**Maharashtra State Electricity Transmission Company Limited**

**(State Transmission Utility)**

**Agreement for Connection to the intra state transmission system**

**CONNECTION AGREEMENT**

**For the use of Intra-State Transmission System (InSTS) in Maharashtra State**

**Between**

**M/s. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**(Generation Company /Consumer and/or Others Permitted by State Commission)**

**(Transmission System User)**

**And**

**Maharashtra State Electricity Transmission Company Limited**

**(Transmission Licensee)**

**CONNECTION AGREEMENT**

This Connection Agreement (the “Agreement”) is made on the \_\_\_\_\_ day of \_\_\_\_\_\_\_\_ by and between:

***Company-A: M/s. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*** *is a*company incorporated under the companies Act, 1956 having its registered office at \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ and

***Company-B: M/s. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*** *is a*company incorporated under the companies Act, 1956 having its registered office at \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ and

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***Company-Z: M/s. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*** *is a* company incorporated under the companies Act, 1956 having its registered office at \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ and

*(Hereinafter collectively referred to as Applicant/s and individually referred to as Company-A, B,……….Z respectively which expression shall unless repugnant to the context or meaning thereof include its successors and assignees as party of the second, third, fourth, \_ \_ \_ \_ \_ \_ \_ \_ \_ \_ and \_ \_ \_ \_ \_ \_ \_ \_ respectively).*

**And**

Maharashtra State Transmission Electricity Transmission Company Limited (MSETCL) *Transmission Licensee*, a company incorporated under the Companies Act, 1956, having its registered office at ‘Prakashganga’, Plot No. C-19, E-Block, Bandra Kurla Complex, Bandra (East), Mumbai – 400 051 *(hereinafter called “****MSETCL”*** *which expression shall unless repugnant to the context or meaning thereof include its successors and assignees);*

WHEREAS

1. MSETCL is a Transmission Licensee under Section 14 of the Electricity Act, 2003 and owns, operates & maintains Intra- State Transmission System in the State of Maharashtra.
2. Maharashtra Electricity Regulatory Commission (hereinafter referred to as “MERC”) has specified the Maharashtra Electricity Grid Code (MEGC) 2020 which inter-alia lays-down the minimum technical and design criteria to be complied with by MSETCL and ***M/s. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*** connected to/or seeking connection to the Intra-State Transmission System.
3. The Applicant/s has applied to the STU for connection of the \_\_\_MW\_\_\_\_\_\_\_\_\_\_\_Power Project proposed at Site: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_[***mention generating station including a captive generating plant as appropriate****]* facility to the STU’s Transmission System and use of the STU’s Transmission System to transmit electricity to and/or from the facility through the Intra -State Transmission System.
4. The STU has agreed to the connection of \_\_\_MW\_\_\_\_\_\_\_\_\_\_\_Power Project proposed at Site: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_[***mention generating station including a captive generating plant as appropriate****] f*acility to the STU’s Transmission and Communication System (via the Applicant/s’s Site-Related Connection Equipment) at the Connection Point i. e. \_\_\_kV level of \_\_\_\_\_\_\_kV Substation or making LILO on \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ [***mention details of the connection point, the name of substation, name of line which is to be made LILO, etc…..]*** using the Transmission and Communication System of the STU or Intra-state transmission licensee other than the STU, as the case may be, to transmit electricity as well as real time data to and or from the Facility through the STU’s Transmission and Communication System.
5. As per Connection Conditions specified in the Maharashtra Electricity Grid Code (MEGC) 2020, this Agreement is hereby entered into between MSETCL and ***M/s. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (One by one details of Companies from A-Z)*** for seeking connection of \_\_\_MW\_\_\_\_\_\_\_\_\_\_\_Power Project proposed at Site: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ at \_\_\_kV level of \_\_\_\_\_\_\_kV Substation or making LILO on \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
6. MSETCL and ***M/s. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_***are hereinafter individually referred to as “party” and collectively referred to as “parties”.
7. Further, a signed copy of the agreement along with all the Annexures, and amendments when ever made, shall be submitted to SLDC & STU.

Now, therefore, in consideration of the premises and mutual agreements, covenants and conditions set forth herein, it is hereby agreed by and between the parties as follows:-

**Definitions and Interpretation**

In this agreement unless the context otherwise requires the definitions of terms used shall be as follows:

