



ಭಾರತ ಹೆವಿ ಎಲೆಕ್ಟ್ರಿಕಲ್ಸ್ ಲಿಮಿಟೆಡ್
भारत हेवी इलेक्ट्रिकल्स लिमिटेड
Bharat Heavy Electricals Limited
(A Government of India Undertaking)
ELECTRONICS DIVISION

P.B.No 2606, Mysore Road, Bangalore - 560 026
An ISO 9001, ISO 14001 & OHSAS 18001 Company

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**Addendum to RFQ : HBSMM20002 dt. 25.10.2013 RFQ Due Date:
18.11.2013 for 15MW Solar Photo Voltaic Plant at NTPC-Singrauli,MP**

Following revision/ modifications are incorporated in the specification :

AA. Revision in scope of supply :

1. Supply of 12 nos of 1600kVA Transformers with 1 Set of Spares as per ps-439-847 enclosed.(Details as per attachment). Enclosures B1 & B2 have been revised accordingly. Please submit your offer in the revised Formats only.
2. Change in scope/specification in existing line items of PS-439-858.

BB. Dwg No. 36790500658: Single Line diagram-AC revised. Revised SLD is enclosed.

CC. Due date is revised to 25.11.2013.

All other terms and conditions of RFQ remain unchanged.


Sr.MANAGER (SC&PV/MM)

List of Enclosures :

1. Revised Request For Quotation(RFQ)
2. Addendum with details of change in specification.
3. Transformer Specification PS-439-847.
4. Revised SLD : Dwg No. 36790500658.
5. Revised Enclosures B,B1 & B2.

पंजीकृत कार्यालय : ' भेल हाउस ', सिरी फोर्ट , नई दिल्ली – 110 049
Regd. Office : BHEL House, Siri Fort, New Delhi – 110 049

REQUEST FOR QUOTATION

 MMI:PU:RF:003	BHARAT HEAVY ELECTRICALS LIMITED Electronics Division PB No. 2606, Mysore Road Bangalore - 560026 INDIA	RFQ NUMBER: HBSMM20002 RFQ DATE : 25.OCT.2013	Due Date 25.NOV.2013 Time: 13:00 HRS VENUE : NEW ENGG. BLDG
		(for all correspondence) Purchase Executive : SRINIVAS H B Phone : 26998452 Fax : 00918026989217 E-mail: srinivasahb@bheledn.co.in	

Please submit your lowest quotation subject to our terms and conditions attached for the material mentioned below. The quotation must be enclosed in a sealed envelope / Fax superscribed with RFQ no. and due date, should reach us on or before the due date by **13.00** hours IST and will be opened on the same day at **13.30** hours at the venue mentioned above. **PLEASE DROP THE OFFER IN THE BOX PROVIDED AT RECEPTION.**

SI No.	Description	Qty	Unit	Delivery qty	Delivery Date
1	PS0679033084 Transformer 3-winding 1600kVA ONAN Supply of transformer 33kV/xxx-xxx V, outdoor, oil-immersion type, ONAN, 3-phase, 3-windings with two identical LV windings and one HV winding as per BHEL spec PS-439-847 Annexure to Addendum -1. LV voltage is expected to be between 270V and 385V. Similarly, vector group is expected to be Dyn11yn11. Vendors shall submit their offer based on these expected values. The exact voltage and vector group will be intimated to the vendors before opening price bid. Test Certificate	12	NO	12	17.FEB.2014
2	PS0679033092 Spare items for 1600kVA transformer Supply of spare items for 33kV/xxx-xxx V, outdoor, oil-immersion type, ONAN, 3-phase, 3-winding transformer as per BHEL spec PS-439-847. Annexure to Addendum-1 Test Certificate	1	ST	1	17.FEB.2014
3	PS0679033467 Supply of MC4, Cable tie, HDPE pipe etc Supply of MC4 connectors, cable ties, HDPE conduits, cable lugs, hardware, cable trays, submersible pumps (for bore wells) etc as per clauses 5.5, 5.7, 5.9, 5.10, 5.11. of BHEL Spec PS-439-858. Test Certificate	1	ST	1	17.FEB.2014
4	PS0679033475 Supply of LT/HT/data cables, kits etc Supply of LT power cables, HT (33kV) power cables, control / instrumentation cables with cable installation accessories, hardware, termination kits etc as per clauses 5.20, 5.21 of BHEL spec PS-439-858. Test Certificate	1	ST	1	17.FEB.2014
5	PS0679033483 Supply of Materials for Inv. Room Supply of materials for construction of inverter rooms as per clause 5.14 of BHEL spec PS-439-858. (1 set = 1 inverter room) Test Certificate	5	ST	5	17.FEB.2014
6	PS0679033491 Supply of DG Set, Aux Transformer etc Supply of auxiliary transformer, ACDB / DCDB panels, battery banks, battery chargers, DG set with all related accessories and hardware as per clauses 5.27-5.31 of BHEL spec Ps-439-858	1	ST	1	17.FEB.2014

For and On behalf of BHEL.

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REQUEST FOR QUOTATION

	BHARAT HEAVY ELECTRICALS LIMITED Electronics Division PB No. 2606, Mysore Road Bangalore - 560026 INDIA	RFQ NUMBER: HBSMM20002 RFQ DATE : 25.OCT.2013	Due Date 25.NOV.2013 Time: 13:00 HRS VENUE : NEW ENGG. BLDG
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SI No.	Description	Qty	Unit	Delivery qty	Delivery Date
	Test Certificate				
7	PS0679033505 Supply of items of earthing systems Supply of items of earthing system for solar array field, control room panels, switchyard equipment etc including GI flats, MS rods (for earth mat) etc and all related miscellaneous hardware etc as per clauses 5.33. of BHEL spec PS-439-858. Test Certificate	1	ST	1	17.FEB.2014
8	PS0679033513 Supply items of module cleaning system Supply of items of module cleaning system such as pumps, GI pipes with fittings, valves etc, as per clause 5.36. of BHEL spec PS-439-858. Test Certificate	1	ST	1	17.FEB.2014
9	PS0679033521 Supply LA for PV array, cntrl room etc Supply of lightning arrestors for the complete solar power plant as per clauses 5.34 as per BHEL spec Ps-439-858. Test Certificate	1	ST	1	17.FEB.2014
10	PS0679033530 Supply of items of yard lighting systems Supply of items for lighting system such luminaires, ballasts, junction boxes, conduits, fittings and accessories etc, and related accessories, hardware etc as per clause 5.35 of BHEL spec PS-439-858. Test Certificate	1	ST	1	17.FEB.2014
11	PS0679033548 Supply of miscellaneous items Supply of miscellaneous items such as ABT metering panel, cable tags, danger boards, cable markers, hoarding board, sign boards, display boards, electrical insulation mat, checkered plates, air conditioners, tool kits, measuring instruments, office furniture, LCD display for SCADA system etc as per clauses 5.26, 5.32, 5.37-5.43.as per BHEL spec PS-439-858. Test Certificate	1	ST	1	17.FEB.2014
12	PS0679033556 Supply fire alarm sys, extinguishers etc Supply of safety related items including fire alarm system, fire extinguishers, safety gadgets etc as per clauses 5.44 of BHEL spec PS-439-858. Test Certificate	1	ST	1	17.FEB.2014
13	PS0679033564 I&C: Temp site office, storage yard etc I&C: Temporary site office, storage yard, bore wells, unloading / movement of consignments, arranging	1	AU	1	20.MAR.2014

For and On behalf of BHEL.

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SI No.	Description	Qty	Unit	Delivery qty	Delivery Date
	electrical power / water etc as per clauses 5.1 to 5.6 of BHEL spec Ps-439-858.				
14	PS0679033572 I&C: Interconnection Modules, SMBs etc I&C: Interconnection of SPV modules, installation of string monitoring boxes including power cable terminations as per clauses 5.7 to 5.13 as per BHEL spec PS-439-858.	6	AU	6	20.MAR.2014
15	PS0679033580 I&C: Trenches, cable laying etc I&C: Cable trenches & laying of cables for LT AC/DC power cables, HT (33kV) cables, data communication / control / SCADA / OFC cables as per clause 5.22. of BHEL spec PS-439-858.	6	AU	6	20.MAR.2014
16	PS0679033599 I&C : Inverter Room I&C: Erection of inverter rooms (prefab roof / wall) with all related features such as roof, walls, floors, doors, windows, ventilators, exhaust provisions, plinth protection, electrical wiring, appliances, painting etc as per clause 5.14 of BHEL spec PS-439-858.	5	AU	5	20.MAR.2014
17	PS0679033602 I&C: Elec panel instln Inverter room I&C: Erection of indoor electrical panels (PCUs, breaker panels, ACDB/DCDB panels etc) in the individual inverter rooms including grouting of panels, laying & fixing of cable trays, routing and terminations of DC/AC cables at the electrical panels up to interconnections to LV side of transformers in the switchyard as per clauses 5.18 to 5.21. of BHEL spec Ps-439-858.	5	AU	5	20.MAR.2014
18	PS0679033610 I&C: 33 KV S/yard at Inv room I&C: Erection of 33kV switchyards (attached to the five individual inverter rooms) with necessary land leveling within switchyard, laying of underground earth mat grid, foundation / erection of transformers, underground cable trenches, laying of 33kV/ LT / data / control / SCADA cables between switchyard and the inverter room panels, laying of earthing strips, earthing interconnections, stone jellies, fencing and gate for switchyard, etc. as per clauses 5.15, 5.22, 5.33. of BHEL spec Ps-439-858.	5	AU	5	20.MAR.2014
19	PS0679033629 Construction of Main Control Room (CMCS) Construction of RCC main control room (CMCS room with	1	AU	1	20.MAR.2014

