

TECHNICAL SPECIFICATION

"TECHNICAL REQUIREMENTS FOR MAJOR REPAIR OF MAIN ROAD LOCOMOTIVES SKD4B-2301, 2303, 2304, 2305 MANUFACTURED IN CHINA AND OWNED BY "MONGOLIAN RAILWAY" SOSC

Project Details:

Client: "Mongolian Railway" SOSC

Locomotives: CKD4B -2301, CKD4B -2303, CKD4B -2304, CKD4B -2305

Production Numbers: CKD4B -3001, CKD4B -3003, CKD4B -3004, CKD4B -3005

Manufacturer: China

Scope of Work:

This technical assignment outlines the requirements for performing major repair work on the specified mainline locomotives owned by "Mongolian Railway" SOSC. The goal of this project is to ensure the continued operational efficiency, reliability, and safety of the locomotives.

When performing a major overhaul of the locomotive, the following documents should serve as guidelines for technical tasks:

1. "Operation and Maintenance Instructions for CKD4B Type Locomotives"
Publisher: "Northern Rolling Stock Corporation of the People's Republic of China"

Issued by: " CRRC DALIAN Co., LTD., China"

Date: November 2011

2. "Maintenance Manual for CKD4B Diesel Electric Locomotive"
Publisher: " CRRC DALIAN Co., LTD., China"

3. "16V240ZJD2 Diesel Engine Maintenance and Operating Instructions"
Publisher: " CRRC DALIAN Co., LTD., China"

During the overhaul process, it is imperative to meticulously follow the rules and instructions outlined in these documents. The specified guidelines encompass inspecting systems, equipment, and components, and undertaking repairs and replacements as deemed necessary. Adhering to these comprehensive instructions will facilitate a successful overhaul process and ensure the locomotive's optimal performance.

1. Diesel engine

- 1.1 Conduct comprehensive measurements on all 4 crankshafts of the diesel engine. Measure the seating of the crankshaft main neck bearings and, replace the main neck bearings with new appropriate-grade bearings.
- 1.2 Measure the connecting rod necks of the diesel engine crankshaft and replace 64 new connecting rod bearings.
- 1.3 Replace all 64-cylinder bushings of the diesel engines with new ones.
- 1.4 Replace the 64 pistons and 256 compression rings of the diesel engine with new ones.
- 1.5 Perform a thorough inspection of all 64 cylinder covers and the density of the diesel engines.
- 1.6 Install new intake and exhaust valves for the cylinder head, totaling 256 valves.
- 1.7 Replacement of 4 new Diesel Engine Crankshaft Rotation Mechanism.
- 1.8 Verify and repair the functionality of the indicator taps on the diesel engine cylinder covers.
- 1.9 Replace the gaskets for the end caps of the diesel engine's 4 crankshafts (a total of 4 gaskets).
- 1.10 Replace 4 new crankcase ventilation filters of the diesel engine.
- 1.11 Replace 32 large seals of the diesel engine's gas manifold with new ones.
- 1.12 Replace 64 middle seals of the diesel engine's gas manifold with new ones.
- 1.13 Replace 64 small seals of the diesel engine's gas manifold with new ones.
- 1.14 Perform a thorough measurement of 4 camshafts of the diesel engine crankshafts and replace them if they fail to meet the specified requirements.
- 1.15 Conduct an overhaul of the 4 anti-vibration dampers on the diesel engine, addressing any issues with their anti-vibrator functionality.
- 1.16 Completely disassemble the rear 4 reducers of the diesel engine for major repairs.
- 1.17 Replace 4 tachometers with new ones that are part of the integrated speed control system of the diesel engine.

2.Oil system

- 2.1 Completely replace 80 new flexible hoses within the oil system.
- 2.2 Replace all 16 fine oil filters with new ones.
- 2.3 Perform a comprehensive replacement of all 16 coarse oil wipers with new ones.
- 2.4 Verify and repair the performance of the 4 auxiliary oil pumps.
- 2.5 Replace a total of 8 oil pumps with new ones.
- 2.6 Replace all 8-turbocharger oil filters with new ones.
- 2.7 Replace 4 diesel engine safety switches with new ones.
- 2.8 Replace the protection valve for the diesel engine's oil system with a total of 56 new ones.

