



बैंक नोट मुद्रणालय, देवास (म.प्र.) 455 001
BANK NOTE PRESS, DEWAS (M. P.) 455 001

(आईएसओ : 9001 एवं आईएसओ : 14001 प्रमाणित इकाई)
 (ISO 45001 : 2018 Certified Unit)

भारत प्रतिभूति मुद्रण तथा मुद्रा निर्माण निगम लिमिटेड की इकाई
 A Unit of Security Printing & Minting Corporation of India Limited

मिनिरत्न श्रेणी-I, सीपीएसई (भारत सरकार के पूर्ण स्वामित्वाधीन)
 Miniratna Category - I CPSE (Wholly owned by Government of India)
 CIN : U22213DL2006G0I144763



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Ph. : 07272-255222
 Fax : 07272-255111

NATIONAL INVITATION FOR EXPRESSION OF INTEREST (EOI)

1.	Name of the organization	:	Bank Note Press, Dewas, Madhya Pradesh 455001
2.	Type of the organization	:	A Miniratna Category-I CPSE and Wholly owned by Government of India
3.	EOI Reference No.	:	BNP/P/E/7.5 MVA Transformer/2022/EOI
4.	EOI Title	:	Expression of Interest (EOI) for 7.5 MVA Transformer on buy back basis.
5.	Category	:	Non-Security
6.	Sub-category	:	Capital
7.	Date of Annoucement	:	09.12.2022
8.	Last date for submission	:	10.01.2023 before 14.30 hrs.
9.	Technical Specifications and Scope of Work	:	Placed at Annexure I
10.	Eligibility / Pre-qualification criteria:	:	Placed at Annexure II
11.	Procurement Process	:	Placed at Annexure III
12.	Specimen Response letter to EOI	:	Placed at Annexure IV



**EXPRESSION OF INTEREST (EOI) FOR 7.5 MVA TRANSFORMER ON BUY BACK BASIS
AT BANK NOTE PRESS DEWAS. (M.P.), INDIA.**

BNP/P/E/7.5 MVA Transformer/2022/EOI

Dated 09.12.2022

Bank Note Press, Dewas is an industrial unit of Security Printing & Minting Corporation of India limited (SPMCIL), wholly owned by Government of India, Ministry of Finance, Department of Economic Affairs. BNP was established in 1974 to print world class high quality bank notes of different denominations. Bank Note Press, Dewas has its own security printing ink manufacturing unit also.

Interested vendors fulfilling the eligibility criteria as given in Annexure II are requested to submit Expression of Interest as per format given in Annexure IV to this expression of interest. The Expression of Interest must be submitted with the brief profile of the firm, their past performance in similar operation, financial background etc. in support of the eligibility criteria. The Expression of Interest must be sent to the following address:

The Additional General Manager (Materials)
For and on the behalf of The Chief General Manager
Bank Note Press, Dewas (M.P.) 455001 India
Phone No. 07272-268253/268468
Email: bnppurchase@spmcil.com

Last date and Time for receipt of Expression of Interest : **On 10.01.2023
At 14:30 Hrs. (IST)**

Date and Time of opening of Expression of Interest : **On 10.01.2023
At 15:00 Hrs. (IST)**

Place of opening of Expression of Interest : **Administration Block,
Bank Note Press,
Dewas (M.P.) 455001 India**

Delay due to postal/courier etc, will not be entertained. Tender received after the due date and time will be rejected.



Details of Annexures:

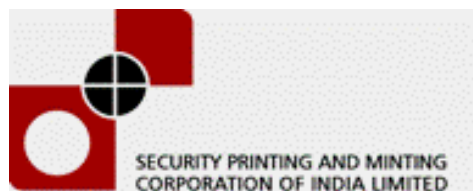
1. Technical Specifications and Scope of Work – Annexure I
2. Eligibility/Pre-qualification Criteria – Annexure II
3. Procurement Process - Annexure III
4. Specimen Response letter to EOI - Annexure IV

For and behalf of Security Printing and Minting Corporation of India Limited

Diganta Kumar Deka
Additional General Manager (Materials),
Bank Note Press, Dewas (M.P.) 455001 India
Phone No. 07272-268253/268468

Note: The Company reserves the right to accept/reject any application at its sole discretion and / or cancel the entire exercise. Mere fulfilling the minimum eligibility criteria will not confer any right on the applicant to be called for discussion/selection.

All Addendum/Corrigendum to this EOI shall be uploaded only on website i.e. www.spmcil.com.



BNP/P/E/7.5 MVA Transformer/2022/EOI

Dated 09.12.2022

Background of the company

Security Printing and Minting Corporation of India Limited (SPMCIL) is a Mini-Ratna Category-I CPSE and a wholly owned schedule 'A' Company of Government of India and is under the administrative control of Department of Economic Affairs, Ministry of Finance, Government of India. SPMCIL is engaged in the manufacture of currency/security paper, minting of coins, printing of banknotes, non-judicial stamp papers, postage stamps, travel documents, etc. having nine units including four mints (India Government Mint-Kolkata; India Government Mint-Hyderabad; India Government Mint-Mumbai and India Government Mint-Noida), two security presses (India Security Press, Nashik and Security Printing Press-Hyderabad), two currency presses (Currency Note Press, Nashik and Bank Note Press-Dewas) and one paper mill (Security Paper Mill-Narmadapuram) across the country.



Annexure -I

(I). BNP/P/E/7.5 MVA Transformer/2022/EOI

Dated 09.12.2022

TECHNICAL SPECIFICATION FOR 33/11KV ONAN POWER TRANSFORMERS

1. SCOPE

1.1 This Specification provides for design, manufacture, assembly, stage inspection, final inspection and testing ,transport, transit insurance, unloading at site ,Retro fitting ,Erection, Installation & commissioning of **7.50 MVA, 33/11kV Power Transformers**, complete with all fittings, accessories, associated equipment, Spares, 10% extra Transformer Oil, required for its satisfactory operation. The Transformer shall be of outdoor type with off load tap changers.

1.2 **The core shall be constructed from high grade, non-aging Cold Rolled Grain Oriented (CRGO) Silicon Steel laminations conforming to HIB grade with lamination thickness not more than 0.23mm to 0.27mm or better quoted grade Core.** The maximum flux density in any part of the core and yoke at normal voltage and frequency shall not be more than **1.5 Tesla. The Bidder shall provide saturation curve of the core material**, proposed to be used. **Laminations of different grade(s) and different thickness (s) are not allowed to be used in any manner or under any circumstances.**

1.3 The Power Transformers shall conform in all respects to highest standards of engineering, design, workmanship based on this specification and the latest revisions of relevant standards at the time of offer. BNP shall have the power to reject any work or material, which, in his judgment, is not in full accordance therewith. The Transformers offered, shall be complete with all components, necessary for their effective and trouble free operation. Such components shall be deemed to be within the scope of supply, irrespective of whether those are specifically brought out in this specification and / or in the commercial order or not.

BNP reserves the right to reject the transformers-

- i) If on testing the No-load and load- losses exceed the stipulated values as per this Technical Specification
- ii) if the temperature rise in oil and / or winding exceeds the value as per this Technical Specification
- iii) if impedance value differs from the guaranteed value including tolerance as per this specification



iv) On Inspection and testing, if any of the technical data does not comply to this specification, bid offer and approved drawings etc.

1.4 The offered rating transformer should have been tested for “Short Circuit withstand capability test” and “Impulse test” in an NABL accredited Government Laboratory as per relevant IS/IEC and the Type Test certificates in complete shape shall be accompanied with the bid offer.

TECHNICAL REQUIREMENTS OF POWER TRANSFORMER

1	Rated MVA of Transformer (ONAN rating)	7.5 MVA
2	No. of Phases	3
3	Type of Installation	Outdoor
4	Frequency	50 Hz (- 5% to +3%)
5	Cooling medium	Insulating Oil (ONAN)
6	Type of mounting	On Wheels, Mounted on rails.
7	Rated voltage a) High Voltage Winding b) Low Voltage Winding	33 KV 11 KV
8	Highest continuous system Voltage a) Maximum system Voltage ratio(HV / LV) b) Rated Voltage ratio (HV / LV)	36 kV/ 12 kV 33 KV/11 KV
9	No. of windings	Two winding Transformers
10	Type of cooling	ONAN (Oil natural & Air natural)
11	MVA Rating corresponding to ONAN cooling system	100 %
12	Method of connection: HV : LV :	Delta Star
13	Connection symbol	Dyn 11
14	System earthing	Neutral of LV side to be solidly earthed.
15	Percentage impedance voltage on Normal tap and MVA base at 75°C corresponding to HV/ LV rating and applicable tolerances :	% Impedance for 7.5 MVA - 8.35% (Tolerance +10%) (No negative tolerance will be allowed)



16	Intended regular cyclic	As per IEC –76-1 Clause	
17	overloading of windings a) Anticipated unbalanced loading b) Anticipated continuous loading of windings (HV / LV)	Around 10% 110 % of rated current	
18	Type of tap changer	OFF load tap changer	
20	Range of taping	+ 5% to – 15% in 8 equal steps of 2.5% each on HV winding, 9 tap positions. Tap No 3 will be the Principal tap position.	
21	Neutral terminal to be brought out	On LV side only	
22	Over Voltage operating capability and duration	112.5 % of rated voltage (continuous)	
23	Maximum Flux Density in any part of the core and yoke at rated MVA, rated voltage i.e 33kV / 11kV and system frequency of 50 Hz	1.5 Tesla	
24	Insulation levels for windings :-	33 KV	11 KV
	a) 1.2 / 50 microsecond wave shape Impulse withstand (KVP) b)Power frequency voltage withstand (KVrms)	170	95
25	Type of winding insulation		
	a) HV winding b) LV winding	Uniform Uniform	
26	Withstand time for three phase short circuit	As per NEMA Publication No. TR-1.	



