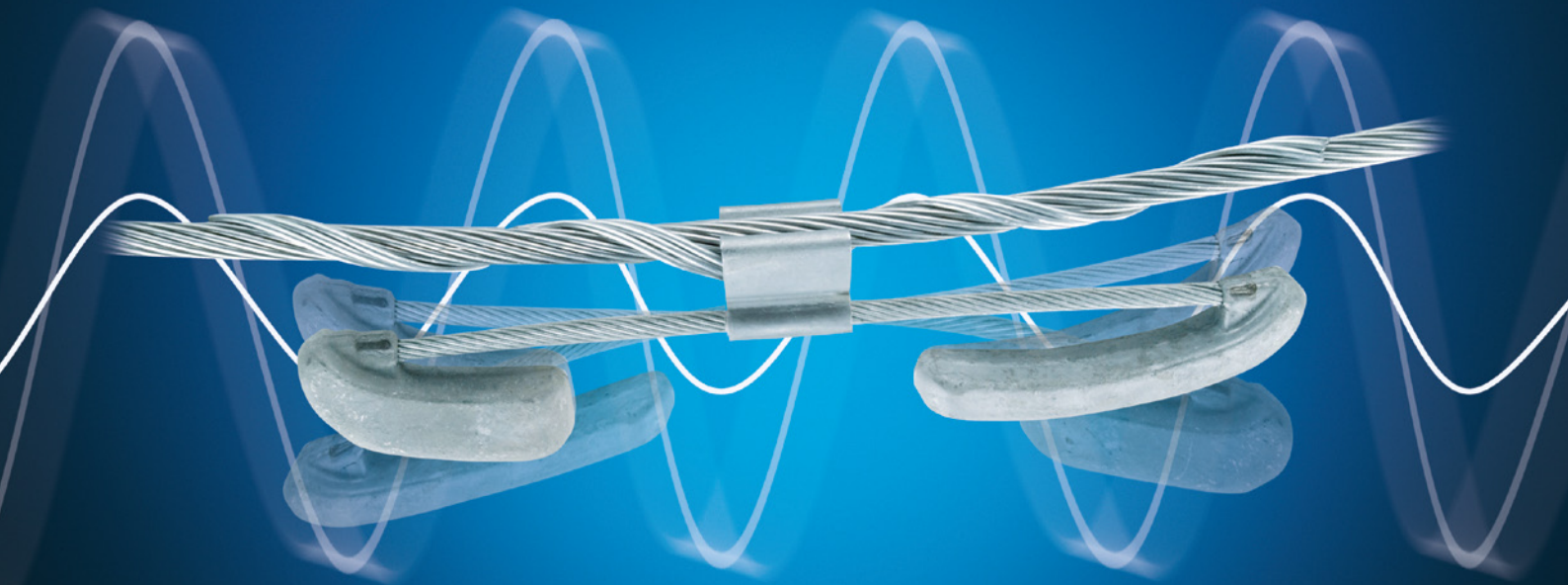


RIBE[®]


ELECTRICAL FITTINGS



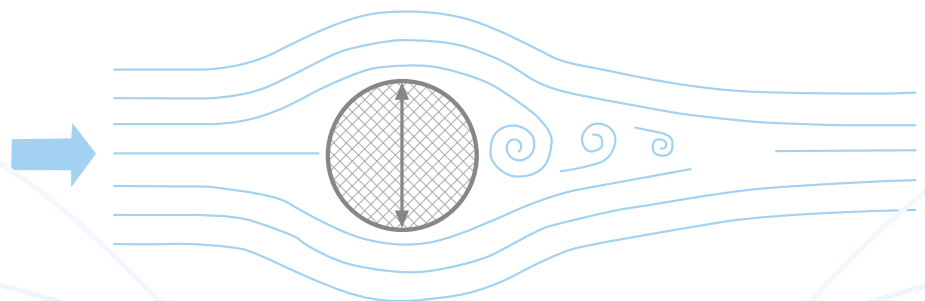
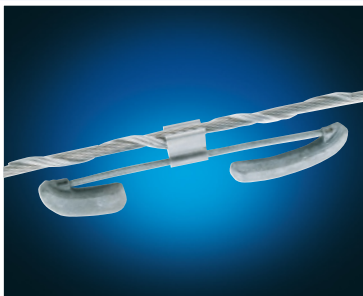
RIBE[®] VIBRATION DAMPERS
PROTECT YOUR INVESTMENT

