

TECHNICAL REPORT ON TREATMENT OF A DG-99 DIESEL ENGINE

DG-99 diesel at a drilling rig: crankshaft journal sizes restored without teardown

ORTES LLC (Society for the Development of Technical and Power Systems), Krasnodar · director V. A. Dudchenko · treatment by Khado-Yug LLC, general director Yu. P. Lebedintseva

Drilling rig No. 2, Raduzhny area, Tyumen Region, Russia · report dated 01.10.2002

PRODUCT

XADO revitalizant
applied without engine
teardown, during normal
operation

TEST OBJECT

DG-99 diesel No. 38
crankshaft: journal diameter
250 mm · piston diameter 360
mm

DOCUMENT TYPE

Technical report by
ORTES LLC, signed and
stamped

**WHAT RAN AND WAS
INSPECTED**

DG-99 diesel No. 38,
drilling rig No. 2

CONDITION BEFORE TREATMENT

Crankshaft attacked by corrosion:
water had entered the crankcase,
leaving rust marks on the crankpins
and main journals

WHAT WAS MONITORED

Operation of **8 h** and **102 h** after
treatment at various rotation
speeds and loads

Crankshaft, 3rd crankpin

After grinding, sizes were **0.04-0.12
mm** below factory dimensions, with
corrosion pits about **0.05 mm** deep

Diameter at three cross-sections —
horizontal and vertical

5th crankpin, cylinder liners

Corrosion marks from water ingress
into the crankcase

Condition of friction surfaces at
inspection openings

Treatment was carried out without engine teardown, during normal operation; the journals were exposed for inspection only.

Key result

↑ **0.03-0.11**mm

3rd crankpin diameter, 249.86-249.94 → 249.94-249.98 mm (factory size 249.98 mm)

Third crankpin diameter: after grinding and after treatment

CROSS-SECTION AND MEASURING DIRECTION	AFTER GRINDING, MM	AFTER TREATMENT, MM	GAIN, MM
Section A, horizontal	249.87	249.98	+0.11
Section A, vertical	249.86	249.94	+0.08
Section B, horizontal	249.92	249.95	+0.03
Section B, vertical	249.88	249.95	+0.07
Section C, horizontal	249.94	249.94	0.00
Section C, vertical	249.93	249.96	+0.03

The factory journal size is **249.98 mm**. Control measurements were taken after **102 h** of operation at various rotation speeds and loads.

Inspection openings: what happened to the friction surfaces

INSPECTION	WHAT WAS EXAMINED	WHAT WAS RECORDED
After 8 h of operation	5th crankpin, liners	«A mirror finish had formed on the crankshaft journals where the journal and the bearing shell rub, its surface finish considerably exceeding the mirror finish left by grinding»; the condition of the liner friction surfaces improved; the crankshaft turned more freely on the turning gear
After 102 h of operation	5th and 3rd crankpins, liners	«On them, in the friction areas, a formed mirror finish was clearly visible»; the corrosion marks «took on a bright steel colour and could no longer be felt»; the friction surfaces of the liners of all pistons took on a bright steel colour; the shaft turned freely on the turning gear

Before treatment, grinding had not removed the corrosion completely: black marks about **0.05 mm** deep remained on the journals. Oil temperature under operating conditions — **63-78 °C**.

Report conclusion

ORTES LLC recorded that «the use of XADO revitalizant made it possible to restore the geometric dimensions of the crankshaft journals virtually to factory sizes, without engine teardown, during normal operation». The engine came in for treatment after crankshaft corrosion — water had entered the crankcase, and grinding had taken the journal sizes **0.04-0.12 mm** below factory dimensions. Over **102 h** of normal operation the journal gained metal, while the corrosion marks took on a bright steel colour and could no longer be felt. Given the engine's location (drilling rig No. 2, Raduzhny area, Tyumen Region) and its overall dimensions — piston diameter **360 mm**, crankshaft journal diameter **250 mm** — the authors of the report consider that periodic treatment of engines by the XADO technology «will make it possible to minimise the material and time costs of their repair and to increase overhaul intervals several times over».



© XADO. All rights reserved.

The results relate to a stationary DG-99 diesel engine and its crankshaft under drilling-rig conditions; figures may differ on other units and operating modes. The treatment was performed by Khado-Yug LLC, the supplier of the formulation. The original report with signatures and stamps is published in full and available for download.