

▶ **SAFETY AND RELIABILITY**

- ▶ CRRC's range of metro trains have been developed according to stringent international safety standards. The trains adhere to safety requirements throughout the entire development process, from design to testing, purchase and manufacture.
- ▶ The design, strength and verification of the car bodies are tested against international standard En12663.
- ▶ The design, strength and verification of the bogies are tested against international standard En13749.
- ▶ The collision resistance, design and verification of the vehicle meet international standard EN15227 and can meet the 40km/h collision requirement.
- ▶ The Strength, design and verification of the braking system meet international standard En13452.
- ▶ The vehicles are fitted with a fire alarm system, and the fire protection system is designed according to standard DIN5510.
- ▶ The design of the metro trains follows international standards GOA4 and IEC62267, which allows safe and reliable driverless operation of the vehicles.

▶ **EXCEPTIONAL PASSENGER COMFORT**

- ▶ Our metro trains provide passengers with a spacious and bright environment. Journeys are stable and comfortable; vehicle noise is minimized and follows international standards (ISO3095).

▶ **ENERGY CONSERVATION AND ENVIRONMENTAL PROTECTION**

- ▶ Our metro trains are light-weight and feature a low-resistance design. Intelligent dimming technology applied on carriages' LED and indication systems allow up to 33% energy savings. Additionally, a new variable-frequency air conditioning system provides 25% energy savings compared to traditional air conditioners.

▶ **INTELLIGENT COMMUNICATION**

- ▶ CRRC's metro trains feature a tried and tested, and reliable vehicle control system, developed to IEC61375 international standards.
- ▶ A wireless transmission system operates between the vehicle and ground control center. This allows train monitoring data to be uploaded and downloaded swiftly, making the maintenance of vehicles more efficient.
- ▶ Communication between the vehicle and the metro network uses big data processing techniques. This allows passengers on the train to access real-time transfer information and transport status.
- ▶ The trains are also mounted with wireless internet access, improving passengers' experience and providing fast and easy access to travel information
- ▶ Driverless operation can be both semi-automatic or fully automatic.

▶ **LIFE CYCLE MANAGEMENT**

- ▶ The Life Cycle Management of our trains is a key part of our development process, from design to manufacture, purchasing of accessories, testing and after-sales services. During the design and manufacture of the trains, focus is placed on maintenance throughout the vehicle's lifecycle. Train components are standardized, modularized and unitized to allow for flexibility and interchangeability. This facilitates maintenance over the product's life, making the trains both safer and more reliable.



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Address: No.16 West 4th-Ring Mid Road, Haidian District, Beijing
 Zip Code: 100036
 English-Tel: +86 10 51897295
 Deutsch-Tel: +86 10 51897284
 Русский-Tel: +86 10 51897300
 E-mail: gjjy@crccgc.cc
 Fax: +86 10 52608280
 http://www.crccgc.cc/



METRO TRAINS
 Safe, intelligent and green public transportation



OVERVIEW

CRRC has developed a sophisticated and reliable range of metro trains that meets increasing global requirements for lower carbon emissions. The range covers the traditional A, B and C type metro vehicles in carbon steel, stainless steel and alloy and provides clients with a safe, intelligent and green transportation solution.

MAIN FEATURES

▶ **HIGH ENVIRONMENTAL ADAPTABILITY**

CRRC's metro trains can be operated in ambient temperatures ranging from -40°C to 47°C. When below 25°C, the maximum level of air humidity can be up to 95%. The trains can operate at altitudes up to 3,000m, under varying climatic conditions caused by wind, sand, rain, snow, foghae, and for short periods of exposure to salt mist, acid rain and sand storms.

▶ **HIGH PASSENGER CAPACITY**

Trains can be arranged in configurations from two to eight cars, according to operators' requirements. The maximum capacity per single car is up to 400 passengers.



EXAMPLES OF CRRC METRO TRAINS IN OPERATION AROUND THE WORLD

A TYPE VEHICLES

Mecca Metro in Saudi Arabia, Shenzhen Metro and Shanghai Metro in China.