1. **‘Act’** means the Electricity Act, 2003(No 36 of 2003) including amendments thereto;
2. **‘Apparatus’** means all equipment in which electrical conductors are used, supported or of which they form a part;
3. **‘Appropriate Transmission Utility’** means the Central Transmission Utility or State Transmission Utility as the case may be.
4. **‘Automatic Voltage Regulator (AVR)’** means a continuously acting automatic excitation control system to control the voltage of a Generating Unit as measured at the generator terminals;
5. **‘British Standards’ (BS)** means those standards and specifications approved by the British Standards Institution.
6. “**CEA/Authority**” means the Central Electricity Authority (CEA) as specified in the EA,2003;
7. **‘Commission’** means the Maharashtra Electricity Regulatory Commission;
8. **‘Connection Agreement’** means an agreement setting out the terms relating to connection to and/or use of the intra-State transmission system;
9. **“Connection Point”** means a point at which a plant and/or apparatus connects to the Transmission/Distribution System;
10. **‘Earth Fault Factor’** at a location in a three phase system means the ratio of ‘the highest root mean square (r.m.s) phase-to-earth power frequency voltage on a sound phase during fault to earth (affecting one or more phases)’ to ‘the r.m.s phase-to-earth power frequency voltage which would be obtained at the selected location without the fault.
11. **“Event Logging Facilities”** means a device provided to record the chronological sequence of operations of the relays and other equipment;
12. ‘Electrical Plant’ means any plant, equipment, apparatus or appliance or any part thereof used for, or connected with, the generation, transmission, distribution or supply of electricity but does not include:
13. an electric line; or
14. a meter used for ascertaining the quantity of electricity supplied to any premises; or
15. an electrical equipment, apparatus or appliance under the control of a consumer;
16. **“Force Majeure”** means any event which is beyond the control of the persons involved which they could not foresee or with a reasonable amount of diligence which could not be foreseen or which could not be prevented, and which substantially affect the performance by either person such as but not limited to:-
	* + 1. Acts of God, natural phenomena, including but not limited to floods, droughts, earthquakes and epidemics;
			2. Acts of any Government domestic or foreign, including but not limited to the war declared or undeclared, hostilities, priorities, quarantines, embargoes;
			3. Riot or Civil Commotion;
			4. Grid’s failure not attributable to persons involved;
17. **‘Frequency’** means the number of alternating cycles per second (expressed in Hz).
18. **‘Generating Unit’** means an Electrical Generator coupled to a prime move within a Power Station together with all Plants and Apparatus at that Power Station (up to the Connection point) which relates exclusively to the operation of that generator.
19. **‘IEC Standard’** means standard approved by the International Electro technical Commission
20. **‘Isolator’** means a device for achieving isolation of one part of an electrical from the rest of the system.
21. **‘Intra-State Transmission System’ (InSTS)** means any system for conveyance of electricity by transmission lines within the area of the State and includes all transmission lines, substations and associated equipment of transmission licensees in the State;
22. **“Maximum Continuous Rating (MCR)”** means the maximum continuous output in MW at generator terminal guaranteed by the manufacturer at rated parameters;
23. **‘Power Factor’** means the cosine of the electrical angle between the voltage and current complexors in an AC electrical circuit.
24. **‘Protection system’** means the equipment by which abnormal conditions in the grid are detected and fault clearance, actuating signals or indications are initiated without the intervention by the operator;
25. **‘Reactive Power’** means in relation to an AC electrical system, the product of root mean square (r.m.s) voltage, root means square (r.m.s) current and the sine of the electrical phase angle between the voltage complexor and current complexor, measured in volt-amperes reactive (VAr).
26. ‘Site Common Diagram’ means drawings prepared for each Connection Point, which incorporates layout drawings, electrical layout drawings, common protection/control drawings and common service drawings;
27. **'Standards'** means "Standards on Grid Connectivity" specified by Central Electricity Authority;
28. **‘Single Line Diagram’** means diagrams which are a schematic representation of the HV/EHV apparatus and the connections to all external circuits at a Connection Point incorporating its numbering nomenclature and labeling;
29. **‘State Grid Code’** means the Grid Code specified by the Commission under Section 86(1) (h) of the Act;
30. **‘State Transmission Utility’** or ‘STU’ means Maharashtra State Electricity Transmission Company Ltd. notified by Government of Maharashtra as such under sub-section (1) of section 39 of the Act;
31. **‘Thermal Generating Unit’** means a generating unit using fossil fuels such as coal, lignite, gaseous and liquid fuel.
32. **‘Total Harmonic Distortion’ (THD)** means a measure of distortion of the voltage or current waveform (which shall ideally be sinusoidal) and is the square root of the sum of squares of all voltage or current harmonics expressed as a percentage of the magnitude of the fundamental.
33. **‘Transmission System’** means a network of transmission lines and substations.
34. **Under Frequency Relay’(UFR)** means a relay which operates when the system frequency falls below specified limits and initiates load shedding;
35. **‘USER’** means a person, including in-State Generating Stations, Distribution Licensees Consumers of the Distribution Licensees directly connected to intra-State transmission system and persons availing of Open Access, who are connected to and/or use the intra-State transmission system.
36. **‘Voltage Unbalance”** means the deviation between highest and lowest line voltage divided by Average Line Voltage of the three phases.

The words and expressions used and not defined herein shall have same meaning as assigned to them under Maharashtra Electricity Grid Code (MEGC) 2020, Act and Regulations.

**Compliance of Maharashtra Electricity Grid Code (MEGC) 2020:**

Both the parties agree and confirm that they shall be abiding the provisions of the Maharashtra Electricity Grid Code (MEGC) 2020 (with amendments thereof) and procedures and operating practices prescribed there under.

Both the parties agree and confirm that they shall be abiding the provisions of MEGC, IEGC and all other regulations concerning standards of grid connectivity notified by the Authority.

The parties agree to supply the Standards Planning Data and Detailed Planning Data to the State Transmission Utility as may be specified for the purpose of planning and development of intra-State transmission System in accordance with Section 14 of the Maharashtra Electricity Grid Code (MEGC) 2020.

Both the parties agree to abide by the directions and instructions of State Load Despatch Centre issued in discharge of its functions and comply with any procedure and processes prescribed by the State Load Despatch Centre under the Maharashtra Electricity Grid Code (MEGC) 2020. The parties confirm that they shall adhere to the system security standards specified under Section 29 of the Maharashtra Electricity Grid Code (MEGC) 2020 and operate respective systems in accordance with Section 28 of the Maharashtra Electricity Grid Code (MEGC) 2020.

