

**Technical passport**  
Of results of XADO® technology treatment

Date: 17. 07. 2004

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

Unit:

- Type Electric locomotive
- Model (ЧС-2)
- Factory number 377
- Year of manufacturing \_\_\_\_\_
- Manufacturer "Skoda", Czechoslovakia
- Date of last overhaul February 2002
- Home depot Dnepropetrovsk depot, Pridneprovskaya Railway
- Run after XADO® technology treatment 323457 km

**Units subject to XADO® technology treatment**

Item	Description	Factory number	Type of basic lubrication	Amount of lubrication, l	System of lubrication	Notes
1	Wheel-engine block axis №1	4812	Lubrication oil ТСП-14 or ТАП15В	12.5	Oil reservoir	
2	Wheel-engine block axis №2	2152				
3	Wheel-engine block axis №3	064Н1				
4	Wheel-engine block axis №4	6498				
5	Wheel-engine block axis №5	8329				
6	Wheel-engine block axis №6	2656				

**Data of XADO® technology treatment**

№ of unit	Type of XADO material	Treatment data			Amount of XADO material, l			Total amount of XADO material, l
		1 <sup>st</sup> stage	2 <sup>nd</sup> stage	3 <sup>rd</sup> stage	1 <sup>st</sup> stage	2 <sup>nd</sup> stage	3 <sup>rd</sup> stage	
1	Wheel-engine block axis № 1 (gel )	16.05.02			0.185			0.185
2	Wheel-engine block axis №2 (gel )	16.05.02			0.185			0.185
3	Wheel-engine block axis №3 (gel )	16.05.02			0.185			0.185
4	Wheel-engine block axis №4 (gel )	16.05.02			0.185			0.185
5	Wheel-engine block axis № 5 (gel )	16.05.02			0.185			0.185
6	Wheel-engine block axis № 6 (gel )	16.05.02			0.185			0.185

ТОВ "XADO - технологія"  
БЮРО ІНОЗЕМНИХ ПЕРЕКЛАДІВ  
№31233443  
61018, м.Харків, пров. 23-го Серпня, 4



**Measurement results of gear wheel teeth thickness before and after  
XADO® technology treatment**

Number of tooth	Date of measurement	Run, km	Wheel-engine block					
			Wheel-engine block 1	Wheel-engine block 2	Wheel-engine block 3	Wheel-engine block 4	Wheel-engine block 4	Wheel-engine block 5
			№4812	№2152	№064H1	№6498	№8329	№2656
			Number of gear wheel in wheel-engine block					
			1291	2795	83	70	3704	143
Tooth thickness in mm at height h = 9mm from the tooth top								
1	Before treatment 16.05.2002	-	15.7	14.7	15.9	15.6	15.8	15.8
	12.11.2002	85039	16.25	15.05	16.45	16.05	16.35	16.25
	13.01.2004	238451	16.25	15.05	16.6	16.0	16.5	16.3
	16.07.2004	323457	16.25	15.0	16.55	15.95	16.4	16.3
2	Before treatment 16.05.2002	-	15.8	14.8	15.9	15.65	15.8	15.8
	12.11.2002	85039	16.3	15.15	16.4	16.0	16.4	16.35
	13.01.2004	238451	16.3	15.1	16.6	16.0	16.4	16.35
	16.07.2004	323457	16.3	15.05	16.55	16.0	16.35	16.3
3	Before treatment 16.05.2002	-	15.8	14.85	15.9	15.65	15.85	15.75
	12.11.2002	85039	16.45	15.15	16.45	16.0	16.4	16.25
	13.01.2004	238451	16.35	15.1	16.55	16.0	16.4	16.35
	16.07.2004	323457	16.25	15.05	16.55	16.0	16.3	16.3
4	Before treatment 16.05.2002	-	15.8	14.7	16.0	15.5	15.8	15.8
	12.11.2002	85039	16.4	15.05	16.5	15.95	16.35	16.35
	13.01.2004	238451	16.4	15.15	16.6	16.0	16.35	16.4
	16.07.2004	323457	16.25	15.05	16.5	16.1	16.3	16.3
5	Before treatment 16.05.2002	-	15.85	14.7	15.9	15.65	15.8	15.7
	12.11.2002	85039	16.3	15.1	16.45	16.05	16.3	16.3
	13.01.2004	238451	16.3	15.1	16.6	16.0	16.4	16.35
	16.07.2004	323457	16.25	15.1	16.6	16.0	16.35	16.3

Note:

Before treatment of tooth №5 of gear wheel №70 (wheel-engine block №6498) an accumulation of pitting blisters with maximum diameter up to 6 mm and depth up to 0.7 mm has been detected on the working surface of contact patch. Contact patches of gear wheels №143 (wheel-engine block №2656) and №83 (wheel-engine block №064H1) had hairlines and blisters with maximum diameter up to 2 mm and depth up to 0.4 mm.

**Conclusions:** 1. After a 85039 km run all pitting blisters and hairlines on the working surfaces of gear wheel teeth detected before treatment were eliminated, all contact patches of gear wheel teeth had the form of smooth polished surface. An increase of gear wheel teeth thickness by the value of 0.35 - 0.6 mm has been detected, proving the complete absence of wear on the working surfaces of gear wheel teeth of traction gear boxes.

*Александр С*





2. After a 238451 km run the thickness of gear wheel teeth remain stable compared to the measurements after a 85039 km run. On many gear wheels the formation of ceramic metal layer continued, while the increase of thickness made up additionally 0.05-0.2 mm compared to a 85039 km run. Total increase of teeth thickness from the beginning of treatment made up 0.35-0.7 mm.

3. After a 323457 km run general retention of the obtained teeth thickness is observed. Insignificant decrease of teeth thickness is observed on several gear wheels within the limits of 0.05- 0.1 mm. But in general the teeth thickness remain higher than the initial values by 0.35-0.6 mm. A layer of ceramic metal is visually observed on contact patches of all teeth, which eliminated all small blisters and burrs on the working surface of gear wheel teeth. Surface of the contact patches remain smooth and without visible mechanical damages.

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Seal: LLC "XADO", Kharkov, Ukraine

Seal: Dnepropetrovsk Locomotive Depot, Ministry of Transport of Ukraine

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