

Clarifications No. 04 Dated 20.01.2020

NIB No. 344 Dated 17.12.2019.

Clarifications to the Queries raised by the Bidders

Name of Work: Limited Tender for undertaking "Mega Risk Insurance Policy for Kameng Hydro Electric Project (600 MW), West Kameng District, Arunachal Pradesh for a period of 1(one) year".

Sl. No.	Bidders Queries	NEEPCO's response
1.	It would be useful to have the enclosed Testing & Commissioning Questionnaire (attached to clause) fully completed. Please share completed questionnaire at the earliest.	Enclosed at <u>Annexure-I</u> .
2.	How long is the warranty for each key equipment? Please provide a list.	All the equipment supplied under various packages have warranty period of 12 to 18 months.
3.	Details on spares stored on site.	Details on spares stored on site is enclosed at <u>Annexure-II</u> .


20/01/2020


20/01/2020

Annexure-I

Operational Insured's Name	North Eastern Electric Power Corporation Ltd. (NEEPCO)
Project Name	Kameng Hydro Electric Project (600 MW), West Kameng District, Arunachal Pradesh.
Proposed Date of Inception of Operational Cover	
Endorsement Reference Number	
Date Information Completed	

Please provide attachments where necessary to support the following information requests.

0	Overview
0.1	Provide details of the full scope of assets to be transferred to the operational policy under this endorsement. <i>Please Refer Section-VI, Description of Assets of the Bid Document.</i>
0.2	Provide details of the start-up plan including a schedule with the order and approximate dates in which units will be started up. Include details of any units which will be started up and subsequently idled. <i>Unit-1 : After full load achievement, trial operation shall be conducted as the CERC regulation. On successful conclusion of trial operation, unit shall be declared for COMMERCIAL OPERATION.</i> <i>Tentative date of Commercial Operation : 00:00 hours of 28/02/2020.</i> <i>Unit-2 : After full load achievement, trial operation shall be conducted as the CERC regulation. On successful conclusion of trial operation, unit shall be declared for COMMERCIAL OPERATION.</i> <i>Tentative date of Commercial Operation : 00:00 hours of 31/01/2020.</i>
0.3	Provide details of any restrictions on the ability to demonstrate 100% Contract Design Criteria (e.g. fuel availability, Demand availability). <i>No restriction envisaged.</i>
0.4	Have there been any insurance claims to the Construction policy? If yes, provide details below. <i>Please refer Sl. 14 of Clarification No. 02 Dtd. 09/01/2020</i>
0.5	Have there been any incidents, not necessarily resulting in an insurance claim, during the project?

BM *[Signature]*

Examples would include a significant Loss of Primary Containment (LOPC), commissioning error, fire, explosion, machinery breakdown, dropped load or equipment damage.

If yes, provide details below.

Penstock leakages observed during initial pre-commissioning stage. One penstock has since been rectified and other one is under repair.

- 0.6 At what construction milestone/Handover does the Construction policy stop providing cover i.e. Taking Over, Final Taking Over, Final Acceptance, Actual project Acceptance etc.

On commencement of Commercial Operation of units.

- 0.7 Provide a copy of the EPC Contract or other relevant contractual documentation including clauses, appendices, schedules and forms of acceptance.

The Project has not been developed on EPC basis. The different packages under which the plant has been built are given below:

Package-I: Civil works for Bichom Dam, River Diversion, Bichom Intake and Head Race Tunnel from R.D. 0 to 4400 M. plus minus 500 M (i.e. 1st Half of Bichom-Tenga Portion)

Package-II: Civil Works of Tenga Dam, River Diversion, Tenga Intake and Head Race Tunnel from R.D. 4400 M to 11600 M plus minus 500 M on either side (i.e. 2nd Half of Bichom-Tenga Portion & 1st Half of Tenga-Kimi Portion)

Package-III: Civil works for Head Race Tunnel RD 11600 M $\pm$ 500 M upto Surge Shaft (i.e. 2nd Half of Tenga-Kimi Portion), Surge Shaft, Pressure Tunnels, Power House and Tail Race Tunnels.

Package-IV: Hydro-Mechanical Works / Equipments

Package-V: Electro-Mechanical Equipment

Package-VI: 132 kV & 400 kV Switchyard.

Package-VII: Transformers

1 Mechanical and Electrical Completion *

** Can be a contractual milestone and also the point of transfer of care, custody and control from the (EPC) Contractor to the Owner. In some cases "substantial Completion" can be the trigger for Testing and Commissioning to begin.*

Mechanical and Electrical completion by EPC Contractor shall be on issuance of Taking Over Certificate which shall on completion of all tests and trial operation as per the Contract provision

- 1.1 Was a certificate of Mechanical and Electrical Completion issued to the Owner?

YES ☐ NO ☒ *Shall be issued only after completion of trial run and other requirement as per contract.*

- 1.2 Provide details of any significant issues with materials or equipment (e.g. major fabrication defects, material non-conformity) which could affect the mechanical

integrity of the plant and provide a summary of what has been done to rectify these issues as well as punch lists.

No significant issues has been envisaged.

2 Testing & Commissioning *

* This is normally regarded as 'hot testing' and comprises:

- Commissioning - including all dynamic and energised checking and test work such as starting up of machinery and function testing.
- Start-Up - milestone at which hydrocarbon feedstock is introduced with subsequent ramp-up to operating conditions, optimisation and troubleshooting.