2.9 Replace 56 new inter-cylinder lubrication hoses within the diesel engine.

2.10 Conduct a major repair of the 4-diesel engine oil main pumps and replace any pumps that do not meet the required standards.

2.11 Replace a total of 8 oil filters with new ones.

3. Fuel System

3.1 Replace 64 high-pressure fuel pumps with new units.

3.2 Replace 64 fuel injectors spray tip with new units.

3.3 Replace 64 high-pressure fuel pipes with new ones.

3.4 Replace 4 units governors with new ones.

3.5 Replace 64 fuel system hoses with new ones.

3.6 Replace 64 new pieces of the flexible pipe entering the fuel high-pressure suction pump.

3.7 Replace 64 new flexible hoses originating from the fuel high-pressure suction pump.

3.8 Verify and repair the performance of the 6 fuel injection pumps.

3.9 Replace a total of 20 coarse fuel filters with new ones.

3.10 Replace 8 fine fuel filters with new ones.

3.11 Replace 4 fuel heaters with new ones.

3.12 Replace 8 fuel pressure regulators and protection valves with new ones.

3.13 Perform a thorough cleaning of all 4 fuel tanks.

4. Auxiliary Equipment

4.1 Replace 192 new rubber couplings used for connecting the compressor and its electric motor.

4.2 Replace 192 new rubber couplings used for the connection of the rear distribution reducer.

4.3 Replace 8 identified links with new ones.

4.4 Overhaul all 8 cooling fans of the traction electric motor.

4.5 Perform an overhaul of the 4 front reducers.

4.6 Perform an overhaul of the 4 rear reducers.

4.7 Replace all 8 rubber air hoses on the turbocompressor with new ones.

4.8 Overhaul all 8 turbocompressors.

5. Auto Braking System

5.1 Overhaul all 8 air compressors, aligning and installing them.

5.2 Overhaul all 8 drivers' brake valves (trains) and bench test them.

- 5.3 Perform major repairs on all 8 auxiliary brake valves (only locomotives) and test them on the stand.
- 5.4 Replace all 16 rubber hoses within the brake system with new ones.
- 5.5 Replace a total of 32 two-way ball valves within the brake system with new ones.
- 5.6 Replace 48 pieces of 5 types of Ball-Type Angle Cock with new ones.
- 5.7 Conduct a complete revision of all 48 brake cylinders, fully replacing rubber cuffs.
- 5.8 Replace all 48 hosepipes used for air transmission in the brake cylinders with new ones.
- 5.9 Replace 8 pieces of the 4.5 kg/cm² air protection valves with new ones.
- 5.10 Replace 8 pieces of the 10.5 kg/cm² air protection valves with new ones.
- 5.11 Replace 8 sludge removers with new ones.
- 5.12 Carry out major repairs on the water trap and air brake system and replace 4 pieces.
- 5.13 Replace 8 faucets used for draining sludge from the general tank with new ones.
- 5.14 Replace 48 new brake shoes.
- 5.15 Inspect and overhaul brake system levers.
- 5.16 Replace 48 new brake cylinder clutch adjuster handles.
- 5.17 Replace 64 cut-out cocks with new ones.
- 5.18 Replace 8 new air dryer valves.
- 5.19 Overhaul all air distributors of the 4 locomotives and bench test them.
- 5.20 Replace 20 new, non-reversible valves.
- 5.21 Provide a guarantee by conducting a liquid test in the 8 general containers.

6. Water System

- 6.1 Replace 20 new rubber hoses within the water system.
- 6.2 Replace 8 new probes used for monitoring the water level of the expansion tank.
- 6.3 Replace all water barriers and replace 20 new ones with a diameter of d40.
- 6.4 Bench test all cooling sections of the 4 locomotives on a with pressurized water, conduct major repairs.
- 6.5 Replace 4 cooling expansion tanks with new ones.
- 6.6 Replace 8 new sets of glass used for checking the water level of the expansion tank.
- 6.7 Replace 4 lids to the upper part of the water in the expansion tank with new ones.
- 6.8 Overhaul all 8 high and low-temperature water pumps within the diesel engine cooling system, replacing non-compliant paddles.

