

INDUSTRIAL IMPLEMENTATION REPORT · 24.12.2012

Locomotive TEM2: engine regained power and cut oil burn-off without teardown

PTP Pavlogradpogruztrans, locomotive depot · approved by the company chief engineer I. V. Bilych,
company seal

Pavlograd, Ukraine · work carried out 05.12–24.12.2012 · repeat measurements after 276 h of engine
running time

PRODUCT

XADO revitalizants
revitalizant gel for diesel
engines · revitalizant gel for
injection pumps · VITAFLUSH
cleaner · JET 100

TREATED OBJECT

PDG-1 diesel engine and
fuel equipment
locomotive TEM2 No. 2941 · six
cylinders · oil system, fuel
system, injection pump

DOCUMENT TYPE

Company report
with signatures and seal

EQUIPMENT AND UNIT**CONDITION AT START OF WORK****WHAT WAS MEASURED**

Locomotive TEM2 No.
2941, PDG-1 diesel
engine

Built in **1975**, **37** years in service

Compression and maximum combustion
pressure in each of the six cylinders,
controller positions **3** and **5**

Engine oil system

Only cylinders **3, 4 and 5** ran
satisfactorily; oil consumption
about **5 %** of fuel consumption

Oil pressure at controller positions **3, 5,**
7, engine block temperature, monthly oil
burn-off

Fuel system and injection
pump

Flushing with **5,000 ml** of JET 100
in the remaining **3,600 l** of fuel,
then treatment of the injection
pump

Maximum combustion pressure per
cylinder

Treatment without engine teardown: VITAFLUSH flush in the used oil, oil change, revitalizant gel in three stages; repeat
measurements after 276 h of running time.

Key results

↑ **25-36 %**

compression of the worn cylinders,
controller position 5, 22-24 → 30
kgf/cm²

↓ **35 %**

monthly oil burn-off in normal
service, 200 liters per month

↑ **50-95 %**

maximum combustion pressure,
cylinders 1, 2 and 6, controller
position 5, 22-24 → 36-43 kgf/cm²

Compression in the engine cylinders

CYLINDER	CONTROLLER POSITION 3, kgf/cm ²	CONTROLLER POSITION 5, kgf/cm ²
I	22 → 26	22 → 30
II	26 → 28	22 → 30
III	34 → 35	36 → 36
IV	32 → 33	32 → 34
V	22 → 27	24 → 30
VI	20 → 26	22 → 30

Maximum compression pressure, maximeter; measured before treatment and after it at a total engine running time of 276 h.

Maximum combustion pressure per cylinder

CYLINDER	CONTROLLER POSITION 3, kgf/cm ²	CONTROLLER POSITION 5, kgf/cm ²
I	24 → 30	22 → 43
II	26 → 36	24 → 40
III	38 → 40	40 → 45
IV	40 → 42	42 → 44
V	34 → 44	38 → 46
VI	22 → 28	24 → 36

Before treatment, in cylinders 1, 2 and 6 the combustion pressure was almost the same as the compression pressure — these cylinders were not developing rated power.

Engine oil system

PARAMETER	BEFORE	AFTER
Oil pressure, controller position 3	2.8 kgf/cm ²	3.0 kgf/cm ²
Oil pressure, controller position 5	3.0 kgf/cm ²	3.2 kgf/cm ²
Oil pressure, controller position 7	3.0 kgf/cm ²	3.3 kgf/cm ²
Oil consumption as a share of fuel consumption	about 5 %	3.4 %
Engine block temperature	58 °C	56.7 °C

Oil pressure was measured at the same engine temperature. Monthly oil burn-off in normal service fell by 200 liters.

Conclusions of the company commission

Based on the results of a full cycle of flushing and treatment of the fuel and oil systems of the engine of locomotive TEM2 No. 2941 with XADO revitalizant compounds, and on repeat measurements after a total engine running time of **276 h**, it was established that:

1. In all engine cylinders the compression rose by **1-8 kgf/cm²**, which indicates an increase in engine power. The maximum spread of compression between cylinders was **16 kgf/cm²** before treatment and fell to **9 kgf/cm²** after treatment.
2. The maximum combustion pressure also rose in all cylinders by **2-21 kgf/cm²**, and the spread of maximum combustion pressure between cylinders decreased from **20 kgf/cm²** to **16 kgf/cm²**.
3. The oil pressure at the same engine temperature rose by **0.2-0.3 kgf/cm²** when running at various positions of the driver's controller.
4. The monthly oil burn-off with the engine operating in normal service fell by **35 %** (by **200 liters** per month).
5. The actual oil consumption was **3.4 %** of the fuel consumption, which meets the established standard figures for this engine.

XADO

© XADO. All rights reserved.

The results relate to a TEM2 shunting locomotive with a PDG-1 diesel engine at 276 h of running time after treatment; on other engines and duty cycles the figures may differ. The measurements were taken jointly by specialists of the locomotive depot of PTP Pavlogradpogruztrans and XADO LLC, and the report was approved by the company chief engineer. The original report with signatures and seals is published in full and available for download.