

# Coal handling plant

- Coal
- Unloading system
- Conveyor system
- Crushing system
- Feeding system
- Stacking system
- Magnetic separator/ metal detector
- Bin/chute vibratory system
- Coal weighment
- Coal sampling
- Fire fighting system
- Dust suppression system
- Dust extraction system

# CATEGORIZATION OF COAL

Grade	UHV (Kcal / kg) approx.	Equivalent GCV (Kcal / kg) approx.
A	UHV > 6200 Kcal / Kg	GCV > 6401
B	6200 > = UHV (Kcal / Kg) > 5600	6401 > GCV >5800
C	5600 > = UHV (Kcal / Kg) > 4940	5801 > GCV >5400
D	4940 > = UHV (Kcal / Kg) > 4200	5401 > GCV >4800
E	4200 > = UHV (Kcal / Kg) > 3360	4801 > GCV >4200
F	3360 > = UHV (Kcal / Kg) > 2400	4201 > GCV >3600
G	2400 > = UHV (Kcal / Kg) > 1300	3601 > GCV >3200

•“Useful Heat Value” :  $UHV = 8900 - 138 (A + M)$  where

UHV = Useful Heat Value in Kcal / Kg / A = Ash content (%) M = Moisture content (%)

•In the case of coal having moisture less than 2 percent and volatile content less than 19 percent, the useful heat value are arrived as above reduced by 150 kilo calories per kilogram for each 1 percent reduction in volatile content below 19 percent fraction prorata.

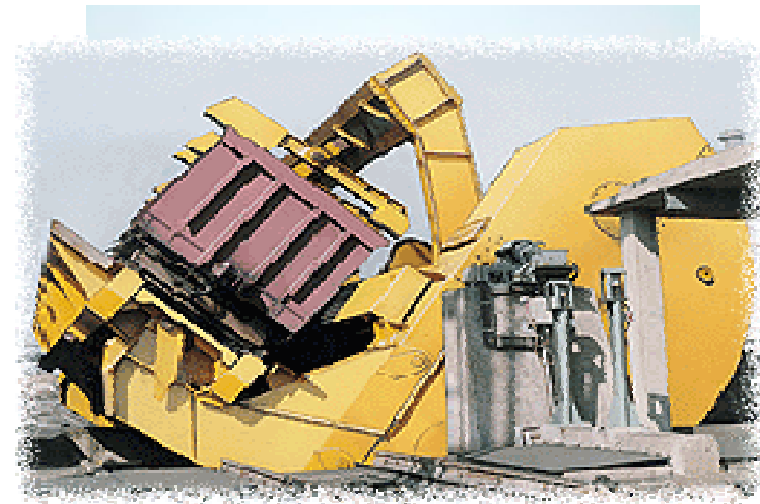
Both moisture and ash are determined after equilibrating at 60 percent relative humidity and 40<sup>0</sup>C temperature as per relevant clauses of Indian Standard Specification No. IS 1350 –1959

“Gross Calorific Value” at constant volume is the quantity of heat liberated by combusting the fuel at constant volume in oxygen saturated with water vapour, the original material and final products of combustion being at a reference temperature at 25<sup>0</sup>C and the water obtained from the fuel being in the liquid state.