2.1 Are there any significant remaining construction works taking place on the plant that could present a risk to the plant when handed over to Operations i.e. simultaneous construction and operation (SIMOPS)?

If yes, provide details below.

YES ☐ NO ☒

2.2 Provides details of the current status of Safety Critical Equipment as per the definitions below and the following table.

- Tested** - all such systems have been tested against a predefined performance standard. This should include the full loop from detection device (e.g. sensor) to final element (e.g. isolation valve). In the case of fire protection systems, this should include a full 'wet test'. In the case of mechanical relief devices, this is taken to mean the items have been bench tested and certified as per the original design specification.
- Available** - all such systems are available to the process should a demand be placed upon them i.e. no impairment/override/bypass of individual systems.
- Deviations/Impairments** - record any individual systems which do not meet the Tested and/or Available criteria as outlined above. Details of any long term impairments should be provided here.

Safety Critical Equipment	100% Tested ⁽ⁱ⁾	100% Available ⁽ⁱⁱ⁾	Deviations/Impairments ⁽ⁱⁱⁱ⁾
Safety Instrumented Functions for example: • Emergency Shut Down (ESD), Isolation & Depressurisation systems • Safety trips & interlocks • Safety critical alarms • Safety critical analysers • Machinery protection systems (overspeed, vibration etc.) • Fired heater protection systems (fuel supply low pressure etc.) • Any safety instrumentation as part of a vendor supplied package	YES ☒ NO ☐	YES ☒ NO ☐	All safety devices/instruments have been tested/ checked /being tested/checked as per standard procedure by the EPC contractor during pre-commissioning/ commissioning stage.
Mechanical Relief Devices for example: • Over Pressure Protection Devices • Vacuum Relief Devices • Thermal Relief Devices • Steam Water Chemistry	YES ☒ NO ☐	YES ☒ NO ☐	As available/installed have been checked/being checked during pre-commissioning/commissioning stage.
Mechanical Interlocks	YES ☒ NO ☐	YES ☒ NO ☐	
Emergency Power Supply for example: • Uninterruptible Power Supply (UPS) • Emergency Diesel Generator(s) • DC Supply	YES ☒ NO ☐	YES ☒ NO ☐	
Remotely Operable Emergency Isolation Valves (ROIVs)	YES ☒ NO ☐	YES ☒ NO ☐	
Fire & Gas Detection systems for example: • Smoke detection in business critical buildings • Flammable gas detection in open plant & enclosures • Flame & heat detection in open plant & enclosures	YES ☒ NO ☐	YES ☒ NO ☐	
Fire Protection systems for example: • Firewater storage, pumps & distribution • Hydrants, monitors & deluge systems • Foam & powder systems • Gaseous extinguishing systems	YES ☒ NO ☐	YES ☒ NO ☐	

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Annex-1

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- 3 Performance Testing * conforming to 100% Contract Design Criteria ** having been maintained by the entire plant in a stable and controlled manner for a continuous period of a minimum of 72 hours duration.

** Performance Testing is demonstration of plant operation at 100% Contract Design Criteria for a minimum time period.*

*** Contract Design Criteria are the plant design specifications as stipulated in the project design basis.*

Being carried out.

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- 3.1 Provide daily production data from the start of operations to date for the plant and identify the 100%/72hrs Performance Test within the data.

Performance test being carried out. There is only minor production during various tests with grid.

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- 3.2 If it is not possible to achieve the 100%/72hrs Performance Test, provide details as to the reasons why not and provide daily production data to indicate the maximum production achieved to date.

Under commissioning stage and shall achieve during trial operation.

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- 3.3 Are there any major equipment items which have not yet been subject to Performance Test but are to be attached under this endorsement?

This is not intended to cover installed spare equipment (e.g. pump A & B) but rather major equipment items which have not yet been utilised for operational duty.

If yes, provide details below.

YES ☐ NO ☐

Unit-1 & 2 is under commissioning stage and performance test as part of Contract shall be carried out by the EPC contractor after successful trial operation.

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- 4 Official acceptance by the Insured following formal hand over without reservation or waiver of guarantee conditions.

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- 4.1 Has the project been officially accepted by the Owner following formal handover as detailed in the EPC Contract without reservation or waiver of guarantee conditions?

If no, provide details below.

YES ☐ NO ☒

Presently under commissioning stage, shall be accepted only after completion of commissioning/trial operation and other requirements as per the Contract.

 

5 Any deficiencies identified during testing, commissioning and start-up that may affect the Mechanical Integrity^{5.1}, Process Safety^{5.2} or Reliability^{5.3} of the plant.

5.1 Mechanical Integrity

5.1.1 Are there any equipment faults, warranty issues, fabrication defects, temporary modifications or punch list items remaining which could potentially affect the Mechanical Integrity of the plant?

If yes, provide details below.

YES ☐ NO ☒

5.1.2 If "Yes" to 5.1.1, provide a copy of the latest status of any punch list items which could potentially affect the Mechanical Integrity of the plant.

5.2 Process Safety

5.2.1 Was a formal Pre Start-up Safety Review (PSSR) completed for the project?

YES ☒ NO ☐

Were the following items considered during the PSSR (or equivalent procedure) and their status deemed adequate by the Owner:

Status of all Process Hazard Analysis (PHA) (e.g. HAZOP) YES ☐ NO ☒
actions?

