

TEST REPORT · PLOVDIV LOCOMOTIVE DEPOT

Locomotive traction gearbox: gear teeth gained metal with no teardown, in service

"MAY" OOD together with Locomotive Depot – Plovdiv · signed by: Deputy Director of Rail Traction D. Spasov, Head of Repairs N. Hristev, Chief Specialist for Safety and Inspection Yonchev, fitter N. Zhekov, Manager of "MAY" OOD A. Iliev

Plovdiv, Bulgaria · testing 22.06–10.10.2002 · report dated 16.10.2002

PRODUCT

XADO revitalizant gel for gearboxes
added to the oil bath in 3 stages
at 8-hour intervals, without
dismantling the gearbox

TEST OBJECT

Two traction gearboxes of
locomotive No. 44 099
one gearbox treated, the other
left as control · both ran under
identical conditions

DOCUMENT TYPE

Commission report
signed and stamped by the
depot

EQUIPMENT**MILEAGE DURING
TEST****WHAT WAS MEASURED**

Locomotive No. 44 099, traction
gearbox — experimental

35,000 km

Tooth thickness of the large gear wheel at the
constant chord height

Locomotive No. 44 099, traction
gearbox — control

35,000 km

Tooth thickness of the small gear wheel, same
measuring points

The same teeth, selected at random, were measured before and after; gear tooth caliper, constant chord height. Before treatment the tooth surfaces carried pitting and wear marks.

Key results

↑ 0.34-0.58 mm

tooth thickness of the treated gear wheel, deviation
from nominal 0.62-1.22 → 0.26-0.64 mm

↓ 0.30-0.32 mm

tooth thickness of the untreated gear wheel over the
same 35,000 km, deviation 0.68-0.70 → 1.00 mm

Treated gearbox — tooth thickness of the large gear wheel

TOOTH	DEVIATION BEFORE TREATMENT	DEVIATION AFTER 35,000 KM	THICKNESS CHANGE
I	-0.62 mm	-0.28 mm	+0.34 mm
III	-0.61 mm	-0.27 mm	+0.34 mm
IV	-0.62 mm	-0.26 mm	+0.36 mm
V	-1.22 mm	-0.64 mm	+0.58 mm

The largest gain was on the most worn tooth V: the coating builds up where wear is greater and does not build up where there is none.

Control gearbox of the same locomotive — tooth thickness of the small gear wheel

TOOTH	DEVIATION AT START	DEVIATION AFTER 35,000 KM	THICKNESS CHANGE
I	-0.68 mm	-1.00 mm	-0.32 mm
II	-0.70 mm	-1.00 mm	-0.30 mm
III	-0.69 mm	-1.00 mm	-0.31 mm
IV	-0.70 mm	-1.00 mm	-0.30 mm
V	-0.70 mm	-1.00 mm	-0.30 mm

The report notes: after the large gear wheel of the control gearbox failed, the small gear wheel of the experimental gearbox was fitted into it.

Commission conclusion

The commission of the Plovdiv locomotive depot recorded in the report: "Analysis of the data obtained shows that on the experimental gear wheel wear was stopped and an increase in tooth thickness occurred, while on the control gear wheel wear continued. A metal-ceramic protective layer of high hardness formed on the working surface of the teeth of the experimental gearbox gear wheels." Visual inspection revealed a transparent layer on the working surfaces that had completely filled the pits and other wear marks. Before the test began, the teeth of both gear wheels were thinner than the norm — deviation up to **1.22 mm** — and the gearbox was not dismantled for treatment: the gel was added to the oil bath, and the locomotive ran all **35,000 km** in regular service.



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The results refer to the traction gearbox of locomotive No. 44 099 at the Plovdiv depot over 35,000 km of running; on other units and operating modes the figures may differ. The treatment was carried out by "MAY" OOD, a XADO distributor; the measurements and certification were made by the commission of the Plovdiv locomotive depot. The report is published in full and available for download.