

PFISTERER



OVERHEAD LINES

Innovative Solutions for Distribution and Transmission Lines

THE POWER CONNECTION

CABLE SYSTEMS | COMPONENTS | OVERHEAD LINES | RAILWAY CATENARY SYSTEMS

Welcome to the World of Overhead Lines



The Centre of Competence



The Power Connection



Overhead Lines Product Range

PFISTERER's Centre of Competence (CoC) for Overhead Lines offers customised, comprehensive component and package solutions for low-, medium- and high-voltage networks up to 1000 kV.

The company has access to all the necessary resources and expertise and can deliver a wide range of high quality components and packages for today's power supply systems and those of the future. This range includes SILCOSIL[®] composite insulators, complete insulator strings, fittings for insulator sets and vibration damping products including vibration recorders and warning spheres.



Customer Focus

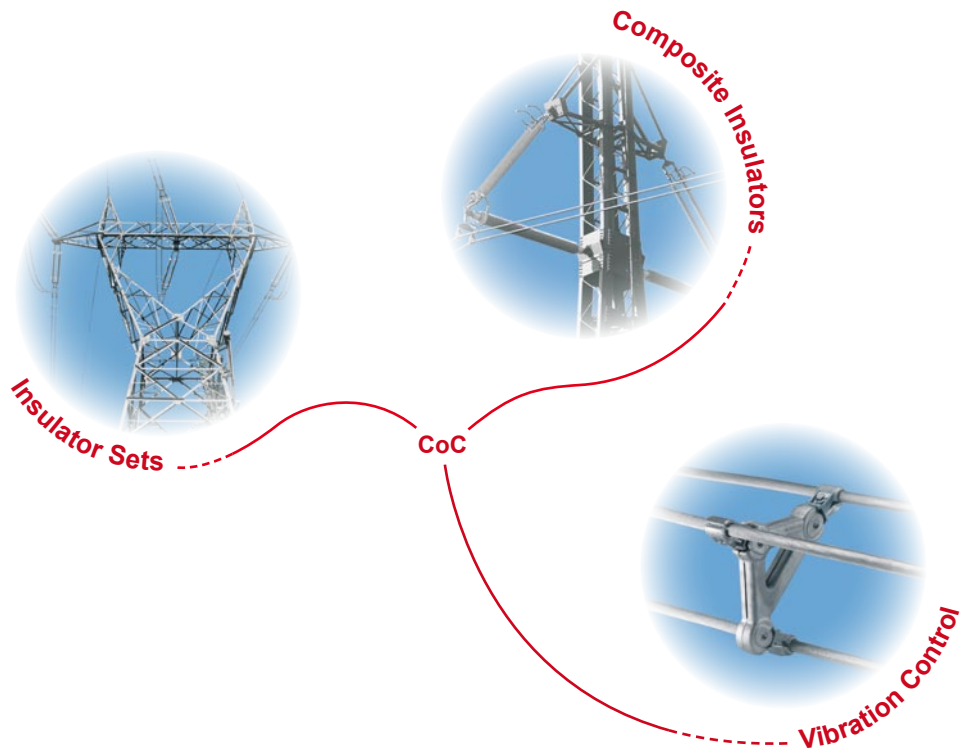
PFISTERER's engineering and sales departments are committed to providing the customers with an optimised product and to meeting their requirements in a fast, reliable and economical way.

PFISTERER utilises comprehensive engineering, production planning and quality assurance systems in order to ensure customer satisfaction. The flexibility of the development and the manufacturing enables PFISTERER to meet any standards or special customer requirements.



Dedicated to Quality and Continuity

Since its foundation in 1921, PFISTERER has been committed to innovative products, outstanding quality and excellent customer service. PFISTERER's excellence has been focused on continued growth in the supply of high quality components for overhead lines.



Product Innovation

PFISTERER has pioneered many innovative solutions especially for transmission lines such as spacer dampers, corona free suspension clamps, heavy duty tension clamps, short circuit and arc-proof fittings for insulator sets since 1921.

In 1975, PFISTERER started the development and manufacture of Silicone Rubber composite insulators. Since then, a variety of processing technologies have been perfected, which allow optimised insulator designs for suspension, tension, post and hollow core applications. These designs have been successfully installed in a wide range of environmental conditions since this time.