Availability of Start-Up, Shutdown & Emergency Operating Procedures? YES ☒ NO ☐

Delivery of training to Operators and Maintenance technicians? YES ☒ NO ☐

Availability of as-built (or red-line version) P&IDs to Operational staff? YES ☒ NO ☐

If no to any of the above, provide details below.

HAZOP study shall be carried out at appropriate time.

5.2.2 Is there a formal and documented Management of Change (MoC) procedure in place for the operational phase covering all permanent, temporary and emergency changes?

YES ☐ NO ☐ *Shall be documented once operation shall start*

5.2.3 Is there an operational procedure in place to manage and authorise the temporary override/bypass of Safety Instrumented Functions?

YES ☒ NO ☐

5.2.4 Is there an operational procedure in place to manage and authorise the temporary

impairment of fire protection systems and any other Safety Critical Equipment?

YES ☒ NO ☐

- 5.2.5 Is the Operations organisation fully staffed versus the agreed headcount? Is additional management and technical resource available during start-up? Are overtime hours being monitored and controlled?

If no to any of the above, provide details below.

YES ☒ NO ☐

- 5.2.6 Is the Emergency Response Team (ERT) fully staffed, equipped and trained? Is the ERT aware of current plant status and any special procedures necessary? Is free and uninhibited access to the plant possible?

If no to any of the above, provide details below.

YES ☒ NO ☐

5.3 Reliability

- 5.3.1 Are there any current known process or equipment (Mechanical, Electrical and Instrumentation) issues affecting the reliability of plant operation?

If yes, provide details below.

YES ☐ NO ☒

- 5.3.2 Are major spares readily available for long delivery equipment items without an onsite spares holding which if they failed, could result in a significant Business Interruption impact. Examples include compressor or turbine shafts, compressor and turbine hardware (blades and vanes) combustion turbine hot section components large electric motors and large transformers.

If no, provide details below.

YES ☒ NO ☐

RM *[Signature]*

KAMENG HEP (4 X 150 MW), NEEPCO

ITEMWISE BREAKUP OF PRICES OF MANDATORY SPARES

Sl.	Description	Qty.
I.	SPARES FOR TURBINE AND MAIN INLET VALVE (MIV)	
A.	Turbine	
1)	Runner	1 No.
2)	Labyrinth rings.	1 set.
3)	Guide Vanes	1 set (5 Nos.)
4)	Shaft Seal rings wearing element.	1 set.
5)	Guide Bearing pads with babbit metal.	1 set.
6)	Guide Apparatus	
	a) Bushes for top and bottom of guide vanes.	1 set.
	b) Guide vane spindle seals (upper & lower)	1 set.
	c) Shear pins.	1 set.
	d) Bushes for turning mechanism	1 set.
	e) Servomotor piston rings, bushes and sealing elements.	1 set.
7)	Limit switches for mounting on shear pin contacts.	1 set.
8)	All seals (Cup Seal, rubber cords, O-rings, gaskets etc.).	1 set.
9)	Electro magnet pressure gauges.	1 of each type
10)	Control temperature indications (DTI)	1 No.
11)	Turbine head cover water level detector. (Included in Governor spares)	1 set.
12)	Thermal Resistance Transmitters (RTD)	1 No.
	TOTAL - TURBINE SPARES	
B.	MAIN INLET VALVE	
1)	Main seal rings (without hard coating)	1 set.
2)	Servomotor piston rings.	1 set.
3)	Piston rings for hydraulic drive of by pass valve.	1 set.
4)	Pressure gauge.	1 of each type.
5)	O-rings, cup sealings.	1 complete set.
	TOTAL - MIV SPARES	
	TOTAL - SPARES FOR TURBINE & MIV	



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Sl.	Description	Qty.
II.	SPARES FOR STATION AUXILIARIES	
A.	HP COMPRESSED AIR SYSTEM	
1)	Piston	
2)	Piston rings	
3)	Cylindrical valves.	
4)	Bearings.	
5)	Gudgeon pin.	
6)	Springs.	
7)	Packing, sealing & gaskets etc.	
B.	SPARES FOR UNIT AND STATION DRAINAGE AND DEWATERING SYSTEM	
a.	UNIT DEWATERING SYSTEM	
	- Pump impellers	1 set
	- Pump bearings	1 set
	- Pump suction sealing rings	1 set
	- Pump motor, bearing	1 set
	- Instruments (Pressure gauge)	1 No of each type
	- Strainer (Foot strainer)	1 No.
	- Stuffing box	1 No.
b.	STATION DRAINAGE SYSTEM	
	- Pump impellers	1 set
	- Pump bearings	1 set
	- Pump suction sealing rings	1 set
	- Pump motor, bearing	1 set
	- Instruments (Pressure gauge)	1 No. of each type
	- Strainer (Foot strainer)	1 No.
	- Stuffing box	1 No.
C.	Cooling Water System	
	- Plate for heat exchangers	10 Nos.
	- Plate sealing for heat exchangers	20 Nos.
	- Baskets for secondary circuit water strainer	02 Nos.
	TOTAL - STATION AUXILIARIES	