27	Permissible Maximum Temperature Rise over ambient temperature of 50°C	
	a) Of top oil measured by thermometer.	35 °C
	b) Of winding measured by resistance.	40°C
	c) Hot Spot Temperature rise	54°C
28	Minimum clearances in air (mm) :-	Phase to Phase Phase to ground
	a) HV	400 320
	b) LV	280 140
29	Terminals :- a) HV winding line end b) LV winding	36kV oil filled communicating type porcelain bushings (Antifog type) 12kV porcelain type of bushings (Antifog type)
30	Insulation level of Bushing :- a) Lightning Impulse withstand (KVP) b) 1 Minute Power Frequency withstand voltage (KV-rms) c) Creepage distance (mm) (minimum)	HV LV 170 95 70 28 900 320
31	Material of HV & LV Conductor	Electrolytic Copper
32	Maximum current density for HV and LV winding for rated current at normal tap	2.4 A/ mm ²



33	Polarisation Index i.e ratio of Megger values at 600 sec. to 60 sec for HV to earth, L.V to earth and HV to LV	Shall be greater than or equal to 1.5 but less than or equal to 5.
34	Core Assembly	Boltless type
35	Temperature Indicator a) Oil b) Winding	One number One number
36	Maximum permissible no load loss at rated voltage and rated frequency.	7.5 - 4.5KW (Maximum)
37	Maximum permissible load loss at rated current, at normal tap and at 75°C	7.5 - 38.0KW (Maximum)
38	Paper Covering thickness of HV Winding Conductor	0.6 mm(minimum)
39	Paper Covering thickness of LV Winding Conductor	0.5 mm(minimum)
40	Clearances:-	
	a) Gap between HV Coil to the inside of the tank on the longer side	65 mm(minimum)
	b) Gap between HV Coil to the inside of the tank on the width side (LV Side)	65 mm(minimum)
	c) Gap between HV Coil to the inside of the tank on the width side (HV Side to accommodate delta and tapping leads)	115 mm(minimum)
	d) Gap between Core yoke to tank bottom	55 mm(minimum)
	e) Yoke insulation at top and bottom	130 mm(minimum)
	f) Phase to Phase clearance between HV Limbs	20 mm(minimum)



	g) Radial Clearance between LV and HV Coil	20 mm(minimum)
	h) Radial Clearance between Core to LV Coil	12.5 mm(minimum)
41	The difference of Ampere Turns at each location shall not be more than 5 % at all percentages of tapings	--
42	Winding to winding clearance should have minimum 20% of sum of pressboard Cylinder/Barrier	--
43	. Minimum Air core reactance of HV winding	20 %
44	Minimum Air core reactance of HV winding Type of oil preservation	Air-cell type

MARSHALLING BOX

A metal enclosed, weather, vermin and dust proof marshalling box fitted with required glands, locks, glass door, terminal Board, heater with switch, illumination lamp with switch etc. shall be provided with each transformer to accommodate temperature indicators, terminal blocks etc. It shall have degree of protection of IP 55 or better as per IS: 2147.

2.2 PERFORMANCE

i) Transformer shall be capable of **withstanding for two seconds** without damage to any **external short circuit**.

ii) The maximum flux density in any part of the core and yoke at rated MVA, Voltage and frequency, shall be 1.5 Tesla (maximum).

iii) Transformer shall under exceptional circumstances due to sudden disconnection of the load, be capable of operating at the voltage approximately 25% above normal rated voltage for a period of not exceeding one minute and 40% above normal for a period of 5 seconds.

iv) The transformer may be operated continuously without danger on any particular tapping at the rated MVA \pm 12.5% of the voltage corresponding to the tapping.



- v) The thermal ability to withstand short circuit shall be demonstrated by calculation.
- vi) Transformer shall be capable of withstanding thermal and mechanical stress caused by any symmetrical and asymmetrical faults on any winding. The Bidder shall submit the necessary Short Circuit Force Calculation with the offer

2.3 DRAWINGS/ DOCUMENTS INCORPORATING THE FOLLOWING PARTICULARS SHALL BE SUBMITTED WITH THE BID

- a) General outline drawing showing shipping dimensions and overall dimensions, net weights and shipping weights, quality of insulating oil, spacing of wheels in either direction of motion, location of coolers, marshalling box and tap changers etc.
- b) Assembly drawings of core, windings etc. and weights of main components / parts.
- c) Height of center line on HV and LV connectors of transformers from the rail top level.
- d) Dimensions of the largest part to be transported.
- e) GA drawings / details of various types of bushing
- f) Tap changing and Name Plate diagram
- g) Type test certificates of the quoted rating transformer.
- h) Illustrative & descriptive literature of the Transformer.
- i) The drawings and Type Test certificates of Tap Changer
- j) Maintenance and Operating Instructions.
- k) The Type Test certificates in complete shape for "Lightning Impulse" and "Short Circuit" Test and Temperature Rise Test

2.4 MISCELLANEOUS

- i) Padlocks along with duplicate keys as asked for various valves, marshalling box etc. shall be supplied by the contractor, wherever locking arrangement is provided.
- ii) Foundation bolts for wheel locking devices of Transformer shall be supplied by the Contractor.

2.7 NAME PLATE

Transformer rating plate shall contain the information as given in clause 15 of IS-2026 (part-I). The details on rating plate shall be finalized during the detailed engineering. Further, each transformer shall have inscription of DISTCOM's name which will be intimated by BNP to the firm.



The name plate shall also include :

- (i) The short circuit rating
- (ii) Measured no load current and no load losses at rated voltage and rated frequency
- (iii) Measured load losses at 75°C (Normal Tap only)
- (iv) D.C resistance of each winding at 75° C.

3.0 SYSTEM CONDITIONS

The equipment shall be suitable for installation in supply systems of the following Characteristics.

		33 kV	11 kV
1	Frequency	50 Hz (- 5% to +3%)	50 Hz (- 5% to +3%)
2	Nominal system voltages	33 kV	11 kV
3	Maximum system voltages	36 kV	12 kV
4	Nominal short circuit level	AS per IS:2026	
5	Insulation levels (1.2/50 μ sec impulse withstand voltage)	170 kV (peak)	95kV (peak)
6	Power frequency with one minute withstand (wet & dry) voltage	70 kV(rms)	28 kV(rms)
7	Neutral earthing arrangements	--	Solidly earthed
8			



4.0 CODES & STANDARDS

4.1 The design, material, fabrication, manufacture, inspection, testing before dispatch and performance of power transformers at site shall comply with all currently applicable statutory regulations and safety codes in the locality where the equipment will be installed. The equipment shall also conform to the latest applicable standards and codes of practice. Nothing in this specification shall be construed to relieve the Contractor of this responsibility.

4.2 The equipment and materials covered by this specification shall conform to the latest applicable provision of the following standards.

1	IS: 5	Color for ready mixed paints & Enamels
2	IS: 335	New insulating oil for transformers, switch gears
3	IS: 1271	Classification of insulating materials for electrical machinery and apparatus in relation to their stability in services
4	IS: 2026(Part I to IV)	Power Transformer
5	IS: 2071	Method of high voltage testing
6	IS: 2099	High voltage porcelain bushings
7	IS: 2147	Degree of protection
8	IS: 2705	Current Transformers
9	IS: 3202	Code of practice for climate proofing of electrical equipment
10	IS: 3347	Dimensions for porcelain Transformer Bushings
11	IS: 3639	Fittings and accessories for power Transformers
12	IS: 5561	Electric Power Connectors



13	IS: 6600/BS:CP" 10:0	Guide for loading of oil immersed Transformers
14	IS: 10028	Code of practice for selection, installation and maintenance of transformers, Part I. II and III
15	IS 1002/1981 (Part – III)	Maintenance of Transformer
16	C.B.I.P. Publication	Manual on Transformers

If the standard is not quoted for any item, it shall be presumed that the latest version of Indian Standard shall be applicable to that item.

The equipment complying other internationally accepted standards, may also be considered if they ensure performance superior to the Indian Standards.

4.3 DRAWINGS

a) The contractor shall furnish after award of contract one month before Six copies each of the following drawings/documents incorporating the transformer rating for approval.

i) Detailed overall general arrangement drawing showing front and side elevations and plan of the transformer and all accessories including radiators and external features with details of dimensions, spacing of wheels in either direction of motion, net weights and shipping weights, crane lift for un-tanking, size of lugs and eyes, bushing lifting dimensions, clearances between HV and L.V terminals and ground, quantity of insulating oil etc.

ii) Assembly drawings of core and winging and weights of main components / parts. In the Core-Coil assembly drawing , the following dimensions should be clearly mentioned:-

Core:- Window Height, Leg Centre, Core diameter, Grade & thickness of Core material, gross & net Core Cross-Sectional area, Watt loss per kg at the quoted flux density, VA per kg at the quoted flux density.

HV & LV Windings:- Conductor Size (both bare and insulated), Inside and Outside diameters, axial heights, type of windings, No. of spacers with sizes, No. of discs, No. of turns/disc, gap between discs ,clearance from top and bottom yoke, gap between windings, Size of the conductor for delta connection etc.

iii) Foundation plan showing loading on each wheel land jacking points with respect to Centre line of transformer.



- iv) GA drawings details of bushing and terminal connectors.
 - v) Name plate drawing with terminal marking and connection diagrams.
 - vi) Wheel locking arrangement drawing.
 - vii) Transportation dimensions drawings.
 - viii) Magnetization characteristic curves of PS class neutral and phase side current transformers, if applicable.
 - ix) Interconnection diagrams.
 - x) Over fluxing withstand time characteristic of transformer.
 - xi) GA drawing of marshalling box.
 - xii) Control scheme/wiring diagram of marshalling box.
 - xiii) Technical leaflets of major components and fittings.
 - xiv) As built drawings of schematics, wiring diagram etc.
 - xv) Setting of oil temperature indicator, winding temperature indicator.
 - xvi) Completed technical data sheets.
 - xvii) Detail Drawings, Type Test Certificates including write-up of On-Load tap changing gear and its required accessories/equipment's, wiring diagrams etc. as per this specification.
 - xviii) HV conductor bushing.
 - xix) Bushing Assembly.
 - xx) Bi-metallic connector suitable for connection to 100 sq. mm up to 232 Sq.mm AAAC Conductor.
 - xxi) GA of LV cable Box.
 - xxii) Radiator type assembly
 - xxiii) Specific loss(watt/Kg. vs. Flux density),VA/Kg.vs.Flux density &B-H Graph for the offered HIB or better core material, to be used for the offered transformer
- b) All drawings, documents, technical data sheets and test certificates, results and calculations shall be furnished.
- c) Ampere –Turns Calculation at various locations and tapping positions of both LV and HV windings.



4.4 Any approval given to the detailed drawings by the BNP shall not relieve the contractor of the responsibility for correctness of the drawing and in the manufacture of the equipment. The approval given by the BNP shall be general with overall responsibility with contractor

5.0 GENERAL CONSTRUCTIONAL FEATURES

5.1 All material used shall be of best quality and of the class most suitable for working under the conditions specified and shall withstand the variations of temperature and atmospheric conditions without distortion or deterioration or the setting up of undue stresses which may impair suitability of the various parts for the work which they have to perform.

5.2 Similar parts particularly removable ones shall be interchangeable

5.3 Pipes and pipe fittings, screws, studs, nuts and bolts used for external Connections shall be as per the relevant standards. Steel bolts and nuts exposed to atmosphere shall be galvanized.

5.4 Nuts, bolts and pins used inside the transformers and tap changer compartments shall be provided with lock washer or locknuts.

5.5 Exposed parts shall not have pockets where water can collect.

5.6 Internal design of transformer shall ensure that air is not trapped in any location.

5.7 Material in contact with oil shall be such as not to contribute to the formation of acid in oil. Surface in contact with oil shall not be galvanized or cadmium plated.

5.8 Labels, indelibly marked, shall be provided for all identifiable accessories like Relays, switches current transformers etc. All label plates shall be of in corrodible material.

