PERIODIC TEST PROGRAM

COMPRESSOR

CHD		CONTROLLERATE OF INSPECTION (HEAVY VEHICLES) AVADI		
APPD		TITLE: PERIODIC TEST PROGRAM FOR AVIATION COMPRESSOR AK 150C		
DATE	25.7.86	SHEET 1 OF 6	USED ON AK 150C_01C6	DRAWING NUMBER AK 150 C

A. PURPOSE OF TESTS

1. Periodical tests of the compressor for correspondence with specifications are carried out with the purpose:

   To periodically test quality of the compressor;

   To check the stability of the technological process between preceding and following tests.

B. TEST EQUIPMENT

2. Test is performed on a test unit, made according to the diagrams attached to special specifications (appendices 4 and 5) and paras 25-27 of general specifications.

C. TEST PROCEDURE

3. To perform prolonged periodic tests, the customer's representative selects one compressor from the present series of compressors which have passed acceptance tests satisfactorily.
4. Weight and visually inspect the compressor selected by the customer's representative for periodic tests.
5. Mount the compressor on the test unit and carry out periodic tests according to paras 43-45 of special specifications.

   Note: Place automatic pressure regulator АД1 Y-2C in the test unit.
6. After satisfactory acceptance tests, subject the compressor to 600 hours test in ground conditions. Tests are carried out with oil МТ-16П, GOST 6360 in steps under the conditions given in the table below

Description of compressor operations.	Temperature, C of Air supplied to the first stage of compressor	Air for blowing of compressor	Inlet oil	Speed of compressor blowing with air, m/s	Pressure of supplied oil, kg/cm²	Speed of compressor crankshaft rpm	Time of continuous operation, min
Replenishing of 30-l cylinder with air from 30 kg/cm² till compressor change over to idle run by automatic pressure regulator A 11 Y 2C.	Plus 20 - 35°	Plus 40±5°	Plus 50-70°	9^{+4}	$0.5^{+0.3}$	1700^{+50}	30
					$1^{+0.3}$	2100^{+50}	30
					$0.5^{+0.3}$	1500^{+50}	till cut-off pressure 20 (idle run)
					$0.5^{+0.3}$	1500	

Notes: 1. Compressor continuous operating under load lies in rising of pressure (Replenishing) in 30-l cylinder from 30 kg/cm² till time of cutting it off by automatic pressure regulator. In 20 minutes of compressor run idle, rise pressure in cylinder.

2. Perform two stages at an air temperature of +50 to 60°C for blowing of compressor and the supplied oil temperature of +90 ± 5°C.

3. The first air filling of 30-l cylinder to pressure of 30 kg/cm² may be performed from the compressor under test. On doing so the time of compressor operating should be included into the total time of test.

7. After two stages, stop the compressor and cool it to an ambient temperature of test station. During each stage of the compressor operating, make an entry in the record according to the form appended (fill in columns 11 and 12 in 25 hours of the compressors operating).

8. In 25 hours of the compressor operating do the following:

a. Subject the compressor to acceptance tests according to paras 43-46 of special specifications.

b. Stop the compressor and check it visually. During checking, the nuts of the nipple connections of the STAND PNEUMATIC SYSTEM AND THE CONNECTIONS OF THE pneumatic system with the outlet pipe union of the third stage compressor are allowed to be tightened. In this case, disconnect the cylinder from the pneumatic system. Bleed the air from the airline.

9. After prolonged tests, subject the compressor to acceptance tests according to paras 43-46 of special specifications.

10. Remove compressor from the test unit, disassembly and visually check it. Draw up a statement on visual check of components. Measure components with the help of micrometer.

11. Make up a report on results of acceptance tests.

Note to para 8a: In the end of the prolonged test, oil ejection from compressor with air may be upto 65 g/h.

*Note: In the course of acceptance tests, wear-out of walls of grooves for rings in pistons AK150C-100 and AK150H-

31 is allowed upto 0.3mm on edge.

Wearout of bushings for pins in pistons and connecting rods may be upto 0.1 mm around diameter. Wearout around inner diameters of cylinders AK150C-18, AK150H-15 may be upto 0,01mm.

RECORD OF THE PERIODIC TESTS OF COMPRESSOR AK 150 CB TEST UNIT NO.

OIL ANALYSIS NO.

