

DIRECTORATE GENERAL BORDER ROADS
GENERAL MAINT INSTRUCTION NO 201
ON

30/45 TPH AUTO BATCH KHOT MIX
AS PHALT PLANT (APOLLO)

1. INTRODUCTION

- 1.1 Modern High ways are being constructed by laying Hot Mix of various aggregate and bitumen of desired composition in predetermined thickness. To have a good quality, speed and better riding surface, Auto HMP of higher capacity has been introduced in the BRO Ministry of Surface Transport (MOST) has also made it mandatory to use Auto batch type of HMP for the construction of National Highways. Regular servicing and preventive Maintenance are essential to prolong the life of the plant ,ensure timely repairs to arrest defects from developing into major one , to operate plant efficiently at all times ,to minimum break-down and time loss.
- 1.2 These instructions are issued as guidelines for general and scheduled maintenance, lubrication and safety precaution. In case of any doubt, manual issued along with the machine may be referred.

2. AIM

To enumerate the details of periodic add preventive maintenance of 30/45 TPH AUTO BATCH HOT MIX PLANT (APOLLO).

3. ACTION BY

- (a) USER UNIT:- To carry out periodic inspection, regular and preventive maintenance task as laid down.
- (b) FIELD WKSP (GREF) :-
- (i) To carry out and monitor, maintenance schedule and periodic oil changes as per periodicity laid down by the manufacturer.
- (ii) Advise user units in respect of any discrepancy/short coming noticed.
- (c) MOBILE MAINTGENANCE TEAM : To ensure, lubrication, maintenance is carried timely and accordingly apprise OC Field Wksp for necessary action., if required.

4. DETAILS:-

- (a) Composition of plant and unit wise general maintenance of plant are given in Appx'A'.
- (b) Periodical maintenance is given in Appx'B'
- (c) Safety precautions, guideline for lubrication and lubrication chart are given in Appx'C'.

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COMPOSITION AND UNIT WISE GENERAL MAINTENANCE: 30/45 TPH AUTO BATCH HOT MIX ASPHALT PLANT (APOLLO)

1. The composition of 30/45 TPH Auto Batch Hot Mix Plant is as under:-

- 1.1 FEEDER UNIT
- 1.2 DRYER
- 1.3 BURNER
- 1.4 HOT ELEVATOR
- 1.5 INCLAIND VIBRATING SCREEN
- 1.6 HOT STORAGE BINS
- 1.7 AGGREGATE, BITUMEN AND FILLER WEIGH HOPPERS
- 1.8 PADDLE MIXER
- 1.9 DUST COLLECTION SYSTEM
- 1.10 MIXED MATERIAL STORAGE
- 1.11 BITUMEN STORAGE SYSTEM
- 1.12 FILLER SURGE HOPPER

2. The maintenance will be carried out as per following schedule:-

- 2.1 Daily - 8 to 10 operating hours
- 2.2 Weekly - 50 to 60 operating hours
- 2.3 Monthly - 200 to 250 operating hours
- 2.4 Three monthly - 500 to 600 operating hours

3. **GENERAL MAINTENANCE:-** Following paras laid down the unit wise maintenance to be carried out on this plant:-

3.1 FEEDER UNIT INCLUDING BELT FEEDER AND COLLECTING AND FEED CONVEYOR

3.1.1 Belt should be visually checked (running) on a daily basis.

3.1.2 Conveyor drive V-belt should be tensioned without putting excess stress on motor by adjusting reduction gear box torque arm. Ensure drive is transmitted without slip.

3.1.3 All guards and placed when the unit is operation.

3.1.4 Keep bearings lubricated (See lubrication chart for periodicity and grade Appx 'C').

3.1.5 Belt should be kept aligned.

3.1.6 Belt scraper must be free and the blade in good condition.

3.1.7 Rubber drapes should be checked daily and adjusted as necessary to prevent spillage.

3.1.8 Ensure no rollers get jammed.

3.1.9 Build up of sticky materials should be removed as soon as is apparent.

4. DRYER

4.1 Lubricate support roller and thrust roller bearings in accordance with the lubricants chart and periodicity Appendix 'C'.