5.9 All internal connections and fastenings shall be capable of operating under overloads and over-excitation, allowed as per specified stands without injury.

5.10 Transformer and accessories shall be designed to facilitate proper operation, inspection, maintenance and repairs.

5.11 No patching, plugging, shimming or other such means of overcoming defects, discrepancies or errors will be accepted.

5.12 Schematic Drawing of the wiring, including external cables shall be put under the prospane sheet on the inside door of the transformer marshalling box.

5.13 Painting

Particular attention shall be paid to the following:

- a) Proper storage to avoid exposure as well as extremes of temperature.
- b) Surface preparation prior to painting.
- c) Mixing and thinning
- d) Application of paints and the recommended limit on time intervals between coats.
- e) Shelf life for storage.

5.13.1.1 All paints, when applied in normal full coat, shall be free from runs, sags, wrinkles, patchiness, brush marks or other defects.



5.13.1.2 All primers shall be well marked into the surface, particularly in areas where painting is evident, and the first priming coat shall be applied as soon as possible after cleaning. The paint shall be applied by airless spray according to the manufacturer's recommendations. However, wherever airless spray is not possible, conventional spray be used with prior approval of BNP.

5.13.1.3 The supplier shall, prior to painting protect nameplates, lettering gauges, sight glasses, light fittings and similar such items.

5.13.2 Cleaning and Surface Preparation

5.13.2.1 After all machining, forming and welding has been completed, all steel work surfaces shall be thoroughly cleaned of rust, scale, welding slag or spatter and other contamination prior to any painting.

5.13.2.2 Steel surfaces shall be prepared by Sand/Shot blast cleaning and Chemical cleaning by Seven tank process including Phosphating to the appropriate quality. The surface shall be treated by phosphating and dried in accordance with IS 6005 (Code of practices for phosphating of Iron and Steel). Immediately after Phosphating, surface shall be given two coats of high quality Zinc Chromate Primer.

5.13.2.3 The pressure and Volume of the compressed air supply for the blast cleaning shall meet the work requirements and shall be sufficiently free from all water contamination prior to any painting.

5.13.2.4 Chipping, scraping and steel wire brushing using manual or power driven tools cannot remove firmly adherent mill-scale and shall only be used where blast cleaning is impractical.

5.13.3 Protective Coating

As soon as all items have been cleaned and within four hours of the subsequent drying, they shall be given suitable anticorrosion protection.

5.13.4 Paint Material

Followings are the type of paints that may be suitably used for the items to be painted at shop and supply of matching paint to site:

i) Heat resistant paint (Hot oil proof) for inside surface.

ii) For external surfaces one coat of Thermo Setting Paint or 2 coats of Zinc chromate followed by 2 coats of POLYURETHANE. The color of the finishing coats shall be dark admiral grey conforming to No.632 or IS 5:1961.

5.13.5 Painting Procedure

5.13.5.1 All painting shall be carried out in conformity with both specifications and with the paint manufacturer's recommendations. All paints in any one particular system. Whether shop or site applied, shall originate from one paint manufacturer



5.13.5.2 Particular attention shall be paid to the manufacture's instructions on storage, mixing, thinning and pot life. The paint shall only be applied in the manner detailed by the manufacturer e.g. brush, roller, conventional or airless spray and shall be applied under the manufacturer's recommended conditions. Minimum and maximum time intervals between coats shall be closely followed.

5.13.5.3 All prepared steel surfaces should be primed before visible re-rusting occurs or within 4 hours whichever is sooner. Chemical treated steel surfaces shall be primed as soon as the surface is dry and while the surface is warm.

5.13.5.4 Where the quality of film is impaired by excess film thickness, (wrinkling, mud cracking or general softness) the supplier shall remove the unsatisfactory paint coatings and apply another. As a general rule, dry film thickness should not exceed the specified minimum dry film thickness by more than 25%. In all instances, where two or more coats of the same paints are specified, such coatings may or may not be of contrasting colors.

5.13.5.5 Paint applied to items that are not to be painted, shall be removed at supplier's expense, leaving the surface clean, un-stained and undamaged.

5.13.6 Damages to Paints Work

5.13.6.1 Any damage occurring to any part of the painting scheme shall be made good to the same standard of corrosion protection and appearance as that originally employed.

5.13.6.2 Any damaged paint work shall be made as follows:

a) The damaged area, together with an area extending 25mm around its boundary, shall be cleaned down to bare metal.

b) A priming coat shall immediately applied, followed by a full paint finish equal to that originally applied and extending 50mm around the perimeter of the originally damaged.

5.13.6.3 The repainted surface shall present a smooth surface. This shall be obtained by carefully chamfering the paint edges before & after priming.

5.13.7 Dry Film Thickness

5.13.7.1 To the maximum extent practicable, the coats shall be applied as a continuous film of uniform thickness and free of pores. Over-spray, skips, runs, sags and drips should be avoided. The different coats may or may not be same color.

5.13.7.2 Each coat of paint shall allowed to hardened before the next is applied as per manufacture's recommendations.

5.13.7.3 Particular attention must be paid to full film thickness at edges.

5.13.7.4 The requirement for the dry film thickness (DFT) of paint and the material to be used shall be as given below:



Sl. No	Paint Type	Area to be painted	No of Coats	Total Dry film thickness(Min)
1	Liquid Paint			
a	Zinc Chromate(Primer)	Out side	02	45 micron
b	POLYURETHANE (Finish Coat)	Out side	02	35 micron
c	Hot Oil	inside	01	35 micron

6.0 DETAILED DESCRIPTION

6.1 Tank

6.1.1 The Transformer tank and cover shall be fabricated from high grade low carbon plate steel of tested quality. The tank shall be of welded construction. The transformer Tank shall be of rectangular Shape design(No elliptical shape design is allowed).

6.1.2 Tank shall be designed to permit lifting by crane or jacks of the complete transformer assembly filled with oil. Suitable lugs and bossed shall be provided for this purpose.

6.1.3 All beams, flanges, lifting lugs, braces and permanent parts attached to the tank shall be welded and where practicable, they shall be double welded.

6.1.4 The main tank body of the transformer, excluding tap changing compartments and radiators, shall be capable of withstanding pressure of 760mm of Hg. **The side Tank wall shall be of 6mm thickness 8mm(minimum) for 7.5 MVA . The bottom and Top Plate of the Tank shall be of of 7.5 mm thickness (minimum) for 12mm.(minimum) for 7.5 MVA.**

6.1.5 Inspection hole(s) with welded flange(s) and bolted cover(s) shall be provided on the tank cover. The inspection hole(s) shall be of sufficient size to afford easy access to the lower ends of the bushings, terminals etc.

6.1.6 **Gaskets:** Gaskets of nitrile rubber or equivalent shall be used to ensure perfect oil tightness. All gaskets shall be closed design (without open ends) and shall be of one piece only. Rubber gaskets used for flange type connections of the various oil compartments, shall be laid in grooves or in groove-equivalent sections on bolt sides of the gasket, throughout their total length. Care shall be taken to secure uniformly distributed mechanical strength over the gaskets and retains throughout the total length. Gaskets of neoprene and / or any kind of impregnated / bonded core or cork only which can easily be damaged by over-pressing are not acceptable. Use of hemp as gasket material is also not acceptable.



6.1.7 Suitable guides shall be provided for positioning the various parts during assemble or dismantling. Adequate space shall be provided between the cores and windings and the bottom of the tank for collection of any sediment.

6.2 Tank Cover

The transformer top shall be provided with a detachable tank cover with bolted flanged gasket joint. Lifting lugs shall be provided for removing the cover. The surface of the cover shall be suitable sloped so that it does not retain rain water.

6.3 UNDER CARRIAGE

6.3.1 The transformer tank shall be supported on steel structure with detachable plain rollers completely filled with oil. Suitable channels for movement of roller with transformer shall be space accordingly, rollers wheels shall be provided with suitable rollers bearings, which will resist rust and corrosion and shall be equipped with fittings for lubrication. It shall be possible to swivel the wheels in two directions, at right angle to or parallel to the main axis of the transformers.

6.4 CORE

6.4.1 Stage inspection for core construction shall be carried out by the Owner through a 3rd party agency as well as NABL / DISCOM. Inspection certificate shall be provided by the firm to BNP Dewas

6.4.2 Each lamination shall be insulated such that it will not deteriorate due to mechanical pressure and the action of hot transformer oil.

6.4.3 The core shall be constructed from high grade, non-aging Cold Rolled Grain Oriented (CRGO) silicon steel laminations conforming to HIB grade or better grade with lamination thickness not more than 0.23mm to 0.27mm. The maximum flux density in any part of the cores and yoke at normal voltage and frequency shall not be more than 1.5 Tesla. The Bidder shall provide saturation curve of the core material, proposed to be used. Laminations of different grade(s) and different thickness (s) are not allowed to be used in any manner or under any circumstances.

6.4.4 The bidder should offer the core for inspection starting from the destination port to enable BNP for deputing inspecting officers for detail verification as given below and approval by the BNP during the manufacturing stage. Bidder's call notice for the purpose should be accompanied with the following documents as applicable as a proof towards use of prime core material:

The core coils, if found suitable, are to be sealed with proper seals which shall be opened in presence of the inspecting officers during core- cutting at the manufacturer's or it's sub-vendor's premises as per approved design drawing.

a) Contract Order No. & Date.

b) Invoice of the supplier

c) Mills test certificate

d) Packing list

e) Bill of lading

f) Bill of entry certificate to customs



Core material shall be directly procured either from the manufacturer or through their accredited marketing organization of repute, but not through any agent.

6.4.4 (B) For Transformer Manufacturer (TM), who has in-house core-cutting facility, the packed core coils shall be verified at their works as per followings along with witnessing of core- cutting.

- a) Purchase Order No. & Date ;
- b) No. of packed coils with Package Nos.
- c) Gross Weight.
- d) Net Weight :
- e) Port of loading.
- f) Port of Discharge ;
- g) Name of the Ocean Vessel :
- h) Grade & Thickness of Core Material :
- i) Any other information as mentioned on the body of packed coils.

6.4.4 (C) For those bidders, who have no in-house core-cutting facility, they should mention the names of at least three sub-vendors to whom they intend to assign their core-cutting. Such sub-vendors should have been approved by other Electricity Board / Electrical Utilities and accredited by some internationally recognized certification body like ISO- 9000 etc. to ensure that a minimum quality parameters & tolerance are maintained. The experience, the details of core-cutting facilities finishing & testing facilities etc. as available which such sub-vendors should be clearly out-lined in the bid

6.4.4 (D) On award of Contract the TM is to assign the core-cutting to such sub-vendors for which approval is to be given by the BNP.

6.4.5 The laminations shall be free of all burrs and sharp projections. Each sheet shall have an insulating coating resistant to the action of hot oil.

6.4.6 The insulation structure for the core to bolts and core to clamp plates, shall be such as to withstand 2000 V DC voltage for one minute.