	Time of			Supplied oil			Temperature °C				
Date	Measurement	From the beginning of the test	Speed of the compressor crank shaft, rpm	Pressure, kg/cm²	Temperature, °C	Mean velocity of air blowing of the cylinders, m/s	Air supplied to the first stage compressor.	For blowing of compressor	Filling time of 30-1 cylinder from pressure 30 kg/cm² to 150 kg/cm²	Oil ejection by compressor with air according to special specifications	Compressor capacity according to special specifications.
1	2	3	4	5	6	7	8	9	10	11	12

TECHNICAL DOCUMENTS

AIR COMPRESSOR - AK

150 CB

ISSUE-A

CHD	Bhattacharya	CONTROLLERATE OF INSPECTION [HEAVY VEHICLES] AVADI		
APPD		TITLE: SPECIAL SPECIFICATIONS FOR AVIATION COMPRESSOR AK 150 C		
DATE	25.7.86	SHEET 1 OF 12	USED ON AK 150C_01CB	DRAWING NUMBER: AK 150CCTY

SPECIAL SPECIFICATIONS

COMPRESSOR

1. Given special specifications are worked out on the basis of general specifications 101 MTY - 50 on series supply of compressors for air craft engines and air planes. These specifications are supplement to and refinement of General specifications for compressor AK 150 CB.

I. DEFINITION AND PURPOSE

2. Unit AK 150 CB is an air compressor meant for compression of air used in different pneumatic systems of the tank.

II. TECHNICAL REQUIREMENTS

3. The supplied compressors should meet the requirements of paras 6 - 9 of General specifications.

BASIC DATA

4. Designation - AK 150 CB
5. Type of compressor - three stage, two-cylinder
6. Dimensions of compressor:
   a. Diameter of the first stage cylinder - 46 mm
   b. Diameter of the second stage cylinder - 46/40 mm, differential
   c. Diameter of the third stage cylinder - 38/35 mm, differential
   d. Piston stroke - 28 mm.
7. Compressor drive - from engine.
8. Direction of compressor crankshaft rotation as per 1630 - 45 - left or right.

9. Speed of compressor crankshaft:

   a. Minimum condition - 1500 - 50 rpm;

   b. Design condition - 1000 - 50 rpm;

   c. Maximum condition - 2100 - 50 rpm;

10. Working pressure built up by compressor - 150 kg/cm^2.

11. Compressor capacity at crankshaft speed of 2000 $\pm$ 50 rpm with air suction from atmosphere - 2.4 (A) m^3/h referred to one atm.

    Note: The specified capacity provides filling of 8l cylinder to 150 kg/cm^2 for 30 minutes, maximum or rising of pressure in 30-l cylinder (Replenishing) from 120 kg/cm^2 to 150 kg/cm^2 for 3 minutes, maximum. Filling time determines permissible air seepage in compressor crankcase.

12. Operating conditions of compressor in case air is sucked from atmosphere are as follows:

Description of operations	Temperature, °C		Blowing speed m/s	Crank shaft speed rpm	Time of continuous operation, min.	Breaks or idle run of compressor
	Air supplied to the first stage compressor	Air for flowing of compressor				
Pumping of 30-l cylinder with air from 30 kg/cm^2 to cut-of pressure.	from +2° C to + 50° C	from +2° C to + 60° C	atleast 9m/s	1700^{+50} 2100^{+50} 1500^{+50}	30 30 to cut off pressure.	atleast 20 min after operating under load

A	DO CORRECTION		27-7-94		AK150C CTY	A-1 3 42115 KA
Alt	SHEET	No. OF DOCUMENT	SIGNATURE	DATE		SHEET 3

3

Notes: 1. Compressor continuous operating lies in rising of pressure (Replenishing) in cylinder from 30 kg/cm^2 till time of cutting it off by automatic pressure regulator.

2. Air speed should be measured in plane perpendicular to the direction of air flow and located at a distance of 30mm from foremost point of cylinder ribs.

13. Ambient temperature at which compressor operation is guaranteed from +60°C to - 60°C.

Note: Compressor start is guaranteed at a temperature of +2°C, provided the line ice blocks were preliminarily melted.

14. Consumed power on compressor crankshaft - 3.5 hp.

15. Cooling of compressor by air.

16. Area of air flow - the entire compressor should be in air flow.

17. Speed of air flow at nominal speed of compressor atleast 9m/s.

18. Lubricating of compressor - by spraying.

19. Pressure of supplied oil - from 0.5 to 5 kg/cm^2.

20. Temperature of supplied oil not more than 85°C.

Note: Oil temperature may be increased upto 95°C for a period not more than 10 min and not more than 5 times for each 5 hours of operating.