For and On behalf of BHEL. Page 3 OF 6

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Sl No.	Description	Qty	Unit	Delivery qty	Delivery Date
	lounge, inverter / breaker panel rooms, store room, battery room, toilets, wash basins etc), with all RCC works, masonry works, doors, windows, glazing/ plastering works, flooring, roofing, false ceiling, ventilators, exhaust provisions, plinth protection, electrical wiring, appliances, overhead water tanks, water plumbing works, sanitary fittings, painting etc as per clause 5.16 of BHEL spec PS-439-858.				
20	PS0679033637 I&C: Elec panel instln at CMCS I&C: Erection of indoor electrical panels (PCUs, VCB panels, batteries, chargers, DC/AC distribution board panels, SCADA system etc) in the main control room (CMCS) including grouting of panels, laying & fixing of cable trays, routing and terminations of DC/AC cables to the electrical panels and to 33kV side of 33/132kV transformer in switchyard etc as per clauses 5.18 to 5.21 of BHEL spec Ps-439-858.	1	AU	1	20.MAR.2014
21	PS0679033645 I&C: 33 KV S/yard at CMCS I&C: Erection of 33kV portion of the 33/132kV switchyard (attached to the main control room - CMCS) with erection of three winding transformers (including their foundations and oil soak pits), fire wall between transformers, underground cable trenches, laying of 33kV/ LT / data / control / SCADA cables between switchyard and the control room panels, laying of earthing strips for 33kV switchyard equipments, earthing connections etc as per clause 5.17, 5.22, 5.33. of BHEL spec PS-439-858.	1	AU	1	20.MAR.2014
22	PS0679033653 I&C SCADA System I&C: Installation and commissioning of SCADA system by integrating the data cables from all the electrical and weather monitoring equipments of the power plant at the data logger / PLC panel / HMI computer control desk at CMCS room as per clause 5.32 of BHEL spec PS-439-858.	1	AU	1	20.MAR.2014
23	PS0679033661 I&C : DG Set, aux Transformer, etc I&C: Installation of auxiliary transformer, ACDB / DCDB panels, Battery banks, Battery chargers, DG set including cable interconnections as per clauses 5.27-5.31. of BHEL spec PS-439-858.	1	AU	1	20.MAR.2014
24	PS0679033670 I&C: Earthing system: Array, S/yard etc I&C: Earthing system for solar array field including	1	AU	1	20.MAR.2014

For and On behalf of BHEL. Page 4 OF 6

REQUEST FOR QUOTATION

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Sl No.	Description	Qty	Unit	Delivery qty	Delivery Date
	laying of underground earth mat grids and interconnection to the module mounting structures, I&C of lightning protection system (lightning arrestors) with earthing provisions as per clauses 5.33, 5.34. of BHEL spec PS-439-858.				
25	PS0679033688 I&C: Yard lighting system I&C of lighting system for illumination of the complete power plant including cable terminations at the yard lighting poles as well as ACDB panels of inverter room / main control room etc as per clause 5.34. of BHEL spec PS-439-858.	1	AU	1	20.MAR.2014
26	PS0679033696 I&C: Module cleaning system I&C of module cleaning system including trenches for pipelines, laying of pipelines from bore wells to solar array field, erection of pumps, valves etc as per clause 5.36. of BHEL spec PS-439-858.	1	AU	1	20.MAR.2014
27	PS0679033700 Construction of Boundary Wall Construction of boundary walls as per clauses 5.46 of BHEL spec PS-439-858. (20% of total work = 1 AU)	5	AU	5	20.MAR.2014
28	PS0679033718 I&C: Misc Items fire alarm sys etc I&C of miscellaneous and safety items such as ABT metering panel, cable tags, danger boards, cable markers, hoarding board, sign boards, display boards, electrical insulation mat, checkered plates, air conditioners, office furniture, fire extinguishers, fire alarm system, LCD display for SCADA system etc as per clauses 5.26, 5.32, 5.37-5.41, 5.43, 5.44 of BHEL spec PS-439-858.	1	AU	1	20.MAR.2014
29	PS0679033726 I&C: Commissioning, state clearances etc I&C: Pre-commissioning inspections / checks / tests, MRT tests and coordination with state / central departments / CEIG etc for necessary approvals / clearances for commissioning, synchronization with grid and post-commissioning operation of the plant as per clause 5.53 of BHEL spec PS-439-858.	1	AU	1	20.MAR.2014
30	PS0679033734 O&M of SPV Power Plant Operations and Maintenance per month (one Year) as per clause 8.0 of BHEL spec PS-439-858. 1AU = 1 Month.	12	AU	12	20.MAR.2014
31	PS0679033742 Supply of spares Supply of spare items as per clause 5.54 of	180	LOT	180	20.MAR.2014

For and On behalf of BHEL.

REQUEST FOR QUOTATION

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Sl No.	Description	Qty	Unit	Delivery qty	Delivery Date
	BHEL spec PS-439-858. Test Certificate				
32	PS0679033866 Constn. of approach road & level crossing Construction of approach roads and railway level crossing as per clauses 5.49, 5.50 of BHEL spec PS-439-858.	1	AU	1	19.NOV.2013
33	PS0679033874 Construction of Pathways Construction of pathways as per clauses 5.47 of BHEL spec PS-439-858.	1	AU	1	19.NOV.2013
34	PS0679033882 Construction of Drainage System Construction of drainage system as per clause 5.48 of BHEL spec PS-439-858. (20% of total work = 1 AU)	5	AU	5	19.NOV.2013
35	PS0679033890 Constn. of Security cbn, watch tower etc Construction of security cabin, watch tower, landscaping as per clauses 5.45, 5.51 and 5.52 of BHEL spec PS-439-858.	1	AU	1	19.NOV.2013

Total Number of Items - 35

Please note that the tender will be opened in the presence of the bidders or his authorised representatives (maximum two per organisation) who choose to be present with authorisation letters. Refer annexure for the terms and conditions.

Preference will be given to vendors who accepts our standard payment terms i.e. 100% payment - 30 days after receipt of material at our works subject to acceptance. Please specify Terms of delivery, Excise duty, sales tax, Ex-BHEL, Ex-works surcharge, Insurance, P&F, Freight and other taxes very clearly .

For evaluation, exchange rate (TT selling rate of SBI) as on scheduled date of tender opening (Part-I bid in case of two part bid) shall be considered.

The offers of the bidders who are on the banned list as also the offer of the bidders, who engage the services of the banned firms, shall be rejected. The list of banned firms is available on BHEL web site www.bhel.com

- i). This is only RFQ not an order.
- ii). In all correspondence quote RFQ No. & due date.
- iii). In Quotation BHEL material code / RFQ Sl. No. should be mentioned clearly.
- iv). Quotation Envelope / Fax not superscribed with RFQ No. and due date is liable for rejection.
- v). Quotation should remain valid for a minimum period of 90 days from due date.
- vi). In case of non-receipt of Quotation or regret letter for 3 consecutive RFQs you are liable to be removed from our vendors list.
- vii). All Prices should be written in words and numbers.
- viii). Excise Chapter Heading should be mentioned for all items where VAT is applicable .

**Addendum to PS-439-858 for Design Supply, I&C, O&M of Balance of system items for
15 MWp Solar Photovoltaic Grid Connected power plant at NTPC- Singrauli, MP**

With reference to above tender / RFQ, please refer to the BHEL technical specs PS-439-858 for Design Supply, I&C, O&M of Balance of system items for 15 MWp Solar Photovoltaic Grid Connected power plant at NTPC- Singrauli, MP.

Following are the revisions to the specification:

A. Revision in scope

- 1) Supply of 12 Nos of 1600kVA 33kV/xxx-xxxV (one HV winding and two windings) and spares for these **transformers shall be in vendor scope instead of BHEL scope**. BHEL will confirm the LV values (xxx) during detailed engineering. However, this value is expected to be in the range 300V-400V. Specification of the transformer is PS-439-847 Rev 01 and the same is enclosed along with this addendum document.

Separate line items - Line Item No. 1 for main transformer and Line Item No.2 for spare items have been added to the deliverable list in our RFQ.

B. Revision in existing clauses of BHEL spec Ps-439-858

- 2) Single line diagram 3-679-05-00658 has been revised.
Revised SLD (Rev 01) is enclosed along with this addendum document. This shall replace the SLD (Rev 00) enclosed with the tender documents. According to this revision,
 - (a) The outgoing panel in the five inverter rooms has been removed. Accordingly, number of VCB panels per inverter room reduces from three to two. Hence, two independent 33kV cable lines (3Cx300mm²) shall run from each of the five inverter rooms to the centralized CMCS room, instead of one cable line. Because of this, the total length of the cable gets doubled. The approximate total length of this cable shall, hence, be 6 Km instead of 3Km. However, all other attributes of the cable remains unaltered.
 - (b) The number of incoming panels in the CMCS room is, accordingly, increased from seven to twelve.
 - (c) A bus-coupler breaker panel (for future expansion purpose) has been added in CMCS room.

All changes arising out of the above revisions i.e. in respect of supply of related items and I&C of related activities shall be accordingly taken into account.

- 3) The metering panel, which houses one ABT energy meter, shall have two additional blank cut-outs on the door. These extra cut-outs are meant for installation of two ABT energy meters that are in

BHEL/NTPC scope of supply. BHEL shall intimate the exact sizes of these two cut-outs during detailed engineering after placement of purchase order.

4) There is a typographical error in clause 5.20.3 (c) in respect of number of cores of the LT cable connected to LV side of 200kVA auxiliary transformer. The cable shall be 3.5Cx95 mm² instead of 3Cx95 mm². However, all the other attributes of the cable shall remain unaltered.

