RIBE® Electrical Fittings – Spacer Dampers

PROTECTION FOR YOUR INVESTMENTS

RIBE®
ELECTRICAL FITTINGS

RIBE® Electrical Fittings – Protection for your investments

WIND-INDUCED VIBRATIONS IN OVERHEAD TRANSMISSION LINES CAN DAMAGE CONDUCTORS

Easy assembly
cantilever bolted clamp.

Helically attached clamp
as an alternative to bolted clamp screw fixing.

Optimized damping
thanks to innovatively designed damping elements.

Bundled conductors are used in high-voltage and extra-high-voltage lines primarily for electrical reasons. A dreaded phenomenon is the occurrence of high-frequency, short-wave mechanical vibrations in the subconductors at wind speeds between 1 and 7 m/s. These vibrations are caused by the alternate shedding of vortices on the top and bottom sides of the subconductors, which induces periodic vertical oscillations in the subconductors transverse to the direction of wind flow. The frequencies typically range from 5 to 60 Hz with amplitudes of up to one conductor diameter. These vibrations cause alternating bending stresses in the conductors, which are superimposed on the static tensile and bending strains. This can result in conductor damage at the clamping points (e.g. suspension and tension clamps, spacers) ranging from fatigue failure of single wires to complete conductor failure. Conductor vibrations spread via the conductor fittings to the supports and can lead to problems such as abrasion in the hinge joints of the suspension and strain insulator sets. Damage of supports, including fatigue failure of bracings, has been observed.

Another vibration phenomenon is the occurrence of subspan oscillations, low-frequency vibrations of the conductors between the spacer dampers, which can have amplitudes large enough to cause subconductors to clash. Subspan oscillations occur in horizontally adjacent subconductors at wind speeds greater than 6 m/s when the leeward subconductor is affected by the wake produced by the windward subconductor.

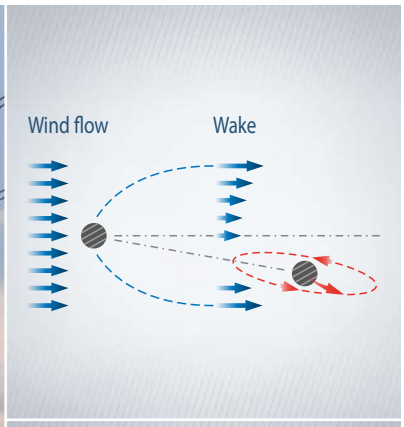
RIBE® Electrical Fittings – Spacer Dampers

RIBE® NEXT-GENERATION SPACER DAMPERS PROTECT YOUR "OVERHEAD LINE" ASSET

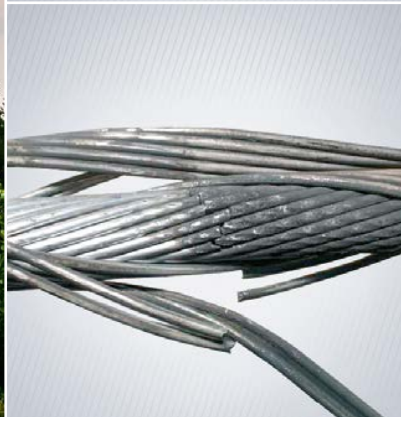
Effective protection must be provided for conductors if an increased tendency of conductor oscillation exists. Installing vibration dampers at the span ends only is generally not sufficient to control aeolian vibrations of bundled conductors. If rigid (non-damping) bundle spacers are used vibration remains entrapped in the individual subspans. As a result, the vibration energy continuously introduced by the wind flow cannot reach the end of a line section and be absorbed by a vibration damper there.

Spacer dampers are the solution. Unlike rigid spacers, they have defined damping properties, which reduce bending stress due to short-wave conductor vibrations and render them harmless. A well designed placement scheme is needed to effectively limit the amplitude of subspan oscillations. This placement scheme is characterized by a maximum permissible distance between two adjacent spacer dampers and a sequence of subspan lengths that are as uneven as possible. Damping solutions featuring RIBE® spacer dampers effectively limit short-wave conductor vibrations and subspan oscillations.

RIBE® has 50 years of operational experience in the field of spacer dampers, enabling us to achieve an excellent position in this segment. We have incorporated these insights into the next generation of products, which are most notably reflected in the patented, simplified assembly, the new, innovatively designed damping elements, a manufacturing process featuring semi-automated assembly and finally in their functionality, which of course meets the latest IEC 61854 standards.



Excitation of subspan oscillations
Low-frequency vibrations of the subconductors between the spacers at wind speeds between 7 and 15 m/s.