21. Oil ejection at air back pressure of 10kg/cm^2, oil temperature 50° to 90°C, oil pressure 2 to 5 kg/cm^2 and Speed of compressor crankshaft of 1700 rpm

from 0.4 to YO 9/h.

22. Oil used - HT16 ∩, GOST 6360-58.

23. Compressor operating position - with cylinders up. Deviation of bisectrix of V-angle of cylinder from vertical position should not exceed 31° towards low-pressure cylinder and 19° towards high pressure cylinder.

24. Air temperature at compressor outlet at an ambient temperature not exceeding 60°C - not more than 110°C, at speed 2100 rpm - not more than 120°C.

25. Compressor dry weight - 5.8 kg.

26. Guarantee period of compressor operating is 600 hours when total storage and operating period is 8 years. The following is allowed within specified storage period:

a. Transportation and storage period of compressor in the customer's store rooms upto 1 year.

b. Transportation and storage of compressor in the manufacturer's packing or those of the compressor together with the tank packing in open air without tents for 3 years, max (except for the zones of hot climate where storage period in open air is 2 years and under tents for 3 years).
Trouble free operation is guaranteed under all operating conditions of the tank for which the compressor is intended and under any climatic conditions.

26a. If supplier of bearings is changed, compressors may be manufactured only after subjecting of them to technolo-

gical test and obtaining satisfactory results of operation and condition of new supplier's bearings.

In the course of compressor operation, check connections of air pipes for tightness by coating these with oil (during operation). Cylinder pressure should be 100 - 140 kg/cm^2. When checking for tightness, compressor may not be blown for 10s, max. Blowing may be again cut off after 5min of operating with blowing.

In case of air leakage, stop the compressor, completely bleed pressure from line at compressor outlet. Remove wire locking of pipeline clamps, tighten clamps (component AK 150-049 and AK 150B-219). Check pipelines for tightness and lock clamps.

Make an entry on the performed work in the compressor certificate.

27. Guarantee period is 1800 hours.

Guarantee period after repair should be according to guarantee period of the repaired engine. Number of repairs within guarantee period is not specified.

28. The supplier guarantees quality of compressors within specified period under normal service conditions and also if all supplier's seals and lockings certifying, that the compressor and its units have not been disassembled, are intact.

29. The assembled compressor should be interchangeable as per overall dimensions, mounting seats, ensuring mounting of compressor on the tank without additional adjustment.

III. ACCEPTANCE RULES

31. If acceptance test results were satisfactory, compressors should be sealed in places pointed on the General view or on the Installation drawing and presented to the customer's representative and the QID in batches.

32. If test results were unsatisfactory, compressors should be sent back to the shop for rectification of defects. Then, they should be again presented by foreman to the QID for repeated tests.
Compressors rejected by the customer for rectification of defects should be again presented for tests according to form No.1.
The statement specifying the causes of defects and measures taken and signed by chief engineer and QID chief should be attached.

33. One compressor from a specified series should be subjected to bench tests atleast once every five months according to the programme attached to these special specifications.

34. Number of compressors in a series is determined on the basis of the 6 months' programme.

V. TEST PROCEDURE

36. Before presenting to QID, each ready assembled compressor should be subjected to the running in and acceptance tests using test bench made according to the diagram attached to special specifications.

RUNNING-IN TESTS

37. Compressor running-in is performed to align its components and check them for proper assembly. Use oil MT 16 to run-in compressor.

Note: While running-in, measure the oil circulation rate of the compressor in the oil line at n = 1500 rpm, inlet oil pressure of 4kg/cm^2, outlet oil pressure of 0 kg/cm^2. The oil circulation rate should be atleast 700 cm^3/min.

RUNNING-IN CONDITIONS

Operating time, min	Crankshaft speed, rpm	Pressure at compressor outlet kg/cm^2	Inlet oil pressure kg/cm^2	Inlet oil temperature °C	Mean velocity of compressor air blowing, m/s
5	500	0			
5	1500	50			
5	2000	100			
3	2000	0			
5	2000	100	3.5 - 5	50-70	9 m/s, min
3	2000	0			
5	2100	150			
3	2100	0			
5	2100	50			

38. If results of running-in of compressor are satisfactory, they may be presented for acceptance tests.

Note: If results of running-in tests are unsatisfactory, compressors should be sent to the shop for partial disassembly as per the cylinder piston group and rectification of defects.