In case of discrepancy between terms and conditions stipulated in the Agreement and Maharashtra Electricity Grid Code (MEGC) 2020 Conditions, the terms and conditions of the Maharashtra Electricity Grid Code (MEGC) 2020 shall prevail.

**Compliance of Central Electricity Authority Regulations.**

Both the parties agree and confirm that they shall be abiding the provisions of the Central Electricity Authority’s Technical Standards for Connectivity to the Grid Regulations 2007 inclusive of any subsequent modifications thereof issued by the CEA.

**General Connectivity Conditions**

1. **Connection Standards and codes of practice**
2. Both the parties shall follow the industry best practices and applicable industry standards in respect of the equipment installation and its operation and maintenance
3. The equipment including overhead lines and cables shall comply with the relevant Indian standards, British Standards (BS) or International Electrotechnical Commission (IEC) Standard or American National Standards Institute (ANSI) or any other equivalent International Standard.

Provided that, whenever an International Standard or International Electrotechnical Commission Standard is followed, necessary corrections or modifications shall be made for nominal system frequency, nominal system voltage, ambient temperature, humidity and other conditions prevailing in India before actual adoption of the said Standard.

1. The effect of wind, storms, floods, lightening, elevation, temperature extremes, icing, contamination, pollution and earthquakes must be considered in the design and operation of the connected facilities.
2. Installation, operation and maintenance of equipment by both the parties shall conform to the relevant standards specified by the Authority under Section 177, and Section 73 of the Act, as and when they come into force.
3. **Safety Standards**

Both the parties shall comply with the Central Electricity Authority (Measures relating to Safety and Electricity Supply) Regulations, 2010 inclusive of any subsequent Amendments thereof issued by the CEA.

1. **Commercial Arrangement**

The commercial arrangement between the parties relating to evacuation and transmission of power shall be governed by the separate Bulk Power Transmission Agreement entered into by these two parties.

Metering at the Inter-connection Points shall be owned and maintained as per Section 72 of Maharashtra Electricity Grid Code (MEGC) 2020. The Metering System shall be suitable to measure and store all pertinent parameters at all inter-connection points needed for billing the intra-state energy exchange as per the applicable tariffs and for energy accounting and UI settlement system as specified by the Commission from time to time.

MSETCL shall duly inform the **M/s. \_\_\_\_\_\_\_\_\_\_\_** regarding all changes in Transmission lines/ substations/assets ownership, commissioning and commencement of commercial operation of new assets and any other relevant development/ changes as also the consequent changes in transmission charges payable as specified by the Commission from time to time.

1. **Substation Grounding**

Each transmission substation must have a ground mat solidly connected to all metallic structures and other non-energized metallic equipment. The mat shall limit the ground potential gradients to such voltage and current levels that will not endanger the safety of people or damage equipment which are in, or immediately adjacent to, the station under normal and fault conditions. The ground mat size and type shall be based on local soil conditions and available electrical fault current magnitudes. In areas where ground mat voltage rises would not be within acceptable and safe limits (for example due to high soil resistivity or Ltd. substation space), grounding rods and ground wells may be used to reduce the ground grid resistance to acceptable levels. Substation grounding shall be done in accordance with the norms of the Institute of Electrical and Electronics Engineers (IEEE) –80.

1. **Metering Requirements**

Metering requirement at the inter-connection points shall be governed by the latest Metering Code approved by the Commission. The MSETCL and **M/s. \_\_\_\_\_\_\_\_\_\_\_** agree to abide by the Central Electricity Authority (Installation and Operation of Meters) Regulations, 2006 inclusive of any subsequent Amendments thereof issued by the CEA.

1. **Basic Insulation Level and Insulation Co-ordination**

Basic Insulation Level (BIL) of various items of equipment and ratings of surge arresters for generating stations, lines and substations shall be decided on the following order of priority, namely:-

1. Ensure safety to public and operating personnel;
2. Avoid permanent damage to plant;
3. Prevent failure of costly equipment;
4. Minimize circuit interruptions; and
5. Minimize interruptions of power supply to consumers.

Insulation coordination of equipment and lines on connection point belonging to MSETCL and the grid shall be accomplished and the co-ordination shall be done by the Appropriate Transmission Utility.

1. **Equipment at Connection Points**

**M/s. \_\_\_\_\_\_\_\_\_\_\_**and the MSETCL confirm that their respective equipment at Connection Point shall comply with minimum technical and design criteria specified in the Maharashtra Electricity Grid Code (MEGC) 2020. Single Line Diagram showing arrangement of equipment belonging to the **M/s. \_\_\_\_\_\_\_\_\_\_\_**and/ or MSETCL at each connection point are appended with this agreement and also made available to the SLDC. The parties herein agree that they shall not alter the arrangement of equipment at the connection point without consent of other party.

**M/s. \_\_\_\_\_\_\_\_\_\_\_**and the MSETCL confirm that before physical connection of their systems at the connection points they shall intimate to the State Transmission Utility and the State Load Despatch Centre.

1. **Site Common Drawings**

Both the parties agree that Site Common Drawings showing layout of equipments, electrical layout drawings, common protection/control drawings and common service drawings shall be prepared at each Connection Point before taking up construction, erection and Commissioning of equipment. The parties herein agree that following drawings as may be necessary shall be prepared for connection arrangement:

1. Site Layout;
2. Electrical Layout;
3. Details of Protection; and
4. Common Services Drawings
5. **Inspection, Test, calibration and Maintenance prior to connection:**

Before connecting, MSETCL shall complete all inspections and tests finalized in consultation with the State Transmission Utility or MSETCL to which its equipment is connected. MSETCL shall make available all drawings, specifications and test records of the project equipment pertaining to integrated operation to the State Transmission Utility or licensee or Generating Station as the case may be.