5) Based on the above revisions, the respective clauses in the specification PS-439-858 shall be read as follows:

a) **Clause No. 1.1 (b) revised as below:**

a. String monitoring boxes (SMBs) are employed to monitor the DC parameters of the strings of solar array. The DC power outputs from the SMBs are fed to 24 Nos of 630kW grid-interactive power conditioning units (inverters) that are housed in a distributed manner among 5 inverter rooms and one central monitoring and control station (CMCS) room. The inverter rooms, each generating 2.5MWp, are placed at different locations of the power plant. Each room is associated with a 33kV transformer yard (switchyard), employing two oil-immersion transformers of 1.6MVA, 33kV/xxx-xxxV (one HV and two LV windings), xxx in the range 300-400V. **The vacuum circuit breaker (VCB) protection indoor panels (2 nos)** are also placed in each inverter room. Thus, all these five inverter rooms, put together, generate 12.5MWp. The balance 2.5MWp is generated at CMCS end, using one similar set of 4x630kWp inverters, 2x1.6MVA transformers.

b) **Clause No. 1.1 (c) revised as below:**

a. **The 12 sets of 1.25MWp** outputs are combined at CMCS using another set of indoor VCB panels placed within CMCS. **This set has 12 incomer and 2outgoer panels.** Further, this combined power output (33kV, 15MWp) is fed to an oil-immersion type 16MVA, 33/132kV transformer.

c) **Clause No. 3.2.13 revised as below:**

a. Supply of 33kV breaker panels Vacuum circuit breaker (VCB) panels – indoor type – with CTs, PTs, relays, meters etc: (a) **10 VCB Panels** at solar power plant end, (b) **12 VCB Panels (incomers), 2 VCB Panels (outgoerpanels), 1 Bus Coupler and 1 Bus PT panel** at 33kV grid end.

d) **Clause No. 5.14,first pararevised as below:**

a. Each inverter room houses 4 PCUs, **2 nosof VCB panels**, necessary ACDB and DCDB boards, SCADA panels with UPS etc. Similarly, each inverter is attached to two transformer yards each placed on either side of the room.

e) **Clause No. 5.18.1 (b) revised as below:** VCB panels: 2 Nos

f) **Clause No. 5.18.2. (e)revised as below:**

- a. VCB panels: **12 incomers + 2 outgoers+ 1 Bus PT+ 1 Bus Coupler.**
- g) **Clause No. 5.20.3 (b) revised as below:**
- a. HV (33kV) side connections in VCB panels (incomers, outgoers), Bus PT panel, 16MVA transformer, 200kVA transformer.
 - b. 3-phase 3-wire cable, 3Cx300mm², 33kV, aluminium conductor, XLPE insulation, armoured, PVC sheathed as per IS: 7098. **The cable must have screen size corresponding to fault current of 2.5 KA for each core for 1 seconds. Approximate total length = 6 Km.**
- h) **Clause No. 5.20.3 (c) revised as below:**Auxiliary transformer in switchyard to ACDB panel in CMCS room: 3-phase 4-wire cable, **3.5Cx95mm²**, 1.1kV grade, aluminium conductor, armoured, XLPE insulation, PVC sheathed as per IS: 7098. Approximate length requirement = 100m maximum.
- i) **Clause No. 5.26(a) revised as below:**Vendor shall install one ABT tariff main metering panel on 33kV side of 16MVA, 33/132kV transformer. The panel shall be installed in CMCS room and all necessary cable interconnections shall be made with the associated CT and PT of outgoer VCB and Bus PT panels. **Although only one (1 no) meter is in vendor scope, the metering panel shall have provision (space etc) for mounting a total of three (3 nos) of meters. The door shall have three cut-outs, out of which one shall be used for the meter supplied & mounted by vendor. The size of other two cut-outs will be intimated to the vendor (during detailed engineering) based on the meters selected by BHEL.**
- j) **Clause No. 3.2 (BHEL Scope of Supply) – Item No 11 : 12 nos. of 1.6MVA Transformer** is deleted from BHEL Scope and included in vendor's scope as indicated in Pt.(1) of this Addendum



**PURCHASE SPECIFICATION / GROUP : PHOTOVOLTAICS
ONAN TYPE 3-PHASE, 3-WINDING, 1600 KVA TRANSFORMER**

PS-439-847

REV NO: 01

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Technical specification

for

Outdoor, Oil-immersion, 1600 kVA, 3-winding, 33kV / xxx-xxx V transformer

for

15 MWp Solar Photovoltaic Grid-connected Power plant

at

NTPC-Singrauli, M.P

Approved by :

Revision details :R 01

Prepared

Issued

Date

Prachi Rao.V

N. Harihara Krishnan

08-11-2013



**PURCHASE SPECIFICATION / GROUP : PHOTOVOLTAICS
ONAN TYPE 3-PHASE, 3-WINDING, 1600 KVA TRANSFORMER**

PS-439-847

REV NO: 01

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1.0 INTRODUCTION

Bharat Heavy Electricals Limited (BHEL), Electronics Division, Bangalore is setting up a 15 MWp Solar PV Grid-connected power plant at **NTPC-Singrauli, M.P.** The plant employs 12 transformers of outdoor, oil-immersion type, ONAN, 3-phase, 3-winding, 1600 kVA to step up the LV voltage, which is inverted from solar generated DC voltage, to 33kV HV level. These transformers are placed at different locations of the power plant in a distributed manner. The HV outputs of all the transformers are collected at a common location and combined to achieve the 15MWp output for the power plant. This document details the technical specifications, supply conditions, erection and commissioning and post-commissioning requirements.

2.0 List of items

2.1	<p>Outdoor, Oil-immersion type, ONAN, 3-phase, 3-winding with two identical LV windings and one HV winding, 1600 kVA, 33kV / <u>xxx – xxx V</u> Transformer</p> <p>Notes:</p> <p>1) LV voltage</p> <p>Voltage rating of the two LV windings is expected to be a value between 300V and 400V. Vendors shall submit their offer based on this expected range of value. The exact voltage will be intimated to the vendors, before opening price bid. However, whatever be the value of the voltage, the same will be applicable to both the LV windings, which shall, hence, be identical in design as well as performance.</p> <p>2) Vector group</p> <p>Similarly, the offer shall be for the expected vector group of Dyn11yn11. However, the exact vector group will be intimated to the vendors before opening price bid.</p>	12 Nos
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2.2	<p>Spares shall be offered as per list below:</p> <table border="1"><thead><tr><th>#</th><th>Spares</th><th>Qty</th></tr></thead><tbody><tr><td>1</td><td>HV Bushings with metal parts and gaskets</td><td>1 set (3 Nos)</td></tr><tr><td>2</td><td>LV Bushings with metal parts and gaskets</td><td>1 set (6 Nos)</td></tr><tr><td>3</td><td>Neutral Bushings with metal parts and</td><td>1 set (2 Nos)</td></tr></tbody></table>	#	Spares	Qty	1	HV Bushings with metal parts and gaskets	1 set (3 Nos)	2	LV Bushings with metal parts and gaskets	1 set (6 Nos)	3	Neutral Bushings with metal parts and	1 set (2 Nos)	1 set
#	Spares	Qty												
1	HV Bushings with metal parts and gaskets	1 set (3 Nos)												
2	LV Bushings with metal parts and gaskets	1 set (6 Nos)												
3	Neutral Bushings with metal parts and	1 set (2 Nos)												



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	gaskets	
4	Isolating valves of all types (List of different types of valves with type-wise population quantity and spare quantity shall be indicated by vendor)	5% of total population for the respective types
5	Pressure Relief Device with alarm / trip contacts	2 Nos
6	Winding temperature indicator with alarm & trip contacts	1 No
7	Oil temperature indicator with alarm & trip contacts	1 No
8	Buchholz Relay (complete unit)	1 No
9	Gaskets of all types (List of different types of gaskets with type-wise population quantity and spare quantity shall be indicated by vendor)	5% of total population for the respective types
10	MOG of transformer	1 No
11	Silica gel breather with charge	2 Nos
12	Diaphragm of explosion vent	2 Nos

Notes:

- "Population" indicates total quantity of an item as used in the total consignment of 12 transformers.
- Where % of total population works out to a fraction (decimal number), the same shall be rounded off to the next higher whole number.
- In case population of any item is only one number, then, the spare quantity shall also be one number.
- Vendor shall provide a complete list of spare items showing item-wise unit price, quantity and total price.
- BHEL reserves the right in selection and inclusion of the spares in the final scope of supply.



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4.0 Technical specification

#	Technical parameter	BHEL specification
1	Transformer type	Outdoor, oil-immersion type
2	IP class	Transformer, including the cable box and marshalling box shall be of IP55. Transformer will be placed directly under sunlight without any shelter or shade. Hence, the significance for IP55 class.
3	Type of cooling	ONAN
4	Governing Standard	IS: 2026, IS:6600, IEC:60076, CBIP
5	Rating in KVA	1600 kVA
6	No. of phases	3
7	Frequency	50 Hz, +/- 3%
8	HV winding	One 3-phase winding with Delta connection. HV voltage: 33kV
9	LV windings	Two independent 3-phase windings, each with Star connection. LV voltage will be a value between 300V and 400V. Exact value will be intimated to the vendor prior to opening the price bid. And, whatever be the voltage value, the same shall be applicable to both the LV windings.
10	Winding material	Electrolytic grade copper for both HV and LV windings
11	Winding Insulation	Class A
12	Neutral on LV side	Neutral terminals of both the windings shall be brought out separately to facilitate earthing connections.
13	Vector Group	Dyn11yn11 (Vendor shall offer for this vector group). Exact vector group shall be informed to vendor prior to price bid opening.
14	Short circuit withstand time (thermal)	2 sec.