B TYPE VEHICLES

Lines 1 & 2 of Tehran Metro in Iran, Beijing Metro and Wuhan Metro in China.

C TYPE VEHICLES

Buenos Aires M Argentina Metro in Argentina and Lines 6 & 8 of Shanghai Metro in China.

Project	A type metro vehicle parameters	B type metro vehicle parameters	C type metro vehicle parameters
Maximum design speed	90Km/h	80Km/h	80Km/h
Maximum running speed	80Km/h	80Km/h	80Km/h
Common braking deceleration	1.0m/s ²	1.0m/s ²	1.1 m/s ²
Emergency braking deceleration	1.2m/s ²	1.2m/s ²	1.3m/s ²
Maximum impact rate	0.75m/s ²	0.75m/s ²	0.8m/s ²
Line voltage	DC1,500V/ DC750VA	DC1,500V/ DC750VA	DC1,500V/ DC750VA
Car-body length	A car: 23,580mm; B and C cars: 21,880mm	Tc car: 19,500mm; others: 19,000 mm	Tc car: 17,500mm; others: 17,000 mm
External width	3,091mm	2,800mm	2,600mm
Inside net height	≥2,100mm	≥2,100mm	≥2,100mm
Floor height	1,130mm	1,100mm	1,100mm
Maximum passenger capacity (AW3)	417persons/vehicle	313persons/vehicle	300persons/vehicle
AC output of auxiliary power supply	380V/220V 50 Hz	380V/220V 50 Hz	380V/220V 50 Hz
Minimum service life of the vehicle	30years	30years	30years
Door	5 doors per side of the vehicle	4 doors per side of the vehicle	4 doors per side of the vehicle

EXAMPLES OF CRRC METRO TRAINS IN OPERATION AROUND THE WORLD

CRRC METRO TRAINS OPERATING INTERNATIONALLY

- ▶ Boston subway in the United States of America (A type vehicles)
- ▶ Chicago subway in the United States of America (C type vehicles)
- ▶ Mecca pilgrimage metro in Saudi Arabia (A type vehicles)
- ▶ Rio de Janeiro metro 1A line in Brazil (A type vehicles)
- ▶ South island line in Hong Kong (A type vehicles)
- ▶ West island line in Hong Kong (A type vehicles)
- ▶ Bangkok Transit System in Thailand (A type vehicles)
- ▶ Tehran airport line in Iran (B type vehicles)
- ▶ Tehran metro in Iran (B type vehicles)
- ▶ Buenos Aires metro A line in Argentina (C type vehicles)



METRO VEHICLES EXPORTED TO THE UNITED STATES OF AMERICA

BRIEF INTRODUCTION

CRRC's metro trains for export to the United States of America are flexibe-formation trains where each car can run independently, or can be paired where two cars form one train.

MAIN FEATURES

- ▶ Carbody: designed to American standard ASME RT-2 2014. This is the first time that a laser welded carbody is used on the international market.
- ▶ Passenger doors: Large sliding pocket doors with single door leaf control. This system is both reliable and safe;
- ▶ Bogie: The bogie comprises a swing bolster and built-in axle box. It has been designed for maximum strength and a long service life;
- ▶ Network communication: The trains use an Ethernet network for all system communications;
- ▶ The design of the carbody follows ASME RT-2 2014 standards, and meets the 40km/h collision requirements.



