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 – HIGH SPEED DIESEL

1.0 Purpose

a. To establish effective instrument & control maintenance system for the plant and machinery to ensure continuing process capability
b. 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
AE – Assistant Engineer
SAE - Sub Assistant Engineer

4.0 Roles and Responsibility

Tasks in Reference Clause nos.	Responsibility
5.1, 5.2, 5.3, 5.4	Head of instrument & control maintenance, Concerned technical staff, SDE/ AE/SAE
5.5	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

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 off load, permission of the concerned authority is taken.
- Maintenance work is carried out accordingly
- On completion of Maintenance required checking is carried out.
- Maintenance work is recorded AE/ SAE

5.2 Schedule Maintenance

- Seek permit from operation department on schedule issue

- Operation gives permit after isolation
- Respective maintenance work is done following the manufacturer manuals
- Pressure Switches and Gauges
    - The setting of these pressure switches and calibration of the gauges are checked either with a dead weight tester or with a regulated source of clean, dry, compressed air and an accurate pressure gauge
    - The use of air pressure is generally more convenient and is recommended whenever the air pressure is sufficient to check the specified switch setting and gauge calibration
    - To avoid the possibility of oil contamination, it is preferable that air-actuated switches and gauges not be tested with the dead weight tester
- thermometer (Dial Type)
    - To calibrate a dial-type stem thermometer, immerse the sensor a minimum of two inches (5.08 cm) in an agitated bath maintained at a temperature between 1/2 and 3/4 of its full-scale reading or near the maximum temperature normally registered by that particular thermometer, if known
    - By means of an external adjusting screw, rotate the thermometer dial face until the pointer registers the correct temperature
    - The bath temperature must be monitored by a thermal sensing device known to be accurate
- Flow meter
    - The ±1.5% accuracy of the flow meter is checked and calibrated by the manufacturer or a qualified facility
- Vibration Detectors
    - Monitor the vibration levels during j operating
    - Ensure each vibration detector is functional
    - Vibration levels may be monitored directly on the HMI

  - Physically check the mounting security of each vibration detector and detector leads. The Vibrations alarms are 12.5mm and Tripping is at 25 mm.
- Liquid Fuel Indicators
  - When the tank is drained of liquid check that the linkages are free from binding and the float is in good condition.
  - Make sure the high- and low-level switches are set within the limits specified on the Schematic Piping.
- Temperature Switches
  - Temperature switches are pretested, set and locked in the
  - If trouble is experienced in the field, new pretested and set switches are ordered
  - These switches are not tested, adjusted or reset in the field unless a special Fenwal Test Kit, Model 80001-0, is available, since the settings require close tolerances
  - The arrow on the head of the thermo switch unit indicates the direction to turn the adjusting screw for increased temperature setting. One complete turn of the adjusting screw equals
  - Approximately 100_F (56_C).
- Thermostats
  - to check the accuracy of the space heater thermostats in the turbine, accessory and control compartments, compare the setting of the thermostat with the temperature shown on an accurate thermometer
  - f there is a discrepancy of more than five degrees, the thermostat is repaired or replaced
- pressure Regulating Valves (VPRs)
  - If the valve is not operating properly, remove it and bench check it for:
    1. Sensing line restrictions
    2. Ruptured diaphragm
    3. Valve body obstruction
    4. Bent or binding valve stem
    5. Broken spring
  - Refer to the Schematic Piping Diagram or Device Summary for The proper setting of the valve
  - It is recommended that valve diaphragms and stem packings be replaced every five years, unless operating experience indicates that more frequent replacement is necessary
- Temperature Control Valves (VTRs)
  - The temperature -control valves (VTRs) are used to regulate the cooling water flow to the lube oil heat exchanger.
  - The temperature control point of these valves is preset and should require no adjustment for normal operation. The control point is set to control the bearing header lube oil
  - The temperatures are specified on the Device Summary of the Schematic Piping Diagram for each system

- These temperatures should be maintained during normal operation; however, on hot days, the temperature may be exceeded
- An alarm will sound if the temperatures are exceeded. If the alarm sounds, check the following:
  1. VTR valve fully open
  2. Adequate coolant flow going through the lube oil heat exchanger and coolant-to-air heat
  Exchanger.
  3. Proper mixtures of ethylene glycol in water.
  4. Proper air flow through coolant-to-air heat exchangers
  5. Plugged heal exchanger surfaces
- The valve proportional band is defined as that temperature difference in the controlled fluid (sensed by the bulb) which is required to fully stroke the valve
- If the actual valve proportional band varies markedly from that given on the valve nameplate, the valve sensing element may have been improperly assembled into its well or have an improper charge of sensing fluid
- The element could be defective, or there may be too much friction in the valve mechanism
- Sensing bulbs are marked "TOP or "UP" and must be assembled properly
- If it is noted that the valve proportional band increases with time, the sensing element probably has a small pinhole leak and should be replaced
- If the temperature sensing system must be replaced, the valve can be cranked open mechanically and the temperature sensing probe, capillary tube and diaphragm in the valve bonnet can be replaced without having to shut off the cooling water or shut down the turbine
- If sensing bulb is removed for any reason, make sure the bulb temperature well is filled with heat transfer compound prior to reinstalling he sensing bulb
- Refer to the Standard Practices, Recommended Solvents, Sealers and Cleaners section
- Valve stem packing nuts should be tightened just enough to stop water leaks

5.3 Preventive maintenance

- Prepare long-term preventive maintenance plan. at least for 3 'ears 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 shut down

- Maintenance work is carried out following approved plan
- Necessary checks are performed after maintenance work

5.4 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

5.5 Implementation & Review

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

5.6 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-High Speed Diesel are as below:

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

5.7 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 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-High Speed Diesel are as below:

Sl 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 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) User's Manual (GEH-5979). Maintenance Manual (GEH-5980), Application Manual (GEH-6195
b) Audit Report

7.0 Appendix

None

8.0 Revision History

Sl No.	Revision Number	Section	Change Made	Date of Revision