1. **Site Responsibility Schedule**

Before connecting to grid, a Site Responsibility Schedule (SRS) for every Connection Point shall be prepared by the owner of the substation where connection is taking place.

Transmission Licensees and the Users shall be responsible for safety as indicated in the SRS for each connection point. At the connection site where equipment of both entities, i.e., the Transmission Licensee and the User are installed, the User shall furnish required data to the Transmission Licensee and the Transmission Licensee shall prepare SRS. At a generating station, the transmission licensee shall furnish the necessary data to the generating company who shall prepare SRS.

The following information shall be included in Site Responsibility Schedule (SRS), namely:

1. Schedule of High Voltage (HV) Apparatus
2. Schedule of plant, Low Voltage (LV) / Medium Voltage (MV) apparatus,
3. Services and supplies
4. Schedule of telecommunications and measurement apparatus
5. Safety rules applicable to each plant/apparatus.

Following information shall be furnished in the Site Responsibility Schedule for each item of equipment installed at the Connection site, namely

1. The ownership of Plant/ apparatus
2. The responsibility for control of Plant/ apparatus
3. The responsibility for maintenance of Plant/ apparatus
4. The responsibility for operation of Plant/ apparatus
5. The manager of the Site
6. The responsibility for all matters relating to safety of persons at site
7. The responsibility for all matters relating to safety of equipment at site

No connection shall be made unless Site Responsibility Schedule is prepared and signed by all concerned parties.

1. **Capital Expenditure by parties**

Both the parties agrees that any capital expenditure arising from necessary reinforcement or extension of the system at the connection point shall be dealt in accordance with of MERC (Multiyear Tariff) Regulations, 2019 (with amendments thereof) and shall be shared by the parties in accordance with the provisions of the said clause or regulatory orders/directions as the case may be.

1. **Agreement to Pay Charges & Costs**
	1. **Agreement to Monthly Transmission Tariff**

The Applicant/s declares that it shall pay the Monthly Transmission Tariff including ULDC/NLDC charges, for use of Inter-State Transmission System, as and when Long term access, Medium-term open access or short-term open access is availed by the Applicant/s, in accordance with the relevant regulations of CERC in this regard.

* 1. **Agreement to additional costs**

The Applicant/s declares that it shall pay the cost towards modification/ alterations to the infrastructure of STU or Intra-state transmission licensee other than the STU, as the case may be, for accommodating the proposed connection as specified in the letter of STU furnishing connection details.

* 1. **Agreement to pay for damages**

The Applicant/s declares that it shall pay/ make good damages, if any, caused by the customer to the property of the STU or Intra-state transmission licensee other than the STU, as the case may be, which has been notified by the STU or Intra-state transmission licensee other than the STU, as the case may be, within reasonable time of its occurrence, during the course of control, operation and maintenance of the equipment.

* 1. **Agreement to pay Charges for construction of Bays:**

The Applicant/s or Intra-State transmission licensee will execute an agreement with STU for the Erection of equipment of Applicant/s or Intra-State transmission licensee in the substation premises of the STU for construction of bays, if required. For this purpose the Applicant/s or Intra-State transmission licensee shall pay charges to the STU on mutually agreed terms.

* 1. **Agreement to pay O&M Charges:**

The Applicant/s or Intra-State transmission licensee shall pay O&M charges to the STU on mutually agreed terms for the bay equipment of Applicant/s or Intra-State transmission licensee being operated & maintained by the STU in their substation. These O&M charges will be governed time to time as per the mutually agreed terms.

1. **Conditions Precedent to the implementation of the Commissioning Instructions**

The Applicant/s or Intra-State transmission licensee shall have to get appropriate “Commissioning Instruction” prior to actually first charging of the equipment through the grid. The charging instruction shall be issued only when the STU is satisfied (by acting reasonably) that:

* + 1. The Connection Works have been completed as mentioned in STU’s Grid Connectivity Letter;
		2. The Applicant/s has complied with its all obligations as set out in the STU’s Grid Connectivity Letter.
		3. The Applicant/s or Intra-State transmission licensee has demonstrated the data communication facilities to concerned SLDC;
		4. The Applicant/s or Intra-State transmission licensee has obtained necessary approvals like PTCC, Electrical Inspectorate of CEA etc. from competent authority;
		5. The Applicant/s or intra-State transmission licensee has complied with its obligations under the Central Electricity Authority (Technical Standards for Connectivity to the Grid) Regulations, 2007. (with amendments thereof)
1. **General philosophy and guidelines on Protection:**

The parties agree and confirm that connection with Intra-State Transmission System shall comply with following minimum technical and design criteria with regard to System parameters and protection.

**Grid Parameter Variations**

**General**

The parties shall ensure that Plant and Apparatus requiring service from or providing service to the intra-State Transmission System is of such design and construction that satisfactory operation of such Plant and Apparatus will not be prevented by variation in instantaneous values of system frequency and voltage from their nominal values.

