

**LIST OF MANDATORY SPARES**

| SI No | DESCRIPTION   | UNIT | QUANTITY                |                         |
|-------|---|------|-------------------------|-------------------------|
|       |   |      | CHARIKAR                | DOSHI                   |
| A)    | <b>220/20KV Power transformer</b>   |      | <b>(16MVA )</b>         | <b>(4MVA)</b>           |
| 1     | Oil cooler pump with motor  | Set  | 1                       | 1                       |
| 2     | Buchholz relay complete with float and contacts (Main Tank)   | Set  | 1                       | 1                       |
| 3     | Local & Remote WTI complete with sensing device & contacts  | Set  | 1                       | 1                       |
| 4     | OTI complete with contacts & sensing device   | Set  | 1                       | 1                       |
| 5     | Pressure relief Device  | No.  | 1                       | 1                       |
| 6     | Magnetic oil level gauge  | No.  | 1                       | 1                       |
| 7     | Cooler fan with motor   | No.  | 1                       | 1                       |
| 8     | Starters, contactors, switches & relays for electrical control panels (one set for each type)               | Set  | 1                       | 1                       |
| 9     | Set of valves (complete set for one transformer)  | Set  | 1                       | 1                       |
| 10    | Fuses (one set for complete replacement for one Autotransformer)  | Set  | 1                       | 1                       |
| 11    | Stainless Steel Oil sampling bottles (One Litre Capacity)   | Nos. | 10                      | 10                      |
| 12    | Oil storage tank along with complete accessories (15KL capacity)  | Sets | 1                       | 1                       |
| 13    | Indicating lamps (one set for complete replacement for one Autotransformer)                                 | Set  | 1                       | 1                       |
| 14    | Aux Transformers for control of Cooler control cabinet & OLTC (if applicable)                               | Set  | 1                       | 1                       |
| 15    | Breather Assembly (one of each type) for conservator and OLTC   | Set  | 1                       | 1                       |
| 16    | Remote tap position indicator   | No.  | 1                       | 1                       |
| 17    | Oil flow indicator with flow switch   | No.  | 1                       | 1                       |
| 18    | Oil surge relay for OLTC  | No.  | 1                       | 1                       |
| 19    | Bushings of each rating   | Set  | 1                       | 1                       |
| 20    | Spare transformer oil   | kL   | 2                       | 2                       |
| 21    | Terminal connectors   | Set  | 1                       | 1                       |
| 22    | Bushing CTs of each ratio   | Set  | 1                       | 1                       |
| B)    | <b>245 kV SF6 Circuit Breaker</b>   |      |                         |                         |
| 1     | One pole complete with column and interrupter with MB and operating mechanism and without support structure | No.  | 1                       | 1                       |
| 2     | SF6 Gas   | Kg   | 40% of ordered quantity | 40% of ordered quantity |
| 3     | Rubber gaskets, 'O' rings and seals (complete replacement for one pole)                                     | Set  | 1                       | 1                       |
| 4     | Trip coils with resistor(110 V operating Voltage)   | Nos. | 2                       | 2                       |
| 5     | Closing coils with resistor(110 V operating Voltage)  | Nos. | 2                       | 2                       |
| 6     | Terminal pad & connectors of each type  | No.  | 1                       | 1                       |
| 7     | Molecular filter for SF6 gas  | Sets | 2                       | 2                       |
| 8     | Density/Pressure monitor for SF6 circuit  | No.  | 1                       | 1                       |
| 9     | Pressure switches complete for one CB.  | Set  | 1                       | 1                       |
| 10    | Operation Counter   | No.  | 1                       | 1                       |
| 11    | Fixed moving and arcing contacts including  | No   | 1                       | 1                       |

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Charikar &amp; Doshi Substation Package

