

High Power Electric Locomotives for Hauling Heavy Ore Trains IORE Locomotives



In August 2007, the Swedish mining group LKAB ordered four additional IORE double locomotives from Bombardier Transportation. The initial contract for the supply of nine double locomotives dates back to September 1998.

The locomotives are part of an extensive program of investment with the aim of increasing productivity with

high axle loads of 30 tons. The double locomotives have a power of 2 x 5,4 MW, a weight of 2 x 180 tons and haul iron ore trains weighing more than 8 000 tons at 60 km/h.

The locomotives are constructed using components and systems of Bombardier's locomotive platforms. They are designed for the extreme Nordic weather conditions and the heavy LKAB ore trains. Each locomotive section runs on two three-axle Flexifloat bogies.

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IORE Locomotives

Sweden

PROPULSION SYSTEM

The propulsion system consists of a transformer, two water-cooled GTO converters (one per bogie) and 6 six-pole air-cooled three-phase induction motors with VERIDUR insulation. The converters permit continuous regenerative braking. The converters operate completely independently of each other. Each has its own control and cooling system and is automatically shut down in the event of failure. The converters contain seven identical interchangeable power modules. This uniformity achieves high availability while keeping costs for maintenance and spares to a minimum.

AUXILIARY SYSTEM

The auxiliaries are supplied from a separate transformer winding by three-phase IGBT converters with 3 x 400 V 50 Hz rated output, of which one supplies constant voltage and two operate with variable voltage/frequency. The DC voltage system is supplied via a 400 V AC / 110 V DC battery charger.

CONTROL SYSTEM

The MITRAC* control system performs all control and communication functions. It has an open system architecture that can be subsequently adapted and expanded to meet new requirements, including the integration of third-party systems. All diagnostic information is displayed on the screen in the driver's cab and can be transmitted to the control center via GSM-R link.

COMMISSIONING

The first locomotive was commissioned in December 2000 and the other units followed between 2002 and 2005. The newly ordered locomotives will be commissioned in 2010.

Main data

Track Gauge	1435 mm
Railway system operator	MTAB Malm Transport AB
Type of vehicle	Electrical twin-section heavy haul locomotive
Quantity	9 + 4

Technical data

System voltage	15 kV AC, 16.7 Hz
Wheelset arrangement	Co'Co' + Co'Co'
Mass of electrical equipment	2 x 38 t
Total mass	2 x 180 t
Number of traction motors	2 x 6
Continuous rating at wheel rim	2 x 5.4 MW
Starting tractive effort at wheel rim	2 x 600 kN
Maximum dynamic braking effort at wheel rim	2 x 375 kN
Maximum speed	80 km/h
Transmission gear ratio	1:6.267
Length over coupling	2 x 22 905 mm
Overall width	2 950 mm
Height over pantograph	4 465 mm
Distance between bogie centers	12 890 mm
Bogie wheel-base	1920 + 1920 mm
Wheel diameter – new	1250 mm
Wheel diameter – worn	1150 mm
Years of commissioning	2000 – 2005 2010 – 2011

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