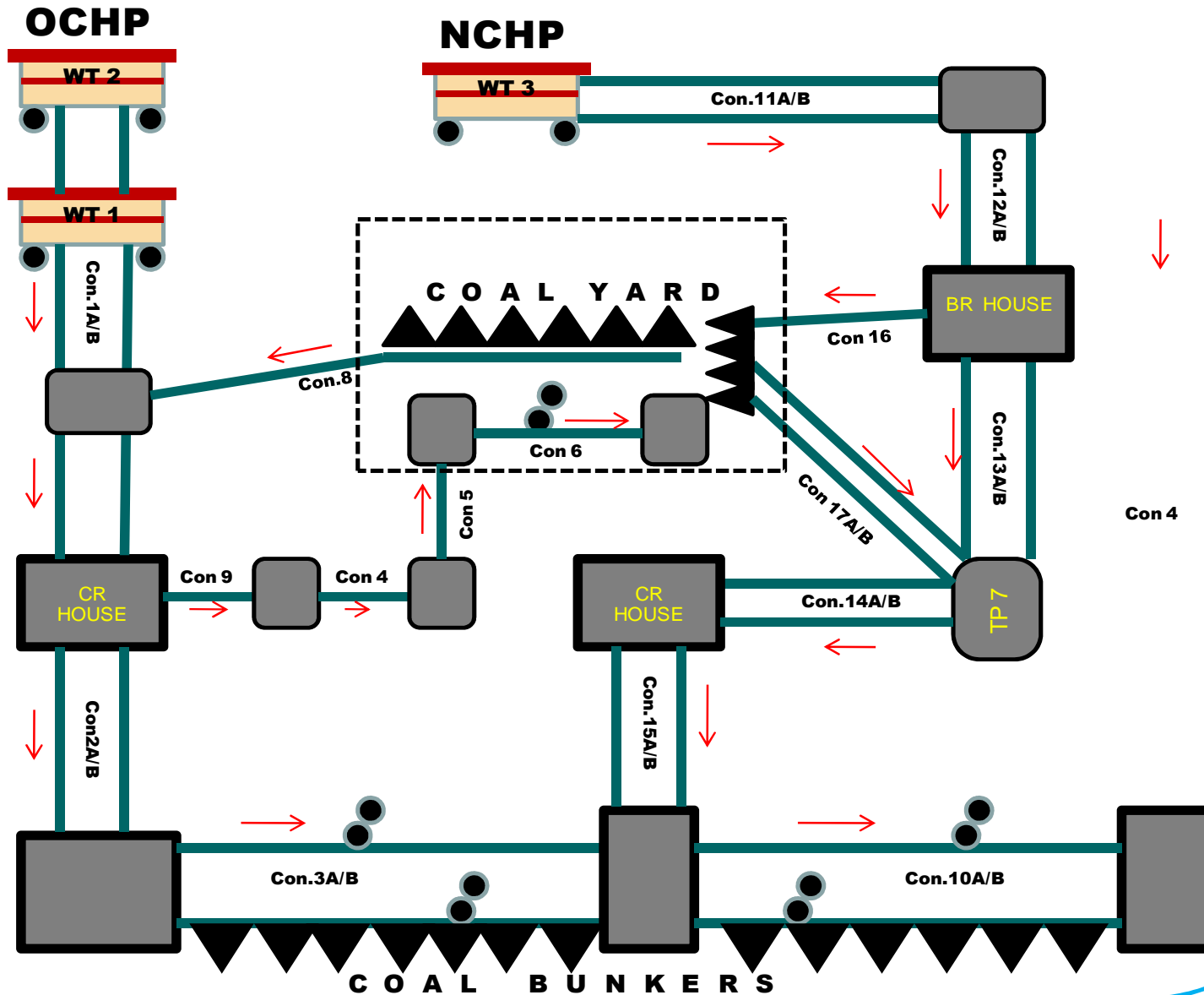
# COAL CHARACTERITIC

- Moisture 6-7%
- Ash 24-33%
- Volatile matter 24-28%
- Gross Clorific Value 4778-4944 kcal/kg
- Hardness index 45-50
- Density 0.8MT/m<sup>3</sup>
- Size 250mm

# Coal unloading



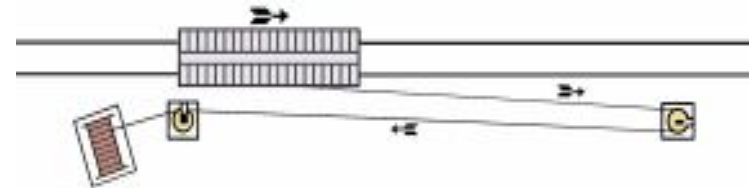
# LAY OUT OF COAL HANDLING PLANT BTPS



# Wagon placement system



Side Arm Charger for hauling rake of wagons, placement of wagons on tippler table and evacuation of empty wagons from tippler table.



Car puller

By attaching rope to rear pulling loop on car, front of car can be brought somewhat beyond position of single sheave block.