6.4.7 The completed core and coil shall be so assembled that the axis and the plane of the outer surface of the core assemble shall not deviate from the vertical plane by more than 25mm.

6.4.8 All steel sections used for supporting the core shall be thoroughly shot or sand blasted, after cutting, drilling and welding.

6.4.9 The finally assembled core with all the clamping structures shall be free from deformation and shall not vibrate during operation.

6.4.10 The core clamping structure shall be designed to minimize eddy current loss.

6.4.11 The framework and clamping arrangements shall be securely earthed.

6.4.12 The core shall be carefully assembled and rigidly clamped to ensure adequate mechanical strength.



6.4.13 Oil ducts shall be provided, where necessary, to ensure adequate cooling inside the core. The welding structure and major insulation shall not obstruct the free flow of oil through such ducts.

6.4.14 The design of magnetic circuit shall be such as to avoid static discharges, development of short circuit paths within itself or to the earth clamping structure and production of flux component at right angle to the plane of the lamination, which may cause local heating. The supporting framework of the cores shall be so designed as to avoid the presence of pockets, which would prevent complete emptying of the tank through the drain valve or cause trapping of air during filling.

6.4.15 The construction is to be of boltless core type. The core shall be provided with lugs suitable for lifting the complete core and coil assembly. The core and coil assemble shall be so fixed in the tank that shifting will not occur during transport or short circuits.

6.4.16 The temperature gradient between core & surrounding oil shall be maintained less than 20 deg. Centigrade. The manufacturer shall demonstrate this either through test (procedure to be mutually agreed) or by calculation.

6.5 INTERNAL EARTHING

6.5.1 All internal metal parts of the transformer, with the exception of individual laminations and their individual clamping plates shall be earthed.

6.5.2 The top clamping structure shall be connected to the tank by a copper strap. The bottom clamping structure shall be earthed by one or more the following methods:

- a) By connection through vertical tie-rods to the top structure.
- b) By direct metal to metal contact with the tank base.
- c) By a connection to the structure on the same side of the core as the main earth connection to the tank.

6.5.3 The magnetic circuit shall be connected to the clamping structure at one point only and this shall be brought out of the top cover of the transformer tank through a suitably rated insulator. A disconnecting link shall be provided on transformer tank to facilitate disconnections from ground for IR measurement purpose.

6.5.4 Coil clamping rings of metal at earth potential shall be connected to the adjacent core clamping structure on the same side as the main earth connections.

6.6 WINDING:-

6.6.1 Winding shall be subjected to a shrinking and seasoning process, so that no further shrinkage occurs during service. Adjustable devices shall be provided for taking up possible shrinkage in service.

6.6.2 All low voltage windings for use in the circular coil concentric winding shall be wound on a performed insulating cylinder for mechanical protection of the winding in handling and placing around the core.



6.6.3 Winding shall not contain sharp bends which might damage the insulation or produce high dielectric stresses. No strip conductor wound on edge shall have width exceeding six times the thickness.

6.6.4 Materials used in the insulation and assembly of the windings shall be insoluble, non-catalytic and chemically inactive in the hot transformer oil and shall not soften or be otherwise affected under the operating conditions.

6.6.5 Varnish application on coil windings may be given only for mechanical protection and not for improvement in dielectric properties. In no case varnish or other adhesive be used which will seal the coil and prevent evacuation of air and moisture and impregnation by oil.

6.6.6 Winding and connections shall be braced to withstand shocks during transport or short circuit.

6.6.7 Permanent current carrying joints in the windings and leads shall be welded or brazed. Clamping bolts for current carrying parts inside oil shall be made of oil resistant material which shall not be affected by acidity in the oil steel bolts, if used, shall be suitably treated.

6.6.8 Terminals of all windings shall be brought out of the tank through bushings for external connections.

6.6.8.1 The completed core and coil assemble shall be dried in vacuum at not more than 0.5mm of mercury absolute pressure and shall be immediately impregnated with oil after the drying process to ensure the elimination of air and moisture within the insulation. Vacuum may be applied in either vacuum over or in the transformer tank.

6.6.8.2 The winding shall be so designed that all coil assemblies of identical voltage ratings shall be interchangeable and field repairs to the winding can be made readily without special equipment. The coils shall have high dielectric strength.

6.6.8.3 Coils shall be made of continuous smooth high grade electrolytic copper conductor, shaped and braced to provide for expansion and contraction due to temperature changes.

6.6.8.4 Adequate barriers shall be provided between coils and core and between high and low voltage coil. End turn shall have additional protection against abnormal line disturbances.

6.6.8.5 The insulation of winding shall be designed to withstand voltage stress arising from surge in transmission lines due to atmospheric or transient conditions caused by switching etc.

6.6.8.6 Tapping shall not be brought out from inside the coil or from intermediate turns and shall be so arranged as to preserve as far as possible magnetic balance of transformer at all voltage ratios.

6.6.8.7 Magnitude of impulse surges transferred from HV to LV windings by electro magnetic induction and capacitance coupling shall be limited to BIL of LV winding.

6.6.8.8 The current density adopted in all winding shall not exceed 2.4 A/mm². The total net conductor area should be arrived after deducting the area ,lost due to rounding off the sharp edges of the conductor , which is given below:-



0.21 mm ² up to a depth of 1.6 mm
0.36 mm ² mm up to a depth of 2.24 mm
0.55 mm ² up to a depth of 3.25 mm
0.86 mm ² above 3.25 mm

6.6.8.9 The finally compressed shrunk height of both HV and LV windings should be equal.

6.7 INSULATING OIL

6.7.1 The insulating oil for the transformer shall be of EHV grade, generally conforming to IS: 335. No inhibitors shall be used in the oil.

6.7.2 The quantity of oil required for the first filling of the transformer and its full specification shall be stated in the bid. The bidder shall quote the price of transformer complete with all fittings, accessories and new transformer oil required for first filling plus 10% extra oil. The extra quantity of oil shall be supplied in non-returnable drums along with the oil required for the radiator banks.

6.7.3 The design and materials used in the construction of the transformer shall be such as to reduce the risk of the development of acidity in the oil.

6.7.4 Transformer Oil-The contractor shall ensure that the Transformer oil furnished conforms to IS:335 including amendment if any, of reputed make i.e. IOCL, BPCL, HPCL, or Equivalent.

6.8 VALVES:-

i) Valves shall be of forged carbon steel upto 50mm size and of gun metal or of cast iron bodies with gun metal fittings for sizes above 50mm. They shall be of full way type with screwed ends and shall be opened by turning counter clockwise when facing the hand wheel. There shall be no oil leakage when the valves are in closed position.

ii) Each valve shall be provided with an indicator to show the open and closed positions and shall be provided with facility for padlocking in either open or closed position. All screwed valves shall be furnished with pipe plugs for protection. Padlocks with duplicate keys shall be supplied along with the valves.

iii) All valves except screwed valves shall be provided with flanges having machined faced drilled to suit the applicable requirements, Oil tight blanking plates shall be provided for each connection for use when any radiator is detached and for all valves opening to atmosphere. If any special radiator valve tools are required the contractor shall supply the same.

iv) Each transformer shall be provided with following valves on the tank:

a) Drain valve so located as to completely drain the tank & to be provided with locking arrangement.



- b) Two filter valves on diagonally opposite corners of 50mm size & to be provided with locking arrangement.
- c) Oil sampling valves not less than 8mm at top and bottom of main tank & to be provided with locking arrangement.
- d) One 15mm air release plug.
- e) Valves between radiators and tank.
Drain and filter valves shall be suitable for applying vacuum as specified in this specification.

6.9 ACCESSORIES:-

6.9.1 Bushing

- i) All porcelain used in bushings shall be homogeneous, non-porous, uniformly glazed to brown colour and free from blisters, burns and other defects.
- ii) Stress due to expansion and contraction in any part of the bushing shall not lead to deterioration.
- iii) Bushing shall be designed and tested to comply with the applicable standards.
- iv) Bushing rated for 400A and above shall have non-ferrous flanges and hardware.
- v) Fittings made of steel or malleable iron shall be galvanized
- vi) Bushing shall be so located on the transformers that full flashover strength will be utilized. Minimum clearances as required for the BIL shall be realized between live parts and live parts to earthed structures.
- vii) All applicable routine and type tests certificates of the bushings shall be furnished for approval.
- viii) Bushing shall be supplied with bi-metallic terminal connector/ clamp/ washers suitable for fixing to bush terminal and the BNP's specified conductors. The connector/clamp shall be rated to carry the bushing rated current without exceeding a temperature rise of 50°C over an ambient of 50°C. The connector/clamp shall be designed to be corona free at the maximum rated line to ground voltage.
- ix) Bushing of identical voltage rating shall be interchangeable.
- x) The insulation class of high voltage neutral bushing shall be properly coordinated with the insulation class of the neutral of the low voltage winding.
- xi) Each bushing shall be so coordinated with the transformer insulation that all flashover will occur outside the tank.



6.9.2 Protection & Measuring Devices:-

i) Oil Conservator Tank

a) A conservator, complete with drain valve shall be provided in such a position, so as not to obstruct the electrical connections to the Transformer. The capacity of the conservator between highest and lowest visible levels shall be minimum of 7.5% of the total cold oil volume in the Transformer.

b) The conservator tank shall be bolted on its support of mounting to allow for its removal for cleaning/ repairing purposes.

c) The conservator shall be fitted with magnetic oil level gauge with low level electrically insulated alarm contact.

d) The silica gel breather shall have minimum quantity of silica gel as 1kg for every 3500Ltrs. of oil in the Tank. The container for the dehydrating agent shall be of transparent plastic of best quality, to be approved by BNP.

ii) Pressure Relief Device.

The pressure relief device provided shall be of sufficient size for rapid release of any pressure that may be generated in the tank and which may result in damage of the equipment. The device shall operate at a static pressure of less than the hydraulic test pressure of transformer tank. It shall be mounted direct on the tank. A pair of electrically insulated contact shall be provided for alarm and tripping.

iii) Buchholz Relay

A double float type Buchholz relay shall be provided., Any gas evolved in the transformer shall collect in this relay. The relay shall be provided with a test cock suitable for a flexible pipe connection for checking its operation. A copper tube shall be connected from the gas collector to a valve located about 1200 mm above ground level to facilitate sampling with the transformer in service. The device shall be provided with two electrically independent potential free contacts, one for alarm on gas accumulation and the other for tripping on sudden rise of pressure.

iv) Temperature Indicator

a) Oil Temperature Indicator (OTI)

The transformers shall be provided with a mercury contact type thermometer with 150 mm dial for top oil temperature indication. The thermometer shall have adjustable, electrically independent potential free alarm and trip contacts. Maximum reading pointer and resetting device shall be mounted in the local control panel. A temperature sensing element suitably located in a pocket on top oil shall be furnished. This shall be connected to the OTI by means of capillary tubing. Accuracy class of OTI shall be $\pm 1\%$ or better. One No electrical contact capable of operating at 5 A ac at 230 volt supply.

b) **Winding Temperature indicator(WTI)** A device for measuring the hot spot temperature of the winding shall be provided. It shall comprise the following.

i) Temperature sensing element.