4.2 Drive chain should be tensioned.

4.3 Drive gear box oil should be checked monthly basis.

4.4 Oil level of fluid rive coupling should be checked every three months.

4.5 Expansion mountings and '2' buckets should be inspected periodically any broken or missing bolts must be replaced.

5. BURNER (MODEL RTH-250)

5.1 Keep exterior of burner and accessories clean.

5.2 Inspect spark electrodes weekly, remove, clean as required and reposition.

5.3 Clean front swirl plate weekly, Excessive build up of dust will restrict full air flow.

5.4 Remove and clean fuel line filter weekly by washing it in paraffin.

5.5 Clean photocell at least weekly.

5.6 Lubricate linkage between butterfly air flaps once every year.

5.7 Blower motor bearings should be lubricated once every year.

5.8 Alternator motor bearings should be lubricated once every year.

5.9 Remove and clean jet and nozzle assembly weekly, using paraffin. Care must be exercised when replacing jet.

5.10 Any material builds up inside or on top of burner. Cone should be removed immediately or weekly inspection.

NOTE: - Under dusty environment condition the burner gets jammed the swirl plate be cleaned more frequently.

6. VERTICAL HOT ELAVATOR

6.1 The sliding plate which holds the tail-shaft assembly on either side of the casing must be checked daily for free movement.

6.2 Chain tension should be maintained and adjusting bolts should be kept greased.

6.3 Gear box and fluid pulley oil level should be checked. Monthly or 200-250 hours operating. Head and tail-shaft bearing require lubrication. Drive belts tension should be checked.

6.4 Inspection of chain and buckets should be carried out monthly or 200-250 hrs of operation.

7. VIB SCREEN

7.1 Lubrication of bearing is the most important feature (see lubrication chart- Appx'C') and lubricates daily or 8 operating hours.

7.2 Bearing labyrinths should be kept fully charged with grease as per lubrication chart.

7.3 Meshes should be kept correctly tensioned. Securing bolts should be checked weekly for tightness.

7.4 tension of drive should be checked weekly. Adjustment is carried out by moving the motor on its slide rail.

NOTE: - CORRECTLY TENSIONED BELTS OF 1M CENTERS (BETWEEN SHAFTS PULLY) CAN BE DPPRESSED APPROX 35MM AT CENTRE OF SPAN BY MODERATE PRESSURE.

7.5 Check support springs weekly for trapping of aggregate. Remove any build up of dust/aggregate.

8. HOT STORAGE BINS

8.1 Virtually no maintenance is required. Keep the discharged door bearings lubricated as recommended in the lubrication chart. Check interiors and discharged doors for wear on three months basis or 500 to 600 operating hours.

9. WEIGH SECTION

9.1 Batch weigh hopper:- Keep discharge door bearing lubricated (weekly or 50 operating hours). Check suspension (either weigh or load cells) basis to ensure free from build up or aggregate or dust.

9.2 Filler weigh Hopper:- Keep discharge door bearing lubricated (weekly or 50 operating hours). Ensure weigh gear free. Check vent fitted on top or for any restriction on weekly basis.

9.3 Bitumen Weigh Hopper:- Ensure weigh gear free.

CAUTION:-

If any welding to be done in the vicinity of load cells, disconnect power supply.

10 MIXER

10.1 lubricate:-

- (i) Main shaft bearing with labyrinth grease as recommended. (see lubrication chart-Appx 'C')
- (ii) Mixer drive gear box as recommended (see lubrication chart)
- (iii) Mixer door bearings, keep well lubricated daily.

10.2 Motor drive belts to kept tensioned.

10.3 Arms and tips should tips should be kept tightened.

11. DUST COLLECTION SYSTEM

11.1 Exhaust fan:-

- (i) Check tension and condition of 'V' belts monthly.
- (ii) Clean impeller for dusted for corrosion monthly.
- (iii) Check for excess vibration and tightness of holding down bolts monthly.
- (iv) Lubrication bearings as recommended in lubrication chart.

11.2 Screw conveyor:-

- (i) Lubricate bearings as per lubrication chart –Appx 'C'
- (ii) Check seal at conveyor end plates which may be stuffing box or felt seal. Replace gland packing monthly.
- (iii) Change gear box oil at six monthly intervals.

12. MIXED MATERIAL STORAGE UNIT

12.1 Carry out visual inspection.

12.2 Bitcren system

- (i) All cocks to be lubricated daily using either sticks of grease inserted in the core of the valve and manually turned, it is usually injected by a grease gun this requires a lighter grease.
- (ii) constant attention to be bitumen pump gland is required. Gland packing should be renewed on a three months basis or earlier, if it is leaking.

