

New York City Transit – R34142 ... ONIX 800



ONIX for New York City Transit

- 680 R34142 rapid transit cars
- 952 IGBT naturally cooled drives
- ONIX 800 Range

Contract overview

In 1997, ALSTOM were chosen by NYCT and Bombardier to supply the drive systems for a new fleet of 680 metro cars, R34142's.

The trains will be equipped with ONIX 800 naturally cooled inverters. The reduction in equipment weight, size and power consumption enabled by the ONIX IGBT drive will make the vehicles among the most technologically advanced in the world.

Localization

Under "Buy America" Rules, part of the contract will be manufactured locally in ALSTOM's Hornell plant in the US.

ALSTOM qualification on R38 cars

One of the principal contract requirements was a one year revenue service test of the traction equipment. An eight car train of R-38 cars was used for the testing of both forced air cooled and naturally ventilated IGBT based propulsion system. ALSTOM achieved qualified status after 1 year of successful in-service running.

Prequalification requirements

ALSTOM had to achieve:

- Compatibility with existing DC car systems speed/distance and braking requirements

- Compatibility with signalling system (EMC)
- 370,000 miles of revenue service running

Flawless operation

The most successful aspect of the demonstration has been the flawless operation of the naturally cooled inverter, the stability of the software for the system and the system availability. This programme resulted in ALSTOM qualifying as a supplier of propulsion equipment for the R34142 contract.

Naturally cooled inverter

The naturally cooled inverter was a specific customer requirement for the R3142 contract and considered the best option for the operating environment which can be dusty and hot.

The air cooled inverter means no fans, no noise, no dust build-up requiring practically no maintenance.

Small space envelope on underframe

There is restricted space for the equipment on the underframe due to the narrow width of the R34142 vehicle. This meant that ALSTOM had to work closely with its customer to make adjustments for the small envelope space and to ensure that the equipment would fit in the space available. This was enabled by the compact format of the ONIX Drive.

ALSTOM

Operational specification

Operator: MTA New York City
 Carbuilder: Bombardier
 Line gauge: 1435 mm
 Line voltage range: 450-800 V
 Number of trains:
 136 x 5 car units
 Number of cars: 680
 Number of IGBT inverters: 952

Traction range: ONIX 800
 Type of vehicle: Subway
 Train consist: 5 car train configuration
 A-B-B-B-A
 Power collection: 3rd rail
 Maximum tractive power per motor
 car: 512 kW A car 256 kW B car
 Maximum braking power per motor
 car: 1272 kW A car 636 kW B car

Maximum starting tractive effort:
 245 kN for 14 motors
 Maximum design speed:
 60 mph
 Maximum design acceleration:
 2.5 mph/sec
 Maximum design braking:
 -2.2 mph/sec

PROPULSION

1 ONIX IGBT inverter
 with rheostatic chopper
 Braking: regenerative and
 rheostatic braking

CONTROL

AGATE 32 bit
 microprocessor
 - Equipment performance
 monitoring
 - Slip/slide control

TRACTION

4 x ONIX 3 phase AC
 motors

HIGH VOLTAGE

Line inductor
 Soft Crow-bar
 Circuit breakers
 Brake resistor

Technical characteristics

IGBT Inverter

Nominal DC input: 600 V
 Peak accelerating
 current, rms: 1050 A rms
 Cooling: heatsink cooled by
 vehicle motion
 Motor/inverter ratio: 2:1
 Modulation frequency: 1250 Hz
 varies

ONIX AC Motor

Supply voltage: 600 V
 Nominal power rating: 110 kW
 Rated speed: 1750 rpm
 Maximum speed: 4314 rpm
 Cooling: Self-ventilation
 totally enclosed
 Motors per axle: 1
 Class 200 insulation

Dimensions and mass

Traction Equipment Case

Length: 1680 mm
 Width: 1400 mm
 Depth: 740 mm
 Mass: 722 kg

Motor

Rotor diameter: 263 mm
 Mass: 540 kg
 Height: 470 mm
 Width: 420 mm
 Depth: 784 mm

Propulsion performance