- ii) Image Coil.
- iii) Mercury contacts.
- iv) Auxiliary CTS, If required to match the image coil, shall be furnished and mounted in the local control panel.
- v) 150mm dial local indicating instrument with maximum reading pointer mounted in local panel and with adjustable electrically independent ungrounded contacts, besides that required for control of cooling equipment, one for high winding temperature alarm and on for trip.
- vi) Calibration device.
- vii) Two number electrical contact each capable of operating at 5 A ac at 230 Volt supply.

7.9.3 Oil Preservation Equipment

6.9.3.1 :-

The oil preservation shall be diaphragm type oil sealing in conservator to prevent oxidation and contamination of oil due to contact with atmospheric moisture.

The conservator shall be fitted with a dehydrating filter breather. It shall be so designed that.

- i) Passage of air is through a dust filter & Silica gel.
- ii) Silica gel is isolated from atmosphere by an oil seal.
- iii) Moisture absorption indicated by a change in colour of the crystals of the silica gel can be easily observed from a distance.
- iv) Breather is mounted not more than 1400 mm above rail top level.

6.10 MARSHALLING BOX:-

- i) Sheet steel, weather, vermin and dust proof marshalling box fitted with required glands, locks, glass door, terminal Board, heater with switch, illumination lamp with switch, watertight hinged and padlocked door of a suitable construction shall be provided with each transformer to accommodate temperature indicators, terminal blocks etc. The box shall have slopping roof and the interior and exterior painting shall be in accordance with the specification. Padlock along with duplicate keys shall be supplied for marshalling box. The degree of protection shall be IP-55 or better.
- ii) The schematic diagram of the circuitry inside the marshalling box be prepared and fixed inside the door under a suitable sheet.



iii) The marshaling box shall accommodate the following equipment:

- a) Temperature indicators.
- b) Space for accommodating Control & Protection equipment in future for the cooling fan (for ONAF type cooling, may be provided in future).
- c) Terminal blocks and gland plates for incoming and outgoing cables.

All the above equipment's except c) shall be mounted on panels and back of panel wiring shall be used for inter-connection. The temperature indicators shall be so mounted that the dials are not more than 1600 mm from the ground level and the door (s) of the compartment(s) shall be provided with glazed window of adequate size. The transformer shall be erected on a plinth which shall be 2.5 feet above ground level.

iii) To prevent internal condensation, a metal clad heater with thermostat shall be provided. The heater shall be controlled by a MCB of suitable rating mounted in the box. The ventilation louvers, suitably padded with felt, shall also be provided. The louvers shall be provided with suitable felt pads to prevent ingress of dust.

iv) All incoming cables shall enter the kiosk from the bottom and the gland plate shall not be less than 450 mm from the base of the box. The gland plate and associated compartment shall be sealed in suitable manner to prevent the ingress of moisture from the cable trench.

v) The control connection, wiring etc. shall be as per Clause 3.15 of this

6.11 OFF LOAD TAP CHANGER

1. The transformers shall be provided with Off-load Taps
2. The Transformer with off-load tap changing gear shall have taps ranging from +5% to -15% in 8 equal steps of 2.5% each on HV winding for voltage variation
3. The tap changing switch shall be located in a convenient position so that it can be operated from ground level. The switch handle shall be provided with locking arrangement along with tap position indication, thus enabling the switch to be locked in position

6.12 FITTINGS AND ACCESSORIES:-

The following fittings and accessories shall be provided on the transformers:

1. Conservator with isolating valves, oil filling hole with cap and drain valve. The conservator vessel shall be filled with constant oil pressure diaphragm oil sealing system.
2. .Magnetic type oil level gauge (150 mm dia) with low oil level alarm contacts
3. Prismatic/ toughened glass oil level gauge
4. Silica gel breather with oil seal and connecting pipe complete with first fill of activated silica gel mounted at a level of 1300 mm above ground level.



5. A double float type Buchholz relay with isolating valve. Bleeding pipe and a testing cock, the test cock shall be suitable for a flexible (pipe connection for checking its operation). A 5mm dia. Copper pipe shall be connected from the relay test cock to a valve located at a suitable height above ground level to facilitate sampling of gas with the transformer in service. Interconnection between gas collection box and relay shall also be provided. The device shall be provided with two electrically independent ungrounded contacts, one for alarm on gas accumulation and the other for tripping on sudden oil surge. These contacts shall be wired upto transformer marshalling box. The relay shall be provided with shut off valve on the conservator side as well as on the tank side.

6. Pressure relief devices (including pressure relief valve) and necessary air equalizer connection between this and the conservator with necessary alarm and trip contacts.
7. Air release plugs in the top cover
8. Inspection cover, access holes with bolted covers for access to inner ends of bushing etc.
9. Winding temperature (hot spot) indicating device for local mounting complete in all respects. Winding temperature indicator shall have three set of contacts to operate at different settings :
 - a) To provide winding temperature high alarm
 - b) To provide temperature too high trip
10. Dial thermometer with pocket for oil temperature indicator with one set of alarm and one set of trip contacts and maximum reading pointer.
11. Lifting eyes or lugs for the top cover, core and coils and for the complete transformer.
12. Jacking pads
13. Haulage lugs
14. Protected type mercury / alcohol in glass thermometer and a pocket to house the same.
15. Top and bottom filter valves on diagonally opposite ends with pad locking arrangement on both valves.
16. Top and bottom sampling valves.
17. Drain valve with pad locking arrangement.
18. Rating and connection diagram plate.
19. Two numbers tank earthing terminals with associated nuts and bolts for connections to Owner's grounding strip.
20. Bi-directional flagged rollers with locking and bolting device.
21. Marshalling Box (MB)
22. Shut off valve on both sides of flexible pipe connections between radiator bank and transformer tank.
23. Cooling Accessories :
 - a) Requisite number of radiators provided with :-
 - One shut off valve on top
 - One shut off valve at bottom
 - Air release device on top



- Drain and sampling device at bottom
- Lifting lugs.

b) Air release device and oil drain plug on oil pipe connectors :

24. Terminal marking plates for Current Transformer and Main Transformer
25. Oil Preservation Equipment
26. Oil Temperature indicator

Note:

- (i) The fittings listed above are indicative and any other fittings which are generally required for satisfactory operation of the transformer are deemed to be included in the quoted price of the transformer.
- (ii) The contacts of various devices required for alarm and trip shall be potential free and shall be adequately rated for continuous, making and breaking current duties as specified

6.13 CONTROL CONNECTIONS AND INSTRUMENT AND WIRING TERMINAL BOARD AND FUSES:-

- i) Normally no fuses shall be used anywhere instead of fuses MCB"s (both in AC & DC circuits) shall be used. Only in cases where a MCB cannot replace a fuse due to system requirements, a HRC fuse can be accepted.
- ii) All wiring connections, terminal boards, fuses MCB"s and links shall be suitable for tropical atmosphere. Any wiring liable to be in contact with oil shall have oil resisting insulation and the bare ends of stranded wire shall be sweated together to prevent seepage of oil along the wire.
- iii) Panel connections shall be neatly and squarely fixed to the panel. All instruments and panel wiring shall be run in PVC or non-rusting metal cleats of the compression type. All wiring to a panel shall be taken from suitable terminal boards.
- iv) Where conduits are used, the runs shall be laid with suitable falls, and the lowest parts of the run shall be external to the boxes. All conduit runs shall be adequately drained and ventilated. Conduits shall not be run at or below ground level.
- v) When 400 volt connections are taken through junction boxes or marshalling boxes, they shall be adequately screened and 400 volts Danger Notice must be affixed to the outside of the junction boxes or marshalling box. Proper colour code for Red, Yellow, Blue wires shall be followed.
- vi) All box wiring shall be in accordance with relevant ISS. All wiring shall be of stranded copper (48 strands) of 1100 Volt grade and size not less than 2.5 sq.mm
- vii) All wires on panels and all multi-core cables shall have ferrules, for easy identifications, which bear the same number at both ends, as indicated in the relevant drawing.



- viii) At those points of interconnection between the wiring carried out by separate contractors, where a change of number cannot be avoided double ferrules shall be provided on each wire. The change of numbering shall be shown on the appropriate diagram of the equipment.
- ix) The same ferrule number shall not be used on wires in different circuits on the same panels.
- x) Ferrules shall be of white insulating material and shall be provided with glossy finish to prevent the adhesion of dirt. They shall be clearly and durably marked in black and shall not be affected by dampness or oil.
- xi) Stranded wires shall be terminated with tinned Ross Courtney terminals, claw washers or crimped tubular lugs. Separate washers shall be suited to the size of the wire terminated. Wiring shall, in general, be accommodated on the sides of the box and the wires for each circuit shall be separately grouped. Back of panel wiring shall be arranged so that access to the connecting items of relays and other apparatus is not impeded.
- xii) All circuits, in which the voltage exceeds 125 volts, shall be kept physically separated from the remaining wiring. The function of each circuit shall be marked on the associated terminal boards.
- xiii) Where apparatus is mounted on panels, all metal cases shall be separately earthed by means of stranded (48 No.) copper wire of strip having a cross section of not less than 2 sq. mm where strip is used, the joints shall be sweated. The copper wire shall have green colour insulation for earth connections.
- xiv) All wiring diagram for control and relay panel shall preferably be drawn as viewed from the back and shall show the terminal boards arranged as in services.
- xv) Terminal block rows should be spaced adequately not less than 100 mm apart to permit convenient access to external cables and terminations.
- xvi) Terminal blocks shall be placed with respect to the cable gland (at a minimum distance of 200 mm) as to permit satisfactory arrangement of multicore cable tails .
- xvii) Terminal blocks shall have pairs of terminals for incoming and outgoing wires. Insulating barriers shall be provided between adjacent connections. The height of the barriers and the spacing between terminals shall be such as to give adequate protection while allowing easy access to terminals. The terminals shall be adequately protected with insulating dust proof covers. No live metal shall be exposed at the back of the terminal boards. CT terminals shall have shorting facilities. The terminals for CTs should have provision to insert banana plugs and with isolating links.
- xviii) All interconnecting wiring, as per the final approved scheme between accessories of transformer and marshalling box is included in the scope of this specification and shall be done by the Transformer supplier.



xix) The schematic diagram shall be drawn and fixed under a transparent prospane sheet on the inner side of the marshalling box cover.

xx) To avoid condensation in the Marshalling Box, a space heater shall be provided with an MCB and thermostat.

xxi) Suitable MV, CFL light shall be provided in the Marshalling Box for lightning purpose.

6.14 RADIO INTERFERENCE AND NOISE LEVEL:

Transformers shall be designed with particular care to suppress at least the third and fifth harmonic voltages so as to minimize interference with communication circuits. Transformer noise level when energized at normal voltage and frequency shall be as per NEMA stipulations.