13. FILLER SYSTEM:-

13.1 Lubrication screw conveyer bearings as per lubrication chart-Appx 'C'

13.2 Screw drive belts tension should be kept tensioned.

13.3 Drive gear box oil level checked monthly, change oil six monthly.

14. PNEUMATIC:-

14.1 Air compressor:-

- (i) Check oil level daily.
- (ii) Clean air filter daily, if eqpt is deployed in dusty environment. Otherwise clean it once a weekly.
- (iii) Clean oil cooler and after cooler weekly.
- (iv) Every 2000 hrs change oil. Clean oil filter clean return valve, change air intake filter element.

14.2 Check line pressure daily, should be 95 psi (7 bar) adjust by use of pressure regulator.

14.3 Check daily that any automatic drain valves fitted are ejecting water.

14.4 Check daily operation of air line lubricator.

PERIODICAL MAINTENANCE SCHEDULE

1. DAILY 8 TO 10 OPERATING SCHEDULE

- 1.1 Lubricate all grease nipples with red discs, in particular screen bearings and mixer door.
- 1.2 Check tracking of all feeders and conveyor belts, ensure all conveyor idlers belt scraper and are turning free.
- 1.3 Check feed hopper and feed boot rubber drapes for spillage, adjust if necessary.
- 1.4 Screw in lubrication plug bolt of all bitumen cooks in use.
- 1.5 Check hot elevator tail shaft for freedom of movement.
- 1.6 Drive chain oil bottles, refill.
- 1.7 Clean all air filters where situated in dusty environment (air compressors, pneumatic blower, and pyrometer blower).
- 1.8 Check all pressure gauges temperature gauges and ensure are in working order.
- 1.9 Check air compressor sump oil level.
- 1.10 Recharge air line lubricator with appropriate oil. Check operation of automatic drain valves.
- 1.11 Cleanout mixer after use.

2. WEEKLY 50 TO 60 OPERATING HOURS

- 2.1 Lubricate all grease nipples.
- 2.2 Check freedom of feeder.
- 2.3 Inspect all conveyor belts for wear or damage repair if necessary. Check belt scraper blade for wear and adjust as required to ensure there for wear and adjust as required to ensure there is no slippage.
- 2.4 Inspect burner combustion cone fir distortion clean out dust any debris. Clean swirl plate photo cell and nozzle jets, clean fuel filter check electrode settings. Lubricate linkage.
- 2.5 Check screen meshes for tightness and wear.
- 2.6 Check screen drive belts for tension.
- 2.7 Check screen support springs for material build up.

- 2.8 Inspect all weigh gear for freedom of movement.
- 2.9 Check filler weigh hopper discharge door seal for security.
- 2.10 Check filler weigh hopper vent clear.
- 2.11 Clean all air filters, on blowers, compressors and fuel systems not already cleaned on daily basis.
- 2.12 Check bitumen tank level indicators.
- 2.13 Clean air compressor oil cooler.
- 2.14 Clean pyrometer lens.

3. MONTHLY 200-250 OPERATING HOURS

- 3.1 Lubricate all grease nipples.
- 3.2 Check oil level in all gearboxes.
- 3.3 Inspect elevation chain and buckets. Check sprockets.
- 3.4 Check elector discharge adjustable plate and chute for wear.
- 3.5 Check mixer arms and tips for wear.
- 3.6 Check tension and condition of all V- belts and drive chains.
- 3.7 Clean exhaust fan impeller and check for corrosion. Check tightness of holding down bolts.
- 3.8 Inspect ducting temperature probes for wear.

4. THREE MONTHLY (500-600 OPERATING HOURS)

- 4.1 Check fluidrive coupling oil levels.
- 4.2 Check dryer lifters for wear.
- 4.3 Check interiors of hot bins and discharge door for wear.
- 4.4 Repack bitumen pump gland packing.
- 4.5 Check weigh gear calibration with weights.

5. SIX MONTHLY

- 5.1 Drain and refill all gearbox oils.
- 5.2 Dismantle, clean inspect and overhaul rotary valves.

6. ANNUALLY

- 6.1 Lubricate motor bearings.
- 6.2 Lubricate burner actionator motor gears.
- 6.3 Change oil bearing grease where not fitted with grease nipples.
- 6.4 Change air compressor sump oil. Clean oil filter. Clean oil return valve. Change air intake filter element.