Rabbit charger



locomotive

Beetle charger



# Conveyor system

- Idlers – Troughing, Return, Impact, Self aligning
- Pulleys- head, tail, bend, snub pulleys
- Counter weight/ take up
- Gear box, fluid coupling, hold back, scraper
- Duct, flap gate, liners, deflector plate, skirt board
- Dust suppression, fire fighting
- Pull cord, zero speed , belt sway , EPB

# conveyors

- Capacity old/new -600/800T/hr
- Speed old/new- 2.3/2.5m/s, 18A/B-1m/s  
11A/B,12A/B-2.9m/s
- Breadth- 1000mm
- Material nylon fabric
- Trough 35'
- Cover grade- fire resistant
- Ply/top thick/bottom thick-4/5mm/2mm



# Conveyor system



Conveyor gallery



Belt sway switch



Pull cord switch



Self aligning roller



Zero speed switch



Counter weight

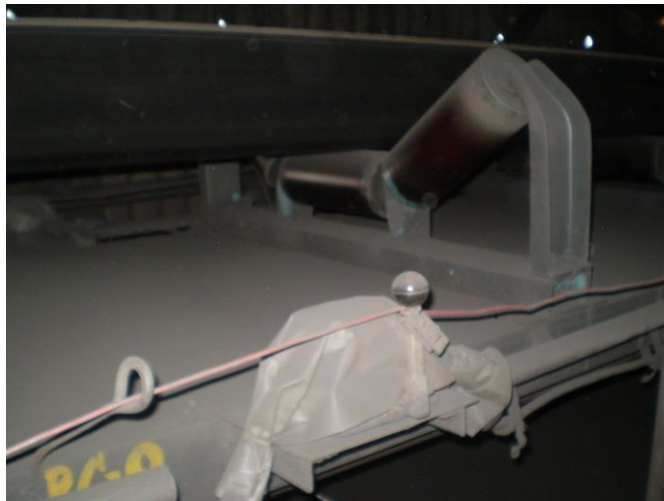
# Conveyor system



Hold back



Return roller



Pull cord switch



Snub pulley



# Metal detector, online ms



# Conveyor system



Inline magnetic separator



Conveyor head pulley



Bin/chute vibrator

electromagnetic bin vibrator well-suited for use on hoppers, chutes, tracks, or bins. The coil is encapsulated to protect against liquids, dust, and mechanical damage. The vibrator requires an electronic controller such as Automation Devices' Model 6000, set for DC operation which produces 3600 VPM. Power consumption is approximately 225 watts.



