

DIRECTORATE GENERAL BORDER ROADS
GENERAL MAINTENANCE INSTRUCTION NO-216
ON
PERIODICAL MAINTENANCE OF CHICAGO PNEUMATIC
DIESEL SCREW COMPRESSOR

INTRODUCTION

1. This General Maintenance Instruction covers the periodical maintenance of Chicago Pneumatic Diesel Screw Compressors. The rotary screw air compressor is a single stage oil flooded, rotary compressor driven by an engine through a coupling. The compressor casing accommodates a pair of male and female helical rotors, machined with the highest precision and mounted on rolling element bearings. The male rotor has four helical lobes, which mesh with six flutes of the female rotor. The male rotor revolves at 1.5 times the speed of the female rotor. The male rotor is driven by a coupling through step-up gears. The male rotor lobes mesh with female rotor flutes and the air trapped in the interlobal spaces is smoothly compressed until it reaches the outlet port. As continuous compression takes place in all the pockets, pulsation free air is delivered.
2. The oil injected through the lower gusset of the compressor casing mixes with the indrawn air and ensures an efficient sealing between the rotors and the casing, and at the same time, there is an intensive cooling during the compression process.
3. Inter cooling is not necessary because huge quantity of lubricating oil cools the air as it is being compressed. The oil which lubricates the compressor and seals the clearance spaces, is cooled in an oil cooler mounted in front of the radiator by an engine fan.
4. Regular pre-checks and periodic maintenance are essential to prolong the life of the equipment. Also it should be ensured that preventative maintenance tasks are carried out timely, repairs to arrest defects from developing into major ones are done expeditiously and that the equipment is operated efficiently at all times, thereby minimizing inopportune breakdowns and down time losses.
5. To enumerate the details of periodic preventive maintenance of Chicago Pneumatic Diesel Screw Compressor.

ACTION BY

(a) USER UNIT :

(i) To carry out maintenance schedule and oil changes etc as per periodicity laid down by this maintenance instruction and also follow safety precautions for optimum utilization.

(b) FIELD WORKSHOP :

(i) To carry out and monitor, maintenance schedule and oil changes etc as per periodicity laid down vide these instructions.

(ii) To advise user unit in respect of any lapses noticed.

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DETAILS

6. The details of maintenance, fuel, lubricants and safety precautions are as under :-

- (a) Operation & Periodical Maintenance Schedule - Appx 'A'
- (b) General Specification - Appx 'B'
- © Do's and Dont's - Appx 'C'

7. Please ack receipt.

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Distribution :-

Normal

Appx 'A'

OPERATION AND PERIODICAL MAINT SCHEDULE ON DIESEL SCHEW AIR COMPRESSOR

1. CHECK THE FOLLOWING BEFORE STARTING NEW/LONG STORED COMPRESSOR

- (a) Ensure that chassis and wheel bearing are correctly lubricated and tyres inflated.
- (b) Set the compressor in a location which is as leveled as possible and free from dust or dirt.
- (c) Remove R ¾” plug, located on top of inlet casing and fill approx 10 Ltrs of clean compressor oil and refit plug.
- (d) Drain water and dirty oil from air- oil receiver and fill compressor oil in air oil receiver. The oil level indicator glass should show ½ of the indicator or upto the black band.
- (e) Drain water and dirty diesel from diesel tank and fill with suitable good quality engine fuel. Prime fuel system.
- (f) Drain old dirty oil from engine oil sump and fill correct grade engine oil.
- (g) Blow and clean the radiator and oil cooler assemble to remove the dust and dirt collected on it. Flush radiator with clean water and refill to correct level. In winter a good permanent antifreeze should be used. Ensure that there are no leakages.
- (h) Check and connect the batteries to the system. Check that all the electrical connections are correctly made.
- (i) Tighten the fan belt, if necessary, and ensure that the fan is not touching the fan cowl.
- (j) Blow and clean suction air cleaner elements for compressor and engine.
- (k) Open choke in the oil return line and check for blockage. Clean the strainers.
- (l) Clean “Y” type strainers. Clean oil injection nozzle for gears.
- (m) Check the oil filter elements and if found in bad condition, replace it with new one.
- (n) Ensure that P2P type capacity controller and control lever connections are in order.
- (o) Check that the fibre glass elements are in good condition. If these are deteriorated, replace them with new ones. This can only be established after the compressor has been started and the oil throw noticed.
- (p) Tighten all hoses and flexible nylon tube connections and fittings etc and check that they are free from damages. Repair or replace any damaged parts.