NOTE: - FOR PERIODICITY GRADE OF OIL/GREASE REF LUBRICATION CHART- APPENDIX 'C'

Appendix 'C'

GENERAL GUIDE LINES FOR LUBRICATION

1. Grease all bearings as per the lubrication chart colour coded discs supplied with the plant.
2. In case colour coded lubrication chart is not supplied with the machine, the lubrication of bearing, buses and gear box should be carried out as mentioned below:-
 - 2.1 Roller bearing monthly.
 - 2.2 Bush bearing weekly.
 - 2.3 If operating in dusty environment, grease more frequently.
 - 2.4 If units gets hot, grease more frequently (consider if high temp, grease would be more suitable).
 - 2.5 Some bearings have been supplied with out grease nipples have been supplied with out grease nipples (i.e. exhaust fan shaft bearing). Replguish on annual basis.
 - 2.6 Should plant be run double shifts, greasing frequency should be increased pro rates basis.
 - 2.7 All gear box oil levels should be checked monthly. Oil should be changed on regular interval, (As per lubrication chart). Lubricant G/B If plant being operated on 40 hours a week basis, oil should be changed every 6 months.

Appendix 'C'

LUBRICATION CHART

AUTO BATCH TYPE HMP 30/45 TPH EX-APOLLO

| S/NO | Location of item to be lubricated | Name of the item to be lubricated | Lubricating oil to be used | Time period for flush refill Hrs | Approx qty of oil reqd per item in liters | Approx qty of oil reqd in liters |
|------|-----------------------------------|-----------------------------------|-------------------------------------|----------------------------------|---|----------------------------------|
| 1. | Four bin feeder Conveyors | Gear box C 20 Fenner make | Servo gear HP 90 or 140 | 700 | 0.6 | 2.4 |
| 2. | Gathering Conveyors | Gear box D 20 Fenner make | Servo gear HP 90 or 140 | 700 | 1.2 | 1.2 |
| 3. | Slinger Conveyor | Gear box D 5 Fenner make | Servo gear HP 90 or 140 | 700 | 1.4 | 1.4 |
| 4. | Dryer unit | Gear box 7 FSM Elecon make | Servo gear HP 90 or 140 | 700 | 9.0 | 9.0 |
| 5. | Hot Aggregate Elevator | Gear box 7 FSM Elecon make | Servo gear HP 90 or 140 | 700 | 9.0 | 9.0 |
| 6. | Filler Elevator | Gear box 4 NU Elecon make | Servo gear HP 90 or 140 | 700 | 3.5 | 3.5 |
| 7. | Dust & Mineral Screw Conveyor | Gear box C 20 Fenner make | Servo gear HP 90 or 140 | 700 | 0.6 | 0.6 |
| 8. | Mixing unit | Gear box 7 FSM Elecon make | Servo gear HP 90 or 140 | 700 | 9.0 | 9.0 |
| 9. | Bitumen tank | Gear box 4 NU Elecon make | Servo gear HP 90 or 140 | 700 | 3.5 | 3.5 |
| 10. | Dryer & Mixing Unit | Fluid Coupling 12B7Pembril make | Servo system 311 or 314 | 700 | 5.7 | 11.4 |
| 11. | Air Compressor | DPS 12 model KAC make | Servo system 320 | 700 | 4.2 | 4.2 |
| 12. | F.R.L Unit | Oil Cap Schrader bellows | Servo gear HP 90 or 140 | 56 | 0.2 | 0.2 |
| 13. | Dryer chain | Chain 3.075" P | Servo grease Molex/SAE 40 | 56 | 15.0 | 15.0 |
| 14. | All Bearing Block | Bearing Reputed make | Servo gem Greaseno2or3coldSecweekly | Hot Sec daily | 5kg | 5kg |
| 15. | Fuel tank | Apollo Make | Servo Therm Medium | 2800 | 600 | 600 |

It is only a thermic fluid & should not be heated more

Note: - For all gear boxes. Please check oil level daily

Appendix 'C'

SAFETY PRECAUTION

1. Before undertaking maintenance disconnect any motors from the electric supply. Ensure it cannot be reconnected inadvertently.
2. If work is associated with pneumatically operated equipment, the complete air circuit, including reservoir, must be drained.
3. All guards must be replaced before re-start, If the particular task calls for their removal.
4. If extended greasing pipe are in use, it must be ensured that there are no breaks/ leaks in tubing and connection on actual bearing housing is secure.
5. Inspect the burner flame through the sight hole as the back of the boiler, the sight glass must be clean and free from any discoloring. Do not attempt to remove this whilst the burner is in operation. Do not look directly at burner flame without viewing through furnace glass or welding goggles.
6. Before turning on the main switch, always make sure that all valves in the oil pipes between tank and burner (including automatic fusible fire valve if any) are open so that there is a free path for oil to expand back to the storage tank as it heats up.

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