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Contact Line Systems for Mass Transit

Future-oriented, efficient and reliable

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More people, more challenges, one solution



Demographic change, urbanization and climate change: these are the global trends of today and tomorrow. For the world population is not only growing, it's also getting older: Current forecasts expect it to rise to 9.2 billion by 2050.

These people will need efficient transportation and logistics. And that calls for innovative electrification solutions.



Needed more than ever before: efficiency and sustainability

Not only the world's population will continue to grow in the coming years, urbanization will also be on the increase. So much so that experts are predicting that 90 percent of future population growth will be concentrated in cities.

Such trends mean however that traffic densities all over the world will likewise increase – and with them the demand for intelligent, sustainable solutions for mobility.

Intelligent and efficient rail electrification solutions

Concepts that make transport more efficient are in demand with the ever-increasing need for mobility. With our long-standing transport-expertise and out IT know-how, we are constantly developing new, intelligent mobility solutions that increase availability of infrastructure, optimize throughput and improve passenger experience. It's in how we electrify, automate and digitalize infrastructure that we're setting the benchmark for tomorrow's mobility – today.

Optimal service – a competent partner

You can benefit from our decades of experience in the engineering, construction and commissioning of contact line systems for mass transit.

As one of the world's leading suppliers of electrotechnical plants and innovative technology partner to all major rail operators, we offer you all services from one source and enable you to tap a lot of potential savings. Savings made possible by innovative, powerful overhead contact line systems, by even more reliable systems and enhanced performance capabilities. And by engineering tools which uncover open questions as early as the project analysis phase.

Place your trust in our ability to take a good component and make an even better contact line system. When it comes to mass transit, regional and main-line railways, we are the right partner for your overhead contact line projects, for consultation and planning, for project implementation and commissioning, and for worldwide service.





Perfection from one source: Optimal service – from planning to commissioning



We believe that working in close consultation is the key to success when it comes to planning, designing and installating contact line systems for mass transit.

In an intensive dialog with you, we lay down the main features of tailor-made systems that not only reflect your requirement profile precisely but also, if required, include interfaces for future expansions.

Consulting: the all-important factor

We believe that intensive consulting lies at the start of every successful project. Even at this early stage, you start to benefit from our wealth of experience and save valuable time before the project is even officially underway.

We each contribute our expertise to reach an agreed choice and design of system in a mutually trusting and sound preliminary planning phase that essentially defines how the project will develop. It helps us to rule out unpleasant surprises and lays the foundation for our renowned on-time performance.

From the idea to the project

Our IT-based project planning approach is totally oriented to the swift and smooth implementation of projects.

With our wealth of experience we integrate local requirements into a project perfectly and provide the necessary reserves in order to optimize our planning. Of course, focused engineering work obviously also plays an important role in this context. Our high degree of standardization enables us to speed up the project planning because we use perfectly harmonized components to avoid interface problems and improve system performance.

Quality installation work done professionally

Whether we install the system ourselves or help local companies to do it themselves, we are the right partner for the installation of your contact line systems. We give you a tailor-made offer. However much support you need, we can respond flexibly.

We have highly qualified specialists at our disposal around the world, who often pioneer new methods of installation to create economic advantages for our customers.

Systematic planning

Efficient projects need clear structures, so we have defined the following phases for our project planning:

- Preliminary planning phase: Centers on the most important decisions concerning the choice of system and design of equipment
- System analysis phase: Analyzes the characteristics of the planned contact line or overhead contact line



- System integration phase: Integrates catenary, cantilevers and tension wheel assemblies into one system, includes electrical and mechanical testing
- System design phase: Uses Sicat[®] Master to plan the catenary design for the line and Sicat Candrop or Sicat Candrop Pro to calculate the cantilevers and droppers according to the requirements of the line
- System construction phase: Supplements individual solutions such as for feeders, the equipment for bridges and non-standard tunnels with variable cross-sections or the design of system sectioning points
- At the same time, the planning documents for material procurement and construction work are produced which, in turn, form the basis for the maintenance.

Is good, stays good

Higher line utilization and closer headways increase the stresses on your contact line systems. We offer you complete maintenance service packages which eliminate in advance the possibility of any negative effects occurring. Although our contact line equipment has a low-maintenance requirement, it has to be said that trust is good but maintenance is better.

We therefore apply our many years of system know-how to draw up individual diagnostics-based maintenance schedules for each facility and, of course, are also glad to take over the responsibility for its maintenance.

Designed for mass transit: Technology and experience



For your contact line projects, place your trust in an experienced partner who has led the development of rail electrification systems for mass transit from the very beginning.

Our products and systems are the result of over one hundred years of experience in electrified mass transit and constant research and development – products which are intended to optimize your profitability and reliability.

Reliability as a principle

It is especially because an overhead contact line cannot be designed with redundancy that we believe a high degree of system availability should be taken for granted. This includes not only optimizing the corrosion resistance of all components but also minimizing the wear on the contact wire and the contact strip of the pantograph. This is complemented by outstanding resistance to environmental influences, such as to wind and icing, and reactive substances in the atmosphere.

Right from the design stage, we take into account the expected temperature fluctuations during rail operations in order to ensure the safe, uninterrupted transmission of electric current from the contact wire to the pantograph under all conditions.

