



Elektrische Zahnrad- Triebwagenkomposition Bhe 2/4

Die Corcovado-Bahn in Rio de Janeiro nahm nach einer Gesamterneuerung im März 1979 den Betrieb wieder auf. Die SLM lieferte drei zweiteilige elektrische Zahnrad-Triebwagenkompositionen, bestehend aus einem Triebwagen und einem motorisierten Steuerwagen, sowie einen einzelnen Zahnradtriebwagen. Mit Steigungen von 40–300‰ auf einer Länge von 3773 m zählt die mit Riggenbach-Zahnstangen ausgerüstete Bahn zu den steilsten Zahnradstrecken der Welt.

Der nur für Sitzpassagiere vorgesehene Wagenkasten ist als selbsttragende Stahlkonstruktion konzipiert. Jedes Drehgestell ist mit einer talseitigen Trieb- und einer bergseitigen Laufachse ausgerüstet. Der Triebmotor ist in Längsrichtung in die Drehgestelle eingebaut. Zwei mechanische sowie ein elektrisches Bremssystem erfüllen die vorgeschriebenen Sicherheitsbedingungen.

Rame automotrice électrique à crémaillère Bhe 2/4

Le chemin de fer du Corcovado, à Rio de Janeiro, a été remis en service, en mars 1979, après un renouvellement complet. La SLM a livré trois rames automotrices électriques jumelées à crémaillère, composées d'une automotrice et d'une motrice-pilote, ainsi qu'une automotrice simple à crémaillère. Avec des rampes de 40 à 300‰ sur une longueur de 3773 m, la ligne équipée d'une crémaillère Riggenbach compte parmi les tronçons à crémaillère les plus raides du monde.

La caisse, prévue uniquement pour des passagers assis, est conçue sous forme de construction métallique autoportante. Chaque bogie est équipé d'un essieu moteur côté aval et d'un essieu porteur côté amont. Le moteur de traction est monté longitudinalement dans le bogie. Deux systèmes de freinage mécaniques et un frein électrique remplissent les conditions de sécurité prescrites.

Electric rack-railcar set Bhe 2/4

Following complete modernization, the Corcovado Railway in Rio de Janeiro was put into service again in March 1979. SLM supplied the railway with three electric twin-unit rack-railcar sets, comprising a motor car and a powered control car, and also a single unit railcar. With gradients of 4 to 30% over a length of track measuring some 3773 m, the railway with its Riggenbach rack system is one of the steepest rack-railway lines in the world.