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Sl.	Description	Qty.
III.	SPARES FOR GOVERNING SYSTEM AND INSTRUMENTS	
a.	Turbine	
1	Speed detector	1 No
2	Turbine head cover water level detector	1 set
	Total of turbine	
b.	PRESSURE OIL SYSTEM AND AUTOMATIC CONTROLS FOR GOVERNOR AND MIV	
1	Pressure oil pump-motor set	1 No.
2	Bearings	1 Set
3	Unloader valve	1 No.
4	Safety relief valve	1 No.
5	Oil filter/breather	1 No.
6	Level relays for O.P.U.	1 No.
7	Glass pipe for the sight gauge	2 Nos.
8	Pressure relay	1 No.
11	Pressure gauge for each type	1 No.
12	Non return valve	1 No.
13	Oil filter cartridges	1 Set
	Total	
c.	GOVERNORS	
1	Hydraulic amplifier	1 No.
2	Transducer (combined with Sl. No. 1 above)	1 No.
3	Pilot valve (bushing) sleeve	1 No.
4	Pilot valve (plunger) needle (combined with Sl. No. 3 above)	1 No.
5	Transducer Coil (N.A.)	1 No.
6	Filtering element	1 Set
7	Membrane for the hydraulic amplifier	1 No.
8	Rubber rings	1 Set
9	Pressure gauge	1 No.
10	Tachometer electric	1 No.
11	Potentiometer	1 No.
12	Micro switch	1 Set
13	Zero reader (N.A.)	1 Pc.
	Total of governor items	
d.	DEWATERING SYSTEM	
	Instruments (level electrodes pressure gauges)	1 No. of each



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Sl.	Description	Qty.
e.	STATION DRAINAGE SYSTEM	
1	Instruments (level electrodes pressure gauges)	1 No. of
	TOTAL - SPARES FOR GOVERNING SYSTEM AND INSTRUMENTS	
IV.	SPARES FOR GENERATOR, GEN. COOLERS AND STATIC EXCITATION EQUIPMENT	
a.	Generator spares	
1	Stator bars (VPI) with slot wedges and caps	1/3rd set
2	Pole with field coil assy	2 Nos
3	Thrust bearing pads	1 set
4	Upper guide bearing pad	1 set
5	Carbon brushes (HM-6)	6 sets
6	Brush holders	1 set
7	Lower guide bearing pad	1 set
8	Brake pads	2 sets
9	RTDs duplex type	6 Nos
10	DTTs	4 Nos
11	Thermostat (CO2)	2 Nos
12	Smoke detectors	2 NOs
13	Gaskets for brake cylinder	10 sets
14	Gaskets/ Washers for air cooler	20 sets
15	Oil level switch, pressure switch, pressure	1 set
	Total for Gen spares	
b.	SPARES FOR GEN. COOLERS	
1	6 X 38 frame Air cooler	2 Nos
2	8 X 16 frame plt oil cooler	1 No
3	3 X 10 frame plt oil cooler	1 No
	Total - spares for gen. coolers	
c.	SPARES FOR STATIC EXCITATION EQUIPMENT	
1	Electronic modules, one no. of each type used in one set of SEE	1 Set
2	Pulse transformer	1 Set
3	Excitation Transformer	1 Set
4	Fuses	1 Set
5	Thyristor electronic module	1 Set
6	Field winding and field circuit breaker	1 Set
7	Block diagram of SEE	1 Set



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Sl.	Description	Qty.
IX	SPARES FOR PROTECTION SYSTEM	
1.	SIEMENS/make generator protection relay	1 No.
2.	SEL421/eq distance relay	1 No.
3.	OHMEGA/ eq distance relay	1 No.
4.	DOUBIASM/EQ Transformer protection relay	1 No.
5.	5B3x3/ eq high impedance relay	1 No.
6.	ARGU2/eq make dir. 3ø/c+1E/F relay	1 No.
7.	2DABT/eq make LBB relay	1 No.
8.	MART/eq make auto reclose relay	1 No.
9.	ARGUS7/eq make CS/DLC	1 No.
10.	UNDERFREQUENCY RELAY	1 No.
11.	ARGUS1/ eq make REF	1 No.
12.	ARGUS1/ eq make NON DIR THREE PHASE O/C and E/F relay	1 No.
13.	XR351/eq make trip circuit sup. Relay	1 No.
14.	TR 221/ eq make tripping relay	1 No.
15.	Over fluxing relay	1 No.
16.	AR121T/AR101/ eq DC supervision relay	1 No.
17.	B33x5/ eq auxiliary relay	1 No.
18.	AR111 x 2/ eq make aux. relay	1 No.
19.	ARGUS8/ eq make over voltage relay	1 No.
	TOTAL - SPARES FOR PROTECTION SYSTEM	
X	SPARES FOR UNIT AND STATION CONTROL AND MONITORING SYSTEM	
1	Process computer (including computers interfaces etc. technical specifications as given for unit computers)	One No. CPU
2	DC/DC Converter	One of each type
3	Indicating instruments used in control boards	One of each type
4	Control switches, selector, push buttons, indicating lamps, position indicators used in control boards	Two of each type



