



Bangladesh Power Development Board
INTEGRATED MANAGEMENT SYSTEM
(BASED ON ISO 9001:2015, ISO 14001:2015 & ISO
45001:2018 STANDARDS)

PROCEDURE FOR INSTRUMENT AND CONTROL
MAINTENANCE – GAS STEAM POWER PLANT



INTEGRATED MANAGEMENT SYSTEM

Document No.:
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Revision No.: 00

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Effective Date: 01-11-2021

Page 2 of 10

1.0 Purpose

- To establish effective instrument & control maintenance system for the plant and machinery to ensure continuing process capability.
- To plan and implement instrument & control maintenance.

2.0 Scope

Applies to whole of Integrated Management System of Bangladesh Power Development Board (BPDB).

3.0 Terms & Definition

Definition

None

Abbreviations

BPDB- Bangladesh Power Development Board
MR- Management Representative
SDE-Sub Divisional Engineer
SAE- Sub Assistant Engineer
AE- Assistant Engineer

4.0 Roles and Responsibility

Tasks in Reference Clause nos.	Responsibility
5.1	Head of instrument & control maintenance, SDE/AE/SAE
5.2, 5.3	Head of instrument & control maintenance
5.5, 5.6	Head of instrument & control maintenance
5.7	MR/ Head of the plant

5.0 Procedure

Plan of the maintenance procedures

Following 3 types of maintenance is carried out

- Breakdown maintenance
- Schedule maintenance
- Preventive maintenance

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BPDB-IMS-PR-030

Revision No.: 00

PROCEDURE FOR INSTRUMENT AND CONTROL MAINTENANCE- GAS STEAM POWER PLANT

Effective Date: 01-11-2021

Page 3 of 10

5.1 Breakdown Maintenance

On-Load Off-Load

- Concerned operation unit report Breakdown or abnormality
- Job allocated to concerned official
- Concerned technician/ official Engineer check the facility and assess the maintenance task
- Maintenance task is approved
- If the maintenance can be done on-load, then it is carried out
- If the maintenance of repair requires to be carried out of load, permission of the concerned authority is taken
- Maintenance work is carried out accordingly
- On completion of Maintenance work, required checking is carried out.
- Maintenance work is recorded

5.2 Schedule Maintenance

- Seek permit from operation department on schedule issue
- Operation gives permit after isolation
- Respective Maintenance work is done accordingly
- Daily Visual Inspection
 - Daily Visual Inspection
 - ID & F"D Fan (Side "A" &"B") Regulation
 - Gas Flow regulation System
 - Air Flow Regulation System
 - Boiler Hot Chamber Air Pressure Regulation System
 - Main Steam Temperature Regulation (1st, 2nd& 3rd Stage A & B Side) System
 - Reheat Steam Temperature Regulation (Side A & B) System
 - Natural Gas Sub-Station Regulation System
 - Boiler Feed Water Regulation System (Boiler Drum Level Controller)
 - Continuous Blow-down Flash Tank Level Regulation System
 - Turbine supervisory unit
 - i) Servomotor,
 - ii) Axial Shift,
 - iii) HPC.IPC Expansion,
 - iv) Differential Expansion (HPCJPC&LPC)
 - Condenser Water Level Control Regulation System
 - De-aerator Water Level Control Regulation System
 - Auxiliary Steam Pressure Control Regulation System
 - Turbine Gland Steam (Shaft Seal) Pressure Control Regulation System
 - LPH Group Water Level Control Regulation System

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BPDB-IMS-PR-030

Revision No.: 00

PROCEDURE FOR INSTRUMENT AND CONTROL MAINTENANCE- GAS STEAM POWER PLANT

Effective Date: 01-11-2021

Page 4 of 10

- Makeup Water Tank Level Control Regulation System
- HP-LP Bypass System
- Up-stream controller (Electrical Servomotor) Regulation System
- Protection & Signaling system

