

TREATMENT CERTIFICATES UNDER XADO TECHNOLOGY · 2003–2005

KT6EL compressors and traction gearboxes: lower current, faster air build-up

Main Locomotive Department of Ukrzaliznytsia · Nizhnedneprovsk-Uzel depot, Prydniprovsk Railway, and Kazatin depot, South-Western Railway

Ukraine · treatment in 2002 · interim-measurement certificates 2003–2005

PRODUCT

XADO revitalizants
revitalizant gel for compressors
and bearings · revitalizant gel
for gearboxes

TEST OBJECT

VL-8 and VL-80K electric
locomotives
ten KT6EL compressors ·
traction gearboxes of wheelsets

DOCUMENT TYPE

Six treatment certificates
signed and stamped by the
depots

LOCOMOTIVE AND DEPOT	MILEAGE AFTER TREATMENT	WHAT WAS MEASURED	CERTIFICATE DATE
VL-8 No. 979 · Nizhnedneprovsk-Uzel	128 696 km	Two KT6EL compressors: current, air system fill	23.05.2003
VL-8 No. 506 · Nizhnedneprovsk-Uzel	94 834 km	Two KT6EL compressors: current, air system fill	01.07.2003
VL-8 No. 1297 · Nizhnedneprovsk-Uzel	92 246 km	Two KT6EL compressors; teeth of treated and control gearboxes	15.08.2003
VL-80K No. 542 · Kazatin	294 300 km	Two KT6EL compressors: current, air system fill	05.12.2003
VL-80K No. 1809 · Kazatin	299 806 km	Two KT6EL compressors at teardown; gearbox teeth	05.04.2004
VL-8 No. 979 · Nizhnedneprovsk-Uzel	362 677 km	Same compressors and gearboxes, teardown at TR-3 overhaul	12.05.2005

All certificates are signed by the depot chief engineer and chief process engineer and bear official stamps; the treatment was carried out in 2002 during scheduled maintenance.

What repeated on every locomotive

↓ **5.5-12.8 %**

current drawn by the compressor motor, 10.5-90 → 9.5-80 A

↓ **7-19 %**

air system fill time, 17.5-82 → 15-72 s

↓ **0.04-0.09 mm**

diameter of worn compressor cylinders at teardown

↑ **0.25-0.55 mm**

tooth thickness of treated traction gearboxes

KT6EL compressors — output and current draw

LOCOMOTIVE	COMPRESSOR	AIR SYSTEM FILL, s	CURRENT UNDER LOAD, A
VL-8 No. 1297	No. 4-31-550	46 → 42 · -8.7%	11 → 10.4 · -5.5%
VL-8 No. 1297	No. 434836	82 → 68 · -17.1%	10.5 → 9.5 · -9.5%
VL-8 No. 506	No. 8-41-122	71 → 65 · -8.5%	12 → 11 · -8.3%
VL-8 No. 506	No. 8-484	69 → 58 · -15.9%	—
VL-8 No. 979	No. 1118949	71 → 66 · -7.0%	11 → 10.2 · -7.3%
VL-8 No. 979	No. 5-12655	79 → 72 · -8.9%	10.5 → 9.7 · -7.6%
VL-80K No. 1809	No. 1-21-602	18 → 16 · -11.1%	—
VL-80K No. 1809	No. 1-21-006	17.5 → 15 · -14.3%	—
VL-80K No. 542	No. 10-80-324	19 → 15.5 · -18.4%	90 → 80 · -11.1%
VL-80K No. 542	No. 10-54-754	21 → 17 · -19.0%	78 → 68 · -12.8%

Fill time was measured with a stopwatch: on the VL-8 over the 5→8 atm range, on the VL-80K over 0→4 atm; current was read with a clamp meter under working back pressure.

Traction gearboxes — treated wheelsets against control ones

LOCOMOTIVE	MILEAGE	TREATED TEETH	UNTREATED, SAME MILEAGE
VL-8 No. 1297	92 246 km	+0.30-0.55 mm	-0.20-0.35 mm

LOCOMOTIVE	MILEAGE	TREATED TEETH	UNTREATED, SAME MILEAGE
VL-80K No. 1809	299 806 km	+0.15-0.70 mm	-0.15-0.75 mm
VL-8 No. 979	362 677 km	+0.25-0.35 mm	-0.35-0.60 mm

Tooth thickness was taken at the constant-chord height on the same teeth throughout; the untreated wheelsets ran the same mileage on the same locomotives.

Compressor geometry at teardown

PARAMETER	VL-8 No. 979 · 362 677 km	VL-80K No. 1809 · 299 806 km
Bore diameter of LP and HP cylinders	smaller by 0.04-0.08 mm	smaller by 0.06-0.09 mm
Cylinder ovality	0.07-0.15 → 0.03-0.076 mm	0.05-0.09 → 0.01-0.02 mm
Cylinder taper	0.11-0.194 → 0.04-0.085 mm	0.07-0.12 → 0.01-0.02 mm
Radial clearance in crankshaft bearings	0.12-0.15 → 0.08-0.10 mm	—

Measured with micrometers and bore gauges during teardown at scheduled maintenance; score marks and scratches in the cylinders are visible through the layer but cannot be felt.

What the depots recorded

The certificates of both depots record the same result: "The measurement results confirm the effectiveness of XADO revitalizants for treating locomotive compressors, which makes it possible to reduce power consumption, increase their output and lower the noise level." Teardown of the compressors showed where it comes from: "the cylinder diameters, the taper and the ovality have decreased. The surface of all cylinders carries a characteristic metal-ceramic layer. In the crankshaft bearings the radial clearance has decreased by **0.03-0.05 mm**, the bearings are in perfect condition and fully serviceable." Before treatment these same cylinders carried score marks and scuffing, and the gearbox teeth showed pitting and spalling. Over one and the same mileage the treated teeth gained thickness, while the untreated ones on the same locomotives lost it.

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The results relate to KT6EL reciprocating compressors and to the traction gearboxes of VL-8 and VL-80K electric locomotives; on open assemblies — axle-box guides, spring and brake joints — the certificates record continuing wear. The treatment was performed by XADO LLC, the measurements were made with the depot's instruments and signed by its officers. The original certificates with signatures and stamps are published in full and available for download.