6.15 Decreased environment footprints:

The 2021 EU Eco design regulation coming into place on July 1st, 2021 has made amendments to the Regulation 548/2014. The new regulations tighten the requirements for load-losses on energy-related products. It is in place to improve energy efficiency, environmental compatibility and reduce CO2 emissions. The strict new design regulation aims to reduce energy losses of distribution transformers.

7.0 INSPECTION AND TESTING

(i) The Contractor shall carry out a comprehensive inspection and testing program during manufacture of the transformer. An indicative in Standard for inspection is given under Clause No. 4.1. This is, however, not intended to form a comprehensive programmer as it is contractor's responsibility to draw up and carry out such a programme duly approved by the BNP.

(ii) The contractor shall carry out type tests and routine tests on the transformers. both transformers will be subjected to type tests as per relevant IEC/IS in CPRI in presence of authorized personnel of BNP. The charges for conducting each of type tests shall be included in the bid price and no separate type test charges shall be paid. Front page of the Type test report of same voltage class, same ratio (33/11kV) & rating (7.5/ 8 MVA) duly signed by the bidder is required to be submitted along with the bid. However, designed transformer as per tender specification parameters to be made by the contractor at his cost. Type test to be done design wise not package wise

(iii) The pre-shipment checks shall also be carried out by the contractor.

(iv) The requirements on site tests are as listed in the specifications.

(v) Certified test report and oscillograms shall be furnished to the BNP for evaluation as per the schedule of distribution of documents. The Contractor shall also evaluate the test results and rectify the defects in the equipment based on his and the BNP's evaluations of the tests without any extra charges to BNP. Manufacturer's Test Certificates in respect of all associated auxiliary and ancillary equipment shall be furnished.



(vi) The bidder shall state in his proposal the testing facilities available at his works. In case full testing facilities are not available, the bidder shall state the method proposed to be adopted so as to ascertain the transformer characteristics corresponding to full capacity.

(vii) BNP at its discretion may use its power analyser or the power analyser of authorized testing agency for determination of no load loss, no load current, load loss and % Impedance at the works of the manufacturer and the concerned stores/Testing Laboratory of BNP/Any other Government approved laboratory. Contractor to supply transformers based on parameter of losses provided in technical specification. If losses increase during its test, then offered transformer shall be rejected by BNP.

8.0 INSPECTION

i) Tank and Conservator

- a) Inspection of major weld.
- b) Crack detection of major strength weld seams by dye penetration test.
- c) Check correct dimensions between wheels, demonstrate turning of wheels, through 900 and further dimensional check.
- d) Leakage test of the conservator.

ii) Core

- a) Sample testing of core materials for checking specific loss, properties, magnetization characteristics and thickness.
- b) Check on the quality of varnish if used on the stampings.
- c) Check on the amount of burrs.
- d) Visual and dimensional check during assembly stage.
- e) Check on completed core for measurement of iron loss, determination of maximum flux density. (Determination of gross and net cross sectional area of the core & no. of turns/Phase.)
- f) Visual and dimensional checks for straightness and roundness of core, thickness of limbs and suitability of clamps.
- g) High voltage DC test (2 KV for one minute) between core and clamps.

iii) Insulating Material

- a) Sample check for physical properties of materials.
- b) Check for dielectric strength
- c) Check for the reaction of hot oil on insulating materials.

iv) Winding

- a) Sample check on winding conductor for mechanical and electrical conductivity.
- b) Visual and dimensional checks on conductor for scratches, dent mark etc.



- c) Sample check on insulating paper for PH value, electric strength.
- d) Check for the bonding of the insulating paper with conductor.
- e) Check and ensure that physical condition of all materials taken for windings is satisfactory and free of dust.
- f) Check for absence of short circuit between parallel strands.

v) Checks Before Drying Process

- a) Check condition of insulation on the conductor and between the windings.
- b) Check insulation distance between high voltage connections, between high voltage connection cables and earth and other live parts.
- c) Check insulating distances between low voltage connections and earth and other parts.
- d) Insulating test for core earthing.

vi) Check During Drying Process

- a) Measurement and recording of temperature and drying time during vacuum treatment.
- b) Check for completeness of drying

vii) Assembled Transformer

- a) Check completed transformer against approved outline drawing, provision for all fittings, finish level etc.
- b) Jacking test on the assembled Transformer.

viii) Oil

All standard tests in accordance with IS: 335 shall be carried out on Transformer oil sample before filling in the transformer.

ix) Test Report for bought out items

The contractor shall submit the test reports for all bought out / sub contracted items for approval.

- a) Buchholz relay
- b) Sudden pressure rise relay on Main Tank
- c) Winding temperature indicators (for TX capacity 7.5 MVA)
- d) Oil temperature indicators
- e) Bushings
- f) Bushing current transformers in neutral
- g) Marshalling box
- h) Tap changer
- i) Any other item required to complete the works.



j) Porcelain, bushings, bushing current transformers, wherever provided, winding coolers, control devices, insulating oil and other associated equipment shall be tested by the contractor in accordance with relevant IS. If such requirement is purchased by the contractor on a sub-contract, he shall have them tested to comply with these requirements.

8.1 FACTORY TESTS

i) All standards routine tests in accordance IS: 2026 with dielectric tests corresponding as per latest amendments to IS: 2026 shall be carried out.

ii) All auxiliary equipment shall be tested as per the relevant IS. Test certificates shall be submitted for bought out items.

iii) High voltage withstand test shall be performed on auxiliary equipment and wiring after complete assembly.

iv) Following additional routine tests shall also be carried out on each transformer:

a) Magnetic Circuit Test

Each core shall be tested for 1 minute at 2000 Volt DC

b) Oil leakage test on transformer

8.2 Type Tests: The transformer shall be subjected to the following type tests particularly **Short circuit and Impulse withstand tests at CPRI**. Before conducting the short circuit test and Impulse test, the firm will offer for both stage inspection and final inspection of the transformer through a 3rd party agency i.e. NABL accredited Lab/ IIT/ NITs/ Central agency / State DISCOM in presence of BNP's representative(s) at the manufacturer's works. If Manufacturer has facilities for such tests, manufacturer has to provide valid calibration certificate issued by NABL accredited Lab/ IIT/ NITs/ Central agency / State DISCOM for the related instruments and copy of duly approved SOPs for such tests.

If the transformer complies to the specification and offered technical parameters, the transformer will be sealed by authorized representative(s) of BNP and there after the transformer can be transported to CPRI for required type tests in presence of BNP's authorized representative(s) who will verify the seal & allow for conducting the type tests.

The Type Tests shall include:

(1) Tan delta measurement and capacitance of each winding to earth (with all other windings earthed) & between all windings connected together to earth.

(2) Measurement of Zero sequence impedance.



- (3) Temperature Rise Test
- (4) Short Circuit Test
- (5) Tank Vacuum test
- (6) Tank Pressure Test
- (7) Lightning impulse withstand test for line and neutral terminal.
- (8) Measurement of acoustic noise level.

8.3 STAGE INSPECTION:-

The supplier shall offer the core, windings and tank of each transformer for inspection by a 3rd party agency as well as BNP representative(s). During stage Inspection, all the measurements like diameter, window height, leg centre, stack width, stack thickness, thickness of laminations etc. for core assembly, conductor size, Insulation thickness, I.D., O.D, winding height, major and minor insulations for both H.V and L.V windings, length, breadth, height and thickness of plates of Transformer tank, the quality of fittings and accessories will be taken / determined. The supplier can offer for final inspection of the transformers subject to clearance of the stage Inspection report by the BNP. No. of turns is to be determined by wrapping known No. of turns across LV winding and determining the turns ratio by ratio meter.

8.4 Routine Tests: Transformer routine tests shall include tests stated in latest issue of IS: 2026 (Part –1). These tests shall also include but shall not be limited to the following :

- (i) Measurement of winding DC resistance.
- (ii) Voltage ratio on each tapping and check of voltage vector relationship.
- (iii) Impedance voltage at all tappings.
- (iv) Magnetic circuit test as per relevant ISS or CBIP manual or latest standard being followed.
- (v) Measurement of Load losses at normal tap and extreme taps.
- (vi) No load losses and no load current at rated voltage and rated frequency, also at 25% to 121 % of rated voltage in steps.
- (vii) Absorption index i.e insulation resistance for 15 seconds and 60 seconds (R 60/ R 15) and polarization index i.e Insulation Resistance for 10 minutes and one minute (R 10 mt / R 1 mt).



- (viii) Induced over voltage withstand test.
- (ix) Separate source voltage withstand test.
- (x) Tan delta measurement and capacitance of each winding to earth (with all other windings earthed) & between all windings connected together to earth.
- (xi) Measurement of zero sequence impedance
- (xii) Tests on On- Load tap changer (fully assembled on transformer) as per IEC : 214/ 1976 and BS: 4571/ 1970.
- (xii) Auxiliary circuit tests
- (xiv) Oil BDV tests
- (xv) Measurement of neutral unbalance current which shall not exceed 2% of the full rated current of the transformer.
- (xvi) Magnetic balance test
- (xvii) Leakage test.

Six (6) set of certified test reports and oscillographs shall be submitted for evaluation prior to dispatch of the equipment. The contractor shall also evaluate the test results and shall correct any defect indicated by his and BNP's evaluation of the tests without charge to the BNP.

8.5 TANK TESTS

- a) Oil leakage Test :** The tank and oil filled compartments shall be tested for oil tightness completely filled with air or oil of viscosity not greater than that of insulating oil conforming to IS : 335 at the ambient temperature and applying a pressure equal to the normal pressure plus 35 KN/ m² measured at the base of the tank. The pressure shall be maintained for a period of not less than 12 hours of oil and one hour for air and during that time no leak shall occur.
- b) Pressure Test:** Where required by the BNP, one transformer tank of each size together with its radiator, conservator vessel and other fittings shall be subjected to a pressure corresponding to twice the normal head of oil or to the normal pressure plus 35 KN / m² whichever is lower, measured at the base of the tank and maintained for one hour.
- c) Vacuum Test:** One transformer tank of each size shall be subjected to the vacuum pressure of 60 mm of mercury. The tanks designed for full vacuum shall be tested at an internal pressure of 3.33 KN/m² (25 mm of mercury) for one hour. The permanent deflection of flat plates after the vacuum has been released shall not exceed the value specified in C.B.I.P. Manual on Transformers (Revised 1999) without affecting the performance of the transformer.



8.6 PRE-SHIPMENT CHECK AT MANUFACTURERS WORKS

- i) Check for proper packing and preservation of accessories like radiators, bushings, explosions vent, dehydrating breather, rollers, buchholz relay, control cubicle connecting pipes and conservator etc.
- ii) Check for proper provision of bracing to arrest the movement of core and winding assembly inside the tank.
- iii) Gas tightness test to conform tightness.