5.3 Scheduled maintenance

- Checking and Adjustment of all Regulating System, dismantling its defective equipment repairing, testing & commissioning and installing or replacement by new one as:
 - i) All Actuators and its auxiliaries,
 - ii) Analog PID Controllers (Pulse Control-PBH Block-P5H, Conductive Separation Block-EKP, Manual Presetter-P3fl-22, Precision Integration Block-Bnu-no),
 - iii) Manual Control Block-B3Y
 - iv) Contract less Reversible Starter
 - v) Magnetic Starters
 - vi) All transmitters (Primary Sensors) and its auxiliaries,
 - vii) Circuit breaker viii) Distribution terminal cleaning & proper numbering,
 - ix) All Control cables meggering
- Check & Adjustment of Microprocessor PID Controllers "REMICONT" (P-112), dismantling its defective equipment repairing, testing & commissioning and installing or replacement by new one (will be Supplied from GPS store) as:
 - i) Microprocessor Computer (FIPL45, 03V4, n3Y3).
 - ii) Communication System Subscriber (AL(n2, LArI2, MAH2, I4AH2, PM2, PF22).
 - iii) Communication System Operator.
 - iv) Interface Coupling Connection System of the upper level control.
 - v) Supply Units and Switching devices (EnC-5, EflH-24, BC3n, EHP-5).
 - vi) Inter Block Interface Coupling Connection buses
- Checking of Burner igniter and its solenoid coils, dismantling and its defective equipment High voltage supply source unit & relays), repairing, testing and installing or replacement by new one
- Checking and Adjustment of Impulse safety valves of Boiler Side, Gas quick acting valve, dismantling its defective equipment (Pistons, coils), repairing, testing & commissioning and installing or replacement by new one
- Checking and Repairing of all electrical motorized Valves and it's control circuits
- Checking of protection panel & signaling system (Related to Boiler side), dismantling its defective equipment (Electronic Blocks cards and relays) repairing, testing & commissioning and installing replacement by new one

5.4 Unit shutdown maintenance

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INTEGRATED MANAGEMENT SYSTEM

Document No.:
BPDB-IMS-PR-030

Revision No.: 00

PROCEDURE FOR INSTRUMENT AND CONTROL MAINTENANCE- GAS STEAM POWER PLANT

Effective Date: 01-11-2021

Page 5 of 10

Unit Shut-down Maintenance work is done according to the defects list prepared by the operation personnel.

- Checking and Adjustment of all Regulating System, dismantling its defective equipment repairing, testing & commissioning and installing or replacement by new one as:
 - i) All Actuators and its auxiliaries,
 - ii) Analog PID Controllers (Pulse Control-PBH Block-PBH, Conductive Separation Block-EKP, Manual Presetter-P3fl-22, Precision Integration Block-EnH-nO),
 - iii) Manual Control Block-B3Y,
 - iv) Contract less Reversible Starter
 - v) Magnetic Starters,
 - vi) All Transmitters (Primary Sensors) and its auxiliaries,
 - vii) Circuit breaker,
 - viii) Distribution terminal cleaning & proper numbering,
 - ix) All Control cables meggering.
- Check & Adjustment of Microprocessor PID Controllers "REMICONT" (P-112), dismantling its defective equipment repairing, testing & commissioning and installing or replacement by new one (will be Supplied from GPS store) as:
 - i) Microprocessor Computer (riPL|5, 03Y4, nsys).
 - ii) Communication System of the Subscriber (AI (n2, LJ/Ari2, flqri2, LP12, L(fln2, PH2, PF22).
 - iii) Communication System of the Operator.
 - iv) Interface Coupling Connection System of the upper level control.
 - v) Supply Units and Switching devices (EnC-5, BHH-24, BC3n, BRP-5)
 - vi) Inter Block Interface Coupling Connection buses.
- Checking of Burner igniter and its solenoid coils, dismantling and its defective equipment (High voltage supply source unit & relays), repairing, testing and installing or replacement by new one.
- Checking and Adjustment of Impulse safety valves of Boiler Side, Gas quick acting valve, dismantling its defective equipment (Pistons, coils), repairing, testing & commissioning and installing replacement by new one
- checking and Repairing of all electrical motorized Valves and it's control I circuits
- Checking of protection panel & signaling system (Related to Boiler side), dismantling its defective equipment (Electronic Blocks cards and relays), repairing, testing & commissioning and installing or replacement by new one
- Checking of primary sensors dismantling its defective equipment repairing, testing & commissioning and installing or replacement by new one as:
 - i) Liquid in Generator Body, oil-hydrogen separator (Level indicating relays),
 - ii) Vacuum tank (Level indicating relays), Oil-H2 Separator (Electronic Blocks & relays)
- Control Cable laying if it's necessary
- To maintain proper numbering, Marking, Electrical dressing and japing

