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Government of India
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Ministry of Power
पूर्वी क्षेत्रीय विद्युत समिति
Eastern Regional Power Committee
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FAX MESSAGE NO._511

To

As per Distribution List

Subject: **Notice for Special Meeting on "RGMO/FGMO and PSS Tuning of Generators in Eastern Region"**

Sir,

In 148th OCC Meeting held on 20.08.2018, it was decided that a separate meeting on Restricted Governor /Free Governor Mode Operation of generators with the power station authorities in the Eastern Region shall be convened for detailed deliberation. In the meeting it was also decided that present status of PSS tuning of the generating plants is to be accessed and a tentative plan for PSS Tuning is to be prepared in a separate meeting.

As per the decision of 148th OCC Meeting, a special meeting on "**RGMO/FGMO and PSS Tuning of Generators in Eastern Region**" is hereby convened on **31st January 2019 at 11:00 hrs** at **ERPC Conference Hall, Kolkata** for detailed discussion.

In view of the above, it is requested to depute executives from Turbine group (Actively involved in Governor Response) and Excitation System Group (Involved with Excitation system) from the concerned generating stations, to attend the meeting along with supporting data, so that fruitful discussions can take place during the meeting regarding compliance to IEGC 5.2 (f), (g), (h) and (i) for the events given below as well as for compliance of IEGC 5.2.k on PSS Tuning status.

Table: Frequency Response Event

Event No	Date	Time	Net Frequency Change
Event-1	23-04-18	10:42	0.287 Hz Dip
Event-2	06-05-18	16:50	0.055 Hz Dip
Event-3	10-06-18	06:11	0.054 Hz Dip
Event-4	10-07-18	08:14	0.062 Hz Dip
Event-5	30-07-18	20:48	0.071 Hz Dip
Event-6	06-08-18	13:06	0.13Hz Rise
Event-7	07-08-18	14:17	0.035 Hz Dip
Event-8	29-08-18	04:02	0.056 Hz Dip
Event-9	30-10-18	19:23	0.19 Hz Dip

In addition to that, modelling of governor system is required for validation of the primary response of the generator with the help of simulation. Governor Model technical data is required in a format enclosed at **Annexure-A** for the simulation study. The model development of governor may be pre-filled and submitted to ERLDC during the meeting.

Thanking you,

Yours faithfully,

9/1/19

(J. Bandyopadhyay)
Member Secretary

LIST OF ADDRESSES:

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3.3 Hydro turbine

Table 6: Hydro turbine data checklist

ID	Information obtained	Checklist
Type of prime mover	Hydro-electric turbine Other (Pumped Storage)	
Manufacturer of turbine	Manufacturer and nameplate details	
Modes of operation	Types of modes of operation capable: - Generator - Pump - Synchronous condensor	
Governor	Electro-mechanical governor (including settings and drawings) Digital electric governor (including settings and drawings) PID governor details and settings Transient droop (Dashpot) governor details and settings Tacho-accelerometric governor details and settings Input transducer details Transfer function data (if available)	
Ramp rates	How fast can the turbine increase and/or decrease load, specified in MW/min Guide vane/wicket gate characteristic, including opening, closing rates/times and limits	
Droop	Droop setting (% on machine base) Frequency influence limiters • Maximum frequency deviation limiter (eg+/-2 Hz) • Maximum influence limiter (eg 10% of rating)	
Dead-band	Details of frequency dead-band (typically in Hz or RPM)	
Hydro-electric turbine	Type of hydro turbine - Impulse turbines – typical with high-head plants (Pelton wheel) - Reaction turbine – typical with low- and medium-head plants (such as Francis and Kaplan turbine) Water flow, velocity and pressure (e.g. intake and outtake/draft tube)	
Penstock Note: Also applicable to shared penstocks.	Length (m) Area (m^2) Internal penstock diameter Pipe thickness, material or other characteristics (such as tapering) Non-elastic or elastic Linear or non-linear model (with or without relief valve) or Kaplan model	

	Flow of water through turbine (m^3/s) – with gates fully open
	Number of penstocks supplied from common tunnel
Pressure relief valve	Drawings/schematics
	Settings
	Operational descriptions
Pipe and Tunnel	Diameter of pipe
Note: Also applicable to shared pipes.	Thickness
	Material
	Length
	Linear or non-linear model
Surge tank, reservoir and tail water (i.e. Head)	Vertical distance between the upper reservoir and level of turbine (in metres)
	Head at turbine admission (lake head minus tailrace head) – (in metres)
	Head loss due to friction in conduit (in metres)
	Surge tank height, diameter and other characteristics (e.g. restricted inlet orifice)
Other	Details of protection schemes that could influence dynamics (if any)
	Details of resonance chambers for pipes (if any)
	Temperature (e.g. water, ambient, unit)

3.3 Prime mover

Table 6: Prime mover data checklist

ID	Information obtained	Checklist
Type of prime mover	Steam turbine	
	Open cycle gas turbine	
	Aero-derivative (twin shaft) gas turbine	
	Combined cycle plant	

	Hydro-electric turbine Other
Manufacturer of turbine	Manufacturer and nameplate details
Type of fuel	Coal (brown or black) Gas Diesel (liquid fuel) Water (for hydro) Other
Governor	Electro-mechanical governor Digital electric governor
Ramp rates	How fast can the turbine increase and/or decrease load, specified in MW/min
Droop	Droop setting (% on machine base) Frequency influence limiters • Maximum frequency deviation limiter (eg+/-2 Hz) • Maximum influence limiter (eg 10% of rating)
Dead-band	Details of frequency dead-band (typically in Hz or RPM)
Technology	Coal: • Sub-critical (Steam pressure =x MPa) • Super-critical (Steam pressure =x MPa) Gas/distillate: • Open cycle • Combined cycle • Engine
Steam turbine	**Tandem compound:** all sections on one shaft with a single generator **Cross compound:** consists of two shafts, each connected to a generator and driven by one or more turbine sections **Turbine sections:** High pressure (HP), intermediate pressure (IP) and low pressure (LP) **Reheat or non-reheat:** In a reheat, steam upon leaving HP section returns to boiler where it is passed through reheater before entering IP section Valves: - Main inlet stop valve (MSV) - Governor control valve (CV) - Reheater stop valve (RSV) - Intercept valves (IV) Turbine control action: - Boiler follow mode - Turbine follow mode - Coordinated control Fast valving / bypass operation
Gas turbine	Type of gas turbine: open cycle heavy duty, aero-derivative twin shaft gas turbine Does turbine operate in dual fuel (gas and liquid fuel)

	Inlet guide vane characteristic Limit for exhaust gas temperature (EGT) Base load / frequency control
Combined cycle plant	Details on heat recovery steam generator (HRSG) Size of steam turbine (MW) Frequency control of ST Time lag and relationship of GT and ST Is the combined cycle plant a single-shaft plant – i.e. the gas and steam turbine are on same shaft and drive same generator
Hydro-electric turbine	Type of hydro turbine - Impulse turbines – typical with high-head plants (Pelton wheel) - Reaction turbine – typical with low- and medium-head plants (such as Francis and Kaplan turbine) Head – vertical distance between the upper reservoir and level of turbine (in metres) Penstock: Length, non-elastic or elastic, linear or non-linear model Tunnel and Surge Tank Water flow and velocity Pipe: - Diameter of pipe - Thickness - Material - Length