newag GROUP

DIESEL
LOCOMOTIVES

Contents


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DIESEL LOCOMOTIVE

6Dg

Modernisation of the SM42 series shunting diesel locomotive to the 6Dg version.

Modernisation enabled designers at NEWAG S.A. to introduce to the Polish and European market a diesel-powered locomotive equipped with a new generation engine which complies with all the exhaust-gas emission standards.

The scope of upgrading of the SM42 locomotive to the 6Dg version

Within modernisation, based on new design documentation:

- **The previously used a8C22 motor was replaced with American-made C27, a 12-cylinder, high-pressure diesel engine manufactured by CATERPILLAR of 708 kW (962 KM) power;**
- **The generator set was changed;**
- **Fuel and oil consumption has been significantly reduced**

Completely new designs were developed and implemented for the first time for systems supporting engine operation (the cooling system, the power supply system, the exhaust system, and the steering system) as well as for the structural connection of the engine with the power generator and for encasing the power-generating set on the loco frame. These solutions have no equivalents in other, already existing constructions offered in the domestic rail vehicles market.

The loco's modern body shape meets the contemporary requirements in ergonomics and safety and enlarging windows in the driver's cab has led to improved safety of shunting operations.


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LOTOS


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Pulpit 1
Vmax: 90 km/h

Modern electrical systems

- microprocessor-based locomotive control system;
- on-board diagnostics on the driver's panel;
- set of synchronous generators designed for continuous duty (S1- compliant with the IEC349 standard);
- electric power transmission: alternating current – direct current;
- inverter for powering auxiliary equipment;
- induction motors for powering auxiliary equipment and LSa 420 traction motors powered by the mainsynchronous generator through a diode rectifier;
- IGBT –based traction rectifier;
- electronic brake control.

Enhanced driver's comfort

- increased usable space of the driver's cab;
- two driver control panels, one for either driving directions;
- touch-screen monitor displaying loco's operation parameters and diagnostic commands;
- electronic speedometer with event recorder;
- improved visibility and safety during shunting operations;
- eliminated vibrations due to the use of metal-rubber shock absorbers;
- air-conditioned cab and heated windshield;
- cab access from locomotive platform
- amenities including a refrigerator, a wash basin and a cooker.


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Eco-friendly technologies

Application of modern solutions led to the maximum reduction in fuel and oil consumption, thus limiting the exhaust-gas emissions to the environment.

Locomotive technical data	After modernisation	Before modernisation
Locomotive type	6Dg	SM42
Track width	1435 mm	1435 mm
Axle configuration / bogie type	Bo'Bo'/1LNa	Bo'Bo'/1LNa, 6D
Service mass (with full stock)	70 ± 3% t	74 t
Maximum wheel set pressure on track	17,5 t	18,5 t
Overall length including buffers	14240 mm	14240 mm
Maximum speed / continuous speed	90 km/h / 13,5 km/h	90 km/h / 12,5km/h
Theoretical starting tractive effort	219 kN	219 kN
Minimum tract curve radius	80 m	80 m
Diesel engine type / cylinder number and layout	Caterpillar C27/12V (60°)	a8C22/8V (50°)
Diesel engine nominal power	708 kW (962 KM)	590 kW (800 KM)
Diesel engine nominal revolutions	1800 rpm	1000 rpm
Fuel consumption rate	198 g/kWh	225 g/kWh
Fuel consumption at idling	4,5 l/h	10,2 l/h
Power and revolution governor	electronic	Woodward PGEV type
Main generator	Ghp 400M4C	LSPa-740
Auxiliary generator	Ghp 315 S4K	LSPa-280
Traction engines	LSa-420, H class	LSa-430, B class
Traction engine power	173 kW	173 kW
Air compressor type and model	AIRPOL SK18 / KNOR SL20	Piston W2P-315
Air compressor efficiency	2,0 m^3/min ± 6%	06-3,4 m^3/min
Brake system	SABWABCO / KNORR BREMSE	Oerlikon
Microprocessor-based locomotive control system	NES / MEDCOM / INTECO	none
Fuel reserve (diesel)	2350 litres	2840 litres
Locomotive radio control	optional	optional
Electrical wiring voltage of auxiliary circuits	24 V	110 V
Driver's cab air-conditioning	yes	none


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DIESEL LOCOMOTIVE

15D|16D

Modernisation of the TEM-2 (SM 48) diesel locomotive to the 15D|16D version.

