



Eaton MV switchgear chosen for Stockholm Rail Tunnel

Location:

Stockholm, Sweden

Challenge:

As part of a major rail project in Stockholm, Trafikverket required reliable, safe and environmentally friendly medium-voltage (MV) switchgear systems for substations in a tunnel.

Solution:

Systems based on SVS/08 MV switchgear, which is approved for railway applications. These have excellent environmental characteristics and features a modular design to allow for easy future expansion.

Results:

The first MV substation has been completed and subjected to extensive factory acceptance testing. During this undertaking it met all of its design targets. Goodtech Projects & Services AB is confident that the remaining substations will be equally satisfactory.

Background

At present, all rail traffic in Stockholm city center runs on just two tracks. This includes commuter trains, regional trains, long distance services and goods trains. At busy times, this leads to delays and congestion. To remedy this, Trafikverket, the state-run Swedish Transport Administration, is building a new six kilometer long tunnel – called the Stockholm City Line – exclusively for commuter trains. This will effectively double the track capacity in the Stockholm city area, allowing trains to run more frequently and more punctually. The project also includes two new railway stations that will make passenger interchange easier and smoother as they are located close to bus and metro routes.

Challenge

At the heart of the City Line project is an MV electrical distribution system that incorporates 11 substations. These are located in the emergency escape tunnel that runs parallel with the project's main running tunnel where the trains will operate. Because failures could potentially disrupt the journeys of many thousands of commuters, it was essential that the switchgear selected for this project should have an excellent track record for safety and reliability. In addition, switchgear based on vacuum interrupters was strongly preferred, because of its excellent environmental characteristics.

Solution

Goodtech Projects & Services contracted Holtab AB, one of Scandinavia's leading substation manufacturers, to build the substations for the City Line project. Engineers from both companies carefully evaluated the technical capabilities, and value for money offered by products from a number of MV switchgear suppliers capable of supplying equipment approved for use in railway applications in Sweden.

As a result of this detailed and exhaustive evaluation, Eaton SVS/08 switchgear was selected for use in all of the substations. Additional factors that influenced this decision were the product's proven track record for safe and reliable operation in even the most demanding applications, its use of vacuum interrupters in conjunction with solid resin insulation, as well as its modular design.



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The Eaton SVS switchgear chosen for this high-profile project is a versatile modular system suitable for use in applications up to 24 kV. It features epoxy resin as its primary insulation material around live parts. The phases are completely separated by this material and interconnections between primary components are protected by rubber sleeves. The same high level of insulation is maintained throughout the entire switchgear assembly, minimising the risk of corona discharge and arc faults. Research on installed equipment has also demonstrated that the epoxy resin components in SVS switchgear are not affected by ageing.

The earthed metal enclosures used for SVS switchgear ensure safety for personnel during normal operation and, in addition, the comprehensive insulation of the primary parts and primary component connections removes the risk of contact with live parts during maintenance, modification and repair work.

The vacuum interrupters at the heart of the switchgear are completely enclosed in epoxy resin to provide the highest possible level of protection against environmental influences. The vacuum interrupters offer long service lives and require no routine maintenance – important benefits in this demanding application where downtime is not only costly but could also lead to major disruption in Stockholm's rail network.

A further benefit of using vacuum interrupters in conjunction with epoxy insulation is the lack of SF6 (sulphur hexafluoride) gas as an insulator. SF6 is not only noxious, it is also a notorious greenhouse gas that contributes significantly to global warming. Eliminating the need to use this gas was particularly important for the City Line project. As the equipment is installed in a tunnel, a gas leakage would be especially problematic. Additionally, consideration for the environment is a decisive feature of all construction work carried out for Trafikverket.

Results

Eaton SVS switchgear has proved to be an excellent choice for this project. Not only does it have excellent technical characteristics, but it boasts a compact construction – an important consideration for equipment that is to be installed within the confines of a tunnel – and a modular design. This will allow future modifications and extensions to be incorporated easily and cost effectively.

The switchgear has been readily incorporated into the design and construction of the new City Line substations, the first of which has been completed and successfully shown to satisfy all design criteria. All 11 substations will be installed and commissioned in the near future, ready for the planned inauguration of rail services on the Stockholm City Line in 2017.



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