



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

PROCEDURE FOR OPERATION AND CONTROL OF
AUXILIARY SYSTEMS – GAS TURBINE



INTEGRATED MANAGEMENT SYSTEM

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1.0 Purpose

- To determine and plan its processes and define the functions that are necessary for providing generation of electric power that can continue to meet the needs and expectations of customers
- To plan and control in accordance with the organization's strategy
- To run the processes under controlled conditions
- To monitor, measure and review activities,
- To ensure a method for safe and quality auxiliary operation.

2.0 Scope

Applies to all Gas Turbine power plant 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

4.0 Roles and Responsibility

None

5.0 Procedure

5.1 Plan of the operational procedures

Auxiliary processes consist of followings:

- | | |
|---------------------------|-----------------------|
| a) Lubricating oil system | d) Jacking oil system |
| b) Water cooling system | e) Turning Gear |
| c) Hydraulic oil system | f) Fuel system |
| Operation | g) Gas booster |

5.1.1 Lubricating oil system:

- The lubricating oil system maintains the quality of the bearing lubricating oil. The system provide the necessary cooling to prevent overheating of the bearing.
- Lubricating oil system consists of three pumps.

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1. Auxiliary lube oil pump (AC); operate automatically during the cool down operation only. If the lube oil pressure fall down during the units at running condition it is run automatically.
2. Main lube oil pump (Gear driven pump); Operate during the running condition only by the power of turbine shaft with the help of an auxiliary gear.
3. Emergency lube oil pump (DC); if the auxiliary power is failed by any cause and the auxiliary lube oil pump stopped then it will be run automatically.

5.1.2 Water cooling system:

The water cooling system removes heat from lube oil by circulating cool water through heat exchanger. After absorbing heat from lube oil heated water circulated through the radiator and cool down by air. It consists of water circulation pump (AC), radiator and Cooling fan. Demi water is used for cooling with a close cycle and operates automatically.

5.1.3 Hydraulic oil system:

- Hydraulic oil system maintain the desire oil pressure to operates and control Inlet guide van (IGV), Gas control valve (GCV), Atomizing air system and trip circuit. It consists of auxiliary pump (AC) and main pump (Gear driven). Gear driven pump operate automatically by the power of turbine shaft with the help of an auxiliary gear.
- If hydraulic oil pressure decrease and reach the certain' low limit then auxiliary hydraulic pump operate automatically during the running condition of the turbine.

5.1.4 Jacking oil system:

During turning operation of the turbine jacking oil is used to lift the turbine shaft. This system maintains desire oil pressure to make thin film between the lower part of the bearing and turbine

- Due to frequent load variation; make sure to maintain the discharge pressure to 24 bars by slightly open/close recycle valve.

Shutdown:

- Decrease the pressure to 22 bars by clicking Hi open recycle valve if CP031 is more than 1 bar that means the compressor is isolated from the system.
- Press on the panel to stop the compressor.
- Reset the turn switch. on HV panel
- Reset the common panel to clear the noise.
- Close the gas cooler fan, enclose fan etc.

5.2 Environmental Aspect, Impact & Controls

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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 Procedure for Operation & Control of Auxiliary Systems-Gas Turbine are as below:

SI Nos.	Aspect	Impact	Controls
1.	Electricity Consumption	Global Warming	1. Ensure Components are running efficiently
2.	Use of lubricant	Soil Pollution	1. Follow the waste management plan 2. Work and dispose as per the chemical disposal plan
3.	Oil Leakage	Soil Pollution	1. Regular Inspection and monitoring
4.	Water Use for Cooling	Water Use	1. Ensure that there is no leakage for water delivery
5.	Paper Use	Natural resource depletion	1. Reuse of Paper with the blank side
6.	Recruitment of incompetent people	Inadequate knowledge on operation and environmental management may lead to unnecessary environmental pollution	1. Awareness training given periodically to relevant staffs on environmental management issues 2. On-job training related to environmental awareness given to staffs and workers.

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

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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 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 Procedure for Operation & Control of Auxiliary Systems-Gas Turbine are as below:

SI Nos.	OHS Hazard	Controls
1.	Leaking Gas Supply Pipeline	1. Check LEL detector Status
2.	Possibility of flammable gases/fumes in engine room chamber	1. Follow the 'Prevention of Fire and Explosion' Procedure
3.	Fire on transformer	1. Regular Inspection and maintenance 2. Follow the 'Prevention of Fire and Explosion' Procedure
4.	Cooling system failure	1. Ensure Regular Maintenance
5.	High Noise Level	1. Staff must wear Earmuff whilst in the Engine room
6.	Slipping due to water spillage on floors	1. Maintain adequate housekeeping. 2. Maintain signage if there is any spill.
7.	Dropping / falling object	1. Maintain adequate PPE (e.g. Helmet) whilst at worksite
8.	Electric shock / Electric Arc	1. Ensure a Permit to Work is issued as per guidance before personnel is sent for work 2. Maintain LoTo Procedure 3. Maintain adequate PPE whilst at worksite
9.	Fire / Explosion at worksite	1. Follow the 'Prevention of Fire and Explosion' Procedure
10.	Heat Stress	1. Ensure Heat Stress Training for all the employees 2. Ensure a good work plan
11.	Getting Stuck in moving / Rotating Parts	1. Ensure protocols are maintained, such as not leave loose long hair, or loose long dress 2. Proper signage 3. Maintain barrier / mark area so that when personnel enter that zone, he/she is obliged to take adequate precautions

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12.	Chemical Spillage / Burn	<ol style="list-style-type: none"> 1. Provide Necessary Training 2. Maintain adequate PPE whilst at worksite 3. Ensure good House Keeping
13.	Burn from contact with hot surface	<ol style="list-style-type: none"> 1. Use of Guards to ensure contact can't be made directly 2. Provide Caution Sign 3. Maintain adequate PPE whilst at worksite
14.	Fumes and gases	<ol style="list-style-type: none"> 1. Maintain adequate PPE whilst at worksite 2. Ensure a Permit to Work is issued as per guidance before personnel is sent for work
15.	Light from welding	<ol style="list-style-type: none"> 1. Provide Necessary Training 2. Maintain adequate PPE whilst at worksite 3. Proper Supervision
16.	Unhygienic work environment e.g. canteen, toilet etc.	<ol style="list-style-type: none"> 1. Maintain adequate housekeeping.
17.	Cuts from Material Handling / movement	<ol style="list-style-type: none"> 1. Maintain Material handling Procedure 2. Ensure a Permit to Work is issued as per guidance before personnel is sent for work
18.	Poor Visibility due to improper lighting	<ol style="list-style-type: none"> 1. Maintain adequate housekeeping. 2. Installing adequate Lighting
19.	Lifting heavy objects	<ol style="list-style-type: none"> 1. Maintain Material handling Procedure 2. Ensure a Permit to Work is issued as per guidance before personnel is sent for work

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

None

7.0 Appendix

None

8.0 Revision History

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