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|             |   |     |                         |                         |
|-------------|---|-----|-------------------------|-------------------------|
|             | insulating nozzles for one pole of CB   |     |                         |                         |
| 12          | Relays, Power contactors, switch fuse units, limit switches, push buttons, timers & MCB etc.(110 V operating Voltage)             | Set | 1 of each type          | 1 of each type          |
| 13          | Closing Coil assembly   | No  | 1                       | 1                       |
| 14          | Trip Coil assembly  | No  | 1                       | 1                       |
| 15          | Support Insulator Stack   | No  | -                       | -                       |
| 16          | Set of Control Valves (of each type)  | Set | 1                       | 1                       |
| 17          | Pressure switches (For one CB)  | Set | 1                       | 1                       |
| 18          | Pressure gauges & Coupling device of each type  | Set | 1                       | 1                       |
| 19          | Aux. contact assembly   | set | 1                       | 1                       |
| 20          | Spring operated closing mechanism(If applicable)  |     | -                       | -                       |
| a)          | Closing Dashpot   | Set | 1                       | 1                       |
| b)          | Opening Dashpot   | Set | 1                       | 1                       |
| c)          | Closing Latch Gear  | Set | 1                       | 1                       |
| d)          | Opening Latch Gear  | Set | 1                       | 1                       |
| 21          | Micro Filter set  | Set | 1                       | 1                       |
| 22          | Micro switches for aux. contact assembly  | Set | 1                       | 1                       |
| 23          | All types of coupling for SF6 gas   | Set | 1                       | 1                       |
| 24          | Pipe length (Copper & Steel)  | Set | 1                       | 1                       |
|             | <b>Pneumatic Operating mechanism (If Applicable)</b>  |     |                         |                         |
| 1           | Complete Operating mechanism  | No. | 1                       | 1                       |
| 2           | All types of Valves for Pneumatic Operating mechanism   | Set | 1                       | 1                       |
| 3           | "O" rings, Gaskets & Seals for operating mechanism  | Set | 1                       | 1                       |
|             | <b>Hydraulic Operating mechanism (If Applicable)</b>  |     |                         |                         |
| 1           | Hydraulic Operating mechanism with drive Motor  | No. | 1                       | 1                       |
| 2           | Pressure gauges for Hydraulic Operating Mechanism   | Set | 1                       | 1                       |
| 3           | "O" rings, Gaskets & Seals for operating Mechanism  | Set | 1                       | 1                       |
| 4           | All types of Valves for Hydraulic Operating mechanism   | Set | 1                       | 1                       |
| 5           | Pressure Transducer   | No. | 1                       | 1                       |
| 6           | Pressure switch for Hydraulic circuit   | Set | 1                       | 1                       |
| 7           | Accumulator   | No. | 1                       | 1                       |
| 8           | Hydraulic Oil   |     | 40% of ordered quantity | 40% of ordered quantity |
| <b>C 1)</b> | <b>245 kV Isolator</b>  |     |                         |                         |
| 1           | One complete pole of Isolator including support insulator with 1 E/S with operating mechanism for main isolator and earth switch  | No. | 1                       | 1                       |
| 2           | Copper contact fingers for female & male contacts of each type  | No  | 1                       | 1                       |
| 3           | Relays, power contactors, MCBs, switch fuses, push buttons and resistors for electrical control circuit as per approved schematic |     |                         |                         |
|             |   | Set | 1                       | 1                       |

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|             |  |      |                    |                    |
|-------------|--|------|--------------------|--------------------|
| <b>D 1)</b> | <b>216 kV Surge Arrestor</b>   |      |                    |                    |
| 1           | 216kV Surge Arrestor complete  | No   | 1                  | 1                  |
| 2           | Surge Counters   | No   | 3                  | 3                  |
| <b>D 2)</b> | <b>20 kV Surge Arrestor</b>  |      |                    |                    |
| 1           | 20kV Surge Arrestor complete   | No   | 1                  | 1                  |
| 2           | Surge Counters   | No   | 3                  | 3                  |
| <b>E)</b>   | <b>Control and Relay Panel</b>   |      |                    |                    |
| <b>I)</b>   | <b>Control Panel Equipment Spare</b>   |      |                    |                    |
| 1           | Ammeter with transducer  | Nos. | 2                  | 2                  |
| 2           | Wattmeter with transducer  | No.  | 1                  | 1                  |
| 3           | Varmeter with transducer   | No.  | 1                  | 1                  |
| 4           | Voltmeter with transducer  | Nos. | 2                  | 2                  |
| 5           | Voltmeter selector switch  | No.  | 2                  | 2                  |
| 6           | Control switch for breaker   | No.  | 3                  | 3                  |
| 7           | Control switch for isolator  | Nos. | 4                  | 4                  |
| 8           | Semaphore for Earthswitch  | Nos. | 6                  | 6                  |
| 9           | Red/Green/White indicating lamp (with complete assembly) (3 no. for each colour) | Set  | 1                  | 1                  |
| 10          | Indication lamps   | Nos. | 5                  | 5                  |
| 11          | Annunciations windows with necessary annunciation relay                          | Nos. | 5                  | 5                  |
| 12          | Push button  | Nos. | 10                 | 10                 |
| 13          | Trip transfer switch   | No.  | 2                  | 2                  |
| 14          | Synchronising socket   | No.  | 1                  | 1                  |
| 15          | Synchronising selector switch (if applicable)                                    | No.  | 1                  | 1                  |
| 16          | MCB & HRC fuses used in C&R Panel  | No   | 1 of each type     | 1 of each type     |
| <b>II)</b>  | <b>Breaker Relay Panel Spares</b>  |      |                    |                    |
| 1           | Breaker failure relay  | No.  | 1                  | 1                  |
| 2           | Trip circuit supervision relay   | No.  | 1                  | 1                  |
| 3           | Auto reclose relay with check Synchronising relay and dead line charging relay   | Nos. | 1                  | 1                  |
| 4           | Self reset trip relay (110 V operating Voltage)                                  | Nos. | 1 no. of each type | 1 no. of each type |
| 5           | Hand reset trip relay (110 V operating Voltage)                                  | Nos. | 1 no. of each type | 1 no. of each type |
| 6           | Timer relay (110 V operating Voltage)  | No.  | 1 no. of each type | 1 no. of each type |
| 7           | DC supervision relays (110 V operating Voltage)                                  | No.  | 1 no. of each type | 1 no. of each type |
| 8           | Flag relays (110 V operating Voltage)  | Nos. | 1 no. of each type | 1 no. of each type |
| 9           | Auxiliary relays (110 V operating Voltage)                                       | Nos. | 1 no. of each type | 1 no. of each type |
| <b>III)</b> | <b>Transformer Protection Panel Spares</b>                                       |      |                    |                    |
| 1.0         | Transformer differential protection relay including all aux. CTs                 | No.  | 1                  | 1                  |
| 2.0         | Restricted earth fault protection relay with non-linear resistor                 | No.  | 1                  | 1                  |
| 3.0         | Back up protection relay directional O/C one phase & one phase E/F element       | Set  | 1                  | 1                  |
| 4.0         | Over Fluxing relay   | No.  | 1                  | 1                  |
| 5.0         | CVT selection relay  | No.  | 1                  | 1                  |

