### PREVENTIVE CONDITION BASED MECHANICAL MAINTENANCE

**1 Purpose :**

To describe the procedure for Preventive, Condition Based and Breakdown Maintenance of Blast furnaces & Accessories.

**2 Scope :**

This procedure is applicable to Mechanical Maintenance of equipment of Blast furnaces.

**3 Responsibility and Authority :**

Mechanical Maintenance Section Head. Maintenance.

All Mechanical Staff

**4 Maintenance Procedure:**

* 1. **Preventive Maintenance** :

Preventive Maintenance of equipment of blast furnaces is carried out on fixed time basis. The time schedule for preventive maintenance is normally once a month (after 30 days from the previous maintenance) depending upon the condition of the furnace. A minor variation in scheduled time is considered in view of the condition of the furnace.

The list of activities is recorded in format FRMT /MAINT/06 & 07 ,one for each furnace in advance and issued after review by Manager (Production) one day before the shut down in consultation with all departments concerned. The activities listed for the shut down is derived on the basis of activities, which are mandatory in nature and also on the condition, observed during routine checks. The exact date of shut down shall be determined on the basis of the condition of the furnace. After the completion of the planned activities the status on completion of activities is indicated on the same list or SAP and maintenance department indicates the time of handing over of the furnace. Checklist is followed as per schedule for the inspection of equipment after fix span of time.

* 1. **Routine Mechanical Maintenance** :

Routine maintenance activities such as preparation of spares, overhauling jobs are planned by Manager / Asst Mgrs. / Maintenance at the end of the day for the following day which shall be recorded in the log book kept in workshop .Work Instructions are followed details of, which is available in master list of work instruction.

**4.3 Condition Based Maintenance** :

The levels of vibration and bearing condition of all critical equipments are recorded as per schedule Analysis is done and Corrective actions (including balancing) are taken if the levels of vibration/ temperature exceed the acceptable limits.

**4.4 Break down Maintenance :**

Any failure with the equipment or structure of the equipment not necessarily resulting in shut down of the blast furnace is treated as breakdown; such breakdowns are attended as and when noticed or occurred. During shift period shift crew attends such breakdowns. Record of history of Eqpt. are maintained. Similarly the corrective action for the breakdown of equipment which resulting in the furnace shutdown are taken on the spot and preventive action is planned subsequently to avoid the same in future as per corrective/preventive plan as per format FRMT/MR/04. (Depending upon the breakdown)

1. **List Of Equipment :**

List of Equipment is available in the equipment module of ERP system.

1. **Spares Planning :**

The spares planning are carried on the basis of lead time for procurement, criticality of equipment, historical consumption pattern etc. The levels have been fixed on the basis of these factors. EDP center contains the min level of spares and information is triggered when the level goes below min level. A review of critical spares is carried out at regular intervals by Manager with Sr Engineer - Planning and a list of such items is furnished to purchase dept every week during production review meeting for follow up.

**Inspection of Spares:** Sr. Engineers – planning inspect Spares received at the main stores as per the specification, drawings furnished in the purchase order. Any discrepancy is reported to the Manager Stores.

**7 Corrective and Preventive Action :**

Breakdowns are analyzed and corrective and preventive actions are taken to prevent them from occurring. Records of such activities are maintained. Improvements and modifications are carried out proactively to enhance plant availability and reliability by improving the material of construction, methods etc.

**8 Relining and major repairs :**

Relining of blast furnace is decided on the basis of condition of the refractory lining the wear out of refractory is noticed from changes in operating parameters and also visually checking through the inspection opening on the furnace top during monthly planned shut downs. Evidence of such observation is maintained in the planned shut down record.

**9 Checklist :**

Checklists are prepared and followed for inspection of critical equipment as per list given for check list in the master list of records.

1. **Improvement & Up gradation :**

Need of Improvement and up gradation of the equipment are being studied every year to improve work safety, quality & easiness of job and also to increase the efficiency of the available system with inclusion of new assets and accordingly capital proposals are made for each financial year. Similarly proposals are made in coordination of project department to suit the available condition.

1. **Work instruction :**

Work Instruction for certain required jobs are made as listed in master list of work instruction. And this is strictly followed while carrying out the stated jobs. It is review by HOD- maintenance depending upon the scope of the job. New detected work instruction is subsequently added to the list as per the need.

1. **Formats :**

Formats are made and maintained as per master list of Format.

1. **Records :**

Records are maintained and followed as per master list of record and is being retained till its retention period as indicated in the master list.

**Amendement Record**

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| **Date** | **Manual Section Ref. & Para** | **Brief details of Revision** | **New Rev.** |
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| **Prepared By:**  Area Engineer | **Reviewed & Issued By:**  Management Representative | **Approved By:**  Mechanical Head |
| **Signature:** | **Signature:** | **Signature:** |
| **Date:12.12.2022** | **Date:12.12.2022** | **Date:12.12.2022** |