

## **SCOPE OF WORK (SOW)**

**IMPLEMENTATION OF 1 NO. OF 220 KV LINE  
BAY AT 400/220KV AIS SUBSTATION DHULE PS  
FOR INTERCONNECTION OF 220 KV**

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## 1. GENERAL

Dhule Power Transmission Ltd (“DPTL”) is implementing 1 no. of 220 kV Line bay at 400/220KV AIS Substation Dhule PS for interconnection of 220 kV .

### 1.1.Associated Transmission System:

The following transmission system is envisaged under the scheme:

- 220 kV line bay – 1 no. at Dhule PS

## 2. SCOPE OF WORK

The scope of work shall cover following:

Design, engineering, supply, testing at manufacturer’s works, transportation, unloading and delivery at site including insurance & storage, associated civil works, erection, testing and commissioning at site along with all equipment’s, fittings, accessories, foundation bolts (if any), cables and Mandatory Spare Parts at Dhule PS substation on LSTK basis as per the details given below:

- 220 kV line bay – 1 no. at Dhule PS.

## 3. BID PRICE SCHEDULE:

The Bid Price Schedule is attached separately in Volume-III.

## 4. PHYSICAL AND OTHER PARAMETERS

### 4.1.Location of the substation - The location of substation is indicated below:

Name of Substation	Tentative Co-ordinates	Name of State	Address
400/220KV AIS Substation– Dhule PS	AS PER LAYOUT	MAHARASHTRA	DHULE, MAHARASHTRA

### 4.2.Access to Site -

DPTL shall provide land for the said augmentation work at Dhule PS (“Site”) with non-exclusive access and handover such portion of the Site to Contractor on as is basis to commence the services under the Contract

The Contractor shall (and shall cause all its sub-contractors) use only the entrance(s) to the Site specified by DPTL for ingress and egress of all Contractor’s and its Subcontractors’ personnel, the Services, Contractor’s Equipment, vehicles and the like.

The Contractor shall be responsible for planning and conducting its operations and those of its sub-contractors so that neither the Contractor nor any of its sub-contractor shall (a) enter upon lands (other than the designated Site) or waterbodies in their natural state unless authorized by the Project Manager and or appropriate person; (b) close or obstruct any utility installation, highway, waterway, harbor, road or other property unless applicable permits are obtained and authorized by the Project Manager and or appropriate person; or (c) disrupt or otherwise interfere with the

operation of any portion of any pipeline, telephone, conduit or electric transmission line, ditch, navigational aid, dock or structure unless otherwise specifically authorized by the appropriate Person.

**4.3. Meteorological data** - For design purposes, meteorological data are as below:

<b>Altitude</b>	Less than 1000 meters above mean sea level (MSL)
<b>Snow Fall</b>	NIL
<b>Seismic Zone</b>	As per IS 1893-2002
<b>Wind Zone</b>	39 m/sec, Wind map as per National Building Code – 2016 (Volume-I)
<b>Min./Max. Design Ambient Temperature</b>	0°C to +50°C
<b>Creepage Requirement</b>	As per Technical Specification

**4.4. Fault Level-** The system fault level is as mentioned below:

<b>Sl. No</b>	<b>Substation</b>	<b>kV</b>
1	Dhule PS	50kA for 1 second (220kV)

## **5. SCHEDULE OF QUANTITIES**

This work is to be awarded on LSTK basis including design, engineering, supply, testing at manufacturer's works, transportation, unloading and delivery at site including insurance & storage, associated civil works, erection, testing and commissioning at site along with all equipment's, fittings, accessories, foundation bolts (if any) cables and Mandatory Spare Parts.

The Contractor shall submit a detailed BOQ/ Billing Breakup, for Employer's review and approval, within 15 days of the Effective Date for billing and invoicing purpose, however the total price shall be restricted to the Contract Price.

The bidder is required to estimate the quantities required for entire execution and completion of works and incorporate their price in respective Bid Price Schedule. The bidder shall include all such items in the BOQ / Billing Breakup, which are not specifically mentioned but are essential for the execution of the contract. Items which are not mentioned in the BOQ/ Billing Breakup and required for successful commissioning of the Facilities shall be included in the Bid Price quoted by the bidder and shall be provided at no extra cost to the Employer.