|   |   |      |    |    |
|---|---|------|----|----|
| 6.0                                     | Over load spare relay with timer  | No.  | 1  | 1  |
| <b>IV) Line Protection Panel Spares</b> |   |      |    |    |
| 1.0                                     | Main 1 numerical distance relay (excluding external trip relays)                            | Nos. | 1  | 1  |
| 2.0                                     | Main -II numerical distance relay (excluding external trip relays)                          | Nos. | 1  | 1  |
| 3.0                                     | Disturbance recorder-comprising of evaluation & acquisition units (if stand alone)          | Nos. | 1  | 1  |
| 4.0                                     | Distance to fault locator including mutual compensation units (if stand alone)              | Nos. | 1  | 1  |
| <b>V) Common Spares</b>                 |   |      |    |    |
| 1.0                                     | Power supply module for Bus bar protection  | No   | 1  | 1  |
| 2.0                                     | Metrosil (Non linear resistor) (1 no of each type)  | Set  | 1  | 1  |
| 3.0                                     | Inter -posing CT & PT (1 no of each type)   | Set  | 1  | 1  |
| 4.0                                     | Power supply & module of each type for event logger   | Set  | 1  | 1  |
| <b>F) LT Switchgear</b>                 |   |      |    |    |
| 1.0                                     | Relays of each type   | Set  | 1  | 1  |
| 2.0                                     | CT, PT (each type)  | Set  | 1  | 1  |
| 3.0                                     | Switch, Push buttons, meters  | Set  | 1  | 1  |
| 4.0                                     | TPN switch/MCB/MCCB 1 No. of each rating  | Set  | 1  | 1  |
| <b>G) Batteries</b>                     |   |      |    |    |
|   | a) Dry and uncharged cells  | Nos. | 10 | 10 |
|   | b) Inter cell connectors  | Nos. | 10 | 10 |
|   | c) Terminal lugs  | Nos. | 5  | 5  |
|   | d) Cell filling plug  | Nos. | 10 | 10 |
|   | e) Float plug with float  | Nos. | 10 | 10 |
| <b>H) Battery Charger</b>               |   |      |    |    |
|   | Spares of Battery charger (220V) Float/Boost  |      |    |    |
|   | a. Set of control cards (All PCB cards)   | Set  | 1  | 1  |
|   | b. Set of relays  | Set  | 1  | 1  |
|   | c. Set of contactor   | Set  | 1  | 1  |
|   | d. Micro switches (If applicable)   | Set  | 1  | 1  |
|   | e. Filter capacitor   | Nos. | 1  | 1  |
|   | f. Three phase full wave bridge rectifier (Thyrister/diode)                                 | Nos. | 1  | 1  |
|   | g. Set of wound resistor (If applicable)  | Set  | 1  | 1  |
|   | h. Set of switches  | Set  | 1  | 1  |
|   | i. Potentiometer  | No.  | 1  | 1  |
|   | j. Fuses of thyristor with indicator  | Nos. | 6  | 6  |
| <b>I) DG Set</b>                        |   |      |    |    |
| 1                                       | Element L.O. filter   | No   | 1  | 1  |
| 2                                       | Element L.O. bypass filter  | No   | 1  | 1  |
| 3                                       | Element fuel filter   | No   | 1  | 1  |
| 4                                       | Screen filter for fuel pump   | No   | 1  | 1  |
| 5                                       | Coil assembly 24 V  | No   | 1  | 1  |
| 6                                       | Solenoid coil for fuel oil system   | No   | 1  | 1  |
| 7                                       | Voltage regulator complete (AVR)  | No   | 1  | 1  |
| 8                                       | Switches  | Set  | 1  | 1  |
| 9                                       | Power contactors  | Set  | 1  | 1  |
| 10                                      | Auxiliary contactors  | Set  | 1  | 1  |
| 11                                      | Auxiliary relays  | Set  | 1  | 1  |
| 12                                      | Timers  | Set  | 1  | 1  |
| 13                                      | D.C. starter assembly with clutch engaging and disengaging arrangements complete with motor | No   | 1  | 1  |
| 14                                      | Coil for the contactors (for both power and aux   | No   | 1  | 1  |

