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IE A023 | INDUSTRIAL CASE STUDY | HEAVY MACHINE BUILDING | ROAD TRANSPORT · ENGINE

TECHNICAL REPORT OF THE MOTOR TRANSPORT SHOP, PJSC NKMZ

ZiL-131 engine: cylinders evened out in compression, no teardown

PJSC Novokramatorsk Machine-Building Works (NKMZ), motor transport shop · approved by: A. A. Naumkin, Deputy Head of the Motor Transport Shop · measurements: A. S. Bobko, shop mechanic, and R. A. Petrenko, driver, together with engineers of XADO LLC

Kramatorsk, Donetsk region, Ukraine · treatment 16–19.04.2013 · measurements 16.04 and 13.07.2013 · report 30.07.2013

PRODUCT

XADO 1 STAGE revitalizant gel

27.0 ml tube · lubrication system prepared with XADO Vitaflush cleaner

TEST OBJECT

ZiL-131 truck, reg. no. AN 9719 VS

gasoline eight-cylinder engine · cylinder-piston and crank-and-rod assemblies

DOCUMENT TYPE

Technical report Motor Transport Shop, PJSC NKMZ

signed by the commission, certified with the shop seal

MACHINE	MILEAGE AT START OF TESTING	WHAT WAS MEASURED
ZiL-131, reg. no. AN 9719 VS, in service since 1986	**73 237 km**	Compression in all eight cylinders — before treatment and after **3420 km** of running

The treatment was carried out without dismantling the engine, during a scheduled oil change: XADO Vitaflush cleaner, then XADO 1 STAGE revitalizant gel, 16–19.04.2013.

Key result

↑ 0.2 bar

compression in the weakest cylinder, 8.0 → 8.2 bar; the other cylinders changed within 0.5 bar

compression evened out across the cylinders

Engine compression by cylinder — before treatment and after 3420 km of running

CYLINDER	BEFORE TREATMENT, bar	AFTER 3420 KM, bar	CHANGE, bar
I	**8.0**	**8.2**	**+0.2**
II	**8.5**	**8.3**	**−0.2**
III	**8.7**	**8.5**	**−0.2**
IV	**8.2**	**8.2**	**0**
V	**8.7**	**8.5**	**−0.2**
VI	**9.0**	**8.5**	**−0.5**
VII	**8.5**	**8.5**	**0**
VIII	**8.8**	**8.5**	**−0.3**
Range across the engine	**8.0–9.0**	**8.2–8.5**	lower bound **+0.2**, upper bound **−0.5**

ZECA 362 compression tester, engine temperature **50 °C** at both measurements; the measurement cards are attached to the report. The report states the cylinder-to-cylinder spread in kgf/cm².

Conclusions of the report

The technical report of the motor transport shop of PJSC NKMZ recorded the following: the initial measurements established that compression in the engine ranged from **8.0** to **9.0 bar** — a normal value for engines of this model given the design compression ratio of **6.5** — but the maximum cylinder-to-cylinder compression spread was **1 kgf/cm²**, "which for a gasoline engine is the maximum permissible value". After the vehicle had covered **3420 km**, repeat measurements were taken: compression ranged from **8.2** to **8.5 bar** and the maximum cylinder-to-cylinder spread was **0.3 kgf/cm²**, "which is comparable to the compression spread of new engines". The report explains the decrease in individual cylinders by the fact that the initial value there was higher owing to the oil wedge in the thermal clearances enlarged by wear. Conclusion: "after the treatment the mechanical wear has been localized, the thermal clearances have been optimized, and the compression across the cylinders has likewise become optimal".

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The results relate to the gasoline engine of a ZiL-131 truck under the operating conditions of the motor transport shop of PJSC NKMZ; on other machinery and under different conditions the figures may differ. The original technical report bearing signatures and stamp is published in full and available for download.