The Format for BOQ/ Billing Breakup has been annexed as Volume-III (SOW).

## **6. REFERENCE DRAWINGS**

The following drawings are enclosed for reference purpose of the Bidder.

1. Tentative Plan Layout
2. Tentative SLD
3. Existing Earthing Layout for Switchyard
4. Existing outdoor Cable Trench Layout
5. Indicative Drawings – Civil Works

*Note:*

*In case of any discrepancy between the drawings and text of specification the requirements of text shall prevail in general. However, the bidder is advised to get these clarified from Employer.*

## **7. DIFFERENT SECTIONS OF TECHNICAL SPECIFICATION**

For the purpose of scope of work, technical specification shall consist of following sections, and they should be read in conjunction with each other.

1. Technical Specification for Substations – Civil Works.
2. Technical Specification for Substations – Electrical Works.

## **8. MANDATORY SPARE PARTS**

The Mandatory Spare Parts and Condition Monitoring Instruments shall be included in the bid proposal by the bidder. The prices of these spares shall be quoted by the Bidder in the Bid Price Schedule and shall be considered for evaluation of bid. The Bidder shall submit the detailed Price breakup in the BOQ/ Billing Breakup. The list of Mandatory Spare Parts is attached at Annexure-B (SOW).

The bidder is clarified that no mandatory spares shall be used during the commissioning of the equipment. Any spares required for commissioning purpose shall be arranged by the Contractor. The unutilized spares, if any, brought for commissioning purpose shall be taken back by the Contractor.

## **9. SPECIFIC REQUIREMENT**

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## **10. ANNEXURES**

### **ANNEXURE- A(SOW)**

**Supply:**

<u>S. No.</u>	<u>Item Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Rate (including Freight and Insurance)</u>	<u>GST (INR)</u>	<u>Total Amount (INR)</u>

**Service:**

<u>S. No.</u>	<u>Item Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Rate</u>	<u>GST (INR)</u>	<u>Total Amount (INR)</u>

**ANNEXURE-B (SOW)**

**List of Mandatory Spare Parts**

Sl. No.	Description	Quantity of Each Make & Type	
		At Substation/switchyard Level	At State Level
1.0 CIRCUIT BREAKERS			
800/420/ 245/ 145/72.5 KV SF6 CIRCUIT BREAKER			
1.1	Complete Pole (Phase) of circuit breaker including closing resistor/ CSD, grading Capacitor (as applicable), pole column, interrupter, operating mechanism, Marshalling Box and terminal connector but without support structure	1. 1 No. pole of each make & type 2. For cyclone/whirlwind/tornado prone areas- 10% poles of each make and model installed at the substation (rounded up to the next integer) subject to minimum of one pole	
1.2	Grading Capacitor	3 Nos.	
1.3	Rubber gaskets, 'O' rings and seals	1 set	
1.4	Trip coils with resistor	2 sets	
1.5	Closing coils with resistor	2 sets	
1.6	Terminal Pads and connectors	2 sets	
1.7	Molecular filter	2 Nos.	
1.8	Density/ pressure monitoring systems	1 No.	
1.9	Corona rings	1 No.	
1.10	Relays, Power contactors, switch fuse units, limit switches, push buttons, timers & MCB etc.	1 set	
1.11	Pressure switches	1 set	
1.12	Pressure Gauge and coupling	1 set	
1.13	SF6 Gas	15% of total used quantity in substation	
1.14	Auxiliary switch assembly	1 set	
1.15	Operation Counter	1 No.	
1.16	Magnetic ventile, if required	3 Nos.	