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INTEGRATED MANAGEMENT SYSTEM

Document No.:
BPDB-IMS-PR-030

Revision No.: 00

PROCEDURE FOR INSTRUMENT AND CONTROL MAINTENANCE- GAS STEAM POWER PLANT

Effective Date: 01-11-2021

Page 6 of 10

- Testes:- All Protection, Interlocking, Automatic Reserve Closing, Signaling System of Boiler, Turbine & Generator Side tests shall have to be done to ensure the performance and confirm protection functions

5.5 Preventive maintenance

- Prepare long-term preventive maintenance plan , at least for 3 years for major facilities
- Concerned authority approves preventive maintenance plan
- Resources and spares are mobilized to carryout preventive maintenance
- Where applicable, plant shutdown is solicited
- Plan/ Scheduled maintenance is modified to adjust with the approval of shutdown
- Maintenance work is carried out following approved plan
- Necessary checks are performed after maintenance work

5.6 maintenance work Maintenance Records

- All maintenance jobs are recorded in maintenance log book
- Machine history cards are maintained and maintenance records, especially breakdown reports, are recorded.
- Equipment check list are prepared and carrying out routine checks

5.7 Implementation and Internal Audit

- Procedure for Maintenance and its effectiveness after implementation will be checked and reviewed during internal audits.
- Actions are taken on the basis of review.

5.8 Environmental Aspect, Impact & Controls

Any activity at the plant, whether it is carried out for ensuring quality of service or meeting requirement of the interested parties, there will be some environmental aspects associated with it. It is a requirement of the IMS of BPDB to identify those environmental aspects, evaluate their impact and determine necessary controls.

While carrying out the activities and operation, the employees of BPDB need to exercise appropriate and predetermined controls so as to prevent or mitigate any adverse impact that may be associated with the activity or the process.

Some examples of environmental aspects associated with the Procedure for Instrument & Control Maintenance-Gas Steam Power Plant are as below:

SI Nos.	Aspect	Impact	Controls
1.	Solid Waste(wires,	Soil / Water Pollution	1. Follow the waste

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Document No.:
BPDB-IMS-PR-030

Revision No.: 00

PROCEDURE FOR INSTRUMENT AND CONTROL MAINTENANCE- GAS STEAM POWER PLANT

Effective Date: 01-11-2021

Page 7 of 10

	plastics)		management plan
2.	Discarding of Rare Earth Metals	Depletion of Resource	1. Follow the waste management plan
3.	Chemical Cleaning Agent	Soil / Water Pollution	1. Work and dispose as per the chemical disposal plan 2. Provide Necessary Training
4.	Rejection of Refrigerant	Depletes Ozone layer	1. Use the latest eco-friendly air-conditioner
5.	Paper Use	Natural Resource Depletion	Avoid printing e-mail and drafts (display documents on screen rather than printing out a paper copy) § Archive electronically
6.	Lighting	Natural Resource Depletion	Using day lightings § Unnecessary lights should be switched off
7.	Empty Packs	Waste Generation	Segregate properly and deliver to the central admin department
8.	Effluent from toilet use	Water Pollution	Dispose to Municipal discharge connection for adequate disposal
9.	Battery Disposal	Soil / Water Pollution	1. Follow the waste management plan
10.	Capacitors Disposal	Soil / Water Pollution	1. Follow the waste management plan

The table above provides examples only. The IMS team of each site needs to identify the aspect impact and controls related to specific activities and ensures that the environmental performance of the organization is effectively maintained. For this purpose, the procedure “Environmental Aspect Impact Assessment Procedure” is to be followed and forms “Environmental Aspect Impact Register” is to be filled up by the IMS team.