6.9 Perform a major repair on all 8 air coolers.

6.10 Overhaul all 8 oil heat exchangers.

6.11 Overhaul all 8 hydrostatic heat exchangers.

7. Cooling Fan

7.1 Inspect and repair for cracks in the general fan.

7.2 Replace 8 high and low-temperature hydro-pumps with new ones.

7.3 Perform an overhaul on all 8 hydro-pump reducers.

8. Cooling Blinds

8.1 Replace all 12 electric gas propellers of the cooling blinds with new ones.

8.2 Inspect and repair the functionality of Cooling Louver Vanes.

9. Diesel Air System

9.1 Replace a total of 96 pieces of air 4-way wipers used in the diesel engines with new ones.

9.2 Replace the 4 new air ducts that connect to the turbo compressor sweeper.

9.3 Perform an overhaul on the Multi Cyclone 8 system.

10. Accumulator

10.1 Install a total of 192 new batteries.

11. Fire Equipment

11.1 Perform a major repair on the fire equipment and replace a total of 40 fire detectors with new ones.

12. Measurement and Control Tools

12.1 Replace the following oil pressure relays with new ones: OPSR1, OPRS2, OPRS3, OPRS4 (a total of 16 relays).

12.2 Replace all 8 compressor pressure indicator manometers with new ones.

12.3 Replace all 8 hydrostatic oil tank temperature indicator manometers with new ones.

12.4 Replace new lights on the positive and negative sides of the electrical grounding check for a total of 8 locations.

12.5 Replace 8 sets of manometers and thermometers on the control panel with four indicators located in the diesel engine room.

12.6 Replace a new set of 4 manometers and thermometers on the control panel with 4 pointers located in the diesel engine room.

12.7 Replace 4 new pressure relays used for adjusting the air pressure of the general tank.

12.8 Replace 8 110V general generator current indicators with new ones.

12.9 Replace all 8 diesel engine speed and oil pressure indicators with new ones.

12.10 Replace 16 brake manometers on the driver's desk with new ones.

12.11 Replace 8 new electronic pressure sensors.

12.12 Replace 8 electronic temperature sensors with new ones.

12.13 Check and repair a total of 24 shunt resistors used for traction electric motor current measurement.

12.14 Check and repair 8 new shunt resistors are used for measuring battery charging current.

12.15 Replace 16 warning lights on the driver's console with new ones.

12.16 Replace 4 speed sensors with new ones.

12.17 Replace oil and fuel pressure manometers, thermometers, and flexible hoses of all 8 connecting copper pipes with new ones, ensuring they have detachable fittings.