Then they should be assembled again and sent for repeated running-in. Crankcase and crankshaft with connecting rods may be disassembled if there are visible defects or on the customer's demand.

ACCEPTANCE TESTS

39. Acceptance tests determine compressor capacity, pressure tightness, and mass of oil ejected by the compressor with air. Use oil MT 16П to perform acceptance tests.

DETERMINATION OF CAPACITY

40. To determine capacity, check the filling time of 8-l cylinder with air from 0 to 150 kg/cm^2. Tests are performed twice under the following conditions:

Speed of compressor crank shaft,	Inlet oil pressure kg/cm^2	Inlet oil temperature, °C	Mean velocity of air blowing of cylinders, m/s	Filling time of 8-l cylinder from 0 to 150 kg/cm^2, min.
2000 ± 50	3.5 - 5	50 - 70	9^{+4}	not more than 30

Notes:
1. While determining capacity, disconnect the automatic pressure regulator from the test circuit.
2. After the first air filling of cylinder the compressor runs idle (without back pressure) for 3 minutes, after that, tests are repeated.
3. When determining the time for filling of 8-l cylinder, exclude line filling time, if the line length exceeds 3 metres.
4. During acceptance tests, check the compressor for tightness by coating the connections with oil. Cylinder pressure should be 100-140 kg/cm^2,

oil and air leakage through connections and joints is not allowed.

5. When checking for tightness the compressor blowing may be switched off for 10s.
   Repeated switching off of the compressor blowing may be done in 5 minutes of operating with blowing.
6. During running-in and acceptance tests, the temperature of oil supplied to the first stage compressor and for blowing of compressor cylinders should be within 25 ± 10°C

DETERMINATION OF OIL EJECTION

41. The test is performed for 15 minutes, the quantity of ejected oil is determined by weighing of the vessel before and after the tests. Increase of the vessel weight for 15 minutes of compressor operating should not be more than 10g and not less than 0.1g.
2. Determination of oil ejection from compressor with air is done under air backpressure of 10kg/cm^2, at an oil temperature of 50° to 90° oil pressure of 2 to 5 kg/cm and speed 1700 rpm.

VI. FORCED LUBRICATION AND PRESERVATION OF COMPRESSOR INNER SPACES

42. If compressors passed acceptance tests satisfactory and were accepted by the QID, the inner spaces of the compressors should be subjected to forced lubrication and preservation.
43. Forced lubrication and preservation of the compressor inner spaces are performed with preliminarily dehydrated transformer hot (60-70°C) oil. Oil is supplied

to the inlet pipe union of the first stage under pressure of 2 - 2.5 kg/cm^2, ensuring oil drain from delivery pipe union of the third stage.

44. In 1.5 min of compressor lubrication as per P 43 give the eccentric tail piece 1.5 or 2.5 turns by hand using spanner.
To ensure easier turning of eccentric decrease pressure of the oil supplied to the compressor.

45. Repeat oil lubrication of the compressor spaces for 1.5 min according to P 43.

46. Disconnect oil supply from the first stage inlet pipe union. Remove excess oil from spaces and air pipes.
To this end, turn the compressor towards drain of oil from pipeline; screw eccentric tail piece with spanner till oil stops running from the pipe union of the delivery valve of the third stage.
Make an entry on the preservation of compressor inner spaces in the assembly chart.

VII. MARKING, PACKING, OUTSIDE PRESERVATION

47. Compressors to be supplied should be marked.

48. Compressors accepted by the QID and with inner spaces preserved, should be preserved from the outside according to the factory Instructions.

49. Before sending to the customer, preserved compressors should be stored in dry premises at an air temperature from +10°to +30°

50. When compressors are stored in manufacturer's packing and under conditions specified in the preservation instructions, preservation guarantee period is 1 year before mounting on the tank. Compressors to be reserved are preserved for a period of 5 years . Compressors sent to the customer are packed according to points 48-53 of general specifications and specifications for container.

51. Preservation period of group set of spare parts is 3 years, for reserved - 6 years.

PERIODIC TEST PROGRAM

COMPRESSOR

CHD	Chattarjee	CONTROLLERATE OF INSPECTION (HEAVY VEHICLES) AVADI		
APPD		TITLE: PERIODIC TEST PROGRAM FOR AVIATION COMPRESSOR AK 150C		
DATE	25.7.86	SHEET 1 OF 6	USED ON AK 150C_01CB	DRAWING NUMBER AK 150 C

A. PURPOSE OF TESTS

1. Periodical tests of the compressor for correspondence with specifications are carried out with the purpose:

   To periodically test quality of the compressor;

   To check the stability of the technological process between preceding and following tests.