**Frequency Variation**

Rated frequency of the system shall be 50.0 Hz and connected equipment must be capable of operating within the limits specified in Clause 22.2 of the Maharashtra Electricity Grid Code (MEGC) 2020 and Central Electricity Authority (Grid Standards) Regulations 2010. Operating frequency shall normally be controlled within the limits in strict conformity with IEGC, and any other Regulations as may be specified by the appropriate authority from time to time.

|  |  |  |
| --- | --- | --- |
| **Target****(CEA Grid Standards Regulation)** | **Variations (%)** | **Value (Hz)** |
| Upper Limit | +1% | 50.2 Hz |
| Lower Limit | -2% | 49.6 Hz |

**Voltage Variation**

The variations of voltage may not be more than the voltage range specified in the regulations as per Clause 22.3 and Clause 22.4 of Maharashtra Electricity Grid Code (MEGC) 2020 and Central Electricity Authority (Grid Standards) Regulations 2010 and any other Regulations/Standards framed by the Authority or specified by CERC and as amended from time to time.

**Protection System**

1. Protection System shall be designed to reliably detect faults on various abnormal conditions and provide an appropriate means and location to isolate the equipment or system automatically. The protection system must be able to detect power system faults within the zone. The protection system should be able to detect abnormal conditions such as equipment failures or open phase conditions.
2. Every Element of the Power system shall be protected by a standard protection system having the required reliability, selectivity, speed, discrimination and sensitivity. Where failure of a protective relay in the MSETCL’s system has substantial impact on the grid, the MSETCL shall connect an additional protection as back up protection besides the Main protection.
3. Notwithstanding the protection systems provided in the grid, the MSETCL shall provide requisite protections for safeguarding his system from faults originating in the grid.
4. Bus bar Protection and Breaker Fail protection or Local Breaker Back-up Protection shall be provided wherever stipulated in the regulations.
5. Special Protection Scheme such as Under Frequency relay for Load shedding, voltage instability, angular instability, generation backing down or Islanding Schemes may also be required to be provided to avert system disturbances.
6. Protection co-ordination issues shall be finalized at regional levels by Regional Electricity Board/ Regional Power Committee and for Intra-State lines by STU
7. The MSETCL shall develop protection manuals conforming to various standards for the reference and use of its personnel.
8. Protection Systems shall be provided by all Transmission Licensees and Users to isolate the faulty equipment and protect the other components against all types of faults, internal/external to them, within specified fault clearance time with the reliability, selectivity and sensitivity:

Provided that all Users or Transmission Licensees shall provide protection systems as specified by the Authority and the provisions of the protection code and Connection Agreement.

1. Relay setting coordination shall be done at State level in coordination with the STU and with WRLDC/WRPC.
2. All 220 kV and above stations shall have bus bar protection scheme, over flux, under voltage, over voltage relays and any other protection recommended by Regional PSCC of WRPC/STU.
3. Users shall provide information to SLDC regarding installation and healthiness of protective equipment like df/dt relays etc., reactive compensation on UFR monthly basis.

**Substation Equipment**

All Extra High Voltage (EHV) substation equipments of both the parties shall comply with Bureau of Indian Standards/International Electro technical Commission/prevailing Code of practice.

All equipment shall be designed, manufactured and tested and certified in accordance with the quality assurance requirements as per the standards of International Electro technical Commission or the Bureau of Indian Standards.

Each connection shall be controlled by a circuit breaker capable of interrupting, at the connection point, at least the short circuit current as advised by State Transmission Utility.

**Fault Clearance Time**

The fault clearance time for primary protection schemes, for a three phase fault (close to the busbars) on MSETCL equipment directly connected to intra-State Transmission System and for a three phase fault (close to the bus-bars) on intra-State Transmission System connected to MSETCL equipment, shall not be more than:

1. 100 milli seconds for 800 kV class & 400 kV
2. 160 milli seconds for 220 kV & 132 kV/110kV /100kV

Back-up protection shall be provided for required isolation/protection in the event of failure of the primary protection systems provided to meet the above fault clearance time requirements. If a Generating Unit is connected to the intra-State Transmission System directly, it shall be capable of withstanding, until clearing of the fault by back-up protection on the intra-State Transmission System side.

1. **Reactive Power Compensation**
2. Both the parties agree that the reactive Power compensation and/or other facilities shall be provided by **M/s.\_\_\_\_\_\_\_\_\_\_\_\_**, as far as possible, in the low voltage systems close to the load points thereby avoiding the need for exchange of Reactive Power to/from the intra-State Transmission System and to maintain the intra-State Transmission System voltage within the specified range.
3. Reactive power compensation and/or other facilities shall be provided by the STU/Users, as far as possible, in the areas prone to low or high voltage systems close to the load points thereby avoiding the need for exchange of Reactive Power to/from the InSTS and to maintain the InSTS voltage within the specified range at all the times. Their healthiness and operation as per real time requirement shall be ensured by the User/STU.
4. Users shall endeavor to minimize the Reactive Power drawal at an interchange point when the voltage at that point is below 97% of rated voltage and shall not inject Reactive Power when the voltage is above 103% of rated voltage.
5. Switching in/out of all 400 kV bus and line Reactors throughout the grid shall be carried out as per instructions of State Load Despatch Centre. Tap changing on all 400/220 kV Interconnecting Transformers shall also be done as per the instructions of State Load Despatch Centre only.
6. Wind generating stations connected to InSTS shall be capable of supplying dynamically varying reactive power support, so as to maintain power factor of 0.98 (absorbing) at their grid inter-connection point for all dispatch scenarios by providing adequate reactive compensation or as specified by the Authority.
7. Wind generating stations and solar generating stations shall have fault ride through the capability of not less than 300 milliseconds so that the grid is not destabilized due to sudden outage of generation in the event of grid disturbance. The provisions of the CEA’s Regulations for Low Voltage Ride Through (LVRT) and High Voltage Ride Through (HVRT) shall be applicable to the Wind and Solar Generators as amended from time to time.
8. Wind and Solar generators shall control the harmonics level, at all connection points of a User on the transmission system, in accordance with that prescribed by the IEEE STD 519-1992, namely “IEEE recommended practices and requirements for harmonic control in the electrical power systems”
9. All Users shall attempt to ensure that grid voltages always remain within the limits specified in CEA (Grid Standards) Regulations, 2010 as amended from time to time and as mentioned below:

|  |
| --- |
| **Voltage-(kV rms)** |
| **Nominal** | **Maximum** | **Minimum** |
| 765  | 800  | 728  |
| 400  | 420  | 380  |
| 220 | 245 | 198 |
| 132 | 145 | 122 |
| 110 | 121 | 99 |
| 100 | 110 | 90 |
| 66 | 72 | 60 |
| 33 | 36 | 30 |

1. Applicant/s shall provide up to date capability curves for all Generating Units to the SLDC indicating any restrictions to allow accurate system studies and effective operation of the InSTS.
2. Wind Generators, during the start-up, shall ensure that reactive power Drawal shall not affect the grid performance Provided that SLDC may direct the wind generator to curtail VAr drawal/injection for the security of the grid.
3. **Communication Facilities**

**M/s.\_\_\_\_\_\_\_\_\_\_\_\_** and the MSETCL agree to provide reliable and efficient speech and data communication systems to facilitate necessary communication and data exchange as prescribed by the SLDC for supervision/control of the State Grid under normal and abnormal conditions at their respective ends at their own cost. **M/s.\_\_\_\_\_\_\_\_\_\_\_\_** and MSETCL agree to abide by the guidelines of the State Load Despatch Centre issued under Section 24 & Part – F of the Maharashtra Electricity Grid Code (MEGC) 2020.

1. **System Recording Instruments**

**M/s.\_\_\_\_\_\_\_\_\_\_\_\_** and MSETCL agree to provide the recording instruments such as Data Acquisition System/Disturbance Recorder/Event Logger/Fault Locator (including time synchronization equipment) as may be necessary under applicable standards within the time frame specified in the Maharashtra Electricity Grid Code (MEGC) 2020.

Every Generating Station and substation connected to the grid at 132 KV or above shall be provided with Disturbance Recording and Event Logging facilities. All such equipment shall be provided with time synchronization facility for global common time reference.

1. **Access to both parties**

The parties owning the Connection Site as the case may be shall provide reasonable access and other required facilities to another including the SLDC, whose equipment is proposed to be installed / installed at the Connection Site for installation, operation, maintenance, etc.

Written procedures and agreements shall be developed between entities to ensure that mandatory access is available to the entity concerned at the same time safeguarding the interests of both entities at the connection site.

The authorized personnel of both parties shall have the right to inspect the plant of other party at inter-connection point to ensure conformity to standards and restrictions.

1. **Unintended and Unscheduled back-energization**

Both the parties agrees and confirm that they shall take adequate precautions to ensure that no part of the grid is energized by **M/s.\_\_\_\_\_\_\_\_\_\_\_\_** system from another source of supply unless it is requisitioned in writing by the other party as an exceptional arrangement. The switchgear and controls of MSETCL systems shall be so designed as to prevent back-energisation and the personnel shall be made aware of the need for this precaution.

1. **Notice**

All correspondence/notices required or referred to under this Agreement shall be in writing and signed by the respective authorized signatories of **M/s.\_\_\_\_\_\_\_\_\_\_\_\_** and MSETCL mentioned herein, unless otherwise notified. Each such notice shall be deemed to have been duly given if delivered or served by registered mail/ speed post of the department of post with an acknowledgment due to other party (ies) as per authorization by parties.

The authorities of the parties who shall responsible for the correspondence notices etc. in connection with this agreement shall be informed in advance.

1. **Settlement of Disputes and Arbitration**

All differences and/or disputes between **M/s.\_\_\_\_\_\_\_\_\_\_\_\_** and MSETCL arising out of or in connection with these presents shall at first instance be settled through amicable settlement at the level of CEO/CE.

In the event of unresolved disputes or differences as covered under the statutory arbitration provided under The Electricity Act, 2003, the same shall be resolved accordingly.

Notwithstanding the existence of any disputes and differences referred to arbitration, the parties herein shall continue to perform their respective obligations under this Agreement.

1. **Force Majeure**

Force Majeure herein is defined as any clause which is beyond the control of the STU or the Applicant/s or intra-State transmission licensee as the case may be, which could not be foreseen or with a reasonable amount of diligence could not have been foreseen and which substantially affects the performance of the agreement. Force Majeure events would include:

* Natural phenomenon including but not limited to floods, droughts, earthquake and epidemics;
* War (whether declared or undeclared), invasion, armed conflict or act of foreign enemy in each case involving or directly affecting India, revolution, riot, insurrection or other civil commotion, act of terrorism or sabotage in each case within India;
* Nuclear explosion, radioactive or chemical contamination or ionizing radiation directly affecting the generation station, captive generating plant or bulk consumer, inter-state transmission system of the STU or Intra-state transmission licensee other than STU, or any facility or system that is integral to and substantial for the performance of this agreement.
* Any event or circumstances of a nature analogues to any events set forth above within India.

Provided either party shall within fifteen (15) days from the occurrence of such a Force Majeure event notify the other in writing of such cause(s).

Neither of the parties shall be liable for delays in performing obligations on account of any force majeure causes as referred to and/or defined above.