Competence

PFISTERER's engineering staff have experience and knowledge to ensure that PFISTERER's products meet and even exceed the most difficult requirements. The long-standing know-how enables PFISTERER to assist the customers in choosing the right product for any specific application. Active participation in CIGRE and IEC Working Groups helps to always be up-to-date with the latest service experiences and standards.

Insulator Sets for High Voltage Applications



420 kV Double Suspension Set



420 kV Double Tension Set



420 kV Suspended Double Tension Set

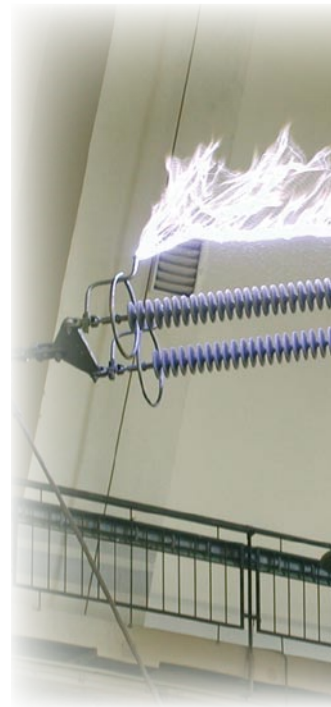
PFISTERER has been producing fittings for over 50 years and composite insulators for over 30 years, both for voltages from 1,5 kV up to 1000 kV. This experience, gained over decades in the design, production and application of complete insulator sets, qualifies PFISTERER as a most competent and reliable partner.

PFISTERER's insulator sets are installed and in operation on all continents and under extreme conditions from the tropic zones and desert areas with extremely high temperatures to very low temperatures at higher degrees of latitude.

PFISTERER is a most competent partner in providing optimized solutions also for cases of special application requirements for insulator sets such as:

- light and compact designs
- extremely high strength requirements
- very long spans
- elevated conductor suspension points
- special string configurations
- other special designs

Generally, PFISTERER bases its design of insulator sets on the specific customer specification as well as on the relevant IEC standards and most recent findings of the CIGRE Working Groups. This includes considering the required insulation level, the permissible corona and RIV (Radio Interference Voltage) values, the required power arc rating and short circuit current capability, pollution classes and the mechanical strength classes.



PFISTERER develops insulator sets with a high standard of engineering for various applications. The aim is to produce economical constructions which are easily assembled and which offer reliable long-term quality taking into consideration the following parameters:

- reliable reproducible assemblies
- corrosion resistant components
- connection contact quality
- effective corona and arc protection
- low radio interference
- improvement of voltage distribution along the insulators
- prevention of such discharges, which could cause erosion on insulators and on fittings



*Insulated Crossarm for 420 kV
Emergency Tower*

The quality and overall performance of the insulator sets are tested and proven by many and extensive tests in PFISTERER's own high voltage laboratory in Altdorf, Switzerland or in various independent accredited laboratories in Europe.

Therefore, PFISTERER insulator sets guarantee safe and reliable transmission system operation over decades.



420 kV Insulated Crossarm

COMPOSITE INSULATORS

Composite Insulators for High Voltage Applications

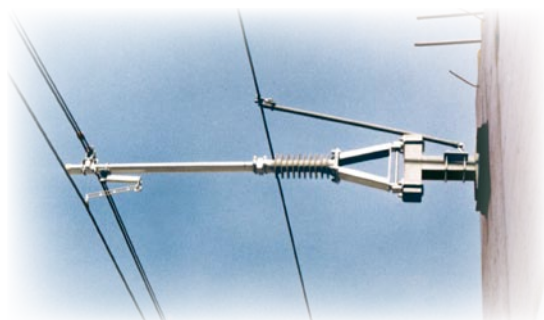
PFISTERER started in 1975, the era of composite insulator design and manufacture. Since then, Silicone Rubber has been used as housing material. The first applications were hollow core insulators for cable terminations and current transformers.



123 kV Cable Termination installed in 1975



245 kV Current Transformer manufactured in 1975



Catenary Installation for the Swiss Railway installed in 1979

After the first positive service experiences with these applications, it was a logical step to use the composite insulator concept with Silicone Rubber housing for line applications as well. It was a Swiss railway project, resulting from the need to eliminate the contamination-related outages by replacing the original, ceramic insulator designs. The first composite insulators were installed in 1979 on the Swiss railway lines.