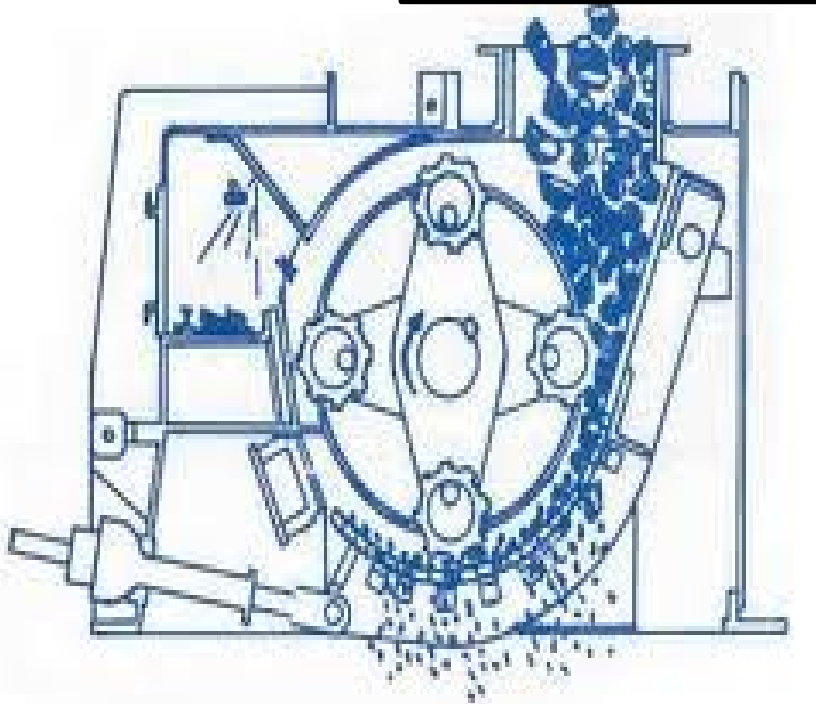
Bin/chute vibrator

# Crushing system

- Ring granulator
- Primary crusher/beaker



# Coal crushing system



Deluge system



Primary crusher/ rotary breaker

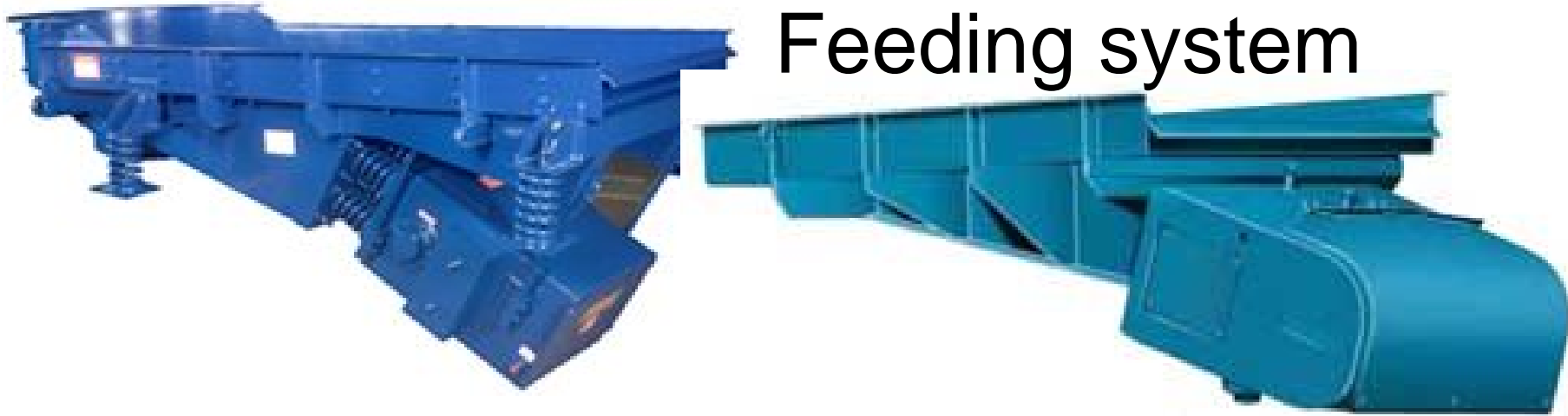


Zero speed switch





# Feeding system



## How Feeders Work and Benefits

Vibrating feeders are classified in two sub-groups, these being Electro-magnetic feeders and Electro- mechanical feeders. Electromagnetic models incorporate an electric motor which energizes a magnet, enabling it to activate multiple times per minute. Every time the magnet is energized it creates a 'stroke' action which resonates through the feeder trough and vibrates the materials in a uniform, high controlled flow towards the end of the trough. As there are minimal or no moving components in these feeders, they are exceptionally reliable units that offer precise feed control where batch weighing and flow control needs to be precise.

Electro-mechanical feeders are also reliable units with many models offering economical value compared to electromagnetic models. Material flow is coarser and the occasional preventative maintenance will need implementing. Instead of magnet activation, these feeders may utilize an eccentric motor, vee-pulley, cam and bearing arrangement to introduce the vibrating action. These units are capable of operating in the harshest conditions and are unrelenting in moving massive volumes of coal, rock or aggregates.

