



ACT OF EXPERIMENTAL LOCOMOTIVE TREATMENT, 2009

TEM2K locomotive: engine, compressor and wheel-motor blocks restored without teardown

Dalnevostochnoe Locomotive Repair Depot, Traction Rolling Stock Repair Directorate, Far Eastern Railway
— a branch of JSC Russian Railways · approved by: depot head V. I. Demagin

Vyazemskaya locomotive depot base, Russia · works 9 August — 25 September 2009 · act dated 30.09.2009

PRODUCT

XADO technology
no-disassembly repair method
of the XADO chemical group ·
treatment in three stages

TREATED OBJECT

TEM2K locomotive No.
1084
1-PDG4D FO engine No. 133 ·
KT-6 compressor No.
20-04-311 · wheel-motor blocks
1 and 6

DOCUMENT TYPE

Depot commission act
with signatures and seals

LOCOMOTIVE UNIT**SERVICE SINCE
REPAIR****WHAT WAS MEASURED**

1-PDG4D FO engine No. 133

359 days

Oil clearance of main and connecting-rod bearing
shells; oil pressure by controller notch

KT-6 compressor No.
20-04-311

359 days

Fill time from 7.0 to 8.0 atm; oil pressure

Wheel-motor blocks 1 and 6

359 days

Tooth thickness of pinions and bull gears at the
pitch circle

The units were not disassembled: the treatment was carried out in three stages, and the "after" measurements were taken following 39 days of locomotive operation.

Key results

↓ **15 %**

oil clearance of engine connecting-rod bearing shells, 0.14-0.19 → 0.09-0.17 mm

↑ **0.2-0.3 mm**

tooth thickness of wheel-motor block bull gears, 17.8 → 18.0-18.1 mm

↑ **6.7 %**

KT-6 compressor output, fill time 30 → 28 s

↑ **3.8 %**

engine oil pressure at controller notches, 2.5-4.8 → 2.7-5.0

1-PDG4D engine: oil clearance in crankshaft bearings, mm

BEARING No.	MAIN, BEFORE → AFTER	CONNECTING-ROD, BEFORE → AFTER
1	0.15 → 0.15	0.16 → 0.16
2	0.16 → 0.16	0.17 → 0.15
3	0.18 → 0.16	0.19 → 0.17
4	0.17 → 0.15	0.15 → 0.15
5	0.15 → 0.13	0.14 → 0.10
6	0.15 → 0.15	0.15 → 0.09
7	0.15 → 0.15	—

According to the conclusion of the act, the clearance decreased by 3.6 % on the main bearing shells and by 15 % on the connecting-rod shells. At no measurement point did the clearance increase.

1-PDG4D engine: oil pressure by driver's controller notch

CONTROLLER NOTCH	BEFORE TREATMENT	AFTER TREATMENT
0	2.5	2.8
1	2.5	2.7
2	2.5	2.7

CONTROLLER NOTCH	BEFORE TREATMENT	AFTER TREATMENT
3	3.2	3.3
4	3.8	3.9
5	4.5	4.6
6	4.6	4.6
7	4.7	4.8
8	4.8	5.0

Measured at an oil temperature of 60 °C. According to the conclusion of the act, the engine oil pressure rose by 3.8 %.

KT-6 compressor No. 20-04-311

PARAMETER	BEFORE TREATMENT	AFTER TREATMENT
Fill time from 7.0 to 8.0 atm	30 s	28 s
Compressor oil pressure	3.8	4.0

According to the conclusion of the act, the compressor output rose by 6.7 % and the oil pressure by 5.3 %.

Wheel-motor blocks: tooth thickness at the pitch circle, mm

GEAR	WMB 1, BEFORE → AFTER	WMB 6, BEFORE → AFTER
Pinion (driving)	18.4 → 18.5	18.3 → 18.3
Bull gear (driven)	17.8 → 18.1	17.8 → 18.0

According to the conclusion of the act, the tooth thickness of the wheel-motor block gears increased by up to 3.4 %; the table measurements show a gain of 0.1-0.3 mm.

Findings of the depot commission

The locomotive, with **359 days** of service since its last repair, was treated in three stages without disassembling the units. The commission of the Dalnevostochnoe Locomotive Repair Depot recorded: on the main engine the clearances decreased by **3.6 %** on the main bearing shells and by **15 %** on the connecting-rod bearing shells, and the oil pressure rose by **3.8 %**; on the KT-6 compressor the output rose by **6.7 %** and the oil pressure rose by **5.3 %**; on the wheel-motor block gears the tooth thickness increased by up to **3.4 %**. "The commission considers that the use of XADO technology makes it possible to: extend the service life of units and assemblies, improve the technical characteristics of mechanisms and reduce labour costs during repairs, which is economically beneficial." The commission proposed analysing the range of applications of the no-disassembly repair technology on the units and assemblies of the locomotive fleet in order to identify the economic effect of further use of XADO technology.



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The results refer to a TEM2K shunting locomotive with a 1-PDG4D engine, a KT-6 compressor and wheel-motor blocks of the stated service time; on other equipment and under different operating conditions the figures may differ. The original act with signatures and seals is published in full and available for download.