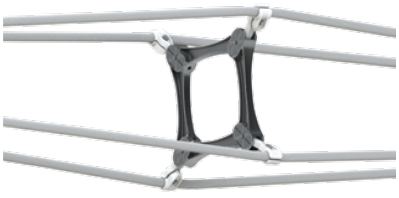
Damages due to wind-induced vibrations
at the clamping points, e.g. suspension clamps, due to fretting and fatigue failure.

DAMPING VIA ENERGY ABSORPTION IN THE ELASTICALLY POSITIONED ARMS

The spacer dampers maintain the design distance between the subconductors in the bundle under all operating conditions. The intelligent design of the RIBE® clamps on the spacer dampers makes it possible to absorb and transmit conductor oscillations in the line section without causing damage to the conductor. The spacers dampen vibrations by absorbing energy in the damping elements.
RIBE® spacer dampers effectively prevent subconductors from clashing and provide bundle stability against rotation under ice loads. RIBE® Engineering plays a decisive role here by providing precise, project-based specifications on the number of spacers and the distances between them.

SHORT-CIRCUIT LOAD

When a short-circuit occurs, the effects of the electromagnetic forces between the subconductors carrying the short-circuit current cause a contraction of the conductor bundle between the spacers. This subjects the spacers to an extreme pressure load and then to an extreme tension load when the short-circuit current is removed as the mechanical energy stored in the subconductors is released.
RIBE spacer dampers withstand the compressive and tensile loads caused by a short-circuit current without permanent deformation and without damage to the conductors.



RIBE® QUALITY – FOR A LONG SERVICE LIFE

RIBE® spacer dampers meet the high standards required of "bundle spacer" overhead line components. All of our solutions and products are distinguished by their excellent quality and long service life – the result of a perfect synthesis between development, production, quality control, sales and sound market knowledge. The elastomer damping elements are permanently corrosion-resistant under atmospheric overhead line conditions and when used in connection with the spacer's metallic components.


ZERTIFIKAT

Die Zertifizierungsstelle
der TÜV SÜD Management Service GmbH
bescheinigt, dass das Unternehmen

Richard Bergner Elektroarmaturen GmbH & Co. KG
Norisstraße 24
91154 Roth
Deutschland

für den Geltungsbereich

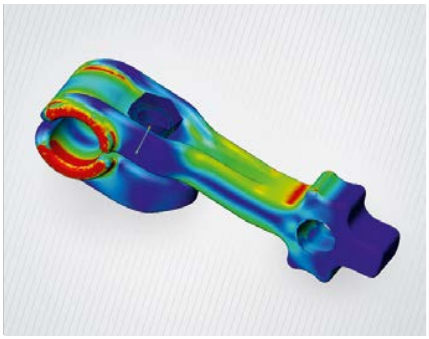
Entwicklung und Herstellung von Armaturen
und Engineeringleistungen für
Anlagen der elektrischen Energieversorgung,
Fahrleitungsanlagen, Telekommunikationsanlagen
und Armaturen für Schaltanlagen

ein Qualitätsmanagementsystem
eingeführt hat und anwendet.

Durch ein Audit, Auftrags-Nr. 70008279,
wurde der Nachweis erbracht, dass die Forderungen der

ISO 9001:2015

erfüllt sind.



Assembly equipment
for partially automated pre-assembly of spacer dampers.

In-house testing
performed on our own test benches to guarantee optimum quality.

RIBE® Electrical Fittings – Engineering

RIBE® ENGINEERING – FROM DEVELOPMENT TO PRACTICAL APPLICATION

Since RIBE was founded in 1902, our corporate philosophy has focused not only on developing and optimizing transmission line conductor fittings in our own test laboratories and facilities, but also using our technical expertise in application engineering.
A fully equipped indoor vibration test bench featuring three test spans of up to 40 m in length is available for our expert engineering team to perform vibration tests in line with all international standards and customer specifications. Other laboratory facilities with state-of-the-art systems for measuring mechanical and electrical parameters enable us to react flexibly to our customers' specific test requirements.
RIBE Engineering can also solve customers' application problems using proprietary computation programs or programs developed in close collaboration with renowned universities of applied sciences.

RIBE® APPLICATION ENGINEERING EXPERTISE

We not only supply advanced products, we also offer our customers application engineering support. RIBE® Engineering prepares damping concepts based on your project data, including conductor type, span lengths and other relevant line data, defines the necessary quantities and installation locations and provides calculations to ensure optimum effectiveness.

www.cmb-group.de

COMPETENCE CONNECTS

RIBE®
ELECTRICAL FITTINGS

RICHARD BERGNER ELEKTROARMATUREN GMBH & CO. KG
Bahnhofstr. 8-16 · 91126 Schwabach · Germany
Phone: +49 (0) 91 22 / 87–0 · Fax: +49 (0) 91 22 / 87–15 06
E-mail: electrical-fittings@ribe.de · www.ribe.de

EL/115/02/2408/0.25/dh