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15	% Impedance	<p>HV to LV1, HV to LV2, HV to (LV1, LV2 combined): 6.25% (approx).</p> <p>The value of impedance is indicative and the final value shall be informed during detailed engineering.</p> <p>Vendor shall indicate the value for "LV1 to LV2" impedance.</p>
16	Termination HV/LV/Orientation	<p>Air insulated cable box with disconnecting chamber, for both HV and LV sides.</p> <p>Cable box / Cable box / 180°.</p>
17	Cable entry on HV side	<p>Bottom entry of cables.</p> <p>1 run of 3Cx300 sq-mm, 33kV grade, aluminum conductor, armoured, XLPE insulation, PVC sheath as per IS: 7098 will be used. Cables and termination kits, cable lugs and connecting hardware shall be in BHEL scope.</p> <p>Vendor shall provide hole on the bottom-side gland-plate of HV side cable box for cable entry. For this purpose, outer diameter of cable will be intimated to the vendor at the time of manufacturing.</p>



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18	Cable entry on LV side	<p>Bottom entry of cables. Three wire system. No neutral wire.</p> <p>For each of the LV windings, 4 runs per phase, 1Cx300 sq-mm per run, aluminum conductor, armoured, XLPE insulation, PVC sheath as per IS: 7098 shall be used. Supply of these cables shall be in BHEL scope.</p> <p>Aluminium cable lugs (Dowell make) and cable glands (Comet make) along with connecting hardware shall be in vendor scope of supply. Outer diameter of cable shall be informed to vendor during drawings approval by BHEL.</p> <p>Vendor shall provide holes on the bottom-side gland-plate of LV side cable box for placement of glands. Also, cable glands (nickel plated brass glands of double compression type, Comet make) shall be provided by vendor. Gland sizes will be intimated to vendor at the time of manufacturing.</p> <p>Similarly, vendor shall provide necessary holes in the bus bars as per BHEL instruction which will be provided at the time of manufacturing.</p> <p>Cables shall enter the cable box straight upwards and get connected to the bus bars. After entry into cable box, cables shall not undergo any bends or turns.</p>
19	Tapping on HV winding	<p>Off circuit tap changer (OCTC) switch with five tap positions: +5%, +2.5%, 0, -2.5%, -5%.</p>
20	Loading Capability	<p>Continuous operation at rated MVA on any tap with voltage variation of +/-10%.</p> <p>Transformer shall be capable of being loaded in accordance with IS: 6600 / IEC 60076-7.</p>
21	Ambient temperature	<p>Max 50 deg C</p>
22	Temperature rise	<p>For top oil: Max. 50 deg C by thermometer method.</p> <p>For winding: Max. 55 deg C, by resistance method.</p> <p>Both rises shall be over an ambient temperature of 50 deg C irrespective of tap position.</p>



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23	Flux density	Not to exceed 1.9 Wb/sq.m at any tap position with +/-10% voltage variation from voltage corresponding to the tap. Transformer shall also withstand following over-fluxing conditions due to combined voltage and frequency fluctuations: a) 110% for continuous rating b) 125% for at least one minute c) 140% for at least five seconds Vendor shall furnish over-fluxing characteristics up to 150%
24	Air Clearance	As per CBIP
25	Load loss principal tap at 75°C, with IS tolerance	This shall be provided by vendor.
26	No Load loss at rated voltage on principal tapping and at rated frequency, with IS tolerance	This shall be provided by vendor.
27	No load current at rated voltage and rated frequency	This shall be provided by vendor. To be indicated as percentage.
28	Efficiency at 75°C, UPF	Minimum 98% at full load (100%). Efficiencies at 75% and 50% loads to be indicated by vendor.
29	Regulation at full load, 75 °C	< 3 % for UPF For 0.8 PF lagging, to be indicated by vendor.
30	Harmonics	Shall be designed to suppress harmonics especially 3 rd & 5 th .
31	Vibration & noise	Noise level shall be according to NEMA TR-1 standard
32	Highest system voltage	LV side: 1.1kV HV side: 36 kV
33	Insulation levels as per IS:2026 Rated Lightning Impulse withstand voltage / Short duration power frequency withstand voltage	LV side: -- kVp / 3 kV rms HV side: 170kVp / 70kV rms



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34	Overall dimensions in mm Length x Breadth x Height	This shall be provided by vendor.
35	Oil capacity (in Litres)	This shall be provided by vendor.
36	Weight of transformer in Kg	This shall be provided by vendor.
37	Painting	Paint shade shall be informed by BHEL during drawing approval stage.
38	Constructional features	As per clause 5.0 of this specification
39	Fittings and accessories	As per clause 5.10 of this specification
40	Design requirements with respect to double winding on LV side.	<p>The application is grid-connected solar photovoltaic power plant.</p> <p>HV side (33kV) of transformer is connected to already existing and operational grid supply to which the power generated by solar plant is exported.</p> <p>LV side has two windings, each of which shall have an identical and equal rating of 800kW.</p> <p>Following points shall be ensured in the design of this transformer.</p> <p>(a) Transformer shall have identical performance for both the LV windings.</p> <p>(b) Even when one LV winding is not fed from solar generation side, performance of the other (operational) LV winding shall remain unaffected.</p>
41	Provision of shield	<p>The electrostatic screen (connected to earth), which shall be provided to ensure correct capacitance insulation between the HV and LV windings, shall be properly insulated.</p> <p>Further, the screen shall be securely fastened to ensure that no damage occurs while shipping, transit, or operation. The method and quality of earthing connection shall be accordingly appropriate. This shield will be earthed during service.</p>



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5.0 Constructional features and details of transformer components

5.0	<p>Transformer shall be constructed in accordance with IS: 2026 and IS: 3639 or equivalent international standard.</p> <p>All materials / components used shall be of best quality and class most suitable for working under the conditions specified.</p> <p>These shall withstand the variations of temperature and atmospheric conditions, overload, over-excitation, short-circuits as per specified standards without distortion or deterioration, without development of stresses in any part and also without affecting the strength and suitability of the various parts for the work that they have to perform.</p>	
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5.1 Tank

5.1.1	The transformer tank and cover shall be fabricated from high grade low carbon plate steel of tested quality. The tank and cover shall be of welded construction and there should be provision for lifting by crane.	
5.1.2	Suitable inspection hole(s) with welded flange(s) and bolted cover(s) shall be provided on the tank cover. The inspection hole(s) shall be sufficient size to afford easy access to the lower ends of the bushings, terminals etc.	
5.1.3	The exterior of tank and other steel surfaces exposed to the weather shall be thoroughly cleaned and have a priming coat of zinc chromate applied. The second coat shall be of an oil and weather-resistant nature, preferably of distinct colour from the prime and finish coats. The final coat shall be of a glossy, oil and weather resistant non-fading paint of specified shade.	
5.1.4	The interior of the tank shall be cleaned by sand blasting and painted with two coats of heat resistant and oil insoluble paint.	
5.1.5	Steel bolts and nuts exposed to atmosphere shall be galvanized. All bolted connections to the tank shall be fitted with suitable oil-tight gaskets that shall give satisfactory service under the operating conditions for complete life of the transformer, if not opened for maintenance at site.	



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5.1.6	<p>The tank together with radiators, conservator, bushings and other fittings shall be designed to withstand the following conditions without permanent distortion:</p> <ul style="list-style-type: none">(i) Full vacuum of 760 mm of Hg, for filling with oil by vacuum. Internal gas pressure of 0.35 Kg/cm² (5 lbs/sq.in) with oil as at operating level.(ii) The transformer shall have conservator tank of adequate capacity to accommodate oil preservation system and volumetric expansion of total transformer oil. The conservator shall be bolted into position so that it can be removed for cleaning purposes.(iii) The conservator shall be of single compartment type. The top of the conservator shall be connected to the atmosphere through a transparent type silica gel breather.(iv) The tank cover shall be suitably sloped so that it does not retain rain water. The material used for gaskets shall be cork, neoprene or approved equivalent.	
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5.2 Core

5.2.1	The magnetic circuit shall be of core type. The core shall be constructed from non-ageing, cold rolled, super grain oriented silicon steel laminations (CRGOS) equivalent to M4 grade steels or better.	
5.2.2	The insulation structure of the core to clamp plates shall be such that it withstands a voltage of 2kV (rms) for one minute in air.	
5.2.3	Adequate lifting lugs will be provided to enable the core & windings to be lifted.	



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5.3 Windings

5.3.1	Windings shall be of electrolytic grade copper free from scales and burrs.	
5.3.2	Windings shall be subjected to a shrinking and seasoning process so that no further shrinkage occurs during service.	
5.3.3	Windings shall have uniform insulation.	
5.3.4	Tapping shall be so arranged as to preserve the magnetic balance of the transformer at all voltage ratios.	
5.3.5	The completed core and coil assembly shall be dried in vacuum and shall be immediately impregnated with oil after the drying process to ensure elimination of air and moisture within the insulation.	
5.3.6	Windings shall be made in dust proof and conditioned atmosphere. Vendor shall indicate those details of facilities (as available at the winding works) that will ensure meeting this requirement.	

5.4 Internal earthing

5.4.1	The frame work and clamping arrangements of core and coil shall be securely earthed inside the tank by copper strip connection to the tank.	
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5.5 Bushings

5.5.1	Bushings shall be designed and tested to comply with the applicable standards. If type test certificates are not available, these tests shall also be carried out in addition to the routine tests. Bushings rated for 400A and above shall have non-ferrous flanges and hardware. Bushings shall be supplied with terminal connector clamp suitable for connecting the cables.	
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5.6 Cables boxes and disconnecting chambers

5.6.1	Cable boxes shall be supplied with gland plates having holes to suit BHEL specified cables.	
5.6.2	Cable boxes / disconnecting chambers shall be provided with body earth terminals.	
5.6.3	LV cable boxes shall be provided with necessary LV bushings, bus bars, bus bar supports for making cable terminations.	
5.6.4	HV cable boxes shall be provided with necessary HV bushings and terminals for making cable terminations.	
5.6.5	Cable boxes shall be provided with suitable gaskets to ensure the specified protection class requirement (IP55).	
5.6.6	Cable boxes / disconnecting chambers shall be provided with necessary arrangements to prevent entry of rain water into the same.	
5.6.7	Disconnecting chambers: (1) Disconnecting chambers shall be provided to enable the transformer to be removed without unsealing the cables or draining oil from the main tank. (2) Disconnecting chamber shall be air insulated and complete with seal-off bushings, removable flexible connectors / links and removable covers. (3) Phase-to-phase and Phase-to-ground clearances within the chamber shall be such as to enable either the transformer or cable to be subject separately to HV tests. Clearances shall be subject to BHEL approval.	