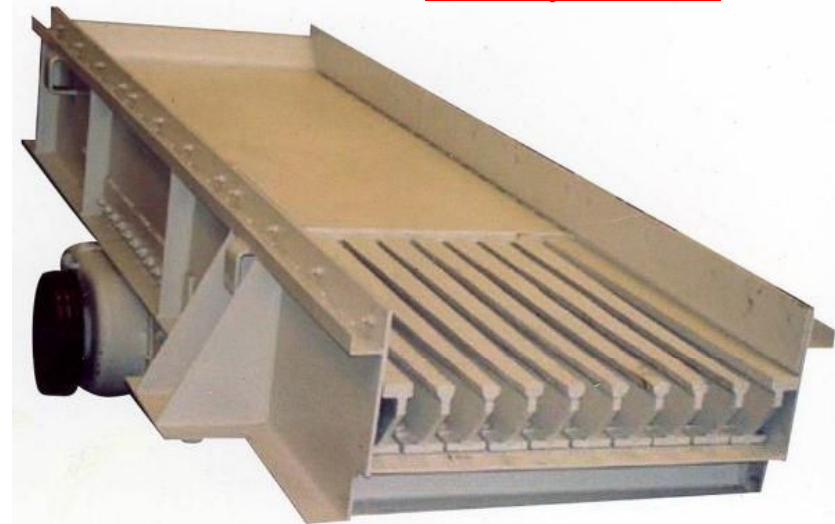


# Feeding system

Electromagnetic vibrating feeder



Grizzly feeder



Apron feeder

# Feeding system



Suspended vib. feeder

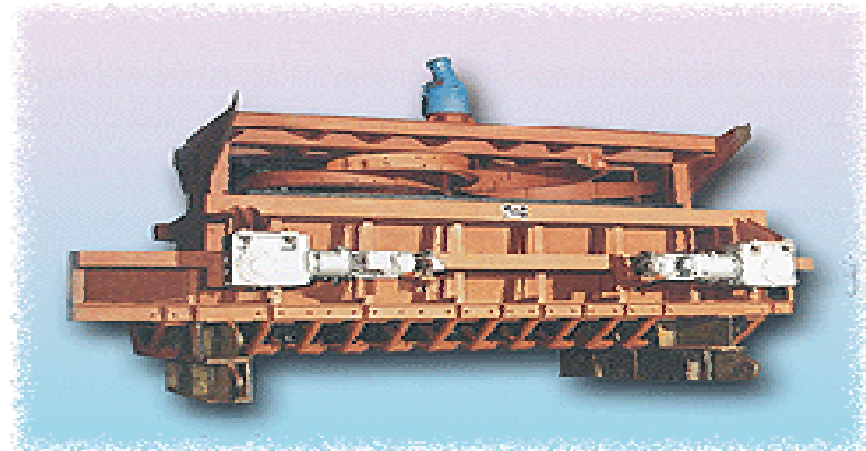
The vibratory screen adopts the barrel type of eccentric shaft vibration exciter and eccentric block to adjust the swing



Vibrating screen



Stacker & reclaimer in reclaiming action



Paddle feeder

# V feeder, crusher, hyd coupling, RPG



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# Stacking system



Tripper trolley



Overhead conveyor stacking



Stacker reclaimer in stacking



Tripper trolley

# Dust extraction system



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# Coal sampling unit, belt weigher



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# Stacker-reclaimer



A stacker usually operates on a rail-like structure with movable wheels, but the main operation is performed on a fixed place.

Stackers are used to stack into different patterns, such as cone stacking and chevron stacking. Stacking in a single cone tends to cause size segregation, with coarser material moving out towards the base. Raw cone ply stacking is when additional cones are added next to the first cone. Chevron stacking is when the stacker travels along the length of the stockpile adding layer upon layer of material.

The controlling system used is typically a PLC ([programmable logic controller](#)) with an HMI ([human-machine interface](#)) for display connected to a central [control system](#).

Other than stacking, the stacker does three basic movements: luffing, travelling and slewing.

Luffing: This is vertical movement (that is, up & down) by hydraulic cylinders .

Travelling: The stacker moves on a [rail track](#). All the controls are in the controller's cabin which is above the boom conveyor. The new stackers can be controlled remotely.

Slewing: This is the movement of the stacker around its central axis (that is, rotary movement). This allows aligning or placing the stockpile in the required area as per requirement. This works mostly by swel penion which rotates around a swel base. This type of gear assembly is called the [sun and planet](#).

Most stackers are electrically powered by way of a trailing cable. There are basically two types of cable trailing: PCRDR (power cord rotating drum) and CCRDR (control cable rotating drum). Pendulum adjustments are made to ensure the proper alignment of these cables while the stacker is travelling.