With the increasing demand for composite insulators, this technology has been growing rapidly. At the same time, the first service experience led to optimisation of the properties of the Silicone Rubber. For these reasons, PFISTERER decided to focus primarily on HTV-Silicone Rubber technology (HTV = High Temperature Vulcanising). Since the early nineties, such insulators have been installed up to 550 kV for applications in lines and systems.

An engineering milestone, which shows PFISTERER's capabilities, was the design and manufacture of the world's first 420 kV line equipped with braced line post arrangements using composite insulator technology in 1998.



420 kV Braced Line Post erected in 1998

Since the year 2000, the HTV technology has been extended for bulk volume manufacturing of railway insulators for high speed tracks worldwide.



Station Post for 800 kV DC



High Speed Track of KTMB Malaysia



High Speed Track in the Swiss Loetschberg Tunnel

With 30 years' knowledge and experience in the design and production of composite insulators using Silicone Rubber technology as well as the corresponding feedback from operational service, PFISTERER offers solutions for the complete range of applications:

- suspension/tension insulators up to 1000 kN
- line post insulators
- station post insulators
- system insulators

The voltage range of the composite insulators is from 1,5 kV up to 1000 kV for AC and DC applications.

The understanding of customer requirements and long-term experience in the design and manufacture of Silicone Rubber insulators makes PFISTERER the first choice partner for today's special challenges such as the new generation of braced line post configuration for compact lines, 500 kN rated tension insulators and high strength station posts.



DEWA's 420 kV Compact Line



ATEL's 420 kV Line with 500 kN Force Rating

FITTINGS AND CLAMPS

Hardware for Overhead Lines

PFISTERER has been one of the world's leading companies in the design and production of fittings for overhead lines since 1921. The development of fittings focuses on mechanical and electrical ratings, proper interaction to conductors and insulators, corrosion resistance and easy assembly.



String Fittings



Suspension Clamp

PFISTERER's suspension clamps are designed based on all the latest knowledge from testing and from successful service operation over many years. According to customer requirements various types of clamps are available such as:

- trunnion type
- armour grip suspension type
- envelope type for enhanced corona requirements

For tension clamps, PFISTERER offers three different systems, i.e. compression dead-end clamps, bolted strain clamps, and wedge-type tension clamps.

Of those three clamp systems, PFISTERER has been primarily using the hexagonal compression method and has been developing it to a high technical level since the mid-sixties. The compression clamps are made of high quality aluminium alloy and used up to 1000 kN.

Clamps are available for all types of conductors.



Tension Clamps

Spacer Dampers, Stockbridge Dampers, Recorders and Warning Spheres

PFISTERER's spacer dampers are specifically designed and coordinated to provide damping against conductor motions caused by wind. In particular the spacer dampers control the levels of aeolian vibration and subspan oscillation within the accepted safety limits, under all service conditions and for the expected life time of the line. PFISTERER offers a complete range of spacer dampers for two, three, four and six bundles, with spacing ranges from 300 to 600 mm.



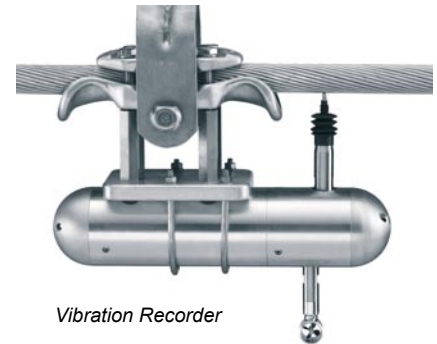
Triple Spacer Damper



Stockbridge Damper

PFISTERER's range of stockbridge dampers is designed to dissipate energy from all types of conductors, shieldwires and OPGW cables caused by wind-induced motions. Many tests are needed to prove a successful damper design, which includes corrosion resistance, damping performance and fatigue behaviour. These tests are necessarily supplemented by electrical tests in regard to corona and RIV and are performed in PFISTERER's own laboratories.

As the ultimate means of checking damping systems or to investigate the cause of conductor damages, PFISTERER offers vibration recorders. These can be used to easily measure vibrations on lines in operation. Moreover, the component of wind velocity acting perpendicularly to the line and the ambient temperature can be recorded. The conductor vibration data can be recorded and converted. By autonomous, long-term and direct measurements, an assessment of all critical line sections can be made.