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5.7 Neutral bushings

5.7.1	<p>The neutrals of the star-connected LV windings shall be brought out to separate bushing terminals.</p> <p>The neutral bushings shall be provided on the tank at such a location that facilitates connecting earth conductor down to the ground level.</p> <p>Tank-mounted pin-type support insulators shall be provided for supporting the neutral earthing bar of specified section, along its run from the neutral bushing to ground level.</p>	
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5.8 Marshalling box

5.8.1	Vendor shall provide a marshalling box and marshal to it all the contacts / terminals of electrical devices mounted on the transformer.	
5.8.2	It shall be in the vendor scope to provide the interconnection cabling between the marshalling box and all the accessory devices of transformer by either PVC insulated unarmoured cables routed through GI conduit (or) PVC insulated, armoured cables.	
5.8.3	Necessary cable glands shall be provided at the marshalling box for the above mentioned cables as well as for terminating the incoming cables from remote panels.	
5.8.4	Marshalling box shall be tank mounted, outdoor and weather/vermin/dust proof (protection class IP55), sheet-steel (2mm thick minimum) enclosure, with hinged door having padlocking facility and painted. All doors, covers and plates shall be fitted with neoprene gaskets. Bottom shall be at least 1600 mm above floor level and provided with gland plate and cable glands as required. Top surface shall be sloped to drain off water falling on the box.	



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5.9 Transformer oil

5.9.1	Transformers shall be supplied complete with transformer oil. The new insulating oil before pouring into the transformer shall conform to the requirement of IS: 335. No inhibitors shall be used in the oil. The oil samples taken from the transformer at site shall conform to requirements of IS: 1866.	
5.9.2	10% extra oil, in non-returnable sealed containers, shall be sent along with main consignment to avoid any shortage of oil at the time of topping up of oil at the site.	

5.10 Fittings and accessories

Following fittings per transformer shall be provided. Vendor shall indicate compliance (Yes / No) for each line item. In case of non-compliance or deviation, vendor shall indicate and provide comments.

#	Nomenclature of fitting / accessory	Qty	Vendor compliance
1	Oil conservator with equalizer pipe	1 set	
2	HV cable box	1 set	
3	HV disconnecting chamber	1 set	
4	LV cable box	1 set	
5	LV disconnecting chamber	1 set	
6	Off circuit tap changing switch (OCTC) with operating knob, tap position marking and locking facility, with warning plate "Tap switch to be operated only with the transformer de-energized".	1 set	
7	Neutral bushings for earthing of LV windings	2 Nos	
8	Earthing terminals with hardware suitable for connecting 50x6 GI earth strips. Separate terminals shall be provided for cable boxes, tank etc.	1 set	
9	Radiators (detachable type) with drain valve at the bottom, relief valve at the top, air plug, shut-off valves at every point of connection to the tank and lifting lugs.	4 sets	
10	Double float Buchholz relay with alarm and trip contact. The relay shall be provided with a test cock suitable for a flexible pipe connection for checking its operation. Buchholz relay shall be provided with one shut-off valve on conservator side of size 50 mm for transformer rating up to 10MVA and 80 mm for rating 10MVA and above.	1 set	



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11	Provision for collecting gas and oil from Buchholz relay	1 set	
12	Silica gel dehydrating breather with oil cup	1 set	
13	Magnetic oil level gauge (MOG), dial type, with alarm contact, minimum and maximum filling level markings. Contact shall be suitable for 110V/220V DC. The oil level at 30 deg C shall be marked on the gauge.	1 set	
14	Prismatic / toughened glass oil level gauge for transformer and tap changer chamber with min and max markings.	1 set	
15	Spring operated Pressure relief valve with alarm/trip contacts. Location of this valve shall be such that the hot oil discharge shall not fall on the transformer or any of its parts. This shall include all necessary arrangements to facilitate proper discharge of PRV through pipes away from the transformer.	2 sets	
16	Explosion vent (double diaphragm) with sight glasses and equalizing pipe connection to conservator	1 set	
17	Thermometer pocket for OTI	1 No	
18	Temperature sensor for OTI	1 No	
19	Thermometer pocket for WTI	1 No	
20	CT for WTI	1 No	
21	Oil temperature indicator, 150 mm dial type, with alarm and trip contacts, maximum reading pointer & resetting device. Oil temperature range: -40 to 150 deg C (resolution 1 deg C) Oil temperature accuracy: +/- 2 deg C RTD PT-100 temperature sensor for OTI (IEC 751). Two analog outputs of 4-20mA for remote indication of OTI.	1 No	
22	Winding temperature indicator, 150-mm dial type, with alarm and trip contacts, maximum reading pointer & resetting device. Winding temperature range: -40 to 200 deg C (resolution 1 deg C) Winding temperature accuracy: +/- 2 deg C Two analog outputs of 4-20mA for remote indication of WTI.	1 No	
23	Marshalling box (IP55) shall be provided with removable gland plates and glands for cable entry from bottom side. Marshalling box shall be provided with OTI, WTI, transmitters (for 4-20mA output of OTI and WTI), space heater, thermostat, lamp, MCBs, power socket, switch for WTI, terminal connectors and all other attachments that are necessary to meet its functional aspects. Terminal connectors for the following signals / connections shall be made available. Number of terminal connectors for each case shall be as per connection requirements:	1 set	



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	PT-100 sensor from thermometer pocket 1) 4-20mA output for OTI 2) 4-20mA output for WTI 3) WTI CT secondary 4) Alarm contact of WTI 5) Trip contact of WTI 6) Alarm contact of OTI 7) Trip contact of OTI 8) Buchholz relay alarm 9) Buchholz relay trip 10) Magnetic oil level gauge alarm 11) Pressure relief valve alarm 12) 90-260V DC power supply (external source) 13) 240V AC supply (external source) 14) Spare connectors: Eight terminals Note: Alarm and trip contacts shall be rated for 220V DC.		
24	Inspection window with cover	1 set	
25	Cover lifting lugs / eyes	2 Nos	
26	Core and winding lifting lugs / eyes	2 Nos	
27	Tank lifting lugs / eyes for the entire transformer	2 Nos	
28	Jacking pad with hauling eyes, to enable transformer with oil to be raised or lowered using hydraulic or screw jacks.	4 sets	
29	LV cable box supports with mounting plates	2 sets	
30	HV cable box supports with mounting plates	2 sets	
31	Bi-directional flat rollers	4 sets	
32	Base channel with towing holes / lugs	2 sets	
33	Air release hole with plug	1 No	
34	Oil filling hole with cap	1 No	
35	Top filter valve with threaded male adapter (blanking plug)	1 No	
36	Bottom filter valve with threaded male adapter (blanking plug)	1 No	
37	Drain valve for the tank, with blanking plug	1 No	
38	Drain valve for conservator, with blanking plug	1 No	
39	Shut-off valves for conservator	2 Nos	
40	Sampling valve, with blanking plug	1 No	



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41	Shut-off valves for radiators, with open and close markings	8 Nos	
42	Sludge valve at bottom most point of tank to be provided for easy flush out / removal of sludge during maintenance	1 No	
43	Valve schedule plate made of stainless steel or aluminium (anodized)	1 No	
44	Rating and diagram plates made of stainless steel or anodized aluminium.	1 No	
45	Terminal marking plates	1 Set	
46	Protected type Mercury or alcohol in glass thermometer	1 No	

6.0 Inspection and testing of transformers at vendor works

6.0	Vendor shall provide inspection call to BHEL for the type and routine tests. Prior to the call, vendor shall submit the detailed quality plan in NTPC Manufacturing Quality Plan (MQP) format for approval.	
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6.1 Routine tests

6.1	<p>Following routine tests shall be carried out on 100% basis. BHEL and NTPC shall witness these tests at vendor works.</p> <ol style="list-style-type: none">1) Measurement of voltage ratio and phase displacement as per IEC 60076-12) Measurement of winding resistance on all the taps as per IEC 60076-13) Vector group check as per IEC 60076-14) Polarity check as per IEC 60076-15) Magnetic balance and magnetizing current test6) Measurement of no-load current with 415V, 50Hz AC supply7) Measurement of no-load losses and current at 90%, 100% and 110% of rated voltage as per IEC 60076-18) Measurement of impedance voltage / short-circuit impedance, load loss on principal and extreme taps9) Measurement of insulation resistance as per IEC 60076-110) Dielectric tests as per IEC 60076-3<ol style="list-style-type: none">a. Separate source voltage withstand testb. Induced AC voltage short duration test (ACSD) <p>Note: Max allowed change in PD after voltage enhancement = 100 pC. The background noise level shall not exceed 100 pC.</p>	
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	<p>11) Repeating the no-load current, no-load loss and IR measurements after completion of all the dielectric tests</p> <p>12) Oil leakage test on completely assembled transformer along with unit coolers / radiators: All tank and oil filled compartment shall be tested for oil tightness by being completely filled with oil of viscosity not greater than that of specified oil at the ambient temperature and applying pressure equal to the normal pressure plus 35 kN/sq-m measured at the base of the tank. The pressure shall be maintained for a period of not less than 6 hours during which time no sweating shall occur. This test shall be repeated as pre-commissioning test at site with test duration of 24 hours.</p> <p>13) Jacking test followed by DP test</p> <p>14) Marshalling box / Cable box: IP Class test (IP55): It shall not be possible to insert a thin sheet of paper under gaskets and through enclosure joints.</p> <p>15) IR measurement on wiring of Marshalling Box.</p> <p>16) BDV test on oil as per IS:335-1993: Test certificate shall be submitted to BHEL.</p>	
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6.2 Temperature rise test as per IS: 2026 (Type test on 1 No. of transformer)

