

ANNEXURE-A

5.21.1 **FIRE PROTECTION SYSTEM**

400KV ICTs shall be provided with 'Nitrogen Injection, Drain and Stir Method type fire prevention and extinguishing system along with all associated fittings and control equipments. All items for complete system shall be listed out in bill of material for supply. Details of the system required are indicated as below.

- a) The fire protection/prevention system shall work on the oil drain, Nitrogen Inject and Stir method. The system shall operate correctly during fire on transformer due to internal or external factors, including fire due to bursting of transformer bushing. Fire detectors (bulb type or linear heat detector type) provided on the transformer top cover / body shall take minimum time for detection of fire and initiate the fire protection system. The bidder shall give complete details of the system and also arrange to demonstrate the operation of the fire fighting system, if desired by the purchaser.
- b) The system may have its own power supply unit for operation during A/C failure condition. Alternatively, systems suitable for operation on station DC aux. supply (220V DC) may be offered. The system shall operate in 'Auto'/'Remote Electrical'/'Local Manual' modes. Provision shall be available to keep the system "OUT", which is necessary for preventing any mal-operation during transformer maintenance.
- c) The fire fighting system shall be compatible to be hooked on to the station SCADA/ fire alarm system. Systems using micro processor/micro-controller will be given preference.
- d) The fire fighting system should have its own temperature sensors to detect all types of fires. On detection of fire (by the sensors) and receipt of positive feedback signal regarding "Master trip relay operated" the system shall start operation, initially draining out top level oil in the main tank and simultaneously closing the valve in the conservator line and then start nitrogen injection into the transformer tank. **The operational logic of the system shall be generally as shown in Drawing No. D&E-S/421A.** Any modification shall be subject to approval of the purchaser.
- e) The system shall have built-in on line testing facility, which will be operatable without affecting the functioning of the transformer.
- f) On initiation of the fire extinguishing system on detection of fire, if the circuit breakers fail to trip/trip-relay fails to operate, suitable audible alarm should be sounded so as to call the attention of the operator to trip the breakers manually.

Shw
17/06/19

ADN
22.6.19

5

and simultaneously initiating the oil drain and nitrogen injection system. The manual operating system shall be used only in case the automatic system fails to operate and hence the arrangement for manual operation shall be provided in a box and shall be accessible only after breaking the glass cover on this box.

The bidder shall confirm whether it is advisable to initiate the "oil drain and nitrogen injection" manually even when the transformer is not electrically isolated due to stuck breaker problem.

- g) The system shall preferably have built-in facility for monitoring/display of the following:
 - i) Oil temperature.
 - ii) Tank pressure.
 - iii) Healthiness of all sensors.
 - iv) 'Open'/'Close' status of valves.
- h) Provision shall be available for annunciation (alongwith audible alarm) of the following:
 - i) Increase in temperature of oil/tank pressure beyond the set limit.
 - ii) Detection of fire due to external causes.
 - iii) Low nitrogen pressure.
 - iv) System initiated (automatic)
 - v) Automatic operation failed.
 - vi) Control cable faulty.
- i) All valves used in the system shall preferably be stainless steel ball type together with flanges. By-pass valves alongwith electrical limit switches shall be provided wherever required. The connecting cables shall be Fire Retardant Low Smoke (FRLS) armoured cables. Cables passing along the top of the transformer shall be fire survival (FS) type.
- j) Fire extinction cubicle shall be of robust design/construction and shall accommodate the Nitrogen gas cylinder of adequate capacity and associated accessories like, regulators, stainless steel tubings, etc. The cubicle shall have a degree of protection not less than IP-56.
- k) The remote control panel, to be mounted inside the control room shall accommodate the necessary control unit operating switches, push buttons, etc, as also the display unit and alarm annunciation unit.
- l) The bidder shall furnish the complete details including bill of materials of the fire extinguishing/fire prevention system offered. The list of all accessories including FRLS & Fire Survival cables, pipes, valves, sensors, control cubicle, Nitrogen gas cylinder, etc shall be listed out and furnished in the offer.
- m) The bidder/manufacturer shall ensure that the fire protection/prevention system offered is fool-proof and reliable. **Installation, testing and commissioning of the fire fighting system shall also be in the successful bidder's scope. As such, length of connecting pipes, cables etc, required as per site conditions, during erection, shall be ensured by the transformer manufacturer.**
- n) Fire Protection System should be capable of working on Automatic Mode, Remote Electrical mode and Local manual mode.
- o) The Fire Fighting Scheme for the power transformer should have authentic certification regarding performance issued by any standard approved laboratory.