RIBE® vibration dampers – effective protection against conductor vibrations

A dreaded phenomenon in overhead transmission lines is the occurrence of high-frequency, short-wave vibrations in conductors, shield wires and aerial telecommunication cables due to natural wind flow. This is caused by the periodic shedding of vortices on the downstream side of the conductors (Kármán vortex street), which induces vibrations in the conductor transverse to the direction of wind flow. The frequencies are in the range from 5 to 120 Hz with amplitudes up to 1 x conductor diameter.

These vibrations cause alternating bending strains in the conductor, which are superimposed on the static tensile and bending strains. This can result in conductor damage at the clamping points, ranging from fatigue breakages in single wires to breakage of the complete conductor. The vibrations spread via the suspension and tension fittings to the mast and lead to problems such as shaking out of joints to breakage of mast struts. These wind-induced vibrations cannot be prevented.

RIBE® vibration dampers remove the wind energy from the conductor and reduce vibration stresses sufficiently to ensure a long life for the overhead transmission lines.

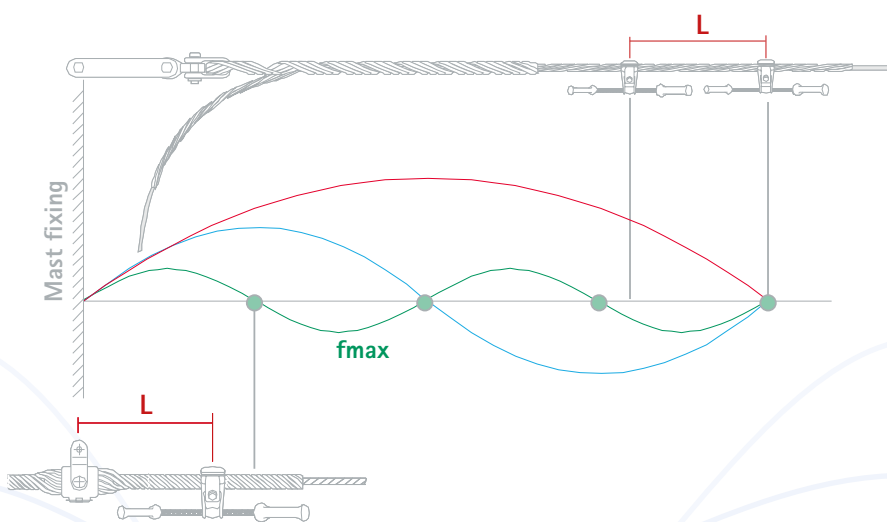


Kármán vortex street

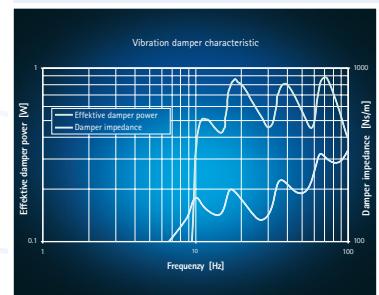
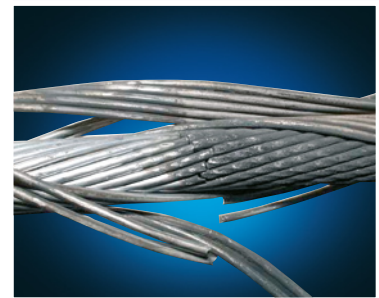
Effective damping is determined by more factors than just the use of vibration dampers. If the physical background of the interaction between the vibration dampers and the conductor is neglected, then not only is no adequate damping effect achieved, but the damper even causes damage to the conductor at its fixing point or is itself destroyed by overloading.