<p>6.2.1</p>	<p>This test shall be performed as a type test on one sample of transformer. This is a mandatory test and shall be witnessed by BHEL/NTPC. In case extra charges are required, the same shall be indicated separately in the offer on per-transformer basis. Offers that do not include this specific type test are liable for rejection.</p> <p>This temperature rise test shall be carried out at a tap corresponding to maximum losses as per IS: 2026.</p> <p>Gas chromatography shall be conducted, as per relevant standard, on oil sample taken before and immediately after temperature rise test. Test report shall be furnished to BHEL.</p>	
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6.3 Other type tests



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ONAN TYPE 3-PHASE, 3-WINDING, 1600 KVA TRANSFORMER**

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6.3.0	List of other type tests is as below. In case the vendor has conducted the type test(s) within last ten years as on the date of technical bid opening, report(s) of the type test(s) shall be submitted to BHEL for waiver of conducting those particular type tests. Such report(s) should be for the test(s) conducted on transformer that is similar to this present specification. Also, the test(s) should have been either conducted at an independent laboratory (or) should have been witnessed by a client. In case the vendor is not able to submit report(s) of the type test(s) conducted within last ten years from the date of technical bid opening (or) in case the type test reports are not found to be meeting the specification requirements, the vendor shall conduct the type test(s) as per applicable standards at no additional cost to BHEL and the type test reports shall be submitted to BHEL/NTPC for approval.	
6.3.1	Tank vacuum and pressure test as per CBIP norms. (In process inspection)	
6.3.2	Zero sequence impedance measurement test	
6.3.3	Measurement of harmonics of no load current	
6.3.4	Measurement of acoustic noise level as per NEMA TR-1	
6.3.5	Lightning impulse (full & chopped wave) test on HV & LV windings	



**PURCHASE SPECIFICATION / GROUP : PHOTOVOLTAICS
ONAN TYPE 3-PHASE, 3-WINDING, 1600 KVA TRANSFORMER**

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7.0 Documents to be submitted after receipt of purchase order

7.1	<p>Following documents shall be submitted for BHEL approval within seven days from date of purchase order.</p> <ol style="list-style-type: none">(1) Detailed transformer drawings for<ol style="list-style-type: none">(a) Overall General Arrangement (plan, elevation, end view) with overall dimensions and bill of accessories.(b) Rating plate details(c) Valve schedule plate details with elevation and side view showing valve positions(d) HV cable box with disconnecting chamber, bushings, gland plate, cable termination details etc.(e) LV cable box with disconnecting chamber, bushings, gland plate, cable termination details etc.(f) Marshalling box GA (front view, side view, bill of items) and wiring diagram(g) Foundation plan(h) Bill of material of transformer(i) Untanking details (removal of core and assembly from tank)(2) Guaranteed technical specification of transformer in line with Appendix-B (schedule of technical particulars to be furnished by manufacturer) of IS: 2026 (part-1)-1977.(3) Quality assurance plan (routine tests, type tests, test certificates) covering incoming materials, stage-wise inspection during manufacturing, finished goods, packing and forwarding. Quality Assurance Plan shall be in the format of NTPC Manufacturing Quality Plan (MQP), which shall be forwarded to vendor during detailed engineering. Witness by NTPC and BHEL shall be included for stage inspection / final inspection as required.(4) Detailed Test Procedure for all routine, type and special tests.(5) Manufacturing clearance shall be subject to approval of the above documents by NTPC.	
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**PURCHASE SPECIFICATION / GROUP : PHOTOVOLTAICS
ONAN TYPE 3-PHASE, 3-WINDING, 1600 KVA TRANSFORMER**

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8.0 Documents to be submitted along with consignment

8.1	<p>Following documents shall be submitted to BHEL at the time of delivery of the consignment:</p> <ol style="list-style-type: none">(1) As built drawings of transformer(2) Routine test reports on transformer(3) Type test reports on transformer(4) Test certificate for pressure & vacuum test on tank(5) Test certificate for transformer oil(6) Operations and maintenance manual of transformer(7) Technical datasheets of transformer accessories such as Buchholz relay, Magnetic oil level gauge, Pressure release valve, OTI, WTI, Temperature sensor (PT-100), Explosion vent with diaphragm, Breather with silica gel, HV / LV Bushings, CT for WTI, etc.	
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**PURCHASE SPECIFICATION / GROUP : PHOTOVOLTAICS
ONAN TYPE 3-PHASE, 3-WINDING, 1600 KVA TRANSFORMER**

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9.0 REFERENCE STANDARDS

9.1	Following shall be the list of standards to be adopted: <table border="1" data-bbox="308 566 1137 1041"><tr><td>Power Transformer</td><td>IS: 2026 IS: 6600 IEC: 60076</td></tr><tr><td>Fittings and Accessories</td><td>IS: 3639</td></tr><tr><td>Loading of oil immersed transformer</td><td>IS: 6600</td></tr><tr><td>Oil</td><td>IS: 335</td></tr><tr><td>Bushing for >1000 V AC</td><td>IS: 2099</td></tr><tr><td>Bushing for <1000 V AC</td><td>IS: 7421</td></tr><tr><td>Degree of protection</td><td>IS: 2147</td></tr><tr><td>Tests and tolerance of guaranteed particulars</td><td>IS: 2147</td></tr><tr><td>Buchholz relay</td><td>IS: 3637</td></tr><tr><td>Electrical insulation classified by thermal stability</td><td>IS: 1271</td></tr><tr><td>Climate proofing</td><td>IS: 3202</td></tr></table>	Power Transformer	IS: 2026 IS: 6600 IEC: 60076	Fittings and Accessories	IS: 3639	Loading of oil immersed transformer	IS: 6600	Oil	IS: 335	Bushing for >1000 V AC	IS: 2099	Bushing for <1000 V AC	IS: 7421	Degree of protection	IS: 2147	Tests and tolerance of guaranteed particulars	IS: 2147	Buchholz relay	IS: 3637	Electrical insulation classified by thermal stability	IS: 1271	Climate proofing	IS: 3202	
Power Transformer	IS: 2026 IS: 6600 IEC: 60076																							
Fittings and Accessories	IS: 3639																							
Loading of oil immersed transformer	IS: 6600																							
Oil	IS: 335																							
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Bushing for <1000 V AC	IS: 7421																							
Degree of protection	IS: 2147																							
Tests and tolerance of guaranteed particulars	IS: 2147																							
Buchholz relay	IS: 3637																							
Electrical insulation classified by thermal stability	IS: 1271																							
Climate proofing	IS: 3202																							
9.2	If vendor is offering equipment conforming to the standards other than those stipulated above, it shall be established in the bid that the standards adopted are comparable with relevant Indian Standards or IEC Standards. Further, a comparative statement shall be furnished with bid. Also, the vendor must supply copies in English language of the standards and codes adopted by him (If these are in different languages, copies translated in 'English' may be furnished).																							

COMMERCIAL TERMS & CONDITIONS (to be enclosed with TECHNO-COMMERCIAL BID) (For Indigenous Purchase Orders)				
RFQ No.HBSMM20002 RFQ DATE : 25.10.2013 DUE DATE :25.11.2013 FOR DESIGN,SUPPLY,I&C AND O&M FOR BALANCE OF 15MW SPV PLANT AT NTPC-SINGRAULI,MP				
SI No.	Terms	BHEL Term	Confirmation	Deviation / Remarks
1	Bidding	(a) Bid has to be submitted as Two Part – in two sealed covers-Techno Commercial Bid(Part-1) & Price Bid (Part-II)- clearly written on each cover both put in a single sealed envelope super-scribed with RFQ No. and Due date.	Acceptable / Not acceptable	
		(b) Documents as called in Pre-Qualification Criteria (Clause 2.0 of PS-439-858) to be submitted along with technical bid(Part-1).	Acceptable / Not acceptable	
		(c) Enclosures-B & B1 to be submitted along with technical bid (Part-1) & Enclosure-B2 to be submitted along with Price bid (Part-II).	Acceptable / Not acceptable	
		(d) Clause-wise compliance to BHEL Purchase specification along with all documents as called in Technical specification to be submitted along with technical bid(Part-1).	Acceptable / Not acceptable	
2	Price Basis	Firm i.e., from the date of PO to completion of supply if I&C is not applicable. If I&C is in supplier's scope, then the prices shall remain Firm till commissioning & handing-over of the complete system. (PVC clause not acceptable).	Acceptable / Not acceptable	
3	Terms of Delivery	Free On Road Basis to Project site :NTPC-Singrauli-MP.	Acceptable / Not acceptable	
4	Delivery Period	(a) Supply : Completion within 12 weeks from the date of Drawing Approval. Drawing Submission : Within 1 week from PO date.	Acceptable / Not acceptable	
		(b) I&C : Completion within 4 weeks from supply date.	Acceptable / Not acceptable	
		(c) Civil Works : Completion within 12 weeks from the date of Drawing Approval.	Acceptable / Not acceptable	
5	Payment Term	(a)Supply :80% payment of Supply value + 100% Taxes shall be made with 45 days credit from the date of receipt of material at site. 10% on completion of I&C and certification line item wise on pro-rata basis. Balance 10% on execution of PBG valid for warranty period + 6 months claim period from any of the BHEL Consortium banks.	Acceptable / Not acceptable	
		(b)I&C: 90% on completion of I&C and certification line item wise on pro-rata basis.Balance 10% on execution of PBG valid for warranty period + 6 months claim period from any of the BHEL Consortium banks.	Acceptable / Not acceptable	
		(c)Civil Works: 100% on completion & certification line item wise on pro-rata basis.	Acceptable / Not acceptable	
		(d) O&M: 100% payment on quarterly basis on completion and certification.	Acceptable / Not acceptable	
		(e)For any other deviation loading will be done as per clause 25(A) of Enquiry - General Terms & Conditions (Ref : SCPV/BOS/01-Rev 00)	Acceptable / Not acceptable	
6	Excise Duty	(a) To confirm whether applicable. If applicable, indicate prevailing rate of Excise duty.	Applicable / Not applicable	Prevailing rate of Excise duty : %
		(b) BHEL is trying to avail Customs Duty & Excise duty exemption.Successful bidder shall support with all relevant documents.	Agree/Not Agree	
7	Sales Tax	(a) To confirm whether applicable. If applicable, indicate prevailing rate of Sales Tax against Form c.	Applicable / Not applicable	Prevailing rate of Sales Tax against Form c: %
		(b) For issue of form "C", vendor has to furnish "E1/E2" form.Please confirm that "E1/E2 Sale form" will be submitted.	Agree/Not Agree	
8	Value Added Tax	Since it is inter-state movement of goods, VAT is not applicable. Only CST against form C is applicable.	Applicable / Not applicable	CST applicable @.....%
		OR Both are in the same State, VAT is applicable please indicate VAT applicable.	Applicable / Not applicable	VAT applicable @.....%
9	Octroi	To confirm whether applicable, if applicable indicate current rate of Octroi.	Applicable / Not applicable	Octroi.....%
10	Service Tax	To confirm whether applicable, if applicable indicate current rate of Service Tax.Furnish Service Tax Regn. No. Confirmation that Service Tax register is maintained.	Applicable / Not applicable	Service Tax% Service Tax Regn. No. S.Tax Register maintained : Yes/No