8.7 INSPECTION AND TESTING AT SITE

The Engineer authorized from BNP along with the contractor's site engineer shall carry out detailed inspection covering areas right from the receipt of material up to commissioning stage. An indicative program of inspection as envisaged by the Engineer is given below.

8.7.1 Receipt and Storage Checks

- i) Check and record conditions of each package visible parts of the transformers etc for any damage.
- ii) Visual check of core and coils before filling up with oil and also check

8.7.2 Pre-Commissioning Tests

After the transformer is installed, the following pre-commissioning tests and checks shall be done before putting the transformer in service.

- i) Dry out test
- ii) Megger Test
- iii) DC Resistance measurement of windings
- iv) Ratio test on all taps
- v) Phase relationship test (Vector grouping test)
- vi) Buchholz relay alarm & surge operation test
- vii) Low oil level (in conservator) alarm
- viii) Temperature Indicators
- ix) Marshalling kiosk
- x) Protective relays
- xi) Magnetising current
- xii) Tests on off line tap changer



8.7.3 The following additional checks shall be made:

- i) All oil valves are incorrect position closed or opened as required
- ii) All air pocket are cleared.
- iii) Thermometer pockets are filled with oil.
- iv) Oil is at correct level in the bushing, conservator, diverter switch & tank etc.
- v) Earthing connections are made.
- vi) Colour of Silica gel is blue.
- vii) Bushing arcing horn is set correctly and gap distance is recorded.
- Viii) C T polarity and ratio is correct.

9.0 PERFORMANCE: The performance of the transformer shall be measured on the following aspects.

- a) The transformer shall be capable of being operated without danger on any tapping at the rated KVA with voltage variations and $\pm 10\%$ corresponding to the voltage of the tapping.
- b) Radio interference and Noise Level
- c) The transformer shall be designed with particular attention to the suppression of third and fifth harmonics so as to minimize interference with communication circuits.

9.1 FAULT CONDITIONS

- a) The transformer shall be capable of withstanding for two(2) seconds without damages any external short circuit to earth
- b) Transformer shall be capable of withstanding thermal and mechanical stresses conveyed by symmetrical or asymmetrical faults on any winding. This shall be demonstrated through calculation as per IS : 2026.
- c) Transformer shall accept, without injurious heating, combined voltage and frequency fluctuation which produce the 125% over fluxing condition for one minute and 140% for 5 seconds.

Certified test report and oscillograms shall be furnished to the BNP for evaluation as per the schedule of distribution of documents. The Contractor shall also evaluate the test results and rectify the defects in the equipment based on his and the BNP's evaluations of the tests without any extra charges to the BNP. Manufacturer's Test Certificates in respect of all associated auxiliary and ancillary equipment shall be furnished.



The bidder shall state in his proposal the testing facilities available at his works. In case full testing facilities are not available, the bidder shall state the method proposed to be adopted so as to ascertain the transformer characteristics corresponding to full capacity testing.

Sl. No	Transformer Rating	Maximum Load Loss in KW at rated voltage & frequency	No-Load Loss in KW at rated voltage & frequency	Maximum Load Loss in KW at 75°C at normal tap position & rated frequency
1	33/1133/1KV, 7.5 MVA, 8 MVA	4.5	38	38

N.B : There shall be no positive tolerance to above losses. Capitalization of losses shall not be factored in the comparative statement for selection of vendors.

11.0 SPARE PARTS:

In case the manufacturer goes out of production of spare parts, then he shall make available the drawings of spare parts and specification of materials at no extra cost to the BNP to fabricate or procure spare parts from other sources.

Mandatory Spare Parts

The suppliers shall provide the following mandatory spares for each of Transformer supplied

1. H.V. & L.V. Bushing & Studs –Each 2 Nos
2. Bimetallic connector for H.V & L.V. Bushings – Each 2 sets

12.0 INSTRUCTION MANUAL:

Eight sets of the instruction manuals shall be supplied at least four (4) weeks before the actual dispatch of equipment. The manuals shall be in bound volumes and shall contain all the drawings and information required for erection, operation and maintenance of the transformer.

The manuals shall include amongst other, the following particular:

- a) Marked erection prints identifying the components, parts of the transformer as dispatched with assembly drawings.
- b) Detailed dimensions, assembly and description of all auxiliaries.
- c) Detailed views of the core and winding assembly, winding connections and tapings tap changer construction etc. These drawings are required for carrying out overhauling operation at site.
- d) Salient technical particulars of the transformer.
- e) Copies of all final approved drawings.
- f) Detailed O&M instructions with periodical check lists and Performa etc.



13.0 COMPLETENESS OF EQUIPMENT:-

All fittings and accessories, which may not be specifically mentioned in the specification but which are necessary for the satisfactory operation of the transformer, shall be deemed to be included in the specification and shall be furnished by the supplier without any extra charge. The equipment shall be complete in all details whether such details are mentioned in the specification or not, without any financial liability to the BNP under any circumstances.

13.1 TOOLS AND TACKLES:-

All the necessary tools and tackles required for normal operation & maintenance of the transformers shall be supplied by the Contractor.

13.2 COMMISSIONING:-

The equipment shall be commissioned as per CBIP manual, IS: 10028 and manufacturer's recommendations. All the related drawings and manuals shall be pre-requisite for release of final payment.

14.0 Scope of work :

Retro fitting of 7.5 MVA 33/11 KV transformers shall include following scope of work.

- 1) Replacement of existing 6000 KVA transformers with new 7.5 MVA transformers in following steps.
 - (a) Shut down one transformer from 33 KV transmission line then HT & LT connection removal work is to be carried out.
 - (b) Drain out the existing transformer oil from the transformer and keep it in empty drums.
 - (c) Disconnect the Neutral CT from the circuit.
 - (d) Removal of foundation bolt.
 - (e) Lift the transformer from its foundation and keep it on plane surface.
 - (f) Removal of existing cable from transformers to 11 KV Control Panel.
 - (g) Making of new foundation for 7.5 MVA transformers as per their dimensions.
 - (h) After making new foundation new transformers has to put on foundation and alignment is to be done as per the standard condition.
 - (i) All the connection of HT & LT cable with neutral CT and Earth arrangement is to be done.
 - (j) Control wiring for WTI, OTI, Buchholz relay etc is to be done.
 - (k) Fill new transformer oil in transformer and take the company recommended test.
 - (l) Transformer oil soak pit is to be prepared.
- 2) Firm shall have to put new transformer in operation within 30 days from start of dismantling of existing transformer (one by one) .



- 3) Firm has to ensure the availability of all the materials and ancillaries at the work site before dismantling the existing system.
- 4) Firm will take back the existing transformer at its own cost and risk from BNP premises.
- 5) Existing transformer will be handed over to the successful bidder after successful SITC and FAT of new transformer.

15.0 Bill of Material: Brief Detail of Bill of material is as follows.

Schedule 1 :

Sr No	Item	Quantity
1	design, manufacture, assembly, stage inspection, final inspection and testing ,transport, transit insurance, unloading at site of 7.50 MVA, 33/11kV Power Transformers	01 no.
2	Retro fitting, Erection, Installation & commissioning of 7.50 MVA, 33/11kV Power Transformer including all civil and other works.	01 no.
3	SITC of Earth pit	04 no.
4	Provision of new 2x 400 sq. mm, 11 KV grade power cable from transformer to 11 KV panel board.	50 Meters

Schedule 2 :

Sr No	Item	Quantity
1	design, manufacture, assembly, stage inspection, final inspection and testing ,transport, transit insurance, unloading at site of 7.50 MVA, 33/11kV Power Transformers	01 no.
2	Retro fitting, Erection, Installation & commissioning of 7.50 MVA, 33/11kV Power Transformer including all civil and other works.	01 no.
3	SITC of Earth pit	04 no.
4	Provision of new 2x 400 sq. mm, 11 KV grade power cable from transformer to 11 KV panel board.	50 Meters

Schedule 3 :

Sr No	Item	Quantity
1	Provision of oil sock pit with regard to compliance of fire standards.	01 no.

Note: All items which are standard and essential for design, manufacture, assembly, stage inspection, final inspection and testing, transport, transit insurance, unloading at site, Retro fitting ,Erection, Installation & commissioning of 7.50 MVA, 33/11kV Power Transformers under scope of work as per tender document and not included / mentioned in the tender document shall be considered as an integral part of Bill of Material as above. No additional payment shall be considered for the same and the bidder firm shall be liable to provide/ install the same within terms and condition of this tender document.



16.0 Terms & conditions:

1. The complete work of design, manufacture, assembly, stage inspection, final inspection and testing ,transport, transit insurance, unloading at site ,Retro fitting ,Erection, Installation & commissioning of 7.50 MVA, 33/11kV Power Transformers on buy back of existing 6000 KVA transformer as per above scope of work is a turnkey project.
2. The technology to be used should be latest state of art.
3. The new transformer should be able to be installed / retrofitted without any adverse effect on the performance of the existing system.
4. Service Support: Service support should be provided for next 10 years by bidder firm and OEM. The bidder firm shall give a commitment that they shall provide technical support for the offered systems and accessories and make available required spares and consumables for a period of at least 10 years from the date of FAT.
5. Training: At the discretion of purchaser, the bidder shall provide one week operational / maintenance training of the system at working site.
6. Any civil, erection and fabrication work i.e. breaking / making of foundation, required for installation of transformer shall be in the scope of bidder firm. Also if any civil work like widening of entrance at switch yard, any arrangement or construction work required for entrance of crane , jack and access up to the work site shall be in the scope of bidder firm.
7. Transformers shall be shipped with first fill of transformer oil of suitable grade.
8. Loading of existing transformers, transportation, unloading and shifting of new transformers shall be in the scope of bidder.
9. All the machinery and equipment for loading and unloading of transformers i.e. Crane ,Hydraulic Jack etc. shall be in the scope of bidder firm.
10. Government clearances / certificates i.e. clearance issued by chief electrical inspector / central electricity authority etc. shall be in the scope of bidder firm.
11. All tools and tackles required for the work as per the tender documents shall be brought by bidder in the work site on returnable basis.
12. Bidder firm shall have to comply all security norms of Bank Note Press Dewas.
13. Bidder firm has to ensure compliance all the safety norms while executing the work in Bank Note Press Dewas.
14. Firm will take back the existing transformers at its own cost and risk from BNP premises. Each Existing transformer will be handed over to the successful bidder after successful SITC and FAT of corresponding new transformer. Loading ,Unloading and transportation of the existing buy back 6000 KVA transformers shall be in the scope of bidder firm.
15. Bidder firm may visit the existing installation at BNP Dewas in any working day from 09.00 Am to 04:00 PM with pre information and approval.