RIBE® provides the necessary engineering services in the form of vibration studies and energy balance calculations to ensure that damping systems are designed effectively. All the vibration frequencies that subsequently occur in the conductor are calculated on the basis of the ambient factors, e.g. geographical location and possible wind force. These frequencies determine the vibration nodes, at which a vibration damper would have no effect. RIBE® uses these factors to determine the right type of damper for the specific conductor, the number of dampers necessary and the optimum spacing L between them for each application.

RIBE® damping concepts are the optimized solution in terms of number of dampers, total costs and functioning of the overhead line system.



Determination of spacing between dampers



Various versions and fixings for every damping requirement

RIBE® vibration dampers are based on the Stockbridge damper. The main component of this type of damper is the message cable, to whose ends the damper weights are attached. The damper is fixed to the conductor by the conductor clamp. RIBE® vibration dampers are available with various weights to achieve the necessary broad bandwidth in each case (as 2-, 3- and 4-resonance damper). The dampers are available with screw clamp or spiral rod fixing systems.



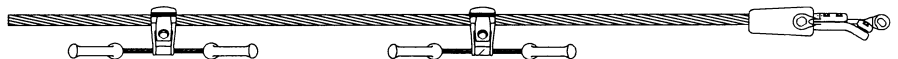
A RIBE® vibration damper with spiral rod fixing has the following advantages:

- easy installation without tools
- correct installation easily recognized from the ground
- no lateral forces and therefore ideal for sensitive fiber-optic overhead cables
- minimized bending strain



A RIBE® vibration damper with the classic screw clamp has the following features:

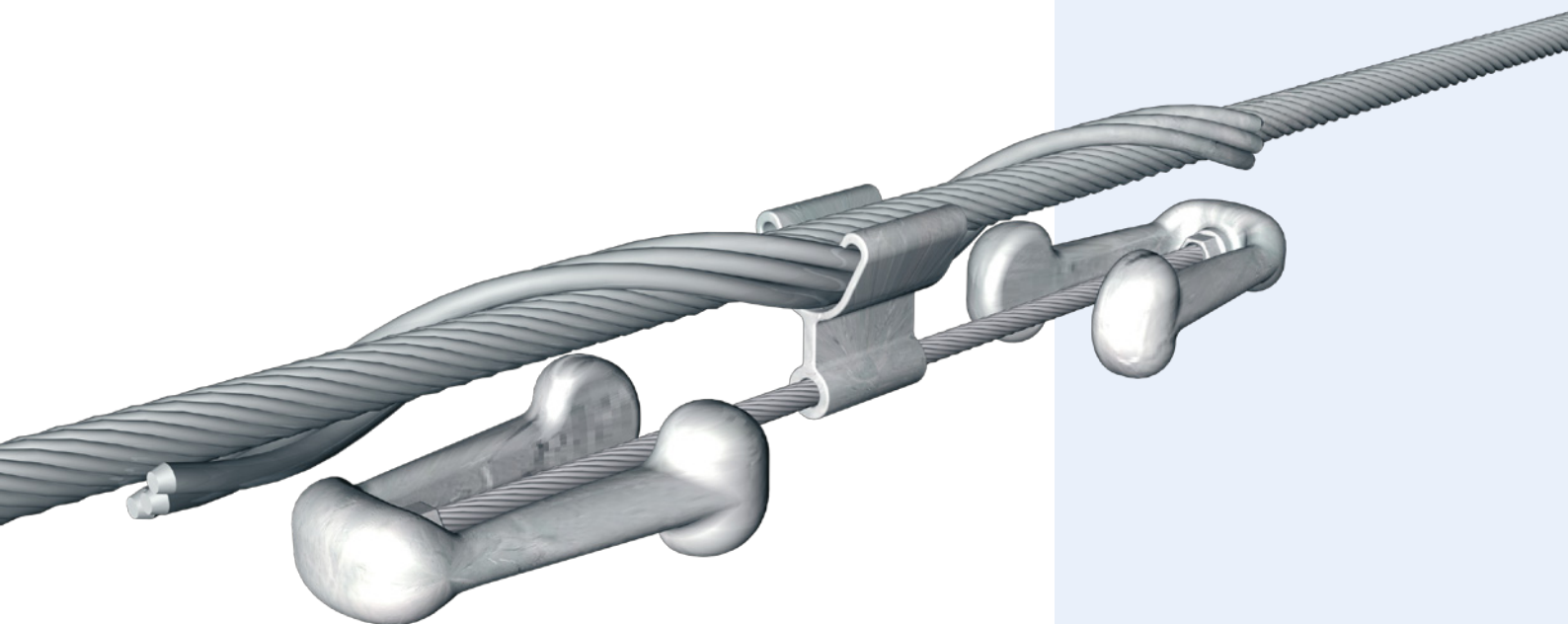
- perfect adaptation of the clamping channel to conductor diameter
- captive clamping cover