Annexure B

Sl No.	Terms	BHEL Term	Confirmation	Deviation / Remarks
11	Works Contract Tax	Vendor shall ensure quoting WCT inclusive.TDS applicable as per provisions of MP VAT Act. Vendor to be registered under MPVAT, file returns & remit applicable VAT/WCT.Declaration in Form 3 as per MPVAT to be submitted by vendor.TDS is applicable as per provisions of MPVAT Act. The WCT% included shall be indicated.	Agree/Not Agree	WCT @% included in quoted rate
12	Freight	If Freight is quoted extra, original money receipt from Transporter has to be submitted for payment of freight. Please indicate a lumpsum value for Freight charges in Price bid if quoted extra.	Agree/Not Agree	
13	Insurance	Transit Insurance will be in vendor's scope	Agree/Not Agree	
14	Evaluation of L1 vendor	(a)Over all L1 of Supply + I&C + Civil Works + O&M on "FOR" basis to site will only be considered.	BHEL	
		The percentage of Supply, Civil works, I&C and O&M values shall be in the range indicated below(approximately,with overall tallying to 100%) : (a) Supply : 24-28% (b) I&C : 32-36% (c) Civil : 34-38% (d) O&M : 1-4%	Agree/Not Agree	
15	Warranty / Guarantee	(a) Supply : Warranty for 60 months from the date of commissioning or 63 months from the date of supply whichever is earlier.	Agree/Not Agree	
		(b) Workmanship and I&C : 60 months from the date of I&C	Agree/Not Agree	
16	Pre Shipment Inspection	Pre Shipment Inspection will be carried out by BHEL/NTPC for which test report shall be sent one week in advance.	Agree/Not Agree	
17	Penalty	Penalty of 0.5% per week at the basic price of the good for undelivered quantity of supply portion, subject to a maximum of 10%. For Supply, Pre Shipment Inspection Call Letter Date (Receipt of test report) will be treated as delivery for purpose of penalty. For other activities the activity completion date as certified by Engg. will be considered for penalty calculation.	Agree/Not Agree	
		For any deviation, loading will be done as per Clause 25.B of Enquiry - General Terms & Conditions(Ref : SCPV/BOS/01-Rev 00)	Agree/Not Agree	
18	Road Permit	Road permit if applicable will be given by BHEL before Dispatch of ordered Items	BHEL	
19	PBG	(a) PBG shall be furnished in the BHEL prescribed format. (b) Deviation if any Please specify	Agree/Not Agree	
20	Despatch Documents	Complete set of despatch documents in 3 sets shall be forwarded to BHEL directly. Despatch documents include Commercial Invoice, Excise Invoice (if ED is applicable), Lorry receipt (L/R), Packing list, Warranty certificate, Insurance intimation letter, & Original Performance Bank Guarantee (Directly from issuing bank to BHEL). One set of Invoice, Packing list and L/R shall be faxed immediately after despatch to BHEL-EDN, Bangalore.	Agree/Not Agree	
21	Reverse Auction	BHEL reserves the right to conduct Reverse auction.Procedure for the same will be informed by BHEL . Please confirm your acceptance for reverse auction.	Agree/Not Agree	
22	Other terms & conditions	For any other Terms and Conditions, kindly refer to the enclosed Enquiry - General Terms & Conditions(Ref : SCPV/BOS/01-Rev 00)	Agree/Not Agree	
23	Integrity Pact	The bidder shall sign an "INTEGRITY PACT" in the format enclosed (total 8 sheets). Only those vendors / bidders who have entered into such an Integrity pact with BHEL would be competent to participate in the bidding. In other words, entering into this pact is a preliminary qualification. The Name & Address of Independent External Monitor (IEM) is given below: Shri D. P. Bagchi, IAS (Retd.) Y-165, Regency Park - II, DLF City, Phase IV, Gurgaon - 122 009	Agree/Not Agree	
24	Validity	(a) Quotation should remain valid for a period of 90 days from the due date	Agree/Not Agree	
		(b) Deviation if any Please specify	(b)	
25	Bank Charges	(a) All Bank charges to respective accounts	Agree/Not Agree	
		(b) Deviation if any Please specify	(b)	
26	Billing Schedule	Billing schedule shall be submitted by successful vendor after PO is released.	Agree/Not Agree	
27	Spares	Vendor shall quote for mandatory spares as per PS-439-858. Successful vendor shall provide the price breakup of spares.	Agree/Not Agree	

AUTHORISED SIGNATORY WITH SEAL

REVISED TECHNICAL BID ENCLOSURE FOR COMPLIANCE OF QUOTE AS PER ADDENDUM TO RFQ											
RFQ No.HBSMM20002 RFQ DATE : 25.10.2013 DUE DATE : 25.11.2013 FOR DESIGN,SUPPLY,I&C AND O&M FOR BALANCE OF 15MW SPV PLANT AT NTPC-SINGRAULI											
Sl No.		DESCRIPTION	QTY	UNIT	QUOTED	TAXES					Remarks
						ED %	CST%	VAT %	WORKS CONTRACT TAX	SERVICE TAX %	
A. SUPPLY :											
1	PS0679033084	Transformer 3-winding 1600kVA ONAN	12	NO	YES/NO				NA	NA	Taxes Extra
2	PS0679033092	Spare items for 1600kVA transformer	1	ST	YES/NO				NA	NA	Taxes Extra
3	PS0679033467	Supply of MC4, Cable tie, HDPE pipe etc	1	ST	YES/NO				NA	NA	Taxes Extra
4	PS0679033475	Supply of LT/HT/data cables, kits etc	1	ST	YES/NO				NA	NA	Taxes Extra
5	PS0679033483	Supply of Materials for Inv. Room	5	ST	YES/NO				NA	NA	Taxes Extra
6	PS0679033491	Supply of DG Set, Aux Transformer etc	1	ST	YES/NO				NA	NA	Taxes Extra
7	PS0679033505	Supply of items of earthing systems	1	ST	YES/NO				NA	NA	Taxes Extra
8	PS0679033513	Supply items of module cleaning system	1	ST	YES/NO				NA	NA	Taxes Extra
9	PS0679033521	Supply LA for PV array, cntrl room etc	1	ST	YES/NO				NA	NA	Taxes Extra
10	PS0679033530	Supply of items of yard lighting systems	1	ST	YES/NO				NA	NA	Taxes Extra
11	PS0679033548	Supply of miscellaneous items	1	ST	YES/NO				NA	NA	Taxes Extra
12	PS0679033556	Supply fire alarm sys, extinguishers etc	1	ST	YES/NO				NA	NA	Taxes Extra
13	PS0679033742	Supply of spares	1	ST	YES/NO				NA	NA	Taxes Extra
B. I&C :											
1	PS0679033564	I&C: Temp site office, storage yard etc	1	AU	YES/NO	NA	NA	NA	NA		Taxes Extra
2	PS0679033572	I&C: Interconnection Modules,SMBs etc	6	AU	YES/NO	NA	NA	NA	NA		Taxes Extra
3	PS0679033580	I&C:Trenches,cable laying etc	6	AU	YES/NO	NA	NA	NA	NA		Taxes Extra
4	PS0679033599	I&C : Inverter Room	5	AU	YES/NO	NA	NA	NA	NA		Taxes Extra
5	PS0679033602	I&C: Elec panel instln Inverter room	5	AU	YES/NO	NA	NA	NA	NA		Taxes Extra
6	PS0679033610	I&C: 33 KV S/yard at Inv room	5	AU	YES/NO	NA	NA	NA	NA		Taxes Extra
7	PS0679033637	I&C: Elec panel instln at CMCS	1	AU	YES/NO	NA	NA	NA	NA		Taxes Extra
8	PS0679033645	I&C: 33 KV S/yard at CMCS	1	AU	YES/NO	NA	NA	NA	NA		Taxes Extra
9	PS0679033653	I&C SCADA System	1	AU	YES/NO	NA	NA	NA	NA		Taxes Extra
10	PS0679033661	I&C : DG Set, aux Transformer, etc	1	AU	YES/NO	NA	NA	NA	NA		Taxes Extra
11	PS0679033670	I&C: Earthing system: Array, S/yard etc	1	AU	YES/NO	NA	NA	NA	NA		Taxes Extra
12	PS0679033688	I&C: Yard lighting system	1	AU	YES/NO	NA	NA	NA	NA		Taxes Extra
13	PS0679033696	I&C: Module cleaning system	1	AU	YES/NO	NA	NA	NA	NA		Taxes Extra
14	PS0679033718	I&C: Misc Items fire alarm sys etc	1	AU	YES/NO	NA	NA	NA	NA		Taxes Extra
15	PS0679033726	I&C: Commissioning, state clearances etc	1	AU	YES/NO	NA	NA	NA	NA		Taxes Extra
C. CIVIL WORKS :											
1	PS0679033629	Construction of Main Control Room (CMCS)	1	AU	YES/NO	NA	NA	NA	Included	NA	Taxes Included
2	PS0679033700	Construction of Boundary Wall	5	AU	YES/NO	NA	NA	NA	Included	NA	Taxes Included
3	PS0679033866	Constn. of approach road & level corssing	1	AU	YES/NO	NA	NA	NA	Included	NA	Taxes Included
4	PS0679033874	Construction of Pathways	1	AU	YES/NO	NA	NA	NA	Included	NA	Taxes Included
5	PS0679033882	Construction of Drainage System	5	AU	YES/NO	NA	NA	NA	Included	NA	Taxes Included
6	PS0679033890	Constn. of Security cbn, watch tower etc	1	AU	YES/NO	NA	NA	NA	Included	NA	Taxes Included
D.O&M											
1	PS0679033734	O&M of SPV Power Plant	12	AU	YES/NO	NA	NA	NA	NA		Taxes Extra
E	**Freight Charge including Service Tax on Freight(12.36% on 25% of Freight Value)		LUMPSUM		YES/NO	NA	NA	NA	NA	NA	Freight : Included/Extra
F	**Transit Insurance		LUMPSUM		YES/NO	NA	NA	NA	NA	NA	Insurance : Included/Extra