Modernisation enabled NEWAG S.A. to build a vehicle characterised by universal tractive parameters – a shunting locomotive or a locomotive for pulling heavy freight trains.

The scope of upgrading of the TEM-2 (SM 48) locomotive to the 15D|16D version

The whole mechanical section of the locomotive was modernised. The diesel engine was replaced by an engine compliant with all emission standards. This has increased the power of the diesel engine to 1550 kW. Moreover, modern mechanical sub-assemblies have been encased allowing for a reduced fuel and oil consumption.


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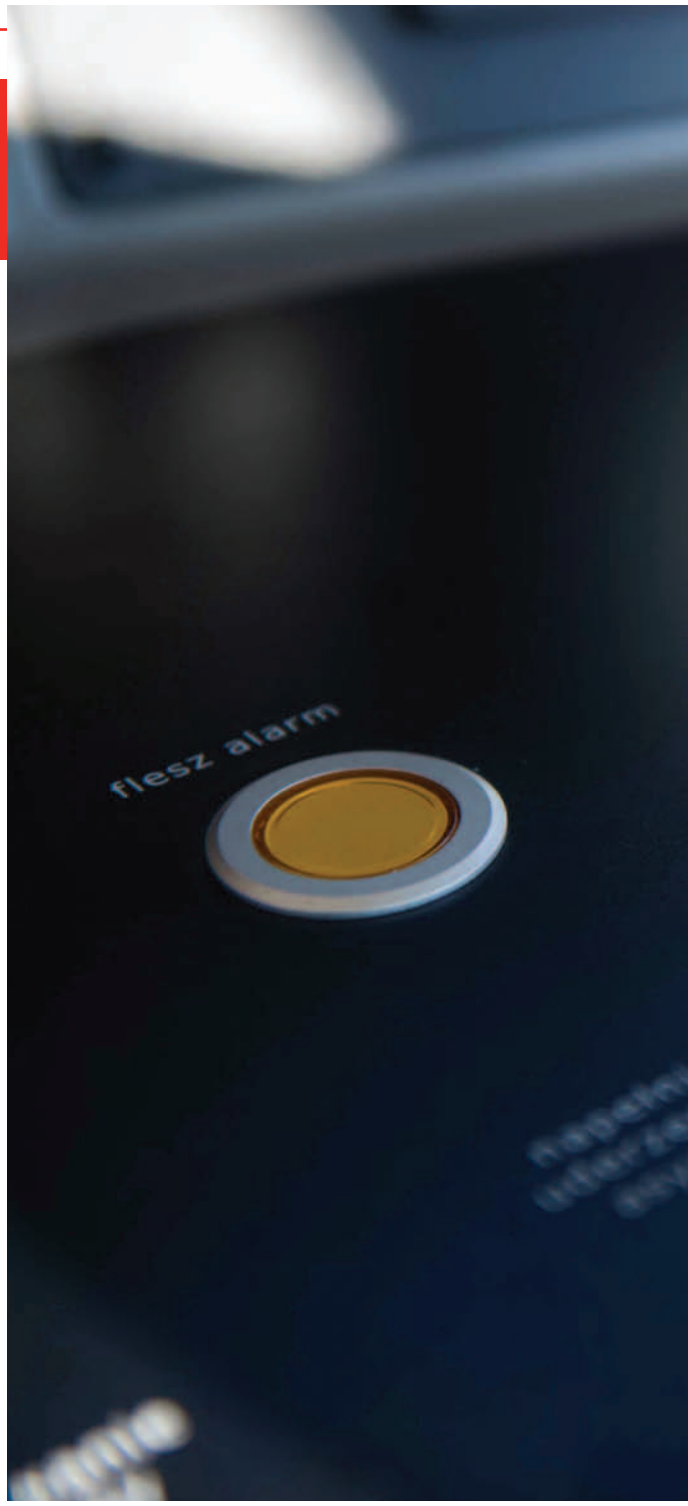
The elements used which underwent the overhaul

- upgrading the locomotive frame and bogies;
- changing the bogie brake lever system by implementing four brake-operating cylinders;
- adding the spring-actuated brake system;
- enhancing the traction engines insulation by subjecting them to pressure-vacuum impregnation.