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Sl.	Description	Qty.
IX	SPARES FOR PROTECTION SYSTEM	
1.	SIEMENS/make generator protection relay	1 No.
2.	SEL421/eq distance relay	1 No.
3.	OHMEGA/ eq distance relay	1 No.
4.	DOUBIASM/EQ Transformer protection relay	1 No.
5.	5B3x3/ eq high impedance relay	1 No.
6.	ARGU2/eq make dir. 3o/c+1E/F relay	1 No.
7.	2DABT/eq make LBB relay	1 No.
8.	MART/eq make auto reclose relay	1 No.
9.	ARGUS7/eq make CS/DLC	1 No.
10.	UNDERFREQUENCY RELAY	1 No.
11.	ARGUS1/ eq make REF	1 No.
12.	ARGUS1/ eq make NON DIR THREE PHASE O/C and E/F relay	1 No.
13.	XR351/eq make trip circuit sup. Relay	1 No.
14.	TR 221/ eq make tripping relay	1 No.
15.	Over fluxing relay	1 No.
16.	AR121T/AR101/ eq DC supervision relay	1 No.
17.	B33x5/ eq auxiliary relay	1 No.
18.	AR111 x 2/ eq make aux. relay	1 No.
19.	ARGUS8/ eq make over voltage relay	1 No.
	TOTAL - SPARES FOR PROTECTION SYSTEM	
X	SPARES FOR UNIT AND STATION CONTROL AND MONITORING SYSTEM	
1	Process computer (including computers interfaces etc. technical specifications as given for unit computers)	One No. CPU
2	DC/DC Converter	One of each type
3	Indicating instruments used in control boards	One of each type
4	Control switches, selector push buttons indicating lamps, potentiometers, etc. used in control boards	Two of each type



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Sl.	Description	Qty.
5	Bulbs for indicating lamps	20% of each type
6	Heating resistors for thermostat for cubicle heat	One
7	Operator keyboard	One
8	Printer	One
9	Hard copy unit	One
10	V. D. U.	One
11	Trackball / Mouse	One
12	Digital clock for indicating the year, month, day, hour, minutes, second	One
13	Electrical transducers used in control boards	one (1) pair of each kind
14	Plug-in-type connection accessories	one (1) pair of each kind
15	Fiber optic interface module	5 pcs.
16	Miscellaneous (cables, plugs, etc) (Consisting of Ethernet cable One (1) No. of each type)	1 Set
17	Digital / Analog input / output cards	Three (3) Nos. of each
18	Electronic rack fan unit	2 Pcs.
19	Field bus interface board (Ethernet Switches)	2 Nos.
20	MCB of each type	3 Pcs.
21	Fuses of each type	10 Pcs.
22	Spares for synchronising system (Double frequency meter, double voltmeter, synchroscope, check synchronizing relay)	1 Set consisting of one (1) No. of each type
23	Terminals of each type (TBS)	100 Nos.
TOTAL SPARES FOR UNIT & STATION CONTROL AND MONITORING SYSTEM		



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Sl.	Description	Qty.
XI	SPARES FOR EMERGENCY POWER SUPPLY (DG SET)	
1.	Shaft bearing set	1 No
2.	Gland packing and gasket	1 Each
3.	Crack pin bolt & assembly	1 No
4.	Mechanical Seals	2 Sets
5.	Oil seals	2 Sets
6.	Line ring	1 Set
7.	Filter element	1 Each
8.	Ignition set	2 Nos
9.	Piston ring and oil ring	1 Lot
10.	Valves (air inlet and exhaust)	1 Set for each valve
11.	Piston pins	1 Lot
12.	Heater (air, water)	1 each type
13.	Space heater for alternator	1 No
14.	Realy and base	1 No of each type
15.	Indicating lamps	5 Nos
16.	Annunciation Facias	5 Nos
17.	Bulbs for indicating lamps	10 Nos
18.	Bulbs for Annunciation Facias	10 Nos
19.	Emergency stop push button	10 Nos
20.	Ammeter	1 No
21.	Voltmeter	1 No
	TOTAL - SPARES FOR DG SET	
	TOTAL - MANDATORY SPARES	



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Spares list for BF Valve under Package-V

Sl.No.	Description of Item	Qty.
I.	Initial Spares for BF Valve	
1	Service seal	1 No.
2	Maintenance seal	1 No.
3	Fixing screw for item 1&2	1 Set
4	Piston ring for servomotor & by-pass valve	1 Set
5	Bearing bushes for BFV & servomotor	1 Set
6	Sealing, gasket, O-rings packings, rubber cup seals, ring chord etc.	1 Set
7	Drain valve	1 No.
II.	Mandatory spares for Gov. items BFV OPU	
1	Pressure oil pump motor for BFV (spare), BBU No.2.4 A(i)	1 Set
2	Unloder Valve BFV (Spare), 2.4A(ii)	1 No.
3	Safety Relief Valve BFV(Spare) 2.4A(iii)	1 No.
4	Oil filter element-3no. BFV(Spare) 2.4A(iiv)	3 Nos.
5	Pressure Gauges, VH Item 2.4A(v)	2 No.
6	Solenoid Valve BFV (Spare) 2.4A(vi)	1 Set
7	Pressure Switch BFV (Spare) 2.4A(vii)	1 Set
8	Differential Pressure Switch for BF Valve (Spare) 2.4B(i)	1 No.
9	Limit Switchs , VH Item 2.4B(ii)	3 Nos.
10	Pressure Gauges of each type/range, VH Item 2.4B(iii)	1 Set
III.	Mandatory spares for EOT Cranes	
1	Truck Wheels	4 Nos.
2	Trolley wheels	2 Nos
3	Long Travel Motor	2 Sets
4	Cross Traverse Motor	1 Set
5	Main hoist Motor	1 Set
6	Auxiliary hoist Motor	1 Set
7	Rope Drums	1 Set
8	Pulleys for main hoist	1 Set
IV.	Brake coil for E.M for:	
1	Long Travel Motor	1 Set
2	Cross Traverse Motor	1 Set
3	Main hoist Motor	1 Set
4	Auxiliary hoist	1 Set
V.	Brake lining with rivets for E.M Brakes:	
1	Long Travel Motor (2 Sets)	1 Set
2	Cross Traverse Motor (2 Sets)	1 Set
3	Main hoist Motor (2 Sets)	1 Set
4	Auxiliary hoist	1 Set
VI.	Brake Spring for E.M Brakes for:	
1	Long Travel Motor	1 Set
2	Cross Traverse Motor	1 Set
3	Main hoist Motor	1 Set
4	Auxiliary hoist	1 Set
VII.	Brake lining with rivets for thruster operated brakes for:	
1	Main hoist Motor	1 set
2	Auxiliary hoist	1 set
VIII.	Brake lining with rivets for Foot operated hydraulic brake for:	
1	Long Travel Motor	1 Set