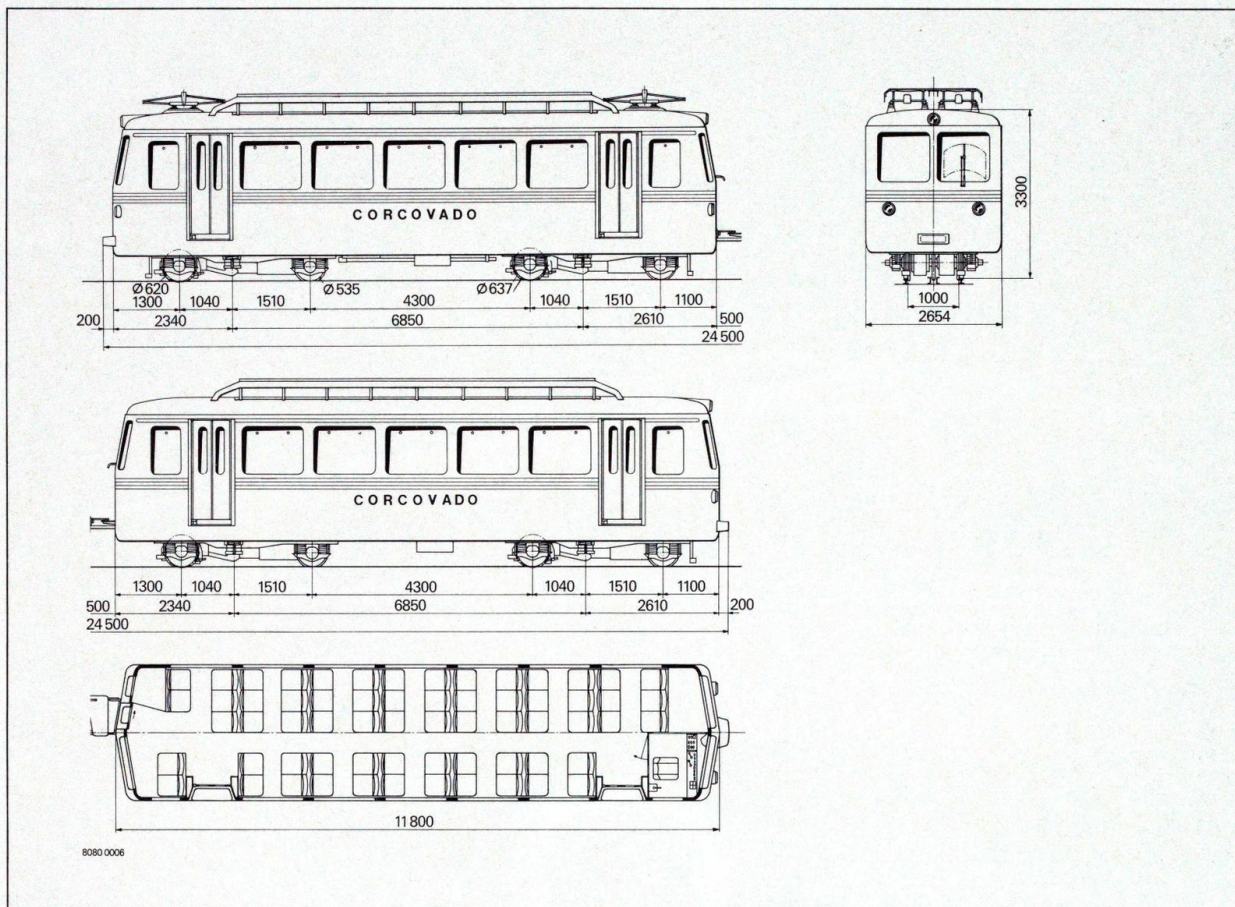
The passenger compartment is laid out to accommodate seated passengers only. It is designed as a self-supporting steel structure. Each bogie is equipped with a driven downhill axle and an idle uphill axle. The traction motor is mounted longitudinally in the bogie frame. Two mechanical as well as an electric braking system fulfil the respective safety requirements.

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Daten der Komposition

Leistung am Rad – einständig	480 kW
Zugkraft – einständig – maximal	114 kN 220 kN
Geschwindigkeit – maximal bergwärts – maximal talwärts	15 km/h 12 km/h
Gewicht – tara – brutto	36,9 t 46,2 t
Getriebeübersetzung	1:14,4
Steigung – mittlere – maximale	167‰ 300‰
Spurweite	1000 mm
Stromsystem	Drehstrom 900 V, 60 Hz
Lieferant der elektrischen Ausrüstung BBC Aktiengesellschaft Brown, Boveri & Cie., Baden	

Caractéristiques de la rame

Puissance à la jante – unihoraire	480 kW
Effort de traction – unihoraire – maximal	114 kN 220 kN
Vitesse – maximale en montée – maximale en descente	15 km/h 12 km/h
Poids de la composition automotrice – à vide – à pleine charge	36,9 t 46,2 t
Rapport de transmission	1:14,4
Rampe – moyenne – maximale	167‰ 300‰
Ecartement de la voie	1000 mm
Système électrique Courant triphasé 900 V, 60 Hz	
Fournisseur de l'équipement électrique BBC Société Anonyme Brown, Boveri & Cie., Baden	

Data of the railcar set

Output at the wheel – one-hour rating	480 kW
Tractive effort – one-hour rating – maximum	114 kN 220 kN
Speed – maximum uphill run – maximum downhill run	15 km/h 12 km/h
Weight of railcar set – tare – gross weight	36.9 t 46.2 t
Transmission ratio	1:14.4
Gradient – average – maximum	16.7% 30%
Gauge	1000 mm
Electric system Three-phase current 900 V, 60 Hz	
Electrical equipment supplier BBC Brown, Boveri & Company Ltd. Baden	