RIBE® vibration dampers offer decisive advantages over competitors

Property	RIBE®	W1	W2	W3	W4
Stockbridge vibration damper	●	●	●	●	●
Cast-on weights	-		●	-	●
Cast-iron weights	-	●	-	-	-
Crimped weights	●		-	●	-
Broadband range (4R)	●	●	○	●	●
Consistent damping characteristic	●	-	-	-	-
100 % test of damper weight pull-off force	●	-	-	-	-
Spiral fixing	●	-	-	●	-
Easy installation	●	○	○	○	○
Cover with captive screw	●	-	-	-	-
Energy balance calculation	●	○	-	-	○
Optimization of number of dampers	●	-	-	-	-
Provision of a project-based installation scheme	●	-	-	-	-
Optimization of clamp weight	●	○	○	●	○
Suitable for OPGW	●	○	○	○	○

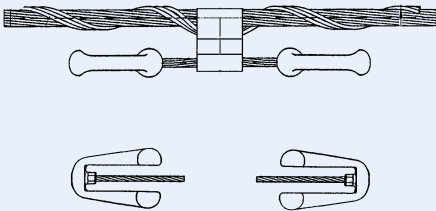
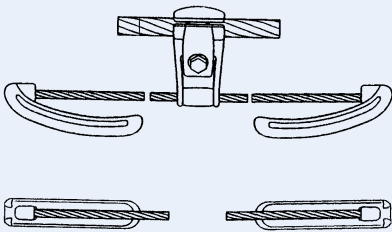
● available / ○ partly available / - not available