- u
- p) The manufacturers of such scheme should have past experience and should submit the list of such scheme supplied and commissioned.

5.21.2 Specification of UG Tank

This tank is intended for collection of oil drained from the transformer during the operation of the N2 injection system of each transformer having N2 fire prevention system.

A. OIL Container:-

- i) a) Capacity of tank shall be of 10% excluding free board as per requirement of the total oil capacity of the respective transformer subject to a minimum tank capacity of 10 KL.

- b) For single phase ICTs forming a bank of 3 Phase ICT:
(e.g.: for 7x 167MVA single phase units, forming 2 banks + 1 spare unit)

There shall be two such tanks, one common for three units and other common for the remaining four units of single phase ICTs.

- ii) Tank shall be of cylindrical shape and made of minimum 5 mm thick MS sheet. The tank shall be painted with epoxy powder coating to resist corrosion.

- iii) Cylinder shall be placed with horizontal axis below ground level with adequate supporting frame of angles and channels at bottom and clamp on sides. The bottom frame shall be fixed firmly with bolts grouted in ground with cement concrete 1:2:4 (1cement: 2coarse sand: 4 graded stone aggregate).

- iv) Tank shall have

- a) 700 mm dia air tight manhole cover with gasket.
- b) Drainage/suction valve.
- c) Lifting hooks of suitable strength.
- d) Air vent pipe with through silica gel breather.
- e) One no. drain/suction pipe DN 50 NB on topmost circular surface of tank.
- f) One no. drain pipe DN 150 NB on vertical flat surface of tank and
- g) All other accessories for functional requirement of tank.

- v) Outside surface of tank shall be painted with black anti corrosive bitumastic paint (two or more coats on new work) and also oil resitive paint as per requirement.

B. Chamber for OIL tank below GL:-

- i) Chamber shall be of rectangular in size having minimum 50 CM clearance on sides and top of the MS tank.
- ii) Bottom slab of the tank shall be of minimum 125 mm thick RCC 1:1.5:3 (1 cement: 1.5 coarse sand: 3 grade stone aggregate of 20 mm of nominal size)

3

having reinforcement 12mm dia @ 175 centre to centre both ways (TMT bars confirming to relevant IS codes).

iii) Cement shall confirm to OPC 43 grade.

iv) Water proofing compound @ 1 kg./bag cement as per CPWD specifications shall be mixed with the cement in RCC and plaster work.

v) Side walls of the chamber shall be brick masonry in cement mortar.

(1 cement: 4 Coarse sand) with bricks confirming to class designation 75 thickness of wall shall be given below.

a) From GL to 500 mm below GL - 230 mm

b) From 500 mm below GL to 1250 mm below GL - 345 mm.

c) From 1250 mm below GL to 2000 mm below GL - 460 mm

vi) Complete inside face and outer surface up to 300 mm below of GL of wall shall be plastered with 15 mm thick cement mortar 1:4 (1 Cement:4 fine sand) having neat cement punning on top of the plaster.

vii) Top of brick wall shall have 100 mm thick coping in cement concrete 1:2:4 (1 cement: 2 Coarse sand : 4 graded stone aggregate 20 mm nominal size).

viii) Space between wall and MS tank including bottom gasp and top of tank shall be filled with dry Jamuna sand after fixing of tank in chamber and on top of Jamuna sand gap shall be plugged with cement concrete 1:2:4 (1 cement : 2 Coarse sand : 4 graded stone aggregate) having minimum 125 mm thickness.

ix) All material and items shall confirm to CPWD specifications.

x) For 700 mm dia. Of manhole of tank, round MS sheet of 700 mm dia., 5mm thick and length as per requirement to be provided as attachment with tank.