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2. ROUTINE PRE START INSPECTION

- (a) Check engine oil, water and fuel lines for leakages.
- (b) Drain water and dirty oil from air receiver, till clean oil appears.
- (c) Check oil for contamination.
- (d) Maintain oil level to $\frac{1}{2}$ in oil level indicator glass.
- (e) Check oil cooler and radiator for external cleanliness.
- (f) Check cooling water for contamination and fill water in radiator to correct level.
- (g) Check air cleaner condition.
- (h) Drain water from engine diesel filter and tank. Check fuel level and fill if required.
- (i) Check battery electrolyte level.
- (j) Check safety valve for operation/ activation, after first starting.
- (k) Check wiring and piping for loose connections.
- (l) Check cooling fan belt tension.

3. STARTING

- (a) Relieve any air pressure in the air/ oil receiver by opening one or the air service valves. Close all air service valves. This is important.
- (b) Loosen the wing nut on the 'L' Slotted plate, so that it is pulled to 'IDLE' position. This will ensure that start of engine at idle speed.
- (c) Operate starter.
- (d) Relieve air pressure if engine shown sign of stalling. Never run the compressor with less than 4 Kg /cm^2 receiver pressure.
- (e) Run the engine at idle speed for five minutes to warm up.
- (f) Set the nut 'L' slotted in 'RUN' position and tighten the wing nut.
- (g) Open air service valve to load the compressor.

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4. COLD WEATHER STARTING

(a) When starting, run engine at idle speed till it is well warmed up. Run the compressor with the radiator air flow closed and open them only as required to prevent the water temperature exceeding 85 °C. The front radiator closing has a considerable effect on the cooling so regulate their position carefully.

(b) The service valve should only be opened after the compressor has been started and air receiver pressure quickly brought to about 4 Kg/cm² or more. The pressure should then be raised gradually to the full working pressure.

5. STOPPING

(a) Close all the air service valves causing plant to unload.

(b) Run the plant in unload condition for about 15 Minutes to cool down.

(c) Set the wing nut on 'L' slotted plate to 'IDLE' position.

6. WARNING

(a) The compressor must NEVER be operated with a compressor air discharge temperature higher than 110°C (220° F).

(b) Do not restart the compressor until the air pressure in the receiver has fallen to Zero.

(c) Release all air pressure before removing the oil filling cap of air /oil receiver.

7. ROUTINE/PERIODICAL MAINTENANCE TASK

(a) Daily Before starting

I. Drain water from Air/Oil receiver.

II. Check and maintain correct lub oil level in compressor air oil receiver and engine crankcase.

III. Check and maintain correct coolant level in radiator.

8. DAILY MAINTENANCE TASK

(a) Drain water from control filter frequently and before shutting down. 'Service Indicator' on suction air cleaner (Dry Type only)

9. FIRST 50 HOURS RUN

(a) Change engine oil.

(b) Change engine oil filters.

(c) Change battery electrolyte specific gravity.

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(d) Clean /replace engine air cleaner elements.

(e) Replace cooling water, fill clean water and fit new corrosion resistance/coolant.

- (f) Change fuel filter elements.
- (g) Clean internal and externals of radiator cooling systems.
- (h) Clean fuel tank terminals.
- (i) Change compressor oil filter element.
- (j) Clean 'Y' strainers.
- (k) Clean all chokes of compressors.
- (l) Clean /replace compressor in take air cleaner element.
- (m) Apply grease to Trailer spring pins and wheel hub bearing.

10. EVERY 50 HRS RUN

- (a) Drain water and dirty diesel from fuel filter.

11. FIRST 100 HOURS

- (a) Chicago Compressor lub oil and refill with Chicago pneumatic super Oil/IOC HLP 68.

12. EVERY 100 HOURS PERIODICAL CHANGE

- (a) Check battery electrolyte specific gravity.
- (b) Clean/replace engine air cleaner elements.
- (c) Clean/replace compressor intake air cleaner elements.