B. TEST EQUIPMENT

2. Test is performed on a test unit, made according to the diagrams attached to special specifications (appendices 4 and 5) and paras 25-27 of general specifications.

C. TEST PROCEDURE

3. To perform prolonged periodic tests, the customer's representative selects one compressor from the present series of compressors which have passed acceptance tests satisfactorily.
4. Weight and visually inspect the compressor selected by the customer's representative for periodic tests.
5. Mount the compressor on the test unit and carry out periodic tests according to paras 43-45 of special specifications.

   Note: Place automatic pressure regulator АД Y-2C in the test unit.
6. After satisfactory acceptance tests, subject the compressor to 600 hours test in ground conditions. Tests are carried out with oil МТ-16П, GOST 6360 in steps under the conditions given in the table below

Description of compressor operations.	Temperature, C of: Air supplied to the first stage of compressor	Air for blowing of compressor	Inlet oil	Speed of compressor blowing with air, m/s	Pressure of supplied oil, kg/cm²	Speed of compressor crankshaft rpm	Time of continuous operation, min
Replenishing of 30-l cylinder with air from 30 kg/cm² till compressor change over to idle run by automatic pressure regulator A 11 Y 2C.	Plus 20 - 35°	Plus 40±5°	Plus 50-70°	9^{+4}	$0.5^{+0.3}$ $1^{+0.3}$ $0.5^{+0.3}$ $0.5^{+0.3}$	1700^{+50} 2100^{+50} 1500^{+50} 1500	30 30 till cut-off pressure 20 (idle run)

Notes: 1. Compressor continuous operating under load lies in rising of pressure (Replenishing) in 30-l cylinder from 30 kg/cm² till time of cutting it off by automatic pressure regulator. In 20 minutes of compressor run idle, rise pressure in cylinder.

2. Perform two stages at an air temperature of +50 to 60°C for blowing of compressor and the supplied oil temperature of +90 ± 5°C.

3. The first air filling of 30-l cylinder to pressure of 30 kg/cm² may be performed from the compressor under test. On doing so the time of compressor operating should be included into the total time of test.

7. After two stages, stop the compressor and cool it to an ambient temperature of test station. During each stage of the compressor operating, make an entry in the record according to the form appended (fill in columns 11 and 12 in 25 hours of the compressors operating).

8. In 25 hours of the compressor operating do the following:

a. Subject the compressor to acceptance tests according to paras 43-46 of special specifications.

b. Stop the compressor and check it visually. During checking, the nuts of the nipple connections of the STAND PNEUMATIC SYSTEM AND THE CONNECTIONS OF THE pneumatic system with the outlet pipe union of the third stage compressor are allowed to be tightened. In this case, disconnect the cylinder from the pneumatic system. Bleed the air from the airline.

9. After prolonged tests, subject the compressor to acceptance tests according to paras 43-46 of special specifications.

10. Remove compressor from the test unit, disassembly and visually check it. Draw up a statement on visual check of components. Measure components with the help of micrometer.

11. Make up a report on results of acceptance tests.

Note to para 8a: In the end of the prolonged test, oil ejection from compressor with air may be upto 65 g/h.

*Note: In the course of acceptance tests, wear-out of walls of grooves for rings in pistons AK150C-100 and AK150H-

31 is allowed upto 0.3mm on edge.

Wearout of bushings for pins in pistons and connecting rods may be upto 0.1 mm around diameter. Wearout around inner diameters of cylinders AK150C-18, AK150H-15 may be upto 0,01mm.

RECORD OF THE PERIODIC TESTS OF COMPRESSOR AK 150 CB TEST UNIT NO.

ANALYSIS NO.

OIL

No.	Item	Group
1	Date	
2	Measurement	Time of
3	From the beginning of the test	Time of
4	Speed of the compressor crank shaft, rpm	
5	Pressure, kg/cm^2	Supplied oil
6	Temperature, °C	Supplied oil
7	Mean velocity of air blowing of the cylinders, m/s	
8	Air supplied to the first stage compressor.	Temperature °C
9	For blowing of compressor	Temperature °C
10	Filling time of 30- l cylinder from pressure 30 kg/cm^2 to 150 kg/cm^2	
11	Oil ejection by compressor with air according to special specifications	
12	Compressor capacity according to special specifications.	