1. **Confidentiality**

**M/s.\_\_\_\_\_\_\_\_\_\_\_\_** and MSETCL shall keep in confidence any information obtained under this Connection Agreement and shall not divulge the same to any third party without the prior written consent of the other party, unless such information is

* 1. in the public domain,
	2. already in the possession of the receiving party,
	3. Required by the Govt. Ministries/Agencies/Court of competent jurisdiction.

The information exchanged herein between the parties shall be used only for the purpose of, and in accordance with, this Agreement and for the purpose stated herein. This clause shall remain in force even after termination of Connection Agreement.

1. **Transfer Assignment and Pledge**

**M/s.\_\_\_\_\_\_\_\_\_\_\_\_** or Intra-State transmission licensee shall not transfer, assign or pledge its rights and obligations under this connection agreement to any other person.

1. **Term of Agreement & Amendment to the Agreement**

This agreement shall remain valid unless both **M/s.\_\_\_\_\_\_\_\_\_\_\_\_** and MSETCL with mutual agreement decide to amend/modified in respect of re-allocation of bays, upgradation of voltage level etc. or terminate it.

In witness whereof the parties have signed this agreement on the day, month and year first written above.

|  |  |
| --- | --- |
| **For and on behalf of \_ \_ \_** (One by one details of Companies from A-Z)**(TSU)** | **For and on behalf of MSETCL****(Transmission Licensee )**  |
| **In the presence of** |  |

**Schedule 1(A)**

**Grid Connectivity Standards applicable to the Generating Units**

The units at a generating station proposed to be connected to the grid shall comply with the following requirements besides the general connectivity conditions given in the regulations and general requirements given in the general connectivity conditions in this document.

**New Generating Units**

* 1. The excitation system for every generating unit
	2. shall have state of the art excitation system;
	3. Shall have Automatic Voltage Regulator (AVR). Generators of 100 MW rating and above shall have Automatic Voltage Regulator with digital control and two separate channels having independent inputs and automatic changeover and
	4. The Automatic Voltage Regulator of generator of 100 MW and above shall include Power System Stabilizer (PSS)
	5. The Short -Circuit Ratio (SCR) for generators shall be as per IEC-34.
	6. The generator transformer windings shall have delta connection on low voltage side and star connection on high voltage side. Star point of high voltage side shall be effectively (solidly) earthed so as to achieve the Earth Fault Factor of 1.4 or less.
	7. All generating machines irrespective of capacity shall have electronically controlled governing system with appropriate speed/load characteristics to regulate frequency. The governors of thermal generating units shall have a droop of 3 to 6% and those of hydro generating units 0 to 10%.
	8. The project of **M/s.\_\_\_\_\_\_\_\_\_\_\_\_** / MSETCL shall not cause voltage and current harmonics on the grid which exceed the limits specified in Institute of Electrical and Electronics Engineers (IEEE) Standard 519.
	9. Generating Units located near load Centre, shall be capable of operating at rated output for power factor varying between 0.85 lagging (over-excited) to 0.95 leading (under excited) and Generating Units located far from load centers shall be capable of operating at rated output for power factor varying between 0.9 lagging (over-excited) to 0.95 leading (under-excited). The above performance shall also be achieved with voltage variation of +5% of nominal, frequency variation of +3% and -5% and combined voltage and frequency variation of +5%. However, for gas turbines, the above performance shall be achieved for voltage variation of +5%.
	10. The coal and lignite based thermal generating units shall be capable of generating up to 105% of Maximum Continuous Rating (subject to maximum load capability under Valve Wide Open Condition) for short duration) to provide the frequency response.
	11. The hydro generating units shall be capable of generating up to 110% of rated capacity (subject to rated head being available) on continuous basis.
	12. Every generating unit shall have standard protections to protect the units not only from faults within the units and within the station but also from faults in transmission lines. For generating units having rated capacity greater than 100 MW, two independent sets of protections acting on two independent sets of trip coils fed from independent Direct Current (DC) supplies shall be provided. The protections shall include but not be Ltd. to the Local Breaker Back-up (LBB) protection.
	13. Hydro generating units having rated capacity of 50 MW and above shall be capable of operation in synchronous condenser mode, wherever feasible.
	14. Bus bar protection shall be provided at the switchyard of all generating station.
	15. Automatic synchronization facilities shall be provided in the MSETCL’s Project.
	16. The Reactive demand and Injections shall be in compliance with Clause 37.4 Maharashtra Electricity Grid Code (MEGC) 2020.
	17. The station auxiliary power requirement, including voltage and reactive requirements, shall not impose operating restrictions on the grid beyond those specified in the Grid Code or state Grid Code as the case may be.
	18. In case of hydro generating units, self-starting facility may be provided. The hydro generating station may also have a small diesel generator for meeting the station auxiliary requirements for black start.
	19. The standards in respect of the substations associated with the generating stations shall be in accordance with the provisions specified in respect of ‘substations’ under Schedule 2 of these Standards.

**Existing Units**

For thermal generating units having rated capacity of 200 MW and above and hydro units having rated capacity of 100 MW and above, the following facilities would be provided at the time of renovation and modernization.

Every generating unit shall have Automatic Voltage Regulator. Generators having rated capacity of 100MW and above shall have Automatic Voltage Regulator with two separate channels having independent inputs and automatic changeover.

* + 1. Every generating unit of capacity having rated capacity higher than 100Mw shall have Power System Stabilizer.
		2. All generating units shall have standard protections to protect the units not only from faults within the units and within the station but also from faults in transmission lines. The protections shall include but not Ltd. to the Local Breaker Back-up (LBB) protection.