Mandatory Spares for 400kV & 132kV Switchyard of Kameng HEP under Package-VI

Sl. No	Description of Item	Unit	Qty
I.	SHUNT REACTOR		
1	Mandatory Spares for Shunt Reactor		
	a) 420 kV, 800A bushing with metal parts & gaskets.	Nos	1
	b) 145 kV, 800A bushing with metal parts & gaskets.	Nos	1
	c) Local & Remote WTI complete with sensing device & contacts.	Set	1
	d) OTI complete with sensing device & contacts.	Nos	1
	e) Magnetic Oil level gauge.	Nos	1
	f) Pressure relief device.	Nos	1
	g) Sets of gaskets (complete replacement for one reactor).	Set	1
	h) Buchholz relay complete with float & contacts.	Nos	1
	i) Flexible Air Cell.	Nos	1
	j) Terminal connectors (complete set for one reactor).	Set	1
	k) Bushing CTs of each ratios and characteristic.	Set	1
	l) Breather Assembly.	Nos	1
	m) Expansion Joint.	Nos	1
	n) Set of valves.	Nos	1
	o) Gas Collecting bottles.	Nos	1
	p) Oil Level Gauge.	Nos	1
II.	400kV SWITCHYARD		
1	List of Mandatory Spares for 420 kV, 3150 Amps Single 3(three) pole SF6 Circuit Breakers		
	i) One pole of CB complete with support structure and operating mechanism box etc.	Nos	3
	ii) Relay, power contactors and switch fuses for electrical control circuit (consisting of one no. each of all types.	Set	2
	iii) Sets of gaskets, rings and seals.	Set	3
	iv) Molecular filter for Circuit Breaker.	Set	3
	v) Insulating nozzle.	Set	3
	vi) Support Insulator Stack.	Set	3
	vii) Tripping and closing coil.	Nos	16
	viii) Density monitoring system for circuit breaker.	Set	1
	ix) Coupling device for pressure gauge cum switch/for connecting gas handling plant.	Set	1
	x) Spring charging motors	Nos	2
	xi) Terminal connectors.	Nos	8
2	List of mandatory spares for 420 kV, 3150 Amp, triple pole Horizontal Centre Break isolators with 2 (two) earthing switch		
	i) One complete pole of HCB isolator with 2 earth switch along with operating mechanism etc.	Nos	3
	ii) Copper/aluminium contact fingers for female contact.	Set	3
	iii) Relays, power contactor, switch fuses for electrical control circuit (one no. Of each type and rating).	Set	3
	iv) Support insulator stack for one pole of isolator.	Set	3
	v) Rotary bearing of isolator.	Set	3
	vi) Limit switch and auxiliary switch.	Set	6

	vii) Terminal connectors	Set	8
3	List of mandatory spares for 420 kV, 3150 Amp, triple pole Pantograph isolator (individually pole operated) without earth switch		
	i) One complete pole of Pantograph isolator including support insulator without earth switch with MOM, scissor arm and contact.	Nos	2
	ii) Suspension contact with accessories complete for one isolator.	Nos	2
	iii) Scissor contacts (for one complete isolator).	Set	2
	iv) Relays, power contactors, MCBs, switch fuses, push buttons and resistors for electrical control circuit as per approved schematic (1 no of each type).	Set	2
4	List of mandatory spares for 420 kV, 3150 Amp, triple pole Pantograph isolator (individually pole operated) with 1(one) earthing switch		
	i) One complete pole of Pantograph isolator including support insulator without earth switch with MOM, scissor arm and contact.	Nos	1
	ii) Suspension contact with accessories complete for one isolator.	Nos	1
	iii) Scissor contacts (for one complete isolator).	Set	1
	iv) Relays, power contactors, MCBs, switch fuses, push buttons and resistors for electrical control circuit as per approved schematic (1 no of each type).	Set	1
5	List of mandatory spares for 400 kV, 3150 Amp, triple pole Pantograph isolator (individually pole operated) with 2(two) earthing switch		
	i) One complete pole of Pantograph isolator including support insulator without earth switch with MOM, scissor arm and contact.	Nos	1
	ii) Suspension contact with accessories complete for one isolator.	Nos	1
	iii) Scissor contacts (for one complete isolator).	Set	1
	iv) Relays, power contactors, MCBs, switch fuses, push buttons and resistors for electrical control circuit as per approved schematic (1 no of each type).	Set	1
6	Mandatory Spares for 400 kV single phase current transformer		
	i) Terminal connector for above current transformer	Nos	1
	ii) Terminal block	Nos	1
7	Mandatory Spares for 400 kV single phase Capacitive Voltage Transformer		
	i) Terminal connector for above CVT.	Nos	4
8	Mandatory Spares for 10kA, 390kV, station type, heavy duty single phase surge arresters		
	i) Surge Counter Monitor	Nos	3
	ii) terminal connector for surge arrester	Nos	6
9	420kV Bus solid core type Post insulator	Nos	25
10	ACSR Moose Conductor	Mtrs	500
III.	132 kV SWITCHYARD		
1	Mandatory Spares for 132kV 1600 amp SF6 triple pole circuit breaker		

