 3 phase (5KW output puresine wave inverter), and Controls and Protections, inter connect cables and switches all complete up to net meter installation and export to the grid with 5 year ON-SITE warranty and fully comprehensive maintenance contract complete.as per the standard specifications. Tentative locations - DOH, KRI, AQ, WR.	S&E	Set	222204.38	10	2222044
5	SETC of LT PVC insulated, armoured, PVC sheathed Allu. Conductor cables size of 4 Core 25 Sq. mm with aluminium lugs, glands suitable nut bolt etc.	S&E	Mtrs.	160.83	3000	482490
6	Provision of trench in all kind of normal Soil to depth 40x100cm & filling the trench (After laying cable) to bring the original condition.	S&E	Mtrs.	78.58	1600	125728
7	Provision of trench in hard rock/soil/road track crossing to depth 40x100cm & filling the trench (After laying to bring the original condition.	S&E	Mtrs.	171.33	500	85665
8	Supply and laying of 63mm outer dia.(2") size of HDPE pipe for cable supporting Grade PE- 100,PN 6 (Kg/Cm2Capacity) as per IS 4984-1995 or latest, complete with all connected accessories required as per site conditions as per the specification. The pipe shall be laid with UG cable along with earth wire where laid in cable trenche sand breaking hard soil/ concrete/road etc.	S&E	Mtrs.	72.02	2200	158444
9	SETC of DPX3 160 thermal magnetic based release;1cu = 36kA;63A 4 Pole MCCB conform to IEC 60947-2of or its equivalent with extended ROM, spreader links (2 sets)	S&E	Nos.	10074.33	15	151115
10	Supply and fixing of D curve FP MCBs of 32 A with all connected accessories.	S&E	Nos.	1941.96	30	58259
11	Provision of M.S. Work for Ladder size as per site requirement complete with fixing arrangement.	S&E	Kgs	81.67	9200	751364.00
	Total Tender cost					30651573.70

(Total cost in words Rupees Three Crore Six lakh fifty-one thousand five Hundred seventy-three and seventy paisa only).

Sr. DEE (G) NGP

Note: A. The quantities shown in Schedule are approximate and are as a guide to give the tenderer(s) an idea of quantum of work involved. The Railway reserves the right to increase/ decrease and/or delete or include any of the quantities given in tender schedule and no extra rate will be allowed on this account.
Note B. The above rates shall be firm, inclusive of all taxes, duties, freight and other incidental charges.

- 1. Before quoting the rates, the tenderer should visit the site and read explanatory note. In case of any discrepancy between description of price schedule items and explanatory notes of each item, the details specified in explanatory notes with latest design of lift and as per site requirement shall be applicable.
- 2. All the bidders / tenders should ensure that they are GST compliant and their quoted tax structure / rates are as per GST Law.
- 3. The quantities mentioned above are tentative, however these may change as per requirement and site conditions.
- 4. The tenderer shall quote the all-inclusive rates i.e., Labour, Material, tools / repair Maintenance, license fee, Inspection etc. Including **GST and income tax** etc. No additional payment shall be paid by railway other than accepted offer.

CERTIFICATE OF OFFER

I/We agree to execute the above work: -

i) At Par with the Railway's estimated rates.

OR

ii)% (in figure).....% (in words) below the Railway's estimated rates.

OR

iii) % (in figure)% (in words) above the Railway's estimated rates.

Contractor’s seal

Contractor's Signature.....Date.....