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|  |  |       |     |     |
|--|--|-------|-----|-----|
|  | contactors)  |       |     |     |
| 15   | Lub oil pressure safety control  | No    | 1   | 1   |
| 16   | High water temperature safety control  | No    | 1   | 1   |
| 17   | Diode  | No    | 1   | 1   |
| <b>J)</b>  | <b>LT Transformer</b>  |       |     |     |
| a)   | Bushing with metal parts ( 1 no. of each voltage rating)   | Set   | 1   | 1   |
| b)   | Oil temperature indicator  | Set   | 1   | 1   |
| c)   | diaphragm for pressure relief vent   | Set   | 1   | 1   |
| d)   | Tap changer contacts   | Set   | 1   | 1   |
| <b>OPGW Cable &amp; Communication Equipments</b>   |  |       |     |     |
| <b>A</b>   | <b>OPGW cable</b>  |       |     |     |
|  | 24 Fibre (DWSM) OPGW fibre optic cable   | Km.   | 1   | -   |
| <b>B</b>   | <b>OPGW cable Accessories</b>  |       |     |     |
|  | Installation Hardware set for 12 Fibre (DWSM) OPGW Fibre Optic cable consisting of following:                          |       |     |     |
| 1  | <b>Suspension assembly</b>   | Nos.  | -   | -   |
| 2  | <b>Tension assembly</b>  |       |     |     |
|  | a) At dead end location  | Nos.  | 1   | -   |
|  | b) At Pass through location  | Nos.  | 1   | -   |
|  | c) At joint box location   | Nos.  | 1   | -   |
| 3  | <b>Splice enclosures</b>   | Nos.  | 1   | 1   |
| <b>C</b>   | <b>Underground Fibre Optic approach cable</b>  |       |     |     |
| a)   | 24 Fibre (DWSM)  | Km    | 0.5 | 0.5 |
| <b>D</b>   | <b>Installation hardware set including ties/clips/cleats, conduits, ducts, supports, fittings, accessories etc for</b> |       |     |     |
| a  | 24 Fibre (DWSM) approach cable   | Set** | 0.5 | 0.5 |
| <b>NOTE**:</b> One set of installation hardware shall contain all installation hardware fittings as may be required for 1 km fibre optic approach cabling. |  |       |     |     |
| <b>A</b>   | <b>SDH Equipment</b>   |       |     |     |
|  | (I) Common cards, Power supply cards, hardware & accessories (each)  | Set   | 1   | 1   |
|  | <b>(II) Optical Cards</b>  |       |     |     |
|  | (a) L 1.2  | No.   | 1   | 1   |
|  | <b>(III) Tributary Cards</b>   |       |     |     |
|  | a) E1 Interface card (Minimum 4 interfaces per card card)  | No.   | 1   | 1   |
|  | (b) Ethernet interfaces 10 Base T with Layer-2 switching (Minimum 4 interfaces per card.)                              | No.   | 1   | 1   |
| <b>B</b>   | <b>Multiplexer</b>   |       |     |     |
|  | (i) Drop-Insert: Fully Equipped excluding subscriber line interface cards  | No.   | 1   | 1   |
|  | <b>(ii) Subscriber line interface cards</b>  |       |     |     |
|  | a) Voice channel cards: 2 wire   | No.   | 1   | 1   |
|  | b) Voice channel cards: 4 wire (E&M)   | No.   | 1   | 1   |
|  | c) Synchronous data cards (64 kbps)  | No.   | 1   | 1   |
| <b>C</b>   | Pre- connectorized optical fibre Patch cords - pack of 6 patch cords of 10 meter each                                  | Pack  | 1   | 1   |

#### M) Erection Hardware Item

5% spares of the actual Quantities for disc insulator, hardwares, clamps & connectors, spacers, corona bell, AL tube, welding sleeves etc at each station. No spares are to be

considered for conductor, BMB, grounding conductors, cable tray, Pipes (GI/PVC/hume), buried cable trenches, angles, channels, Junction boxes.

#### **N) Spares for illumination system**

5% of each type of lighting fixture supplied at each station