1.17	Actuator rings, if required	6 Nos.	
1.18	Control valves, if required	1 No.	
1.19	Fixed, moving and arcing contact assemblies including Insulating Nozzles etc. for 1 Interrupter.	2 Nos.	
<b>1.20</b>	<b>Pneumatic Operating Mechanism for ICU (INDIVIDUAL COMPRESSOR UNIT)</b>		
1.21.1	Complete compressor assembly along with motor, accessories & coupling along with regenerating unit (wherever applicable)	1 Set	
1.21.2	Micro-filters	1 No.	
1.21.3	Coupling for compressed air	1 Set	
1.21.4	Valves & reducers (Including Safety valve)	1 Set	
1.21.5	Pressure switches	1 Set	
1.21.6	Pressure gauges	1 Set	
1.21.7	Gaskets 'O' rings & seals	1 Set	
1.21.8	Dowty Seal	2 Sets	
1.21.9	Operating drive mechanism with drive motor	1 Set	
1.22.2	Ferules and joints	1 Set	
1.22.3	Hydraulic filter	3 Sets	
1.22.4	High pressure hose	1 Set	
1.22.5	N2 Accumulator	2 No.	
1.22.6	Pressure transducer	1 No.	
1.22.7	Valves	1 Set	
1.22.8	'O' rings, gaskets and seals	1 Set	
1.22.9	Pipe length	1 Set	



	(copper & steel)		
1.22.10	Pressure switches	1 Set	
1.22.11	Pressure gauges	1 Set	
1.22.12	Hydraulic oil	15% of total used quantity in substation	
1.22	Spring Operated Mechanism		
1.22.1	Closing Dashpot	1 set	
1.22.2	Opening Dashpot	1 set	
1.22.3	Opening Catch gear	1 set	
1.22.4	Closing Catch gear	1 set	
1.22.5	Complete Spring Operating Mechanism	1 set	
1.22.6	Spring Charging Motor	1 Nos.	
<b>Note: 1 set is for 3 poles</b>			
<b>2.0 ISOLATORS</b>			
2.1	800/420/ 245/ 145/ 72.5 KV HORIZONTAL CENTRE BREAK/ DOUBLE BREAK ISOLATORS		
	Contacts and current carrying assembly		
2.1.3	Support Insulators	1 set	
2.1.4	Copper contact fingers for male & female contacts	2 sets	
2.1.5	Open/Close contactor assembly, timers, key interlock push button switch & auxiliary switches	1 set	
2.1.6	Limit switch	2 sets	
2.1.7	Motor housing bearing assembly	1 No.	
2.1.8	Terminal Pads and connectors	2 sets	
2.1.9	Motor with gear assembly and bevel gear	1 No.	

	assembly		
2.1.10	Corona shield rings	3 Nos.	
2.1.11	Hinge pins	3 Nos.	
2.1.12	Bearings	1 set	
2.1.13	Interlocking coil with resistor	5 Nos.	
2.1.14	Fuses of each rating	5 Nos.	
<b>2.2 420 KV PENTOGRAPH ISOLATOR</b>			
2.2.1	Fixed contacts	3	
2.2.2	Gear Assembly	1	
2.2.3	Damper assembly	1	
2.2.4	Scissors assembly	1	
2.2.5	Scissors contacts	3	
2.2.6	Drive motor	1	
2.2.7	Limit switches	1 set	
2.2.8	Bearings	1 set	
2.2.9	Terminal pads and connectors	4	
2.2.10	Corona shield rings	1 set	
2.2.11	Interlocking coils, timers, key interlocks etc.	1 set	
<b>3.0 CURRENT TRANSFORMER</b>			
3.1	800/420/ 245/ 145/ 72.5/ 36 KV CT		
3.1	Complete CT with Terminal connector & structure	2 Nos. of each rating for population up to 20 Nos. 3 Nos. of each rating for population more than 20 Nos. For cyclone/whirlwind/tornado prone areas- 10% CTs of each voltage class installed at the substation (rounded up to the next integer) subject to a minimum two numbers	For cyclone/whirlwind/ tornado prone areas- Two complete CTs of each voltage class(along with support structure).CT ratio shall be decided by the utility based on the population of similar ratio CTs available in the State.
3.2	Primary Terminal bushing	2 sets	
<b>4.0 VOLTAGE TRANSFORMER (PT/CVT)</b>			
4.1	Complete Potential Transformer / Capacitor Voltage Transformer with	2 Nos. of each rating for population up to 20 Nos.	For cyclone/whirlwind/ tornado prone areas- Two complete PT/CVTs of each voltage class