# permissive

- Belt status ready (pull cord, BSS, EPB, Control supply)
- Discharge gate on running belt open and that belt is running



# interlock

- In case of any belt trip, entire system behind except crusher will stop
- Any other belt of pair will not start on the same discharge belt except 1A&1B
- Corresponding feeder will trip if any belt trips

# protection

- Belt & following system except crusher will trip in case of operation of BSS
- In case of excessive belt slippage, low speed due to over load or otherwise, belt not running although motor running, belt snapped than belt and following system will stop through zero speed switch
- Overloading of more than 600T/hr
- Motors are protected against over load, short circuit, single phasing

# Operation of CHP

## General Instructions

- Before starting the plant, check which of the equipment is available and accordingly plan an appropriate path for the movement of coal.
  - Ensure that the path so planned, is clear for coal movement i.e. Flap Gate position, Interlocking etc.
  - Before starting any equipment ensures that the equipment is not subject to a P.T.W.
  - Check from each location that the equipment is ready for start and no persons are working on the equipment.
  - Line up the system by starting each equipment from the last conveyor in the up-stream path.
  - Good communication between the control room and different equipment locations is essential before starting the system.
  - Ensure that all Metal Detectors and Magnetic Separators are working properly on running conveyors and foreign material removed, where necessary.
  - Ensure that all Electrical systems are healthy and all the protection systems mentioned below are in service.
    - a) Hooters
    - b) Emergency Push Buttons
    - c) Pull Cord switches
    - d) Zero-speed switches
    - e) Belt sway switches
    - f) Chute block switches
    - g) Crusher bearing vibration-monitoring equipment
    - h) Interlocks
    - i) PA System
    - j) Magnetic Separators
    - k) Metal Detectors
    - l) Electro Magnetic/Thrust Brakes installed in long conveyors
- Adequate lighting should be ensured in all the areas.

# Operation of Paddle Feeders

- The Paddle Feeders feed the coal on the conveyor belt from the Track hopper at a controlled rate. The paddle blades projected in the hopper slot scoop the coal from hoppers and discharge it on the conveyor belt running below.
- The following points need to be checked before taking any paddle feeder into service.
  - a) The paddle arms are free from any obstruction.
  - b) There is no leakage at gearboxes and fluid couplings and the oil levels are correct.
  - c) There is no leakage of hydraulic oil, in the case of hydraulically driven paddle feeders, and the oil levels are correct.
  - d) The cable reeling drums for correct winding and unwinding.
  - e) The paddle feeder is operating only in interlock mode.

# Operation of Conveyors

- Various conveyors are provided for transporting the coal from Track hopper to Bunkers.
- The following precautions are to be taken before taking any conveyor into service:
  - a) There is no oil leakage at gearboxes / fluid couplings and the oil levels are correct.
  - b) The Discharge and Receiving chutes are free from jamming and choking.
  - c) The Flap Gates are in correct positions.
  - d) All inspection doors are in the closed position.
  - e) All pull-cords are reset and the EPB is released and ensure that all protections are healthy.
  - f) The Alarm Siren is in working order.
  - g) Communication facility is available.
  - h) The lighting is adequate.
  - i) No Permit To Work (Isolation) is pending against that conveyor.

# Operation of Stacker Reclaimer

- The Stacker Reclaimer is provided to stack the excess coal received from the mines and to reclaim the coal, as and when required.
- The following points need to be checked before returning Stacker Reclaimer into service:
  - a) The track is clear of obstructions.
  - b) There is no leakage from gearboxes, fluid couplings & hydraulic system. The oil levels are correct.
  - c) The availability of power supply is checked.
  - d) All operations e.g. travel; slewing, luffing etc. are available.
  - e) Brakes are clean and functioning correctly.
  - f) CRD cable is free from damage and any obstruction and is tensioned correctly.

# Operation of Crushers

- Ring Granulator type crushers are provided to crush the coal generally from (-) 250 mm/100 mm size to (-) 20 mm size. The following points need to be checked before returning any crushers to service:
  - a) The crusher shall be clear from any jamming.
  - b) All inspection doors are in the closed position and locked.
  - c) There is no leakage at gearbox and fluid couplings and the oil levels are correct.

# Operation of Trippers

- Trippers are provided on coalbunkers to receive coal from the conveyors and feed it to the bunkers. The tripper is mounted on rails and feeds coal to the bunkers for use on all the units. The following checks are to be carried-out before taking the tripper into service:
  - a) The availability of supply.
  - b) That the brakes are clean and functioning correctly.
  - c) The tripper discharge chute is free from jamming/blockage.
  - d) That the CRD cable is free from any obstruction and is tensioned correctly.





TYPICAL CHP

THANKS



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