MAIN SPECIFICATION PARAMETERS

Parameters	Boston red line vehicle	Boston orange line vehicle	Chicago metro car
Vehicle Length (distance between coupler faces)	21,260mm	19,914mm	14,630.4mm
Vehicle width	3,048mm	2,819.4mm	2,845mm
Vehicle height (excluding the ripples)	3,725.9mm	3,651.3mm	3,658mm
Vehicle distance	15,544.8mm	14,173.2mm	10,261.2mm
Bogie wheel base	2,082.8mm	2,082.8mm	1,981.2mm
Door opening	1,625.6mm	1,625.6mm	1,270.8mm
Inside top height	2,184mm	2,159mm	2,230mm
Axle load	14.3t	12.7t	10t
Line voltage and method	Three tracks, DC600V	Three tracks, DC600V	Three tracks, DC600V
Operating speed	103km/h	103km/h	112km/h
Max. design speed	113km/h	113km/h	112km/h
Min. curve radius	Main track 76.2m; car yard 38.1m	Main track 134m; car yard 36.6m	25.9m
Acceleration capacity	1.23m/s ²	1.23m/s ²	1.25m/s ²
Deceleration capacity	1.34m/s ²	1.34m/s ²	1.25m/s ²
Seating capacity (People)	Mc car 37, M car 44	Mc car 38, M car 44	41
Total Passenger capacity (People)	Mc car 270, M car 289	Mc car 225, M car 240	132
Wheel diameter	711.2mm	711.2mm	711.2mm

METRO TRAINS CURRENTLY OPERATING IN CHINA

CRRC's range of metro products are currently running in all large and medium-sized cities in China, including Beijing, Shanghai, Guangzhou, Tianjin, Shenzhen, Nanjing, Chongqing and Chengdu.

DRIVERLESS METRO ON BEIJING METRO'S YANFANG LINE

BRIEF INTRODUCTION

Around the world, driverless trains are universally seen as the most advanced automatic trains in operation today. They embody the latest technology and the cutting edge in manufacture, electronics, network communication, control technology and data processing in the railway industry.

MAIN FEATURES

- ▶ CRRC's driverless metro is designed and manufactured following international standards IEC62267, ICE62290 and GOA4 ;
- ▶ Power is supplied by way of a three-track current collection DC750V. The Trains have a maximum running speed of 100km/h;
- ▶ The trains have been designed to meet the BS EN 15227:2008 international collision requirements. If a six-vehicle train were to collide with a stationary six-vehicle train at a speed of 25km/h, the collision energy would be absorbed by the body of the train and the passenger compartments remain undamaged ;
- ▶ The carbody strength meets the BS EN 12663-1:2010 P-III standard and can bear a longitudinal compression load of 800kN;
- ▶ The train fire protection system meets DIN5510 standards, while materials used for passenger touch points meet the BS6853 standard;
- ▶ Information and real-time communication between the vehicle and the ground uses LTE, the latest in mobile network technology;

- ▶ The fully automatic train is adaptable and has been designed to allow manual operation as well, for greater flexibility;
- ▶ The vehicle control technique of remote crawling and jump control modes is based on the unmanned driving and full automatic control technique;
- ▶ Fully automatic, driverless trains present the most efficient and intelligent mode of metro transportation. The development of each vehicle part follows stricter international standards than for manned vehicles, making driverless trains a safer and more reliable option for the future of urban travel.



MAIN SPECIFICATION PARAMETERS

Train formation	2M2T +Tc1-M1-M2- Tc2+
Total length of train (mm)	79320mm
Line voltage	Three-track current collection DC750V
Maximum running speed	100km/h
Vehicle Dimensions	Length Head car: 20,140mm; intermediate car: 19,520mm
Vehicle Dimensions	Width 2,800mm
Vehicle Dimensions	Height 3,800mm
Height of passenger compartment floor surface	1,100mm
Net height of passenger compartment	2,120mm
Vehicle distance	12,600mm
Rigid wheel base	2,300mm
Coupler height	Head coupler: 660mm; intermediate coupler: 660mm
Refrigerating capacity of air conditioner	29kw
Wheel diameter (new/old)	840mm/770mm
Average acceleration (m/s ²)	Train accelerates from 0 to 36 km/h: 0.83m/s ²
Average deceleration (m/s ²)	Service braking rate: 1.0 m/s ² Emergency braking rate: 1.2 m/s ²
Maximum longitudinal impact rate (m/s ²)	≤0.75m/s ²