

Traction Substations for Municipal Mass Transit

Following its successful activity in the field of electrical equipment for electrical traction vehicles Cegelec a.s. realizes supplies in the field of transport infrastructure.

In this field as well Cegelec a.s. offers technically highly advanced solutions with high operational reliability to its customers.

Traction power supply technologies belong to the most important areas in the transport infrastructure. They are used to feed the DC traction for 600 or 750 V DC rated voltage feeding municipal mass transit tramway and trolleybus lines. Typical configuration of the traction substation involves the HV part, traction transformer and traction power supply technology. Cegelec a.s. is ready to draw up the design and to offer a complex supply of the electrical equipment. HV equipment will be offered from companies with significant references. The in-house made equipment – traction power supply technology - is further described in detail.

Traction power supply technologies

The offered traction power supply technologies are constructed as compact cabinets. Single switchboard sections are mechanically and electrically interconnected and create one technological unit. The arrangement of the switchboard sections enables the access from the front and back side.

Rectifier

The input part of the traction power supply technology consists of the rectifier designed, constructed and produced by



Section of the withdrawable high-speed circuit breaker

Cegelec a.s. Diode six- and twelve-pulse bridge rectifiers are offered, preferably with natural cooling. Their overload capacity is designed up to class VI in compliance with IEC 146. Special attention in the design is paid to the selection of diode and the solution of protections (overvoltage, thermal). Rectifiers are tested by an accredited laboratory.

Feeder switchboard

Feeder switchboard usually consists of the section of motor-driven disconnectors, high-speed circuit breakers and manual feeder disconnectors.

Motor-driven disconnectors

Motor-driven disconnectors for up to 2000 A rated current are installed to connect the outlet of rectifier with the main busbar.



The first line in Montpellier

High-speed circuit breaker

For the traction power supply technologies Cegelec a.s. uses withdrawable, high-speed circuit breakers for 1250 up to 2600 A rated current with short-circuit resistance up to 70 kA. The high-speed circuit breakers are fitted with operating, testing and checking functions as a standard. They also involve a traction line loop test and di/dt rise protection. The power distribution system is placed in the back part of the cabinet.

Manual feeder disconnectors

Manually controlled cable disconnectors are used for connecting cable outlets.

Back-current switchboard

Back-current switchboard consists of a section of manual or motor-driven disconnectors and return cables.

Control system

The distributed control system is based on programmable controllers that provide

complex control and display functions. The sections are interconnected through PCs.

The traction power supply technology can be controlled as follows:

- locally using Touchscreens
- centrally from PC
- remotely (control centre)

The control systems are independent of each other.

Modifications

Parameters and execution of single equipment of the traction power supply technology can be modified by customer's request.

The traction power supply technology project in Montpellier, France is a good example of this approach.

Reference

In the year 2005 Cegelec a.s. was selected as a supplier of the traction power supply technology for the construction of the new tramcar line in Montpellier.

The 20-km long second line supports the existing first line. It is fed from 10 traction substations and includes also a tramcar depot equipped to provide complex maintenance of tramcars. Cegelec a.s. was successful here as well with its supply of traction equipment for this depot. Supplies of the traction power supply technology include the rectifier and the complete feeder switchboard. Back-current switchboard is not used. The whole line feeding topology was designed with sufficient redundancy in case of power supply failure in single substations, with the aim to provide a reliable operation without power supply failures in the trolley network. Special attention was also paid to the safety. By customer's requirement the traction power supply technology fits the maximal operating temperature up to +45C. Rated voltage of the applied technology is 750 V DC, rated current of each substation 1200 A.



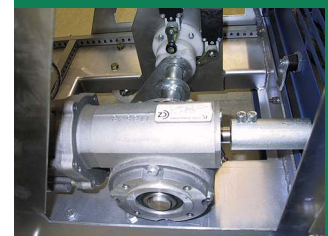
Carriage with high-speed circuit breaker



Type test of the rectifier



Cabinet configuration of traction power supply technology



Motor-drive of the high-speed circuit breaker carriage in detail

Basic data

Number of substations line	9
Number of substations depot	1
Rated voltage	750 V
Rated current	1200 A
Class of overload capacity	VI according to IEC 146
Rectification	6-pulse
Rated power output of the rectifier	900 kW

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