Vibration Recorder



Warning Sphere

PFISTERER's warning sphere has a diameter of 600 mm and is especially manufactured to avoid the loss of colour and UV-degradation by using a special material and painting technology. Optimisations have been applied to eliminate clamp loosening and audible noise due to vibration. Installation costs can be reduced thanks to its simple installation. The sphere is available in various colours and for several conductor diameters.

COMPOSITE INSULATORS – DISTRIBUTION CLASS

Composite Insulators for Medium Voltage Applications

PFISTERER has a comprehensive programme for distribution class insulations. It is worth mentioning that the materials and design rules, which have been successfully proven and used for the transmission level for decades, are also applied for the distribution class level.



Longrod Insulators

A full range of high quality silicone longrod insulators from 1,5 kV to 145 kV for worldwide markets is provided.

Line Post Insulators

These insulators provide a technically superior replacement for the traditional ceramic type post insulator, used at the low to medium distribution voltage range from 1,5 kV to 145 kV.



Guy Strain Insulators

A wide range of guy strain insulators for the purposes of guy wire insulation on distribution line networks is part of the standard programme.

Cutout Fuse Holders

The cutouts provide protection to power lines and various devices on those lines such as transformers and capacitor banks. The range of cutouts is for 12 kV, 24 kV and 36 kV.

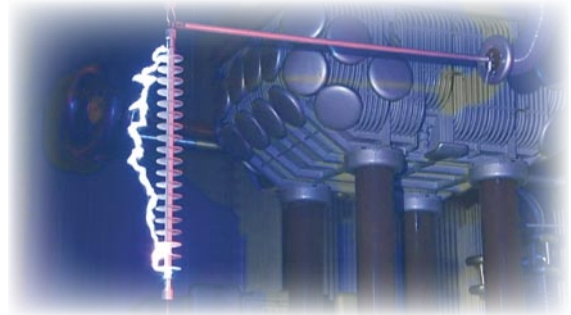


Wood Pole with Suspension and Tension Insulators and Cutouts

PFISTERER – The Scientific Partner for Overhead Line Topics

PFISTERER runs its own laboratories for high voltage testing, vibration damper testing, conductor self-damping testing and material investigations. In these laboratories, design, type and sample testing are carried out in accordance with the appropriate standards and in the presence of inspectors if required.

The laboratory resources are in charge of research and development as well as routine quality testing. This ensures that the products are in a leading position worldwide in terms of service performance and product consistency, even for bulk volume supplies.



PFISTERER's High Voltage Laboratory in Altdorf, Switzerland

The laboratory infrastructure comprises:

- AC test equipment, dry and wet up to 1000 kV
- impulse voltage generator up to 1600 kV
- salt fog chamber
- partial discharge measurement
- combined material tester for tracking/erosion and hydrophobicity
- devices for damper and conductor testing



Test Set-Up for Damper Testing

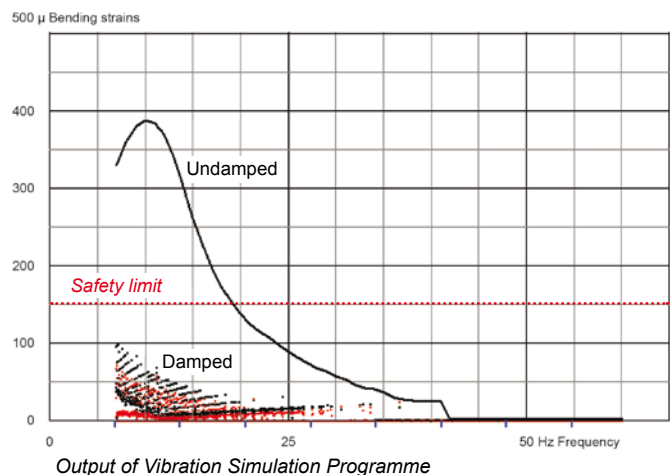


Material Testing

The use of latest FEM simulation programmes ensures the safe and reliable design of new components to meet stringent customer requirements.

A programme for performing vibration studies enables the conductor vibrations for different damping configurations to be accurately calculated. As a result, the right type of dampers and their exact position can be evaluated in order to achieve the required damping characteristic, even in the planning stage of a transmission line.

Additionally, PFISTERER has developed its own programme to simulate insulator set performance during load transfer situations.



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