13. Electrical and Electronic Junctions

13.1 Replace a total of 24 new ADLC electronic boards for excitation control.

13.2 Replace 4 new IFCU electronic boards for diesel engines.

13.3 Replace the ADLC box in 4 instances with new ones.

13.4 Replace 8 control screens with new ones.

13.5 Overhaul the drum of the direction shifter.

13.6 Replace 8 contactors responsible for compressor operation with new ones.

13.7 Replace 4 new contactors used for ignition.

13.8 Replace 4 alarm contactors with new units.

13.9 Replace 8 new projector lights.

13.10 Replace 16 white buffer lights with new ones.

13.11 Replace 16 new red buffer lights.

13.12 Replace 16 new cabin dim lights.

13.13 Replace 32 new bright cabin lights.

13.14 Replace 16 new blower heaters for the driver's and assistant's feet.

13.15 Replace 16 cabin electrical heaters with new ones.

13.16 Replace 16 cabin electrical side heaters with new ones.

13.17 Replace 16 new cabin electrical rear heaters.

13.18 Replace 8 new heaters on both sides of the travel section of the high-voltage camera.

13.19 Replace a total of 24 sand and horn foot pedals with new ones.

- 13.20 Replace the 40 YZQ elements with new ones used for overvoltage protection.
- 13.21 Replace 24 new electric air valves used for sand and sound signals.
- 13.22 Replace 4 time relays during manual start with new ones.
- 13.23 Replace a total of 12 new overvoltage protection elements (YZQ).
- 13.24 Perform a major repair on the electric gas contactor of field weakening and replace 8 pieces of rubber with new ones.
- 13.25 Overhaul the components in the brake resistor box.
- 13.26 Perform an overhaul on the brake resistance cooling motors for all 4 instances.
- 13.27 Check and repair the resistance of the brake system.
- 13.28 Verify and repair the normal operation of the rheostat.
- 13.29 Overhaul all 4 auxiliary generators and bench test them.
- 13.30 Perform an overhaul on the 4 general generators.
- 13.31 Overhaul all 4 exciters.
- 13.32 Perform an overhaul on all 24 electric traction motors.
- 13.33 Check and repair the reliability of electrical circuit low and power circuit plugs.
- 13.34 Check the normal operation of electrical equipment located in the high-voltage room of all 4 locomotives according to the order.
- 13.35 Check and repair the normal operation of the electrical equipment in the locomotive cabin for all 4 instances.
- 13.36 Perform a complete overhaul of the speed recording devices for all 4 locomotives and verify their reliable operation.
- 13.37 Check and repair the normal operation of the electric-air contactor's resistance to weakening in the locomotive area for all 4 locomotives.
- 13.38 Check and repair the reliability and operation of rectifier diodes of four locomotives.
- 13.39 Check and confirm the reliable operation of the 3-phase rectifier diodes of the general generator for all 4 locomotives.
- 13.40 Check and confirm the reliable operation of the 3-phase rectifier diodes of the excitation generator for all 4 instances.
- 13.41 Replace the ganged switches on all four locomotives with new ones.
- 13.42 Check and repair the isolation of high-voltage electrical circuits.
- 13.43 Inspect and repair the insulation resistance of low-voltage electrical circuits.
- 13.44 Check and confirm the insulation resistance of the electric circuit of the excitation of all 4 units of the general generator.

13.45 Check the insulation resistance between the high and low-power circuits of all 4 locomotives.

13.46 Perform an overhaul on the device for checking the alertness of all 4 locomotive drivers and check and confirm its reliable operation.

14. Electric moving parts

14.1 Overhaul and verify the condition of 48 suspension bearings.

14.2 Perform 4 major repairs on the spring of the locomotive frame, horizontal pulling lever, and body of the bogie.

14.4 Overhaul and ensure the normal operation of 4 traction shock absorbers.

14.5 Overhaul all 24 wheelset gear reducers.

14.6 Inspect and repair the wheelset rubber heels. (a total of 16 pieces).

14.7 Perform a major repair on all 8 absorption apparatuses.

14.8 Conduct major repairs on all 8 auto assemblies and auto assembly wedges, then verify their condition.

15. Wheelset

15.1 Overhaul and certify a total of 24 pairs of wheels.

16. Electric Machines

16.1 Overhaul all 8 fuel electric engines.

16.2 Overhaul all 8 auxiliary oil pumps.

16.3 Overhaul all 8 electric smoke removers in the diesel engine room.

16.4 Overhaul all 8 compressor electric motors.

16.5 Overhaul all 8 electric motors of cabin ventilators.

16.6 Overhaul all 8 electric motors for solar shutters.

16.7 Overhaul all 8 wiper motors.

16.8 Overhaul all 8 electric motors of the extracted air.

17. Maintenance

17.1 Check and repair the condition of all 16 mirrors.

17.2 Verify and repair the normal operation of all 8 sun blinds.

17.3 Repair 20 door handles and ensure their normal operation.

17.4 Fully replace 20 new door rubber gaskets.

17.5 Perform an overhaul on all 16 windshield wipers.

17.6 Replace the cabin floors in all 8 instances with new ones.

17.7 Perform a major repair on all 16 cabin opening windows.

18. Narrow Body /Roof/

18.1 Repaint the narrow body of the locomotive.

19. Rheostat Test

19.1 Complete the necessary preparations for the full rheostat testing, including assembling and centering all locomotive components, for all 4 locomotives.

19.2 Conduct a comprehensive testing and adjustment of the rheostat in all 4 locomotives, including the presence of a representative from the ordering party.

19.3 Perform a brief rheostat test during the handover to the ordering party, followed by a test drive of the rolling stock.

20. Requirements for Parts

20.1. Spare parts and components intended for installation on the locomotive must be brand new and stored for no longer than one year after their production.

20.2. The warranty period for new spare parts and components used on the locomotive shall be a minimum of one year.

21. Shipping

21.1. The responsible party shall be responsible for the transportation costs to and from the locomotive repair location.

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