17-06-19

COMPLIENCE CHECK LIST

Cl.	Compliance to requirement	Yes/ No	Deviation, if any
1)	5.21.1 Fire Protection System		
2)	5.21.2 Specification of UG Tank A.Oil Container		
	B.Chamber of oil tank below GL		
3)	Price bid as per BHEL format furnished Any recommended Spares to be cover in main equipment price		
4)	GTP and preliminary technical drawings to be furnished by the bidder		
5)	Separate Quality Plan furnished for approval		
6)	Documents to be furnished to meet vendor qualification requirement		

Seal and Signature of Bidder

ANNEXURE-B		PI NO.- 340694007	PRICE BID FORMAT			
ITEM	Item Description	Qty.	Unit Price	TOTAL		
1	NIFPS FOR 105 MVA, 1 PH ICT AS PER ATTACHED ANNEXURE-A at KARAD, NEW KOYNA	3				
2	INSTALLATION & COMMISSIONING INCLUDING CIVIL WORK (EXCEPT CIVIL WORK OF OIL PIT) OF NIFPS FOR 105 MVA, 1 PH ICT-ANNEXURE A at KARAD, NEW KOYNA	3				
3	MS UG TANK OF 10KL FOR THE 3x105MVA, 1 PH ICT at NEW KOYNA	1				
4	CIVIL WORK FOR OIL PIT OF MS UG TANK OF 10KL FOR THE 3x105MVA, 1 PH ICT at NEW KOYNA	1				
5	NIFPS FOR 167 MVA, 1 PH ICT AS PER ATTACHED ANNEXURE-A at New Koyna	3				
6	INSTALLATION & COMMISSIONING INCLUDING CIVIL WORK (EXCEPT CIVIL WORK OF OIL PIT) OF NIFPS FOR 167 MVA, 1 PH ICT-ANNEXURE A at New Koyna	3				
7	MS UG TANK OF 15KL COMMON FOR THE 3x167MVA, 1 PH ICT at New Koyna	1				
8	CIVIL WORK FOR OIL PIT OF MS UG TANK OF 15KL at New Koyna	1				
9	NIFPS FOR 167 MVA, 1 PH ICT AS PER ATTACHED ANNEXURE-A at Dhule	3				
10	INSTALLATION & COMMISSIONING INCLUDING CIVIL WORK (EXCEPT CIVIL WORK OF OIL PIT) OF NIFPS FOR 167 MVA, 1 PH ICT-ANNEXURE A at Dhule	3				
11	MS UG TANK OF 15KL COMMON FOR THE 3x167MVA, 1 PH ICT at Dhule	1				
12	CIVIL WORK FOR OIL PIT OF MS UG TANK OF 15KL at Dhule	1				
13	NIFPS FOR 167 MVA, 1 PH ICT AS PER ATTACHED ANNEXURE-A at Kalwa (Tentative)	3				
14	INSTALLATION & COMMISSIONING INCLUDING CIVIL WORK (EXCEPT CIVIL WORK OF OIL PIT) OF NIFPS FOR 167 MVA, 1 PH ICT-ANNEXURE A at Kalwa (Tentative)	3				
15	MS UG TANK OF 15KL COMMON FOR THE 3x167MVA, 1 PH ICT at Kalwa (Tentative)	1				
16	CIVIL WORK FOR OIL PIT OF MS UG TANK OF 15KL at Kalwa (Tentative)	1				
17	COMPLETE NIFPS FOR 315 MVA ICT AS PER ATTACHED ANNEXURE-A at CHAKAN PUNE	1				
18	INSTALLATION AND COMMISSIONING INCLUDING CIVIL WORK (EXCEPT CIVIL WORK FOR OIL PIT) OF NIFPS FOR 315 MVA ICT at CHAKAN PUNE	1				
19	MS UG TANK OF 10KL FOR THE 315 MVA 3 PH ICT at CHAKAN PUNE	1				
20	CIVIL WORK FOR OIL PIT OF MS UG TANK OF 10KL FOR THE 315 MVA 3 PH ICT at CHAKAN PUNE	1				
				Total		
NOTE: 1) LENGTH OF 12 CORE CABLE TO BE CONSIDERED AS 300 METER BY THE BIDDER.						
						SEAL & SIGN BY BIDDER