**Schedule 1(B)**

**Grid Connectivity Standards applicable to the Generating Units (Wind & Solar)**

1. Requirement with respect to Harmonics, direct current (DC) Injection & flicker
2. The harmonic current injections from the generating stations shall not exceed the limit specified in institute of Electrical & Electronics Engineers (IEEE) Standard 519.
3. The generating station shall not inject DC current greater than 0.5% of the full rated output at the interconnection point.
4. The generating station shall not introduce flicker beyond the limit specified in IEC 61000. Provided that the standard for flicker will come into effect from 1st April 2014.
5. Measurement of harmonic content, DC injection and flicker shall be done at least in a year in presence of the parties concerned and the indicative date for the same shall be mentioned in the connection agreement.
6. For generating station getting connected on or after completion of 6 month from date of publication of these regulations in the official gazette.
7. The generating station shall be capable of supplying dynamically varying reactive power support so as to maintain power factor within limit of 0.95 lagging to 0.95 leading.
8. The generating unit shall be capable of operating in the frequency range 47.5 to 52 Hz and be able to deliver rated output in the frequency range of 49.5 Hz to 50.5 Hz
9. The generating station connected to the grid, shall remain connected to the grid when voltage at the interconnection point on any or all phases dips up to the level depicted by the thick lines in the following curve.



1. The generating stations with installed capacity of more than 10 MW connected at voltage level of 33 kV and above –
2. shall be equipped with the facility to control active power injection in accordance with a set point, capable of being revised based on directions of the State Load Dispatch Centre or Regional Load Dispatch Centre, as the case may be;
3. shall have governors or frequency controllers of the units at a droop of 3 to 6% and a dead band not exceeding ±0.03 Hz: Provided that for frequency deviations in excess of 0.3 Hz, the Generating Station shall have the facility to provide an immediate (within 1 second) real power primary frequency response of at least 10% of the maximum Alternating Current active power capacity;
4. shall have the operating range of the frequency response and regulation system from 10% to 100% of the maximum Alternating Current active power capacity, corresponding to solar insolation or wind speed, as the case may be;
5. Shall be equipped with the facility for controlling the rate of change of power output at a rate not more than ± 10% per minute.
6. The generating stations of aggregate capacity of 500 MW and above shall have the provision to receive the signal from the State Load Dispatch Centre or Regional Load Dispatch Centre, as the case may be, for varying active and reactive power output.
7. The standards in respect of the switchyard associated with the generating stations shall be in accordance with the provisions specified in respect of ‘Sub-stations’ under Part III of these Standards.
8. The generating station connected to the grid, shall remain connected to the grid when voltage at the interconnection point, on any or all phases (symmetrical or asymmetrical overvoltage conditions) rises above the specified values given below for specified time —



**Schedule 2**

**Grid Connectivity Standards applicable to the Transmission Line and substation**

The transmission lines and substations connected to the grid shall comply with the following additional requirements besides the general connectivity conditions under these regulations and General Standards for Connectivity to the Grid.

* + - 1. Bus bar protection shall be provided on all substations at and above 220 kV levels for all new substations. For existing substations, this shall be implemented in a reasonable time frame.
			2. Local Breaker Back-up (LBB) protection shall he provided for all substations of 220kV and above.
			3. Two main numerical Distance Protection Schemes shall he provided on all the transmission lines of 220 kV and above for all new substations. For existing substations, this shall be implemented in a reasonable time frame.
			4. Circuit breakers, isolators and all other current carrying equipment shall be capable of carrying normal and emergency load currents without damage. The equipment shall not become a limiting factor on the ability of transfer of power on the inter-state and intra-state transmission system.
			5. All circuit breakers and other fault interrupting devices shall be capable of safely interrupting fault currents for any fault that they are required to interrupt. The Circuit breaker shall have this capability without the use of intentional time delay in clearing the fault. Minimum fault interrupting requirement need be specified by the State Transmission Utility. The Circuit Breaker shall be capable of performing all other required switching duties such as, but not Ltd. to, capacitive current switching, load current switching and out-of-step switching. The Circuit Breaker shall perform all required duties without creating transient over-voltages that could damage the equipment provided elsewhere in the grid. The short circuit capacity of the circuit breaker shall be based on short-term and perspective transmission plans as finalized by the Authority.
			6. Power Supply to substation Auxiliaries, shall:
1. For alternating current (AC) supply (Applicable to new substations) 220 kV and above: Two high tension (HT) supplies shall be arranged from independent sources. One of the two high tension supplies shall be standby to the other. In addition, an emergency supply from diesel generating (DG) source of suitable capacity shall also he provided.

66KV and below 220 kV: There shall be one HT supply and one diesel generating source. 33 kV and below 66 kV: There shall be one HT supply

1. For direct current (DC) Supply (Applicable to new substations): substation of transmission system for 132 kV and above and substations of all generating stations: There shall he two sets of batteries, each equipped with its own charger.
2. For substation below 132 kV: there shall be one set of battery and charger.
	* + 1. Earth Fault Factor for an effectively earthed system shall be not more than 1.4.
			2. Transmission Licensee shall provide line Reactors as may be necessary after carrying out system studies to control temporary over voltage within the limits as set out above.
			3. The parties agree that Inter-Connecting Transformer (ICT) taps at the respective drawal points may be changed to control the Reactive Power interchange as per **M/s.\_\_\_\_\_\_\_\_\_\_\_\_** request to the State Load Despatch Centre, but only at reasonable intervals.