ACCEPTANCE TECHNICAL REPORT UNDER CONTRACT No. 8 OF 22.07.2001

TGM-23B locomotive: a worn diesel holds compression again

DAT "Ukrspetstransgaz", repair and production section · treatment performed by TzOV "Ekor" · report approved by Board Chairman P. V. Moroz

Ukraine · treatment 17.08.2001 · contract No. 8 of 22.07.2001

PRODUCT

XADO technology

treatment of the diesel engine, fuel injection equipment and hydraulic transmission

TEST OBJECT

TGM-23B shunting locomotive

1D12-400S1 diesel (twelve-cylinder) · high-pressure fuel pump · hydraulic transmission · reduction gear

DOCUMENT TYPE

Acceptance technical report
with signatures and stamps

UNIT	CONDITION BEFORE TREATMENT	WHAT WAS MEASURED
1D12-400S1 diesel	Compression **19-20 kgf/cm²**, oil temperature **85 °C**	Compression by cylinder, oil temperature
High-pressure fuel pump	Did not deliver normal working pressure	Performance assessment, no instrument measurement
Hydraulic transmission and reduction gear	Elevated noise and vibration at the transmission	Noise, vibration, torque transfer

Treatment carried out on 17.08.2001 on a locomotive in normal service; the units were not disassembled.

Key results

↑ 7.5-14.2 %

compression by cylinder, 19-20 → 20-22 kgf/cm²; the rest unchanged; gain in 6 of 7 measurements; the rest unchanged

↓ 5.9 %

engine oil temperature, 85 → 80 °C

Compression by cylinder — 1D12-400S1 diesel

CYLINDER	BEFORE, kgf/cm²	AFTER, kgf/cm²	CHANGE, kgf/cm²
1st	**20**	**21.5**	**+1.5**
2nd	**19**	**21.7**	**+2.7**
5th	**20**	**22**	**+2.0**
6th	**19.5**	**21**	**+1.5**
8th	**20**	**20**	no change
11th	**19.3**	**21.3**	**+2.0**

According to the conclusion of the report, compression by cylinder rose by **8-10 %** on average; the largest gain was on the cylinder with the lowest initial compression.

Diesel and transmission — what changed after treatment

UNIT	PARAMETER	RESULT
1D12-400S1 diesel	Oil temperature	**85 → 80 °C**
1D12-400S1 diesel	Exhaust smoke opacity	Reduced **1.3×** — per the conclusion of the report
1D12-400S1 diesel	Fuel consumption	Saving of **5-7 %** — per the conclusion of the report
Hydraulic transmission, reduction gear	Transmission noise and vibration	Reduced — per the conclusion of the report
Hydraulic transmission	Torque transfer	Performance improved — per the conclusion of the report

All units of the locomotive were treated — the diesel engine, the high-pressure fuel pump, the hydraulic transmission and the reduction gear.

Conclusion of the commission

Before treatment the high-pressure fuel pump did not deliver normal working pressure, noise and vibration at the transmission were elevated, and compression by cylinder stayed at **19-20 kgf/cm²**. The treatment was carried out on 17.08.2001 without disassembling the units. The commission of DAT "Ukrspetstransgaz" and TzOV "Ekor" recorded:

1. Compression by cylinder rose by **8-10 %** on average.
2. Vibration and noise decreased.
3. The smoke opacity figure dropped **1.3×**.
4. Torque transfer performance in the hydraulic transmission improved.
5. Fuel saving amounted to **5-7 %**. "The positive results obtained indicate an improvement of the technical and economic indicators; the effectiveness of applying XADO technology has been proven. The scope of implementation of XADO technology at this enterprise may be expanded".

XADO

The results refer to a TGM-23B shunting locomotive with a 1D12-400S1 diesel engine operated by DAT "Ukrspetstransgaz"; on other equipment and under other duty cycles the figures may differ. The treatment was performed by TzOV "Ekor", whose representatives are among the authors of the report. The original report with signatures and stamps is published in full and available for download.