NOTE: 1.YOUR QUOTED PRICES SHALL BE on "FREE ON ROAD" basis to NTPC-SINGRAULI-MP
2.PL INDICATE TAXES : ED,VAT/CST,SERVICE TAX CLEARLY APPLICABLE AS ON DATE.
3.USE THIS FORMAT FOR COMPLIANCE(REPRODUCING ON YOUR LETTER HEAD IS ACCEPTABLE).
4. FOR SL NOS A,B & D, TAXES WILL BE CONSIDERED EXTRA.PLEASE QUOTE ONLY THE BASIC RATES.
5. FOR SL NO.C, THE WCT% INCLUDED IN RATE SHALL BE INDICATED IN ANNEXURE B(SL.No.11).
6.**INDICATE WHETHER FREIGHT CHARGE & INSURANCE CHARGE IS INCLUDED IN QUOTED RATE OR WILL BE CHARGED EXTRA.
IN ABSENCE OF CLARITY, QUOTED RATE WILL BE CONSIDERED AS INCLUSIVE OF FREIGHT & INSURANCE CHARGES.

AUTHORISED SIGNATORY WITH SEAL

REVISED PRICE BID FORMAT AS PER ADDENDUM TO RFQ										
RFQ No.HBSMM20002 RFQ DATE : 25.10.2013 DUE DATE : 25.11.2013 FOR DESIGN,SUPPLY,I&C AND O&M FOR BALANCE OF 15MW SPV PLANT AT NTPC-SINGRAULI										
SI No.	DESCRIPTION	QTY	UNIT	Unit Rate (Rs.)	TAXES					Remarks
					ED %	CST%	VAT %	WORKS CONTRACT TAX	SERVICE TAX %	
A. SUPPLY :										
1	PS0679033084 Transformer 3-winding 1600kVA ONAN	12	NO					NA	NA	Taxes Extra
	Rate in words :									
2	PS0679033092 Spare items for 1600kVA transformer	1	ST					NA	NA	Taxes Extra
	Rate in words :									
3	PS0679033467 Supply of MC4, Cable tie, HDPE pipe etc	1	ST					NA	NA	Taxes Extra
	Rate in words :									
4	PS0679033475 Supply of LT/HT/data cables, kits etc	1	ST					NA	NA	Taxes Extra
	Rate in words :									
5	PS0679033483 Supply of Materials for Inv. Room	5	ST					NA	NA	Taxes Extra
	Rate in words :									
6	PS0679033491 Supply of DG Set, Aux Transformer etc	1	ST					NA	NA	Taxes Extra
	Rate in words :									
7	PS0679033505 Supply of items of earthing systems	1	ST					NA	NA	Taxes Extra
	Rate in words :									
8	PS0679033513 Supply items of module cleaning system	1	ST					NA	NA	Taxes Extra
	Rate in words :									
9	PS0679033521 Supply LA for PV array, cntrl room etc	1	ST					NA	NA	Taxes Extra
	Rate in words :									
10	PS0679033530 Supply of items of yard lighting systems	1	ST					NA	NA	Taxes Extra
	Rate in words :									
11	PS0679033548 Supply of miscellaneous items	1	ST					NA	NA	Taxes Extra
	Rate in words :									
12	PS0679033556 Supply fire alarm sys, extinguishers etc	1	ST					NA	NA	Taxes Extra
	Rate in words :									
13	PS0679033742 Supply of spares	1	ST					NA	NA	Taxes Extra
	Rate in words :									
B. I&C :										
1	PS0679033564 I&C: Temp site office, storage yard etc	1	AU					NA	NA	Taxes Extra
	Rate in words :									
2	PS0679033572 I&C: Interconnection Modules,SMBs etc	6	AU					NA	NA	Taxes Extra
	Rate in words :									
3	PS0679033580 I&C:Trenches,cable laying etc	6	AU					NA	NA	Taxes Extra
	Rate in words :									
4	PS0679033599 I&C : Inverter Room	5	AU					NA	NA	Taxes Extra
	Rate in words :									
5	PS0679033602 I&C: Elec panel instln Inverter room	5	AU					NA	NA	Taxes Extra
	Rate in words :									
6	PS0679033610 I&C: 33 KV S/yard at Inv room	5	AU					NA	NA	Taxes Extra
	Rate in words :									
7	PS0679033637 I&C: Elec panel instln at CMCS	1	AU					NA	NA	Taxes Extra
	Rate in words :									
8	PS0679033645 I&C: 33 KV S/yard at CMCS	1	AU					NA	NA	Taxes Extra
	Rate in words :									
9	PS0679033653 I&C SCADA System	1	AU					NA	NA	Taxes Extra
	Rate in words :									
10	PS0679033661 I&C : DG Set, aux Transformer, etc	1	AU					NA	NA	Taxes Extra
	Rate in words :									

AUTHORISED SIGNATORY WITH SEAL

REVISED PRICE BID FORMAT AS PER ADDENDUM TO RFQ											
RFQ No.HBSMM2002 RFQ DATE : 25.10.2013 DUE DATE : 25.11.2013 FOR DESIGN,SUPPLY,I&C AND O&M FOR BALANCE OF 15MW SPV PLANT AT NTPC-SINGRAULI											
Sl No.		DESCRIPTION	QTY	UNIT	Unit Rate (Rs.)	TAXES					Remarks
						ED %	CST%	VAT %	WORKS CONTRACT TAX	SERVICE TAX %	
11	PS0679033670	I&C: Earthing system: Array, S/yard etc	1	AU		NA	NA	NA	NA		Taxes Extra
	Rate in words :										
12	PS0679033688	I&C: Yard lighting system	1	AU		NA	NA	NA	NA		Taxes Extra
	Rate in words :										
13	PS0679033696	I&C: Module cleaning system	1	AU		NA	NA	NA	NA		Taxes Extra
	Rate in words :										
14	PS0679033718	I&C: Misc Items fire alarm sys etc	1	AU		NA	NA	NA	NA		Taxes Extra
	Rate in words :										
15	PS0679033726	I&C: Commissioning, state clearances etc	1	AU		NA	NA	NA	NA		Taxes Extra
	Rate in words :										
C. CIVIL WORKS :											
1	PS0679033629	Construction of Main Control Room (CMCS)	1	AU		NA	NA	NA	Included	NA	Taxes Included
	Rate in words :										
2	PS0679033700	Construction of Boundary Wall	5	AU		NA	NA	NA	Included	NA	Taxes Included
	Rate in words :										
3	PS0679033866	Constn. of approach road & level corssing	1	AU		NA	NA	NA	Included	NA	Taxes Included
	Rate in words :										
4	PS0679033874	Construction of Pathways	1	AU		NA	NA	NA	Included	NA	Taxes Included
	Rate in words :										
5	PS0679033882	Construction of Drainage System	5	AU		NA	NA	NA	Included	NA	Taxes Included
	Rate in words :										
6	PS0679033890	Constn. of Security cbn, watch tower etc	1	AU		NA	NA	NA	Included	NA	Taxes Included
	Rate in words :										
D.O&M											
1	PS0679033734	O&M of SPV Power Plant	12	AU		NA	NA	NA	NA		Taxes Extra
	Rate in words :										
E	**Freight Charge including Service Tax on Freight(12.36% on 25% of Freight Value)		LUMPSUM			NA	NA	NA	NA	NA	Freight : Included/Extra
	Freight charge in words :										
F	**Transit Insurance		LUMPSUM			NA	NA	NA	NA	NA	Insurance : Included/Extra
	Insurance charge in words :										

NOTE: 1.YOUR QUOTED PRICES SHALL BE on "FREE ON ROAD" basis to NTPC-SINGRAULI-MP

2.PL INDICATE TAXES : ED,VAT/CST,SERVICE TAX CLEARLY APPLICABLE AS ON DATE.

3.USE THIS FORMAT FOR COMPLIANCE(REPRODUCING ON YOUR LETTER HEAD IS ACCEPTABLE).

4. FOR SL NOS A,B & D, TAXES WILL BE CONSIDERED EXTRA.PLEASE QUOTE ONLY THE BASIC RATES.

5. FOR SL NO.C. THE WCT% INCLUDED IN RATE SHALL BE INDICATED IN ANNEXURE B(SL.No.11).

6.**INDICATE WHETHER FREIGHT CHARGE & INSURANCE CHARGE IS INCLUDED IN QUOTED RATE OR WILL BE CHARGED EXTRA.

IN ABSENCE OF CLARITY, QUOTED RATE WILL BE CONSIDERED AS INCLUSIVE OF FREIGHT & INSURANCE CHARGES.

AUTHORISED SIGNATORY WITH SEAL