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	i) One pole of CB complete with support structure and operating mechanism box etc.	Nos	1
	ii) Relay, power contactors and switch fuses for electrical control circuit (consisting of one no. each of all types.	Set	1
	iii) Sets of gaskets, rings and seals.	Set	3
	iv) Molecular filter for Circuit Breaker.	Set	3
	v) Insulating nozzle.	Set	3
	vi) Support Insulator Stack.	Set	3
	vii) Tripping and closing coil.	Nos	4
	viii) Density monitoring system for circuit breaker.	Set	2
	ix) Spring charging motors.	Nos	2
	x) Set of valve for pneumatically operated circuit breaker.	Set	2
	xi) pressure switch set for pneumatically operated circuit breaker.	Nos	2
	xii) Terminal connectors.	Nos	4
2	Mandatory Spares 132 kV, 1600 Amp, triple pole Horizontal Centre Break isolators without earth switch		
	i) Copper/aluminium contact fingers for female contact.	Set	2
	ii) Relay, power contactors and switch fuses for electrical control circuit (consisting of one no. each type and rating.	Set	1
	iii) Support insulator stack for one pole of isolator.	Set	1
	iv) Rotary bearing of isolator.	Set	1
	v) Limit switch and auxiliary switch.	Set	3
	vi) Terminal Connectors.	Nos	2
3	Mandatory Spares for 132 kV, 1600 Amp, triple pole Horizontal Centre Break isolators with 1(one) earth switch		
	i) Copper/aluminium contact fingers for female contact.	Set	2
	ii) Relay, power contactors and switch fuses for electrical control circuit (consisting of one no. each type and rating).	Set	1
	iii) Support insulator stack for one pole of isolator.	Set	1
	iv) Rotary bearing of isolator.	Set	1
	v) Limit switch and auxiliary switch.	Set	2
	vi) Terminal Connectors.	Nos	2
4	List of Mandatory Spares for 132 kV, 5-core single phase outdoor type Current Transformer		
	i) Terminal connector for the above.	Nos	6
5	Mandatory Spares for 132 kV, single phase Electro-magnetic type transformers		
	i) Terminal connector for the above VT.	Nos	3
6	Mandatory Spares for 132 kV, single phase CVT		
	i) Terminal connector for the above CVT.	Nos	1
7	Mandatory Spares 10kA, 120kV, station type, heavy duty single phase surge arrester		
	i) Terminal connector for the above LA.	Nos	3
8	a) Bay Marshalling Box	Nos	4
9	145 kV Bus post Insulator.	Nos	3
10	ACSR Zebra Conductor.	Mtrs	200
IV.	COMMON ITEM		
1	Mandatory Spares for illumination systems for 132 & 400 kV switchyards and switchyard room		

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	i) Metal Halide / HPSV		
	a) Lamp	Nos	1
	b) Ballast	Nos	1
	c) Condenser / Igniter	Nos	1
	d) lamp holder	Nos	1
	e) Covers & reflectors	Nos	1
	f) Complete fittings	Nos	5
2	7/3.66 mm G.S. Stranded conductor.	Mtrs	300
3	4 ^{1/2} " IPS (EH) Aluminium tube for 400 kV Bus Bar complete with bus post clamp, (through/expansion type), corona spheroids, welding sleeve including testing etc.	Mtrs	600

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Mandatory Spares for Transformers under Package-VII

Sl. No.	Description of item	Unit	Qty
I	Spares for 13.8/420kV 63MVA 1-ph Generation Transformer		
1	Gasket for all openings	Set	2
2	420kV, HV Bushing	No	1
3	24 kV LV Bushings	No	1
4	36 kV Neutral Bushings	No	1
5	Oil & Winding Temperature indicator	No	2
6	Magnetic Oil level gauge	No	2
7	pressure relief device	No	1
8	Oil pump with Motor and Starter	No	2
9	Oil Flow Indicator	No	2
10	Silica gel Breather	No	1
II	Spares for 400/132/33kV 40MVA 1-ph AutoTransformer		
1	Gasket for all openings	Set	2
2	420kV, HV Bushing	No	1
3	145 kV, MV Bushing	No	1
4	52 kV LV Bushings	No	1
5	36 kV Neutral Bushings	No	1
6	Oil & Winding Temperature indicator	No	2
7	Magnetic Oil level gauge	No	2
8	pressure relief device	No	1
9	Oil pump with Motor and Starter	No	2
10	Oil Flow Indicator	No	2
11	Silica gel Breather		1
III	Spares for 132/33kV 3.15MVA 1-ph Power Transformer		
1	Gasket for all openings	Set	2
2	Bushings	No	1
3	Winding Temperature Indicator	No	2
4	Magnetic Oil level gauge	No	2
5	Pressure relief device	No	1
6	Oil pump with Motor & Starter	No	0
7	Oil Flow Indicator	No	0
8	Silica gel Breather	No	1
IV	Spares for 33/0.433kV 2500kVA 3-ph Dry Type Transformer		
1	Winding Temperature indicator Scanner	No	2
2	HV Bushing Epoxy	No	1
3	LV Bushing Bus bar support insulation	No	1
V	Special Tools & Equipment		
1	Set of Tools and Spanners	No	2