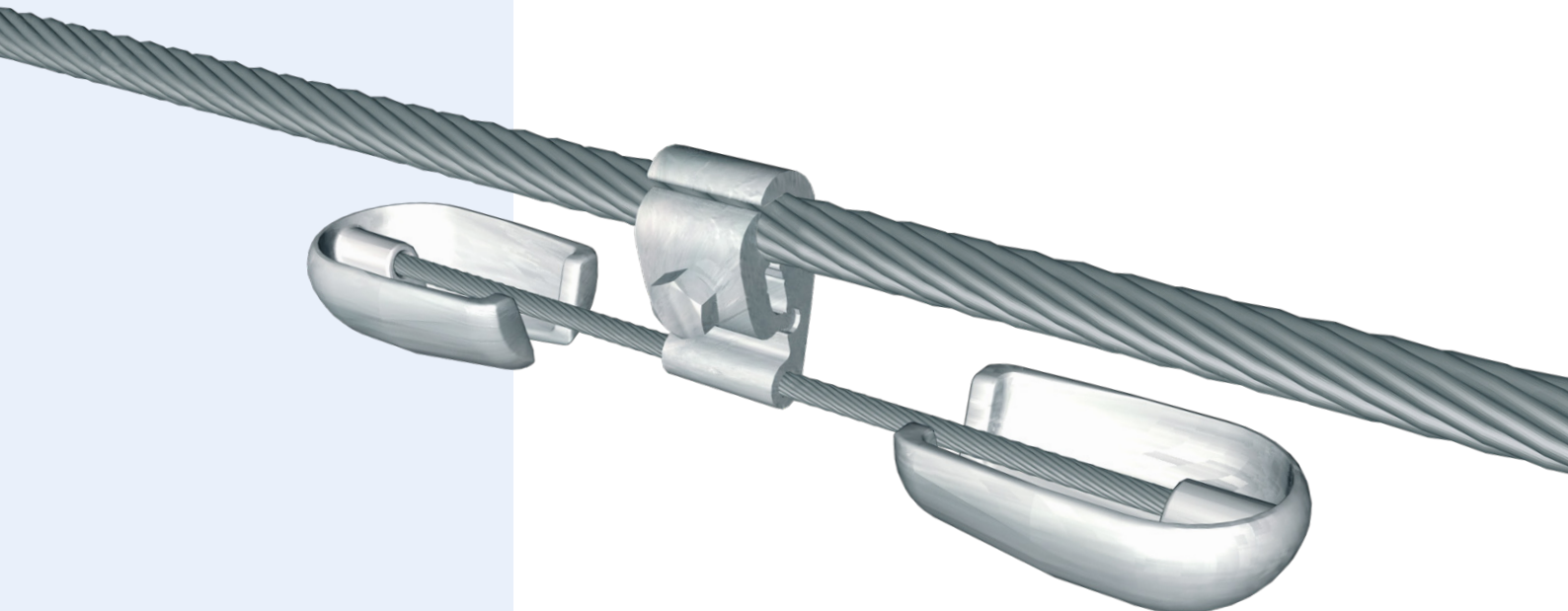
RIBE® damping concepts – know-how for highly critical vibration problems

A team of RIBE® experts is available at any time to provide technical support for the customer for demanding tasks such as:

- damping long span lengths (e.g. fiord crossings)
- damping conductors within the zone of exposure of wind energy plants
- the presence of aircraft warning spheres
- vibration problems in switchgear
(vibrations of busbar tubes)
- external vibration problems
(wind-induced vibrations of vehicle cranes and stay wires of bridges and antennas)



Our proven test methods, equipment and systems guarantee reliable results. We are convinced that our decades of proven development and test experience in optimizing fittings ensure long life and availability of transmission systems and so protect the high investment costs.

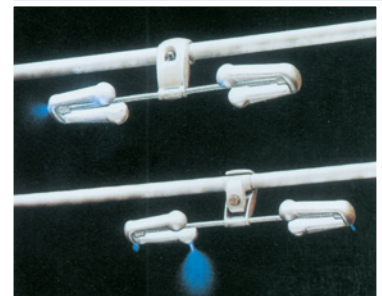
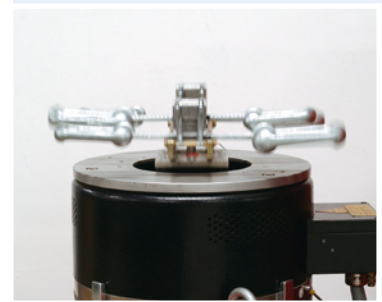


RIBE® Engineering – 100 years of development and experience

Since RIBE® was founded over 100 years ago, it has always been part of our corporate philosophy to not only develop and optimize electrical plant fittings in our own test laboratories and facilities, but also to use our expertise to solve application problems. A fully equipped indoor vibration test bed with three test spans (2x40 m, 1x30 m) is available for our competent engineering team to perform vibration tests to 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 the customer's specific test requirements.

The RIBE® Engineering Group can solve the customer's application problems using its own calculation programs or programs created in close cooperation with noted universities such as the Technical University of Dresden or the Technical University of Darmstadt.





RIBEF[®]

MADE TO **fit**

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