Technical passport №_____
Of results of XADO® technology treatment

Date: September 27, 2003

Customer: Main Locomotive Department of "Ukrzaliznytsa"
Contractor: LLC "XADO"

Unit:

- Type Diesel locomotive
- Model D-1 (Д-1)
- Factory number 764
- Year of manufacturing
- Manufacturer Hungary
- Date of last overhaul August 2002, Khristinovka depot, Odesskaya Railway
- Home depot T.G. Shevchenko depot, Odesskaya Railway
- Run after XADO® technology treatment 115675 km

Units treated by XADO® technology treatment

Item	Description	Factory number	Type of basic lubrication	Amount of lubrication, l	System of lubrication	Notes
1	Diesel engine 12VFE 17/24	24282	Motor oil M14B2 or M14Г2	616	Circulation from the oil tank	

Data of XADO® technology treatment

№ of unit	Type of *XADO* material	Treatment data			Amount of XADO material, l			Total amount of XADO material liters
		1st stage	2nd stage	3rd stage	1st stage	2nd stage	3rd stage	
1.	XADO revitalisant gel for diesel engines	25.09.02	26.09.02	27.09.02	0.86	0.86	0.86	2.588

Measurement results of compression in the cylinders of the engine 12VFE 17/24 №24282 before and after XADO® technology treatment

Number of cylinder (raw J)	1	2	3	4	5	6
Compression value before XADO® technology treatment. kg/sm^2	20	20	20	20	20	20
Compression value after treatment and a 41136 км run. kg/sm^2 (measured on 16.01.03).	32	31	31	31	33	33
Compression value after treatment and a 11567 км run. kg/sm^2 (measured on 27.09.03).	33	34	33	33	35	35
Number of cylinder (raw B)	1	2	3	4	5	6
Compression value before XADO® technology treatment kg/sm^2	18	20	19	19	20	20
Compression value after treatment and a 41136 км run. kg/sm^2 (measured on 16.01.03).	32	33	31	31	32	32
Compression value after treatment and a 11567 км run. kg/sm^2 (measured on 27.09.03).	34	34	32	33	35	35

Measurements of compression value before treatment and after a 41136 км run were performed with a compressometer №140585 MPZ GOST 2405-80.

Measurements of compression value before treatment and after a 11567 км run were performed with a compressometer №115737 MPZ GOST 2405-80.

Measurement results of oil pressure in the engine 12VFE 17/24 №24282 before and after XADO® technology treatment

Engine speed. rev/min	530	830
Oil pressure value before XADO® technology treatment. kg/sm^2	2.1	2.8
Oil pressure value after treatment and a 41136 км run. kg/sm^2 (measured on 16.01.03)	2.3	3.1
Oil pressure value after treatment and a 11567 км run. kg/sm^2 (measured on 27.09.03)	2.5	3.4

Measurements of oil pressure value were performed with a standard manometer installed on the diesel locomotive at oil temperature 60-70°C.

Measurement results of combustion pressure in the cylinders of the engine 12VFE 17/24 №24282 before and after XADO® technology treatment

Number of cylinder (raw J)	1	2	3	4	5	6
Combustion pressure value before XADO® technology treatment. kg/sm^2	40	40	40	40	40	40
Combustion pressure value after treatment and a 41136 км run. kg/sm^2 (measured on 16.01.03).	59	58	58	55	56	59
Combustion pressure value after treatment and a 11567 км run. kg/sm^2 (measured on 27.09.03).	61	62	63	60	59	63
Number of cylinder (raw B)	1	2	3	4	5	6
Combustion pressure value before XADO® technology treatment kg/sm^2	40	40	40	40	40	40
Combustion pressure value after treatment and a 41136 км run. kg/sm^2 (measured on 16.01.03).	58	58	59	57	58	59
Combustion pressure value after treatment and a 11567 км run. kg/sm^2 (measured on 27.09.03).	61	61	61	60	60	63

Measurements of combustion pressure value after a 41136 км run were performed with a maximeter №140585 MPZ GOST 2405-80 at 1180 rev/min.

Measurements of combustion pressure value after a 11567 км run were performed with a maximeter №115737 MPZ GOST 2405-80 at 1180 rev/min.

Measurement results of fuel consumption of the engine 12VFE 17/24 №24282 before and after XADO® technology treatment

Engine speed. rev/min	1180
Fuel consumption value before XADO® technology treatment. l/h	108
Fuel consumption value after treatment and a 41136 км run. l/h (measured on 16.01.03)	85
Fuel consumption value after treatment and a 11567 км run. l/h (measured on 27.09.03)	81

Measurements of fuel consumption value were performed with a standard measuring scale installed on the fuel tank of the diesel locomotive.

Measurement results of noise level of the engine 12VFE 17/24 №24282 before and after XADO® technology treatment

Engine speed. rev/min	530	1180
Engine noise level before XADO® technology treatment dbA	95	108
Engine noise level after treatment and a 41136 км run. dbA (measured on 16.01.03)	84	96
Engine noise level after treatment and a 11567 км run. dbA (measured on 27.09.03)	84	95

Measurements of noise level were performed with a type 0024 noise meter, factory number №31192.

Conclusions:
1. Measurements of operational parameters of engine 12VFE 17/24 №24282 performed during the scheduled technical examination TP-1 after a 41136 km run have shown the following results:
• Average compression in the cylinders has increased by 38.2%;
• Average combustion pressure in the engine cylinders has increased by 30.8%;
• Oil pressure in the engine has increased by 9.6%;
• Fuel consumption at engine idle run has decreased by 21.3%;
• Noise level during the engine operation at maximum engine speed has decreased by 11%.

Measurement data show considerable improvement of engine operation parameters after the treatment with XADO revitalisants and prove high efficiency of XADO technology application on diesel engines of railway vehicles.
2.Measurements of operational parameters of the engine 12VFE 17/24 №24282 performed during the scheduled technical examination TO-3 showed that after a 115675 km run the operational parameters remain stable:

- Compression in the cylinders has increased by 1-3 kg/sm^2 compared to the measurement results after a 41136 km run. Average percentage of compression increase in the tested engine after XADO-technology treatment made up 39.6%.
- Combustion pressure in the engine cylinders has increased by 2-5 kg/sm^2 compared to previous measurement results after a 41136 km run. Average percentage of combustion pressure increase after XADO-technology treatment made up 32,8%;
- Oil pressure in the engine has increased by 9.6 % after XADO-technology treatment.
- Fuel consumption at engine idle run has decreased by 4 l/hour compared to fuel consumption measured after a 41136 km run. Total fuel consumption after XADO-technology treatment has decreased by 27 l/hour or by 24.2 %.
- Noise level during the engine operation at maximum engine speed was practically unchanged compared to measurement results after a 41136 km run. General reduction of noise level after the treatment made up 11.3 %.

The performed measurements of operational parameters of the tested engine after a 115675 km run prove stability of the results obtained after XADO-technology treatment during long-term operation of diesel locomotive section №764-3.

Representative of LLC «XADO»	Burushkin I.A.
Chief engineer of Shevchenko depot	Marzan V.A.
Deputy head of Shevchenko depot	Puzyr Yu.M.
Head of technical department of Shevchenko depot	Zagrebelniy V.V.