	terminal connectors & structure	3 Nos. of each rating for population more than 20 Nos. For cyclone/whirlwind/tornado prone areas- 10% CTs of each voltage class installed at the substation (rounded up to the next integer) subject to a minimum two numbers	(along with support structure).
<b>5.0 SURGE ARRESTOR</b>			
5.1	Complete Surge Arrester with insulating base and Terminal connector & structure	2 Nos. of each rating (not make) for population upto 10 Nos. and 3 Nos. of each rating (not make) for population more than 10 Nos.	For cyclone/whirlwind/tornado prone areas- Four complete SAs of each voltageclass (along with support structure)
5.2	Surge counter/monitor	5 Nos.	
<b>6.0 765/400/ 220/ 132/ 66 KV BUS POST INSULATOR</b>			
6.1	Bus post insulator assembly (Complete)	3 Nos. for each voltage rating	
<b>7.0 POWER TRANSFORMERS &amp; REACTORS</b>			
7.1	<b>AUTO TRANSFORMERS</b>	<b>As per Central Electricity Authority (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations</b>	<b>One number single phase/three-phase unit of each rating, as applicable</b>
7.1.1	Oil cooler pumps with motor (complete assembly)	1 No.	
7.1.2	Buchholz relay Complete (main tank)	1 No.	
7.1.3	Local Winding temperature indicator	1 No.	
7.1.4	Remote winding temperature indicator with sensing device and matching unit	1 No.	
7.1.5	Oil temperature indicator	1 No.	
7.1.6	Pressure relief device	1 No.	

7.1.7	Magnetic oil level gauge	1 No.	
7.1.8	Cooler Fan with motor	1 No.	
7.1.9	Set of Valves	1 No. of each size and type	
7.1.10	Set of starters, contactors, relays and switches for electrical control panel	1 set	
7.1.11	Remote tap position indicator	1 No.	
7.1.12	Oil flow indicator with flow switch	1 set	
7.1.13	Breather assembly for main conservator and OLTC Conservator	1 No. each	
7.1.14	Terminal connector	1 set	
7.1.15	Oil surge relay for OLTC	1 No.	
7.1.16	Aircell		1 No. each type
7.1.17	OLTC		1 No. each type
<b>7.2</b>	<b>SHUNT REACTORS :</b>	As per Central Electricity Authority (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations	One number single-phase/three-phase unit of each rating, as applicable
7.2.1	Local winding temperature indicator	1 set	
7.2.2	Remote winding temperature indicator with contacts and sensing device	1 set	
7.2.3	OTI with contacts and sensing device	1 No.	
7.2.4	Magnetic Oil level gauge	1 No.	
7.2.5	Pressure relief device	1 No.	
7.2.6	Buchholz relay complete	1 No.	
7.2.7	Terminal connector	2 Nos. of each type/rating	

7.2.8	Surge Arrester (connected in neutral of reactor) for each Rating – Wherever applicable	1 No.	
7.2.9	Surge monitor for neutral L.A. (Wherever applicable)	1 No.	
7.2.10	Breather assembly	2 Nos.	
7.2.11	Valves	1 set	
<b>7.3 BUSHINGS</b>			
7.3.1	Bushings 765/ 400 kV Bushing	2 Nos. Of each type(dimensional) & rating	For cyclone/whirlwind/ tornado prone areas- 1 No. of each rating & dimension
7.3.2	Bushing 245kV/ 145kV / Neutral Bushing (36kV)	1 No. of each rating & dimension for population upto 10 Bushings 2 Nos. of each rating & dimension for population more than 10 Bushings	
7.3.3	72.5/52KV Bushings for tertiary	2 Nos.	
7.4	INSULATING OIL	10% of quantity of oil of largest unit (20% in case imported oil is used in transformer/reactors)	
<b>7.5 NEUTRAL GROUNDING REACTOR</b>			
7.5.1	NGR for 765kV along with Terminal Clamps & Connectors		1 No. of each rating
7.5.2	NGR for 400kV along with Terminal Clamps & Connectors		1 No. of each rating
7.5.3	145 KV bushing with metal parts and gaskets along with terminal connector (To be covered separately in Bushings)	1 No.	
7.5.4	Grounding bushing of NGR with metal parts gaskets and terminal conductor	1 set	
7.5.5	OTI with contacts	1 No.	