Of course, we also take into account the specific conditions under which contact line systems have to perform in mass transit systems:

- Short distances between stations
- High maximum ratings
- High train densities
- Little space for overall network expansion
- Tightly intermeshed networks

At the same time, economy depends on the fulfillment of not only the structural and technical specifications but also the specific operating, maintenance and architecture requirements. In addition to the safety regulations, it is important to minimize maintenance and repair costs by designing components and systems intelligently and by increasing their resistance to wear.

Our answer:

Sicat contact line systems

Our systems set themselves apart through their optimized and modular design. The decisive advantage lies in the ability to give customers individual solutions which, despite their "customization", feature universally deployable, service-proven components.



The use of corrosion-resistant materials, a low-maintenance design and especially reliable components ensures Sicat systems which provide high availability and consequently minimize investment and maintenance costs.

Sicat – a system for every task

The range of Sicat contact line systems covers the complete spectrum of requirements and different performance levels for all speed ranges on open lines, in tunnels and in stations and depots.

Besides being economical, Sicat contact line systems are widely known for their long service lives and consistently high quality – factors which facilitate high quality pantograph passage and comply with national and international safety standards.

For the cantilevers of the overhead contact line systems we use GRP, aluminium or steel. Bronze or stainless steel will be used for headspans.





Power for reliable mass transit: More power thanks to impressive technology



The economy of mass transit systems depends largely on the attractiveness and the construction and operating costs.

The electrification is decisive for both factors because the choice of system also defines such cost-relevant characteristics as the dynamics of the future mass transit system and the cost of constructional measures.

It depends on the system

The Sicat contact line systems offer you the right solution for every requirement. Choose the power level you want and we'll have the right system for it – tailored exactly to your operating conditions:

- Simple catenary systems for higher speeds, close headways and high current requirements
- Single trolley wires for moderate passenger volumes, low running speeds and relatively low current requirements
- Single trolley wires in depots for stabling and inspection tracks and train washing plants
- Overhead conductor rail and third rail systems
- Special solutions for industry and mining applications

Sicat LD – catenary systems

Thanks to their low wear, high current-carrying capacity and design-dependent lower number of supports, the tensioned Sicat single catenary systems and their wide range of contact wire and catenary wire cross-sections can be readily adapted to your requirements so that your vehicles have a reliable supply of power – even during peak periods.

With an optional second catenary line they can transmit even higher power ratings with reduced losses and fewer feeding points. The key to better economy lies in selecting the right combination of system, assembly and material, as well as production and installation methods.

Sicat LD – single trolley wire

For low running speeds and relatively low current requirements, the single trolley wire is often the most economical choice. It offers clear-cut advantages where the track layout is complex, such as at busy downtown intersections. In addition, the slimline design allows the wire to blend unobtrusively into the cityscape. It also stands out technically due to its traversing characteristics that are made possible by optimal tensile stress and sagging values – regardless of temperature. Furthermore, stitch wires or bridle-and-pulley suspensions at the supports permit longer spans and require shorter poles. And that means fewer components and lower investment costs.

Economical and task-oriented

Sicat LD spring-tensioned single trolley wires are the most economical solution for stabling and inspection tracks, whereas Sicat LD fixed-tensioned single trolley wires or overhead conductor rails are best suited for depots and washing plants and specially designed for the stringent safety requirements governing maintenance and repair work. Prime examples of this are overhead contact lines that can be lifted up to permit the use of hydraulic working platforms or the Sicat overhead conductor rails which swing back to ensure safe access to the tunnel roof.



Advantages underground

The Sicat contact line system offers a choice of three fully developed systems for cost-effective, reliable electrification in tunnels:

- Contact lines with elastic supports
- Simple catenaries with reduced system heights
- Overhead conductor rails for standard pantographs

Sicat SR - for constricted space conditions

Urban mass transit systems, such as metros and city trains, often can only reach inner-city areas on railway lines that run through tunnels. Therefore, electric traction must also be made possible in constricted space conditions like those created by small tunnel cross sections.

Due to its low installation height, the aluminium overhead conductor rail Sicat SR is able to meet this requirements perfectly and is also suitable for train passages with one or more pantographs. It is designed for use in tunnels, under bridges as well as in maintenance workshops or even in sections which can be pivoted out of the line gauge, such as in workshops, to ensure very easy inspection of rail vehicles. In addition, Sicat SR can be used for vehicles with electric charger.

Sicat SRD – overhead conductor rail solution for depots

The Sicat SRD movable overhead conductor rail for depots provides electrically powered rail vehicles with the necessary operating current for entering and leaving the depot. During maintenance work, the overhead conductor rail can be swung to one side and earthed, thereby ensuring simple and safe access to the vehicles. This considerably simplifies the procedures for roof-level maintenance work, the lifting of the train with lifting cylinders and any crane work in the vicinity of the track.

Powerful but economical: the third rail Sicat 3S

Owing to its large material cross-sections, the robust and technically mature third rail is the obvious choice for carrying the high currents required by modern underground and light rail transit systems. This goes especially for the high currents that modern mass transit systems need on account of the low voltages used (up to 1.5 kV).

Economy built into the system: Powerful overhead contact line components for mass transit



In view io the lengthy investment cycles for which the contact line systems for mass transit services are designed, you must be able to trust the quality of the components and the expertise of the manufacturer.

Siemens can look back on more than 120 years of experience in the field and invests in the continuous development of design and equipment.



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