13. EVERY 250 HOURS PERIODICAL CHANGE

- (a) Change engine oil.
- (b) Change engine oil filters.
- (c) Replace cooling water, fill clean water and fit new corrosion resistance/coolent.
- (d) Check fuel filter element.

14. EVERY 500 HOURS PERIODICAL CHANGE

- (a) Replace Lub oil filter.
- (b) Clean internal and external of radiator cooling system.
- (c) Change compressor oil filter element.
- (d) Clean 'Y' strainers.
- (e) Clean all chokes of compressor.

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- (f) Inspect, replace oil check valve 'O' rings.
- (g) Apply grease to trailer spring pins and wheel bearing.

15. EVERY 1000 HOURS PERIODICAL CHECK

- (a) Clean fuel tank terminals.
- (b) Clean engine oil pan and strainers.
- (c) Check and replace rubber and nylon hoses.(At every overhauling)
- (d) Clean oil cooler tubes internally.
- (e) Check and change compressor lub oil if found dirty.
- (f) Clean/replace compressor intake air cleaner elements.

16. EVERY 1500 HOURS RUN

- (a) Change compressor lub oil.
- (b) Clean radiator and oil coolers.
- (c) Clean air / oil receiver.

NOTE :Under adverse condition servicing periode should be suitably reduced.

17. COMPRESSOR OIL FOR SCREW COMPRESSOR

Recommended lubricating oil is shown below:-

Ambient Temperature (° C)	Brand	Source	Remarks
+ 11 to + 50	Super Oil	Chicago Pneumatic	
-21 to + 50	HLP-68	Indian Oil	
+11 to +45	ENKLO-68	Hindustan Petroleum	
+11 to +45	Bharat Turbo	Bharat Petroleum	

MODELS	UNIT	CPS 180	CPS 260
FAD at normal working Condition	CFM M3/MIN	180 5.1	260 7.4
Normal working Pressure	PSIG Kg/cm ² g	100 7.03	100 7.03
Max.Unloading Pressure	PSIG Kg/cm ² g	115 8.09	115 8.09
Air/oil receiver Volume	Liters	32	60
Oil to be filled in Receiver	Liters	12	18
Fuel tank capacity	Liters	110	140
Length with out Draw bar	Meters	2.8	3.1
Width	Meters	1.2	1.3
Height with silencer	Meters	1.6	1.9
Weight	Kgs	1580	2000
Engine Model	-	P6(I)	ALU 6.65

Appx 'C'

Do's and DONT's

Do's

1. Follow the instructions given in Appx 'A'

DONT'S

1. Do not tow compressor more than 25 Km/Hour speed.
2. Do not locate compressor on uneven ground for filling oil and operation.
3. Do not disturb unloader/capacity controller setting unless it fails to operate.
4. Do not disturb safety valve setting
5. Do not start compressor until the pressure in receiver has fallen to Zero.
6. Do not operate compressor beyond 110⁰ C Air discharge Temperature. Investigate cause of high discharge air temperature.
7. Do not open oil filter cap of oil receiver before relieving completing pressure from receiver.
8. Do not operate starter motor for starting engine for more than 30 seconds continuously as it may overheat and burn.
9. Do not run alternator without the battery as regulator plate will burn.
10. Do not disconnect any lead of alternator when the engine is running.
11. Do not flash alternator output leads to check for current flow.

TO OBTAIN THE BEST RESULTS FROM THE COMPRESSOR

1. Ensure that the compressor plant is placed on a firm level surface.
2. Use only the recommended oils for the compressor and engine.
3. Maintain the lubricating oil level between the low level and high level marks on the oil indicator or dip stick, preferably near the high level, never allow it to fall too low.
4. If the oil pressure gauge fails to register, stop the compressor immediately, check for correctness or replace.
5. Check the tightness of all bolts and nuts at regular intervals.
6. Maintain the general cleanliness of the compressor.
7. Cleaning of the air cleaners at regular intervals is of great importance for prolonging the life of both the compressor and the engine.
8. Never run the compressor or engine without air cleaners.
9. Do not adjust the unloader/capacity controller unless it fails to operate.
10. Change lubricating oil and oil filters at recommended intervals.