17.0 Delivery Schedule:

Sr no.	Description	Quantity	Duration in months	Total duration (in months) from contract date
Schedule 1	design, manufacture, assembly, stage inspection, final inspection and testing ,transport, transit insurance, unloading at site ,Retro fitting ,Erection, Installation & commissioning of 7.50 MVA, 33/11kV Power Transformers, complete with all fittings, accessories, associated equipment, Spares, 10% extra Transformer Oil, required for its satisfactory operation	01		
1.1	PDI		04	04
1.2	Delivery at BNP stores		21 days	04 months and 21 days
1.3	Inspection of transformer at BNP stores with the bidder firm.		09 days	05 months
1.4	Retro fitting ,Erection, Installation & commissioning		01 month	06 months
1.5	FAT		01 month	07 months
Schedule 2	design, manufacture, assembly, stage inspection, final inspection and testing ,transport, transit insurance, unloading at site ,Retro fitting ,Erection, Installation & commissioning of 7.50 MVA, 33/11kV Power Transformers, complete with all fittings, accessories, associated equipment, Spares, 10% extra Transformer Oil, required for its satisfactory operation	01		
2.1	PDI		04	11 months
2.2	Delivery at BNP stores		21 days	11 months and 21 days

2.3	Inspection of transformer at BNP stores with the bidder firm.		09 days	12 months
2.4	Retro fitting ,Erection, Installation & commissioning		01 month	13 months
2.5	FAT		01 month	14 months
Schedule 3	Provision of oil sock pit with regard to compliance of fire standards.	01	NA	05 months

18.0 Final Acceptance Test

After completion of design, manufacture, assembly, stage inspection, final inspection and testing ,transport, transit insurance, unloading at site ,Retro fitting ,Erection, Installation & commissioning of 7.50 MVA, 33/11kV Power Transformers, complete with all fittings, accessories, associated equipment, Spares, 10% extra Transformer Oil, required for its satisfactory operation, **Final Acceptance Test (FAT)** will be started. The FAT will be carried out on the system for a period of 30 days for running on load continuously. If any parameters are not fulfilled, the FAT shall be conducted again after rectification to the satisfaction of BNP.

19.0 Payment:

- 100% payment will be made after completion of design, manufacture, assembly, stage inspection, final inspection and testing ,transport, transit insurance, unloading at site ,Retro fitting ,Erection, Installation & commissioning of 7.50 MVA, 33/11kV Power Transformers, complete with all fittings, accessories, associated equipment, Spares, 10% extra Transformer Oil, required for its satisfactory operation and Final Acceptance Test (FAT) for first transformer .
- 100% payment will be made after completion of design, manufacture, assembly, stage inspection, final inspection and testing ,transport, transit insurance, unloading at site ,Retro fitting ,Erection, Installation & commissioning of 7.50 MVA, 33/11kV Power Transformers, complete with all fittings, accessories, associated equipment, Spares, 10% extra Transformer Oil, required for its satisfactory operation and Final Acceptance Test (FAT) for second transformer .
- No advance payment, payment against delivery and no additional payment for any other work against this bidding document shall be made.

20.0 Any changes / modification suggested by the firm:

- If the bidder firm finds any changes /modifications in technical specifications which are better and do not involved additional financial implication may be submitted mentioning the reference in this document along with detailed technical justification.
- If the bidder firm requires any change regarding the delivery schedule para 17.0 of this bidding document may be submitted with the justification.

21.0 Document required by the bidder firm against EOI:

- Sealed and signed copy of EOI document
- Copy of License issued by the competent authority to OEM for manufacturing of the transformer of required capacity in this EOI document.
- Proof of manufacturing capability.
- Proof of testing capability.

5. If the bidder firm is not OEM the bidder firm has to submit valid manufacturer authorization certificate issued by the OEM to the bidder firm and in such case all the documents related to manufacturing capability and testing capability shall be submitted by the bidder firm in respect of OEM.
6. Copy of certificates issued by BIS related to transformer manufacturing & testing facilities.
7. Copy of Type test certificates for the transformer of capacity 7.5 MVA ,33/11 KV or higher manufactured by the OEM during the last three financial years issued by CPRI for Short circuit and Impulse withstand tests and issued by NABL /Government agency /IITs/ state Discoms for other type test.

22.0 Price schedule :

Schedule 1 :

Sr No	Item	Quantity	Price
1	design, manufacture, assembly, stage inspection, final inspection and testing ,transport, transit insurance, unloading at site of 7.50 MVA, 33/11kV Power Transformers	01 no.	
2	Retro fitting, Erection, Installation & commissioning of 7.50 MVA, 33/11kV Power Transformer including all civil and other works.	01 no.	
3	SITC of Earth pit	04 no.	
4	Provision of new 2x 400 sq. mm, 11 KV grade power cable from transformer to 11 KV panel board.	50 Meters	
			Net
			GST
			Gross (Net + GST)
			(-) Buy back offer of 6.0 MVA, 33/11kV Power Transformers
			Total (schedule 1)= Gross - Buy back offer of 6.0 MVA, 33/11kV Power Transformers

Schedule 2 :

Sr No	Item	Quantity	Price
1	design, manufacture, assembly, stage inspection, final inspection and testing ,transport, transit insurance, unloading at site of 7.50 MVA, 33/11kV Power Transformers	01 no.	
2	Retro fitting, Erection, Installation & commissioning of 7.50 MVA, 33/11kV Power Transformer including all civil and other works.	01 no.	
3	SITC of Earth pit	04 no.	
4	Provision of new 2x 400 sq. mm, 11 KV grade power cable from transformer to 11 KV panel board.	50 Meters	
			Net
			GST
			Gross (Net + GST)
			(-) Buy back offer of 6.0 MVA, 33/11kV Power Transformers
			Total (schedule 2)= Gross - Buy back offer of 6.0 MVA, 33/11kV Power Transformers



Schedule 3 :

Sr No	Item	Quantity	Price
1	Provision of oil sock pit with regard to compliance of fire standards.	01 no.	
			Net
			GST
Total (schedule 3) = Gross (Net + GST)			

Summary:

Schedule	Total schedule wise price
Schedule 1	
Schedule 2	
Schedule 3	
Grand Total	

Note :

1. Payment will be made schedule wise.
2. L1 will be selected on totality basis i.e. total of schedule 1,2 and 3.



Annexure -II

Eligibility/Pre-qualification Criteria

1. **Status:** The applicant should be either proprietary firm/ Limited Liability Partnership (LLP)/company/Partnership/ (legal entity) registered under relevant regulation of the respective Country. The applicant should be in business of manufacturing/supplying of such type of Items/ Services.
2. **Experience:**
 - a. The firm should have past experience in supply & Installation of same / identical Items to any Industries in the last 05 financial year ending on **31.03.2022** Relevant documentary proofs are to be submitted along the offer.
 - b. The interested bidders should also submit along with Expression of Interest a list of parties to whom they have supplied similar type of Items/Services with details and customer satisfaction report form their clients.
3. **The bidder should also confirm specifically that:**
 - a. Applicant is competent and legally authorized to submit and/or to enable into legally binding contract.
 - b. The firm should confirm their annual supply/manufacturing capacity for such Items/ Services.
 - c. Applicant will absolve the purchaser against any infringement of patent rights and other contract provisions.
4. The bidder firm should have not been blacklisted/ debarred by BNPMIPL/BRBNMPL/SPMCIL/Government of India for participation in tender as on the last date of submission of EOI. An undertaking for the same should be furnished.
5. The copy of audited balance sheet and Profit and loss account for last three financial years ending **31.03.2022** are to be submitted along with the proposal.



6. All documents are to be submitted in English/Hindi language only. If the documents are in other language English translation copy shall be furnished along with the documents.
7. The Department of Industrial Policy and Promotion (DIPP) Public Procurement order no. P-45021/2/2017-BE-II dated 15.06.2017 shall be applicable.

Note:-

1. All experience, past performance and capacity/capability related data should be certified by the authorized signatory of the bidder firm.
2. All financial standing data should be certified by certified accountant's along with UDIN No. e.g., Chartered Accounts (CA) in India and Certified Public Accountant/Chartered Accountants of other countries.

Bidder to furnish stipulated documents in support of fulfillment of essential qualifying criteria. Non-submission of documents may lead to rejection of offer.



Annexure-III**Procurement Process**

Following are the details of the process of BNP, Dewas.

1. At first the EOI for procurement of above items/services is published.
2. The firms participating in the EOI are called for details presentation and discussion regarding their offer of service/goods.
3. Later on open Tender will be floated comprising of 2/3 parts namely PQB, Techno-Commercial Bid & Financial Bid which are to be submitted in two/three separate double sealed envelopes on or before the due date of submission of tender. The envelopes containing Bids shall be super scribed as "Pre-Qualification Bid", "Techno-Commercial Bid", "Financial Bid" as the case may be.

Date:.....

**Annexure-IV****BNP/P/E/7.5 MVA Transformer/2022/EOI****Dated 09.12.2022**

WE HAVE GONE THROUGH THE ABOVE REFERRED EOI AND UNDERSTOOD YOUR REQUIREMENTS WITH RESPECT TO EXPRESSION OF INTEREST FOR EXPRESSION OF INTEREST (EOI) FOR 7.5 MVA TRANSFORMER ON BUY BACK BASIS AT BANK NOTE PRESS DEWAS. (M.P.), INDIA.

We fulfill the eligibility criteria and undertake that;

1. We have noted, understood and agreed to all the terms and condition of the EOI. In token of our acceptance, we have enclosed the EOI documents duly signed by the authorized representative.
2. I / We and are Proprietary firm/ Limited Liability Partnership (LLP)/Company/Partnership and I /We have enclosed the registration certificate issued by the registration authorities as applicable in the country of origin as documentary evidence. (Please indicate as applicable)
3. I/ We have supplied/Provided similar Items/Services to _____ nos. of manufacturers/printing presses etc. globally or within India from years_____ to _____. I / we have enclosed the work offer/customer satisfaction certificate/completion certificate issued by _____ as documentary evidence.
4. We have the total experience of _____ years in the related field as on **31.03.2022**.
5. The average annual turnover for last three financial years i.e.**2021-2022, 2020-2021, 2019-2020**, is INR_____. I/We have enclosed the annual report/statement of accounts (preferably audited) and a statement of average annual turnover of last 3 years duly authenticated by an authorized official of the Company/firm.
6. We declare that have not been black listed/debarred by BNPMIPL/BRBNMPL/SPMCIL/Government of India for participation in tender.
7. We also enclose our brief profile and list of our major clients for your consideration.
8. We will be interested to present out proposal and demonstrate our past performance/details of the system being offered to you at a meeting at your convenience.



9. We are enclosing copy of English translation of the documents which are not in English/Hindi.

For _____

(Name and designation of officer)

Enclosures:

1. Duly sealed and signed each and every page of EOI
2. Registration certificates
3. Work order or completion certificate
4. PAN Card copy and copy of GST registration certificate.
5. Brief profile and list of major clients.
6. Budgetary Quote with break-up of Taxes & Other Charges, if any.
7. Generic Specifications of the proposed system.
8. Delivery Period.