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	2	Set of Hydraulic Jacks	No	2
	3	Slings and Lifting Devices	No	2
VI		Transformer Conditioning Monitoring Equipment		
	1	On-line DGA equipment	No	1
	2	Optical fibre based temperature Monitoring System (Core Winding)	No	1



Spares for 750 kVA 2nd Emergency DG Set _KaHEP

Sl. No.	Item Description	Unit	Qty.
1	Shaft Bearing Set	No.	1
2	Main Bearing	No.	1
3	Gland Packing & Gasket Inner	Set	1
4	Crank Pin Bolt Assembly	No.	1
5	Meachanical Seals	Set	2
6	Oil Seals	Set	2
7	Liner Ring	Set	1
8	Filter Element (Each Type)	Set	1
9	Ignition Set	No.	2
10	Piston Ring	Lot	1
11	Oil Ring	Lot	1
12	Air Inlet Valve	Set	1
13	Exhaust Valve	Set	1
14	Piston Pin	Set	1
15	Heater (Air + Water) Set	Set	1
16	Space Heater for Alternator	No.	1
17	Relay and Base	Each	1
18	Indicating Bulb	Nos.	5
19	Annunciation Facia	Nos.	5
20	Bulb for Annunciation Facia	Nos.	10
21	Emergency Push Button	Nos.	10
22	Ammeter	No.	1
23	Voltmeter	No.	1

Additional Spares for Drainage & Dewatering Pumps of Power House KaHEP

Sl. No.	Description of Equipment	Unit	Qty.
1	Impeller	Nos.	1
2	Mechanical seal set	Set	4
3	Bearing Set	Set	4
4	O-Ring Set	Set	4
5	Bottom (Setting) Plate	Nos.	4

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Fire-Fighting System at Kameng HE Project

Sl. No.	Description	Location	Total Qty.	Unit
1	FIRE FIGHTING SYSTEM AT POWER HOUSE AREA			
	FILLING PUMP -KIRLOSKAR BROTHERS LTD.,DSM 150/46,1490 RPM,180 m3/hr,130 M,125 KW	EL.222.5M	2	nos.
	FILLING PIPE LINE -150NB	EL.222.5 M to 243.5 M	285	metre
	Y - strainer - 200 NB	EL 222.5M	2	nos.
	Basket Strainer - 150 NB	EL 222.5M	2	nos.
	C.I. Gate Valve - 200 NB	EL 243.5 M	2	nos.
	C.I. Gate Valve - 150 NB	EL 222.5M	6	nos.
	Hydrant Pipeline - 150 NB	EL 236.7 TO M	460	metre
	Hydrant Pipeline - 100 NB	EL. 243.5 M to 232 M	55	metre
	Spray Pipeline - 100 NB	243.5M	70	metre
	Spray Pipeline - 150 NB	EL.236 M to 300 M	155	metre
	Spray Pipeline - 200 NB	243.5M	145	metre
	Pylon Support for GT/AT	243.5M	15	nos.
	Double Headed Hydrant Valve	243.5M	3	nos.
	Internal Hydrant Valve	236.7M	3	nos.
	Internal Hydrant Valve	232.0M	3	nos.
	Internal Hydrant Valve	228.0M	3	nos.
	Deluge Valve (Wet Pilot) 100 NB	243.5M	15	nos.
	Deluge Valve (Wet Pilot) 80 NB	236.7M	3	nos.
	Deluge Valve Control Panel	236.7M	3	nos.
	Filling pump control panel	232.0M	1	no.
2	FIRE FIGHTING SYSTEM AT SWITCH YARD AREA			
	HYDRANT BOOSTER PUMP -KIRLOSKAR BROTHERS LTD.,CPHM 125/45,1480 RPM,96 m3/hr,70 M,45 KW	EL.292.00M	1	no.
	SPRAY BOOSTER PUMP-KIRLOSKAR BROTHERS LTD.,CPHM 125/45,1450 RPM,108 m3/hr, 60M,37 KW	EL.292.00M	1	no.
	JOCKEY PUMP - CROMPTON GREAVES LTD., NG132S, 2910 RPM,PF 0.89	EL.292.00M	1	no.
	Hydrant Pipeline - 150 NB	EL 292.3 M	596	metre
	Hydrant Pipeline - 100 NB	EL 292.3 M	940	metre
	Hydrant Pipeline - 80 NB	EL 292.3 M	23	metre
	Gate Valve - 150 NB	EL 292.3 M	3	nos.
	Gate Valve - 100 NB	EL 292.3 M	5	nos.
	Spray pipeline 150 NB	EL 292.3 M	360	metre
	Spray pipeline 100 NB	EL 292.3 M	40	metre
	Gate Valve - 100 NB	EL 292.3 M	8	nos.
	Y - strainer - 100 NB	EL 292.3 M	4	nos.
	Deluge Valve (Wet Pilot) 100 NB	EL 292.3 M	4	nos.
	Double Headed Hydrant Point	EL.292.3 M	21	nos.
	Booster Pump Control Panel	EL.292.3 M	1	no.
3	Between Power House and Fire Fighting Water Storage Tank			
	Filling Pipeline-150NB	EL 243.5M to 305M	445	metre
	Spray Pipeline - 200 NB	EL 243.5M to 305M	445	metre
	Hydrant Pipeline - 150 NB	EL 243.5M to 305M	445	metre