7.5.6	Oil level gauge	1 No.	
7.5.7	Pressure relief device	1 No.	
7.5.8	Buchholz relay	1 No.	
8.0	Controlled Switching Devices (CSD)		
8.1	Controlled Switching Devices along with transducers, Sensors, Cables, Contactors, Switches etc	1 set of each make	
<b>9.0 PLCC EQUIPMENT</b>			
9.1	Set of Prints for Carrier terminal, Speech and Data	2 sets	
9.2	Set of Prints for protection coupler	2 sets	
9.6	Telephone 4 wire with necessary connecting cable	2 Sets	
9.7	Co-axial connector	10 Nos.	
9.8	Straight through joint (wherever applicable)	1 Set	
9.9	Co-axial cable	1 km	
9.10	PLCC tool kit	1 set	
9.11	Wave Trap LA	1 No.	
9.12	Wave trap with pedestal & terminal connectors		1 No. of each make & rating For cyclone/whirlwind/ tornado prone areas- 2 Nos. of each make & rating
9.11	Digital PLCC/ Digital Communication equipment/ Digital Protection Coupler		
9.11.1	Card/Module of each type	1 No.	
9.11.2	Connector of each type	1 set	

9.11.3	Connecting cables of each type	1 No.	
<b>10.0 BATTERIES AND BATTERY CHARGERS:</b>			
10.1	220V/ 110 V/ 48V Batteries		
10.1.1	Spare battery cell without electrolyte	10 Nos. for population $\geq$ 100 Nos. 5 Nos. for population < 100 Nos.	
10.1.2	Terminal connectors with Bolts & Nuts	10 Nos. (each type)	
10.1.3	Float level indicators	10 Nos. (each type)	
10.1.4	Vent Plugs	10 Nos. (each type)	
<b>10.2 220V/ 110 V / 48V Battery Chargers</b>			
10.2.1	Set of Control Cards	1 Complete set for each type of charger	
10.2.2	Set of relays	1 set	
10.2.3	Rectifier transformer	1 No.	
10.2.4	Control transformer	1 No.	
10.2.5	Series inductor	1 No.	
10.2.6	Set of contactor	1 set	
10.2.7	Micro switches	1 set	
10.2.8	Filter Capacitors	1 set	
10.2.9	Thyristor/ Diode	1 set	
10.2.10	Set of switches	1 set	
10.2.11	Set of wound resistors	1 set	
10.2.12	Potentiometers	1 No.	
10.2.13	Fuses of Thyristor with indicators	6 sets	
<b>11.0 Control and Relay Panel</b>			
11.1	Line Protection Panel Equipment Spare		
11.1.1	Numerical Relay (IED) of each make and type along with software	1 No.	
11.2	Transformer & Reactor Protection Panel		

11.2.1	Numerical Relay (IED) of each make and type along with software	1 No.	
11.3	Bus-Bar Protection Panel		
11.3.1	Numerical Relay (IED) of each make & Type	1 No.	
12.0	L.T. Transformers		1 no. of each voltage rating & MVA capacity
12.1	Bushings		1 set
12.2	OTI & WTI with sensing device (as applicable)		1 set
12.3	Tap Changer contacts		1 set
12.4	Buchholz relay		1 No.
12.5	Explosion vent diaphragm		1 No.
12.6	Silica gel Container		1 No.
13.0	Conductor (Flexible/Aluminum Pipe)	5% of the length of each type installed at the substation/switchyard	
14.0	Disc Insulators	5% of the total number of discs of each voltage class installed at the substation/switchyard.	
15.0	Long Rod Insulator	5% of the total number of insulators of each voltage class installed at the substation/switchyard, subject to a minimum number of three insulators of each voltage class.	
16.0	Conductor accessories and hardware	Quantity shall be commensurate with the spare for conductor and insulators.	
17.0	Coupling Capacitors	One number of each voltage Class installed at the substation/switchyard.	

----- End of Scope of Work -----