5.8 OHS Hazard, Risk & Controls

Any activity at the plant, whether it is carried out for ensuring quality of service or meeting requirement of the interested parties, there will be some occupational

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Document No.:
BPDB-IMS-PR-030

Revision No.: 00

PROCEDURE FOR INSTRUMENT AND CONTROL MAINTENANCE- GAS STEAM POWER PLANT

Effective Date: 01-11-2021

Page 8 of 10

hazards with it related to the occupational health and safety (OHS) to the workers and employees. It is a requirement of the IMS of BPDB to identify those OHS hazards and determine necessary controls.

While carrying out the activities and operation, the employees of BPDB need to exercise appropriate and predetermined controls so as to prevent or mitigate any adverse consequence that may be associated with the activity or the process.

Some examples of OHS hazards and with the Procedure for Instrument & Control Maintenance-Gas Steam Power Plant are as below:

SI Nos.	OHS Hazard	Controls
1.	Soldering	1. Provide Necessary training 2. Maintain adequate PPE whilst at worksite 3. Ensure a Permit to Work is issued as per guidance before personnel is sent for work
2.	Energized Components	1. Completely de-energizing equipment, conductors or circuits before an employee begins work 2. Maintain adequate PPE whilst at worksite 3. Ensure a Permit to Work is issued as per guidance before personnel is sent for work
3.	Control Room Fire Hazard	1. Use of fire extinguisher 2. Follow the 'Prevention of Fire and Explosion' Procedure
4.	Failure of PTW Process	1. Provide Necessary Training 2. Active Supervision of activity
5.	Wrong Use of tools	1. Provide Necessary Training 2. Active Supervision of activity
6.	Wrong use of Lifting equipment	1. Provide Necessary Training 2. Active Supervision of activity. 3. Maintain adequate PPE whilst at worksite
7.	Dropped object	1. Provide Necessary Training 2. Maintain adequate PPE whilst at worksite
8.	Fall	1. Provide Necessary Training 2. Maintain adequate PPE whilst at worksite
9.	Expose to Chemicals	1. Provide Necessary Training 2. Maintain adequate PPE whilst at worksite
10.	Cold Burn	1. Provide Necessary Training 2. Maintain adequate PPE whilst at worksite
11.	Chemical Burn	1. Provide Necessary Training 2. Maintain adequate PPE whilst at worksite 3. Maintain adequate housekeeping
12.	Electric Shock	1. Ensure a Permit to Work is issued as per guidance before personnel is sent for work 2. Maintain LOTO Procedure

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Document No.:
BPDB-IMS-PR-030

Revision No.: 00

PROCEDURE FOR INSTRUMENT AND CONTROL MAINTENANCE- GAS STEAM POWER PLANT

Effective Date: 01-11-2021

Page 9 of 10

		3. Maintain adequate PPE whilst at worksite
13.	Wrong Startup	1. Alarm 2. Ensure a Permit to Work is issued as per guidance before personnel is sent for work
14.	Improper re-assembly of equipment	1. Provide Necessary Training 2. Active Supervision of activity

The table above provides examples only. The IMS team of each site needs to identify the OHS hazards and necessary controls related to specific activities and ensures that the environmental performance of the organization is effectively maintained. For this, the procedure Hazard Identification and Risk Assessment Procedure is to be followed and Hazard Identification and Risk Assessment Register is to be filled up by the IMS team.

6.0 References

- a) Defect list from operation
- b) Audit Report

7.0 Appendix

None

8.0 Revision History

SI No.	Revision Number	Section	Change Made	Date of Revision

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Page **10** of **10**

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