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TWO-PART RACK-AND-PINION MULTIPLE UNIT

Trem do Corcovado, Brazil

At the end of 2015, Trem do Corcovado ordered three Bhe 4/8 rack-and-pinion double multiple units in order to increase capacity and replace the existing 40-year-old multiple unit. They will start commercial operations in Autumn 2019 and will carry passengers from Rio de Janeiro to Corcovado mountain. This offers a fantastic view over the bay of Rio and is the location of the statue of Christ the Redeemer, one of the New Seven Wonders of the World. Thanks to faster driving speeds and greater capacity, the new trains offer a significant increase in productivity compared to the previous vehicles. Wheelchair spaces in all entrance areas and wide entrance doors provide a barrier-free experience for people with limited mobility – a totally new feature for Trem do Corcovado. Panoramic windows in the central section of the train offer an exceptional experience, immersing you in the surrounding nature during the journey through the rainforest of the Tijuca National Park. Sliding windows for all seats along the entire length of the carriages allow for unobstructed photography as soon as the breathtaking view of the beaches of Ipanema and Leblon appears shortly before the top station.

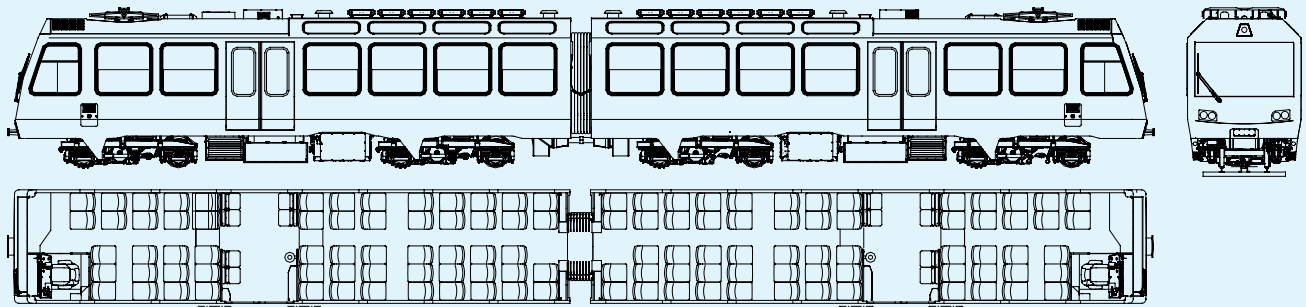
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Technical features

Technology

- Four identical and exchangeable motor bogies, each with a drive cogwheel on the valley side, overcome the steep incline of 300 ‰
- Modern traction equipment with three-phase drive technology allows braking energy to be recuperated on the downward journey, meaning large energy savings can be made

Comfort

- An attractively designed passenger compartment
- Wide entrance doors allow easy access to the train and there is a spacious section in each entrance area for wheelchair users
- Large windows, as well as panoramic windows in the intermediate section, offer an excellent nature experience during the journey through the rain forest
- Windows can be opened in all seating compartments to provide the ideal conditions for photography during the journey

Reliability/Availability/Maintainability/Safety

- Three independent braking systems ensure maximum safety

Vehicle data

Customer	Trem do Corcovado
Area serviced	Corcovado, Brazil
Track gauge	1000 mm
Max. gradient	300 ‰
Designation	Bhe 4/8
Supply voltage	900 VAC
Axle arrangement	1Az' 1Az' 1Az' 1Az'
No. of vehicles	3
Commissioning	2019
Seats (2nd class only)	122
Tip-up seats	12
Standing capacity	20
Floor height	950 mm
Entrance width	1300 mm
Axial thrust	400 kN
Length over coupling	26720 mm
Vehicle width	2650 mm
Vehicle height	3700 mm
Bogie wheelbase	2200 mm
Cogwheel reference circle diameter	637 mm
Carrying wheel diameter, new	630 mm
Continuous output at wheel	800 kW
Max. starting tractive effort	200 kN
Top speed	25 km/h