The upgrading works included lowering the machine room ceiling, rebuilding the driver's cab and the machine rooms which house the power generating unit (the CAT 3512C engine and the main and auxiliary generators) as well as implementing new auxiliaries.

Modern control and power supply systems

- microprocessor control system;
- on-board diagnostics on the operator's panel;
- electric machinery – the main generator's power boosted to 1400kW;
- diesel-electrical transmission, alternating current – direct current;
- auxiliaries powered by AC motors through inverters;
- new equipment in high and low voltage compartments.

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Enhanced driver's comfort and safety

- ergonomic driver's cab positioned on metal-rubber shock absorbers;
- two driver control panels, one for either driving directions;
- air-conditioning and energy-efficient heating of the driver's cab;
- improved visibility and safety during shunting operations;
- electronic tachograph with event recorder;
- amenities area equipped with a fridge, a washbasin, a cooker and lockers.
- dead-man's vigilance device;
- automatic train brake system;
- fire detection and extinguishing system;
- Radio-Stop system.

Functionality upgrade

- universal traction characteristics
- boosted power
- GPS localisation
  and mileage monitoring
- low-cost of maintance


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Eco-friendly technologies

Installation of modern fuel and motor oil efficient subassemblies has resulted in reduced the locomotive's adverse environmental impact.

Locomotive technical data	After modernisation	Before modernisation
Locomotive type	15D|16D	TEM2
Track width	1435 mm / 1520 mm	1435 mm / 1520 mm
Axle configuration / bogie type	Co'Co' / M62	Co'Co' / TEM2
Service mass (with full stock)	116 ± 3% t	116 t
Maximum wheel set pressure on track	19,5 t	19,5 t
Overall length including buffers	16970 mm / 17029 mm	16970 mm / 17029 mm
Maximum speed / continuous speed	100 km/h / 20 km/h	100 km/h / 11,1 km/h
Theoretical starting tractive effort	372,8 kN	372,8 kN
Minimum tract curve radius	80 m	80 m
Diesel engine type / cylinder number and layout	Caterpillar 3512C / 12V (60°)	PD1M / 6 cylinders
Diesel engine nominal power	1550 kW (2108 KM)	882 kW (1200 KM)
Diesel engine nominal revolutions	1800 rpm	750 rpm
Fuel consumption rate	213 g/kWh	225 g/kWh
Fuel consumption at idling	6,8 l/h	10 l/h
Power and revolution governor	electronic	centrifugal with hydraulic servo-mechanism
Main generator	Ghp 500 L4, AC	GP-3002, DC
Auxiliary generator	Ghp 315 M4K	MBG-25/11
Traction engines	ED-118A insulation	ED-118A insulation
Traction engine power	305 kW	305 kW
Air compressor type and model	1×AIRPOL SK-30 or 2×KNORR SL-20	Piston KT6
Air compressor efficiency	4,0 m^3/min ± 6%	do 4,6 m^3/min
Brake system	SABWABCO	Matrosow / Oerlikon
Fuel reserve (diesel)	6000 litres	6000 litres
Locomotive radio control	optional	optional
Electrical wiring voltage of auxiliary circuits	24 V	75V
Driver's cab air-conditioning	yes	none


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About Newag

Polish manufacturer Newag S.A.

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NEWAG S.A. has existed since 1876. It is one of the biggest and oldest railway companies in Poland, a leader in the production, modernisation and repairing rolling stock. The company has extensive experience in production of modern and fast rolling stock for passenger transport, diesel and electric locomotives, trams and underground trains.

Focusing on customer satisfaction, **NEWAG S.A.** pays particular attention to the quality of its products and services it provides, which is confirmed by the recognition the company has received. The company has been awarded the title "The company that transforms Polish industry" for its spectacular market success in competing with European rail industry giants. In 2017, **NEWAG S.A.** was granted a title of "The Promoter of the Polish Economy" by the "Teraz Polska [Poland Now]" Promotional Emblem Foundation in recognition of the company's achievements in building the Polish brand in Poland and abroad.

NEWAG S.A. holds PN-EN ISO 9001:2009 certification which confirms that the company introduced and has implemented the modern quality control system, PN-EN ISO 14001:2005 referring to the implementation of the requirements concerning the environmental management system and PN-EN ISO 50001:2012 confirming effective energy management in every form. **NEWAG S.A.** also holds IRIS Certification Rev. 02.1 that attests to the implementation of the international railway industry standards.

IRIS Certification

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